NATIONAL ENERGY TECHNOLOGY LABORATORY

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2020 Annual Site

Environmental Report

October 1, 2021

U.S. DEPARTMENT OF ENERGY | NATIONAL ENERGY TECHNOLOGY LABORATORY

DISCLAIMER

2020 Annual Site Environmental Report

U.S. Department of Energy

National Energy Technology Laboratory

Anchorage, Alaska

Albany, Oregon

Pittsburgh, Pennsylvania

Houston, Texas

Morgantown, West Virginia

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EXECUTIVE SUMMARY

The U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL) develops the Annual Site Environment Report (ASER) to provide a comprehensive status of its environmental compliance in five states. This annual report verifies and documents NETL's mission to drive innovation and deliver solutions for an environmentally sustainable and prosperous energy future: ensuring affordable, abundant, and reliable energy that drives a robust economy and national security, while developing technologies to manage carbon across the full life cycle and enabling environmental sustainability for all Americans.
The Laboratory implements a wide range of energy and environmental research and development (R&D) programs that enable domestic coal, natural gas, and oil to economically power our nation's homes, industries, businesses, and transportation sources. To meet this goal, NETL applies its expertise to coal, natural gas, and oil technologies; contract and project management; analyses of energy systems; and international energy issues. In addition to research conducted on site, professional support includes R&D conducted through partnerships, cooperative research and development agreements, financial assistance, and contractual arrangements with universities and the private sector. These efforts focus a wealth of scientific and engineering skills to create commercially viable solutions to national energy and environmental problems.

Throughout 2020, NETL continued to implement its Environmental, Safety and Health (ES&H) programs at the Albany, Oregon; Anchorage, Alaska; Houston, Texas; Morgantown, West Virginia; and Pittsburgh, Pennsylvania locations. As part of these programs, NETL maintained its certification to the International Organization for Standardization (ISO) 14001:2015, Environmental Management System Series, and was certified to ISO 45001:2018, Occupational Health and Safety Management System Series. Virtual certification audits to the ISO 14001:2015 and ISO 45001:2018 standards were conducted October 26 – 29, 2020, for the Albany, Morgantown, and Pittsburgh sites. Certification to these standards demonstrates NETL's commitment to continual improvement, as well as conformance to its ES&H Management System.

NETL continues to demonstrate to its workforce, the surrounding community, DOE, and other stakeholders that it is committed to responsible environmental stewardship. NETL's environmental operating experience and performance measure programs exist as part of its ES&H Management System. Integral to these programs are the Safety Analysis and Review System (SARS) programs, which focus on research and development activities, support operations activities, construction permits, and facility use. NETL tracks its performance measures through individual programs, such as groundwater and air quality, and through its ES&H Management System objectives and targets. NETL achieved 95% of its performance metrics in calendar year 2020. More information on each of the areas covered above, as well as details on other NETL ES&H programs, can be found in this document. This report seeks to address questions the public may have about NETL's efforts to protect the environment at its locations. Comments and concerns are always welcome and should be addressed, in writing to Jamie Brown, U.S. Department of Energy—NETL, M/S P04D, 3610 Collins Ferry Road, Box 880, Morgantown, WV 26507; or by email to Jamie.Brown@netl.doe.gov.

1.0 INTRODUCTION

1.1 SITE LOCATIONS

Part of the U.S. Department of Energy's (DOE's) national laboratory system, the National Energy Technology Laboratory (NETL) has laboratory sites in Albany, Oregon; Pittsburgh, Pennsylvania; and Morgantown, West Virginia; and program office sites in Anchorage, Alaska, and Houston, Texas.

1.2 GENERAL ENVIRONMENTAL SETTING

NETL's Arctic Energy Office is leased office space located in Anchorage, Alaska, in the south-central portion. It is located at the terminus of Cook Inlet, on a peninsula formed by the Knik Arm to the north and the Turnagain Arm to the south. The city limits span 1,961.1 square miles, encompassing the urban core, a joint military base, several outlying communities, and almost all of Chugach State Park.

The Albany site is located in Linn County, Oregon in the western portion of the state. The facility is located in the Willamette Valley, which is a structural and erosional lowland between the uplifted marine rocks of the Coast Range and the volcanic rocks of the Cascade Range. The Albany site covers approximately 42 acres, with about 248,000 square feet of building working area. The site is relatively flat, located on a higher section of town and away from floodplains. The Calapooia River is located one-half mile west of the laboratory.

The Pittsburgh site lies within Allegheny County, Pennsylvania, at the Bruceton Research Center. The site comprises 237 acres located approximately 13 miles south of Pittsburgh, in South Park Township. The facilities sit within rolling hills and steeply incised stream valleys that are tributaries of the Monongahela River. The site is a partially wooded tract, divided into two subsites (the administrative plateau and the R&D plateau) with scattered industrial and office buildings. The immediate vicinity was completely rural when the Pittsburgh site was first developed; however, the nearby population and housing densities have increased dramatically in recent years.

NETL's Houston Office is also leased office space. It is located at 1011 Highway 6 South in Houston, Texas. This program office is located within the energy corridor of Houston and serves both onshore and offshore drilling research operations. This leased office space is 2,083 square feet and has 6 enclosed offices and 3 cubicles. The office currently houses three federal employees and one contractor employee.

The Morgantown, West Virginia site lies within Monongalia County, on the northern end of the city of Morgantown. The site sits within the rolling hills of the Appalachian Plateau, about 1,000 feet east of the Monongahela River and about 10 miles west of Chestnut Ridge, the westernmost ridge of the Allegheny Mountains. The site covers approximately 135 acres, 33 of which are developed for industrial use. Two small streams border the site on the east and northeast sides. The Monongahela River is on the northwest side of the site. All surface water drains into these two streams and river. Land use immediately surrounding the Morgantown site is a combination of residential, commercial, deciduous forest, and pasture.

1.3 LABORATORY MISSION

For more than 100 years, the U.S. Department of Energy's National Energy Technology Laboratory, and its predecessor organizations, have helped develop advanced technologies that provide affordable, reliable energy to the American people. Today, NETL sites in Anchorage, Alaska; Houston, Texas; Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania develop advanced energy technologies and accelerate their commercialization in the United States and around the world. NETL also maintains productive partnerships with researchers in industry, academia, and other national laboratories and government organizations to enhance and further develop the Laboratory's energy research and analysis portfolios.

The innovations that NETL and its partners discover address a range of fossil energy challenges, including effective resource development, efficient energy conversion, and results-oriented environmental sustainability. The Lab's research portfolio supports critical domestic energy initiatives that touch the lives of virtually all Americans. Many are focused on reviving the coal industry; others deal with the responsible stewardship of our natural resources; and many others concern the informed formulation of energy policies that will stimulate our economy, ensure our security, and protect our health.

In addition to its fossil energy expertise, NETL also manages DOE projects that address emerging issues in renewable energy. For example, the Laboratory managers facilitate SmartGrid development projects to improve the reliability and efficiency of existing and future power plant and electricity delivery systems.

Our nation realizes an effective return on research investment energy solutions transfers to the commercial marketplace and supports economic activity and workforce development. Licensing agreements with both large and small American companies brings viable solutions to market, while internships and other educational programs allow renowned researchers to interact and inspire students who will become tomorrow's scientists. Further, NETL-sponsored papers, presentations, publications, websites, and conferences ensure that laboratory breakthroughs are shared openly with decision-makers, stakeholders, and other researchers around the globe. Most importantly, all NETL's activities support the DOE mission to promote the national, economic, and energy security of the United States.

1.4 PRIMARY OPERATIONS AND ACTIVITIES AT THE SITES

NETL is organized into six functional areas to accomplish its mission and to provide flexible, dynamic expertise and capabilities to its public and private sector customers throughout the nation. With sites in Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania, the Laboratory's over 1,200 employees are focused on the following areas:

OFFICE OF THE DIRECTOR

Mission: The Office of the Director has span, control, and authority, including delegated authority, over the complete NETL complex. This includes responsibility and authority for delivery and execution of NETL's mission: to discover, integrate and mature technology solutions to enhance the Nation's energy foundation and protect the environment for future generations. In continuous pursuit of this mission and to sustain NETL as a world-class research and development enterprise, the Office of the Director promotes organizational direction and vigor toward sustainability, consistency, effectiveness and efficiency in research efforts and business practices, including:

- Promotes NETL efficiency and effectiveness by establishing and maintaining organizational standards and metrics for quality, productivity, employee development, and workforce utilization;

- Oversees the preparation, justification, and execution of NETL's institutional budget under guidance provided by the Assistant Secretary for Fossil Energy and Carbon Management and DOE's Chief Financial Officer; and
- Exemplifies and promotes the highest level of safety, scientific integrity, public accountability, and social responsibility in the conduct of R&D programs.

Function: The Office of the Director provides management guidance and oversight for the following functional areas:

- Communications & Public Affairs;
- Research & Innovation Center.
- Science & Technology Strategic Plans & Programs.
- Technology Development Center.
- Laboratory Operations Center, including Facility Operations, Information Technology and Strategic Support; and
- Finance & Acquisition Center, including Accounting, Budget & Analysis and Acquisition.

Office of Chief Counsel

Mission: The Office of the Chief Counsel (OCC) has broad oversight of the complete NETL legal and National Environmental Policy Act (NEPA) portfolios. Through management of the NETL Legal Division, the Office of Chief Counsel provides services in the nature of legal advice and counsel to personnel across the NETL complex, at all levels of the organization, with appropriate engagement with DOE General Counsel. Through management of the NEPA Division, the Office manages NETL compliance with the National Environmental Policy Act (NEPA) and related environmental statutes, regulations, and policies in connection with NETL's major projects.

Function: Scope of services include: interpreting state and federal statutory and regulatory requirements; oversight of drafting, review and negotiation of legal contracts, decisions and documentation which operates to bind or represent the policies of the NETL or DOE organization, provision of litigation support, processing requests for information submitted pursuant to the Privacy Act and the Freedom of Information Acts; and management of all other Legal and NEPA activities. The OCC has oversight of two divisions: Legal and Environmental Compliance.

Office of Chief Counsel - Legal

Mission: The Legal division is responsible for supporting the Office of Chief Counsel in its mission to provide full spectrum legal support services to the NETL organization. The organization is responsible for providing expert legal advice and support services on all matters arising within the scope of NETL activities.

Function: Provides legal advice and counsel to the NETL organization as directed by the Office of Chief Counsel on the full NETL legal portfolio. Conducts reviews and provides advice and litigation support on all legal matters involving the NETL organization, including, but not limited to the following practice areas: financial assistance; procurement; appropriations; contract negotiations; employment and labor law; patent and intellectual property; FOIA; Privacy Act; and ethics. The Chief Counsel and the attorneys in Legal represent the Laboratory and DOE and take appropriate action to protect the interests of the Laboratory and the Department in negotiations, litigation, and administrative proceedings.

Office of Chief Counsel - National Environmental Policy Act

Mission: The National Environmental Policy Act (NEPA) division manages NETL's compliance with NEPA and related environmental statutes, regulations, and policies in connection with activities undertaken or funded by NETL and DOE.

Function:

- Prepares NEPA analyses and related documents;
- Conducts studies of environmental issues associated with the citing, permitting and integration of power plants, carbon dioxide pipelines, transmission, and related activities;
- Works closely with NETL project sponsors (e.g., Coal, Natural Gas and Oil, Energy Technology Development and the Research and Innovation Center) and with subject-matter experts within and external to NETL on issues identified as critical to a particular project's implementation and compliance; and
- Supports NEPA compliance activities on behalf of other organizations within the Department as requested by the Offices of Fossil Energy and Carbon Management, Energy Efficiency and Renewable Energy, and Electricity Delivery and Energy Reliability.

Communications & Public Affairs

Mission: The mission of the Communications Team is to manage all NETL-wide public affairs and communications functions in support of the Lab, the Department of Energy's Office of Fossil Energy and Carbon Management, and the U.S. Department of Energy. The Communications Team is responsible for developing and implementing NETL communications and public affairs strategy that elevates the NETL brand. The Communications Team develops NETL high-level messages, manages development of NETL communication products and is responsible for the Laboratory's internal communications efforts.

Functions:

- Serves as primary liaison with the FECM Communications Office, the DOE Public Affairs Office, the news media, governmental agencies, universities, and the National Laboratory Chief Communications Officers (NLCCO) group.
- Develops, implements, and coordinates communication tools, strategies, and campaigns to increase public awareness of NETL programs, research, technologies, accomplishments, and events.
- Develops and coordinates dissemination of media plans to support NETL program areas using a variety of communications platforms targeting a wide array of strategic audiences.
- Elevates the NETL brand by managing the standardization of communications including publication standards, logos, presentation templates and guidelines.
- Provides design and message framework for NETL communications and public affairs activities.
- Provides public online repository of non-copyrighted NETL images (Flickr) and videos (NETL YouTube).
- Manages the NETL website and analyzes its effectiveness.
- Manages NETL social media presence.
- Manages and coordinates NETL media relations and serves as portal for all NETL media inquiries.
- Oversees preparation of the NETL Weekly Media Report.
- Manages, edits, and publishes NETL's magazine (Edge), NETL's quarterly employee newsletter (Inside NETL) and NETL's quarterly accomplishments reports.
- Manages public relations and public inquiries.
- Plans, develops, and implements NETL internal employee communication strategy.
- Provides multimedia product development.
- Provides technical writing and editing services.
- Manages logistics for NETL conferences, events, and exhibits.
- Provides spokesperson guidance and training for NETL staff.
- Manages NETL's Emergency Public Information (EPI) Program and provides trained staff to serve as EPI team members at all NETL research sites.
- Manages NETL crisis communication activities.

RESEARCH & INNOVATION CENTER

Mission: The Research & Innovation Center (RIC) develops, nurtures, and exercises the core technical competencies that enable NETL to be an international resource for Fossil Energy Technology Discovery, Development and Deployment. These technical core competencies, which combine world-class expertise with mission-relevant laboratory facilities, include: Computational Science & Engineering, Energy Conversion Engineering, Geological & Environmental Systems, Materials & Manufacturing Engineering, and Strategic Systems Analysis & Engineering.

Function: Through effective leverage of its technical core competencies, and in collaboration with partners from industry, academia, and other government laboratories, the RIC drives technology innovation and delivers technical solutions while advancing knowledge within the community. The RIC is responsible for safe and efficient research operations at its Albany, Morgantown, and Pittsburgh sites; and for implementation of an R&D portfolio that effectively leverages core technical competencies to exceed customer needs. Research projects effectively combine science-based large-laboratory scales, to accelerate the technology development process. Research conducted by RIC in its laboratories will typically focus on concepts with technology readiness levels (TRL) between two and four. For higher TRL-level concepts, research is coordinated with extramural partners as appropriate, to enable eventual commercial deployment more effectively. The R&ID Center is also responsible for nurturing the human capital, and designing and implementing the laboratory capabilities, necessary to assure the world-class stature of its technical core competencies.

Energy Conversion Engineering

Mission: Energy Conversion Engineering maintains the human capital and mission-relevant laboratory facilities necessary to support a world class core competency in Energy Conversion Engineering at NETL, under the technical guidance of the Senior Fellows, and the direction of the Associate Laboratory Director of RIC. The capabilities maintained enable the development and evaluation of new concepts for advanced energy conversion devices and systems that exceed DOE and NETL goals for efficiency, sustainability, and affordability.

Function: Energy Conversion Engineering conceives, plans, manages, and conducts exploratory and applied research via multidisciplinary teams in the areas of thermal sciences, advanced systems integration, and reaction engineering with a focus on experiments at scales and conditions of relevance to maturing technology. They develop and maintain technical competency in these areas, by building and implementing mission-relevant, state-of-the-art laboratory facilities, and by creating and nurturing a critical mass of federal technical experts. They provide access to this technical expertise as needed to support the organization and its customers.

Geological & Environmental Systems

Mission: Geological & Environmental Systems maintains the human capital and mission-relevant laboratory facilities necessary to support a world class core competency in Geological and Environmental Systems at NETL, under the technical guidance of the Senior Fellows, and the direction of the Associate Laboratory Director of the RIC. The capabilities maintained enable a better understanding of the behavior of engineered natural systems, and the development of the science and technologies that will enable safe, sustainable production and utilization of domestic energy resources, in support of the DOE and NETL missions.

Function: Geological & Environmental Systems conceive, plan, manage, and conduct exploratory and applied research via multidisciplinary research in the areas of geochemistry, reservoir engineering, and geo-analysis and field monitoring. They develop and maintain technical competency in these areas, by building and implementing mission-relevant, state-of-the-art laboratory facilities and simulation tools, and by creating and nurturing a critical mass of federal technical experts. They are responsible for providing access to this technical expertise as needed to support the organization and its customers.

Materials & Manufacturing Engineering

Mission: Materials & Manufacturing Engineering maintains the human capital and mission-relevant laboratory facilities necessary to support a world class core competency in Functional and Structural Materials at NETL, under the technical guidance of the Senior Research Fellows and the direction of the Associate Laboratory Director of RIC. The capabilities maintained enable the discovery and development of affordable, high performance materials that can endure the harsh service environments typical of advanced energy systems, in support of the DOE and NETL missions. Capabilities include the ability to translate lab-scale materials concepts to affordable industrial practice, utilizing advanced manufacturing methodologies.

Function: Materials & Manufacturing Engineering conceives, plans, manages, and conducts exploratory and applied research via multidisciplinary teams in the areas of functional materials, structural materials, and materials characterization. They are responsible for developing and maintaining technical competency in these areas, by building and implementing mission-relevant, state-of-the-art laboratory facilities and simulation tools, and by creating and nurturing a critical mass of federal technical experts. They provide access to this technical expertise as needed to support the organization and its customers.

Strategic Systems Analysis & Engineering

Mission: Strategic Systems Analysis & Engineering maintains the human capital and mission-relevant laboratory facilities and expertise to drive technology advancement at NETL, under the technical guidance of the Senior Research Fellows, and the direction of the Associate Laboratory Director of the RIC. The capabilities maintained enable the utilization of models, simulations, and optimizations to guide and support NETL's existing research portfolio; provide insight on the potential of new technology ideas; identify new energy concepts; and analyze interactions between energy systems at plant, regional, national, and global scales.

Function: Strategic Systems Analysis & Engineering conceives, plans, manages, and conducts research in the areas of energy process analysis via multidisciplinary research, energy process analysis, process systems engineering research, energy systems analysis and energy markets analysis. The Directorate is responsible for developing and maintaining technical competency in these areas, by building and implementing mission-relevant, state-of-the-art laboratory facilities and simulation tools, and by creating and nurturing a critical mass of federal technical experts. They provide access to this technical expertise as needed to support the organization and its customers.

Computational Science & Engineering

Mission: Computational Science & Engineering maintains the human capital and mission-relevant laboratory facilities necessary to deliver a world class core competency at NETL, under the technical guidance of the Senior Research Fellows, and the direction of the Associate Laboratory Director of the RIC. In support of the DOE and NETL missions, the computing capabilities coupled with mission unique computational tools enable the effective application of high-performance computing and data analytics to enhance the NETL research effort, generating information and understanding beyond the reach of experiments alone, across time and length scales.

Function: Computational Science & Engineering conceives, plans, manages, and conducts exploratory and applied research via multi-disciplinary teams on computational materials engineering, computational device engineering and advance computing and artificial intelligence. The Directorate develops and maintain technical competency in these areas, and provide technical expertise as needed to support the organization and its customers.

Research Planning & Delivery

Mission: Research Planning and Delivery maintains and exercises the critical business functions required to effectively and efficiently plan and deliver quality, impactful and relevant research products exceeding the expectations of Fossil Energy and Carbon Management and does so under the guidance of the Senior Fellows and direction of the Associate Laboratory Director of RIC.

Function: Research Planning & Delivery manages and supports the proposal, planning, execution, and completion of research activities conducted solely by RIC or by RIC in partnership with academia, other national labs, and industry. The Directorate leverages expertise and tools within project management, business management and agreements, and administrative support.

Research Partnerships & Tech Transfer

Mission: Research Partnerships & Tech Transfer nurtures relationships to advance the missions of NETL as a premier research organization while also exercising the Laboratory's intellectual property to National benefit and does so under the guidance of the Senior Fellows and in direction of the Associate Laboratory Director of RIC.

Function: Research Partnerships & Tech Transfer nurtures and manages outreach to strategic partners to i) engage in multidisciplinary, partnered research with RIC in support of FE, ii) strategic opportunities to leverage RIC's world class research staff and facilities to the most pressing technical challenges facing the Nation, and iii) pursue transfer of RIC Intellectual Property for the greatest National benefit.

SCIENCE AND TECHNOLOGY (S&T) STRATEGIC PLANS AND PROGRAMS

Mission: Develop strategic direction for programs and activities within NETL and identify future competencies required so that NETL can best utilize existing capabilities (reposition and redeploy as needed) and invest in new capabilities to sustain and grow NETL.

Function: Lead the planning and integration of current existing capabilities and develop the strategic plans with an understanding of the existing environment (technology needs, regulatory, political) and the anticipation of the future environment. This includes:

- Leading the development of the NETL Strategic Plan including identifying future competencies required;
- Defining technical capabilities to invest in for long-term strength of NETL including any budgetary requirements needed to achieve these capabilities; and
- Coordinate across NETL for a collective strategy and engagement plan for external stakeholders.

The Science and Technology Strategic Plans and Programs performs the above functions in conjunction with and through the Research and Innovation Center and the Technology Development Center. This will include Senior Fellows, IPAs, and other leads identified for: University and Laboratory Partnerships, Industrial Partnerships, and Global Partnerships. Strategic planning efforts are led and centered on NETL enduring missions in effective resource development, efficient energy conversion, and environmental sustainability.

TECHNOLOGY DEVELOPMENT CENTER

Mission: Implement national research, development, and demonstration programs in the Office of Fossil Energy and Carbon Management, and other Department of Energy programs, with industry, institutes of higher education, nonprofit organizations, small businesses, and other federal agencies and national laboratories to develop and mature technologies that will accomplish the goals and objectives of those programs.

Function: Lead integrated technical and business teams to define, solicit, negotiate, manage, and deliver federally sponsored energy research, development, and demonstration benefits to the nation. These include:

- Define project technical and budgetary requirements to achieve program goals and objectives;
- Lead program/project teams to prepare and issue competitive solicitations (e.g., Funding Opportunity Announcements) and sole-source actions to access the best research capabilities in the nation that will develop and mature technologies to accomplish program goals and objectives;

- Negotiate and manage projects with industry, institutions of higher education, nonprofit organizations, small businesses, and other federal agencies and national laboratories;
- Coordinate and communicate project results and accomplishments;
- Maintain a qualified and experienced workforce through training and job assignments; and
- Support DOE and NETL program planning, development, analysis, outreach, and communication efforts.

The Technical Development Center performs the above functions through four organizational elements: (1) Natural Gas & Oil; (2) Advanced Coal & Carbon Management; (3) Energy Efficiency; and (4) Energy Delivery & Security.

Natural Gas & Oil

Mission: Implement national research, development, and demonstration programs in the Fossil Energy and Carbon Management's Office of Oil and Natural Gas program to maximize the value of U.S. natural gas and oil resources, and facilitate responsible development and delivery through research, technology development and outreach.
Function: Lead integrated technical and business teams to define, solicit, negotiate, manage, and deliver federally sponsored research, development, and demonstration benefits for natural gas and oil. These include:

- Defining project technical and budgetary requirements to achieve program goals and objectives;
- Lead project teams to prepare and issue competitive solicitations (e.g., Funding Opportunity Announcements) and sole-source actions to access the best research capabilities in the nation that will develop and mature technologies to accomplish program goals and objectives;
- Negotiate and manage projects with industry, institutions of higher education, nonprofit organizations, small businesses, and other federal agencies and national laboratories;
- Coordinate and communicate project results and accomplishments;
- Maintain a qualified and experienced workforce through training and job assignments; and
- Support DOE and NETL program planning, development, analysis, outreach, and communication efforts.

Natural Gas & Oil performs the above functions through technology management teams.

Advanced Coal & Carbon Management

Mission: Retain the economic and security benefit of using the nation's abundant coal resources in an environmentally acceptable manner. Implement national research, development, and demonstration programs in Fossil Energy and Carbon Management's Office of Clean Coal and Carbon Management to advance technologies that increase the socio-economic value of coal, while avoiding adverse impacts on health, climate, and the environment.

Function: Lead integrated technical and business teams to define, solicit, negotiate, manage, and deliver federally sponsored research, development, and demonstration benefits for the advanced coal and carbon management program. These include:

- Defining project technical and budgetary requirements to achieve program goals and objectives;
- Lead project teams to prepare and issue competitive solicitations (e.g., Funding Opportunity Announcements) and sole-source actions to access the best research capabilities in the nation that will develop and mature technologies to accomplish program goals and objectives;
- Negotiate and manage projects with industry, institutions of higher education, nonprofit organizations, small businesses, and other federal agencies and national laboratories; coordinate and communicate project results and accomplishments;
- Maintain a qualified and experienced workforce through training and job assignments; and
- Support DOE and NETL program planning, development, analysis, outreach, and communication efforts.

The Advanced Coal & Carbon Management organization performs the above functions through technology development teams.

Energy Efficiency

Mission: Implement national research, development, and demonstration programs in the Office of Energy Efficiency & Renewable Energy that support the Vehicle Technologies Office - to provide low cost, secure, and clean energy technologies to move people and goods across America - and the Buildings Technologies Office - to develop innovative, cost-effective energy saving solutions for buildings.

Function: Lead integrated technical and business teams to define, solicit, negotiate, manage, and deliver federally sponsored research & development benefits for the Office of Energy Efficiency and Renewable Energy. These include:

- Defining project technical and budgetary requirements to achieve program goals and objectives;
- Lead project teams to prepare and issue competitive solicitations (e.g., Funding Opportunity Announcements) and sole-source actions to access the best research capabilities in the nation that will develop and mature technologies to accomplish program goals and objectives;
- Negotiate and manage projects with industry, institutions of higher education, nonprofit organizations, small businesses, and other federal agencies and national laboratories;
- Coordinate and communicate project results and accomplishments;
- Maintain a qualified and experienced workforce through training and job assignments; and
- Support DOE and NETL program planning, development, analysis, outreach, and communication efforts.

Energy Efficiency performs the above functions through technology management teams.

Energy Delivery & Security

Mission: Implement national research, development, demonstration, deployment, and outreach programs, in the Office of Electricity and the Office of Cybersecurity, Energy Security, and Emergency Response (CESER) with industry, institutions of higher education, nonprofit organizations, utilities, and other federal agencies and national laboratories to develop and mature technologies, and support outreach efforts, that will accomplish the goals and objectives of those programs. Provide emergency response support and National Special Security Events (NSSEs) representing Critical Infrastructure support.

Function: Lead integrated technical and business teams to define, solicit, negotiate, manage, and deliver federally sponsored energy infrastructure technology development benefits for the Office of Electricity and the Office of Cybersecurity, Energy Security, and Emergency Response. These include:

- Defining project technical and budgetary requirements to achieve program goals and objectives;
- Lead project teams to prepare and issue competitive solicitations (e.g., Funding Opportunity Announcements) and sole-source actions to access the best capabilities in the nation that will develop and mature technologies, and support outreach efforts, to accomplish program goals and objectives;
- Negotiate and manage projects with industry, institutions of higher education, nonprofit organizations, utilities, and other federal agencies and national laboratories;
- Coordinate and communicate project results and accomplishments;
- Maintain a qualified and experienced workforce through training and job assignments; and
- Support DOE and NETL program planning, development, analysis, outreach, and communication efforts.

Lead and coordinate NETL efforts in support of DOE's responsibility as the Sector Specific Agency for the energy sector, including:

- Lead Regional Coordinator (RC) and Emergency Support Function #12 (Energy) efforts in assigned regions and events, serving as regional energy advisors to support steady-state operations and preparedness efforts, and provide all-hazards analysis during ESF#12 activations;
- Coordinate and support National Special Security Events (NSSEs) representing Critical Infrastructure.

LABORATORY OPERATIONS CENTER

Mission: To deliver an effective, efficient, and quality work environment and support services that advance the NETL mission.

Function: Responsible for development, implementation, integration, and monitoring, as well as continuous improvement, of products and services necessary to support NETL business and laboratory functions. This includes: Business Integration; Office of Career Management and Education Programs; Information Technology; Facility Operations; and Security.

Business Integration

Mission: Support the efforts of the Office of the Chief Operating Officer in assuring adherence to applicable law and policy while proactively exploring opportunities for improvement, enhanced integration of NETL operations services consistent with best practices and the NETL mission and vision.

Function: Organizational functions include, but are not limited to, Site Support Services, Strategic Planning and Enterprise Performance Assessments, Directives, Continuous Process Improvement Program, Internal Controls & Assessments, and External Audit Functions, as detailed in the following principal roles:

- Coordinate NETL's site support services program, including; contract administration, analysis and financial reporting, standard operating procedures, site support contract management system business owner and participation in the development of support service strategies;
- Facilitate the development of quantifiable, and specific measures that support the strategic plans of DOE, FE, NETL, administer strategic planning processes, ensuring long-term organizational goals are identified and documented; manage NETL's enterprise-wide performance assessment system designed to record, measure and report progress in meeting NETL objectives;
- Administering the NETL Directives Program;
- Develop and implement a Continuous Process Improvement Program which includes the utilization of internal reviews, management review of projects, departmental quality assurance management requirements and best practices;
- Conduct assessments of NETL's Internal Controls and Risk Profile to ensure accountability with requirements mandated by OMB circular A-123 and the Federal Managers Financial Integrity Act; and
- NETL external audit coordination; serving as the primary point of contact for activities, coordinating scheduling, information requests with SMEs, tracking responses and compiling a quarterly report of activities.

Career Management and Education Programs

Mission: To inspire, attract, develop, and retain a skilled, motivated workforce to fulfil the scientific, technical, professional, and administrative functions of the laboratory, including the development of a talent pipeline via educating the next generation through STEM outreach and internship programs.

Function: Career Management and Education Programs is responsible for the development, implementation, integration, and monitoring of a comprehensive career path management program that includes the current and prospective NETL workforce. This includes:

- Strategic Human Capital Management (human capital planning, career, and talent management, recruiting strategies, training, performance management, awards and recognition, onboarding and out processing of federal staff, and implementation of human capital policies and procedures);
- Research Associate and Internship Management (undergraduate and graduate student, postgraduate, and faculty education/internship programs);
- STEM Education & Outreach (K-12 education outreach programs, Science Bowl, career education events, digital outreach, teacher workshops, and STEM education for the general public).

Information Technology

Mission: Maintain a comprehensive information technology and cybersecurity program that provides fully integrated, enterprise-wide systems in support of the NETL mission.
Function: Responsible for management, oversight, and delivery of integrated, secure, reliable, and quality systems to support the information technology needs of NETL. This includes:

- Serving as liaison between DOE CIO and Information Technology offices;
- Serving as the information technology liaison with Fossil Energy and Carbon Management leadership for assistance with information technology matters;
- Managing and supporting enterprise architecture;
- Information technology operations;
- Managing records management;
- Leveraging existing technology and expertise to maximize mission delivery;
- Identifying and fostering new and emerging technologies to maximize mission delivery;
- Providing information technology governance, policy, and oversight processes to ensure secure, efficient, and cost-effective use of information technology resources; and
- Ensuring acceptable risk-based cybersecurity through enhanced enterprise situational awareness, development of near real-time risk management, and combating advanced persistent threats.

Facility Operations

Mission: To assure safe, environmentally friendly, and reliable operations at all NETL sites consistent with the NETL mission and in accordance with applicable law, federal policy, and best practices, under direction of the Executive Director and Chief Operating Officer. The Directorate includes the following Teams at Albany, Morgantown, and Pittsburgh sites: R&D Engineering and Facility Operations; and Environmental, Safety and Health.

Function: Manage real property assets, including daycares, fitness centers and cafeterias, and facility-related operations, ensuring they are maintained in a manner that promotes operational readiness, personnel and environmental safety and health, property preservation and life-cycle cost-effectiveness, through the following competencies:

R&D Engineering: Oversee and conduct engineering design, specification development, procurement, construction, and operation through all phases of the project lifecycle of NETL's on-site innovative research facilities & related infrastructure.

Facility Operations: Oversee the planning, design and construction of all facility-related projects including buildings and structures, roads and sidewalks, utilities and services, real estate development, site-related Environment, Safety and Health (ES&H) projects, physical security systems, and provide facility operations and maintenance, grounds maintenance and janitorial services, on-site and off-site real property assets, and space utilization management.

Safety and Health: Oversee the development and maintenance of a safe and healthy work environment, including: safety analysis and review, chemical and industrial hygiene, hazard communications, chemical inventory maintenance, Occupational Safety and Health Administration (OSHA) and facilities compliance, laser and radiation safety, and ergonomics.

Environmental: Oversee and coordinate onsite environmental compliance activities, including:

environmental monitoring activities; groundwater, air (ambient air and meteorological), storm water, wastewater, soil, and biota sampling; hazardous waste management and waste disposal program; waste minimization and pollution prevention awareness program; and coordinate, monitor, and evaluate NETL's performance in meeting emission requirements established at the local, state, and federal levels.

Comprehensive Emergency Management: Oversee the elements of an emergency management system, including coordination with security counterpart and providing analysis of laboratory safety and risks.

Security

Mission: Establish, develop, and maintain a security operation that includes the separate programs of safeguards and security; personnel security; foreign access review and approval management; counterintelligence; controlled unclassified information management; operational security and continuity of operations.

Function: Includes oversight of onsite security program execution, such as the countermeasures implemented through the physical protective force, and access programs, such as badging and access authorization. Includes the continuity program which provides support to HQ program offices which identifies NETL personnel or facilities as devolution receivers and provides for the development of the program requirements for an NETL COOP program. Through the security programs, risk assessments are performed, levels of protection are established; and countermeasures are developed and instituted. The role of the standards issued by the Interagency Security Committee, as well as DOE Orders, are incorporated into a comprehensive threat, risk, and countermeasures program. Security programs include oversight and management of the NETL SCIF and classified operations.

FINANCE & ACQUISITION CENTER

Mission: The Finance & Acquisition Center plans, directs and coordinates NETL's CFO, procurement, and financial assistance (financial award and grant) functions, ensuring effective oversight and stewardship of the Laboratory's financial resources.

Function: The Finance & Acquisition Center performs the following major roles:

- Develops and implements the Laboratory's financial policies;
- Serves as liaison with DOE CFO and Procurement offices;
- Serves as the financial liaison with Fossil Energy and Carbon Management leadership for budget and financial assistance matters; and
- Serves as the principal advisor to the NETL Director and other senior NETL officials on matters related to the Laboratory's financial resources, procurements, and financial assistance activities.

Accounting

Mission: Accounting ensures the financial integrity of NETL's books and records, while providing effective financial management support to all customers.

Function: Accounting performs the following major roles:

- Ensures that NETL's accounting and reporting activities are accomplished in a manner consistent with applicable statutes, regulations, and other central government agency guidance;
- Establishes and interprets accounting and financial policies and general procedural requirements for general accounting and reporting activities that are applicable to all components of NETL;
- Supports the implementation of the Chief Financial Officer (CFO) Act requirements in accordance with DOE directives;
- Maintains an administrative reporting relationship with the DOE's CFO's Office, FE and other DOE related organizations on matters pertaining to Financial Reporting;

- Develops and maintains integrated accounting and financial reporting information systems, including systems documentation and training materials;
- Develops NETL's indirect rates charged for work performed for other organizations, ensuring full cost recovery;
- Develops NETL travel policy and implementation procedures consistent with HQ policies for both individual temporary duty travel and permanent change of station travel;
- Maintains liaison with audit organizations; central government agencies; and standards-setting bodies, including the Federal Accounting Standards Advisory Board;
- Serves as the liaison with, and develops financial systems policy that is consistent with the Office of Corporate Information Systems; and
- Represents NETL at various forums and on intra- and inter-agency working groups.

Budget & Analysis

Mission: Budget & Analysis ensures the financial integrity of the Laboratory's funds control process, directs the budgetary processes, and performs financial analysis in support of strategic initiatives, while providing effective financial management support to all customers.

We accomplish this by producing, maintaining, analyzing, and forecasting accurate, impartial, and comprehensive information about the Laboratory's financial past, present, and future We communicate that information in a clear, useful, and timely manner to stakeholders inside and outside of the Laboratory, so they may make the best possible planning, financial policy, and resource allocation decision. Our goal is to ensure that budgetary decisions are equitable, implemented properly and consistently, achieving their desired ends. We provide this service in a professional and personal spirit of respect, honesty, fairness, cooperation, and goodwill. The office strives to maintain a high standard of knowledge, expertise, service, ethics, and professional integrity while providing sound counsel in the financial planning and decision-making process of the Laboratory.

Function: Budget & Analysis performs the following major roles:

- Develop annual operating budgets;
- Maintain long-range financial planning models;
- Perform ongoing maintenance of decentralized budgeting through the monitoring of these budgets with emphasis on maintaining good fiscal management with reasonable controls;
- Enforce policy decisions regarding use of funds;
- Provide reports and data to assist management in making sound fiscal decisions;
- Perform budget analyses and consult with staff/managers throughout the Laboratory;
- Respond to numerous internal and external requests for institutional data;
- Conduct numerous special studies drawing on an array of financial and non-financial information at its disposal;
- Support the Laboratory's many academic and administrative operations on financial matters;
- Ensure that all budget activities adhere to statutory and policy requirements;
- Coordinate and prepare the annual institutional budget request to the Laboratory's Executive Board;
- Provide central communications to the Laboratory about various financial and budgetary information;
- Develop budget forecasts, revisions, reports, and analyses to support Laboratory-wide resource allocation and decision-making;
- Provide financial management and budget training; and
- Develop various financial policies and procedures and monitor compliance.

Acquisition

Mission: Acquisition provides business and financial expertise in all areas of procurement and business management to support the mission of NETL and FE, and other government agencies as appropriate. Acquisition is divided into three teams—Procurement, Financial Assistance, and Policy & Analysis.

Function: Acquisition performs the following major roles:

- Develops and coordinates a comprehensive procurement plan to support program plans;
- Leads the development of strategic plans for internal site support contracting activities;
- Performs solicitation, evaluation, negotiation, execution and administration of contracts, financial assistance instruments, and interagency agreements for R&D, demonstration and commercialization projects, information technology, support services, construction, architect-engineer, supply requirements, and simplified acquisitions;
- Performs property-related internal control activities for property purchased through financial assistance vehicles;
- Provides business and financial expertise in all areas of procurement to other field activities within the Department and/or other governmental agencies;
- Implements and coordinates Federal acquisition policies and procedures, and contract reform;
- Maintains and enhances socioeconomic programs;
- Maintains and enhances procurement information systems;
- Negotiates and distributes provisional and final indirect cost rates on a Departmental and Federal Agency basis;
- Administers closeout of all completed instruments; and
- Coordinates unsolicited proposal review, evaluation, and communications.

Acquisition - Procurement Team

Mission: The Procurement Team has primary responsibility for the solicitation, negotiation, placement, award and administration of contracts, delivery orders, purchase orders and other instruments necessary to accomplish the NETL mission and support other agencies as appropriate.

Function: The Procurement Team performs the following major roles:

- Leads the development of strategic plans for internal site support contracting activities, including evaluation of contract structure, tenor, and other key terms;
- Solicits, negotiates, places, awards, and administers contracts, delivery orders, purchase orders and other instruments necessary to accomplish the NETL mission, and support other agencies as appropriate;
- Performs all Procurement Card administrative activities for NETL;
- Facilitates communications between internal and external customers and Acquisition, leading to a better understanding of project needs and the ability to tailor procurement techniques and instruments to best fulfill those needs and ensure consistency in operations;
- Provides business and financial expertise in all areas of procurement to other field activities within the Department and/or other governmental agencies;
- Implements and coordinates Federal acquisition policies and procedures, and contract reform; and
- Administers closeout of all completed instruments.

Acquisition - Financial Assistance Team

Mission: The Financial Assistance Team has primary responsibility responsible for the solicitation, negotiation, placement, and administration of awards primarily in support of the research, development, and demonstration activities necessary to accomplish the NETL mission, and for other agencies as appropriate.

Function: The Financial Assistance Team performs the following major roles:

- Develops and coordinates a comprehensive procurement plan to support program plans;
- Performs solicitation, evaluation, negotiation, execution and administration of financial assistance instruments and interagency agreements for R&D, demonstration, and commercialization projects;
- Facilitates communications between internal and external customers and Acquisition, leading to a better understanding of project needs and the ability to tailor procurement techniques and instruments to best fulfill those needs and ensure consistency in operations;
- Manages the resolution of contentious award terms ensuring compliance with all 2CFR, FAR, DEAR, and other DOE regulations;

- Performs property-related internal control activities for property purchased through financial assistance vehicles;
- Provides business and financial expertise in all areas of grant and award execution and administration to other field activities within the Department and/or other governmental agencies; and
- Administers closeout of all completed instruments.

Acquisition - Policy and Analysis Team

Mission: The Policy and Analysis Team has responsibility for the implementation and coordination of Federal acquisition and assistance policies and procedures, acquisition and financial assistance reform, coordination of unsolicited proposals, maintenance and enhancement of socioeconomic programs, maintenance and enhancement of procurement information systems, performing detailed cost analysis, and the negotiation and distribution of provisional and final indirect cost rates on a Departmental and Federal Agency basis.

Function: The Policy & Analysis Team performs the following major roles:

- Implements and coordinates Federal acquisition and assistance policies and procedures;
- Performs detailed cost and price analysis on competitive proposals, recommending revision to ensure consistency with RFP or FOA terms;
- Negotiates and distributes provisional and final indirect cost rates on a Departmental and Federal Agency basis;
- Maintains and enhances Small Business engagement programs, consistent with Departmental goals and targets;
- Maintains and enhances socioeconomic programs;
- Maintains and enhances procurement information systems;
- As Unsolicited Program Manager for DOE, coordinates all unsolicited proposal reviews, evaluations, and communications.

1.5 RELEVANT DEMOGRAPHIC INFORMATION

With locations in Albany, Oregon; Morgantown, West Virginia; Pittsburgh, Pennsylvania; Anchorage, Alaska; and Houston, Texas, NETL comprises 98 buildings and 14 major research facilities covering over 240 acres. As of December 31, 2020, NETL had 1,408 employees at its five locations – 475 were federal employees and 933 were site-support contractors.

1.6 ACCOMPLISHMENTS

NETL achieved the following technology-related accomplishments in 2020.

AWARDS

- American Institute of Chemical Engineers (AIChE) – AIChE is the world's leading organization for chemical engineering professionals, with more than 60,000 members from more than 110 countries.
  - Madhava Syamlal– 2020 Elsevier PTF Award for Lifetime Achievements Award, Syamlal was the founding technical director of the Carbon Capture Simulation Initiative. He is an AIChE Fellow and has earned numerous awards, including the U.S. Energy Secretary's Achievement Honor Award and the AIChE's Fluidization Process Recognition Award.
  - Isaac Gamwo – 2020 AIChE Minority Affairs Committee (MAC) Eminent Chemical Engineer's Award, Gamwo was recognized for his technical accomplishments and

his services as a mentor and role model to underrepresented minorities in engineering. He is a director of the AIChE's Separations Division and was the 2015 Minority Affairs Committee Chair.

- Carnegie Science Awards – The Carnegie Science Awards program honors and celebrates the innovators whose outstanding science and technology achievements make western Pennsylvania great and inspire the next generation.
  - Laser and Optical Processes Team (LOPT): Michael Buric
- Institute of Chemical Engineers (IChemE) Global Awards is considered as the world's most prestigious chemical engineering awards. The awards celebrate chemical, process and biochemical engineering excellence across the globe.
  - Microwave-Assisted Ammonia Synthesis (MAS) took home the 2020 IChemE Global Awards in the category of Research Project for its potential to aid in agriculture, energy production and other applications while also lowering costs and overall energy use. The technology has changed the way ammonia, one of the most widely used chemicals compounds worldwide, is produced. Team: Dushyant Shekhawat, Christina Wildfire, and West Virginia University's, John Hu.
- R&D 100 Awards – This is the only S&T (science and technology) awards competition that recognizes new commercial products, technologies and materials for their technological significance that are available for sale or license.
  - C2G: NETL's Low-Cost Coal-to-Graphene Manufacturing Process won for the Mechanical/Materials category. This manufacturing technology process makes graphene nanomaterial from domestic coal at higher efficiency, superior product quality and lower cost that is what is currently available. The graphene can be used directly downstream to manufacture new customer products with properties that are significantly enhanced by this carbon material.
  - Institute for the Design of Advanced Energy Systems (IDAES) won for the Software/Services category. An advanced computational framework capable of addressing the complex, interconnected challenges associated with designing the highly flexible, resilient, and sustainable energy generation systems of the future. IDAES leverages advances in computational algorithms, hardware, and glass box modeling to enable optimization of multi-scale processes from conceptual design to process integration, process intensification, model-based control, and real-time optimization.
- Gears of Government Awards – These awards recognize individuals and teams across the Federal workforce whose dedication supports exceptional delivery of key outcomes for the American people. They are designed to encourage a culture of excellence and improvement.
  - Michael Nowak received the Accountable Stewardship Award; he has worked diligently to maximize efficiency of the Lab's work by supporting external research opportunities consistent with or complimentary to the mission of DOE and NETL.

- American Energy Society – A community of professionals, experts, and crusaders working to solve the world's greatest energy challenges.
  - Among the most interesting energy-tech developments of 2020, NETL-supported research at Virginia Tech has been recognized by the American Energy Society (AES) as one of the top energy and technology developments of the year for its game-changing economic potential to supply the United States with a steady domestic source of vitally important rare earth elements (REE).
- Pittsburgh Federal Executive Board Excellence in Government Awards – These awards honor area federal employees whose service demonstrates deep personal and professional commitment.
  - Tim Florian – Diversity and Inclusion Award – GOLD, for his role as Equal Employment Opportunity manager, EEO Office for Diversity & Inclusion. His award nomination describes his dedication to educating others on respecting differences in life experiences, cultural backgrounds, generations, and work and lifestyles. Mr. Florian established a “cafeteria-style” approach to training by providing an expanded menu of shorter programs that are held with greater frequency.
  - Larry Kincell – Community Service Award – GOLD, for his involvement in the Marion County Fringe Challenger Baseball League. He has a passion for helping children and young adults with physical and intellectual challenges. His volunteer work to help those with autism, cerebral palsy, Down syndrome, and other challenges take part in America’s pastime brings Larry a sense of immeasurable joy and personal satisfaction.
- Cell Reports Physical Science, The Best of 2020 Collection, Cell Reports Physical Science is a premium open access journal from Cell Press, which showcases high-quality, cutting-edge research from across the physical sciences; provides a unique and open forum to promote collaboration between physical scientists.
  - Sameh Elsaidi – whose work was featured in the “Best of 2020” collection of the journal Cell Reports Physical Science. Elsaidi published a paper in the journal this year, titled, “Dual-Layer MOF Composite Membranes with Tuned Interface Interaction for Postcombustion Carbon Dioxide Separation.” Elsaidi’s research with metal organic frameworks (MOFs) could offer a path toward commercially viable carbon capture operations.
- Going the Extra Mile Award (GEM) – The GEM Award recognizes employees who go above and beyond in their support of the Office of Fossil Energy and Carbon Management and its primary mission — to ensure the nation can continue to rely on traditional resources for clean, secure, and affordable energy while enhancing environmental protection.
  - Mary Kylee Underwood – Ms. Underwood was nominated for taking initiative in starting a lunch and learn program at NETL. This program provides interested employees with an opportunity to learn Python coding language and Machine Learning techniques in a self-paced, hands-on manner using Kaggle.com. The objective of this program is to familiarize the attendees with the Python coding language and move onto machine learning techniques, visualization, data manipulation, SQL and more.
  - The Coal First Initiative Team – The Coal FIRST Initiative Team was nominated for their commitment on working together, under tight deadlines, ensuring the release on this important funding opportunity announcement.
- The TechConnect Innovation Showcase provided a unique and vetted pipeline for corporate, federal and venture capitalist prospectors to discover and connect with emerging technologies.
  - Immobilized Amine Sorbents for the Removal of Organic Contaminants from Environmental

and Industrial Water Sources was given the Innovation Award. The researchers pitched a technology for removing carbon dioxide from flue gas and a technology for removing dyes from water sources.

- American Society of Mechanical Engineers (ASME) – This society promotes the art, science and practice of multidisciplinary engineering and allied sciences around the globe.

  – Richard Dennis was named Fellow of American Society of Mechanical Engineers, a technology manager for Advanced Turbines and Supercritical Carbon Dioxide (sCO_2) Power Cycle programs.

- Royal Society of Chemistry, Environmental Science: Processes & Impacts (ESPI)

  – Alexandra Hakala, Mengling Stuckman along with a group from West Virginia University were awarded ESPI Best Paper Award for the paper, entitled “Effect of Maturity and Mineralogy on Fluid-Rock Reactions in the Marcellus Shale,” it was originally published February 18, 2019.

- The Department of Mines, Minerals and Energy’s Division of Gas and Oil (DMME), in partnership with the Virginia Oil and Gas Association (VOGA)

  – The Excellence in Exploration Innovation was given to Emerging Stacked Unconventional Plays and Excellence in Coal Bed Methane (CBM) Sustainability awarded to: Quantification of Methane Emissions from Marginal Oil and Gas Wells. These two awards were given to EnerVest, a NETL-sponsored project that could unlock access to large reservoirs of natural gas in Central Appalachia and extract those resources with technology designed to leave a light environmental footprint has earned accolades from state and industry officials. The Virginia Department of Mines, Minerals and Energy’s Division of Gas and Oil, in partnership with the Virginia Oil and Gas Association (VOGA), presented NETL and its project partners with the Excellence in Exploration Innovation Award for the development of the Emerging Stacked Unconventional Plays (ESUP) field laboratory and characterization well in southwestern Virginia.

- Pittsburgh Business Times, a diversified business media company business publication.

  – Jim Wilson named Chief Financial Officer of the Year, was honored for his excellence in providing the critical financial oversight needed to operate an innovative science-focused organization dedicated to maintaining U.S. energy independence, improving the environment, and developing technologies to produce affordable and abundant energy.

- WV Executive, West Virginia’s premier business publication.

  – Lee Ann Haley was named to the Young Guns Class of 2021 by West Virginia Executive magazine. Haley was one of 10 outstanding West Virginians age 43 or younger recognized for accomplishing great things in both their careers and communities.

2.0 COMPLIANCE SUMMARY

NETL is committed to ensuring compliance with all the environmental requirements impacting its locations. This includes requirements found in (DOE) departmental directives; executive orders (E.O.s); federal, state, and local codes and regulations; acquisition letters; negotiated agreements; and consensus standards.

Standards and requirements that subject matter experts (SMEs) determine to be applicable to NETL's ES&H activities are incorporated into one or more NETL directives. The directives provide the policies, programs, and procedures used to implement those standards and requirements. ES&H directives include orders and procedures; the ES&H Team also provides specific guidance through subject-related manuals Assigned SMEs are required to review their directives every two years and update, as appropriate.

Implementation of the standards and requirements is verified by a number of methods, including:

- A rigorous Safety Analysis and Review System (SARS) designed to review the details of a project before authorizing any significant activities to proceed. Checklists have been developed for SARS to facilitate verification of the standards and requirements covered during the review. ES&H SMEs provide support to the SARS process and ensure that all applicable ES&H standards and requirements are being addressed.
- Regular walk-through inspections of site facilities to ensure that all NETL facilities are inspected on an annual basis. Various ES&H subject matter experts visually verify that NETL follows applicable standards and requirements.
- Preparation of this ASER, which requires a complete review of compliance with all major environmental standards and requirements. Numerous SMEs participate in this effort, reviewing the past year's performance to ensure, and as part of the ISO 14001:2015/ISO 45001:2018 surveillance and certification audits.

2.1 MAJOR ENVIRONMENTAL STATUTES

Numerous inspections and audits are performed each calendar year to verify compliance with environmental regulations, standards, and existing permits. The inspections and audits are then documented in inspection reports and audit reports, ensuring no instances of environmental noncompliance have been identified. Examples of the major environmental statutes considered when evaluating compliance include, but are not limited to: Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA); Superfund Amendments and Reauthorization Act (SARA); Resource Conservation and Recovery Act (RCRA); Federal Facilities Compliance Act (FFCA); National Environmental Policy Act (NEPA); Toxic Substances Control Act (TSCA); Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA); Clean Air Act (CAA); Clean Water Act (CWA); and the Atomic Energy Act of 1954 (AEA). Statutes that are addressed across all five locations are covered in more detail below. However, if more specific compliance is appropriate, that compliance is included in the site-specific discussions.

2.1.1 Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 120 (40 CFR 300-310; 43 CFR 11) requires federal facilities to comply with the provisions of the Act. More specifically, this section imposes additional

regulations related to site studies and notices for the sale and other transfers of federal real property. This section of CERCLA makes all CERCLA guidelines, rules, regulations and criteria applicable to federally owned or operated facilities, including requirements for: (1) preliminary assessments for facilities at which hazardous substances are located; (2) possible inclusion of such facilities on the National Priority List (NPL); and (3) remedial actions at these sites. However, federal facilities are not required to comply with CERCLA provisions regarding financial responsibility and removal/remediation contracts with state governments. While federal facilities that are not on the NPL may be subject to state laws concerning removal and remediation actions, these state laws and regulations may not impose provisions more stringent than those applicable to non-federal facilities. NETL did not have any CERCLA violations in 2020 at any of its sites.

2.1.2 Superfund Amendments and Reauthorization Act (SARA) and Community Right-to-Know

The Superfund Amendments and Reauthorization Act (SARA) Title III requires the reporting of hazardous chemicals that were present at a facility and exceeded certain established quantities during the preceding year. This includes gaseous, liquid, and solid chemicals designated as extremely hazardous substances in amounts greater than or equal to 500 pounds, liquids in amounts *greater than or equal to 55 gallons* or amounts greater than or equal to the Threshold Planning Quantity (TPQ). SARA Title III also requires reporting of all other *hazardous chemicals* present at the facility during the preceding calendar year in amounts equal to or greater than 10,000 pounds. NETL did not have any hazardous chemicals in excess of the reporting thresholds in 2020 at any of its sites.

2.1.3 Resource Conservation and Recovery Act (RCRA)

The Resource Conservation and Recovery Act (RCRA) is the public law that creates the framework for the proper management of hazardous and non-hazardous solid waste. The law describes the waste management program mandated by Congress that gave EPA authority to develop the RCRA program. Under RCRA, the EPA has the authority to control hazardous waste from the “cradle-to-grave,” including generation, transportation, treatment, storage and disposal of hazardous waste. Sites that produce, manage, transport, or dispose of hazardous wastes are designated as generators; transporters; or treatment, storage, and/or disposal (TSD) facilities.

At NETL, on-site hazardous waste handling is governed by NETL Procedure 436.1-02.09, RCRA Hazardous Waste Management. This Procedure addresses requirements for NETL’s RCRA Hazardous Waste Management Program, including: (a) general RCRA hazardous waste management; (b) identification, characterization, and classification of RCRA hazardous waste; (c) management of satellite accumulation areas (SAAs); (d) operation of designated central accumulation areas; (e) container management; (f) elementary neutralization of corrosive wastes; (g) waste collection/transportation; (h) record keeping; (i) personnel training; and (j) personal protective equipment (PPE).

All 2020 hazardous waste management activities were performed in a safe and environmentally sound manner and in compliance with Title 40 Part 262, Standards Applicable to Generators of Hazardous Waste and all applicable federal, state, and local laws and regulations, as well as, DOE/ NETL policies. NETL complied with all of the record keeping and reporting requirements specified in 40 CFR 262 Subpart D—Recordkeeping and Reporting Applicable to Small and Large Quantity Generators.

Per 40 CFR 262.11, determinations were made as to whether waste was a hazardous waste to ensure compliance with applicable RCRA regulations. When unidentified wastes

were provided for disposal, NETL sent samples to a contracted, certified laboratory to test for hazardous characteristics (i.e., toxicity, ignitability, reactivity, and corrosiveness) and ensure proper handling. NETL did not have any RCRA violations in 2020 at any of its sites.

2.1.4 Federal Facilities Compliance Act (FFCA)

The Federal Facility Compliance Act of 1992, Pub. Law No. 102-386, became law on October 6, 1992. This law amended the waiver of sovereign immunity with respect to Resource Conservation and Recovery Act (RCRA) compliance. As a result, FFCA ensures that federal facilities are treated the same as private parties regarding compliance with RCRA. Prior to FFCA, the EPA did not have the statutory authority to issue administrative compliance orders pursuant to RCRA section 3008(a). Currently, Federal Facility Compliance Agreements are negotiated with federal facilities to bring them into compliance. In addition, under section 103 of FFCA, Congress further clarified that federal agencies are considered persons for purposes of RCRA. NETL has not had any issues regarding FFCA compliance.

2.1.5 National Environmental Policy Act (NEPA)

The National Environmental Policy Act (NEPA) (42 U.S.C. 4321 et seq., 1969) establishes federal policy for protecting the quality of the environment. The act establishes three levels of review for federal actions: environmental impact statements (EISs), environmental assessments (EAs) and categorical exclusions (CXs). Under the highest level of review, an EIS is prepared to evaluate the environmental consequences of any major federal action that might have significant impact on the quality of the human environment. The EIS must include a comparative analysis of those realistically available alternatives that would accomplish the same goals that the federal action is expected to address. Based on the EIS, a Record of Decision (ROD) is prepared to document which alternative will be pursued.

If the scope of the federal action does not clarify that an EIS is necessary, or if the potential for environmental impacts from the proposed action is uncertain, the second-tier level of review, an EA, is prepared. Based on the analysis in the EA, a determination is made that either the potential environmental impacts warrant preparation of an EIS, or the impacts are not significant, and a finding of no significant impact (FONSI) can be issued.

If the federal action does not have a significant effect on the environment, either individually or cumulatively, then the third level of review, a CX, is warranted. These types of federal actions can be excluded from an in-depth NEPA review. DOE has determined that certain classes of actions do not individually or cumulatively have a significant effect on the human environment and, therefore, can be covered by a CX. A list of the CXs and the eligibility criteria for their application are identified in DOE's NEPA implementing procedures (10 CFR 1021).

In 2015, NETL's process for issuing CX's was modified, wherein a single cumulative CX can be issued per award for the same activities conducted at multiple locations by multiple project recipients and sub-recipients. The result of this procedural change has generally led to a reduced number of CX's issued by NETL. However, it has not necessarily reduced the number of Environmental Questionnaires (EQ) evaluated to process these CX determinations. For these reasons, both CX's approved, and EQ's reviewed to support these CX determinations are included below.

NETL conducts NEPA reviews for both on-site and off-site actions proposed for funding by the federal government. These include actions planned in cooperation with other governmental organizations, educational institutions, and private industry.

The following EIS activities took place in FY2020:

DOE/EIS-0431: HYDROGEN ENERGY CALIFORNIA IGCC PROJECT

Hydrogen Energy California, LLC, was selected under the Clean Coal Power Initiative (CCPI) Program to demonstrate integrated gasification combined cycle (IGCC) technology with carbon capture in a new base load electric generating plant located in Kern County, California. The IGCC demonstration plant will use blends of coal and petroleum coke (pet coke), or pet coke alone, as its feedstock and generate approximately 250 MW (net) of electricity.

The public scoping period ended on July 29, 2012. On July 15, 2013, the Draft EIS was sent out for public comment. The Preliminary Site Assessment and Draft EIS Notice of Availability were published in the Federal Register on July 22, 2013. On September 17 and 18, 2013, joint public hearings/ workshops were conducted in Buttonwillow, California with the DOE, and the California Energy Commission (CEC). Recent corporate changes within Occidental Petroleum (Oxy) and their Elk Hills Facility have resulted in major conceptual changes to the project since SCS Energy has been unable to reach a mutually acceptable CO_2 Sequestration/Off-take Agreement for EOR operations. The Cooperative Agreement between DOE and SCS Energy expired January 20, 2015. Subsequently, Oxy has notified SCS that they are no longer interested in participating in the project. Major milestones issued by CEC have been missed by SCS Energy. Because of losing the sequestration site and missing previously agreed upon milestones, CEC has cancelled their permit application. SCS Energy and Fluor Engineering are providing DOE with information in the close-out process.

ASFE Winberg was briefed on the HECA situation and the ERCs (Emission Reduction Credits). He recommended DOE to obtain ownership of the credits. This information has been passed on to the Contracting Officer. The period of performance for the Cooperative Agreement (CA) expired on December 31, 2017. A letter was drafted by DOE and sent to HECA on January 7, 2020 requesting HECA to disposition the ERCs by transferring title of all the remaining ERCs to DOE with no further compensation to HECA. HECA was asked to provide any documentation necessary to facilitate the transfer no later than January 31, 2020. HECA responded on February 13, 2020 that they were meeting with officials interested in possibly restarting HECA and requested a delay in the transfer. A follow-up email was sent by DOE on February 19, 2020 requesting a response by February 21, 2020, for a date when they will affirmatively know if the project is restarting. There has been no response to-date. This will be the last year the HECA project is listed in the ASER.

The following EA activities took place in FY2020

DOE/EA-2070: FRONTIER OBSERVATORY FOR RESEARCH INTO GEOTHERMAL ENERGY (FORGE), MILFORD UTAH

DOE's Office of Energy Efficiency and Renewable Energy established the FORGE program to create a dedicated field laboratory site where the subsurface scientific and engineering community would develop, test and improve technologies and techniques for the creation of cost-effective and sustainable enhanced geothermal systems (EGS) in a controlled, ideal environment. There were two potential FORGE project locations, with a down-select expected in early 2018. The proposed Utah FORGE site is approximately 10 miles northeast of Milford in Beaver County, Utah, on private, State of Utah, and U.S. Bureau of Land Management (BLM) lands. DOE's proposed action is to provide cost-shared funding to the Energy and Geoscience Institute (EGI) at the University of Utah and its partners for the proposed Utah FORGE site. The project consists of multiple phases, including project planning, site characterization and preparation, and technology testing and evaluation.

Project planning and portions of the site characterization and preparation have been completed or are ongoing. If selected to continue this project, EGI will construct a geothermal observatory and supporting infrastructure to conduct field research and development activities in (EGS). The project would include one or more deep geothermal research wells, monitoring wells, groundwater wells, a modular office structure, utility tie-ins, and monitoring equipment. The Final EA and FONSI for the Utah site were issued in April 2018.

During the operational phase of FORGE, applicants will propose and be selected by a panel to test geothermal methods and equipment at the site. The FORGE site has received the first round of Research and Development project proposals, which were reviewed for compliance with the existing EA and FONSI by NETL's NEPA office. Additionally, the FORGE site has been conducting archaeological surveys within the footprint of the site, in consultation with the State Historic Preservation Office (SHPO). A Supplemental Analysis memo is expected to discuss the results of those surveys.

DOE/EA-2127 FLAMELESS PRESSURIZED OXY-COMBUSTION LARGE PILOT

DOE proposes to provide cost-shared funding to the Southwest Research Institute (SwRI) to construct and operate a 25-MWth flameless pressurized oxy-combustion (FPO) pilot plant. An EA Determination was issued in October 2019 for the original site.

SwRI has recently proposed a new site for the pilot plant. The pilot would be constructed at the Wyodak Resources Development Corporation (WDRC) property, that was previously part of the Wyodak Coal Mine, a surface mine. The WDRC is currently a mixture of undisturbed land and land used for industrial purposes. The pilot plant would be constructed adjacent to an existing building (currently office and warehouse space) on approximately 2 acres. This land is currently undeveloped but has been previously disturbed by grading and the construction of the original adjoining building. The proposed plant site is currently covered with crushed stone. Trenching would occur in order to supply utilities to the pilot from the existing tie-ins. Construction would include concrete foundation piers, with some modular and skid-mounted equipment. The pilot plant would be subject to New Source Review and require a new air permit.

An EA Determination was issued in January 2021 for the new location.

DOE/EA-2128: LARGE PILOT TESTING OF LINDE-BASF ADVANCED POST-COMBUSTION CO_2 CAPTURE TECHNOLOGY

DOE proposes to provide cost-shared funding to the University of Illinois, Urbana-Champaign to design, construct, and operate a 10 MWe capture system based on the Linde/BASF advanced amine-based post-combustion carbon dioxide (CO_2) capture technology at the coal-fired City Water, Light, and Power (CWLP) Dallman Power Plant in Springfield, Illinois.

The proposed plant would be constructed on the west side of the existing CWLP facility on land currently used for equipment and materials storage. The pilot will be constructed in an area of approximately 120 feet by 425 feet (51,000 square feet). This project will use 24,000 gallons of amine compounds which will be stored on-site. The pilot will receive a slipstream from the CWLP plant and return captured CO_2 to the stack for venting. CWLP is located on a peninsula and the proposed location for the pilot unit is within approximately 75 feet of Lake Springfield, a freshwater reservoir that is used as a potable water source for the City of Springfield.

The Final EA and FONSI were released in June 2020. Subsequent to the Final EA, a Native American Tribe requested an Inadvertent Discovery Plan. A draft of the plan was submitted to the interested Tribe in October 2020, and DOE has not yet received any feedback from the Tribal Historic Preservation Officer.

DOE/EA-2057: BUILDING 2 DEMOLITION, ALBANY, OR

NETL proposes to demolish Building 2 (B-2) at the Albany site. This action is proposed because the condition of the building is rapidly declining, it poses a significant safety hazard to site personnel, and there is no existing or anticipated future mission need for the building. The demolition is to eliminate the current unsafe condition of B-2 and to reduce DOE/NETL's inventory of obsolete and unused buildings. DOE/NETL is incurring annual maintenance costs for

B-2, which has been secured and abandoned since the early 1990's. By demolishing B-2, total expenditures for facilities sustainment would be reduced and safety would be increased.

Since the Oregon State Historic Preservation Office (SHPO) determined that B-2 contributes (SHPO letter dated October 9, 1997) to the eligibility of the Albany site for listing as a historic district, demolition of this structure would have an adverse effect. An environmental assessment (EA) was determined to be the appropriate level of analysis under DOE's National Environmental Policy Act (NEPA) Implementing Procedures. It is DOE's intention to coordinate its responsibilities for compliance with Section 106 of the National Historic Preservation Act with related activities associated with the NEPA process (e.g., public notification). As part of the decision-making process, public participation will be solicited during development of the EA. Currently, funding for the demolition of the building is not available. The EA has not commenced, and demolition was put on hold by direction of management due to the budget constraints. The NEPA office requested a thorough structural analysis to be incorporated into the EA to determine if the reconstruction of Building 2 could be considered a viable alternative in the EA. Delays occurred with the structural analysis when asbestos concerns were revealed. Asbestos mitigations were completed. The structural analysis and the report were delayed due to the pandemic situation. The report was completed September 2020; a revision to the report was made in October 2020. The Draft EA has not commenced.

DOE/EA-2134: MAKING COAL RELEVANT FOR SMALL SCALE APPLICATIONS: MODULAR GASIFICATION FOR SYNGAS/ENGINE CHP APPLICATIONS IN CHALLENGING ENVIRONMENTS

The proposed action is for DOE to provide cost-shared funding to the University of Alaska (University). DOE proposes to provide approximately $40 million of the project's $50 million total cost. The University's proposed project is to construct and operate a large pilot-scale modular gasification system for solid fuels, including coal and woody biomass generating a clean syngas for firing in a suitable heat engine.

The plant would be configured to co-produce several saleable products including electricity, pyrolysis liquids (oils and tars), and low-pressure steam. The initial plans were to add the pilot system to the existing combined heat and power (CHP) plant on the campus. Additionally, a small structure of approximately 180 square feet was expected to be added to the existing building with tanks of ammonium hydroxide placed outside of the building. The project team has revised their decision against siting the project at the power plant campus site.

The preliminary design phase of this project has been completed. The EA has not commenced; it was put on hold by direction of project recipient due to site selection delays. The project has been given a time extension to complete the planned Phase II activities which does include completing the EA and the NEPA requirements. These categorical exclusion (CX) activities and no cost time extensions took place in FY2020:

NO COST TIME EXTENSIONS GRANTED: 73

INTERNAL CX'S TO NETL

Morgantown, WV Site	25	
Pittsburgh, PA Site	18	
Albany, OR Site	8	
Total CXs	51	*[Supporting EQ's reviewed: 51]*

NETL PARTNERED PROJECTS (EXTERNAL TO MGN-PGH-ALB)

Continental U.S.	244

Non-Continental U.S.	4	
Total CXs	248	*[Supporting EQ's reviewed: 533, of these, 22 covered work in international or non-continental U.S. locations]*

GRAND TOTAL CX's FOR 2020: 299

GRAND TOTAL EQ's REVIEWED FOR 2020: 584

2.1.6 Toxic Substances Control Act (TSCA)

The Toxic Substances Control Act (TSCA) of 1976 gives EPA the authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. Specifically, TSCA addresses the production, importation, use, and disposal of chemicals including polychlorinated biphenyls (PCBs), asbestos, radon, and lead-based paint. In most cases, TSCA compliance at NETL relates to asbestos and lead-based paint. Given the unique history (related to construction and maintenance activities) and infrastructure at each NETL facility, the activities at each site related to TSCA compliance in 2020 are addressed in the site-specific sections.

2.1.7 Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) requires federal regulation of pesticide distribution, sale, and use. This means that all pesticides distributed or sold in the United States must be registered by EPA. However, before a pesticide can be registered, it needs to be demonstrated that using the pesticide according to specifications "will not generally cause unreasonable adverse effects on the environment." NETL does not typically utilize pesticides at its facilities, however, each site has a pest control subcontractor who handles specific landscaping concerns per the appropriate regulatory requirements, as needs arise.

2.1.8 Clean Air Act (CAA)

The Clean Air Act (CAA) regulates air emissions from both stationary and mobile sources. It includes establishment of National Ambient Air Quality Standards (NAAQS) to protect public health and public welfare and regulates emissions of hazardous air pollutants. Each NETL site tracks its emissions via a quarterly air emissions inventory. Specific air quality compliance requirements are addressed in the site-specific sections. While no air quality violations were identified at any of the sites in 2020, site-specific compliance is addressed in the site-specific sections.

2.1.9 Clean Water Act (CWA)

The Clean Water Act (CWA) regulates the discharge of pollutants into the waters of the United States. The regulations include setting wastewater standards for industry, as well as national water quality criteria recommendations for pollutants in surface waters. Under the CWA, it is unlawful to discharge any pollutant from a point source

into navigable waters, unless a National Pollutant Discharge Elimination System (NPDES) permit was obtained. Currently only the Morgantown site holds an NPDES permit, although the Pittsburgh site is required to comply with the NPDES permit for the Bruceton Research Center which is held by CDC?NIOSH which is co-located with NETL at the BRC. The Albany site does not have an NPDES permit. Compliance with the CWA, as well as other water quality requirements is detailed under the site-specific discussions.

2.2 DOE INTERNAL ENVIRONMENTAL AND RADIATION PROTECTION ORDERS

2.2.1 DOE Order 436.1, Departmental Sustainability

NETL was in full conformance with DOE Order 436.1, Departmental Sustainability. This order addresses the requirements and responsibilities for managing sustainability and includes an emphasis on greenhouse gas reductions and achieving the goals established in applicable laws, regulations, and Executive Orders. It is the primary internal environmental protection Order within the Department.

2.2.2 DOE Order 458.1, Radiation Protection of the Public and Environment

NETL operates a compliant radiation protection program in accordance with DOE Order 458.1, Radiation Protection of the Public and Environment; however, NETL's programs are minimal when compared to other DOE national laboratories or sites administered under the control of the National Nuclear Security Administration (NNSA). The radiation protection program at NETL focuses on radiation generating devices (RGDs), sealed radioactive sources, naturally occurring radioactive materials/ technologically enhanced naturally occurring radioactive materials (NORM/TE-NORM) and legacy radioactive materials. These are discussed, as necessary, in this document based on their location.

2.2.3 DOE Order 231.1 B, Environment, Safety, and Health Reporting

In accordance with DOE Order 231.1, Environment, Safety, and Health Reporting, NETL has established an internal directive to ensure the collection and reporting of environmental, safety, and health (ES&H) information. NETL's procedure addresses reports, required on a scheduled basis by DOE or by regulation, and are essential for evaluating NETL operations and identifying opportunities for improvement for planning purposes. NETL's internal procedure applies to all NETL employees and research associates at the NETL sites. Reports must be compiled and submitted for the Albany, Morgantown, and Pittsburgh sites, as well as the Anchorage and Houston offices, as warranted. The directive requires that reports, documents, and other submissions listed in this procedure detail roles, responsibilities, recordkeeping, and required timelines for reporting, and are prepared and submitted in accordance with DOE Order 231.1.

2.2.4 DOE Order 435.1, Radioactive Waste Management

The objective of DOE Order 435.1, Radioactive Waste Management, is to ensure that all DOE radioactive waste is managed in a manner that protects worker and public health and safety and the environment. It requires that DOE radioactive waste management activities be systematically planned, documented, executed, and evaluated. Radioactive waste is to be managed to: (1) protect the public from exposure to radiation from radioactive materials; (2) protect the environment; (3) protect workers; and (4) comply with applicable Federal, state, and local laws and regulations. NETL ensures that such activities comply with DOE Order 435.1, as well as any other applicable Executive Orders and DOE directives.

2.3 ATOMIC ENERGY ACT OF 1954

The Atomic Energy Act of 1954 (AEA) and its amendments require Federal control of radiation source materials for the protection of the public and workers. DOE orders, EPA regulations, and Nuclear Regulatory Commission regulations are then developed based on the AEA. To fulfill its obligations, DOE has implemented radiation protection programs at its facilities that process, produce, handle, use or dispose of radiation source or other radioactive materials, which is limited based on research activities/priorities and minimal when compared to other DOE national laboratories or sites administered under the control of the National Nuclear Security Administration national laboratories.

Radiation exposure at NETL is managed based on the "as low as reasonably achievable" (ALARA) principle. Specific information is provided within each of the site-specific sections of this report, as necessary. Primary radiation exposure monitoring at the Albany, Morgantown, and Pittsburgh sites consists of personal dosimeter badges. Leak testing of radiation-generating devices is also completed on an annual basis. Source integrity testing is completed on all sealed sources every six (6) months as well. NETL also maintains a listing of radioactive sources and their respective custodians at each site.

The cumulative annual dose for all personnel performing all operations at the Albany, Morgantown, and Pittsburgh sites during 2020 was less than 100 millirem (roentgen equivalent man, <1 millisievert), with an average annual dose of less than 10 millirem (<0.1 millisievert) per person working in the radiation monitoring program.

In 2020, NETL continued to have:

- No doses to humans based on releases or potential releases.
- No radiological releases to air or water.
- No groundwater radiological monitoring required.
- No radiation protection of biota required.
- No radionuclide air emissions (under National Emissions Standards for Hazardous Air Pollutants – NESHAPs; no reporting required).

2.4 COMPLIANCE AND/OR CLEANUP AGREEMENTS

NETL's existing cleanup agreements are with the State of Wyoming's Department of Environmental Quality (WYDEQ) and are the result of experimental R&D research that began in the 1960s. Specifically, the agreements include efforts for groundwater and surface remediation at Rock Springs Oil Shale Retort Site in Sweetwater County, Wyoming. In the 1960's and 1970's, these sites were experimental R&D field sites for in situ oil shale retorting experiments.

From 1965 to 1979, the DOE's Laramie Energy Research Center conducted in situ oil shale retorting experiments at a facility located seven miles west of the town of Rock Springs, Wyoming. After the research activities ended, DOE performed a site-wide surface reclamation in 1982. In 1997, DOE completed a site-wide groundwater characterization identifying benzene as the contaminant of concern. Based on the results of this characterization, WYDEQ is requiring groundwater remediation of benzene with a restoration goal of <5 ug/l benzene at six of the 13 retort sites (Sites 4, 5, 6, 7, 9 and 12). Beginning in 1998, a variety of groundwater remediation technologies were implemented at these six sites, including pump and treat, bioremediation, and air sparging. Once the restoration goal is reached, or WYDEQ approves groundwater remediation at each retort site, DOE will perform surface revegetation and decommissioning prior to closure of each site.

2.5 ENVIRONMENTAL VIOLATIONS CITED BY REGULATORS/ NOTICES ISSUED

Regulators cited no environmental violations in calendar year 2020 at the Albany, Morgantown, or Pittsburgh Sites.

2.6 NOTICES OF VIOLATION NOTICES OF DEFICIENCY, NOTICES OF INTENT TO SUE, AND OTHER ENFORCEMENT ACTIONS

NETL had no Notices of Violation (NOVs), no notices of deficiency, no notices of intent to sue, and no other enforcement actions during calendar year 2020.

2.7 REPORTABLE ENVIRONMENTAL OCCURRENCES THAT REQUIRE NOTIFICATION TO AN OUTSIDE REGULATORY AGENCY

The Department's Occurrence Reporting and Processing System (ORPS) provides timely notification to the DOE complex of events that could adversely affect: public or DOE worker health and safety, the environment, national security, DOE's safeguards, and security interests, functioning of DOE facilities, or the Department's reputation. NETL had four ORPS reportable items in 2020. These are discussed in more detail in the site-specific sections.

2.8 MAJOR ISSUES, INSTANCES OF NON-COMPLIANCE, AND CORRECTIVE ACTIONS

No major issues or instances of noncompliance were reported at NETL in 2020.

NETL underwent recertification audits at all three facilities for the ISO 14001:2015 and ISO 45001:2018 standards in October 2020 with a new external auditor, Government and Military Certification Systems, Inc. During the audits, NETL received two minor nonconformities dealing with Management Review and Internal Audits. These minor nonconformities are being addressed prior to the 2021 surveillance audits. The external auditor recommended that NETL continue to maintain its certifications.

2.9 STATUS OF ONGOING THIRD-PARTY INSPECTIONS, SELF-ASSESSMENTS AND ENVIRONMENTAL AUDITS

The Pittsburgh and Morgantown sites originally received certification to the ISO 14001:1996 standard on August 31, 2003. The Albany site received certification to the ISO 14001:2004 standard June 9, 2005. All three sites were recertified to the same scope by Orion Registrar, Inc., in 2010. Recertification and surveillance audits continued to be conducted at all three sites to demonstrate continual improvement in the ES&H Management System and conformance to the ISO 14001:2004 standard. Subsequently, all three sites were also certified to the OHSAS 18001:2007 standard.

NETL underwent recertification audits in 2016 to demonstrate conformance to the ISO 14001:2004/ OHSAS 18001:2007 standards. In 2018, NETL upgraded to the ISO 14001:2015 version of the standard and continued to maintain its certification to the OHSAS 18001:2007 standard. This involved upgrade audits in Morgantown (April 24, 2018); Pittsburgh (April 25, 2018); and Albany (July 17-18, 2018). Over the course of the upgrade audits, auditors identified two nonconformities and seven strengths.

In addition, surveillance audits took place at Morgantown (November 14, 2018) and Pittsburgh (November 15, 2018). The auditors did not identify any nonconformances but identified three OFIs and one strength.

In 2019, all three sites underwent recertification audits to ISO 14001:2015 and certification

audits to ISO 45001:2018 (which specifies requirements for an occupational health and safety, OH&S, management system).

However, due to the COVID-19 pandemic, in October 2020 NETL held a virtual recertification audit with a new external auditor, Government and Military Systems, Inc. During this audit, the auditor identified two minor nonconformities. The first nonconformity dealt with the requirement for "top management" participation in the Management Review Board (MRB) meetings and the need to include risk and opportunity and consultation and participation of workers in the MRB meeting agenda. NETL's response focused on the Chief Operating Officer (COO) being the Director's representative at MRB meetings (and the subsequent briefing to the Director), and that the agenda of future MRB meetings would be adjusted to include risk and opportunity and consultation and participation of workers. The second nonconformity was that internal audit records for calendar year 2020 did not reflect that management review was audited. This correction was to ensure that that management review was audited during the next internal audit. The auditor also made a number of observations for NETL to consider during the upcoming year.

By maintaining its ISO 14001:2015/ISO 45001:2018 certifications and working toward continual improvements to its ES&H Management System, NETL demonstrates to its workforce, the surrounding community, DOE, and other stakeholders that it is committed to responsible environmental, safety, and health stewardship.

In addition to the third-party certification audit in calendar year 2020, the Albany, Morgantown, and Pittsburgh sites participated in a virtual Site Assistance Visit (SAV) with DOE's Office of Fossil Energy and Carbon Management (FECM). This meeting, held on September 21, 2020. provided an extra review of NETL programs and an opportunity for headquarters staff to gain a better perspective on ES&H activities that occur at NETL.

2.10 SUMMARY OF ENVIRONMENTAL PERMITS – INDUSTRIAL HYGIENE

A summary of industrial hygiene permits (asbestos permits) per site is provided in Table 2.10, 2020 Summary of Permits – Industrial Hygiene.

Table 2.10: 2020 Summary of Permits – Industrial Hygiene

Permit No. and Name	Site	Issue Date	Regulatory Agency	Description
W.L. Thomas (Quarterly Reported Under Small-Scale Permit – *next report run January 2021*) License #: FSC700	Albany	3/17/2020 (AHA) AHA signed 20200415182342143 --- 4/15/2020 (Work Performed)	ORDEQ	B-2 Selective Demolition for Access Ports (16 access points) *Removal of Approximately 24ft² NON-FRIABLE asbestos ceiling and wall finishes* Small Scale
W.L. Thomas (Quarterly Reported Under Small-Scale Permit – *next report run January 2021*) License #: FSC700	Albany	11/16/2020 signed AHA 20201116133753132	ORDEQ	B-29 Room 112 Abatement *Removal of Approximately 16.5ft² of NON-FRIABLE asbestos flooring along with the chemical removal of approximately 100ft² of NON-FRIABLE asbestos-containing mastic (as an exempt material) and HEPA-vacuuming with wet wiping of all surfaces within and adjacent to the disturbed area.* Small Scale permit.pdf

Table 2.10, continued: 2020 Summary of Permits – Industrial Hygiene

Permit No. and Name	Site	Issue Date	Regulatory Agency	Description
KLA Roofing & Construction, LLC Electronic Submission, Reference ID: B-2679 (8/11/2020) License #: AC002801	Morgantown	8/31/2020 – 9/1/2020	WVDHHR	T-43 Demolition *Removal of Approximately = 1,640 ft² (Roofing)* 4025-16 Asbestos Close Out Documen
KLA Roofing & Construction, LLC Electronic Submission, Reference ID: B-2679 (8/11/2020) License #: AC002801	Morgantown	9/1/2020 – 9/4/2020	WVDHHR	T-45 Demolition *Removal of Approximately = 2,380 ft² (Roofing)* 4025-16 Asbestos Close Out Documen

2.11 EXECUTIVE ORDER 13834

On May 17, 2018, E.O. 13834, Efficient Federal Operations, was implemented, revoking the requirements of E.O. 13693, Planning for Federal Sustainability in the Next Decade. The purpose of E.O. 13834 was to establish that it is the policy of the United States that federal agencies shall meet such statutory requirements in a manner that increases efficiency, optimizes performance, eliminates unnecessary use of resources, and protects the environment. In implementing this policy, each agency shall prioritize actions that reduce waste, cut costs, enhance the resilience of Federal infrastructure and operations, and enable more effective accomplishment of its mission.

The goals set forth for federal agencies were to:

- Achieve and maintain annual reductions in building energy use and implement energy efficiency measures that reduce costs;
- Meet statutory requirements relating to the consumption of renewable energy and electricity;
- Reduce potable and non-potable water consumption, and comply with stormwater management requirements;
- Utilize performance contracting to achieve energy, water, building modernization, and infrastructure goals;
- Ensure that new construction and major renovations conform to applicable building energy efficiency requirements and sustainable design principles, consider building efficiency when renewing or entering into leases, implement space utilization and optimization practices, and annually assess and report on building conformance to sustainability metrics;
- Implement waste prevention and recycling measures and comply with all Federal

requirements with regard to solid, hazardous, and toxic waste management and disposal;

- Acquire, use, and dispose of products and services, including electronics, in accordance with statutory mandates for purchasing preference, Federal Acquisition Regulation requirements, and other applicable Federal procurement policies; and
- Track and report on energy management activities, performance improvements, cost reductions, greenhouse gas emissions, energy and water savings, and other appropriate performance measures.

NETL considered the requirements of the executive order when establishing specific objectives and targets for its FY2020 ES&H Management System.

Subsequently, E.O. 13834 was revoked by: E.O.13990, January 20, 2021 – except for Sections 6. Duties of the Federal Chief Sustainability Officer, Section 7. Duties of Heads of Agencies, and Section 11. General Provisions; it is anticipated that the new executive order and any additional ones will impact the ES&H Management System in FY2022.

2.12 COVID-19 IMPACTS

From the onset of the COVID-19 pandemic, NETL has been committed to protecting its workforce and preserving the Lab's ability to complete its mission, while keeping its ES&H values at the forefront of the way day-to-day activities are approached.

Since March 2020 and throughout 2020, on average, approximately 79% of the NETL workforce has worked from home. Minimum personnel reported on site to handle non-portable work, including managing ES&H compliance, facilities, security, information technology, and research and construction activities that, if stopped or paused, would lead to an unacceptable loss of key research results or significant expense. In addition, the Lab instituted a myriad of health, safety, and workplace operations protocols following the latest guidance provided by public health agencies spanning all levels of government. Protocols included accommodations for maximum telework; increased leave flexibilities; symptom monitoring; face masks; physical distancing; cleaning and disinfection; HVAC upgrades and personal hygiene. As a result, NETL had zero instances of on-site transmission in CY2020 and outperformed the Department-wide average for the 2020 Federal Employee Viewpoint Survey in 10 of the 12 pandemic-related survey questions. Future planning to transition the Lab from response to recovery and a return of personnel to the sites in more significant numbers will be guided by the Administration's Safer Federal Workforce Task Force and Department's forthcoming Re-Entry Plan.

As noted above, while there were minimal personnel reporting to the site throughout CY2020, the majority of NETL environmental activities and compliance continued as normal. However, there were three instances in which sampling/monitoring activities and inspections were not conducted due to COVID.

The first instance was with respect to a semi-annual groundwater sampling event at the Albany site. This event would typically take place in the spring and fall of each year to monitor for volatile organic compounds and metals. This semi-annual sampling is aligned with the Oregon Department of Environmental Quality Voluntary Cleanup Program. The sampling event in the fall of 2020 was not conducted since travel was not permitted at the time. There is no permit associated with this sampling, and as a result, regulatory noncompliance did not occur due to the sampling not being conducted. However, NETL initiated plans to resume sampling in the spring of 2021.

The second instance occurred in the second quarter of CY2020 relevant to the Albany site. In this instance, an industrial wastewater semi-annual sampling event was to be collected by the City of Albany. The City of Albany did not perform their sampling in the second quarter of CY2020 but resumed their sampling in the fourth quarter of CY2020. This industrial wastewater sampling is self-imposed

requirement (by the City of Albany); there were no impacts to NETL.

The final instance was the annual on-site inspection that was to be conducted by the City of Albany pertaining to industrial wastewater. This event was not conducted on site but was conducted virtually. No noncompliance issues were identified.

No other sampling, monitoring, or inspection compliance issues were identified as being impacted due to the COVID-19 pandemic.

3.0 COMPLIANCE BY SITE

NETL consists of three research sites and two program office sites, each focusing on different activities. Each of these sites are in different states and are subject to varying state and local environmental regulations. This document includes detailed compliance status discussions for each of the research sites. Since the Albany, Morgantown, and Pittsburgh sites include laboratory facilities, they may present a broad array of environmental concerns and regulatory requirements. A detailed discussion is provided for each of these sites in this report. The Anchorage and Houston program offices perform only administrative functions, therefore, the environmental impacts and regulatory compliance issues for these locations is discussed in less detail.

3.1 ANCHORAGE, ALASKA

3.1.1 Site Description

NETL's Arctic Energy Office promotes the research, development and deployment of energy production and conversion technology in Alaska. Activities in the Anchorage office include facilitating communication among Arctic energy stakeholders, as well as assessing Arctic energy R&D needs associated with unconventional oil and gas, remote electric power technology and tundra access.

Since 2015, the Anchorage program office has been staffed by a site support contractor employee providing technical support to the NETL's Oil & Gas Program. The contractor is responsible for support and delivery of DOE technical assistance, capacity building, energy education, and outreach to all Alaskan tribal entities.

Anchorage is Alaska's primary governmental, transportation, industry and population center. Anchorage (Photo 3.1.1) is in south-central Alaska on the northern end of the Cook Inlet and is situated between the Chugach Mountains and the tidal inlets known as Turnagain and Knick Arms. By air, Anchorage is 55 minutes from Fairbanks and 3.5 hours from Seattle. It is located 358 road miles (576 km) south of Fairbanks.

As of the most recent U.S. Census, there were 291,826 people and 105,517 households in the city of Anchorage. The population density was 171.2 per square mile, with 113,032 housing units at an average density of 66.3 per square mile. The racial makeup was 66.0% White, 8.1% Asian, 7.9% Native American, 7.6% Hispanic or Latino, 5.6% African American, 2.0% Pacific Islander, and 8.1% from two or more races.

The median household income in Anchorage was $76,495 and the per capita income was $36,145. About 7.7% of the population was below the poverty line. The major employers in Anchorage are the military, state government, federal government (civilian sector), the University of Alaska, the Anchorage School District, Ted Stevens International Airport, and Providence Health and Services.

Photo 3.1.1: City of Anchorage.

Building operations, maintenance and janitorial services are under the control of the landlord; therefore, minimal compliance assessments and ES&H inspections and investigations are required. The Anchorage office does not undertake in-house audits, external audits or subject matter reviews. However, in-house inspections and regulatory agency inspections (e.g., by the local fire marshal or municipal building inspectors) of the building and facilities may occur, with any subsequent findings assessed against the landlord. Although fire drills are not practiced, the building is equipped with a fire detection and suppression system that is tested by the landlord on an annual basis.

The lease on the above-described commercial office space expired in December of 2020 and was not renewed. The office was vacated at that time. The NETL support contractor employee and DOE Office of Indian Energy employees will move to office space in the James M. Fitzgerald United States Courthouse and Federal Building in 2021. The new space is leased under an agreement with Office of Indian Energy.

3.1.2 Environmental Compliance

Due to the nature of the work (assessment of Arctic Energy R&D need areas and coordination with Arctic Energy stakeholders) the waste management services are minimal and are provided by the landlord under the terms of the rental agreement. The city of Anchorage does not impose recycling requirements that apply to leased office space. No formal recycling program is in place at the Anchorage office; however, designated containers exist for recycling paper and plastic.

The Anchorage office is not required to implement an environmental compliance program. It does not formally implement a pollution prevention program. Anchorage staff practice affirmative procurement whenever possible (i.e., the procurement of goods containing recycled content or having less life-cycle impact on the environment). No actions were taken in 2020 to alter the facility or operations in a manner that could change the current impacts on the environment in or around the Anchorage office.

3.1.2.1 NEPA

NETL independently reviews any contract performed through or supported by the Arctic Energy Office for potential environmental impacts before the project is undertaken. The Anchorage Office does not conduct National Environmental Policy Act (NEPA) reviews for such proposed, off-site actions.

3.1.2.2 Radiation Protection

The only sources of potentially harmful radiation in the Anchorage office are Class 1

lasers, commonly found in printers and CD/DVD readers/recorders. Anchorage staff is ensured protection from these lasers through proper engineering design of the electronic devices.

3.1.2.3 Air Quality and Protection Activities

The air quality in the city of Anchorage follows all governing regulations. The Anchorage office landlord is responsible for maintaining sufficient air quality in the building and implements ventilation air filter changes on a quarterly basis. Any ozone-depleting refrigerants that may be used for air conditioning are under the control of the landlord.

Due to the nature of the work performed (assessment of Arctic Energy R&D need areas and coordination with Arctic Energy stakeholders), it is unnecessary to implement air quality monitoring, regulation or protection programs.

3.1.2.4 Water Quality and Protection Activities

The Anchorage office landlord is responsible for maintaining sewer and storm water and other related permits. The landlord tests the domestic water supply annually to ensure compliance with Safe Drinking Water Act standards.

3.1.2.5 Responsibilities for addressing Executive Orders 13423, 13514, and 13693

See Section 4.0 ES&H Management System.

NETL-Anchorage engages in minimal ES&H activities. On-site ES&H primarily focuses on affirmative procurement of office supplies and miscellaneous items. The Anchorage office does not maintain an ES&H Management System and is not covered by NETL's ES&HMS system in effect at the Albany, Morgantown and Pittsburgh sites.

3.1.2.6 Other Major Environmental Issues and Actions

Anchorage staff is not aware of any ongoing or pending lawsuits, Notices of Violation, public accusations of regulatory violations or any environmental occurrences. No violations of compliance agreements or cleanup agreements or any unresolved compliance issues have occurred. No audits were conducted in 2020 under the sponsorship of DOE Headquarters, independent regulators or other independent third parties.

3.2 ALBANY, OREGON

3.2.1 Site Description

The Albany site focuses on technologies in scientific and engineering areas creating commercially viable solutions to national energy and environmental problems. These areas include materials performance, multi-environmental materials characterization, alloy development/manufacture, and geospatial data analysis. The work is accomplished through both in-house R&D and contracted research. There are 130 employees at the Albany site, including 39 federal employees and 91 contractor employees.

The Albany, site is located in Linn County, Oregon, in the western part of the state (Photo 3.2.1). Albany, the county seat of Linn County, is located approximately 45 miles north of Eugene, 70 miles south of Portland and 25 miles south of Salem. Geographically, the facility is located in the Willamette Valley, which is structural and erosional lowland between the uplifted marine rocks of the Coast Range and the volcanic rocks of the Cascade Range. The Albany site covers approximately 42 acres with approximately 248,000 square feet of building working area. The site is relatively flat and located on a higher section of town away from any flood plains. The Calapooia River is located west of the laboratory, flowing in a broad arcuate pattern from southeast of the laboratory west to north, emptying into the Willamette River. Land use immediately surrounding the Albany site is a combination of residential housing developments,

small businesses and public-school properties.

As of the 2010 census, the city contained 50,158 people and 18,164 households. The population density was 2,860.1 per square mile. There were 20,979 housing units at an average density of 1,198.8 per square mile. The racial makeup of the city was 87.8% White, 0.7% African American, 1.2% Native American, 1.4% Asian, 0.2% Pacific Islander, 5.2% from other races, and 3.6% from two or more races. Hispanic or Latino of any race were 11.4% of the population.

Photo 3.2.1: Albany Site.

The median income for a household in the city was $45,390. The per capita income for the city was $22,230. About 15.5% of the population was below the poverty line. The major employers in Albany are Samaritan Health Services, Linn Benton Community College, Greater Albany Public Schools ATI, Greater Target Distribution Center, and Linn County.

3.2.2 Major Site Activities

1.) B-28 & B-31 Transfer Switches

Provided the capability of connecting temporary generators to support long-term research experiments during power outages.

2.) B-23/24 Cooling Tower Replacement

Replaced the existing cooling tower that provides chilled water to research operations in Buildings 23 and 24. It was leaking and at the end of its life.

Photo 3.2.2.2: B-23/24 Cooling Tower Replacement

3.) B-7 through B-11 Sidewalk Replacement and Drainage Upgrades

Replaced a degraded sidewalk with a code compliant sidewalk and provided for proper stormwater drainage to eliminate water pooling.

Photo 3.2.2.3: B-7 through B-11 Sidewalk & Drainage Upgrades

4.) B-24 & B-35 Asphalt Roof Replacements

Replaced dilapidated end-of-life asphalt roofs on Buildings 24 and 35.

Photo 3.2.2.4: B-24 & B-35 Asphalt Roof Replacements

5.) B-23 Roof Replacement

Replaced dilapidated end-of-life asphalt and membrane roof on Building 23 and replaced the existing roof access stairs/hatch with OSHA compliant roof access.

Photo 3.2.2.5: B-23 Roof Replacement

6.) B-17 East-Wing Renovation Design

Completed a design to renovate and repurpose the east wing of Building 17 to provide code compliant office spaces.

Photo 3.2.2.6: B-17 East Wing Renovation Design

3.2.3 Environmental Restoration and Waste Management

3.2.3.1 CERCLA

The Albany site had no off-site remediation activities during 2020. There were no National Priorities List (NPL) sites for which the Albany site had liability under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Superfund Amendments and Reauthorization Act (SARA).

3.2.3.2 RCRA

There were no EPA compliance issues in 2020. There were no Notices of Violation, corrective actions, or best management practices associated with the inspection or operations of hazardous waste handling during 2020. There were no RCRA compliance inspections completed by the Oregon Department of Environmental Quality (DEQ) at the Albany site during 2020. There were no EPA, Region 10 inspections during 2020.

Due to the COVID-19 Pandemic restrictions, DOE Headquarters (FE-17) completed a virtual Staff Assistance Visit (SAV) in September 2020 with NETL personnel. During this SAV, the RCRA program was assessed and no additional opportunities for improvement were identified as part of this SAV. All opportunities for improvement identified during prior SAVs have been appropriately addressed.

3.2.3.3 Federal Facilities Compliance Act (FFCA)

There were no issues identified during 2020 regarding the Federal Facilities Compliance Act at the Albany site.

3.2.3.4 NEPA

See section 2.1.2 National Environmental Policy Act (NEPA) for information on Albany NEPA requirements.

3.2.3.5 TSCA

NETL-Albany does not manufacture chemicals and is not subject to sections of the Toxic Substance Control Act (TSCA) related to manufacturing. No spills or releases of substances regulated by the Toxic Substances Control Act (TSCA) of 1976 (with

amendments, et. seq.) – including pesticides, polychlorinated biphenyls (PCBs), formaldehyde, methylene chloride, asbestos, etc. – were reported in 2020 at the Albany site. TSCA waste generated during 2020 included asbestos, lead-based paint, and spent PCB waste, which was disposed of in accordance with Federal, state and local requirements.

Non-friable asbestos present at the NETL-Albany site is inventoried and maintained. No samples taken in 2020 indicated that the materials contained fiber concentrations in excess of EPA or the State of Oregon clearance levels (0.01 fibers/cc). Asbestos engineering drawings based on the Albany site inventory continue to be maintained and updated.

When asbestos is removed as part of any remodeling or reworking in a room, building, or facility; it is handled by a licensed Asbestos Abatement/Removal Contractor (AA/RC). There were two projects that required a 10-day asbestos notification permit to Oregon Department of Environmental Quality in 2020: (1) B-2 Selective Demolition (for Access Ports), which required removal of approximately 24ft^2 non-friable asbestos ceiling and wall finishes; and (2) B-29, Room 112 Abatement, which required removal of approximately 16.5ft ^{2} of non-friable asbestos flooring along with the chemical removal of approximately 100ft^2 of non-friable asbestos-containing mastic.

Additionally, NETL tests for lead-based paint before demolition projects or elimination of materials through excess property or recycling. In 2020, all components associated with the B-17 High Bay, Room 115 demolition were presumed positive. In preparation for inclusion with 50% Design Review of B-17 East Offices, it was decided to presume that all demolition of painted finishes, building materials, components, etc. are lead-containing and/or lead-based paint. A Lead Compliance Plan was submitted for lead renovations in accordance with OSHA 29 CFR 1926.62.

3.2.3.6 FIFRA

No restricted-use pesticides, herbicides or defoliants were used at the Albany site during 2020. Only general-use herbicides were used for routine vegetation control along fence lines, guard rails and flower beds. Rodent control was provided via traps with commercial-use baits. Pest and plant/weed control services at the Albany site are provided by contracted professional pest control and professional landscape management companies, respectively.

3.2.4 Radiation Protection Program

The Albany site has legacy radiological issues, which include the presence of ores that are naturally occurring radioactive materials (NORM), as well as areas that have not been completely released from radiological controls (due to configuration and inability to complete release surveys). Radiological waste generated at the Albany site is packaged for proper waste disposal as low-level radioactive waste (LLRW) in accordance with applicable regulations at the licensed regional facility in the State of Washington (U.S. Ecology), as authorized via an active site-use permit with the State of Washington–Department of Health. No LLRW disposal activities were required during 2020. There are no sealed sources at the Albany site.

Radiation monitoring performed at Albany consisted of whole-body thermoluminescent dosimeters and finger rings for the employees in the mail facility (mail and packages are scanned via x-ray upon receipt), and as identified in appropriate R&D Safety Analysis and Review System (SARS) packages. All radiation generating devices are surveyed for possible leakage on an annual basis.

The cumulative annual dose for all personnel performing all operations at the Albany site

during 2020 was less than 100 millirem (roentgen equivalent man, <1 millisievert), with an average annual dose of less than 10 millirem (<0.1 millisievert) per person working in the radiation monitoring program.

3.2.4.1 DOE Order 458.1, Radiation Protection of the Public and Environment

Additional information may be found in Section 2.2, *DOE Internal Environmental and Radiation Protection Orders*, and Section 2.3, *Atomic Energy Act of 1954*. In accordance with "as low as is reasonably achievable" (ALARA) principles, NETL manages an appropriate radiation protection program for protection of the public and the environment from radiation hazards since radiation sources are low-level, sealed instrumentation sources, radiation generating devices (RGDs) or processes that include naturally occurring radioactive materials or technologically enhanced naturally occurring radioactive materials (NORM/TE-NORM) with minimal radiation levels.

3.2.4.2 DOE Order 435.1, Radioactive Waste Management

There are no source materials located at the Albany site. X-ray generating devices are used for analytical applications at the Albany site, including scanning and transmission electron microscopes, X-ray diffraction and fluorescence instruments and a particle-size analyzer. Table 3.2.4.2 lists the X-ray radiation generating devices at the Albany site. These devices are examined semi-annually for leaks and safety interlocks/controls to ensure employee safety. Minor amounts of legacy items remain stored in the B-28 hot cell and other controlled locations across the site awaiting disposal. The site maintains an active site-use permit with the State of Washington–Department of Health (DOH) that allows for the disposal of low-level radioactive wastes (LLRW) at the regional waste handling facility, US Ecology Washington. There were no LLRW disposal shipments in 2020.

Table 3.2.4.2: 2020 Albany X-Ray Radiation Generating Devices

Device	Quantity
X-Ray Florescence Instrument	1
X-Ray Diffraction Instrument	2
Scanning Electron Microscope/Microprobe	2
Transmission Electron Microscope	1
Mail X-Ray Instrument	1
Sedigraph/Particle Analyzer	1

3.2.5 Air Quality and Protection Activities

Significant requirements and responsibilities of this program are listed in Procedure 436.1-03.01, *NETL Ambient Air Quality Management*. Under this Program, the Air Quality Manager (AQM) ensures compliance with all Federal, state and local regulations, as well as DOE Directives. The AQM also oversees monitoring programs, permitting and reporting. Several previous ES&H management plans (EMPs) were created focusing on various emission categories or sources where NETL can make the most improvement. To maintain quality control, NETL selects and subcontracts analytical work only to certified laboratories. These

laboratories must submit their Quality Assurance/Quality Control (QA/QC) manuals to NETL for inspection, and NETL submits quality control samples (duplicates, blanks and spikes) to the laboratories to verify the quality of the analyses. Air emissions data for the site is calculated and maintained to ensure compliance with regulatory requirements.

Several EMPs direct continuous improvement efforts in air-quality protection and to reduce Greenhouse Gas (GHG) emissions. One EMP tracks a NETL comprehensive GHG inventory for FY2020, along with executing renewable energy generation projects at the NETL sites and purchasing renewable energy credits (to make up any differences). Another EMP requires the reduction of energy usage/ square foot (Btu/ft^2) by 1% annually on a year-over-year basis . This EMP will reduce energy intensity in buildings to achieve GHG reductions. In addition, NETL also has other EMPs that call for reducing petroleum-based fuels and increasing the use of alternative fuels and renewable energy to reduce NETL's impact on ambient air quality. Note that current Scope 1, 2, and 3 goals have been paused and only reporting of annual GHG emissions is required.

The Albany site experienced a significant wildfire season during 2020, with several wildfires coming within less than 30 miles of the site. While there was no direct wildfire damage, the ambient air quality at the site was degraded significantly over a period of two weeks, with the resulting ash impacting site HVAC systems and ambient air quality impacting ability to perform work. Air quality index levels exceeded unhealthy levels for several days and necessitated the site being closed for operations for several days.

3.2.5.1 Clean Air Act

Albany has no emissions that require monitoring, reporting, or permitting based on current operations. In 2020, there were no New Source (Pre-Construction) Reviews for any facilities or projects owned or managed by the Albany site. Operation of the Albany site does not contribute significantly to any emissions under the National Ambient Air Quality Standards (NAAQS).

3.2.5.2 National Emission Standards for Hazardous Air Pollutants

No Albany facilities or projects are regulated under the National Emission Standards for Hazardous Air Pollutants. No Albany facilities and/or projects have the potential to emit more than 10 tons per year of a single designated toxic air pollutant or more than 25 tons per year in aggregate of all toxic air pollutants, nor are any facilities or projects regulated for any of the 189 toxic air pollutants. Table 3.2.5.2 displays the estimated 2020 Air Emissions for both facility operations and R&D projects at the Albany site.

Ozone-depleting substances (ODSs) or refrigerants are used for air conditioning, refrigeration, chilling, or for protection of sensitive electrical systems. A list of existing ODSs is maintained and tracked. Units are being replaced with more environmentally friendly units on a continual basis, whenever practicable.

Table 3.2.5.2: 2020 Air Emissions Inventory—Albany

Pollutant	Calculated Emissions (lbs./yr.)
Volatile Organic Compounds	8.1
Nitrogen Oxide	150
Carbon Monoxide	120
Sulfur Dioxide	5.2
Total Suspended Particulates	170
Particulate Matter 10 (PM_{10})	29

3.2.6 Water Quality and Protection Activities

3.2.6.1 Clean Water Act

The EPA and the Oregon Department of Environmental Quality (DEQ) have implemented water pollution control programs, including setting wastewater standards for industry and setting water quality standards for all contaminants in surface waters. These requirements are managed via permits issued to the City of Albany, which then acts as the CWA permitting authority for NETL.

3.2.6.2 Industrial Wastewater Program

NETL-Albany holds an industrial wastewater discharge permit with the City of Albany, which was last issued in December 2018 on a five-year renewal cycle. Quarterly monitoring is required in accordance with the permit. Table 3.2.6.2 provides the results of the 2020 monitoring, with all results within permit limits. Based on permit requirements, Albany is also required to submit a slug discharge control plan to the city, when the permit is renewed. Elementary neutralization units have been installed at several laboratory buildings (see Photo 3.2.6.2) to prevent potential pH excursions from laboratories even though procedures prohibit disposition of chemicals via laboratory drains. Several industrial wastewater notifications were required for compliance monitoring and planned/unplanned industrial wastewater uses/discharges in 2020, which were completed in accordance with NETL's industrial wastewater permit and slug discharge permit. City of Albany personnel inspected the facility in October 2020 (virtual inspection due to the COVID-19 pandemic restrictions), and no issues were documented.

Photo 3.2.6.2: Elementary Neutralization System.

Table 3.2.6.2: 2020 Industrial Wastewater Discharge Permit Monitoring Analysis—Albany			
Constituent	Permit Limits	Sample Date	
		01/17/2020	07/07/2020
Arsenic	1.0 mg/L	ND	ND
Cadmium	0.44 mg/L	ND	ND
Chromium	2.8 mg/L	0.00096 mg/L	0.0073 mg/L
Copper	3.4 mg/L	0.0054 mg/L	0.052 mg/L
Cyanide (Total)	1.2 mg/L	ND	ND
Lead	0.7 mg/L	ND	0.011 mg/L
Mercury	0.08 mg/L	ND	0.00055 mg/L
Molybdenum	0.84 mg/L	0.0013 mg/L	ND
Nickel	1.6 mg/L	ND	0.0086 mg/L
Oil & Grease (Total)	300 mg/L	2.8 mg/L	5.3 mg/L
Selenium	0.72 mg/L	0.0000860 mg/L	ND
Silver	1.1 mg/L	ND	ND
Zinc	1.5 mg/L	0.025 mg/L	0.14 mg/L

3.2.6.3 NPDES Permit

The Albany site does not hold a stormwater permit because regulation is augmented by the City of Albany through its stormwater program.

The City of Albany continues to work with Oregon DEQ concerning its NPDES MS4 Phase II requirements, including a Stormwater Management Plans (under discussion and litigation). NETL will be required to comply with the final permit when issued. Since NETL does not have a specific, combined outfall or discharge directly to a body of water, any NPDES permit requirements from the City of Albany would likely be limited to general protective measures.

3.2.6.4 Stormwater Management and Energy Independence and Security Act of 2007

There were no issues in 2020 regarding the Stormwater Management and Energy Independence and Security Act of 2007 at the Albany site.

3.2.7 Other Environmental Statutes

3.2.7.1 Endangered Species Contract

There were no issues at the Albany site regarding the Endangered Species Act during 2020.

3.2.7.2 National Historic Preservation Act

As part of its renovation efforts, the Albany site is required to ensure that the requirements of the Oregon State Historic Preservation Office (SHPO) are identified and their concurrence is obtained for the aspects of the long-term Albany Site Plan, since renovations at the site may impact the Albany Site Historic District. NETL continues to

pursue an update to its Programmatic Agreement with the Oregon State Historic Preservation Office (SHPO). This update was prepared via contract and reviewed by Laboratory Operations, General Counsel, and the Chief Operating Officer in late 2016, and was presented to the Oregon SHPO in December 2016. NETL continues to meet and have discussions with representatives from the Oregon SHPO in attempt to finalize this updated agreement. In the interim, NETL continues to work with the Oregon SHPO to provide for reviews and potential mitigations associated with all major projects accomplished at the Albany site.

3.2.7.3 Migratory Bird Treaty Act

There were no issues at the Albany site regarding the Migratory Bird Treaty Act during 2020.

3.2.8 DOE Order 436.1, Departmental Sustainability

See Section 2.2.1.

3.2.8.1 Responsibilities for addressing Executive Orders 13423, 13514, and 13693

See Section 4.0 ES&H Management System.

3.2.8.2 E.O. 13693 GHG Reduction Targets and Sustainability Goals

See Section 4.0 ES&H Management System.

3.2.8.3 Progress on Meeting DOE Strategic Sustainability Performance Plan Goals (2016)

See Section 4.0 ES&H Management System.

3.2.9 Executive Orders and DOE Orders

The Albany site was in full compliance with all applicable environmental Executive Orders in 2020. Throughout the year, numerous inspections and audits were performed and documented to ensure there were no instances of noncompliance. As noted above, E.O.13834, Efficient Federal Operations, was implemented as part of NETL's ES&H management system. E.O. 13693, Planning for Federal Sustainability in the Next Decade was rescinded because of the new executive order, which is described in more detail in Section 4.0.

In addition, other executive orders that apply to NETL, but for which no specific actions were required in 2020, include E.O. 11514, Protection and Enhancement of Environmental Quality; E.O. 11738, Providing For Administration of the Clean Air Act and the Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans; E.O. 11987, Exotic Organisms; E.O. 12088, Federal Compliance with Pollution Control Standards; E.O. 11988, Floodplain Management; and E.O. 11990, Protection of Wetlands; and E.O. 12898, Environmental Justice for Low Income & Minority Populations.

3.2.9.1 Executive Order 11988, Floodplain Management

There were no issues with Floodplain management at the Albany site, as there are no designated floodplains on the Albany site.

3.2.9.2 Executive Order 11990, Protection of Wetlands

There were no issues with protection of wetlands at the Albany site, as there are no designated wetlands on the Albany site.

3.2.10 Other Major Environmental Issues and Accomplishments

The Department's Occurrence Reporting Program System (ORPS) provides timely notification to the DOE complex of events that could adversely affect: the public or DOE worker health and safety, the environment, national security, DOE's safeguards and security interests, functioning of DOE facilities, or the Department's reputation. The Albany Site did not file any ORPS reports in 2020.

3.2.10.1 Green and Sustainable Remediation (GSR)

There were no specific Green and Sustainable Remediation efforts related to brownfield sites at the Albany site in 2020.

3.2.10.2 Organizational Resilience

Organizational Resilience is defined as the ability of an organization to anticipate, prepare for, respond and adapt to incremental change and sudden disruptions in order to survive and prosper. NETL has identified climate-related risks as they relate to national disasters, fire, medical emergencies, hazardous materials, physical assets and real property, and energy/water supplies, and developed initial response procedures. In addition, NETL's Emergency Response Organization (ERO) meets with local emergency planning committees on a monthly basis to review hazards-based risks to the region including high-priority impacts from high-water levels and storm damage due to weather events of increasing intensity. Additional emphasis was also placed on wildfire preparedness due to the adverse wildfire season experienced in Oregon. While normal wildfire seasons rarely impact resources in the Willamette Valley, this year's wildfire season served as a reminder that impacts can swiftly impact site operations.

NETL management strongly supports utilization of the best available science related to organizational resiliency policies and programs and will continue to update all applicable NETL orders, policies and procedures, as necessary.

3.2.11 Continuous Release Reporting

There was no continuous release reporting required at the Albany site in 2020.

3.2.12 Unplanned Releases

There were no unplanned releases at the Albany site during 2020.

3.2.13 Summary of Environmental Permits

A summary of environmental permits for the Albany site is provided in Table 3.2.13, 2020 Summary of Permits.

Table 3.2.13: 2020 Summary of Permits - ALB				
Permit No. and Name	Site	Issue Date - Exp. Date	Regulatory Agency	Description
8731-02 Industrial Wastewater Discharge Permit	Albany	12/15/2018 – 12/14/2023 (updated every 5 years)	City of Albany Public Works Department	Authorization to discharge industrial wastewater to the City of Albany wastewater treatment system.
G2140 Site Use Permit	Albany	03/01/2020 – 02/28/2021 (updated annually)	State of Washington—Department of Public Health	Site-use permit to allow for low-level radioactive waste disposal at the regional disposal facility.

3.2.14 Fire Protection Management and Planning

A wildfire is an uncontrolled fire in an area of combustible vegetation that occurs in the countryside or rural area. The Albany site is 42 acres with 10 acres being vacant fields. The site has a perimeter fence with neighborhoods surrounding the property.

Oregon has a very high risk for wildfire vulnerability. Wildfires often cause the worst air pollution days of the year leading to health risks for the young and elderly as well as those with respiratory ailments. More than 1.2 million people living in Oregon, or 33% of the state's population, are living in areas at elevated risk of wildfire. In 2017, more than 2,000 wildfires were reported in Oregon, burning more than 700,000 acres. Another threat of a forest fire would be incidental fires from off site, or equipment use on the property. Illegal or uncontrolled burning (burning leaves, bon fires, etc.) where debris travels into the woods or fields can ignite a fire during drought conditions. Also, misuse of fireworks from the surrounding neighborhoods could lead to fires in dry/hot summer conditions.

Fire detection systems are installed in most, but not all, site buildings. Each building with a fire detection system is equipped with visual and audible alarms which aid in alerting employees to a fire within the building. Most but not all site buildings are also equipped with fire suppression systems to quickly extinguish any large fires within the buildings. Annual fire drills are conducted, which allow all employees to practice evacuation and accountability protocols. During a fire, employees must be cognizant of their assembly area and fire wardens so that when disaster strikes they are able to escape safely. The site maintains a x11 emergency phone line reporting system, and in the case of a fire 911 would be notified immediately to initiate off-site Albany Fire Department response. The site maintains a mutual aid agreement with the Albany Fire Department.

3.2.15 Recreational Hunting and Fishing

The Albany Site does not offer the opportunity for the public to entertain recreational hunting and fishing to control wildlife populations in a controlled setting.

3.3 PITTSBURGH, PENNSYLVANIA

3.3.1 Site Description

The Pittsburgh site (Photo 3.3.1) lies within Allegheny County, Pennsylvania, at the Bruceton Research Center. The Pittsburgh site comprises 63 acres approximately, 13 miles south of

Pittsburgh in South Park Township (approximately 60 miles north of the Morgantown, West Virginia, site). NETL-Pittsburgh shares the Bruceton Research Center with CDC-NIOSH and U.S. Department of Labor, Mine Safety and Health Administration (who occupies part of the CDC-NIOSH portion of the site. The facility sits within the rolling hills and steeply incised stream valleys that are tributaries of the Monongahela River. It is a partially wooded tract, with two subsites having both industrial and office buildings. The immediate vicinity was completely rural when the Bruceton Research Center was first established, however, the nearby population and housing densities have increased dramatically in recent years.

Immediately west of the site is a low-ridge top with a road and houses. Another road with houses borders the north side of the site. The east side of the site is bordered by Lick Run, the Pleasant Hills Authority Sewage Treatment Plant, and Cochrans Mill Road. Housing development is increasing around all boundaries of the site, especially to the southwest, where new homes overlook the site. Commercial zones are found more than three quarters of a mile away, although some small businesses are located nearby. About 40% of the immediately surrounding land is forested and about 25% is pasture or fallow field. The remainder is residential.

Photo 3.3.1: Pittsburgh Site.

The Pittsburgh site focuses on technologies in scientific and engineering areas that create commercially viable solutions to national energy and environmental problems. These areas include process systems engineering, decision science, functional materials, environmental sciences, and energy systems optimization. The work is accomplished through both in-house R&D and contracted research. As of December 31, 2020, there were 640 employees at the Pittsburgh site: 217 federal and 423 site-support contractors.

As of the 2010 U.S. Census, Pittsburgh's population consisted of 305,704 people and 132,179 households within the city limits. The population density was 5,521.4 per square mile. There were 156,165 housing units at an average density of 2,820.39 per square mile. The racial makeup of the city was 66.0% White, 26.1% African American, 4.4% Asian, 2.3% Hispanic or Latino of any race, 0.2% Native American and 2.5% from two or more races.

The median income (2019 dollars) for a household in the city was $48,711. The per capita income for the city (2019 dollars) was $34,083. About 20.5% of the population was below the poverty line. The major employers within the Pittsburgh area are the University of Pittsburgh

Medical Center, U.S. government, Commonwealth of Pennsylvania, University of Pittsburgh, West Penn Allegheny Health System, Giant Eagle, and Wal-Mart.

3.3.2 Major Site Activities

1.) B-94 Functional Materials Research Center (FMRC) Project Second Floor Renovation

B-94 second floor laboratories were renovated to accommodate planned research operations. This project included renovations to the B-94 – Second Floor laboratories necessary to support completion of the renovations throughout B-94 to accommodate planned research operations. New fume hoods, gas cabinets, lab benches and storage were installed. The 2nd floor of B-94 was only partially renovated and was unoccupied before the project. Further renovations were required to set up the Second Floor to accommodate a new Functional Materials Research Center.

Photo 3.3.2.1a: B-94 Second Floor – Before Renovation.

Photo 3.3.2.1b: B-94 Second Floor – After Renovation.

Photo 3.3.2.1c: B-94 Second Floor – After Renovation.

2.) 900 Plateau Potable and Fire Water Replacement Project

This project included replacement of the potable and fire water piping on the 900 Plateau.

Photo 3.3.2.2a: 900 Plateau Area – Before/During Construction.

Photo 3.3.2.2b: 900 Plateau Area – Near End of Construction.

3.) 920 Plateau Potable and Fire Water Replacement Project

This project included the replacement of the potable and fire water piping on the 920 Plateau.

Photo 3.3.2.3a: 920 Plateau Area Before/During Construction.

Photo 3.3.2.3b: 920 Plateau Area Near End of Construction.

4.) B-922 – Second Floor Renovation Project

This project included the renovation of the second floor of B-922 to replace existing carpet, kitchenette renovation, and painting of existing walls.

Photo 3.3.2.4a: B-922 - Second Floor Before Construction.

Photo 3.3.2.4b: B-922 - Second Floor After Construction.

5.) B-922 Room 102 Conference Room Renovation

This project included the renovation of Room 102 in B-922 to convert the previously vacant room into a VTC conference room.

Photo 3.3.2.5a: B-922 Room 102 Before Construction.

Photo 3.3.2.5b: B-922 Room 102 After Construction.

6.) B-84 Roof Replacement

This ongoing project is for the replacement of the old and leaking B-84 roof membrane with an EPDM membrane with new insulation and air/vapor barrier for the main section of roof, as well as new roof edge metal.

Photo 3.3.2.6: B-84 Roof Replacement – New roof in foreground, old roof in background.

7.) B-911 Water Pit Cover Replacement

This project included the removal and replacement of the failing cover and ladder of the B-911 Water Pit. In addition, repairs were made to spalling concrete of the exterior pit wall.

Photo 3.3.2.7: B-911 Water Pit Cover – Under Construction.

8.) B-922 Boiler Replacement Design and Award

This project includes the removal and replacement of three boilers that serve B-922. This project also includes electrical, plumbing, and exhaust work associated with these boilers. The design was completed, and the project was awarded in 2019.

9.) B-83 Machine Learning Data Center (CDAML) Design

This project is to design the renovation of the north end of the first floor of B-83, as well as a new building addition which will ultimately house a new machine learning data center, visualization laboratory, and necessary office, mechanical, and electrical spaces.

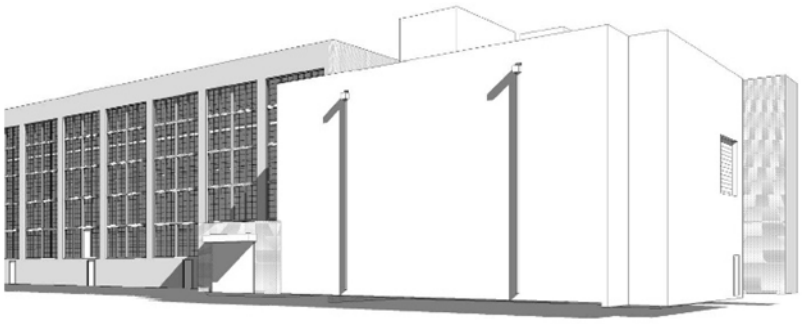

Photo 3.3.2.9: B-83 CDAML – Building Addition Render

3.3.3 Environmental Restoration and Waste Management

3.3.3.1 CERCLA

The EPA administers the CERCLA program in cooperation with the Commonwealth of Pennsylvania for the Pittsburgh site. The Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database had previously listed information about the NETL-Pittsburgh site based on soil and groundwater contamination prior to 1997; the Pittsburgh site had previously been listed as "undetermined" on EPA's CERCLA Section 120 List. However, a remedial action plan letter regarding this issue was never received and historical information on the Pittsburgh site indicates remediation for the areas of concern was completed in 1997. The sampling and analysis results indicated that no further soil remediation was necessary. It was also determined that exposure to media at the facility was not expected to generate adverse health effects for on-site or current receptors. NETL-Pittsburgh has continued to monitor the site on a routine basis.

Additionally, the CERCLIS database has since been retired and has been replaced with the Superfund Enterprise Management System (SEMS) database. NETL has verified that no information regarding the Pittsburgh site being listed as an NPL site is included for CY2020, nor has it been listed as an NPL site at any other time in the recent past.

3.3.3.2 RCRA

Pennsylvania Department of Environmental Protection (PADEP) is authorized to enforce the federal and state hazardous waste management requirements at the Pittsburgh site. (Diagram 3.2.3.2 details the breakdown of hazardous waste generated at the Pittsburgh site in 2020 that was either recycled or landfilled.) Hazardous waste operations personnel frequently review current waste industry newsletters and bulletins, receive information from the Alliance of Hazardous Materials Professionals, study NETL's regulatory compliance reviews, attend hazardous materials transportation training every three years, and attend hazardous waste operations training each year. There were no RCRA non-compliances in 2020.

Additionally, due to the COVID-19 pandemic restrictions, DOE Headquarters (FE-17) completed a virtual Staff Assistance Visit (SAV) in September 2020 with NETL personnel. During this SAV, the RCRA program was assessed and no additional opportunities for improvement were identified as part of this SAV.

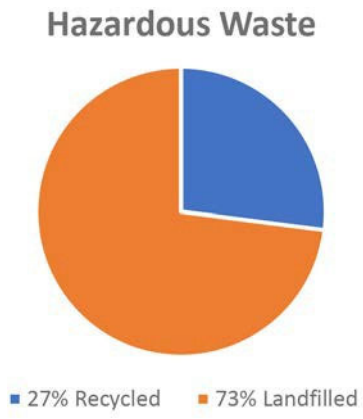

Diagram 3.2. : Pittsburgh 2020 RCRA Hazardous Waste Disposition Profile.

Due to the amount of waste generated each month, the Pittsburgh site is considered a large quantity hazardous waste generator [generating greater than 2,200 lbs. (1,000 kg) of hazardous waste or greater than 2.2 lbs. (1 kg) of acutely hazardous waste per calendar month] and has an EPA Large Quantity Generator Identification Number. While the Pittsburgh site typically generates lesser amounts of hazardous waste most months of the year, occasionally laboratory activities result in the generation of larger quantities, exceeding the threshold for a small-quantity generator. The generator status limits hazardous waste storage is limited by permit to up to 90 days. Most of the waste is packaged and shipped in laboratory packs (lab packs) (Photo 3.3.3.2) containing combinations of several different compatible chemicals within a single container.

Photo 3.3.3.2: Lab Packs.

Hazardous waste support personnel at the Pittsburgh site are not authorized to transport hazardous waste. In 2020, the Pittsburgh site used Tradebe Environmental Services, LLC (Tradebe) to transport six (6) shipments of hazardous waste. Tradebe transported the waste to its storage and treatment facilities where small packages of similar wastes were combined and then repackaged for more cost-effective shipment to a final disposal facility. In some cases, due to the large operational size of Tradebe, more of Pittsburgh's final waste disposition is completed at Tradebe's own facilities. NETL monitors Tradebe facilities, along with other facilities that Tradebe might use for final treatment and disposal. The amount of hazardous materials and waste removed from the site in 2020 remained consistent with previous years. Pittsburgh generated 8,843 pounds of hazardous waste in 2020. (Pittsburgh also generated 4,673 pounds of universal waste.)

Pittsburgh also continued to reduce its chemical footprint, as appropriate, with the understanding that site research requires the purchase of new and sometimes uncommon chemicals. Any chemical items deemed unusable were disposed. (See Section 4.0, Environmental Objectives and Targets, for a detailed explanation of how this quantity was established.) For example, when unused and unopened chemicals are received for disposal, they are offered to other researchers for potential use. Less hazardous or nonhazardous chemicals are substituted for requested hazardous chemicals when possible. Batteries and fluorescent bulbs are sent to recyclers. Used computers and other electronics are recycled via NETL's ADP (automatic data processing) scrap contract.

At the Chemical Handling Facility (B-92), liquid wastes are managed in 55-gallon drums. The Pittsburgh site does not have a storage or treatment pond, nor does the Pittsburgh site have underground storage tanks to store petroleum or hazardous waste, or aboveground storage tanks to store hazardous waste. Liquid acids and bases are collected at satellite accumulation areas (SAAs) and are characterized and analyzed, as necessary. Waste management personnel ensure regulatory compliance by: (1) weekly walk-through

inspections of the Chemical Handling Facility; (2) monthly pickups at SAAs; (3) periodic battery pickups at various locations; (4) participation in the SARS process; (5) participation in Emergency Response Organization exercises; (6) training on hazardous waste management; (7) regulatory reviews; and (8) attendance at conferences addressing hazardous waste requirements, as appropriate.

Hazardous waste generators have full responsibility for managing the waste that they generate from the moment of creation until it is transferred to the Chemical Handling Facility. Waste generators ensure that all hazardous or potentially hazardous wastes are properly contained and identified at the point of generation. Generators are held accountable for wastes that are not properly contained or identified or are otherwise mismanaged.

Tradebe waste-handling personnel inspect the containers, the labels, and the internal documentation to ensure the wastes are properly packaged and labeled and that the required documentation is complete and accurate. Waste-handling personnel are not permitted to accept or move any hazardous waste without proper packaging, labeling, and identification. The responsibility for identifying the waste rests primarily with the hazardous waste generator, which in most cases, is the researcher generating laboratory waste.

NETL's hazardous waste manager ensures compliance with applicable regulations by overseeing the hazardous waste program. The hazardous waste manager reviews the program periodically and brings any deficiencies to the attention of the appropriate individuals or managers, and ensures the development, accuracy, and submission of the Biennial Hazardous Waste Report to the Commonwealth of Pennsylvania and any other reporting required by DOE headquarters.

NETL's hazardous waste manager, or trained designee, signs the RCRA manifests and other relevant documentation (e.g., land disposal restriction forms, waste profiles, and bills of lading). The original copies of the RCRA manifests, biennial reports, and certificates of disposal/or destruction are maintained by the hazardous waste coordinator.

3.3.3.3 SARA Title III – (Emergency Planning and Community Right-to-Know Act)

NETL has established targets for reducing the accumulation of hazardous chemicals on site. The intent of these targets is to avoid the unnecessary accumulation of potentially hazardous chemicals in the laboratories, while maintaining sufficient chemical stores to complete mission-related research.

In order to meet these targets and to meet regulatory requirements, NETL maintains an active inventory of all hazardous and extremely hazardous chemicals on site, along with the Safety Data Sheets (SDS) for each substance with its Environmental Management System (EMS) (see Figure 3.3.3.3.1).

Figure 3.3.3.3.1: NETL Environmental Management System (EMS) Home Page.

Each year, in order to meet SARA Title III Emergency Planning and Community Right-to-Know requirements, the Pittsburgh site submits a Tier II Emergency and Hazardous Chemical Inventory information by March 1st. More specifically, Section 312 of SARA Title III requires NETL-Pittsburgh to provide copies of the information to the following: Pennsylvania Department of Labor and Industry, the Allegheny County Department of Emergency Services, the South Park Local Emergency Planning Commission, the South Park Township Police, the Library Volunteer Fire Department and the Broughton Volunteer Fire Department.

NETL-Pittsburgh is not required to prepare a Toxic Release Inventory Form R (TRI Form R) because the site does not use, produce, or process any of the listed toxic materials in quantities that exceed the threshold amounts (25,000 pounds of the chemicals manufactured or processed at the facility; 10,000 pounds of the chemical used at the facility). In 2020, no toxic releases occurred that would have triggered emergency notification as required by either the Emergency Planning and Community Right-to-Know Act (EPCRA) or CERCLA.

3.3.3.4 Federal Facilities Compliance Act (FFCA)

There are no issues related to the Federal Facilities Compliance Act for the Pittsburgh site in 2020.

3.3.3.5 NEPA

See section 2.1.2 National Environmental Policy Act (NEPA) for information on Pittsburgh NEPA requirements.

3.3.3.6 TSCA

NETL-Pittsburgh does not manufacture chemicals and is not subject to sections of the Toxic Substance Control Act (TSCA) related to manufacturing. No spills or releases of substances regulated by the Toxic Substances Control Act (TSCA) of 1976 (with amendments, et. seq.) – including pesticides, polychlorinated biphenyls (PCBs), formaldehyde, methylene chloride, asbestos, etc. – were reported in 2020 at the Albany site. TSCA waste generated during 2020 included asbestos and lead-based paint, which was disposed of in accordance with Federal, state and local requirements.

All known friable asbestos-containing material (ACM) has either been removed or encapsulated. Non-friable asbestos present at the NETL-Pittsburgh site is inventoried and maintained. No samples taken in 2020 indicated that the materials contained fiber concentrations in excess of U.S. Environmental Protection Agency (EPA) or the State of Pennsylvania clearance levels of (0.01 fibers/cc). NETL-PGH maps and inventory of ACM continue to be updated.

Most ACM is floor tile and floor tile mastic installed in various laboratory buildings (e.g., B-94 and B-901). The remainder of ACM is contained in roofing materials, caulking, or laboratory furniture. Asbestos remaining inside buildings are well encapsulated by the matrix material (e.g., floor tiles and laboratory tabletops). In addition, asbestos was also found in some gaskets and inside some laboratory devices, such as muffle and tube furnaces. When asbestos is removed as part of any remodeling or reworking in a room, building, or facility, it is handled by a licensed Asbestos Abatement/Removal Contractor (AA/RC). There were no projects that required a 10-day asbestos notification permit identified in 2020.

Additionally, NETL tests for lead paint before demolition projects or elimination of materials through excess property or recycling. Four lead-based paint sampling events were conducted in 2020 related operation/ maintenance and construction projects. These included: positive samples as part of the B-92, Room 02 Tepid Eyewash Installation project; (2) positive samples for the B-920, First Floor Renovation Project; (3) non-detect samples related to the B-84, Room 319 California Hood Installation; and (4) eight of the 15 samples were positive related to the Exterior Door Replacement Project (Phase 2). The paint abatement work for the positive samples was conducted in accordance with OSHA 29 CFR 1926.62, Lead.

3.3.3.7 FIFRA

No restricted-use pesticides, herbicides, or defoliants, as regulated by FIFRA were kept on site. Only general-use pesticides were kept and used for routine insect control. A professional pest control company, Leaf Pest Control, is subcontracted to spray inside certain offices, as needed, cafeteria drains, certain lunch areas, certain basement areas, and the daycare facility. Herbicides are not used for controlling weeds except in extremely limited cases. The only recurring use of an herbicide is for the fence lines and guard rails. No defoliants are used.

3.3.4 Radiation Protection Program

NETL maintains an inventory of on-site radiation sources and tracks each item, isotope(s), quantity, custodian, location, status and activity. Table 3.3.4.1 lists the 2020 source inventory at Pittsburgh. Table 3.3.4.2 contains the 2020 X-ray radiation generating devices.

Table 3.3.4.1: 2020 Radioactive Source Materials Inventory—Pittsburgh		
Isotope	Activity/Date Determined	Source
Depleted Uranium	1427 µR/Hr (11.1 µCi) (08/19/21)	Geiger Counter: Model: 6A Serial #, 75788 Victoreen Industries
Depleted Uranium	1537 µR/Hr (11.9 µCi) (08/19/21)	Geiger Counter: Model: 6A Serial #, 7311 Victoreen Industries
N/A	1558 µR/Hr (12.1 µCi) (08/19/21)	Geiger Counter: Model: 290 Serial # 681 Victoreen Industries
N/A	1349 µR/Hr (10.5 µCi) (08/19/21)	Geiger Counter: Model: 290 Serial # 2429 Victoreen Industries
Cs^{137}*	1177 µR/Hr (9.1 µCi) (08/19/21)	Check Source: CS137 Description: PL Yellow Spectrum Techniques for Ludlum Measurements (ID-223)
Cs^{137}*	1272 µR/Hr (9.9 µCi) (08/19/21)	Check Source: CS137 Description: PL Yellow Spectrum Techniques for Ludlum Measurements (ID-470)

* Exempt quantity per 10 CFR 835 Appendix E: No known radiation hazard

Table 3.3.4.2: Pittsburgh X-Ray Radiation Generating Devices	
Device	Quantity
X-Ray Florescence Instrument	1
X-Ray Photoelectron Spectrometer (Physical Electronics, Model 5600ci)	1
X-Ray Diffraction (Phillips X'PERT MPD)	1
FEI Quanta 600 ESEM	1
X-Ray Diffractometer (Rigaku D/maX Rapid II)	1
Mail X-Ray Instrument	1

The Pittsburgh site did not release any radiation source materials into the environment, as all source materials are sealed from escape or discharge. No low-level radioactive waste (LLRW) disposal shipments were required in 2020.

Radiation monitoring performed at Pittsburgh consisted of whole-body thermoluminescent dosimeters and finger rings for the employees in the mail facility (mail and packages are scanned via x-ray upon receipt) and as identified in appropriate R&D Safety Analysis and

Review System (SARS) packages. In addition, specific radiological control areas have dosimeter badges continually displayed. All radiation-generating devices are surveyed for possible leakage on an annual basis.

The cumulative annual dose for all personnel performing all operations at the Pittsburgh site during 2020 was less than 100 millirem (roentgen equivalent man, <1 millisievert), with an average annual dose of less than 10 millirem (<0.1 millisievert) per person working in the radiation monitoring program.

3.3.4.1 DOE Order 458.1, Radiation Protection of the Public and Environment

Additional information may be found in Section 2.2, DOE Internal Environmental and Radiation Protection Orders and Section 2.3, Atomic Energy Act of 1954. In accordance with "as low as is reasonably achievable" (ALARA) principles, NETL manages an appropriate radiation protection program for protection of the public and the environment from radiation hazards since radiation sources are low-level, sealed instrumentation sources, radiation-generating devices (RGDs), or processes that include naturally-occurring radioactive materials or technologically-enhanced naturally-occurring radioactive materials (NORM/TE-NORM) with minimal radiation levels.

3.3.4.2 DOE Order 435.1, Radioactive Waste Management

Use of radioactive materials at NETL-Pittsburgh is limited to research instrumentation and geologic samples that have been identified as NORM via surveys. The 2020 source inventory is displayed in Table 3.3.4.1. NETL-Pittsburgh does not generate or treat any radioactive material, nor does it have any temporary or permanent facility for radioactive waste disposal on-site.

An inventory of radiation sources is maintained and monitored by the radiation safety officer. Information is retained about the item, isotope, quantity, custodian, location, status and sealed-source activity. All the radioactive sources are sealed and are used in instrumentation/ equipment or as check sources. X-ray generating devices are used for analytical applications at the Pittsburgh site, such as scanning and transmission electron microscopes, and X-ray diffraction and fluorescence instruments. These devices are examined annually for leaks and safety interlocks/controls to ensure employee safety.

No radiation leakage, release, or exposure events occurred in 2020.

3.3.5 Air Quality and Protection Activities

3.3.5.1 Clean Air Act

Pennsylvania's Department of Environmental Protection (PADEP) Bureau of Air Quality is responsible for implementing the requirements of the federal Clean Air Act, as well as Pennsylvania's Air Pollution Control Act. Additionally, the Allegheny County Health Department (ACHD), is authorized to administer Title V operating permits under the Clean Air Act Amendments.

To address necessary compliance requirements, NETL's Ambient Air Quality Management Program includes protection of outdoor air quality. This includes the submission of applications for air emission permits, which can include the existing sources (boilers, generators, fuel storage tanks), as well as sources related to on-site research activities. The air quality program manager prepares permit applications, obtains permit renewals (every five years), as needed, and oversees monitoring programs and reporting.

Based on Pittsburgh's existing Title V, Operating Permit, NETL reports air emissions annually. The Title V permit issued on June 14, 2016, designates NETL-Pittsburgh as a synthetic minor source. (Note: A synthetic minor source is defined as any source that has its emissions administratively limited below certain thresholds by means of a federally enforceable order, rule, or permit condition.) Additionally, no existing Pittsburgh facility or project had the potential to emit more than 100 tons per year of any designated air pollutant in CY2020.

Current regulatory requirements include an annual emissions inventory, which is submitted to the ACHD by March 15th of each year, for the preceding calendar year. NETL utilizes an air emission inventory model (AES* Online) required by both the ACHD's Bureau of Environmental Quality and PADEP's Bureau of Air Quality to calculate the emissions. The model is based on fuel usage and provides a worst-case scenario for potential emissions. The model considers the type, quantity, and total burn time of each fuel to calculate the estimated emission levels. Results of the modeling are summarized in Table 3.3.5.2.

In addition to the annual emissions inventory, NETL-Pittsburgh also submits semi-annual reports to ACHD in accordance with the Title V Operating Permit, General Condition III.15.d. The semi-annual report includes data on comfort-heat boilers, space heaters, and emergency generators. The Pittsburgh site did not receive any Notices of Violation, nor were there any unplanned air emission occurrences in 2020.

NETL-Pittsburgh's permit is effective for five years, with an expiration date of June 13, 2021. As a result, preparations for a new permit submission were initiated in December 2020. Since the 2016 permit became effective, a number of emissions sources have been replaced and some have been removed. For example, three gas-fired boilers in B-922 were replaced/upgraded in 2020. NETL also plans to replace the existing summer boiler in B-84 in the spring of 2021. These changes, as well as clarifications regarding comfort-heat boilers, space heaters, emergency generators, and storage tanks were included in the draft air permit application that was submitted to the ACHD in December 2020.

3.3.5.2 National Emission Standards for Hazardous Air Pollutants

NETL actively participates in a program to reduce the use of Class I ozone depleting substances (ODS). This goal of the program is to recover and reclaim chlorofluorocarbon refrigerants from HVAC equipment for subsequent reuse and recycle. In recent years, the inventory of ODS-containing equipment has been steadily decreasing at the Pittsburgh site. Older ODS-containing equipment is being replaced and the use of Class I ODSs is being phased out from the HVAC equipment and replaced with environmentally friendly substitutes.

Table 3.3.5.2: 2020 Air Emissions Inventory—Pittsburgh	
Pollutant	Calculated Emissions (lbs./yr.)
Ammonia	120
Benzene	0.08
Butane	7.9
Carbon Dioxide	4,400,000
Carbon Monoxide	3,100
Hexane	0.70
Naphthalene	0.02
Formaldehyde	2.8
Nitrogen Oxide	82
Lead	0.02
Pentane	9.7
Ethane	12
Methane	86
Particulate Matter, $PM_{2.5}$	1,100
Particulate Matter, PM_{10}	1,400
Sulfur Dioxide	22
Toluene	0.13
Arsenic	0.0070
Barium	0.20
Cadmium	0.040
Chromium	0.050
Cooper	0.030
Manganese	0.010
Mercury	0.010
Molybdenum	0.040
Nickel	0.10
Vanadium	0.10
Zinc	1.1
VOC	210

3.3.5.3 Meteorological Tower Data

NETL-Pittsburgh also tracks meteorological data in support of the Emergency Response Organization (ERO). The site maintains two 30-foot meteorological towers (West of B-74 and West of Building 901) that monitor temperature, relative humidity, precipitation, wind speed, wind direction, barometric pressure, and solar radiation; they are not used for emissions monitoring. The meteorological towers were upgraded with new communications systems, software, and sensors in 2015. The meteorological towers were recalibrated in 2020.

The data collected from the meteorological towers is used to provide critical meteorological information to the ERO during emergency situations, as back-up information to employee

heat-stress data, and in the models used for the air emissions inventory. An example of one of the meteorological towers is shown in Photo 3.3.5.2.

Photo 3.3.5.2: Pittsburgh Meteorological Tower.

3.3.6 Water Quality and Protection Activities

The topography of the Pittsburgh site consists of rolling hills separated by the natural flow of water for the Bruceton Research Center site. As a result, surface water at the Pittsburgh site is divided into two distinct areas: the northern area and the southern area. The northern area is located north of Experimental Drive and houses the laboratory and process facilities for the DOE portion of the site. The southern area is south of Wallace Road and houses administrative, project management and contractor maintenance operations. The northern area is referred to as the "R&D Plateau," and the southern area is referred to as the "Main Plateau."

NETL-Pittsburgh's water quality program ensures that activities do not result in contamination of industrial wastewater, sanitary wastewater, or storm water discharges. ES&H staff review all on-site research projects, support activities, and construction activities for potential impacts to air, surface water, groundwater, and soil as part of the Safety Analysis and Review System (SARS) processes. Applicable federal, state, and local regulations affecting these activities are reviewed to ensure compliance before approval is given to proceed.

INDUSTRIAL WASTEWATER

Industrial wastewater from the R&D Plateau (northern area) of the site is routed to the wastewater treatment facility (WWTF) in Building 74. This wastewater, consisting of laboratory and process wastewater from the site's R&D operations, is regulated under the Pleasant Hills Industrial Sewer Use Permit Program. The current Industrial Sewer Use Permit was issued by

Pleasant Hills Authority (PHA) on December 16, 2020. Permit conditions limit the quantity and

quality of effluent constituents (total cyanide, mercury, cadmium, and pH level) discharged to the PHA Treatment Plant. As part of the permit, wastewater analysis data for effluent discharged through the WWTF must be submitted on a semi-annual basis to the PHA's consulting engineering firm, Gannett Fleming, Inc. Table 3.3.6.: Industrial Sewer Use Permit (B-74) Monitoring Analysis – Pittsburgh shows the results of the 2020 wastewater analysis data collected by NETL-Pittsburgh. The constituents and limits presented are those that were in place prior to the new permit since the permit was issued on December 16, 2020 (Note: The permit in force throughout 2020 included limits for cyanide, copper, mercury, and cadmium, however the new permit does not require monitoring for copper.). The new permit conditions will be presented in the 2021 wastewater analysis data.

Although not required by the permit, as a best practice, NETL-Pittsburgh collects and analyzes monthly wastewater samples (see Table 3.3.6.1: B-74 2020 Monthly Monitoring Results (mg/L). An annual wastewater report of the site's industrial wastewater discharge is prepared, including the volume of wastewater discharged, the number of site employees, the type of waste discharged, and the type of pretreatment performed.

In addition to the sampling and analysis performed by NETL-Pittsburgh and CDC/NIOSH (Center for Disease Control/National Institute of Occupational Safety and Health), the PHA also conducts independent sampling and analysis of wastewater effluent from these locations. PHA uses this information to determine whether any discharges of the treated effluent exceed local limits. No industrial wastewater permit limits were exceeded in 2020.

The Main Plateau (southern area) of the Pittsburgh site does not require an industrial wastewater treatment system, since this portion of the site does not house laboratory operations - only administrative, project management and contractor maintenance operations occur in that area.

Description of Pittsburgh Wastewater Treatment Facility (WWTF)

Treatment in the WWTF begins with flow equalization, followed by pH adjustment using either caustic soda or ferric chloride. Subsequently, metals and particulates are removed by agglomeration in the flocculation tank, followed by solids separation in the plate separator (Photo 3.3.6). Final removal of metals and particulates occurs in a filter press. Prior to discharge to the Pleasant Hills sanitary sewer, the treated water is sent through an activated clay/activated carbon filtration system for additional removal of organics and metals. Once through the filtration system, if the effluent does not meet the necessary pH (6 to 9), it is recirculated through the system. If the pH is outside the allowable range, a diverter valve in the effluent monitoring tank opens automatically, allowing the off-specification effluent to be recirculated within the system for additional treatment. Final effluent pH adjustment occurs in a chamber inside the effluent monitoring tank prior to discharge. Once the WWTF effluent meets specification, it is routed to the Pleasant Hills Authority Sewage Treatment Plant for final treatment.

Photo 3.3.6: Pittsburgh Plate Separator.

Table 3.3.6: 2020 Industrial Sewer Use Permit Monitoring Analysis—Pittsburgh					
Constituent	Total Cyanide	Copper	Mercury	Cadmium	pH
Permit Limit	3.21 mg/L	0.32 mg/L	0.0062 mg/L	0.061 mg/L	6.0–9.0 s.u.
April 08, 2020 Sampling Date					
Sub interceptor Location					
Composite	ND	0.019 mg/l	0.00044 mg/l	ND	N/A
Grab #1	N/A	N/A	N/A	N/A	7.04 s.u.
Grab #2	N/A	N/A	N/A	N/A	6.92 s.u.
Grab #3	N/A	N/A	N/A	N/A	7.46 s.u.
Grab #4	N/A	N/A	N/A	N/A	7.72 s.u.
B-74 Effluent					
Composite	0.0044 mg/l	0.100 mg/l	0.00014 mg/l	ND	N/A
Grab #1	N/A	N/A	N/A	N/A	7.12 s.u.
Grab #2	N/A	N/A	N/A	N/A	7.36 s.u.
Grab #3	N/A	N/A	N/A	N/A	7.69 s.u.
Grab #4	N/A	N/A	N/A	N/A	7.70 s.u.
October 21, 2020 Sampling Date					
Sub interceptor Location					
Composite	ND	0.087 mg/l	0.00022 mg/l	ND	N/A
Grab #1	N/A	N/A	N/A	N/A	7.42 s.u.
Grab #2	N/A	N/A	N/A	N/A	7.48 s.u.
Grab #3	N/A	N/A	N/A	N/A	7.60 s.u.
Grab #4	N/A	N/A	N/A	N/A	7.69 s.u.
B-74 Effluent					
Composite	ND	0.021 mg/l	ND	ND	N/A
Grab #1	N/A	N/A	N/A	N/A	6.85 s.u.
Grab #2	N/A	N/A	N/A	N/A	7.67 s.u.
Grab #3	N/A	N/A	N/A	N/A	7.82 s.u.
Grab #4	N/A	N/A	N/A	N/A	7.85 s.u.

ND = Not Detected; s.u. = standard units; N/A = Not Applicable

Table 3.3.6.1: B-74 2020 Monthly Monitoring Results (mg/L)—Pittsburgh													
Constituent	Permit Limit	Sampling Date											
		1/08/20	2/12/20	3/11/20	4/08/20	5/18/20	6/18/20	7/08/20	8/12/20	9/16/20	10/21/20	11/12/20	12/16/20
Aluminum	None	0.130	0.091	0.170	0.340	0.180	0.120	ND	0.180	ND	ND	ND	ND
Cadmium	0.061	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	None	0.002	0.002	0.003	0.003	0.003	0.001	0.003	ND	ND	ND	0.001	0.002
Copper	0.32	0.039	0.024	0.032	0.110	0.036	0.026	0.027	0.009	0.014	0.021	0.016	0.025
Cyanide Total	3.21	0.0087	ND	ND	0.0045	ND	ND	ND	ND	0.0047	ND	ND	ND
TOX	None	0.044	0.054	0.062	0.041	0.031	0.036	0.032	0.047	0.051	0.072	0.043	0.053
Iron	None	1.400	0.770	1.600	1.300	2.00	0.650	0.530	0.170	0.250	0.780	0.750	1.200
Lead	None	ND	ND	ND	0.004	0.003	ND	ND	ND	ND	ND	ND	ND
Mercury	0.0062	0.00019	ND	ND	0.00028	0.00020	ND	ND	ND	ND	ND	ND	ND
Nickel	None	0.004	0.004	0.005	0.003	0.006	0.002	0.003	0.002	0.012	0.003	0.004	0.005
Oil and Grease	None	ND	ND	2.0	ND	1.6	3.4	2.0	1.5	1.6	1.8	2.8	ND
pH (s.u.)	6.0-9.0	6.67*	7.06*	7.26*	7.36*	8.21*	7.36*	7.69*	7.70*	7.10*	7.70*	7.26*	7.42*
Phenolics	None	0.011	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.010	0.011
TSS	None	2.3	0.80	0.80	2.9	ND	ND	1.10	ND	ND	1.2	1.1	ND
Tin	None	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloro-methane	None	0.0007	0.0052	0.0019	0.0033	ND	0.0016	0.0007	0.0010	0.0010	0.0007	0.0015	0.0010
Zinc	None	0.110	0.082	0.170	0.110	0.077	0.042	0.038	0.032	0.032	0.037	0.036	0.054

ND = not detected; s.u. = standard units; TOX = total organic halogens; TSS = total suspended solids; * = Field Measurement; NA= Not Analyzed

SANITARY WASTEWATER

Separate from the discharge of the treated laboratory/process wastewater, sanitary sewage from the R&D Plateau (northern area) is combined with sanitary sewage from the Center for Disease Control/National Institute for Occupational Safety and Health (CDC/NIOSH), the other major federal agency on the site. The NETL/NIOSH sub-interceptor sanitary sewer line then discharges into the South Park (PA) main sanitary line at a point close to the PHA wastewater treatment facility. CDC/NIOSH also has another sanitary sewer line that discharges directly in the South Park main sanitary line.

The NETL-Pittsburgh sanitary sewage from the Main Plateau is routed to and treated at the Clairton Municipal Sewage Treatment Plant.

STORMWATER

NETL-Pittsburgh also discharges stormwater in conjunction with CDC/NIOSH since the National Pollutant Discharge Elimination System (NPDES) storm water permit for the Bruceton Research Center is held by CDC/NIOSH. The NPDES permit lists four outfalls associated with the NETL portion of the site: the North Outfall (001), the South Outfall (002), the North Outfall Extension (101), and the South Outfall Extension (102). Contaminants to the storm water effluent are regulated by the NPDES permit.

Potential stormwater discharges include: the salt-storage facility area, air-conditioning condensate (Photo 3.3.6.1), runoff from various impervious surfaces into the site storm sewers, and treated acid-mine drainage from a research coal mine operated by CDC/NIOSH. The

permit requires CDC/NIOSH to monitor and report discharge results for North Outfall (001) and South Outfall (002) on a quarterly basis, however, there the permit does not mandate any discharge limits.

Photo 3.3.6.1: Pittsburgh Air Conditioner Condensate.

On the R&D Plateau, stormwater (surface water) runoff from the 69-acre area exits the site through the northern storm drainage system, which drains directly into nearby Lick Run. (Lick Run is a small natural stream that flows along the eastern boundary of the 238-acre Bruceton Research Center.) The stormwater discharge occurs at the NPDES-permitted North Outfall (001). Likewise, the North Outfall Extension (101) also discharges directly into the North Outfall. CDC/NIOSH performs sampling for the outfalls and issues a monthly Discharge Monitoring Report, which measures pH, flow, total suspended solids, manganese, iron, and aluminum.

Stormwater collected from the Main Plateau exits the site through a dedicated southern drainage system, which also enters Lick Run. This discharge occurs at NPDES-permitted South Outfall (002). Stormwater discharged from the southern (Main Plateau) side of the site is also regulated through the NPDES permit. The South Outfall receives stormwater from both NETL-Pittsburgh and NIOSH.

No Notices of Violation were issued with respect to the Bruceton Research Center's NPDES permit in 2020.

3.3.7 Other Environmental Statutes

3.3.7.2 Endangered Species Contract

There were no issues at the Pittsburgh site regarding the Endangered Species Act in 2020.

3.3.7.3 National Historic Preservation Act

There were no issues at the Pittsburgh site regarding the National Historic Preservation Act in 2020.

3.3.7.4 Migratory Bird Treaty Act

There were no issues at the Pittsburgh site regarding the Migratory Bird Treaty Act in 2020.

3.3.8 DOE Order 436.1, Departmental Sustainability

See Section 2.2.1.

3.3.8.2 Responsibilities for addressing Executive Orders 13423, 13514, and 13693

See Section 4.0 ES&H Management System.

3.3.8.3 E.O. 13693 GHG Reduction targets and sustainability goals

See Section 4.0 ES&H Management System.

3.3.8.4 Progress on Meeting DOE Strategic Sustainability Performance Plan Goals (2017)

See Section 4.0 ES&H Management System.

3.3.9 Executive Orders

The Pittsburgh site was in full compliance with all applicable environmental Executive Orders in 2020. Throughout the year, numerous inspections and audits were performed and documented to ensure there were no instances of noncompliance. As noted above, E.O. 13834, Efficient Federal Operations, was implemented as part of NETL's ES&H Management System. This rescinded E.O. 13693, Planning for Federal Sustainability in the Next Decade. This executive order is described in more detail in Section 4.0.

In addition, other executive orders that apply to NETL-Pittsburgh, but that required no specific actions in 2020, include E.O. 11514, Protection and Enhancement of Environmental Quality; E.O. 11738, Providing For Administration of the Clean Air Act and the Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans; E.O.13112 Invasive Species; E.O. 12088, Federal Compliance with Pollution Control Standards; E.O. 11988, Floodplain Management; and E.O. 11990, Protection of Wetlands; and E.O. 12898, Environmental Justice for Low Income & Minority Populations.

3.3.9.1 Executive Order 11988, Floodplain Management

There were no issues with floodplain management at the Pittsburgh site.

3.3.9.2 Executive Order 11990, Protection of Wetlands

There were no issues with protection of wetlands at the Pittsburgh site.

3.3.10 Other Major Environmental Issues and Accomplishments

The Department's Occurrence Reporting Program System (ORPS) provides timely notification to the DOE complex of events that could adversely affect: the public or DOE worker health and safety, the environment, national security, DOE's safeguards and security interests, functioning of DOE facilities or the Department's reputation.

The Pittsburgh site filed three ORPS reports in 2020, described below.

- On May 7, 2020, at 07:25 EDT, the Pittsburgh site experienced multiple short-duration electrical interruptions. During recovery efforts, it was determined that the service door of an electrical air switch (near B-921) was open, and smoke was observed emanating from the switch enclosure. The subject air switch provides electricity to the 920 plateau. A decision was made to close B-920, B-921, and B-922 so that the electrical supply to the area could be shutdown to prevent damage and to inspect the air switch. A generator ensured the IT Data Center remained operational during this time period.

  Inspection of the switch was coordinated with DOE, WE28a, and West Penn Power representatives. System fuses were checked, a visual inspection of the switch was completed, and all conductors were megger tested to confirm the condition of electrical

insulation. No issues were found; it was suspected that what was initially reported as smoke originating from the switch enclosure was actually water vapor formed from an electrical surge as no signs of smoke or fire were subsequently observed. It was concluded that an upstream electrical surge led to the initial incident observations.

Power was restored to the affected buildings at 12:33 EDT. Fire detection systems and facility systems (HVAC, etc.) were subsequently analyzed for proper restart actions, and the buildings were subsequently opened for normal operations.

- At 19:25 EDT, on July 9, 2020, the Pittsburgh site experienced a site-wide electrical interruption during a severe weather event that included intense lightening. Upon investigation, the electrical interruption was found to have been caused by off-site electrical service provider, West Penn Power, equipment failure (i.e., underground electrical line failure). Repairs were coordinated with DOE, WE28a, and West Penn Power representatives. Electrical service was returned to the Administrative Plateau at 23:59 EDT.

  The Administrative Plateau was reopened for employee occupation at the start of business on July 10, 2020, but the Research and Development (R&D) Plateau continued to experience a loss of electrical service due to several damaged conductor feeds. Electrical service was returned to the R&D plateau at 1700 EDT on July 11. A generator ensured that the sites IT Data Center remained operational during the entire outage. Immediately following restoration of electrical service on each Plateau, fire detection and gas monitoring systems and facility systems (HVAC, etc.) were subsequently analyzed for proper re-start actions. The site was subsequently fully opened for normal operations on July 13.

- At approximately 09:15 EDT, on December 3, 2020, NETL's electrical service provider (West Penn Power) developed an overcurrent fault (surge) at one of the substations that provides power to NETL causing a slight power bump across both the 920 and R&D Plateaus. During that fault, the 920 Plateau main electrical switch experienced an arc flash inside the switch arcing across two electrical phases that caused damage to the step- down transformer inside the electrical switch. In response to this issue a decision was made to close the buildings on the 920 Plateau so that the electrical supply to the area could be shutdown to prevent possible damage and to inspect the switch.

  Buildings 920, 921, and 922 were closed at 09:45 EDT and remained closed through 18:00 EDT. Inspection of the switch was coordinated with DOE, WE28a, and West Penn Power representatives. A generator ensured that the sites IT Data Center remained operational during this time period. During the controlled shutdown to the 920 Plateau electrical switch, a damaged transformer was removed, and all electrical connections were tested and cleaned to ensure the switch operates safely and properly. Electrical service was restored at approximately 18:00 EDT. Fire detection systems were subsequently analyzed for proper re-start actions. Facility systems (HVAC, etc.) were reviewed as well. The buildings were subsequently opened for normal operations.

3.3.10.1 Green and Sustainable Remediation

Green and Sustainable Remediation (GSR) is the practice of considering all environmental effects of remedy implementation and incorporating options to minimize the environmental footprints of cleanup actions. The Pittsburgh site is not remediating a brownfield site and therefore there were no GSR efforts in 2020.

3.3.10.2 Organizational Resilience

Organizational Resilience is defined as the ability of an organization to anticipate, prepare for, respond, and adapt to incremental change and sudden disruptions in order to survive and prosper. NETL has identified climate-related risks as they relate to national disasters, fire, medical emergencies, hazardous materials, physical assets and real property, and energy/water supplies, and developed initial response procedures. In addition, NETL's Emergency Response Organization (ERO) meets with local emergency planning committees on a quarterly basis to review hazards-based risks to the region including high-priority impacts from high-water levels and storm damage due to weather events of increasing intensity.

NETL management strongly supports utilization of the best available science related to organizational resiliency policies and programs and will continue to update all applicable NETL orders, policies and procedures, as necessary.

3.3.11 Continuous Release Reporting

There was no continuous release reporting required at the Pittsburgh site in 2020.

3.3.12 Unplanned Releases

There was one unplanned release at the Pittsburgh site in 2020. The unplanned release occurred on October 23, 2020 when a water line on the west side of Building 64 broke. The break in the water line caused a release of turbid water in the storm water drainage system to Lick Run. As a result, of the turbid water being discharged, NETL notified PADEP after consultation with CDC/NIOSH (owner of the NPDES permit); however, PADEP did not identify the release as a permit violation, nor did they issue a Notice of Violation. No additional actions were requested.

3.3.13 Summary of Environmental Permits

A summary of environmental related permits for the Pittsburgh site is provided in Table 3.2.13.

Table 3.3.13: 2020 Summary of Permits - PGH			
Permit No. and Title	Issue Date/ Renewal	Regulatory Agency	Description
0296 Minor Source Operating Permit	06/14/2016, 06/13/2021	Allegheny County Health Department, Air Quality Program	Establishes NETL-PGH as a minor source for particulate matter (PM), particulate matter of 10 microns or less in diameter (PM_{10}), sulfur dioxide (SO_2), volatile organic compounds (VOCs), nitrogen oxides (NO_X), carbon monoxide (CO) and Hazardous Air Pollutants (HAPs), as defined in section 2101.20 of Article XXI Air Pollution Control of the Allegheny County Health Department, Rules and Regulations.
GF 47497.009 Industrial Sewer Use Permit	12/16/2020, 12/16/2025	Pleasant Hills Authority (PHA)	Establishes permission for the discharge of certain industrial wastewaters for the purposes of treatment by PHA. Includes permit requirements, general provisions, fees, reporting and local limits for certain discharge parameters.
PA0025844 NPDES Storm Water Discharge Permit	Responsibility for the NPDES Permit was transferred to CDC/NIOSH effective October 1, 2015	Pennsylvania Department of Environmental Protection (PADEP)	NPDES permit for the discharge of site stormwater into the public waterways of Pennsylvania (Lick Run). If NETL becomes aware of a stormwater discharge, it must be reported to CDC NISOH and PADEP.
ID: 02-81183 SEQ#: 008A Aboveground Storage Tank Registration Permit/ Certificate	1990s, 10/04/2020/ Renewal 10/04/2021	PADEP Bureau of Environmental Cleanup and Brownfields	Permit for above ground storage tank containing ferric chloride at Pittsburgh's wastewater treatment facility (B-74).
ID: 02-81183 SEQ#: 009A Aboveground Storage Tank Registration Permit/ Certificate	1990s, 10/04/2020/ Renewal 10/04/2021	PADEP Bureau of Environmental Cleanup and Brownfields	Permit for above ground storage tank containing caustic soda at Pittsburgh's wastewater treatment facility (B-74).
S-1018 Certificate of Fire and Explosion Safety	05/18/2004	Allegheny County Fire Marshal	Approval for the storage and handling of flammable and/or combustible liquids in aboveground storage tank; certificate covers Ethanol Tank and Pump.
S-1102 Certificate of Fire and Explosion Safety	10/06/2006	Allegheny County Fire Marshal	Approval for the storage and handling of flammable and/or combustible liquids in aboveground storage tank; certificate covers one diesel tank and one gasoline tank.

3.3.14 Fire Protection Management and Planning

A wildfire is an uncontrolled fire in an area of combustible vegetation that occurs in the countryside or rural area. The Pittsburgh site comprises 57 acres (of the Bruceton Research Center) with 31 acres being forest/fields. The site has a perimeter fence separating it from residential neighborhoods to the north, south, and west. A railroad and stream lie on the east side of the property.

Pennsylvania's Department of Conservation and Natural Resources identifies danger ratings based on the National Fire Danger Rating System. Typically, Pennsylvania has a low risk for wildfire vulnerability. The main threat of a fire would be incidental fires from an off-site incident, or from equipment use on the property. In addition, illegal or uncontrolled burning (burning leaves, bonfires, etc.), where debris travels into the woods or fields can ignite fires during drought conditions, as well as misuse of fireworks from the surrounding neighborhoods under dry/hot summer conditions. NETL- Pittsburgh has wooded areas that are mowed and trimmed; there is a very low potential of fire from a lawn mowing equipment malfunction.

At the NETL-Pittsburgh site, Fire Alarm Control Panels (FACPs) are installed in the majority of the buildings on site. All FACPs are equipped with Digital Alarm Communication Transmitters (DACTs) that enable the panels to send fire alarm and trouble signals to the B-923 Security Offices for monitoring and response. Each building with a FACP is equipped with alarm and notification devices to alert personnel of a fire. Fire suppression systems are installed in most of the buildings on site to combat and/or extinguish a fire.

While NETL does not have a firefighting program, the site does have an Emergency Response Organization for on-site emergencies The site maintains an emergency phone line reporting system (by dialing ext. 11), which connects the individual reporting a fire to the security office. NETL's response to any fire - facility, project area, vehicle, wildfire, or other, would be to call the local fire department. Voluntary fire extinguisher usage is allowed, but not required. Annual fire drills are conducted, to allow all employees to practice evacuation and accountability protocols. During any hot work or fire protection outages, a trained 'fire watch' person(s) is designated to continuously monitor the area of concern and report any fires.

3.3.15 Recreational Hunting and Fishing

The Pittsburgh Site does not offer the opportunity for the public to entertain recreational hunting and fishing to control wildlife populations in a controlled setting.

3.4 HOUSTON, TEXAS

3.4.1 Site Description

The Houston program office is located at 1011 Highway 6, South, Suite 309, Houston, Texas 77077 (Photo 3.4.1). The office has no laboratory facilities, but focuses on extramural research related to oil and gas. Because building and facility operations and maintenance are under the control of the landlord, the Houston office itself must comply with few regulatory requirements. The Houston office does not undertake in-house audits, external audits, or subject matter reviews. Regulatory agencies do not conduct ES&H inspections or investigations of activities. However, regulatory agency inspections (e.g., by the local fire marshal or municipal building inspectors) of the building and facilities could occur, with any subsequent findings assessed against the landlord. Four employees are employed at the Houston location; three are federal employees and one is site support contractor.

Building occupants participate in fire drills, which are conducted according to local fire marshal requirements and in cooperation with the building management. Volunteer fire wardens conduct

roll call during drills and facilitate orderly evacuations. Tornado drills are announced through a building-wide public address system and are conducted in accordance with OSHA emergency response requirements.

Photo 3.4.1: Houston Office.

The City of Houston does not impose recycling requirements that would apply directly to office space leases. Nevertheless, building management has a recycling program throughout the office building complex. The landlord has a building-wide recycling plan and procedure for tenant participation.

As of the most recent U.S. Census estimates, there were 2,320,268 people and 848,340 households in the city. The population density was 3,501.5 per square mile.

The median income for a household in the city was $51,140. The per capita income for the city was $31,576. About 20.6% of the population was below the poverty line. The major employers in Houston are Walmart, Memorial Hermann Health System, H-E-B, University of Texas MD Anderson Cancer Center, McDonald's Corp., Houston Methodist, Kroger, United Airlines, Schlumberger, and Shell Oil Co.

3.4.2 Major Site Activities

NETL leases the office space under its own leasing authority. In 2019, the Houston office undertook actions to add three offices, cubicle space and a reception area. No activities were conducted in 2020.

3.4.3 Environmental Restoration and Waste Management

The Houston office had no off-site remediation activities, no on-site Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Superfund Amendments and Reauthorization Act (SARA) cleanups, and no spills or leaks from facilities or operations that were ongoing in 2020. No National Priorities List sites which NETL-Houston had liability under CERCLA/SARA exist. No cleanups or surveillance activities for leaks or spills or other activities that would lead to Resource Conservation and Recovery Act (RCRA) cleanups occurred in prior years.

3.4.3.1 NEPA

The Houston office does not conduct National Environmental Policy Act (NEPA) reviews for proposed off-site federal actions. These actions relate to contract awards or grants to other governmental organizations, educational institutions, and private industry.

3.4.3.2 Radiation Protection

This does not apply to the Houston office.

3.4.3.3 Ionizing Radiation Program

No ionizing radiation sources are at Houston.

3.4.3.4 Air Quality and Protection Activities

Because it is strictly a project management office implementing oil and gas programs, Houston has no air quality protection program and no emissions that require monitoring, reporting, or permits.

3.4.3.5 Water Quality and Protection Activities

The sewer use permits and storm water runoff control and permits are the responsibility of the building landlord Houston office activities in 2020 resulted in no unplanned releases, leaks, or spills that would require reporting to governmental agencies.

Potable water supplies are managed by six community public water systems and are tested to verify compliance with Safe Drinking Water Act standards. All testing has been performed by the City of Houston (municipal water authority) in compliance with the Safe Drinking Water Act standards, and the report can be reviewed at City of Houston Water Quality Report 2020.

3.5 MORGANTOWN, WEST VIRGINIA

3.5.1 Site Description

The Morgantown site (Photos 3.5.1.1 and 3.5.1.2) lies within Monongalia County, West Virginia, on the northern end of the city of Morgantown. The location is about 70 miles south of Pittsburgh, Pennsylvania, and about 200 miles west of Washington, DC. Geographically, the Morgantown site sits within the rolling hills of the Appalachian Plateau, about 1,000 feet east of the Monongahela River and about 10 miles west of Chestnut Ridge, the westernmost ridge of the Allegheny Mountains. The site covers approximately 135 acres, 33 of which are developed as industrial use. All surface drainage goes into two small streams that border the site on the east and northeast sides. Land use immediately surrounding the Morgantown site is a combination of residential, commercial, deciduous forest, and pasture.

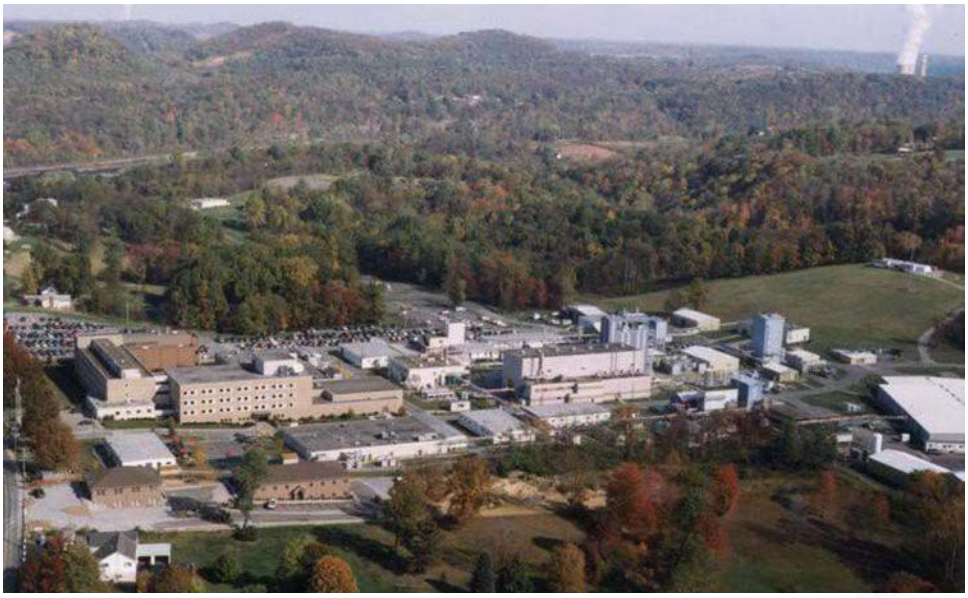

Photo 3.5.1.1: Morgantown

Photo 3.5.1.2: B-39 in Morgantown.

The Morgantown site focuses on technologies in scientific and engineering areas creating commercially viable solutions to national energy and environmental problems. The areas include energy conversion devices, simulation -based engineering, in-situ materials characterization, supercomputer infrastructure, and diagnostics, sensors and controls. The work is accomplished through both in-house R&D and externally through funding awarded for specific research. As of December 31, 2020, 584 employees were employed at the Morgantown site; 215 federal employees and 369 site-support contractor employees.

Morgantown's population, per the 2010 U.S. Census, was 29,660 in 11,701 households within the city limits. The population density was 2,917.0 per square mile. There were 12,664 housing units at an average density of 1,245.2 per square mile. The racial makeup of the city was 89.7% White, 4.1% African American, 3.4% Asian, 2.6% Hispanic or Latino of any race, 0.1% Native American, 0.1% Pacific Islander, and 2.0% from two or more races.

The median household income for the Morgantown, West Virginia metro area was $27,737 in 2010. The per capita income for the city was $19,437. About 36.7% of the population was below the poverty line. Major employers within the Morgantown area according to the Morgantown Area Partnership were West Virginia University, WVU Medicine, Monongalia County Board of Education, Monongalia General Hospital, National Energy Technology Laboratory, Mylan Pharmaceuticals, and U.S. Centers for Disease Control.

3.5.2 Major Site Activities – Morgantown

1.) Trailer 43 and Trailer 45 Demolition

Demolition of 8,352 square feet of modular office space that had reached the end of its useful life. The project recycled over 15 tons of scrap metal and reclaimed over 28 pounds of R-22 refrigerant. Strategic plans include replacing this old office space with more energy efficient and ADA compliant facilities.

Photo 3.5.2.1: Trailers Demolition Finished/Landscaping

2.) Building 5 Roof Replacement

The existing roof was replaced due to age to prevent water, snow, and ice damage to the interior integrity of the building. The new roof is a cold applied granulated fiber reinforced cap sheet built-up roofing system featuring a 20-year warranty. The new roof system incorporated tapered insulation to improve water run-off to the drain system. The project also added a fall protection system to improve worker safety.

Photo 3.5.2.2: Building 5 Roof Replacement

3.) Building 17 Generator

A 480v backup generator and automatic transfer switch is being added to Building 17's electrical infrastructure. This backup generator will provide auxiliary power for the entire facility, as well as the research and development operations that are carried out within the building.

4.) Video Surveillance Upgrade

This project provides replacements and upgrades for NETL's video surveillance systems at the Albany, Morgantown, and Pittsburgh campuses. The upgrades are inter-site networked DVRs, HD cameras with pan tilt and zoom functions, IP based cameras, repositioning of cameras to provide improved coverage and new cameras to improve coverage. Video storage and review capabilities were also improved.

5.) Building 3 Exterior Insulation Finish System (EIFS)

Deteriorated EIF) on Building 3 were replaced/repaired/refinished. The existing EIFS had many areas of patching of deteriorated panels over the years and had several areas of delamination. One man door was replaced with a new fiberglass door and all existing man doors, garage doors, railings, window framing, conduits, and trims were painted. The project also included replacing all building exterior lights with new LED light fixtures and landscaping around the west side of the building.

Photo 3.5.2.5: Building 3 During EIFS Renovation

6.) Building 13 HVAC Replacement

This project replaced two HVAC units, steam unit heaters, office window AC unit and an electric baseboard heater that have reached the end of their life cycle with one new energy-efficient HVAC unit which utilizes new more environmentally friendly refrigerant. All duct work was replaced, and a Siemen's control system was installed. The new unit will supply heating and cooling to the building providing 100% outside air for improved R&D capability support. Also provided was a new building exhaust fan that ties in the building lab hood.

Photo 3.5.2.6: New Building 13 HVAC Unit

7.) Building 17 Laboratory HVAC and Door Upgrades

Two laboratories in the basement of B-17 received a new HVAC system to provide improved ventilation to the rooms. In addition, the doorway to Lab 26 was increased in size to allow for the new CT Scanner to be installed. All new equipment meets or exceeds DOE FEMP energy efficiency standards.

Photo 3.5.2.7: Building 17 Laboratory HVAC Replacement

8.) Buildings 26, 2 and 3 Interior Updates

An extensive remodeling project was started at the beginning of FY2020 in Building 26. This work involved renovations to the hallways, bathrooms, and conference rooms on the ground floor of B26 (including a new computer training room). New carpet, paint, lights, ceiling tiles, AV/VTC equipment, and furniture were included in the project. Interior renovations to Building 2 and 3 were also included in the project. In total, updates were made to over 5.700 square feet of office and conference facilities.

Photo 3.5.2.8: Building 26 Renovated Training Room

9.) Building 6 High-Pressure Combustion Facility Air Preheater

Replacement of the 3 MM Btu/hr high-pressure air preheater was completed on December 4, 2020. The previous unit was installed in 1990. It had experienced costly corrosion issues and reached its 30-year lifespan, necessitating its replacement.

3.5.3 Environmental Restoration and Waste Management

3.5.3.1 CERCLA

Morgantown had no National Priorities List (NPL) sites in 2020 and has never been proposed as an NPL site. Furthermore, NETL has never been on the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list or the West Virginia Hazardous Waste Site list (state equivalent of CERCLIS). There were no reportable releases in 2020.

3.5.3.2 SARA Title III/Emergency Planning and Community Right-to-Know Act

NETL has established targets for reducing the accumulation of hazardous chemicals on site. The intent of these targets is to avoid the unnecessary accumulation of potentially hazardous chemicals in the laboratories, while maintaining sufficient chemical stores to complete mission-related research.

In order to meet these goals and to meet regulatory requirements, NETL maintains an active inventory of all hazardous and extremely hazardous chemicals on site, along with the Safety Data Sheets (SDS) for each substance with its Environmental Management System (EMS) (see Figure 3.5.3.2.1).

Figure 3.5.3.2.1: NETL Environmental Management System (EMS) Home Page.

The Morgantown site submits Tier II Emergency and Hazardous Chemical Inventory information by March 1st of each year. Section 312 of SARA Title III requires NETL-Morgantown to provide copies of the information to the following: West Virginia State Emergency Response Commission, the Monongalia Emergency Centralized Communications Agency (MECCA911) and the Morgantown Fire Department. MECCA911 receives the data in its role as the Local Emergency Planning Committee and for the Morgantown Fire Department.

NETL-Morgantown does not prepare a Toxic Release Inventory Form R (TRI Form R) because the site does not use, produce, or process any of the listed toxic materials in quantities that exceed the threshold amounts. In 2020, no releases occurred that would have triggered emergency notification as required by either the Emergency Planning and Community Right-to-Know Act (EPCRA) or CERCLA.

3.5.3.3 RCRA

NETL generates RCRA hazardous wastes from research activities, site operations, construction, etc., and therefore must comply with Title 40 CFR parts 260 through 273. In addition, NETL accumulates hazardous waste on site, and therefore, must comply with applicable requirements of 40 CFR 124, 264 through 267, and 270, as well as Section 3010 of RCRA. Morgantown site is designated as a Large Quantity Generator (EPA ID #: WV7890031886) under the jurisdiction of the West Virginia Department of Environmental Protection (WVDEP).

NETL-MGN does not have an on-site program to treat hazardous waste or render it harmless; however, NETL does recycle some universal wastes. In 2020, NETL recycled batteries, fluorescent light bulbs, drums (Photo 3.5.3.3), and various items containing mercury.

Photo 3.5.3.3: Morgantown Drum Crusher.

MGN had no RCRA non-compliances in 2020. (See Table 3.5.3.3: 2020 Hazardous Waste Generation – Morgantown for a summary of RCRA Hazardous Waste generated in 2020 in Morgantown.) Hazardous waste generated at the Morgantown site was managed by trained personnel from NETL's Hazardous Waste Program and was transported to the TSD facilities of Tradebe, Inc., located in East Chicago, IN, for ultimate disposition in accordance with regulatory requirements.

Additionally, Morgantown's management of SAAs complied with all requirements specified in 40 CFR 262.15. As a large quantity generator, Morgantown met the Preparedness, Prevention and Emergency Procedures in 40 CFR 262, Subpart M—Preparedness, Prevention, and Emergency Procedures for Large Quantity Generators. A determination was made as to when SAAs were appropriate. SAAs were identified, tracked/inventoried, and a servicing schedule (collection and transportation of wastes) for each SAA was established. The identified SAAs were labeled "Satellite Accumulation Area – Hazardous Waste". Waste generators were responsible for maintaining the SAAs and ensuring all generated hazardous waste was properly contained, stored, and identified. NETL's RPs of any project/ operation generating waste ensured compliance for all team members.

The Hazardous Waste Manager was responsible for the appropriate management of all waste at the Central Accumulation Facility prior to and during the time of pickup by the certified contracted transporter. This included ensuring all required documentation (i.e., profiles, testing documentation) was accurate, proper labeling appears on each container, and the handling and transport of all regulated waste is accomplished in compliance with applicable DOE/NETL polies and all other applicable regulations.

Morgantown accumulated its regulated waste in Building 33, MGN's Central Accumulation Area. Extra spill protection and containment in Building 33 was provided by an epoxy coating on the concrete floor, which drains to fully contained sumps. The building was constructed with blast abatement and spill containment features to minimize the potential risks of spark-induced ignition and the spread of contaminants, in the event of an explosion or leak. Each waste class was stored in a separate room to minimize the chance that a leaked material could contact an incompatible substance and cause a reaction.

The Hazardous Waste Manager ensured weekly inspections of the building and its operations were performed and records were kept. All NETL employees take general computer-based awareness training; employees who generate hazardous waste take additional training for compliance with all applicable regulations and DOE/NETL policies. RCRA-required worker training was mandatory for all technicians who collect and handle hazardous waste.

Table 3.5.3.3: 2020 Hazardous Waste Generation - Morgantown	
Waste Stream	Qty. Generated (lbs.)
Poison (Toxic Solids & Liquids)	162
Mercury/Mercury Compounds	67
Flammable Solids	346
Corrosive (Liquids & Solids)	62
Waste Oxidizers	3.0
Waste Paint (Oil Based)	439
Flammable/Combustible Liquids	173
Activated Carbon	1.0
Other RCRA Hazardous Wastes	18
TOTAL	**1,271**

Due to the COVID-19 Pandemic restrictions, DOE Headquarters (FE-17) completed a virtual Staff Assistance Visit (SAV) in September 2020 with NETL personnel. During this SAV, the RCRA program was assessed and no additional opportunities for improvement were identified as part of this SAV.

3.5.3.4 Federal Facilities Compliance Act (FFCA)

There were no issues related to the Federal Facilities Compliance Act for the Morgantown site in 2020.

3.5.3.5 NEPA

See section 2.1.2 National Environmental Policy Act (NEPA) for information on any NEPA requirements related to the Morgantown site.

3.5.3.6 TSCA

NETL-Morgantown does not manufacture chemicals and is not subject to sections of the Toxic Substance Control Act (TSCA) related to manufacturing. No spills or releases of substances regulated by the Toxic Substances Control Act (TSCA) of 1976 (with amendments, et. seq.) – including pesticides, polychlorinated biphenyls (PCBs), formaldehyde, methylene chloride, asbestos, etc. – were reported in 2020 at the Albany site. TSCA waste generated during 2020 included asbestos and lead-based paint, which was disposed of in accordance with Federal, state and local requirements.

No unplanned releases of air pollutants covered by CERCLA or toxic release inventory (TRI) regulations occurred during 2020. Asbestiform fiber concentration air monitoring is conducted annually in Buildings 1, 2, 3, 4 and 7 because asbestos-containing building materials were used in the construction of these facilities. All known friable asbestos-containing material (ACM) has either been removed or encapsulated. Non-friable asbestos present at the NETL-Morgantown site is inventoried and maintained. No samples taken in 2020 indicated that the materials contained fiber concentrations in excess of EPA or the State of West Virginia clearance levels (0.01 fibers/cc). Asbestos engineering drawings based on the Morgantown site inventory continue to be maintained and updated.

When asbestos is removed as part of any remodeling or reworking in a room, building or facility, it is handled by a licensed Asbestos Abatement/Removal Contractor (AA/RC). There were two projects that required a 10-day asbestos notification permit in 2020: (1) NETL-Morgantown Trailer 43 Demolition (Electronic Permit Submission Reference ID: B-2679); and (2) NETL-Morgantown Trailer

45 Demolition (Electronic Permit Submission Reference ID: B-2679).

Additionally, NETL tests for lead paint before demolition projects or elimination of materials through excess property or recycling. Six lead-based paint sampling events were conducted in 2020; four related to preventive maintenance and two related to construction projects. Preventive maintenance projects included: (1) a non-detect sample as part of the B-39 Courtyard Furniture; (2) non-detect samples for as part of the B-43 Gate preventive maintenance; (3) a positive sample as part of the B-43 Site Entrance Canopy Pillars preventive maintenance; and (4) two of the three samples were positive as part of the main chillers preventive maintenance. The preventive maintenance paint work was conducted in accordance with OSHA 29 CFR 1926.62, Lead. Construction project sampling included: (1) a non-detect as part of the B-17 Room 26, Door Expansion Project; and (2) three of four samples positive as part of the B-6 Pre-Heater Demolition Project. The lead-based paint abatement work for the positive samples was conducted in accordance with OSHA 29 CFR 1926.62, Lead.

3.5.3.7 FIFRA

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) is a United States federal law that set up the basic U.S. system of pesticide regulation to protect applicators, consumers, and the environment. No restricted-use pesticides, herbicides or defoliants, as regulated by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), were kept on site. Only general-use pesticides were kept and used for routine insect control. Professional pest control companies are subcontracted under the site support contract to spray around the base of office trailers and outside of certain buildings (for example, B-1). Herbicides are not used for weed control, except for extremely limited cases. No defoliants are used.

3.5.4 Radiation Protection Program

The radiation safety officer maintains an inventory of on-site radiation sources, tracking each item, isotope(s), quantity, custodian, location, status and activity. Table 3.5.4.1 lists the 2020 source inventory at Morgantown. Table 3.1.4.2 contains the 2020 X-Ray radiation generating devices.

Table 3.5.4.1: 2020 Radioactive Source Materials Inventory—Morgantown

Isotope	Activity/Date Determined	Source
H-3	20 Ci (5/94)	Tritium Exit Sign: Model #B100/U10, Serial #575263, SRB Technologies
H-3	20 Ci (5/94)	Tritium Exit Sign: Model #B100/U10, Serial #574434, SRB Technologies
H-3	20 Ci (5/94)	Tritium Exit Sign: Model #B100/U10, Serial #574435, SRB Technologies
H-3	20 Ci (5/94)	Tritium Exit Sign: Model #B100/U10, Serial #574436, SRB Technologies
Cs-137	10 mCi (3/10)	Registration #0190/10, Geotek, Ltd
Cs-137	1 µCi (1/14)	Serial #206, Spectrum Techniques

Table 3.5.4.2: 2020 Morgantown X-Ray Radiation Generating Devices	
Device	Quantity
Dual Anode X-Ray Source Perkin-Elmer Monochromator X-Ray Source Perkin-Elmer	2
X-Ray Diffractometer PANalytical	2
Astrophysics Inc. Model: X1S100X	1
CT Scanner Toshiba (X-ray tube: Model: CXB-750D	1
Micro CT Scanner Xradia xCT-400	1
Comet X-Ray System	1
Olympus Innov-X-Delta XRF	1
Scanning Microscope JEOL Field Emission Electron Microscope JEOL	2
PANalytical XRF	1
Yxlon International MGC 41	1

The Morgantown site did not release any of the radiation source materials into the environment, because all source materials are sealed from release or discharge. No radiation source materials were sent from the Morgantown site to off-site storage or disposal facilities. No low-level radioactive waste (LLRW) disposal activities were required during 2020.

Radiation monitoring performed at Morgantown consisted of whole-body thermoluminescent dosimeters and finger rings for the employees in the mail facility (mail and packages are scanned via X-ray upon receipt), and as identified in appropriate R&D Safety Analysis and Review System (SARS) packages. In addition, specific radiological control areas have dosimeter badges continually displayed. All radiation-generating devices are surveyed for possible leakage on an annual basis.

The cumulative annual dose for all personnel performing all operations at the Morgantown site during 2020 was less than 100 millirem (roentgen equivalent man, <1 millisievert), with an average annual dose of less than 10 millirem (<0.1 millisievert) per person working in the radiation monitoring program.

3.5.4.1 DOE Order 458.1, Radiation Protection of the Public and Environment

Additional information may be found in Section 2.2, DOE Internal Environmental and Radiation Protection Orders, and Section 2.3, Atomic Energy Act of 1954. In accordance with “as low as is reasonably achievable” (ALARA) principles, NETL manages an appropriate radiation protection program for protection of the public and the environment from radiation hazards since radiation sources are low-level, sealed instrumentation sources, radiation generating devices (RGDs), or processes that include naturally occurring radioactive materials (NORM) or technologically enhanced naturally occurring radioactive materials (TE-NORM) with minimal radiation levels.

3.5.4.2 DOE Order 435.1, Radioactive Waste Management

Use of radioactive materials at NETL Morgantown is limited to research instrumentation and geologic samples that have been identified as NORM via surveys. The 2020 source inventory is displayed in Table 3.5.4.1. NETL-Morgantown does not generate or treat any radioactive material, nor does it have any temporary or permanent facility for radioactive waste disposal on-site. An inventory of radiation sources is maintained and monitored by the radiation safety officer. Information is retained about the item, isotope, quantity, custodian, location, status and sealed-source activity. All radioactive sources are sealed and are used in instrumentation/equipment or as check sources.

X-ray generating devices are used for analytical applications at the Morgantown site, such as scanning and transmission electron microscopes, X-ray diffraction and fluorescence instruments, and particle-size analyzers. These devices are examined annually for leaks and safety interlocks/ controls to ensure employee safety.

No radiation leakage, release, or abnormal exposure events occurred in 2020.

3.5.5 Air Quality and Protection Activities

The Ambient Air Quality Program is one of NETL’s environmental protection programs. Significant requirements and responsibilities of this program are listed in Procedure 436.1-03.01, NETL Ambient Air Quality Management. Under this program, NETL’s Federal Air Quality Manager (FAQM) ensures compliance with all federal, state, and local regulations, as well as, all DOE/ NETL policies.

The FAQM also oversees monitoring programs, permitting, and reporting. Air emissions data for the site is calculated and maintained to ensure compliance with regulatory requirements. To maintain quality control, NETL subcontracts analytical work only to certified laboratories. These laboratories must submit their Quality Assurance/Quality Control (QA/QC) manuals to NETL for review. NETL submits quality control samples (duplicates, blanks, and spikes) to the laboratories to verify the quality of the analyses.

The West Virginia Division of Air Quality's (WVDAQ) Permitting Section implements West Virginia's permit program established under the State's Air Pollution Control Act. West Virginia's permit program includes review of applications, determination of permit applicability and issuance of permits for both minor and major sources. Per the WVDAQ definitions, a *source or stationary source* is defined as any governmental, institutional, commercial or industrial structure, installation, plant, building or facility that emits or has the potential to emit any regulated air pollutant under the Clean Air Act. Per WVDAQ, NETL-MGN's operations (laboratory facilities associated with R&D activities) fall under 45CSR13. Specifically, 45CSR13B, The Permitting of Laboratories Under 45CSR13, provides guidance and clarification regarding any necessary permitting for construction and operation of stationary sources of air pollutants from laboratory facilities. The Morgantown site had no new source reviews in 2020 and nor does the site meet the criteria for a stationary source; therefore, no permit or regulatory reporting is required.

WVDAQ generally evaluates air quality on a county-by-county basis, although the regional data may be aggregated into Air Quality Control Region #6, for north central West Virginia. Monitoring is performed in Monongalia County daily at several sites, and the data is made available from the WVDEP website's air-quality index and from the EPA AirNOW webpage. Although, the Morgantown site is not a significant contributor to ambient air quality issues, air emissions are estimated in quarterly and annual air emission inventories to analyze the cumulative effect of all the projects and facilities. This analysis showed that no regulatory or other environmental impact occurred during 2020. Table 3.5.5 displays the estimated 2020 Air Emissions.

In addition, the Morgantown site maintains two small meteorological towers, one is located on the roof of Building 39 (Photo 3.5.5.1) and the other is on the roof of Building 19 (Photo 3.5.5.2). The Building 39 station monitors wind speed and direction, as well as air temperature. The data is collected every second, averaged over 15 minutes, and over 24 hours to provide critical meteorological information to the Emergency Response Organization (ERO) during emergency situations, to assist in employee heat stress data, and to provide meteorological information used in the models for the Air Emissions Program. The data collected at the Building 19 location includes air temperature, wind speed and direction, relative humidity, and total rainfall.

Table 3.5.5: 2020 Air Emissions Inventory—Morgantown	
Pollutant	Calculated Emissions (lbs. /yr.)
Aldehydes	0.080
Benzene	0.0015
Carbon Dioxide	200,000
Carbon Monoxide	1,200
Formaldehyde	1.6
Nitrogen Oxide	300
Particulate Matter (PM), Condensable	12
Particulate Matter, Filterable	9.9
Particulate Matter, Total	21
Particulate Matter, PM10, Filterable	0.070
Particulate Matter, Total	0.36
Sulfur Dioxide	1.4
Sulfur Oxides	16
Toluene	0.030
TOC	16
VOC	43
Xylene, Mixed Isomers	0.010

Photo 3.5.5.1: B-39 Meteorological Tower.

Photo 3.5.5.2: B-19 Rain Gauge.

3.5.6 Water Quality and Protection Activities

NETL engages in water quality and protection activities to: (1) maintain full compliance with all applicable federal, state and local requirements; (2) prevent spills of potential pollutants into the environment; and (3) ensure the safety and protection of our employees, the public, and the environment. These activities include management of surface water, industrial process water and groundwater/soil. There were no water quality issues at the Morgantown Site during 2020. More details are provided in the following subsections.

3.5.6.1 Clean Water Act

National Pollutant Discharge Elimination System (NPDES) Permit

Morgantown's Surface Water Quality Program is managed per NETL Manual 436.1-03.03, *Surface Water Quality Management*. The manual covers permitting and monitoring for storm water sewers and for construction-related disturbances that have the potential of increasing sediment loads in streams. It also includes spill prevention, hazardous waste control and emergency actions, which are addressed specifically in other procedures.

The Clean Water Act, and corresponding state water quality regulations, require facilities generating point-source discharges, or facilities or areas discharging storm water associated with industrial activities, to obtain a National Pollutant Discharge Elimination System (NPDES) permit. The WVDEP has primacy over its NPDES permitting program. NETL Morgantown (Registration No. WVG610042) is authorized to operate under WV/NPDES General Water Pollution Control Permit No. WV0111457 and subject to the provisions of Section W-1 of the General Permit.

Under the existing permit, the site is required to test their effluent quarterly to verify permit compliance; the test results are submitted to the WVDEP per the Site's NPDES Permit. The Permit also requires that Storm Water Pollution Prevention Plan (SWPPP) be developed and maintained to prevent or minimize potential storm water contamination.

Morgantown has four major outfall locations (Outfall 002, 003, 005, and 010). Three of the outfalls are required to be monitored under the current permit (002, 005, and 010). Outfall 003 is not.

- Outfall 002 drains stormwater from a 616,000 square foot area that contains most of the site's office buildings, research facilities, and storage areas.
- Outfall 003 receives drainage from a 42,000 square foot area that is approximately 65% impervious with the remainder consisting of the vegetated hillside next to B-17.
- Outfall 005 drains a 229,000 square foot area that includes B-19 (warehouse and machine shop), the parking lot behind B-33, and various research facilities.
- Outfall 010 drains a 3.8 million square foot area that includes four facilities, B-39 (offices), B-40 (childcare facility) and B-43 (guard shack and roof at main entrance) parking areas, offices and a large section of undeveloped land.

The effluents from these outfalls are monitored according to the WV/ NPDES Permit #WV0111457 and the Site's SWPPP. Per the previous permit, designated storm water outfalls are sampled twice per year in 2020 and tested for basic pollutants that can indicate contamination from site applications of fertilizer or leaking sewer lines (see Table 3.5.6.2.1). This table displays information that is contained in the Discharge Monitoring Report (DMR) reporting form. The monitoring results are presented in Table 3.5.6.2.2. If a spill were to

occur, emergency response procedures would be activated immediately, and the appropriate outfalls would be monitored, as necessary, for the contaminants of concern. The permit does not have reporting limits, but only requires NETL to report the monitoring results. NETL satisfied the requirements of the permit. No permit issues were identified in 2020. (Note: WVDEP issued the latest Multi-Sector Stormwater General Permit (MSGP) for the Morgantown Site on February 17, 2021, expiring on February 16, 2026.)

Table 3.5.6.2.1: 2020 NPDES Permit Storm Water Monitoring Requirements—Morgantown			
Outfall	Pollutants of Concern	DMR Limits	Frequency
	Fecal Coliform	Report Only	6 Months
	BOD	Report Only	6 Months
	COD	Report Only	6 Months
	TSS	Report Only	6 Months
	pH	Report Only	6 Months
	Total Nitrite plus Nitrate	Report Only	6 Months
	Total Ammonia Nitrogen	Report Only	6 Months
	Oil and Grease	Report Only	6 Months
005	Fecal Coliform	Report Only	6 Months
	BOD	Report Only	6 Months
	COD	Report Only	6 Months
	TSS	Report Only	6 Months
	pH	Report Only	6 Months
	Total Nitrite plus Nitrate	Report Only	6 Months
	Total Ammonia Nitrogen	Report Only	6 Months
	Oil and Grease	Report Only	6 Months
010	Fecal Coliform	Report Only	6 Months
	BOD	Report Only	6 Months
	COD	Report Only	6 Months
	TSS	Report Only	6 Months
	pH	Report Only	6 Months
	Total Nitrite plus Nitrate	Report Only	6 Months
	Total Ammonia Nitrogen	Report Only	6 Months
	Oil and Grease	Report Only	6 Months

BOD = Biological Oxygen Demand; COD = Chemical Oxygen Demand; TSS = total suspended solids

Table 3.5.6.2.2: 2020 NPDES Storm Water Analysis Results—Morgantown						
Constituents	Outfall 002		Outfall 005		Outfall 010	
	May	Nov.	May	Nov.	May	Nov.
Total Nitrite plus Nitrate (Grab)	0.41 mg/L	0.54 mg/L	NS	NS	NS	NS
Total Ammonia Nitrogen (Grab)	<0.6 mg/L	<10.0 mg/L	<0.6 mg/L	<10.0 mg/L	<0.6 mg/L	<10.0 mg/L
Fecal Coliform (Grab)	150 col/ 100 mL	2100 col/ 100 mL	4.1 col/ 100 mL	2900 col/ 100 mL	108.0 col/ 100 mL	2800 col/ 100 mL
TSS (Grab)	40 mg/L	39 mg/L	22 mg/L	10.0 mg/L	7.0 mg/L	52 mg/L
BOD	4.7 mg/L	11.1 mg/L	3.0 mg/L	<3.0 mg/L	<2.0 mg/L	5.4 mg/L
pH	8.5 s.u.	8.0 s.u.	8.1 s.u.	8.1 s.u.	7.9 s.u.	7.9 s.u.
COD	<10.0 mg/L	64.1 mg/L	25.9 mg/L	<20.0 mg/L	<10.0 mg/L	<20.0 mg/L
Oil and Grease	<3.0 mg/L	<20.0 mg/L	<3.0 mg/L	<20.0 mg/L	<3.0 mg/L	<20.0 mg/L

ND = not detected; NS = not sampled; NR = not reported; TSS = total suspended solids

Potential sources of spills of petroleum products and oils are aboveground storage tanks, oil-filled transformers and switches and 55-gallon drums stored at several locations (B-5, B-19 and B-36). Five aboveground storage tanks contain petroleum products (diesel fuel and gasoline), and one contains ethanol. All storage tanks are compliance with West Virginia's Aboveground Storage Tank regulations, and all have appropriate spill control. Two of the aboveground storage tanks are located inside the area drained by Outfall 002. One storage tank is in the drainage area of Outfall 005, and the remaining two are in the drainage area of Outfall 010. The site has 28 oil-filled transformers, all of which have been tested for polychlorinated biphenyls (PCBs). No buried, or partially buried, storage tanks exist at the Morgantown site.

An oil-water separator, Photo 3.5.6.1.1, is installed inside the runoff collection system of the parking garage, but no other treatment systems are installed for storm water at the Morgantown site. Based on previous test results, the primary concern with surface water has been sediment loading. Sediment loading of surface water runoff affects Burroughs Run along the southeastern margin of the site, West Run along the northeastern margin of the Site, and a small stream that traverses the northern portion of the site and empties into West Run. West Run is highly acidic from mine drainage located on the upper reaches of the drainage basin, and suburban development is increasing within the basin. Burroughs Run drains an area of significant urban and suburban development, which contributes typical urban/suburban pollution (e.g., oil, salt, pesticides, and herbicides).

Photo 3.5.6.1.1: Morgantown Parking Lot Oil-Water Separator.

Protection of surface water and groundwater requires the prevention of leaks from storage tanks. Accordingly, NETL is compliant with the WVDEP's Above Ground Storage Tank Regulations. In addition, per NETL Manual 436.1-03.03, *Surface Water Quality Management*, and as required by the NPDES storm water permit, this program maintains written Spill Prevention, Control, and Countermeasures Plan (SPCC) for each site and a written operation and maintenance plan for each individual storage tank system. Each system capable of contributing to fires, explosions, emissions, or spills of hazardous materials must have a written operating plan addressing emergency prevention and actions to be taken should an emergency occur.

Aboveground storage tanks are visually inspected on a weekly basis and have their interstitial cavity checked each quarter. Visible leaks are corrected immediately.

Oil-filled transformers are visually inspected daily. If leaked materials are observed within secondary containment or on the surrounding ground surface, the material is collected or absorbed with spill kits and disposed of per applicable regulations.

Industrial Wastewater Program

Industrial wastewater quality is managed per NETL Manual 436.1-02.04, *Industrial Wastewater System Management Program*, which is administered by the Industrial Wastewater Quality Program Manager. Industrial wastewater is conveyed from Morgantown's facility floor drains, equipment condensate lines, and laboratory sinks to the Clarifier (Photo 3.5.6.1.2) and associated processes/equipment for sediment removal and pH adjustment. The site's Industrial Waste Discharge Permit (MUB 012), issued by the local utility, Morgantown Utility Board (MUB), allows for the operation and maintenance of a 16-foot diameter Lakeside Equipment Company Spirotlo Clarifier, a batch pH treatment system with a 2,632-gallon equalization lank and two 2,500-gallon neutralization tanks, a 12 x 16-foot sludge drying bed and one 12-inch tap to the Morgantown Utility Board Sanitary Sewer Collection System with a wastewater discharge rate limit of 90,000 gallons per day. Per the 2020 permit requirements, monthly sampling is performed at a laboratory chosen from a list certified by the EPA, and Discharge Monitoring Reports (DMRs) detailing this sampling and analysis are provided to the MUB. Results of the DMRs for 2020 are provided in Table 3.5.6.2.3: 2020 Wastewater Effluent Analysis (lbs./d); Pretreatment Permit, Outlet No. 01, One Sample/Month – Morgantown. The sampling point is displayed in Photo 3.5.6.1.3.

Photo 3.5.6.1.2: Morgantown Clarifier.

Photo 3.5.6.1.3: Morgantown Wastewater Permit Sampling Point.

Table 3.5.6.2.3: 2020 Wastewater Effluent Analysis (lbs./d); Pretreatment Permit, Outlet No. 01, One Sample/Month—Morgantown

Parameter	Limit	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Flow (MGD)													
Monthly Avg.	0.09	0.005	0.006	0.007	0.012	0.01	0.007	0.01	0.0065	0.004	0.004	0.01	0.006
Daily Max.	0.15	0.014	0.023	0.02	0.02	0.02	0.02	0.02	0.06	0.025	0.011	0.023	0.012
BOD5													
Monthly Avg.	Monitor	ND	ND	ND	ND	0.91	ND	0.58	ND	0.16	ND	ND	ND
Daily Max.	Monitor	ND	ND	ND	ND	1.52	ND	1.17	ND	1.02	ND	ND	ND
TSS													
Monthly Avg.	Monitor	0.1	0.12	0.2	0.1	0.36	0.11	0.35	0.36	0.16	0.05	0.18	0.46
Daily Max.	Monitor	0.2	0.46	0.57	0.17	0.6	0.32	0.70	3.30	1.02	0.15	0.42	0.91
Arsenic													
Monthly Avg.	0.005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Max.	0.008	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium													
Monthly Avg.	Monitor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Max.	Monitor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium													
Monthly Avg.	0.007	ND	ND	ND	ND	ND	ND	0.0003	0.0009	ND	ND	ND	ND
Daily Max.	0.011	ND	ND	ND	ND	ND	ND	0.0006	0.008	ND	ND	ND	ND
Copper													
Monthly Avg.	0.04	0.0006	ND	0.04	0.0013	0.0014	0.0006	0.0011	0.0006	0.0006	0.0004	0.0009	0.003
Daily Max.	0.06	0.0018	ND	0.06	0.0022	0.0023	0.0017	0.0022	0.0055	0.004	0.001	0.002	0.006
Cyanide													
Monthly Avg.	0.02	0.0005	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Max.	0.03	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead													
Monthly Avg.	0.025	ND	ND	ND	ND	ND	ND	ND	ND	0.0001	ND	ND	0.00001
Daily Max.	0.038	ND	ND	ND	ND	ND	ND	ND	ND	0.0004	ND	ND	0.0002
Mercury													
Monthly Avg.	0.0006	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Max.	0.0009	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel													
Monthly Avg.	0.010	0.00005	ND	0.0001	ND	0.0001	0.0001	0.0001	0.0001	0.0001	ND	0.001	0.001
Daily Max.	0.015	0.0001	ND	0.0003	ND	0.0002	0.0002	0.0002	0.0006	0.0004	ND	0.0023	0.0021
Silver													
Monthly Avg.	0.011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Max.	0.017	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Zinc													
Monthly Avg.	0.2	0.001	ND	0.0041	0.0001	0.0015	0.0006	0.0011	0.0007	0.001	0.001	0.001	0.003
Daily Max.	0.3	0.002	ND	0.012	0.0002	0.0025	0.0017	0.0022	0.0065	0.006	0.002	0.001	0.006
Iron													
Monthly Avg.	Monitor	0.013	ND	0.035	0.025	0.035	0.019	0.025	0.016	0.011	0.01	0.011	0.055
Daily Max.	Monitor	0.04	ND	0.0001	0.04	0.06	0.05	0.05	0.15	0.07	0.03	0.02	0.11
Manganese													
Monthly Avg.	Monitor	0.005	0.01	0.01	0.02	0.01	0.01	0.01	0.004	0.005	0.005	0.005	0.022
Daily Max.	Monitor	0.015	0.03	0.04	0.03	0.01	0.02	0.03	0.04	0.03	0.01	0.01	0.04

Table 3.5.6.2.3: 2020 Wastewater Effluent Analysis (lbs./d); Pretreatment Permit, Outlet No. 001, One Sample/Month—Morgantown

Parameter	Limit	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Phenolics													
Monthly Avg.	Monitor	ND	0.0006	0.0007	0.001	ND	ND	ND	0.001	ND	ND	ND	0.0005
Daily Max.	Monitor	ND	0.0002	0.002	0.002	ND	ND	ND	0.006	ND	ND	ND	0.0001
TOX													
Monthly Avg.	Monitor	ND	0.008	ND	ND	ND	0.005	ND	0.003	ND	ND	ND	0.004
Daily Max.	Monitor	ND	0.029	ND	ND	ND	0.02	ND	0.03	ND	ND	ND	0.01
Organics													
Alachlor-1254	Report	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS
All others	Report	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS
pH (s.u.)													
Minimum	6.0	6.62	6.59	6.23	6.36	613	6.11	6.05	7.15	6.72	7.01	7.57	7.58
Maximum	9.0	7.71	7.31	7.28	7.16	7.53	7.08	7.78	8.06	7.97	8.18	8.23	8.12
TDS													
Monthly Avg.	Monitor	29	39.6	52.6	32.0	57.1	29.8	26.7	19.5	11.7	10.0	37.6	13.0
Daily Max.	Monitor	81	147.8	150.2	53.4	95.1	85.1	53.4	180.3	73.0	27.5	86.4	26.0

MGD = millions of gallons per day; NS = not sampled; ND = not detected; TSS = total suspended solids; BOD5 = biological oxygen demand for 5-day period; s.u. = standard units; TDS = total dissolved solids

3.5.7 Other Environmental Statutes

3.5.7.1 Endangered Species Act

There were no issues at the Morgantown site with regard to the Endangered Species Act.

3.5.7.2 National Historic Preservation Act

There were no issues at the Morgantown site with regard to the National Historic Preservation Act.

3.5.7.3 Migratory Bird Treaty Act

There were no issues at the Morgantown site regarding the Migratory Bird Treaty Act.

3.5.8 DOE Order 436.1, Departmental Sustainability

See Section 2.2.1.

3.5.8.1 Responsibilities for addressing Executive Orders 13423, 13514, and 13693

See Section 4.0 ES&H Management System.

3.5.8.2 E.O. 13693 GHG Reduction Targets and Sustainability Goals

See Section 4.0 ES&H Management System.

3.5.8.3 Progress on Meeting DOE Strategic Sustainability Performance Plan Goals (2017)

See Section 4.0 ES&H Management System.

3.5.9 Executive Orders

The Morgantown site was in full compliance with all applicable environmental Executive Orders in 2020. Throughout the year, numerous inspections and audits were performed and documented to ensure there were no instances of noncompliance. As noted above, E.O.13834, Efficient Federal Operations, was implemented as part of NETL's ES&H management system. E.O. 13693, Planning for Federal Sustainability in the Next Decade was revoked because of the new executive order, which is described in more detail in Section 4.0.

In addition, other executive orders that apply to NETL, but for which no specific actions were required in 2020, include E.O. 11514, Protection and Enhancement of Environmental Quality; E.O. 11738, Providing For Administration of the Clean Air Act and the Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans; E.O. 11987, Exotic Organisms; E.O. 12088, Federal Compliance with Pollution Control Standards; E.O. 11988, Floodplain Management; and E.O. 11990, Protection of Wetlands; and E.O. 12898, Environmental Justice for Low Income & Minority Populations.

3.5.9.1 Executive Order 11988, Floodplain Management

There were no issues with floodplain management at the Morgantown site.

3.5.9.2 Executive Order 11990, Protection of Wetlands

There were no issues with protection of wetlands at the Morgantown site.

3.5.10 Other Major Environmental Issues and Accomplishments

The Department's Occurrence Reporting Program System (ORPS) provides timely notification to the DOE complex of events that could adversely affect the public or DOE worker health and safety, the environment, national security, DOE's safeguards and security interests, functioning of DOE facilities or the Department's reputation. The Morgantown site filed one report with the Department's ORPS in 2020.

- At 13:28 EDT on April 20, 2020, the site security dispatcher received multiple alarms from multiple systems in B-39. Upon investigation it was determined that a failure of a mechanical connector on the load side of a back-up power electrical transfer switch had occurred resulting in a loss of power to several electrical panels which also resulted in a loss of the air conditioning system servicing the IT data center in the basement of the building. The resulting loss of air conditioning in the data center caused processing equipment to quickly approach maximum operating temperature.

  A closure decision was made for B-39, ensuring all non-essential personnel had departed. Portable ventilation fans were installed within the data center to decrease data center equipment temperatures as much as practical. The transfer switch was transported to an off-site vendor to assess the extent of the damage to the switching mechanism and determine if it could be repaired or needed replaced. ES&H personnel worked with electricians to conduct an Activity Hazard Analysis prior to initiating initial evaluation, recovery planning and temporary repair effort.

3.5.10.1.1 Green and Sustainable Remediation (GSR)

There were no specific Green and Sustainable Remediation efforts related to brownfield sites at the Morgantown site in 2020.

3.5.10.1.2 Organizational Resilience

Organizational Resilience is defined as the ability of an organization to anticipate, prepare

for, respond and adapt to incremental change and sudden disruptions in order to survive and prosper. NETL has identified climate-related risks as they relate to national disasters, fire, medical emergencies, hazardous materials, physical assets and real property, and energy/ water supplies, and developed initial response procedures. In addition, NETL's Emergency Response Organization (ERO) Program Manager represents NETL on local emergency planning committees and is available to review hazard-based risks to a particular region, for example, high-priority impacts from high-water levels and storm damage due to weather events of increasing intensity.

NETL management strongly supports utilization of the best available science related to organizational resiliency policies and programs and will continue to update all applicable NETL orders, policies and procedures, as necessary.

3.5.11 Continuous Release Reporting

There was no continuous release reporting required for the Morgantown site.

3.5.12 Unplanned Releases

There were no unplanned releases at the Morgantown site.

3.5.13 Summary of Environmental Permits

A summary of environmental permits for the Morgantown site is provided in Table 3.1.13, 2020 Summary of Permits.

Table 3.5.13: 2020 Summary of Permits - MGN

Permit No. and Name	Site	Issue Date, Exp. Date	Regulatory Agency	Description
MUB 012 Industrial Waste Discharge Permit	Morgantown	02/17/2016, 02/16/2021	Morgantown Utility Board (MUB)	Permit allows for the operation of wastewater pretreatment facilities and discharge into MUB's sanitary sewer system. It establishes discharge limits and monitoring requirements, compliance with the Morgantown Industrial Waste Ordinance, reporting requirements, including accidental discharge reporting and testing procedures.
WV0111457 WV/NPDES General Water Pollution Control Permit	Morgantown	Old Permit: Issued 03/03/2014, Expired 03/30/2020. Permit Extended through 08/2020: Pending new permit at the state level. New Permit: Issued 09/12/2019, Expires 09/12/2024.	WV Department of Environmental Protection (WVDEP), Division of Water and Waste Management	MGN Site (NPDES Stormwater Permit Registration Number: WVG610042) is authorized to operate under WV/NPDES General Water Pollution Control Permit No. WV0111457 and subject to the provisions of Section W-1 of the General Permit. Semi-annual stormwater samples are collected and submitted as per Water Pollution Prevention Plan and Groundwater Protection Management Plan required by the permit.

3.5.14 Fire Protection Management and Planning

A wildfire is an uncontrolled fire in an area of combustible vegetation that occurs in the countryside or rural area. The Morgantown site comprises 132 acres, with 86 acres being considered forest and/or field. The site has a perimeter fence separating it from other industrial sites to the west and north); there is also a railroad to the north, and neighborhoods to the east and south of the site.

West Virginia Division of Forestry links to the Wildfire Assessment System (www.wfas.net) to assess the risk of wildfires based on Fire Danger maps; these typically indicate low to moderate risk for West Virginia. The main threat of a fire would be incidental fires from an off-site incident, or from equipment use on the property. In addition, illegal or uncontrolled burning (burning leaves, bonfires, etc.), where debris travels into the woods or fields can ignite fires during drought conditions, as well as misuse of fireworks from the surrounding neighborhoods under dry/hot summer conditions. NETL-Morgantown has wooded areas that are mowed and trimmed; there is a very low potential of fire from a lawn mowing equipment malfunction.

Fire Alarm Control Panels (FACPs) are installed in most of the buildings on site. All FACPs are equipped with Digital Alarm Communication Transmitters (DACTs) that enable the panels to send fire alarm and trouble signals to the B-7 Security Office for monitoring and response. Each building with a FACP is equipped with alarm and notification devices to alert personnel of a fire. Fire suppression systems are installed in most of the buildings on site to combat and/or extinguish a fire.

While NETL does not have a firefighting program, the site does have an Emergency Response Organization for on-site emergencies. The site maintains an emergency phone line reporting system (by dialing ext. 11), which connects the individual reporting a fire to the security office. NETL's response to any fire - facility, project area, vehicle, wildfire, or other, would be to call the local fire department. Voluntary fire extinguisher usage is allowed, but not required. Annual fire drills are conducted, to allow all employees to practice evacuation and accountability protocols. During any hot work or fire protection outages, a trained 'fire watch' person(s) is designated to continuously monitor the area of concern and report any fires.

3.5.15 Recreational Hunting and Fishing

The Morgantown site does not offer the opportunity for the public to entertain recreational hunting and fishing to control wildlife populations in a controlled setting.

4.0 ENVIRONMENTAL, SAFETY, AND HEALTH MANAGEMENT SYSTEM

The scope of ES&H Management System covers on-site operations involving employees at the Albany, Morgantown, and Pittsburgh sites, including on-site research and development activities, site maintenance and operations, construction management and verification activities, and the supporting administrative functions related to these activities and operations.. Operations not owned or controlled by NETL are excluded from the ES&H Management System, such as the credit unions, childcare facilities and other tenant facilities/operations.

The underlying framework of the ES&H Management System is DOE's Integrated Safety Management (ISM) system, whereby ES&H accountability is integrated into individual decisions and corporate planning processes. The Department's ISM Program, ISO 14001 (Environmental), and ISO 45001 (Occupational Health and Safety) all require NETL to implement a plan-do-check-act approach to maximize the protection of the public, employees, the environment, and property. The ES&H Management System uses the same philosophy to protect the environment, both on site and off site, during the conduct of operations under NETL's control.

The Morgantown and Pittsburgh sites received initial certification to the ISO 14001:1996 standard August 31, 2003 The Morgantown and Pittsburgh sites were recertified as a single entity in 2007 by Orion Registrar, Inc. to the upgraded ISO 14001:2004 standard. The Albany site received initial ISO 14001:2004 certification in April 2005. (The Albany site also achieved certification to ISO 9001 (Quality) in November 2008.) Subsequently, all three sites were recertified to a combined scope by Orion Registrar, Inc., in 2010. It should be noted that NETL's facilities/offices in Houston, TX, and Anchorage, AK ,are not required to have an ES&HMS because these operations are not considered facilities, as defined by E.O. 13148, Greening the Government through Leadership in Environmental Management.

Surveillance audits continued based on prescribed audit schedules to maintain certifications, with external audits generally occurring as combined Morgantown/Pittsburgh audits and Albany audits occurring separately. A listing of historical major audits is provided below.

Table 4.0 Historical Major Audits				
Date	**Site(s)**	**Standard**	**Type**	**Auditor**
2007	MGN / PGH	ISO 14001:2004	Recertification	Orion Registrar
Nov 2009	ALB	ISO 14001:2004	Recertification	Orion Registrar
2010	ALB / MGN / PGH	ISO 14001:2004	Recertification	Orion Registrar
Jun 2010	MGN / PGH	OHSAS 18001:2007	Certification	Orion Registrar
Aug 2010	ALB	OHSAS 18001:2007	Certification	Orion Registrar
Sep 2013	ALB / MGN / PGH	ISO 14001:2004	Recertification	Orion Registrar
Sep 2013	ALB / MGN / PGH	OHSAS 18001:2007	Recertification	Orion Registrar
Aug 2016	MGN / PGH	ISO 14001:2004	Recertification	Orion Registrar
Aug 2016	MGN / PGH	OHSAS 18001:2007	Recertification	Orion Registrar
Sep 2016	ALB	ISO 14001:2004	Recertification	Orion Registrar
Sep 2016	ALB	OHSAS 18001:2007	Recertification	Orion Registrar
Apr 2018	MGN / PGH	ISO 14001:2015	Upgrade	Orion Registrar
Jul 2018	ALB	ISO 14001:2015	Upgrade	Orion Registrar
Aug 2019	ALB / MGN / PGH	ISO 14001:2004	Recertification	Orion Registrar
Aug 2019	ALB / MGN / PGH	ISO 45001:2018	Certification	Orion Registrar

NETL recompeted its ISO 14001/ISO 45001 external auditor contract in 2020, with the new contract being awarded to Government & Military Certification Systems, Inc. of Washington, DC. A surveillance audit was completed on October 26-29, 2020 and was completed virtually due to travel restrictions associated with the COVID-19 pandemic. This audit resulted in two minor nonconformances, including: (1) NETL did not ensure that all required inputs into management review have been covered and that top management is a part of the review, and (2) NETL did not ensure that all of the requirements in the ISO 14001 and ISO 45001 standards were assessed. NETL provided corrective actions to Government & Military Certification Systems for the nonconformities and is currently working to implement those corrective actions. Twenty observations and Opportunities for Improvement (OFIs) were also noted during the audit.

The ES&H Management System continues to ensure consideration of the environmental, safety and health impacts of day-to-day activities and minimizes these impacts, as much as possible, consistent with the mission of fossil energy R&D. The ES&H Management System, as described in NETL's directives and manuals, includes a policy statement, top-down responsibility, personal accountability for work being performed, regulatory awareness, document control, goals, self-assessments, and continual improvement activities. By maintaining its ISO 14001:2015/ ISO 45001:2018 certifications, NETL demonstrates to its workforce, the surrounding community, DOE, and other stakeholders that it is committed to responsible environmental, safety, and health stewardship.

4.1 ENVIRONMENTAL, SAFETY, AND HEALTH POLICY

NETL strives to minimize hazards to the public and the environment and reduce injuries to the workforce. NETL requires consideration of potential environmental, safety and health impacts

when planning and executing work at all levels. NETL's ES&H policy was updated and approved by senior management in 2005 to align with the ISO 14001:2004 version of the standard. It was updated again August 9, 2006, to incorporate safety and health considerations; the Albany site was also added to the scope of the management system.

Management commitment and employee involvement are necessary to maximize oversight and improve communications. However, responsibility for effective environmental, safety and health performance rests with line management. Line management must involve workers in the planning and execution of environmental, safety, and health programs and must fully communicate information to site personnel.

NETL uses the acronym "PRISM" to illustrate its policy (see Diagram 4.1). PRISM describes the incorporation of Integrated Safety Management (ISM) into the Environmental Management System (ES&HMS). The PRISM graphic is used as part of NETL's ES&H management system training, as a reminder of the policy. The PRISM logo was updated in 2006 to include safety and health; this helps to support the NETL's ISO 45001:2018 certification.

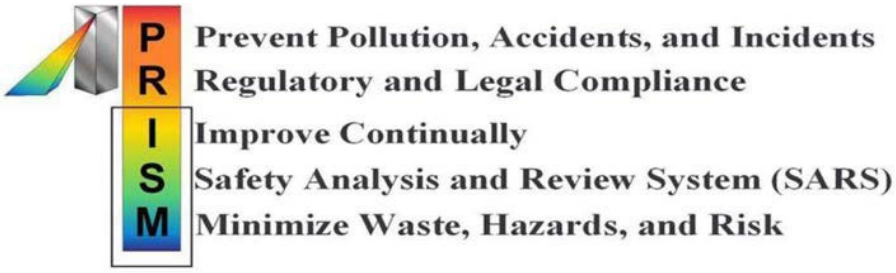

Diagram 4.1: Illustration of NETL's Environmental Policy.

4.2 IDENTIFICATION OF ES&H SIGNIFICANT ASPECTS, OBJECTIVES, AND TARGETS

Significant aspects are elements of an organization's activities that can interact with the environment and are under NETL's control or influence. All research projects, operations, and facilities have been inventoried and scored based on their potential to impact the environment and natural resources, as well as whether they require compliance with specific environmental laws and regulations. The ES&H Management System Crosscutting Team - a group composed of the ES&H Management System Representative and supervisors/leads for the Environmental, Safety, and Health Team and the Engineering and Facilities Team, and the ES&H management system coordinator - reviews the highest impact scores and develops the list of significant aspects. The ES&H Management System Representative then approves NETL's significant aspects.

Table 4.1: Environmental, Safety, and Health Significant Aspects for FY2020 provides a listing of the ES&H significant aspects. The ES&HMS crosscutting team determined the following regarding the ES&H significant aspects:

The ES&H crosscutting team considered, in more detail, the following significant aspects:

- Under Waste Minimization, Pollution Prevention, and Recycling, it was determined that the recycling EMP will be tracked only for the tons of nonhazardous solid waste generated and percentage recycled. DOE is no longer setting a target, although NETL will continue to consider net-zero waste as a strategy for waste reduction. Recycling construction waste will have no target and only be tracked and reported for the Site

Sustainability Plan.

- It was determined that the aspect for High-Performance Sustainable Building Implementation should remain because this aspect is based on DOE's 2019 Sustainability Report and Implementation Plan's (SRIP) target of 15% of GSF or buildings over 10,000 GSF meeting the HPSB GPs in FY 2020. NETL is currently meeting the requirement that 15% of existing facilities above 10,000 gross square feet meet the Guiding Principles. NETL continues to annually assess and report on building conformance to sustainability metrics.

- For the Hazardous Materials Procurement, Consumption, and Storage aspect, it was determined that the Chemical Inventory baseline for the number of containers and pounds will be updated to the FY2019 numbers. The objective and target will remain as is. A new target is proposed to be introduced to track the procurement of a new chemical inventory software/system that will support all three sites. The target for 2020 will be to provide training via computer-based training to all employees by the end of the year on the purpose and use of the new chemical inventory software/system.

- With respect to the Greenhouse Gas Air Emissions aspect, while there are currently no metrics in the guidance for the new executive order, the order does mention tracking and reporting of these emissions; NETL can continue to track and report these.

- For the Green Purchasing aspect, the Environmentally Preferred Products EMP will need more information and specifications developed based on DOE's SRIP and E.O. 13834. Targets need to be developed and reviewed for evaluation and implementation of the EMP. A new objective and target are proposed to track the number of contracts with a sustainable action clause or clauses and the related funding to the clauses.

- The Energy and Fuel Management aspect includes Energy Use, Management of Servers and Data Centers, Renewable Energy, and Fleet Management. For the Energy Use EMP, the baseline needs to be evaluated due to the fact this is now tracked on a year-to-year basis per DOE's SRIP target of 0.5% reduction in FY 2020 based on FY 2019 baseline. For the Management of Servers and Data Centers EMP, the objectives and targets will need to be re-written based upon changes through the Chief Information Officer guidance (Federal Cloud Computing Strategy and Data Center Optimization Initiative Memorandum). The guidance is likely to be along the lines of building the standard PUE for data centers into new designs and construction. For the Renewable Energy EMP, NETL is still required to comply with EPAct 2005, which requires a reduction of 7.5% of total electrical energy use. NETL plans to purchase renewable energy credits (RECs) to meet this goal. For the Fleet Management EMP, the petroleum consumption target will need to be updated per DOE's SRIP target of 2% reduction in FY 2020 based on FY 2019 baseline. The second target to maintain on-site refueling infrastructure and expand electric vehicle charging stations have been built, is being implemented, and can be removed from this EMP.

- The Water Usage aspect's Potable Water Consumption EMP, the target will need to be modified with the FY2019 result being the baseline for FY2020 as this is tracked on a year-to-year basis per DOE's SRIP.

- For the Workplace Health and Safety aspect, the NRTL EMP's target has been completed and can be removed. The electrical PPE EMP's objective has been incorporated into the site operations' contract requirements and that EMP can also be removed. The NORM ES&H Management Plan includes revising procedures/manuals and the tracking of the new chemical inventory software. The other targets will be updated as needed for FY2020. It is expected that the SARS packages with NORM will be identified and that the new chemical inventory software/system will be online and will be able to track NORM samples in FY2020.

- The activities related to the Landscape Management are part of the regular site operations and maintenance contract. This EMP and aspect can be removed..

Following the annual update and ranking of significant aspects, NETL's ES&H objectives and targets were revised and presented to the Management Review Board (MRB) for approval. The MRB is a group of senior managers (Chief Operating Officer; Associate Director for Facility Operations; and the Albany, Morgantown and Pittsburgh Site Managers) that reviews and approves ES&H objectives and targets, reviews ES&H performance, and takes appropriate action when needed to ensure ES&H programs continue to meet ES&H policy. At the MRB meeting held January 29, 2021, the MRB approved the list of significant aspects (see Table 4.2: Environmental, Safety, and Health Significant Aspects for FY2021), the objectives, and the targets for FY2021.

Objectives are overarching for the organization, while targets are specific measurable or quantifiable criteria supporting those objectives. Performance measures are compared to targets to determine the degree of success in reaching associated objectives. Before establishing and reviewing its objectives, NETL considers regulatory and DOE requirements; technological options; financial, operational, and business requirements; and the views of interested parties. Line managers within the organization assign responsibility for objectives and targets to individuals with expertise in the respective subject areas. These individuals, known as responsible persons, develop ES&H management plans (EMPs) specifying how NETL will meet its objectives and targets.

The approved objectives and targets, as well as the actual performance data for the FY2020, are presented in Table 4.3: FY2020 Environmental Management Plan Metrics for Albany, Morgantown, and Pittsburgh, and the performance data for the first quarter of FY2021 are presented in Table 4.4. The following discussion presents the significant "environmental" aspects and their respective EMP results for Fiscal Year 2020. (Note: safety and health significant aspects are not included in this discussion.)

4.2.1 Waste Minimization, Pollution Prevention, and Recycling

For FY2020, EMPs addressing nonhazardous waste recycling, and construction waste recycling included objectives and targets that address the requirements of E.O. 13834. As an example, the objective of the FY2020 *EMP for Nonhazardous Waste Recycling* was to increase diversion of nonhazardous solid waste from disposal by 50%. By the end of FY2020, NETL had recycled 98% of the nonhazardous waste stream (13,614,774 lbs. out of 13,958,690 lbs.). In addition, the objective for *EMP for Recycling Construction Waste* is to recycle a minimum of 50% of construction/demolition waste and divert it from landfill disposal by the end of FY2020. NETL diverted 97% of its construction/demolition waste to recycling.

4.2.2 Hazardous Materials Procurement, Consumption, and Storage

For FY2020, the significant aspect for addressing hazardous materials procurement, consumption, and storage focused on NETL's chemical inventory. The primary objective of the *EMP for Chemical Inventory* was to reduce and minimize the quantity of toxic and hazardous chemicals and materials acquired, used, and disposed based on E.O. 13693. NETL had a 9.4% decrease in the number of containers (1,293 containers) compared to the baseline that was adjusted in FY2019. Pounds cannot be reported at this time due to the transition to a new chemical inventory system. The number of containers are within the no net gain of (+/- 10%) target for FY2020. As part of this EMP, the accelerated chemical inventory verifications were completed as planned and the new chemical inventory and SDS tracking system (EMS) was launched.

4.2.3 Green Purchasing

The FY2020 EMP for Environmentally Preferred Products focused on various aspects of E.O. 13834, including maximizing site use of environmentally preferred products (EPPs) in operation and maintenance, janitorial, and general office activities; purchasing products that are recycled, bio-preferred, Energy Star, Federal Emergency Management Program (FEMP)-designated, EPEAT- registered, WaterSense or otherwise water efficient; acquiring uncoated printing and writing paper containing at least 30% post-consumer fiber; reducing printing paper use; ensuring that 95% of new contract actions for products and services are energy and water efficient; have bio-based and environmentally preferable, non-ozone depleting, recycled content; and are non-toxic or less toxic than alternatives. The FY2020 targets were to achieve the following: 95% of new contract actions for products and services are: energy efficient, water efficient, bio based-content, environmentally preferable, non-ozone depleting, recycled content, and non-toxic, or less toxic than alternatives; 80% of all products that can be purchased "green" under the site support and construction contracts are of environmentally preferred products; and 98% of copier and printer paper shall contain a minimum of 30% recycled post-consumer fiber. In FY2020, NETL achieved the following: 96.5% of contract actions will be energy efficient, water efficient, bio-based content, environmentally preferable, non-ozone depleting, recycled content, and non-toxic, or less toxic than alternatives; 94.1% of janitorial and operation and maintenance products are environmentally preferred products through its storeroom purchases; and 98% of copier and printer paper contains a minimum 30% recycled post-consumer fiber through storeroom purchases.

4.2.4 Electronic Stewardship

The *EMP for Purchase of Electronic Products* for 2020 was focused on further addressing the goals of E.O. 13834, Efficient Federal Operations. The objective was to ensure the procurement of EPEAT-registered electronic products, and the procurement of Energy Star and Federal Emergency Management Program (FEMP)- designated electronic equipment. The new executive order goal was to "acquire, use, and dispose of products and services, including electronics, in accordance with statutory mandates for purchasing preference, Federal Acquisitions Regulation requirement, and other applicable Federal procurement policies." To that end, in FY2020, NETL continued to track its electronic purchases with the targets being that 95% of all products purchased that have EPEAT standards are EPEAT registered; and 95% of specific electronic products are Energy Star- and FEMP-designated. In FY2019, 99.75% of products are EPEAT registered and 100% of electronic products are Energy Star and FEMP- designated. In addition, in FY2020 the objective for the EMP for Operation and Maintenance of Electronic Products continued to be to enable power management, duplex printing and other energy-efficient or environmentally preferable features on all eligible DOE electronic products. In FY2020, when exempt monitors and computers are accounted for, 100% of printers and 97.33% of workstations have power management settings in place.

4.2.5 Landscaping Management

To address the Presidential Memorandum, *Creating a Federal Strategy to Promote the Health of Honeybees*, NETL implemented an EMP for Pollinator Protection Zones. The objective of the EMP was to promote the health of pollinators and enhance pollinator habitat on NETL managed lands and facilities by planting a diverse array of pollinator supporting plants and implementing simple stewardship practices in defined pollinator protections zones. This EMP effort began in FY2016 by identifying potential areas to establish pollinator protection zones. Future efforts include selection of appropriate plant species, pollinator protection zone site installation, and habitat maintenance.

FY2019, it was determined that Presidential Memorandum, *Creating a Federal Strategy to Promote the Health of Honeybees*, had not been rescinded, so the ES&H Management Plan should remain. The focus will be to leave certain areas not mowed; placing plastic through a growing season to destroy invasive species; and identifying native species and pollinator species that can be planted to enhance pollinators with a minimal budget.

A pollinator protection zone had been designated and planted near the Pines Parking Area at the Pittsburgh site. The seed mix (planned to be perennial plants native to Pennsylvania designed for supporting native pollinators) was not planted; a mix that included poppies, nonnatives of Pennsylvania was planted. Additional efforts were suspended since no funding was available to plant new zones in 2019.

The Pollinator Protection Zone EMP was removed for FY2020. The activities related to this EMP are part of the regular site operations and maintenance contract. Any activities for new areas will be funding dependent.

4.2.6 Water Use

To address the goals of E.O. 13834 NETL's objective was to reduce water consumption intensity, relative to the baseline of 27.3 million gallons (which equates to 23.3 gallons/gross square foot [gal/gsf]) through life-cycle cost-effective measures, by 2% annually through FY2020, or 36% by the end of FY2025 using a baseline of FY2007. NETL's FY2020 potable water intensity was 9.788 gal/gsf. This equates to a 7% decrease in potable water intensity from FY2019.

4.2.7 Energy and Fuel Use

E.O. 13834, Efficient Federal Operations, directed Federal agencies to manage their buildings, vehicles, and overall operations to optimize energy and environmental performance, reduce waste, and reduce costs. DOE's Sustainability Report and Implementation Plan (SRIP) dated August 2020 is DOE's action plan to carry out the requirements of Executive Order 13834.

DOE's 2020 SRIP Facility Energy Efficiency goal is a 1% reduction in FY2020 from FY2019. NETL's FY2020 energy intensity was 141,061 BTU/GSF, a 5.2% decrease from FY2019 which meets the 2020 SRIP goal.

Analysis of FY 2020 electricity and natural gas usage compared to FY 2019 found that overall NETL electricity usage increased by 3.3% in the 1st Quarter of FY 2020, as expected based on the expansion of NETL research capabilities in FY 2019 and FY 2020. The Albany and Pittsburgh sites' electricity consumption increased by 12.5% and 3.5%, respectively; while the Morgantown site's electricity consumption reduced by 2.6%. Overall NETL natural gas usage decreased by 10.1%, based mostly on year-to-year degree day changes.

In the 2nd Quarter through the rest of FY 2020, due to the coronavirus pandemic, NETL reduced on-site operations, with most employees teleworking. This resulted in the final 5.2 % decrease in energy intensity from FY 2020 to FY 2019. Note that the Morgantown increase does not include the increased electricity consumption of the Joule supercomputer which does not contribute to energy intensity as it is exempt as a High Energy Mission Specific Facilities (HEMSF).

DOE's 2020 SRIP Renewable Energy goal is 30.5% of total electricity in FY2020. To meet the DOE 2020 SRIP Renewable Energy Goal of 30.5%, and the EPACT 2005 requirement that renewable electric account for 7.5% of total electric consumption, NETL purchased 12,000 MWh of Renewable Energy Credits (RECs). NETL's annual on-site renewable electrical energy generation equates to 0.5% of its total electric energy usage based on the EPACT 2005 double bonus for onsite renewable energy. With these RECs, NETL's renewable electric energy totaled 37.4% of NETL's FY2020 total electric consumption of 32,514 MWh.

NETL has a data center business case with FITARA approval that outlines NETL's full data center strategy. A summary of this strategy is below.

- The Albany data center is relocating to the first floor of B-1 with design plans having

been accepted by NETL. The new datacenter will be fully metered and have an estimated power usage effectiveness (PUE) of 1.3. Data center infrastructure management (DCIM) software (Nlyte) provided by DOE HQ will be implemented in the Albany data center.

- The Morgantown data center will undergo a remodel and consolidate racks into a smaller, contained space. This will significantly save on power and cooling costs. It will be metered and managed by Nlyte, as well with an estimated PUE of 1.14.
- Pittsburgh completed the design phase of a new data center in B-83 in FY 2020 that will combine high performance computing, research IT equipment, and commodity enterprise IT equipment. This consolidation will eliminate the need for multiple data centers on site. It will also be fully metered and managed with DCIM software.
- All three sites are currently going through a physical to virtual migration of our applications and services. Physical servers will be virtualized and placed on shared hardware to save on power and cooling, thus reducing PUE.

The 2020 DOE SRIP Fleet Goal was to reduce petroleum usage by 2.0% as compared to FY2019. NETL's consumption of petroleum fuel decreased in FY2020 by 67.5% from FY2019 petroleum consumption.

NETL's FY 2020 fuel consumption was greatly impacted by the actions taken by NETL to reduce on-site operations and travel restrictions due to the coronavirus pandemic. These actions were put into place in the 2nd Quarter of FY 2020 through the end of the fiscal year. NETL's GSA-lease Fleet travelled 290,000 miles less in FY 2020 than in FY 2019, 58% reduction in miles travelled.

NETL measures to reduce vehicle miles and petroleum consumption include daily intra-site shuttle service between the Morgantown and Pittsburgh sites. This service has reduced the fleet usage miles by an average of 81,000 miles annually and resulted in the elimination of 4 vehicles in the NETL Fleet. NETL management, in another measure to reduce vehicle miles and petroleum consumption, strongly encourages the usage of videoconferencing and teleconferencing centers as an alternative to utilizing a vehicle to attend meetings, hearings, and training.

Additionally, the Morgantown and Pittsburgh sites operate and maintain E85 refueling infrastructure to support the alternate fuel vehicles (AFVs) in the NETL Fleet.

NETL installed electric vehicle charging stations in Pittsburgh and Morgantown in FY 2018. The sites currently have 4 electric vehicles (Chevrolet Bolts) that are used for inter-site travel between the Pittsburgh and Morgantown sites (130 miles round trip). Using the all-electric Chevy Bolts between sites can save NETL between $12 to $20 per round trip. Each round trip also saves 4 to 6 gallons of gas, which subsequently reduces NETL's greenhouse gas emissions.

4.2.8 Air Emissions/Greenhouse Gas Emissions

Per the Implementing Instructions for Executive Order 13834, *Efficient Federal Operations by the Council on Environmental Quality (CEQ)* Office of Federal Sustainability dated April 2019, Agencies are instructed to track and report Scope 1 and 2 GHG emissions in accordance with CEQ's Federal Greenhouse Gas Accounting Guidance (Accounting Guidance). Tracking of Scope 3 GHG emissions was not required for FY2020.

DOE's action plan to carry out Executive Order 13834*, DOE Sustainability Report and Implementation Plan* required tracking of FY2020 Scope 1 and 2 GHG emissions.

The CEQ Implementing Instructions and the DOE SRIP did not set target reductions for FY2020 Scope 1 and 2, or Scope 3 GHG emissions.

NETL's FY2019 Scope 1 and 2 GHG emissions were 20,150.9 MtCO2e. NETL will continue efforts to reduce energy intensity by implementing energy conservation projects to meet the DOE SRIP goal of an annual one percent year-over-year reduction in energy intensity.

4.2.9 High-Performance Sustainable Building Implementation

DOE 2020 SRIP High Performance Sustainable Building goal is 14% of buildings > 10,000 GSF. In FY 2020, NETL met the DOE 2020 SRIP goal of having at least 14% of existing buildings, larger than 10,000 GSF meet the HPSB GPs. NETL had 18.5% of applicable buildings and 21.2% of applicable building GSF meet the HPSB GPs, including the bonus credit for two buildings below 10,000 GSF meeting the HPSB GPs.

NETL has been using the Portfolio Manager HPSB Checklist to track compliance with the 2008 HPSB GP for each building in the NETL HPSB Plan. As of October 1, 2017, the Portfolio Manager HPSB Checklist can no longer be used. NETL will begin using the 2016 Guiding Principle Checklist for Existing Buildings and the 2016 Guiding Principle Checklist for New Construction and Modernization developed by FEMP.

In order to maintain HPSB compliance through FY 2025, NETL will ensure the seven current HPSB compliant NETL buildings meet ongoing EISA requirements and will add the sixth guiding principle, Assess and Consider Climate Change Risks", within four years.

NETL will incorporate planned building modifications into the Annual Lab Plan and Strategic Facilities Master Plan (SFMP). NETL will continue to incorporate the planning and funding required for the buildings in the NETL HPSB Plan to meet HPSB compliance by FY 2025 into the NETL EMS, Annual Lab Plan and SFMP. The NETL HPSB Plan through FY 2022 is attached in Supporting Documents, which indicates that 31% of NETL's buildings by count and 29.6% of NETL's building GSF could comply with the HPSB GPs by FY 2022.

Architect-Engineer (AE) specifications will be reviewed and revised to meet 2016 HPSB GPs. Employees of NETL and AE contractors have maintained training and knowledge of 2016 HPSB GPs to ensure that existing construction meets the latest requirements.

Table 4.2.9.1: NETL FY 2021 HPSB PLAN							
Building	FY Compliance	Compliance	Current Status	GSF Total = 1,143,803	Cumulative % GSF	Cumulative % BLDGS >10,000 GSF (Total = 271) Add 2 for B-40 + B-900 29	Action
MGN B-39	2009	LEED Gold	Met HPSB Criteria Grandfathered	106,522	9.3%	3.4%	Complete
PGH B-58	2015	HPSB	Met HPSB Criteria Grandfathered	32,240	12.1%	6.9%	Complete
MGN B-1	2016	HPSB	Met HPSB 2008 GP Criteria Per CEQ Instructions	51,598	16.6%	10.3%	Complete
PGH B-921	2016	HPSB	Met HPSB 2008 GP Criteria Per CEQ Instructions	25,033	18.8%	13.8%	Complete
PGH B-920	2017	HPSB	Met HPSB 2008 GP Criteria Per CEQ Instructions	11,681	19.9%	17.2%	Complete
MGN B-40	2013	LEED Gold	Met HPSB Criteria Grandfathered	9,411	20.7%	20.7%	Complete - Bonus Credit < 10,000
PGH B-900	2017	HPSB	Met HPSB 2008 GP Criteria Per CEQ Instructions	6,065	21.2%	24.1%	Complete - Bonus Credit < 10,000
MGN B-26	2021	HPSB	Meets 92% of HPSB 2008 GPs. Energy Efficiency/IAQ	63,616	26.8%	27.6%	2016 GPs Apply
PGH B-925	2021	HPSB	Meets 88% of HPSB 2008 GPs. Energy Efficiency/IAQ	9,326	27.6%	–	2016 GPs Apply (Bonus Credit)
ALB B-1	2022	HPSB	Meets 62% of HPSB 2008 GPs. Energy Efficiency/IAQ	23,348	29.6%	31.0%	2016 GPs Apply

4.3 IMPLEMENTATION AND OPERATIONAL CONTROLS

The ES&H Management System is implemented through an organizational structure shown in Diagram 4.3. Senior-level positions include the NETL Director, who serves as the ultimate authority for the ES&H Management System; Chief Operating Officer, Laboratory Operations Center, the

lead member on the MRB; the Associate Director for Facility Operations, who is the environmental, safety, and health steward and champion; the Site Manager for Albany; the Site Manager for Morgantown; and the Site Manager for Pittsburgh, who also acts as the ES&H Management System Representative. (Site-specific ES&H leads are consulted by the MRB, as necessary.) Mid-level titles nd responsibilities are defined in several NETL directives that specify key components of the ES&H Management. The Site Managers assigns employees to the functional titles and responsibilities.

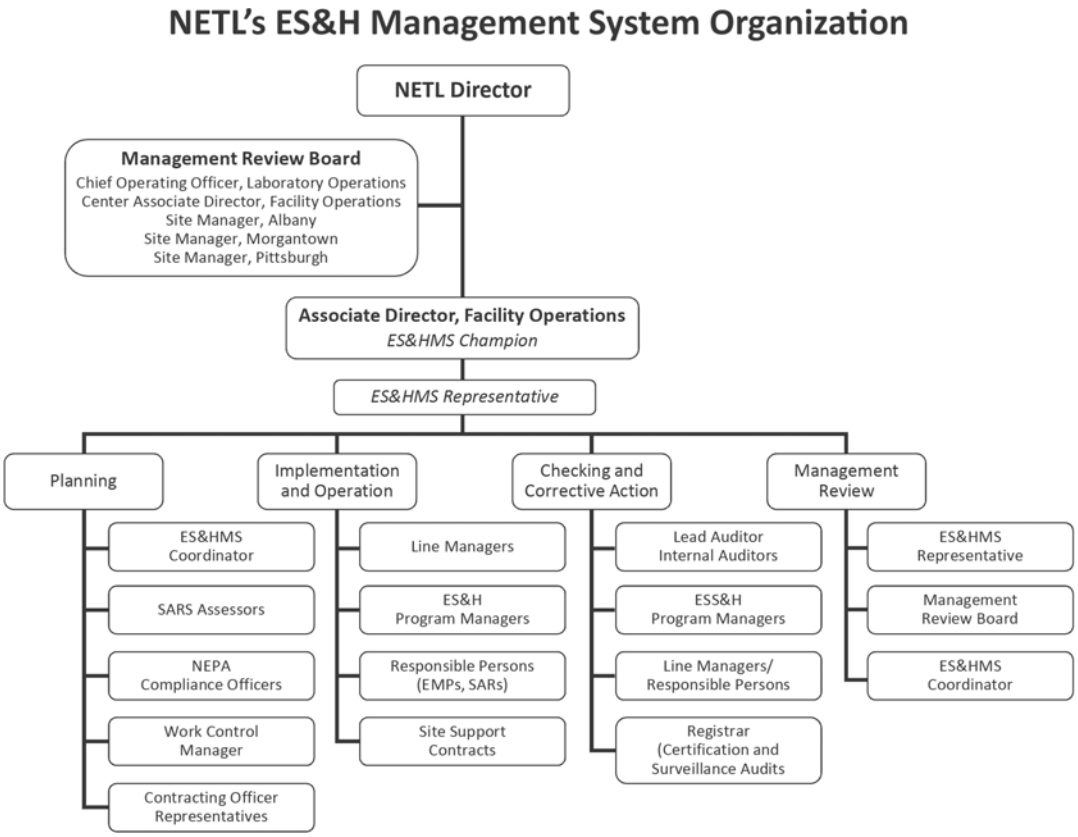

Diagram 4.3: NETL's ES&H Management System Organization.

Line managers are the primary means for NETL to achieve operational control within the ES&H Management System. Communication also occurs through the NETL intranet, which provides a secure internal website containing current versions of all NETL directives, as well as general reference information, forms, and programmatic information. The ES&H Team webpage contains a "ISO 14001:2015/ISO 45001:2018 Roadmap" that provides an overview of available information about the NETL ES&H Management System.

Another example of internal communication at NETL is the biweekly regulatory review, which promotes awareness of regulatory changes and new programs. Every two weeks, federal and state agency websites are reviewed to identify changes in environmental laws, regulations, guidance documents, compliance information and regulatory agency programs. DOE Headquarters' website

is also reviewed to check for new DOE requirements and guidance. These reviews are circulated to the ES&H staff and posted on the NETL intranet homepage.

NETL also communicates information about the ES&H Management System to its employees through the NETL intranet, training, staff meetings, e-mail and posters. The training program includes general ES&H Management System training designed to make employees aware of the ES&H Management System by providing them with information about significant environmental, safety, and health aspects and the potential impacts on their work, employee roles and responsibilities and the potential consequences of not following operating procedures. In addition to the general training, program- and job-specific training is required based on an employee's job duties. The computer-based training system uses a job hazard survey to determine which training modules are necessary. Job-specific training for an employee can also be requested directly by the employee or by his/her supervisor. Each employee and his/her supervisor are responsible for ensuring that all required training is complete before beginning an assignment.

For purposes of communication with external parties, NETL maintains an external webpage (www.netl.doe.gov). The webpage includes a section on Site Environmental Quality that provides the ES&H policy and significant ES&H aspects.

NETL conducts public participation activities under the requirements of the National Environmental Policy Act (NEPA). For projects receiving federal funding, NETL is required by law to use the NEPA process to identify potential environmental impacts, consider alternatives, invite public comment or participation, plan the project with due regard for the environment, impose mitigation requirements, and make informed decisions about whether to proceed with the proposed project. The NEPA process provides a system for reviewing actions prior to a major expenditure of funds to ensure the environmental and social impacts have been identified and analyzed and will be mitigated to the extent practicable prior to committing to the project.

To effectively and efficiently implement the ES&H Management System, NETL must maintain operational control of its on-site R&D projects, facilities, operations and construction activities. This is accomplished through the Safety Analysis and Review System (SARS) process. This process requires proposed projects to be described in writing and subjected to ES&H and quality reviews by subject matter experts and technical committees. Approval must be granted before a project, operation, construction can proceed beyond the planning stage, or before a facility can operate. Included within this process is a review of the potential environmental impacts, regulatory requirements, safety and health hazards, and monitoring plans. After a project begins, annual reviews are required to ensure the project continues to follow environmental, safety, and health requirements. If the project requires changes, the SARS package must be modified, and the SARS process repeated. Other processes for operational control include:

- Environmental Programs that have been established for both defined media (air, surface water, and groundwater), and likely pollution routes (spills, hazardous waste, and nonhazardous waste). Each program is described in directive and is managed by a corresponding ES&H program manager.
- Work performed by contractors that is controlled at the NETL sites through contractual provisions and directives that define the ES&H requirements for work on NETL property, as well as for NETL-funded work at off-site locations.
- Procedure 243.1-01, Records Management, that details operational control through documentation. Critical documents are controlled per a defined process to ensure they

can be located. They are also periodically reviewed and revised. This ensures that the current versions are readily available and obsolete documents are promptly disposed.

- Core ES&HMS documentation that is embodied primarily within NETL ES&H directives. The most recent and official hard-copy versions of NETL directives reside with the NETL directives coordinator. Electronic versions of these controlled directives are placed on the intranet for employee use and are considered official versions. Official copies of ancillary tables, lists and forms are also maintained on the intranet and are reviewed and updated as required.

4.4 SELF-ASSESSMENT PROCEDURES

NETL uses a variety of self-assessment procedures to improve its ES&H performance. This includes internal and external audits, project reviews, and inspections; independent assessments; and reporting through NETL's corrective action tracking system, the Assessment Input Information System (AIIS). Self-assessment enables NETL to make observations and to identify strengths, opportunities for improvement, and nonconformities. In some cases, findings can be corrected on the spot, however, if opportunities for improvement and nonconformities require additional communication, resources and time, they are tracked as preventive and corrective actions.

As noted above, NETL is subject to both internal and external audits of its Environment, Safety, and Health (ES&H) Management System as required by the ISO 14001:2015 and ISO 45001:2018 standards. The auditing process is defined in NETL Manual 450.4-01.02, ES&H Assessments Process. An annual planning schedule is used to ensure that all sections of the ISO 14001:2015 and ISO 45001:2018 standards are audited against. A total of three ES&HMS audits were performed in 2020, including two internal audits and one recertification audit which encompassed activities at the Morgantown, Pittsburgh, and Albany sites. The recertification audit to the ISO 14001:2015 and ISO 45001:2018 standards was conducted by a recently contracted auditor, Government and Military Certification Systems, Inc.

Top management's commitment to the ES&H Management System is evidenced by participation in the Management Review Board, as well as review of ta variety of ES&H assessments. Both DOE and contractor ES&H specialists participate in regular site audits, as well as facility inspections. These audits and facility inspections focus on observable conditions [e.g., compliance with Occupational Safety and Health Administration (OSHA) regulations, National Fire Protection Association (NFPA) codes, National Electric Code (NEC), and other environmental, safety, and health requirements]. Findings from the audits and inspections are entered into the corrective action tracking system, AIIS, and the status of the corrective actions is provided to the office directors each month, as well as to the Management Review Board on a semi-annual basis.

In addition, Safety Analysis and Review System (SARS) assessments are performed on new and modified R&D projects and construction activities and facilities and support operations. Similarly, annual SARS assessments are performed to ensure continued ES&H compliance for these R&D projects, facilities, and support operations. A comprehensive discussion of the SARS process can be found in Section 6.0, Quality Assurance.

In order to better manage ES&H programs (e.g., the Water Quality Program, the Air Quality Program and the Groundwater Program), responsible program managers review their areas on a continual basis to ensure compliance with both external regulatory and NETL requirements. These reviews are informal and may vary in scope and detail and allow managers to verify

NETL directives are relevant and are being met. Some programmatic reviews occur more frequently or focus on monitoring results. The reviews look for trends to identify correctable problems and to address promptly.

In addition, site-support contractor employees periodically inspect higher risk items, documenting findings and providing the results to program managers. This information provides program managers with opportunities to assess the effectiveness of their programs.

Examples include:

- Daily inspections - hazardous waste facility, selected potential spill sources and storm water outfalls.
- Weekly inspections - industrial wastewater discharge points.
- Quarterly inspections - discharge monitoring reports are compiled and reviewed to determine if permit limits have been exceeded.
- Semi-annual inspections – Surface water monitoring reports are compiled and reviewed.

Meaningful reviews for compliance can occur only if the program managers are aware of changing laws and regulations and DOE administrative requirements. Subject matter experts, primarily ES&H staff, are responsible for keeping NETL informed of changing laws and regulations. Part of the program manager's general job responsibilities is to stay abreast of regulatory issues that may affect the NETL ES&H Management System and to take appropriate actions to implement these requirements. NETL has several means of maintaining awareness:

- A biweekly regulatory review covers significant changes in laws and regulations. Information is gathered from selected government websites and DOE's Office of Health, Safety, and Security (AU-1).
- Private sector publications, including "Environmental Compliance in West Virginia," a quarterly regulatory update bulletin published by Business and Legal Reports, Inc.; environmental compliance updates published by the Bureau of National Affairs; and various trade journals.
- Pennsylvania Bulletin and the Pennsylvania Code, (produced by the Commonwealth of Pennsylvania) and the Code of Federal Regulations (published by the National Archives).
- NETL's library subscriptions that are relevant to regulatory documents are available electronically on the NETL intranet or in the library.
- Updated lists of hazardous or regulated chemicals, as needed.
- Websites of regulatory agencies, such as the West Virginia Department of Environmental Protection (WVDEP), the Pennsylvania Department of Environmental Protection (PADEP), and the Oregon Department of Environmental Quality (ORDEQ).
- A regulatory review service, RegScan™ (in Albany) provides regular review of federal and Oregon state regulatory changes.
- Training classes on relevant statutes and regulations.

4.5 CORRECTIVE AND PREVENTIVE ACTION PROGRAM:

- Nonconformance with any of the appropriate regulations or standards identified during any of the self-assessment audits (or external assessments/audits) mentioned above would be documented using NETL's current Corrective and preventive Action Tracking System, the Assessment Input Information System (AIIS).

- NETL Manual 450.4-01.04, *Corrective and Preventive Action Process*, outlines how corrective and preventive action items identified in the various assessments are captured, prioritized, assigned, analyzed for their root cause, tracked, closed, and incorporated, as appropriate, into the lessons learned and training systems. This process holds responsible persons and line management accountable for timely closure of corrective actions within their programs, organizations, or facilities, and disseminates lessons learned across appropriate organizational elements.
- After completion of an assessment, the lead assessor uses the AIIS to generate an assessment record. When a finding is entered into the system, a unique identifying number is assigned and cataloged in the database with the associated assessment record. A notification of the finding is sent electronically to the responsible person and their line manager. All corrective actions taken regarding the finding are then documented in AIIS. To ensure findings have been fully addressed, a follow up is done through the internal auditing process. Each month, several closed findings undergo verification audits to determine if the corrective actions taken address the closed findings appropriately. Open findings are generated into a monthly report and sent out to appropriate line management to further address and complete accordingly.
- Other processes used for reporting corrective actions include: Manual 151.1-01.02, *Emergency Categorizations, Classifications, and Notifications*, a procedure used to catalog and investigate major nonconformities related to emergencies, as required by DOE; and Manual 231.1-00.02, *Injury/Illness Reporting*, which sets forth the minimum reporting requirements for injury or illness classification investigation for NETL.

4.6 MANAGEMENT REVIEW PROCESS

Management review of the ES&H Management System ensures the ES&H policy and management system remain appropriate and effective. The ES&H Management System Representative conducts review meetings nominally twice per year with the Management Review Board – MRB (see Diagram 4.3: NETL ES&H Management System Organization), to allow the MRB to review current environmental, safety and health policy; objectives and targets; internal and external audits; and related issues. Changes are documented and implemented. Management involvement in the ES&HMS ensures that projects are funded with the appropriate priority. Notes from the MRB meetings are posted to the intranet.

The MRB met on July 24, 2020 (second meeting delayed due to personnel changes). Since objectives and targets are on a fiscal year basis, the first MRB meeting focuses on progress towards NETL's current fiscal year objectives and targets. The second meeting focuses on ensuring that the aspects, objectives, and targets were approved for the next fiscal year.

4.7 ENVIRONMENTAL OPERATING EXPERIENCE AND PERFORMANCE MANAGEMENT

NETL sets performance goals as part of the Enterprise Performance Assessment System (EPAS). These metrics are reviewed quarterly by NETL senior management. The specific performance measures that are tracked and their performance for FY2020 are contained in Table 4.7.1. The upper targets and lower targets are shown for each performance metric. If the upper target is met, then the metric is considered "Met." If the metric falls between the upper and lower targets, it is treated as "Caution," which means that the performance needs to be investigated to ensure that the metric does not fall below the lower target. A metric that falls below the lower target is considered "Not Met," and is investigated to determine why the metric was not met.

Table 4.7.1: Performance Management Metrics				
Metric	Objective	Target	FY 2020 Performance	Strategic Objective
Ensure Worker Safety	Minimal cases of wok-related injuries to federal and contractor personnel (assessed quarterly).	Total Recordable Case Rate (TRC) <=1.0 Days Away/Restricted (DART) Case Rate <= 0.4	TRC = 0.3 DART = 0.3	Infrastructure Support
Facility Operations Energy and Sustainability	Demonstrated progress in meeting significant aspects of energy efficiency (assessed quarterly).	Achieve at least 85% energy efficiency score based on compliance with EO 13834 significant aspects.	Energy Efficiency Score = 100%	Infrastructure Support
Minimize Environmental Impacts	Environmental protection programs that minimize adverse impacts on the environment (assessed quarterly).	<2 Group 5 Environmental Occurrence Reports (ORPS) annually. At least 85% ES&H objectives met.	ORPS = 0 ES&H Obj. = 100%	Infrastructure Support

Goal setting is used at NETL to motivate and monitor performance. NETL's environmental performance and progress toward goals is tracked and reported to satisfy both internal and external requirements.

Throughout the year, trained ES&H professionals performed cross-cutting audits and inspections of the NETL ES&H programs to ensure adequate performance. The performance measures used to monitor progress include EMP objectives and targets (see Section 4.2) and institutional environmental performance measures. This includes NETL's performance measures established under the Government Performance and Results Act of 1993. These measures are tracked on a fiscal year basis and cover performance goals and accomplishments.

In addition to these measures, surveillance monitoring is conducted through routine reviews and inspections. Examples of the types of performance monitoring conducted through this program are presented in Table 4.7.2: 2020 Surveillance Monitoring.

Table 4.7.2: 2020 Surveillance Monitoring
Type of Surveillance
SARS Assessments
Transformer Inspections
Storage Tank Inspections
Interstitial Storage Tank Monitoring (MGN)
Back-up Generator Inspections
Chemical Handling Facility Inspections (PGH)

5.0 GROUNDWATER PROTECTION PROGRAM

Groundwater protection at NETL is administered through Procedure 436.1-03.02, *Groundwater Quality Management*. The program covers regulatory requirements and best management practices to prevent leaks and spills, to monitor groundwater and soil, to remove contaminated soil and to address closeout actions. More detailed information is provided in NETL's Groundwater Protection Plan for each site, which documents site hydrogeology, potential pollution sources, potential contaminants to be monitored, well installation and sampling methods, a monitoring strategy and QA/QC processes. Maps of the site aquifers and wells are also included in the plan.

Photo 5.0: Morgantown Monitoring Wells.

Each site has specific reasons for monitoring its groundwater. The groundwater protection and monitoring program in Albany (initiated in 2001) is aligned with the Oregon Department of Environmental Quality (ODEQ) Voluntary Cleanup Program. Albany groundwater monitoring includes 33 wells and two piezometers. The wells were originally sampled for a broad range of contaminants, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, nitrates and PCBs. Current plans include the continued development of a conceptual site model (CSM) to document groundwater and contaminant trends. The CSM is a living document and is updated periodically. NETL will continue to assess the results of periodic monitoring, update the CSM, and plan for future remediation activities (subject to available funding). NETL will continue to provide the ODEQ monitoring reports.

The Pittsburgh site has 23 monitoring wells. A total of 19 wells are screened in shallow weathered bedrock; seven are in the R&D Plateau area, and 12 are in the Valley Fill area (administrative and maintenance areas). The topography, consisting of rolling hills and ridges, reflects the dendritic drainage erosion of the uplifted Allegheny Peneplain. The primary objective of the Groundwater Monitoring Program (GMP) at the Pittsburgh site is to monitor the shallow, weathered bedrock zone as the first significant aquifer or water-bearing unit beneath the Pittsburgh facilities of NETL. Contamination entering the ground from soil surface sources would be expected to impact this zone first and foremost; hence, most wells are placed in this zone. The GMP also monitors the wells screened in the deeper water-bearing zone to provide data on water quality and contaminant migration. Another goal of the monitoring program is to identify and characterize groundwater flow and relate it to surface water flow conditions to better evaluate potential environmental effects of any groundwater contamination.

Twenty active monitoring wells exist at the Morgantown site. These wells monitor two shallow aquifers within the unconsolidated Lake Monongahela sediments and one bedrock aquifer, the Morgantown Sandstone. None of the Morgantown site aquifers are used as a source of water in the immediate area, but selected monitoring wells are sampled and tested for general water-quality parameters. Should a spill occur, containment and cleanup would commence, and the affected soil would be monitored, as necessary, for the contaminants of concern.

5.1 GROUNDWATER AND SOIL QUALITY PROTECTION ACTIVITIES - ALBANY

In 2001, Albany initiated a groundwater protection and monitoring program in accordance with DOE requirements. The program follows the requirements of the Oregon Department of Environmental Quality (DEQ) Voluntary Cleanup Program, with regulatory input from Oregon DEQ. There is no formal agreement between NETL and Oregon DEQ. Albany installed 14 monitoring wells on site in July 2002 and sampled the wells for a broad range of contaminants, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, nitrates, and PCBs. Albany also screened for pesticides, herbicides, dioxins, and radiological constituents from a selected subset of the wells.

Initial periodic sampling showed potential concern over elevated levels of VOCs, metals, and radiological constituents. This necessitated continued periodic monitoring. Subsequent periodic monitoring events have shown excessive turbidity of samples directly influencing metals and radiological results. A review of sampling protocols was undertaken and a requirement was established for future collection of groundwater samples to be performed using U.S. EPA low-stress protocols. Upon implementing the enhanced sampling protocols in 2003, metal and radiological contaminant levels in groundwater were found to be at or near background levels for the Willamette Valley in Oregon.

Photo 5.1: Albany Groundwater Sampling.

VOC detections during periodic monitoring prompted Albany to further investigate areas of suspected contamination, with planning efforts starting in September 2004 and on-site work initiated in January 2005. Results from samples taken in February 2005 showed contaminants of potential concern (COPCs) were likely crossing the eastern boundary of the site and migrating toward Liberty Elementary School. After meeting with Oregon DEQ and the Greater Albany Public School (GAPS) District personnel, investigations were made on-site and offsite

during March- December 2005. Results of the site investigation showed no concern over surface soils, subsurface soils, soil gas, or ambient air at offsite properties. The only issue identified was with elevated levels of COPCs in groundwater at depth, including trichloroethene (TCE), carbon tetrachloride, and chloroform.

Oregon DEQ sampled residential wells within an approximate two-block radius of the site due to resident concerns voiced at Town Hall meetings and further reviews of the sampling results during 2006. A total of 31 residential wells were sampled, with some residential wells (including some used as drinking water) showing elevated levels of COPCs. NETL connected all owners of impacted wells that were used for drinking water (10) to City of Albany potable water supplies by December 2006. One additional owner contacted NETL concerning connection to the City of Albany potable water supplies in 2018, and this action was completed in 2019. NETL has also properly closed any wells that residents requested to be abandoned per Oregon DEQ requirements between 2007-2009.

An independent health consultation was requested by Oregon DEQ in 2006 with the Agency for Toxic Substances and Disease Registry (ATSDR) under U.S Department of Health and Human Services, Public Health Services. This consultation focused on the above-noted groundwater investigation concerns, as well as radioactive waste disposal and beryllium dust concerns, and was completed on October 25, 2006. Results concluded that current and future exposures to VOCs via contaminated groundwater are “no apparent public health hazard”, past exposures at most residences with contaminated wells are “no apparent public health hazard”, and past exposure at one residence is a public health hazard due to exposures to carbon tetrachloride and TCE. The entire health consultation can be found at: https://www.atsdr.cdc.gov/hac/pha/albanyresearchcenter/albanyresearchcenterhc10.25.06.pdf.

Additional monitoring wells have been installed over the years to enhance the groundwater investigation both on site and off site at Liberty Elementary School property, adjacent to the site (see Figure 5.1 for well locations). Regular periodic monitoring is performed twice per year during the wet season (March-April) and during the dry season (August-September), with sampling performed in accordance with the Albany Groundwater Monitoring Plan. Sampling is currently limited to volatile organic compounds (VOCs) and metals. The results of the 2020 monitoring program are presented in Tables 5.1.1-5.1.5. Note that sampling was only completed once during 2020 (March) due to COVID-19 restrictions in place during the year.

NETL continues its site investigation activities, periodic monitoring, and remedial actions at the Albany site in accordance with Oregon DEQ requirements, and will evaluate and pursue actions to protect human health and the environment by eliminating risk and minimizing potential exposures. Copies of all periodic monitoring reports are provided by NETL to Oregon DEQ. A groundwater conceptual site model continues to be updated for the Albany site.

Based on review of available current and historical information, Albany is not considered to be a user of Per- and Polyfluoroalkyl Substances (PFAS) since: (1) there are no quantities of R&D chemicals considered as PFAS; (2) has no fixed aqueous film forming foam (AFFF) systems; and (3) does not operate its own fire department or maintain fire-fighting training facilities.

There is no history of any AFFF discharges at the site. NETL maintains and tracks all chemicals on-site using a chemical inventory management system that ensures proper disposal at the end of chemical life, either via recycling or hazardous waste disposal. Accordingly, Albany does not have an active sampling, analysis, tracking, and monitoring program for PFAS-related compounds, as it is not required per the site’s industrial wastewater permit or the Albany Groundwater Monitoring Plan. Accordingly, PFAS-related substances are not regular analytes of its active groundwater monitoring program and have never been part of any historical sampling. Drinking water is provided by the local public drinking water system

and site groundwater or surface water is not used as a drinking water source.

NETL will continue to review historical records associated with past activities, will proactively manage risks associated with PFAS-related substances, and will continue to manage chemical inventories to ensure proper management of any PFAS-related wastes. Pending budget availability, NETL will program for equipment and facility upgrades to consider environmentally friendly alternatives for R&D chemicals and facility equipment/systems. NETL does not consider PFAS compounds to be of significant environmental concern to warrant additional monitoring in water systems at the site; however, NETL will comply with any pending requirements to perform monitoring for any PFAS compounds.

5.2 GROUNDWATER AND SOIL QUALITY PROTECTION ACTIVITIES - PITTSBURGH

The primary objective of NETL's Groundwater Monitoring Program (GMP) is to monitor the shallow, weathered bedrock zone as the first significant aquifer or water-bearing unit beneath the Pittsburgh facilities. Contamination entering the ground from soil surface sources would be expected to impact this zone first, hence, most the monitoring wells are placed in this zone. The GMP also monitors the wells screened in the deeper water-bearing zone to provide data on water quality and contaminant migration. Another objective of the monitoring program is to identify and characterize groundwater flow and relate the groundwater flow to surface-water flow conditions to better evaluate potential environmental effects of any groundwater contamination.

By properly characterizing local groundwater conditions, it is possible to ensure that potential contamination and potential contaminant migration routes have been suitably identified and investigated. This enables NETL to be cognizant of potential continuing contamination and to remediate these contamination sources, if warranted.

The Pittsburgh site (see Figure 5.2.1: Topographic Site Map – Pittsburgh) is located within the Appalachian Plateau physiographic province. The topography, consisting of rolling hills and ridges, reflects the dendritic drainage erosion of the uplifted Allegheny Peneplain.

All rocks in the area are of sedimentary origin. They are almost exclusively of Pennsylvanian or Permian Age, except for alluvium in the stream and river valleys, which is of Quaternary Age. At the Bruceton Research Center location, bedrock is of Pennsylvanian Age and belongs to the Monongahela and Conemaugh Groups. The contact is identified by the Pittsburgh Coal, which is the basal member of the Monongahela Group (see Figure 5.2.2: General Geologic Column – Pittsburgh).

The shallowest aquifer on NETL property is found in the weathered bedrock just below the rock/soil contact and occurs over most of the site, except where it is undermined. Recharge of this unit occurs where rainfall percolates downward into the weathered strata until a continuous horizon of low vertical permeability (unweathered bedrock) is encountered. A total of 19 groundwater monitoring wells are screened in shallow weathered bedrock; seven (7) groundwater monitoring wells are in the R&D Plateau area, and 12 groundwater monitoring wells are in the Valley Fill area Figure 5.2.3: Groundwater Management Program R&D Plateau Well Locations – Pittsburgh and Figure 5.2.4: Groundwater Management Program Valley Fill Well Locations – Pittsburgh show the locations of the monitoring wells.

A deeper, water-bearing zone has been noted at the contact between the Connellsville Sandstone and the Clarksburg Clay and Limestone. A total of four (4) wells are screened in this deeper zone (located in the R&D Plateau area). This deeper aquifer had extremely low yield in the Valley Fill area.

Four wells (two in the R&D Plateau and two in the Valley Fill area) were originally screened in the depth interval between the two aquifers, within fractured strata. These wells had extremely low yields and were subsequently abandoned. The minimal amount of groundwater occurring in this intermediate zone may be the result of leakage from the overlying shallow, weathered bedrock zone.

The Lick Run Valley, which borders the eastern edge of the Pittsburgh site, is made up of silt and sand alluvial deposits. The alluvial deposits comprise a water-bearing unit, which discharges to form the stream-base flow within Lick Run. Although shallow piezometers have been established in these deposits, the thickness of this water-bearing unit is unknown.

Most domestic water supplies for the area surrounding the Pittsburgh site are provided by the Pennsylvania American Water Company, which processes water from the Monongahela River. However, there is one groundwater well listed for domestic usage within a one-mile radius of the site. This groundwater well, situated near central Bruceton, is 140 feet deep and was completed in the Monongahela Group, per the computerized PADEP Water Well Inventory. However, topographic review of the well location, based on reported longitude and latitude and the reported well depth, indicates that this well was possibly completed in the Conemaugh Group. The well is located to the north of the Pittsburgh site and it should not be affected by potential NETL groundwater impacts because groundwater is assumed to flow in a southerly direction beneath the Lick Run Valley.

A second groundwater well is located on Piney Fork Road, approximately 1½ miles south of NETL- Pittsburgh. This well was recently included in the PADEP Water Well Inventory and is associated with a landfill. The PADEP Water Well Inventory reported no other domestic groundwater wells in Jefferson Borough or South Park Township; however, the inventory does not list wells drilled prior to 1966.

The Pittsburgh site has two groundwater flow patterns. First, groundwater flowing in the shallow, weathered bedrock aquifer may percolate along the soil/bedrock interface and/or along near- vertical stress relief fractures and follow the general site topography, flowing from the tops of hills on the site and generally perpendicular to ground-surface elevation contours. This flow is directed by the intervening valleys toward the Lick Run Valley, where it joins the water-bearing unit located in the valley and adds to the base flow of Lick Run itself, Photo 5.2.1. Some of this flow also discharges as springs on the hillsides or in the valleys.

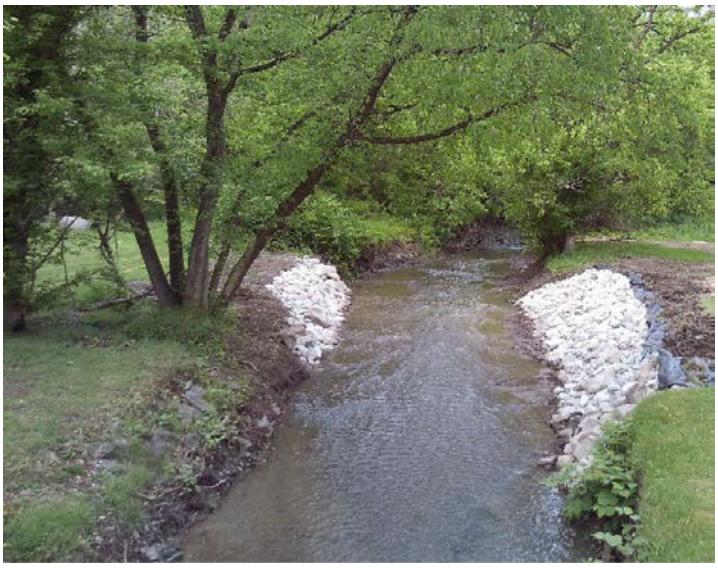

Photo 5.2.1: Lick Run.

The second flow pattern is associated with the deeper aquifer. Groundwater in this zone generally flows east toward the Lick Run Valley, where it comingles with water of the shallow zone as it flows off the hillsides.

In the spring of 2019, due to the poor condition of the weir and the piezometer (used to help measure groundwater- surface water interactions) at Lick Run, the weir and piezometer were removed.
Groundwater monitoring (Photo 5.2.1) in 2020 was performed per the NETL-Pittsburgh 2020 Groundwater Detection Monitoring Plan. The results of the NETL-Pittsburgh Groundwater Detection Monitoring Program are presented in Table 5.2, and the results were compared against federal and state standards for groundwater. None of the results were above any regulatory limits. The total petroleum hydrocarbon (TPH) values are consistent with historical data for TPH.

Photo 5.2.2: Pittsburgh Groundwater Monitoring.

Statistical analysis was conducted on the indicators of groundwater contamination (pH and specific conductance) for eight of the NETL-Pittsburgh Valley Fill Groundwater Monitoring Wells on the 2020 monitoring data. The analysis compared the upgradient wells (VFW-2 and VFW-10) to the downgradient wells. The results of the statistical analysis for pH showed that, for the tolerance interval two-tailed method, no wells were outside of the background-tolerance intervals. The results of the statistical analysis for specific conductance showed that, for the tolerance interval two-tailed method, VFW-7 was outside the upper tolerance limit.

Monthly groundwater elevation measurements to determine contaminant transport were completed in accordance with the Groundwater Protection Management Program. The elevation measurements are consistent with the general groundwater flow patterns described previously.

NETL-Pittsburgh is not considered a major user of Per- and Polyfluoroalkyl Substances (PFAS) since NETL: (1) only maintains limited quantities of R&D chemicals considered as PFAS; (2) has limited fixed aqueous film forming foam (AFFF) systems – two; and (3) does not operate its own fire department or fire-fighting training facilities.

There are only two documented historical discharges at the site in 1999-2000 associated with facility equipment failure and maintenance (no history of discharges associated with facility fires), with appropriate notifications being made at the times of the noted discharges. NETL maintains and tracks all chemicals on-site using a chemical inventory management system that ensures proper disposal at the end of chemical life, either via recycling or hazardous waste

disposal. Accordingly, Pittsburgh does not have an active sampling, analysis, tracking, and monitoring program for PFAS- related compounds, as it is not required per the site's industrial wastewater or stormwater NPDES permits. While there is an active groundwater monitoring program, PFAS-related substances are not a regular analyte and have never been part of any historical sampling. Drinking water is provided by the local public drinking water system and site groundwater or surface water is not used as a drinking water source.

NETL will continue to review historical records associated with past activities, will proactively manage risks associated with PFAS-related substances, and will continue to manage chemical inventories to ensure proper management of any PFAS-related wastes. Pending budget availability, NETL will program equipment and facility upgrades to consider environmentally friendly alternatives for R&D chemicals and AFFF systems for fire protection needs. NETL does not consider PFAS compounds to be of significant environmental concern to warrant additional monitoring in water systems at the site; however, NETL will comply with any pending requirements to perform monitoring for any PFAS compounds.

5.3 GROUNDWATER AND SOIL QUALITY PROTECTION ACTIVITIES - MORGANTOWN

Morgantown's Groundwater Protection Program is controlled via NETL Procedure 436.1-03.02, *Groundwater Quality Management*, which is administered by the Federal Groundwater Quality Manager (FGQM). This Procedure covers regulatory requirements for permitting, monitoring, compliance, and reporting, as well as best management practices for preventing leaks and spills, monitoring groundwater and soil quality, emergency releases, and quality control.

The Procedure also ensures that the Groundwater Protection Plan (GWPP) is developed and implemented to obtain data for the purpose of determining baseline conditions of groundwater quality and quantity; demonstrating compliance with and implementation of all applicable permits, regulations and DOE orders; providing data to allow the early detection of groundwater pollution or contamination; providing a reporting mechanism for detected groundwater pollution or contamination; identifying existing and potential groundwater contamination sources and maintain surveillance of these sources; and providing data upon which decisions can be made concerning land disposal practices and the management and protection of groundwater resources. The GWPP documents the Site's hydrogeology, potential sources of pollution and the associated contaminants that should be monitored, methods of well installation and sampling, a monitoring strategy and QA/QC processes related to water/soil sample analysis.

Spills and accidental discharge cleanup procedures are also addressed in the GWPP. Should a spill occur, containment and cleanup would commence, and the affected soil would be monitored or removed, as necessary.

The primary strategy for groundwater protection is spill and leak prevention. Together, the NETL Spill Prevention, Control, and Countermeasures (SPCC) Plan and the Storm Water Pollution Prevention Plan lay out the strategy for minimizing the risk of unintentional releases and quickly responding to an unintentional release to minimize environmental contamination. In addition, R&D Projects are only initiated or modified after a rigorous ES&H review is conducted in accordance with the SARS directives. According to these directives, the responsible person for each project must prepare a set of written procedures documenting how the project is to be operated, how waste and feedstocks are to be safeguarded and how to contain and control unintended releases. When a leak or spill does occur, and the environment is threatened, the on-site emergency response team is activated, and the facility makes the appropriate internal and regulatory-driven notifications.

Twenty active monitoring wells exist at the Morgantown site. The locations of the wells are displayed in Figure 5.3.1: Active Monitoring Wells at the Morgantown site. These wells monitor two shallow aquifers within the unconsolidated Lake Monongahela sediments and one bedrock aquifer, the Morgantown Sandstone. None of these aquifers are used as a source of water in the immediate area. Figure 5.3.2: Generalized Cross-Section of Aquifer Units at the Morgantown site shows a generalized cross-section through the site and the relationship between the aquifers.

No groundwater contaminants have been consistently detected above regulatory levels at the Site. Groundwater monitoring at the Morgantown site has been focused primarily on past spills and leaks and the effectiveness of the cleanup actions undertaken. The section on CERCLA Section 3.1.3.1 lists the past events and the status of the spill sites.

The only contaminants consistently found in significant amounts in the groundwater at the Morgantown site are related to the application of salts for de-icing. Sodium chloride is applied to the parking lots and roads, and calcium chloride is applied to the sidewalks and outdoor steps. Wells located near these features and near the runoff routes from these features show significantly elevated levels of chloride compared to background levels. This impact on groundwater is a problem shared with many businesses and road maintenance activities in this region, but it is considered a necessary safety practice to prevent injuries to site personnel and visitors.

The overall groundwater monitoring strategy has been to monitor any flow coming onto the site through each aquifer and to monitor the flow after it passes beneath the facilities and moves toward the springs and seeps. Groundwater monitoring at the Morgantown site from 1993 to 2002 was driven by two motivating factors. The first was the mandate of the WVDEP regarding the closure of Pond 005. The second was the mandate of DOE Order 5400.1, General Environmental Protection Program. Although DOE Order 5400.1 no longer exists, samples from many wells were analyzed between 1993 and 2002 for a lengthy list of analytes. This list of analytes included all organic compounds known to have been detected in analyses of the coal tar waste from the gasifier, the Pond 005 bottom sludge, and the sampled soils beneath Pond 005. It also included metals alleged to have been present in the Stretford solution used to remove sulfur oxides in the off-gas from the gasifier. No organic compounds were consistently detected during 10 years of sampling, and no consistent indications of contaminant concentrations above the state limits have been found. Only one analyte (cadmium), traceable to the operation of the closed pond, has been detected, but not above West Virginia groundwater regulatory limits.

After more than 15 years of monitoring, groundwater conditions are well understood. Spills and leaks in the past have not significantly degraded the groundwater on site. The facilities and most of the underlying contaminated soils associated with spills and leaks in the past have been removed. In recent years, operations have changed greatly, and few large projects could now create significant groundwater contamination. At this point, most of the research is bench-scale and uses small quantities of chemicals and solvents. Accordingly, the groundwater analyses have been significantly curtailed. Under the new scheme, wells will be sampled each spring and fall. Wells located around the perimeter of the developed portion of the site in the two shallow aquifers will be tested to check water quality as it enters and leaves the developed area. For the deep aquifer (Morgantown Sandstone), sampling will continue for one up-gradient well and three down-gradient wells. The original list of measurements and analyzed compounds, which was presented in the annual site environmental reports of previous years, has been reduced to the list presented in this year's report. The results of the ground water monitoring conducted during 2020 are presented in the Appendix as Table 5.3.1 through Table 5.3.6.

Morgantown is not major user of Per- and Polyfluoroalkyl Substances (PFAS) since: (1) only maintains limited quantities of R&D chemicals considered as PFAS; (2) has limited fixed aqueous film forming

foam (AFFF) systems – only one portable unit; and (3) does not operate its own fire department or fire-fighting training facilities.

There is no history of any AFFF discharges at the site. NETL maintains and tracks all chemicals on-site using a chemical inventory management system that ensures proper disposal at the end of chemical life, either via recycling or hazardous waste disposal. Accordingly, Morgantown does not have an active sampling, analysis, tracking, and monitoring program for PFAS-related compounds at any of its sites, as it is not required per the site's industrial wastewater permit or stormwater NPDES permits. While there is an active groundwater monitoring program, PFAS-related substances are not a regular analyte and have never been part of any historical sampling. Drinking water is provided by the local public drinking water system and site groundwater or surface water is not used as a drinking water source.

NETL will continue to review historical records associated with past activities, will proactively manage risks associated with PFAS-related substances, and will continue to manage chemical inventories to ensure proper management of any PFAS-related wastes. Pending budget availability, NETL plans equipment and facility upgrades considering environmentally-friendly alternatives for R&D chemicals and AFFF systems for fire protection needs. NETL does not consider PFAS compounds to be of significant environmental concern to warrant additional monitoring in water systems at the site; however, NETL will comply with any pending requirements to perform monitoring for any PFAS compounds.

6.0 QUALITY ASSURANCE

NETL manages a wide range of work activities, including basic and applied on-site research; contract administration for off-site research, development, and demonstration projects; design, construction, operation, modification, decommissioning, and environmental remediation of NETL facilities; and oversight functions related to these activities.

NETL's Quality Assurance (QA) Program provides the tools to ensure this work is accomplished safely while minimizing potential hazards to the public, site workers, the environment, and facilities and operations, through directives (orders and procedures), manuals, handbooks, and forms. DOE Order 414.1, Quality Assurance and DOE's Integrated Safety Management (ISM) principles (see Diagram 6.0, ISM core functions) govern NETL's QA Program.

NETL fully integrates its ISM and QA programs, ensuring line management accountability for ES&H issues. NETL implements this through work performance goals assigned to all line managers. Internal assessments and audits also ensure that line managers meet for their ES&H responsibilities.

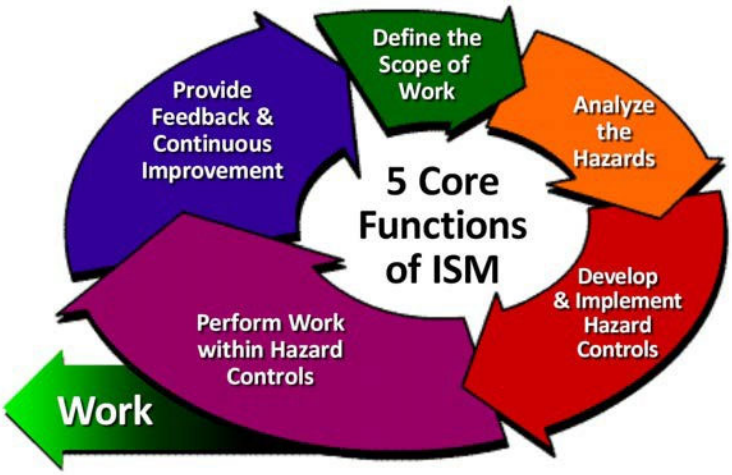

Diagram 6.0: DOE's ISM Principles.

The SARS process serves as the backbone of NETL's QA Program for ES&H. The SARS process identifies and mitigates hazards and environmental impacts highlighting the importance of its effective performance. NETL has four distinct SARS processes: R&D projects, facility construction, facility use, and support operations.

The R&D SARS procedure, NETL Procedure 421.1-01, describes the process for a safety analysis and review of on-site R&D projects. The process identifies, analyzes, and provides the elimination, mitigation, or control of risks associated with on-site R&D projects to a degree acceptable by line management. Following the SARS review, R&D projects receive a SARS operating permit. A team comprising the project's responsible person, an ES&H representative, a project QA engineer, and the site's environmental manager conduct an annual review on all SARS-permitted R&D project. The assessment includes (1) checking for significant modifications made to the project without authorization and SARS review; (2) ES&H Team inspection of the project area covering chemical hygiene, OSHA requirements and environmental compliance; (3) review of the SARS files and the project area for engineering design and QA/quality control

concerns; and (4) review of any issues found in the project area or in the SARS file. Records from each annual assessment become part of the project's SARS file. The team sends the findings from the annual assessment to the responsible person for correction and tracked in the corrective action tracking system.

The Construction Permit SARS manual, NETL Manual 421.1-00.04, ensures that NETL conducts construction activities in a safe and environmentally compliant manner. The review results in an approved construction permit issued before construction activities. Initially, the selected contractor develops and documents an ES&H plan. Construction activities not explicitly covered in contractor ES&H plans will receive an Activity hazard analysis (AHA). Similarly, an AHA will ensure development, consideration, and mitigation of all potential environmental impacts due to construction according to codes and standards.

The Facility SARS manual, NETL Manual 421.1-00.03, addresses on-site facilities including buildings, trailers, utilities, services, structures, roads, and walkways. It ensures the operation, maintenance, and modification of facilities comply with codes, regulations, and standards. The facility SARS focuses on identifying life safety, fire safety, and electrical safety classifications; assessing the compliance of the facility with codes and standards; documenting any deviations of the facility from codes and standards; and developing mitigations to address code deviations and to establish acceptable risk levels for facility utilization when code compliance cannot be achieved without a General Plant Project. The manual also establishes the requirements for obtaining a facility use permit.

The Support Operations SARS procedure, NETL Procedure 421.1-00.02, addresses on-site support operations conducted by site-support contractors. It includes construction, operations, maintenance, and renovation activities conducted by site support contractors and ensures the analysis of associated risks and their elimination, mitigation, or control to a degree acceptable by responsible line management before initiation of the project or operation. An annual assessment is conducted by ES&H on all SARS-permitted support operations. The annual assessment determines the continued validity of the SARS package and addresses changes in operations. Typical items reevaluated include changes in site conditions, worker training, operating procedures, and the effectiveness of controls. Findings from the annual assessment are sent by the ES&H gatekeeper to the responsible person for correction and tracked in the corrective action tracking system.

Other mechanisms for ensuring the quality of the ES&H programs include internal auditing required by ISO 14001/ISO 45001 certifications, external surveillance and certification audits related to the ISO 14001/ISO 45001 certifications, monthly focused inspections, facility inspections, internal reviews, and annual emergency response drills and exercises.

Many directives, manuals, and handbooks governing ES&H programs also contain monitoring requirements ensuring ES&H programs comply with directives and legal requirements. For example, the Fire Protection Program requires the conduct of fire protection appraisals every three years to ensure the evaluation and reduction to acceptable level of hazards to life and property from fires, explosions, or related risks; evaluation of the adequacy of the local fire protection and prevention programs to minimize injury and protect DOE property; and written reports to responsible management, which include recommendations for action, have been provided.

These activities result in findings tracked to a final resolution in the corrective action tracking system resulting in continual improvement of the ES&H programs.

APPENDIX

ACRONYM LIST

AAD	Acquisition and Assistance Division
ACHD	Allegheny County Health Department
AEA	Atomic Energy Act of 1954
AEP	American Electric Power Service Corporation
AES	American Environmental Services, Inc.
AHA	Activity Hazard Analysis
AIIS	Assessment Information Input System
ALARA	As Low as Reasonably Achievable
ALB	Albany, Oregon
ANWR	Alaska National Wildlife Refuge
AQCR	Air Quality Control Region
ARRA	American Recovery and Reinvestment Act
B-	Building
BAMF	Biomass Alternative Methane Fuel
BOD	Biochemical Oxygen Demand
CO_2e	Carbon Dioxide equivalent
CAA	Clean Air Act
CBOD5	Carbonaceous Biochemical Oxygen Demand 5-day Test
CBT	Computer-Based Training
CCPI	Clean Coal Power Initiative
CCUS	Carbon Capture, Utilization, and Storage
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFC	Chlorofluorocarbon
CFO	Chief Financial Officer
CFR	U.S. Code of Federal Regulations
COD	Chemical Oxygen Demand

COPC	Contaminants of Potential Concern
CRADA	Cooperative Research and Development Agreement
CWA	Clean Water Act
CX	Categorical Exclusion
CY	Calendar Year
DMR	Discharge Monitoring Report
DOE	U.S. Department of Energy
DOEGRIT	DOE Green IT
DOT	Department of Transportation
EA	Environmental Assessment
ECM	Energy conservation measure
EISA	Energy Independence and Security Act
EIS	Environmental Impact Statement
EMP	ES&H Management Plan
EMS	Environmental Management System
E.O.	Executive Order
EOR	Enhanced Oil Recovery
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPEAT	Electronic Product Environmental Assessment Tool
EPP	Environmentally Preferred Product
ERO	Emergency Response Organization
ES&H	Environmental, Safety, and Health
ES&HMS	Environmental, Safety, and Health Management System
ESPC	Energy Savings Performance Contract
ES&H	Environmental, Safety, Security, and Health
FCOG	Facility Contractors Group
FECM	Office of Fossil Energy and Carbon Management
FEMP	Federal Emergency Management Program
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act

FLC	Federal Laboratory Consortium
FONSI	Finding of No Significant Impact
FY	Fiscal Year
GCFCI	Ground-Fault Circuit Interrupter
GHG	Greenhouse Gas
GIS	Geographic Information System
GMP	Groundwater Management Program
GPP	General Plant Project
GSA	U.S. General Services Administration
HAZWOPER	Hazardous waste operations and emergency training
HPSB	High Performance and Sustainable Buildings
HVAC	Heating, Ventilation, and Air Conditioning
HQ	Headquarters
IAQ	Indoor Air Quality
ICCS	Industrial Carbon Capture and Sequestration
IGCC	Integrated Gasification Combined Cycle
ISM	Integrated Safety Management
ISO	International Organization for Standardization
LDR	Land Disposal Restriction
LED	Light-Emitting Diode
LEED	Leadership in Energy and Environmental Design
LLRW	Low-Level Radioactive Waste
MAA	Mutual Aid Agreement
MGN	Morgantown, West Virginia
MRT	Management Review Team
MSHA	Mine Safety and Health Administration
MUB	Morgantown Utility Board
NAAQS	National Ambient Air Quality Standards
NEC	National Electric Code
NEPA	National Environmental Policy Act

NESHAP	National Emission Standards for Hazardous Air Pollutants
NETL	National Energy Technology Laboratory
NETL-RUA	NETL-Regional University Alliance
NFPA	National Fire Protection Association
NIMS	National Incident Command System
NIOSH	National Institute of Occupational Safety and Health
NNSA	National Nuclear Security Administration
NORM	Naturally occurring radioactive material
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPRA	National Petroleum Reserve
NRC	Nuclear Regulatory Commission
ODEQ	Oregon Department of Environmental Quality
ODS	Ozone-Depleting Substance
OHSAS	Occupational Health and Safety Assessment Series
OIO	Office of Institutional Operations
ORD	Office of Research and Development
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
PADEP	Pennsylvania Department of Environmental Protection
PCB	Polychlorinated Biphenyl
PGH	Pittsburgh, Pennsylvania
PHA	Pleasant Hills Authority
QA	Quality Assurance
QC	Quality Control
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
REC	Renewable Energy Credit
SARA	Superfund Amendments and Reauthorization Act

SARS	Safety Analysis and Review System
SBEUC	Simulation-Based Engineering User Center
SCC	Strategic Center for Coal
SCNGO	Strategic Center for Natural Gas and Oil
SHPO	State Historic Preservation Officer
SMS	Safety Management System
SOFC	Solid Oxide Fuel Cell
SOD	Site Operations Division
SPCC	Spill Prevention, Control, and Countermeasures Plan
SSP	Site Sustainability Plan
SVOC	Semi-Volatile Organic Compound
SWQM	Surface Water Quality Manager
TCE	Trichloroethylene
TLD	Thermo-Luminescent Dosimeter
TMDL	Total Maximum Daily Loading
TOX	Total Organic Halogens
TPH	Total Petroleum Hydrocarbons
TPQ	Threshold Planning Quantity
TRI	Toxic Release Inventory
TSCA	Toxic Substances Control Act
TSD	Treatment, storage, and disposal
TSS	Total Suspended Solids
USDA	U.S. Department of Agriculture
USGBC	U.S. Green Building Council
VOC	Volatile Organic Compound
WDEQ	Wyoming Department of Environmental Quality
WVDEP	West Virginia Department of Environmental Protection
WVU	West Virginia University
WWTF	Wastewater Treatment Facility

TABLES AND FIGURES

Table 1.2.1: ES&H Programs	
Affirmative Procurement Advocate/Greening Acquisition Program	Hazardous Waste Program
Air Quality Program	Hearing Conservation Program
Alarms Oversight Program	Illumination Quality Program
Asbestos and Lead Abatement Program	Inactive Waste Sites/Off-Site Remediation Program
Authority Having Jurisdiction (AHJ)/Exemptions Program	Indoor Air Quality and Ventilation Program
Assessment Information Input System (AIIS) Program	Industrial Hygiene Program
Computerized Accident/Incident Report System (CAIRS) Program (Injury/Illness Reporting)	Industrial Wastewater Quality Program
Chemical Handling Facility	Laser Safety Program
Chemical Hygiene Program	Lessons Learned Program
Chemical Inventory and Safety Data Sheet (SDS) Program	Life Safety Program
Confined Space Program	Medical Monitoring Program
Construction and Maintenance Safety Program	National Environmental Policy Act (NEPA) Compliance Program
Cryogenic Safety Program	Resource Conservation and Recovery Act (RCRA) Nonhazardous Waste Program
Directives Program	Occupational Medicine Program
Electrical Safety Program	Occurrence Reporting and Processing System (ORPS) Program
Emergency Preparedness Program/Emergency Response Program	Organization Incident Reporting Program
Environment, Safety, and Health Management System (ESHMS)— Management Review Program	OSHA Safety Program
Environmental Program	R&D Projects Program
Ergonomics Program	Radiation Safety Program
ES&H Communications Program	Records Program
ES&H Training Program	Respiratory Protection Program
Facility and Area Custodian Program	Safety & Health Program
Facility Work Authorization Program (Site Operations Division)	Superfund Amendments and Reauthorization Act (SARA) Title III Program
Facility Safety Committee Program	Safety Analysis and Review System (SARS) Program
Fire Protection Program	Soil Quality Program
Fire Warden Program	Storage Tank Program
Ground Water Quality Program	Surface Water Quality Program
Hazard Communication Program	Waste Management Oversight Program
	Waste Minimization and Pollution Prevention Program
	Water Quality Program

Table 4.1: Environmental, Safety, and Health Significant Aspects for FY2020
Waste Minimization, Pollution Prevention, and Recycling
High Performance Sustainable Building Implementation
Hazardous Materials Procurement, Consumption, and Storage
Electronic Stewardship
Greenhouse Gas Air Emissions
Green Purchasing
Energy and Fuel Management
Water Usage
Workplace Health and Safety Issues
Climate Change Adaptation

Table 4.2: Environmental, Safety, and Health Significant Aspects for FY2021
Waste Minimization, Pollution Prevention, and Recycling
High Performance Sustainable Building Implementation
Hazardous Materials Procurement, Consumption, and Storage
Electronic Stewardship
Greenhouse Gas Air Emissions
Green Purchasing
Energy and Fuel Management
Water Usage
Workplace Health and Safety Issues
Organizational Resilience

Table 4.3: FY2020 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Waste Minimization, Pollution Prevention, and Recycling				
Recycling	Divert nonhazardous solid waste from disposal annually. Pursue opportunities for net-zero waste or additional diversion opportunities. (E.O. 13834)		Divert/recycle non-hazardous waste produced.	333,840 lbs. out of 365,600 lbs. recycled in FY2020 = 91%.
			Identify opportunities to reduce nonhazardous waste in FY2020.	WE2 looked into a potential path on replacing PGH towel dispensers and concerning the B-19 underdrain treatment shed demolition, treatment chemicals were removed and placed in storage areas for use, the sheds were saved and will be repurposed, and all piping, tanks and pumps were recycled.
Recycling Construction Waste	Divert/recycle any construction/demolition waste from landfill disposal to the maximum extent feasible. (E.O. 13834)		Divert/recycle construction/demolition waste.	96.6% has been diverted from landfill.
High-Performance Sustainable Building Implementation				
High Performance Sustainable Buildings	Ensure all new construction and major renovations comply with the 2016 Guiding Principles. Make annual progress towards 100% conformance with the Guiding Principles. (E.O. 13834) Ensure at least 15% of existing facilities above 10,000 gross square feet meet the Guiding Principles by FY2025 (E.O. 13834)		Track the design packages to ensure they contain High Performance Sustainable Building (HPSB) requirements.	As of the end of the fiscal year, 5 out of 27 applicable buildings (18.5%) were certified to the Guiding Principles.
			Develop a High-Performance Sustainable Building Plan as part of the Site Sustainability Plan.	The Site Sustainability Plan contains the High-Performance Sustainable Building Plan.
			Submit Site Sustainability Plan (SSP) to DOE-HQ.	Site Sustainability Plan was submitted to DOE-HQ on 12/17/19.
Hazardous Materials Procurement, Consumption, and Storage				
Chemical Inventory	Reduce the quantity of toxic and hazardous chemicals and materials acquired, used, and disposed during FY2020 using FY2019 as a baseline. (E.O. 13834)	13,807 containers 272,457 lbs.	No net gain (plus or minus 10% of baseline) of chemicals (by number of containers and/or weight in pounds).	12,514 containers (9.6% increase) Unable to report pounds because chemical inventory system does not convert to pounds.

Table 4.3: FY2020 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Electronic Stewardship				
Purchase of Electronic Products	To revisit and ensure that processes are in place to evaluate requisitions that have been identified for EPEAT-certified electronic equipment based on the requirements of the aspect. (E.O. 13834) Inspect procurement reference for EPEAT-registered electronic products and the procurement of Energy Star- and FEMP-designated electronic equipment. (E.O. 13834)		95% of all products purchased that have EPEAT standards are EPEAT registered.	99.75% of products are EPEAT-registered.
			95% of specific electronic products are Energy Star- and FEMP-designated.	100% of electronic products are Energy Star and FEMP-designated.
Operation and Maintenance of Electronic Products	Enable power management, duplex printing, and other energy-efficient or environmentally preferable features on all eligible DOE electronic products. (E.O. 13834)		Ensure that 90% of managed workstations and printers have power management settings in place.	100% or printers and 97.33% of workstations have power management settings in place.
End of Life Management of Electronic Products	Verify end-of-life management of excess/surplus electronics follow Bulletin FMR B-34 and the hierarchy established: 1. Reuse within an agency 2. Reuse through transfers, donations, and sales; 3. Recycling through certified recyclers and manufacturer take-back programs using certified recyclers. (E.O. 13834)		Verify that disposition contracts are in place and being used at the PGH, MGN, and ALB sites. Provide contract no. or agreement and implementing person by the end of first quarter FY2020.	Contract between GSA and third-party recycler, Powerhouse Recycling, continues for both PGH and MGN. ALB has a separate contract which is followed and utilizes both UNICOR and the USPS to disposition ADP scrap.
			Report ultimate disposition weights on a quarterly basis.	Year-end total = 37,814 lbs.
			Verify a process is in place to determine the appropriate hierarchy for all excess/surplus electronic products.	ADP scrap is recycled in alignment with the GSA contract which is renewed annually. In addition, excess items are allocated thru GSA or OPMO-approved donations.

Table 4.3: FY2020 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Greenhouse Gas Air Emissions				
Greenhouse Gases	Reduce Scope 1 and 2 GHG emissions by 2.5%, using a FY2019 baseline of 55,100,440 pounds CO_2e. (E.O. 13834)	55,100,440 lbs. CO_2e	53,722,929 lbs. CO_2e (2.5%)	44,424,674 lbs. CO_2e (19.4%)
	Reduce Scope 3 GHG emissions by 2.5%, using a FY2019 baseline of 9,957,076 pounds CO_2e. (E.O. 13834)	9,957,076 lbs. CO_2e	9,708,149 lbs. CO_2e (2.5%)	6,994,314 lbs. CO_2e (29.8%)
	Annually monitor and track Scope 3 greenhouse gas emissions associated with employee commuting and required travel and training. (E.O. 13834)		Emphasize employee ridesharing through NETL's green transportation pool, Plugged-In articles, and Post-Its.	NETL is reducing travel for training and conferences to reduce greenhouse gas emissions.
GHG Emission Reporting	Report comprehensive GHG emission inventory annually by the end of the following January. (E.O. 13834)		Report emission inventories on an annual basis for FY wrap-up by January 31, 2021.	Total emissions = 51,418,988.1 lbs. CO_2e

Table 4.3: FY2020 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Green Purchasing				
Environmentally Preferred Products	Purchase products that are: recycled, Bio Preferred, Energy Star, FEMP-designated, EPEAT, Water Sense - or otherwise water efficient. (E.O. 13834)		Ensure that 95% of new contract actions for products and services are: energy efficient, water efficient, bio-based content, environmentally preferable, non-ozone depleting, recycled content, and non-toxic, or less toxic than alternatives.	96.5% of contract actions were energy efficient, water efficient, bio-based content, environmentally preferable, non-ozone depleting, recycled content, and non-toxic, or less toxic than alternatives.
	Acquire uncoated printing and writing paper containing at least 30% post-consumer fiber. Reduce printing paper use. (E.O. 13834)		Ensure 98% of copier and printer paper shall contain a minimum of 30% recycled post-consumer fiber.	98% of copier and printer paper contained 30% recycled post-consumer fiber.
	Maximize site use of environmentally preferred products (EPPs), including those that have recycled content, are Bio Preferred, or have the Energy Star, FEMP, or EPEAT designation in operation and maintenance, janitorial, and general office activities. Also maximize the use of sustainable products. (E.O. 13834)		Ensure that 80% of all products that can be purchased "green" under the site support and construction contracts are of environmentally preferred products (EPPs).	94.1% of products purchased are "green" purchases.

Table 4.3: FY2020 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Energy and Fuel Management				
Energy Use	Reduce energy usage/square foot by 1.0% in FY2020 from FY2019. (E.O. 13834)	148,867 BTU/ft^2	147,378 BTU/ft^2 (1.0%)	141,060 BTU/ft^2 (5.3%)
Management of Servers and Data Centers	Maximize efficiency of data centers through virtualization and consolidation. (E.O. 13834) Establish a power usage effectiveness (PUE) of 1.2 to 1.4 for new data centers and less than 1.5 for existing data centers. (E.O. 13834)		Have dedicated smart meters installed in MGN, PGH, and ALB data centers in order to measure a monthly PUE.	Plans to have dedicated smart meters in the data centers have been completed with the ALB meter installed. PGH and MGN meters to follow.
			Identify remaining physical servers and establish a plan to virtualize into the NETL datacenter or a cloud instance.	NETL has identified remaining physical servers and has virtualized 94% into the data center according to the plan.
			Identify a plan (consolidation, hot/cold row, reduced footprint) to optimize the PUE for the data centers.	MGN and ALB are moving from design phase to construction phase as of 9/30, with construction start estimated mid-OCT. PGH B-83 CDAML has been released to bidder, design documents completed.
Renewable Energy	Ensure that NETL meets renewable energy on-site usage goals as defined in EPACT 2005, E.O. 13834, DOE Order 436.1, EISA 2007, and DOE SRIP. Ensure that NETL's total electrical energy consumption includes 30.5% renewable energy in FY 2020. (Total renewable electrical energy consumption is estimated to be 9,900 MWh). Total energy consumption is estimated to be 32,460 MWh.	30.5% of renewable energy consumption	Ensure that NETL's total electrical energy consumption includes the DOE SRIP target of 30.5% renewable energy in FY 2020 (9,900 MWh).	12,149 MWh (37.4%)
	Procure Renewable Energy Credits to meet the 30.5% renewable electric energy and clean energy goals. (E.O. 13834)		Procure RECs to meet the renewable electric energy and clean energy goals.	NETL purchased Renewable Energy Certificates (RECs) to meet this goal.

Table 4.3: FY2020 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Energy and Fuel Management (cont.)				
Fleet Management	Reduce FY2020 petroleum consumption 2% from FY2019 level. (E.O. 13834)	6,877 gallons	Reduce FY 2020 fleet petroleum consumption by 2% from FY 2019 levels by increasing use of all-electric zero-emissions vehicles or plug-in hybrid vehicles in fleet and continue use of alternative fuel in fleet AFVs. Number is 6,739.5 gal.	2,297 gallons (67%)

Table 4.3: FY2020 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Water Usage				
Potable Water Consumption	Reduce potable water consumption by 0.5% from the final number for FY2019. (E.O. 13834)	10.53 gal/gsf	10.48 gal/gsf (0.5% reduction)	9.788 gal/gsf (7% reduction)

Table 4.3: FY2020 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Workplace Health and Safety Issues				
Naturally Occurring Radioactive Materials (NORM)	To survey, manage, and control NORM/TE-NORM that is in use or part of R&D operations to ensure the safety of individuals performing the research, control the areas/methods of use, and allow for proper disposal of wastes associated with the use of NORM or TE-NORM. Incorporate proper controls, precautions, and warnings into procedures and R&D SARS packages to ensure appropriate controls are maintained to prevent possible exposure.		Continue to track the number of surveys and items that were surveyed each quarter.	50 items were surveyed during a total of 13 surveys.
			Combine the two different radiation protection procedures into one; incorporate NORM/TE-NORM updates	The two old procedures have been combined and updated and are currently under review.
			Ensure tracking of NORM/TE-NORM inventory via tracking system.	A plan was put in place to update the current database to track radioactive and NORM materials.

Table 4.3: FY2020 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Workplace Health and Safety Issues (cont.)				
Research Project-Specific Training Completion Rate Improvements	Get NETL lab personnel training deficiencies down to more acceptable levels. Currently running between 250 and 300 since October 1st (203 = avg over the past 12 months).		No more than 100 instances of deficient project-specific training at the end of any week over the next calendar year.	212 instances at the end of the fiscal year.

Objective/target not met in FY2020

Objective/target partially met in FY2020

Objective/target met in FY2020

Table 4.4: FY2021 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target		Target	Actual
Waste Minimization, Pollution Prevention, and Recycling				
Recycling	Divert non-hazardous solid waste from disposal annually. (E.O. 13834)		Divert/recycle non-hazardous waste produced.	
	Pursue opportunities for net-zero waste or additional diversion opportunities. (E.O. 13834)		Identify opportunities to reduce non-hazardous waste in FY2021.	
Recycling Construction Waste	Divert/recycle any construction/demolition waste from landfill disposal to the maximum extent feasible. (E.O. 13834)		Divert/recycle construction/demolition waste.	
High-Performance Sustainable Building Implementation				
High-Performance Sustainable Buildings	Ensure all new construction and major renovations comply with the 2016 Guiding Principles. Make annual progress towards 100% conformance with the 2016 Guiding Principles. (E.O. 13834)		Track the design packages to ensure they contain High Performance Sustainable Building (HPSB) requirements.	
	Ensure at least 15% of existing facilities above 10,000 gross square feet meet the Guiding Principles by FY 2025. (E.O. 13834)		Develop a High-Performance Sustainable Building Plan as part of the Site Sustainability Plan.	
			Submit Site Sustainability Plan (SSP) to DOE-HQ.	

Table 4.4: FY2021 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target		Target	Actual
Hazardous Materials Procurement, Consumption, and Storage				
Chemical Inventory	Reduce the quantity of toxic and hazardous chemicals and materials acquired, used, and disposed during FY 2021 using FY 2020 as a baseline. (E.O. 13834)	12,514 containers	No net gain (+/- 10% of baseline) of chemicals (by number of containers and/or weight in pounds).	
Electronic Stewardship				
Purchase of Electronic Products	To revisit and ensure that processes are in place to evaluate requisitions that have been identified for EPEAT-certified electronic equipment based on the requirements of the aspect. Inspect procurement reference for EPEAT-registered electronic products and the procurement of Energy Star- and FEMP-designated electronic equipment.		95% of all products purchased that have EPEAT standards are EPEAT registered.	
			95% of specific electronic products are Energy Star- and FEMP-designated.	
Operation and Maintenance of Electronic Products	Enable power management, duplex printing, and other energy-efficient or environmentally preferable features on all eligible DOE electronic products. (E.O. 13834)		Ensure that 90% of managed workstations and printers have power management settings in place.	

Table.4.4: FY2021 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Electronic Stewardship (cont.)				
End-of-Life Management of Electronic Products	Verify end-of-life management of excess/surplus electronics follow Bulletin FMR B-34 and the hierarchy established: 1. Reuse within an agency 2. Reuse through transfers, donations, and sales; 3. Recycling through certified recyclers and manufacturer take-back programs using certified recyclers. (E.O. 13834)		Verify that disposition contracts are in place and being used at the PGH, MGN, and ALB sites. Provide contract no. or agreement and implementing person by the end of first quarter FY2021.	
			Report ultimate disposition weights on a quarterly basis.	
			Verify a process is in place to determine the appropriate hierarchy for all excess/surplus electronic products.	

Table 4.4: FY2021 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Greenhouse Gas Air Emissions				
Greenhouse Gases	Reduce Scope 1 and 2 GHG emissions by 2.5%, using a FY2020 baseline of 44,424,674 pounds CO_2e.	44,424,674 lbs. CO_2e	43,314,057 lbs. CO_2e (2.5%)	
	Reduce Scope 3 GHG emissions by 2.5%, using a FY2020 baseline of 6,994,314 pounds CO_2e.	6,994,314 lbs. CO_2e	6,819,456 lbs. CO_2e (2.5%)	Scope 3 emissions are calculated on an annual basis only.
	Annually monitor and track Scope 3 greenhouse gas emissions associated with employee commuting and required travel and training.		Emphasize employee ridesharing through NETL's green transportation pool, Plugged-In articles, and Post-Its.	
GHG Emission Reporting	Report comprehensive GHG emission inventory annually by the end of the following January. (E.O. 13834)		Report inventories on an annual basis for fiscal year-end wrap up by January 31, 2022.	Calculated at the end of FY2021.

Table 4.4: FY2021 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Green Purchasing				
Environmentally Preferred Products	Purchase products that are: recycled, Bio Preferred, Energy Star, FEMP-designated, EPEAT, Water Sense - or otherwise water efficient. (E.O. 13834)		Ensure that 95% of new contract actions for products and services are: energy efficient, water efficient, bio-based content, environmentally preferable, non-ozone depleting, recycled content, and non-toxic, or less toxic than alternatives.	
	Acquire uncoated printing and writing paper containing at least 30% post-consumer fiber. Reduce printing paper use. (E.O. 13834)		Ensure 98% of copier and printer paper shall contain a minimum of 30% recycled post-consumer fiber.	
	Maximize site use of environmentally preferred products (EPPs) including those that have recycled content, are Bio Preferred, or have the Energy Star, FEMP, or EPEAT designation in operation and maintenance, janitorial, and general office activities. Also maximize the use of sustainable products. (E.O. 13834)		Ensure that 80% of all products that can be purchased “green” under the site support and construction contracts are of environmentally preferred products (EPPs).	

Table 4.4: FY2021 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Energy and Fuel Management				
Energy Use	Reduce energy usage/square foot by 1.0% in FY2021 from FY2020.	141,060 BTU/ft^2	139,649 BTU/ft^2 1.0% reduction	
Management of Servers and Data Centers	Maximize efficiency of data centers through virtualization and consolidation. (E.O. 13834) Establish a power usage effectiveness (PUE) of 1.2 to 1.4 for new data centers and less than 1.5 for existing data centers. (E.O. 13834)		Have dedicated smart meters installed in MGN, PGH, and ALB data centers in order to measure a monthly PUE.	
			Identify remaining physical servers and complete a plan to virtualize into the NETL datacenter or a cloud instance.	
			Identify a plan (consolidation, hot/cold row, reduced footprint) to optimize the PUE for the data centers.	

Table 4.4: FY2020 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Energy and Fuel Management (cont.)				
Renewable Energy	Ensure that NETL meets renewable energy on-site usage goals as defined in EPACT 2005, E.O. 13834, DOE Order 436.1, EISA 2007, and DOE SRIP. Ensure that NETL's total electrical energy consumption includes 30.5% renewable energy in FY 2020. (Total renewable electrical energy consumption is estimated to be 9,900 MWh). Total energy consumption is estimated to be 32,460 MWh.	30.5% of renewable energy consumption	Ensure that NETL's total electrical energy consumption includes the DOE SRIP target of 30.5% renewable energy in FY2021 (9,900 MWh).	
	Procure Renewable Energy Credits to meet the 30.5% renewable electric energy and clean energy goals.		Procure RECs to meet the renewable electric energy and clean energy goals.	
Fleet Management	Reduce FY2021 petroleum consumption 2% from FY2020 level. (E.O. 13834)	2,297 gallons	Reduce FY2021 fleet petroleum consumption by 2% from FY2020 levels by increasing use of all-electric zero-emissions vehicles or plug-in hybrid vehicles in fleet and continue use of alternative fuel in fleet AFVs. Number is 2,251 gal.	

Table 4.4: FY2020 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Water Usage				
Potable Water Consumption	Reduce potable water consumption by 0.5% from the final number for FY2020.	9.788 gal/gsf	9.739 gal/gsf	

Table 4.4: FY2020 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Workplace Health and Safety Issues				
Naturally Occurring Radioactive Materials (NORM)	To survey, manage, and control NORM/TE-NORM that is in use or part of R&D operations to ensure the safety of individuals performing the research, control the areas/methods of use, and allow for proper disposal of wastes associated with the use of NORM or TE-NORM. Incorporate proper controls, precautions, and warnings into procedures and R&D SARS packages to ensure appropriate controls are maintained to prevent possible exposure.		Continue to track the number of surveys and items that were surveyed each quarter.	
			Combine the two different radiation protection procedures into one; incorporate NORM/TE-NORM updates	
			Ensure tracking of NORM/TE-NORM inventory via tracking system.	

Table 4.4: FY2021 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Workplace Health and Safety Issues (cont.)				
Research Project-Specific Training Completion Rate Improvements	Get NETL lab personnel training deficiencies down to more acceptable levels. Currently running between 250 and 300 since October 1st (203 = avg over the past 12 months).		No more than 100 instances of deficient project-specific training at the end of any week over the next calendar year.	

Table 5.1.1: NETL-Albany 2020 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–VOC Constituents (µg/L)

Constituent	Well Number, Sample Date															
	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		MW-8	
	N/A	N/A	N/A	N/A	03/02	N/A	03/03	N/A	03/04	N/A	03/04	N/A	03/05	N/A	03/03	N/A
1,1,1,2-Tetrachloroethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1,1-Trichloroethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1,2,2-Tetrachloroethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1,2-Trichloroethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloroethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloroethene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloropropene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,3-Trichlorobenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,3-Trichloropropane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,4-Trichlorobenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,4-Trimethylbenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dibromo-3-chloropropane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dibromoethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichlorobenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichloroethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichloropropane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,3,5-Trimethylbenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,3-Dichlorobenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,3-Dichloropropane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,4-Dichlorobenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
2,2-Dichloropropane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
2-Butanone	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
2-Chlorotoluene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
2-Hexanone	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
4-Chlorotoluene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
4-Methyl-2-pentanone	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Benzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromobenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromochloromethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromoform	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromomethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Carbon Disulfide	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Carbon Tetrachloride	NS	NS	NS	NS	ND	NS	0.56	NS	ND	NS	ND	NS	ND	NS	ND	NS
Chlorobenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Chloroethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Chloroform	NS	NS	NS	NS	ND	NS	ND	NS	0.89	NS	ND	NS	ND	NS	ND	NS

Table 5.1.1: NETL-Albany 2020 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–VOC Constituents (µg/L)

Constituent	Well Number, Sample Date															
	MW-1		MW-2		MW-3		MW-4		MW-5		MW-6		MW-7		MW-8	
	N/A	N/A	N/A	N/A	03/02	N/A	03/03	N/A	03/04	N/A	03/04	N/A	03/05	N/A	03/03	N/A
Chloromethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
cis-1,2-Dichloroethene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
cis-1,3-Dichloropropene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dibromochloromethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dibromomethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dichlorobromomethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dichlorodifluoromethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Ethylbenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Hexachlorobutadiene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Isopropylbenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Methyl tert butyl ether	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Methylene chloride	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Naphthalene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
n-Butylbenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
n-Propylbenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
p-Isopropyl toluene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
sec-Butylbenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Styrene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
tert-Butylbenzene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Tetrachloroethene (PCE)	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Toluene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
trans-1,2-Dichloroethene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
trans-1,3-Dichloropropene	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Trichloroethene (TCE)	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Trichlorofluoromethane	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Vinyl chloride	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Xylene, Total	NS	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS

ND = Not detected NS = Not Sampled

Exceeds Groundwater Quality Standard

Table 5.1.2: NETL-Albany 2020 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–VOC Constituents (µg/L)

Constituent	Well Number, Sample Date															
	MW-9		MW-10		MW-11		MW-12		MW-13		MW-14		MW-15		MW-16	
	03/03	N/A	03/03	N/A	03/05	N/A	N/A	N/A	03/02	N/A	03/02	N/A	03/05	N/A	03/05	N/A
1,1,1,2-Tetrachloroethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1,1-Trichloroethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1,2,2-Tetrachloroethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1,2-Trichloroethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloroethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloroethene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloropropene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,3-Trichlorobenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,3-Trichloropropane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,4-Trichlorobenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,4-Trimethylbenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dibromo-3-chloropropane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dibromoethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichlorobenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichloroethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichloropropane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,3,5-Trimethylbenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,3-Dichlorobenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,3-Dichloropropane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,4-Dichlorobenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
2,2-Dichloropropane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
2-Butanone	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
2-Chlorotoluene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
2-Hexanone	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
4-Chlorotoluene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
4-Methyl-2-pentanone	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Benzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromobenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromochloromethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromoform	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromomethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Carbon Disulfide	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Carbon Tetrachloride	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	0.40	NS	7.2	NS	ND	NS
Chlorobenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Chloroethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Chloroform	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	2.0	NS	3.9	NS	ND	NS

Table 5.1.2: NETL-Albany 2020 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–VOC Constituents (µg/L)

Constituent	Well Number, Sample Date															
	MW-9		MW-10		MW-11		MW-12		MW-13		MW-14		MW-15		MW-16	
	03/03	N/A	03/03	N/A	03/05	N/A	N/A	N/A	03/02	N/A	03/02	N/A	03/05	N/A	03/05	N/A
Chloromethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
cis-1,2-Dichloroethene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	1.6	NS	ND	NS
cis-1,3-Dichloropropene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dibromochloromethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dibromomethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dichlorobromomethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dichlorodifluoromethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Ethylbenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Hexachlorobutadiene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Isopropylbenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Methyl tert butyl ether	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Methylene chloride	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Naphthalene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
n-Butylbenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
n-Propylbenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
p-Isopropyl toluene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
sec-Butylbenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Styrene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
tert-Butylbenzene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Tetrachloroethene (PCE)	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Toluene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
trans-1,2-Dichloroethene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
trans-1,3-Dichloropropene	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Trichloroethene (TCE)	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	1200	NS	ND	NS
Trichlorofluoromethane	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Vinyl chloride	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS
Xylene, Total	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS	ND	NS

ND = Not detected NS = Not Sampled

Exceeds Groundwater Quality Standard

Table 5.1.3: NETL-Albany 2020 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–VOC Constituents (µg/L)

Constituent	Well Number, Sample Date															
	MW-17		MW-18		MW-19		MW-20		MW-21		MW-22		MW-23		MW-24	
	03/02	N/A	03/04	N/A	03/03	N/A	03/03	N/A	N/A	N/A	03/02	N/A	03/02	N/A	03/05	N/A
1,1,1,2-Tetrachloroethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,1,1-Trichloroethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,1,2,2-Tetrachloroethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,1,2-Trichloroethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloroethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloroethene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloropropene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,2,3-Trichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,2,3-Trichloropropane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,2,4-Trichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,2,4-Trimethylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,2-Dibromo-3-chloropropane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,2-Dibromoethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,2-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,2-Dichloroethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,2-Dichloropropane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,3,5-Trimethylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,3-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,3-Dichloropropane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
1,4-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
2,2-Dichloropropane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
2-Butanone	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
2-Chlorotoluene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
2-Hexanone	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
4-Chlorotoluene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
4-Methyl-2-pentanone	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Benzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Bromobenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Bromochloromethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Bromoform	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Bromomethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Carbon Disulfide	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Carbon Tetrachloride	ND	NS	1,600	NS	ND	NS	2,200	NS	NS	NS	16	NS	3.4	NS	130	NS
Chlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Chloroethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Chloroform	ND	NS	240	NS	ND	NS	220	NS	NS	NS	2.7	NS	3.9	NS	15	NS

Table 5.1.3: NETL-Albany 2020 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–VOC Constituents (µg/L)

Constituent	Well Number, Sample Date															
	MW-17		MW-18		MW-19		MW-20		MW-21		MW-22		MW-23		MW-24	
	03/02	N/A	03/04	N/A	03/03	N/A	03/03	N/A	N/A	N/A	03/02	N/A	03/02	N/A	03/04	N/A
Chloromethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
cis-1,2-Dichloroethene	ND	NS	2.0	NS	ND	NS	ND	NS	NS	NS	2.1	NS	ND	NS	ND	NS
cis-1,3-Dichloropropene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Dibromochloromethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Dibromomethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Dichlorobromomethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Dichlorodifluoromethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Ethylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Hexachlorobutadiene	ND	NS	0.79	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Isopropylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Methyl tert butyl ether	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Methylene chloride	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Naphthalene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
n-Butylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
n-Propylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
p-Isopropyl toluene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
sec-Butylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Styrene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
tert-Butylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Tetrachloroethene (PCE)	ND	NS	120	NS	ND	NS	11	NS	NS	NS	1.2	NS	ND	NS	ND	NS
Toluene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
trans-1,2-Dichloroethene	ND	NS	1.2	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
trans-1,3-Dichloropropene	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Trichloroethene (TCE)	1.2	NS	150	NS	ND	NS	270	NS	NS	NS	7.8	NS	2.1	NS	62	NS
Trichlorofluoromethane	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Vinyl chloride	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS
Xylene, Total	ND	NS	ND	NS	ND	NS	ND	NS	NS	NS	ND	NS	ND	NS	ND	NS

ND = Not detected NS = Not Sampled

Exceeds Groundwater Quality Standard

Table 5.1.4: NETL-Albany 2020 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–VOC Constituents (µg/L)

Constituent	Well Number, Sample Date													
	MW-25		MW-26		MW-27		MW-28		MW-29		MW-30		MW-31	
	03/03	N/A	03/02	N/A	03/05	N/A	03/04	N/A	03/03	N/A	03/04	N/A	03/04	N/A
1,1,1,2-Tetrachloroethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1,1-Trichloroethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1,2,2-Tetrachloroethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1,2-Trichloroethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloroethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloroethene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloropropene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,3-Trichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,3-Trichloropropane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,4-Trichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2,4-Trimethylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dibromo-3-chloropropane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dibromoethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichloroethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichloropropane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,3,5-Trimethylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,3-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,3-Dichloropropane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
1,4-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
2,2-Dichloropropane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
2-Butanone	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
2-Chlorotoluene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
2-Hexanone	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
4-Chlorotoluene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
4-Methyl-2-pentanone	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Benzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromobenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromochloromethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromoform	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Bromomethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Carbon Disulfide	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Carbon Tetrachloride	ND	NS	ND	NS	70	NS	ND	NS	ND	NS	ND	NS	ND	NS
Chlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Chloroethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Chloroform	ND	NS	ND	NS	16	NS	ND	NS	ND	NS	ND	NS	ND	NS

Table 5.1.4: NETL-Albany 2020 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–VOC Constituents (µg/L)

Constituent	Well Number, Sample Date													
	MW-25		MW-26		MW-27		MW-28		MW-29		MW-30		MW-31	
	03/03	N/A	03/02	N/A	03/05	N/A	03/04	N/A	03/03	N/A	03/04	N/A	03/04	N/A
Chloromethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
cis-1,2-Dichloroethene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	6.2	NS	ND	NS
cis-1,3-Dichloropropene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dibromochloromethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dibromomethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dichlorobromomethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Dichlorodifluoromethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Ethylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Hexachlorobutadiene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Isopropylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Methyl tert butyl ether	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Methylene chloride	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Naphthalene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
n-Butylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
n-Propylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
p-Isopropyl toluene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
sec-Butylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Styrene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
tert-Butylbenzene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Tetrachloroethene (PCE)	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Toluene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
trans-1,2-Dichloroethene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	0.56	NS	ND	NS
trans-1,3-Dichloropropene	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Trichloroethene (TCE)	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Trichlorofluoromethane	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Vinyl chloride	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS
Xylene, Total	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS	ND	NS

ND = Not detected NS = Not Sampled

Exceeds Groundwater Quality Standard

Table 5.1.5: NETL-Albany 2020 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–VOC Constituents (µg/L)

Constituent	Well Number, Sample Date							
	MW-100		MW-101		MW-102		MW-103	
	03/04	N/A	03/04	N/A	03/04	N/A	03/04	N/A
1,1,1,2-Tetrachloroethane	ND	NS	ND	NS	ND	NS	ND	NS
1,1,1-Trichloroethane	ND	NS	ND	NS	ND	NS	ND	NS
1,1,2,2-Tetrachloroethane	ND	NS	ND	NS	ND	NS	ND	NS
1,1,2-Trichloroethane	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloroethane	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloroethene	ND	NS	ND	NS	ND	NS	ND	NS
1,1-Dichloropropene	ND	NS	ND	NS	ND	NS	ND	NS
1,2,3-Trichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS
1,2,3-Trichloropropane	ND	NS	ND	NS	ND	NS	ND	NS
1,2,4-Trichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS
1,2,4-Trimethylbenzene	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dibromo-3- chloropropane	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dibromoethane	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichloroethane	ND	NS	ND	NS	ND	NS	ND	NS
1,2-Dichloropropane	ND	NS	ND	NS	ND	NS	ND	NS
1,3,5-Trimethylbenzene	ND	NS	ND	NS	ND	NS	ND	NS
1,3-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS
1,3-Dichloropropane	ND	NS	ND	NS	ND	NS	ND	NS
1,4-Dichlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS
2,2-Dichloropropane	ND	NS	ND	NS	ND	NS	ND	NS
2-Butanone	ND	NS	ND	NS	ND	NS	ND	NS
2-Chlorotoluene	ND	NS	ND	NS	ND	NS	ND	NS
2-Hexanone	ND	NS	ND	NS	ND	NS	ND	NS
4-Chlorotoluene	ND	NS	ND	NS	ND	NS	ND	NS
4-Methyl-2-pentanone	ND	NS	ND	NS	ND	NS	ND	NS
Benzene	ND	NS	ND	NS	ND	NS	ND	NS
Bromobenzene	ND	NS	ND	NS	ND	NS	ND	NS
Bromochloromethane	ND	NS	ND	NS	ND	NS	ND	NS
Bromoform	ND	NS	ND	NS	ND	NS	ND	NS
Bromomethane	ND	NS	ND	NS	ND	NS	ND	NS
Carbon Disulfide	ND	NS	ND	NS	ND	NS	ND	NS
Carbon Tetrachloride	ND	NS	ND	NS	ND	NS	0.46	NS
Chlorobenzene	ND	NS	ND	NS	ND	NS	ND	NS
Chloroethane	ND	NS	ND	NS	ND	NS	ND	NS
Chloroform	ND	NS	ND	NS	ND	NS	ND	NS

Table 5.1.5: NETL-Albany 2020 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–VOC Constituents (µg/L)

Constituent	Well Number, Sample Date							
	MW-100		MW-101		MW-102		MW-103	
	03/04	N/A	03/04	N/A	03/04	N/A	03/04	N/A
Chloromethane	ND	NS	ND	NS	ND	NS	ND	NS
cis-1,2-Dichloroethene	ND	NS	ND	NS	1.1	NS	ND	NS
cis-1,3-Dichloropropene	ND	NS	ND	NS	ND	NS	ND	NS
Dibromochloromethane	ND	NS	ND	NS	ND	NS	ND	NS
Dibromomethane	ND	NS	ND	NS	ND	NS	ND	NS
Dichlorobromomethane	ND	NS	ND	NS	ND	NS	ND	NS
Dichlorodifluoromethane	ND	NS	ND	NS	ND	NS	ND	NS
Ethylbenzene	ND	NS	ND	NS	ND	NS	ND	NS
Hexachlorobutadiene	ND	NS	ND	NS	ND	NS	ND	NS
Isopropylbenzene	ND	NS	ND	NS	ND	NS	ND	NS
Methyl tert butyl ether	ND	NS	ND	NS	ND	NS	ND	NS
Methylene chloride	ND	NS	ND	NS	ND	NS	ND	NS
Naphthalene	ND	NS	ND	NS	ND	NS	ND	NS
n-Butylbenzene	ND	NS	ND	NS	ND	NS	ND	NS
n-Propylbenzene	ND	NS	ND	NS	ND	NS	ND	NS
p-Isopropyl toluene	ND	NS	ND	NS	ND	NS	ND	NS
sec-Butylbenzene	ND	NS	ND	NS	ND	NS	ND	NS
Styrene	ND	NS	ND	NS	ND	NS	ND	NS
tert-Butylbenzene	ND	NS	ND	NS	ND	NS	ND	NS
Tetrachloroethene (PCE)	ND	NS	ND	NS	ND	NS	ND	NS
Toluene	ND	NS	ND	NS	ND	NS	ND	NS
trans-1,2-Dichloroethene	ND	NS	ND	NS	ND	NS	ND	NS
trans-1,3-Dichloropropene	ND	NS	ND	NS	ND	NS	ND	NS
Trichloroethene (TCE)	1.1	NS	1.2	NS	26	NS	ND	NS
Trichlorofluoromethane	ND	NS	ND	NS	ND	NS	ND	NS
Vinyl chloride	ND	NS	ND	NS	ND	NS	ND	NS
Xylene, Total	ND	NS	ND	NS	ND	NS	ND	NS

ND = Not detected NS = Not Sampled

ds Groundwater Quality Standard

Table 5.2: 2020 Groundwater Detection Monitoring Program Results of Analysis – Groundwater Samples Valley Fill – TPH and Contamination Indicators Constituents - Pittsburgh								
Constituent	Well Number, Sample Date							
	VFW-2		VFW-4		VFW-7		VFW-9	
	05/27/20	11/04/20	05/27/20	11/04/20	05/27/20	11/04/20	05/27/20	11/04/20
TPH-DRO (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND
pH (standard units)	7.08	7.11	7.47	6.92	7.17	6.77	7.56	7.76
Specific Conductance (uS/cm)	2,591	2,541	1,336	2,951	5,800	5,842	1,446	1,448
Temperature (0C)	12.0	13.7	14.8	15.6	13.8	14.3	14.2	14.8
Constituent	Well Number, Sample Date							
	VFW-10		VFW-11		VFW-12		VFW-14	
	05/27/20	11/04/20	05/27/20	11/04/20	05/27/20	11/04/20	05/27/20	11/04/20
TPH-DRO	ND	ND	ND	ND	0.950	ND	0.680	ND
pH (standard units)	7.39	7.75	7.02	6.92	7.78	7.40	7.57	7.09
Specific Conductance (uS/cm)	2,698	3,337	3,565	4,041	2,390	7,199	3,980	2,855
Temperature (0C)	14.1	15.5	12.9	13.4	15.7	15.7	12.5	17.5

ND = not detected

Table 5.3.1: May 2020 Data for "A" Aquifer—Morgantown											
Parameter	UNITS	Sample Location									
		A	B	GAS-4	I	J	L	M	N	SP1-A	SP4-A
pH (field)	S.U.	6.43	6.32	5.39	6.52	4.97	5.37	3.76	4.47	5.97	6.15
Specific Conductance (field)	µmhos	295	264	364	304	1410	1321	2200	1631	475	380
Temperature (field)	deg. C	17.90	16.90	16.29	16.31	15.19	13.70	13.40	15.20	17.01	19.45
Cadmium	ug/L	NT	NT	NT	< 0.21	2.1	2.7	1.9	3.0	NT	NT

Table 5.3.2: May 2020 Data for "B-C" Aquifer—Morgantown						
Parameter	UNITS	Sample Location				
		11	31	32-A	GAS-5	SP2-BC
pH (field)	S.U.	11	31	32-A	GAS-5	SP2-BC
Specific Conductance (field)	µmhos	6.26	5.51	5.14	6.10	6.12
Temperature (field)	deg. C	140	1379	2857	2302	387

Table 5.3.3: May 2020 Data for Morgantown Aquifer				
Parameter	UNITS	Sample Location		
		D1-M	D2-M	D4-M
pH (field)	S.U.	6.53	9.24	6.69
Specific Conductance (field)	µmhos	445	549	613
Temperature (field)	deg. C	18.02	18.86	19.77

Table 5.3.4: Oct. 2020 Data for "A" Aquifer—Morgantown											
Parameter	UNITS	Sample Location									
		A	B	GAS-4	I	J	L	M	N	SP1-A	SP4-A
pH (field)	S.U.	6.28	6.20	5.14	6.21	4.49	5.32	3.45	4.10	5.76	5.82
Specific Conductance (field)	µmhos	297	1059	405	291	1347	1755	1690	1570	513	346
Temperature (field)	deg. C	15.34	14.89	15.70	15.30	15.10	15.50	16.10	14.70	15.00	15.50
Cadmium	ug/L	NT	NT	NT	< 0.2	2.0	0.57 J	1.1	2.0	NT	NT

Table 5.3.5: Oct. 2020 Data for "B-C" Aquifer—Morgantown						
Parameter	UNITS	Sample Location				
		11	31	32-A	GAS-5	SP2-BC
pH (field)	S.U.	5.69	5.37	NS	6.08	6.57
Specific Conductance (field)	µmhos	157	643	NS	1027	229
Temperature (field)	deg. C	14.50	18.09	NS	19.52	15.07

Table 5.3.6: Oct. 2020 Data for Morgantown Aquifer				
Parameter	UNITS	Sample Location		
		D1-M	D2-M	D4-M
pH (field)	S.U.	6.36	7.87	6.48
Specific Conductance (field)	µmhos	470	543	600
Temperature (field)	deg. C	15.00	14.90	13.00

ND = not detected NT = not tested

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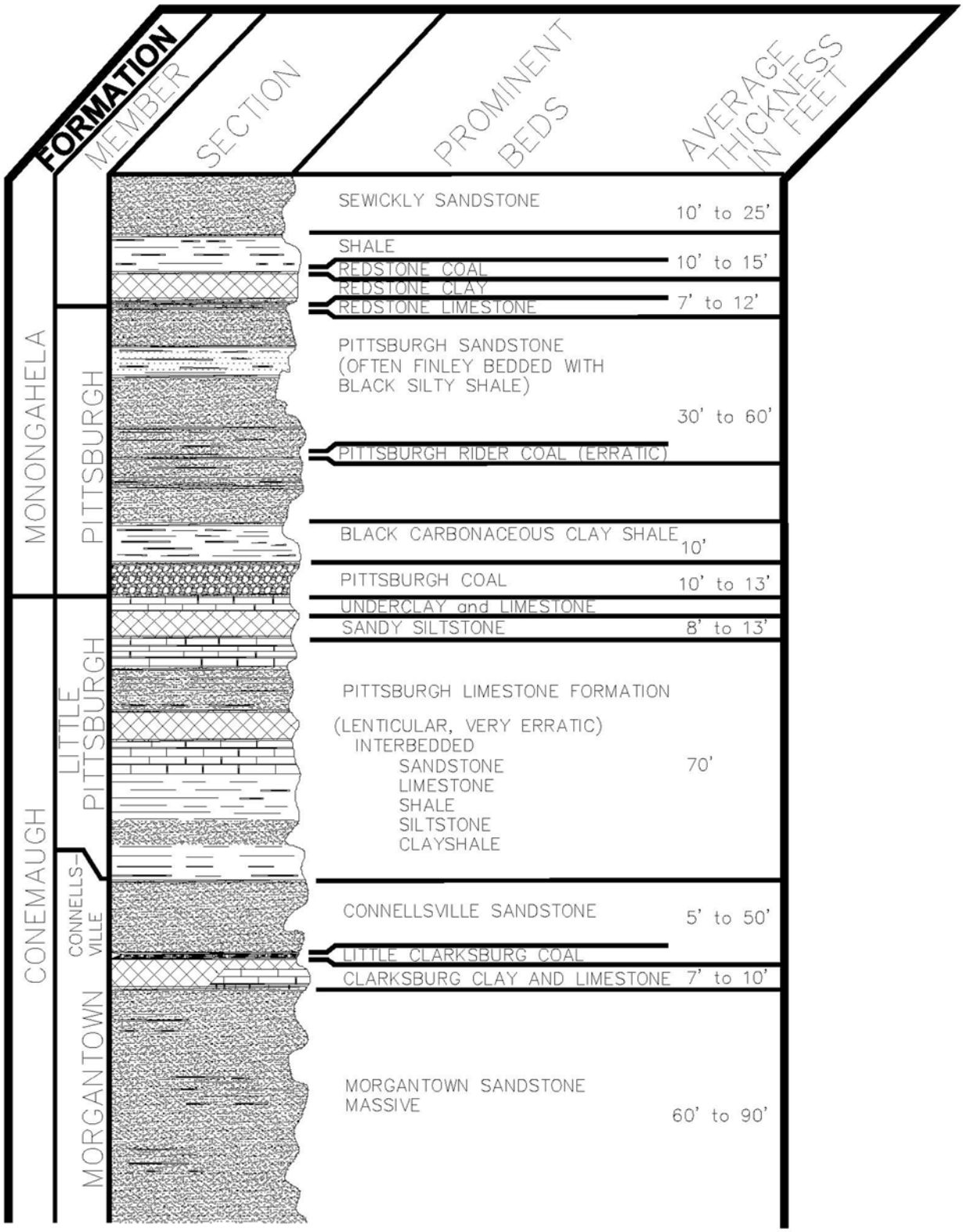

Figure 5.2.2: General Geologic Column—Pittsburgh.

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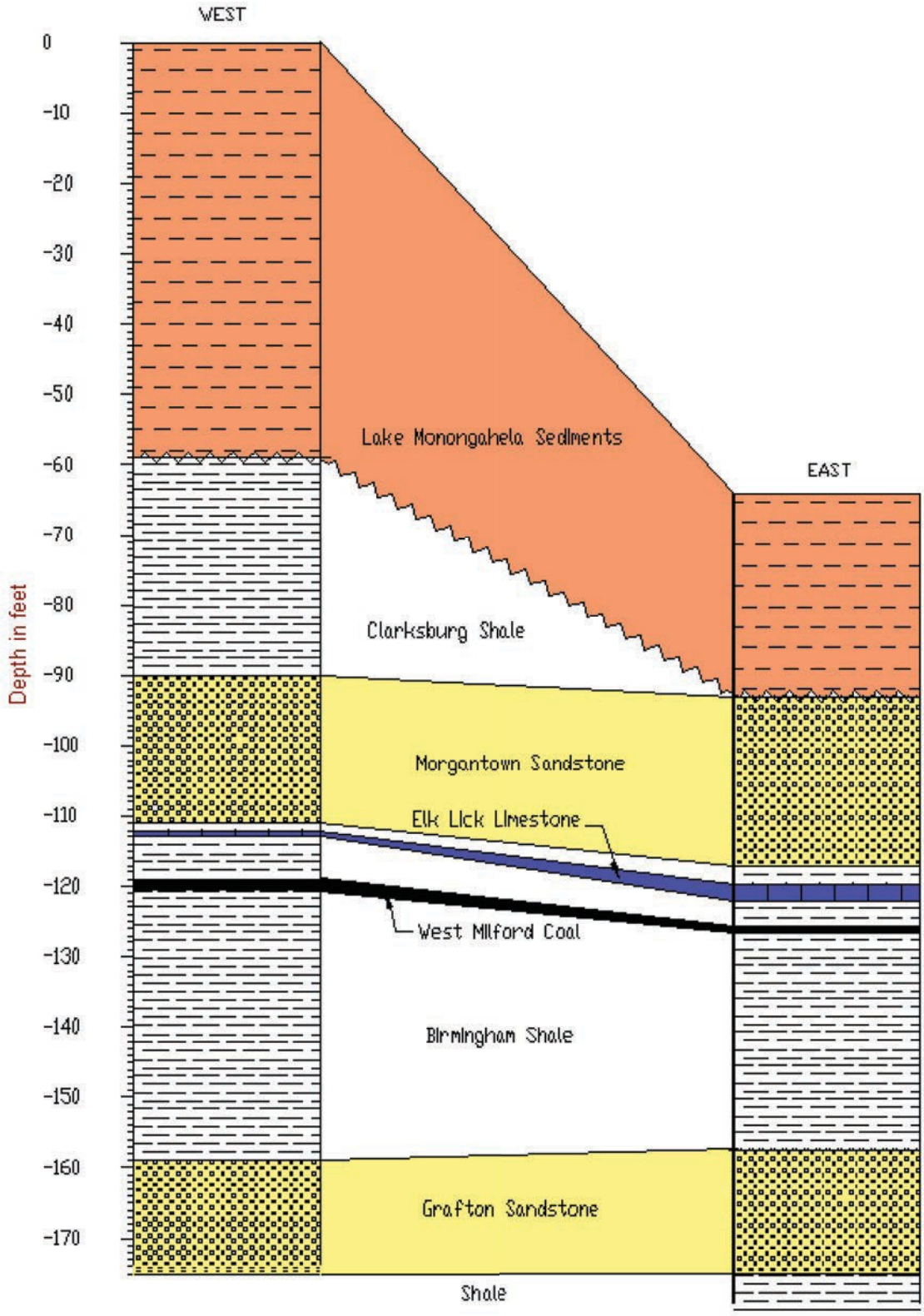

Figure 5.3.2: Generalized Cross-Section of Aquifer Units at the Morgantown Site.

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