NATIONAL ENERGY TECHNOLOGY LABORATORY

2018 Annual Site

Environmental Report

September 30, 2019

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

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2018 Annual Site Environmental Report

U.S. Department of Energy

National Energy Technology Laboratory

Albany, Oregon

Anchorage, Alaska

Morgantown, West Virginia

Pittsburgh, Pennsylvania

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EXECUTIVE SUMMARY

The U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL) assembles and distributes the Annual Site Environment Report (ASER) to provide a comprehensive status of NETL's environmental compliance in four states. This report verifies and documents NETL's mission to advance energy options to fuel our economy, strengthen our security, and improve our environment.

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 on creating commercially viable solutions to national energy and environmental problems.

NETL continued to implement its Environmental, Safety and Health (ES&H) programs throughout 2018 at the Albany, Anchorage, Morgantown and Pittsburgh sites. Previously NETL had a program office in Sugarland, Texas, however this office was closed in 2017; two employees work from their home. NETL maintained its International Organization for Standardization (ISO) 14001:2004 and Occupational Health and Safety Assessment Series (OHSAS) 18001:2007 certifications. Surveillance audits were conducted April 24, 2018, at the Morgantown site and April 25, 2018 at the Pittsburgh site. In the latter half of the year, NETL underwent a second round of audits to upgrade to the ISO 14001:2015 standard, while maintaining the OHSAS 18001:2007 standard certification. These audits were conducted July 17-18, 2018, at the Albany site; November 14, 2018, at the Morgantown; and November 15, 2018, at the Pittsburgh site. The audits demonstrated NETL's commitment to continual improvement and conformance to its Environment, Safety and Health (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 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 achieves 96 percent of its performance metrics. 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. However, 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

As part of the U.S. Department of Energy's (DOE's) national laboratory system, NETL has laboratory sites in Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania; and program office site in Anchorage, Alaska. The program office in Sugar Land, Texas was closed in 2017, and its two employees work from home.

1.2 GENERAL ENVIRONMENTAL SETTING

The Albany, Oregon, site is in Linn County in the western portion of the state. The facility is 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 flood plains. The Calapooia River is located one-half mile west of the laboratory.

The Morgantown site lies within Monongalia County, West Virginia, 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. All surface water drains into these two streams. Land use immediately surrounding the Morgantown site is a combination of residential, commercial, deciduous forest and pasture.

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 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 Arctic Energy Office is also leased office space located in Anchorage, Alaska. Anchorage is in the south-central portion of Alaska at the terminus of the 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 which encompass the urban core, a joint military base, several outlying communities and almost all of Chugach State Park.

1.3 LABORATORY MISSION

The National Energy Technology Laboratory (NETL) is a U.S. Department of Energy (DOE) national laboratory that produces technological solutions to America's energy challenges. For more than 100 years, the Laboratory has advanced technology to provide clean, reliable, and affordable energy to the American people.

NETL's mission is to discover, integrate, and mature technology solutions to enhance the nation's energy foundation and protect the environment for future generations. Through forward-looking

research and technology development, our team of talented and diverse experts provides technology solutions for today and options for tomorrow.

As the only DOE national lab that is both government-owned and -operated, NETL is in a unique position to accelerate the development of technology solutions through strategic partnerships with academia, industry and other research organizations. NETL is also the only national lab dedicated to fossil energy research and development, making our team a sought-after national resource.

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:

- Renewing its emphasis on technical program planning and long-term strategies to maximize technical achievement.
- Emphasizing partnerships with national labs, private industry and academic institutions on global, state and local levels.
- Cultivating a world-class science and technology workforce.
- Integrating strategic planning for infrastructure around enduring mission elements.
- Integrating its extramural and intramural research to promote collaboration and coordination.
- Increasing transparency in business planning and technical operations.

The Laboratory's six functional areas are described below.

OFFICE OF THE DIRECTOR

The Office of the Director maintains full control and authority, including delegated authority, over the complete NETL complex including delivery and execution of NETL's mission.

In continuous pursuit of the mission and to sustain NETL as a world-class research and development enterprise, the Office of the Director promotes organizational direction toward sustainability, consistency, effectiveness and efficiency in research efforts and business practices. The Office of the Director:

- Leads development of the NETL Strategic Plan including identification of future competencies.
- 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 the DOE's Chief Financial Officer.
- Exemplifies and promotes the highest levels of safety, scientific integrity, public accountability and social responsibility in the conduct of R&D programs.

SCIENCE AND TECHNOLOGY STRATEGIC PLANS AND PROGRAMS

The Science and Technology Strategic Plans and Programs unit develops the strategic direction for NETL programs and activities and identifies future competency requirements; leverages existing capabilities to optimize output, including through repositioning and redeployment as necessary; and identifies investments to sustain and grow the Laboratory. Strategic planning efforts are centered on NETL's enduring missions: effective resource development, efficient energy conversion and environmental sustainability. In pursuit of those objectives, the Science and Technology Strategic Plans and Programs unit:

- Leads development of annual enterprise portfolio planning, connecting objectives of the strategic plan to specific actions, and including quantifiable deliverables and measurable outcomes.
- Develops technology roadmaps including the DOE Annual Laboratory Plan, the FE Roadmap, and integrated program development plans.
- Defines technical capabilities that require investment for the long-term strength of NETL, including budgetary requirements for achieving those capabilities.
- Develops a collective strategy and engagement plan for external stakeholders.
- Pursues partnerships with other national laboratories, industries and academia.
- Develops and implements a strategic plan for international efforts to advance the overall strategy of NETL research focus areas.

The Science and Technology Strategic Plans are executed by the Research and Innovation Center and the Technology Development and Integration Center.

RESEARCH AND INNOVATION CENTER

The Research and Innovation Center (RIC) nurtures and exercises core technical competencies that enable NETL to be an international resource for fossil energy technology discovery, development and deployment. The technical core competencies, which combine world-class expertise with mission-relevant laboratory facilities, include:

- Computational Science & Engineering
- Energy Conversion Engineering
- Geological and Environmental Systems
- Materials and Manufacturing Engineering
- Systems Analysis and Engineering

Core competencies are exercised in collaboration with industry, academia, and other government laboratories, to deliver knowledge and technologies that enable affordable, environmentally sustainable use of the nation's abundant, domestic energy resources.

TECHNOLOGY DEVELOPMENT AND INTEGRATION CENTER

The Technology Development and Integration Center (TD&IC) implements national programs in fossil energy and broader DOE programs in collaboration with partners through integrated technical and business teams that define, solicit, negotiate, award, manage and deliver federally sponsored research and development. The Center:

- Defines project technical and budget requirements to achieve research objectives.
- Leads program/project teams to prepare and issue competitive solicitations.
- Negotiates and manages projects with industry, universities and national laboratories.
- Coordinates and communicates project results and accomplishments.
- Maintains a qualified and experienced workforce through training and job assignments.
- Supports DOE and NETL program planning, development, analysis, execution, outreach and communication efforts.
- Maintains and utilizes project management best practices to reduce project risk, enhance project outcomes and support DOE program success.
- Leverages multiple perspectives and lessons learned through collaboration with RIC system analysts and researchers and Finance and Acquisition Center (FAC) procurement specialists to develop and execute funding opportunities and projects that efficiently and effectively advance technology development objectives.
- Uses an integrated systems perspective to appropriately develop and manage projects, especially with respect to project de-risking (FAC) and technology maturation (RIC).

TD&IC's work is performed through three organization element areas: oil and gas, coal and energy technology development.

LABORATORY OPERATIONS CENTER

The Laboratory Operations Center (LOC) manages a comprehensive fully integrated suite of laboratory support services consistent with the NETL mission. The Center develops, implements, integrates, monitors and continuously improves the products and services that support NETL business and laboratory operations. The Center incorporates facility operations, information technology and strategic support that:

- Performs internal audits and compliance reviews.
- Provides strategic analysis, best practices and improved synchronization functions.
- Facilitates engineering and facilities activities and operations.
- Supports environmental safety and health programs and activities.
- Maintains security and counterintelligence programs and activities.
- Provides information technology, records management and cyber security.
- Coordinates science & technology career management.
- Pursues equal employment opportunity functions.
- Maintains effective communications across NETL.

FINANCE AND ACQUISITION CENTER

The Finance and Acquisition Center (FAC) directs and coordinates NETL's CFO, procurement and financial award and grant functions, ensuring effective oversight and stewardship of the Laboratory's financial resources. The Center is the principal advisor to the NETL Director and senior officials on all matters related to the Laboratory's financial resources, procurement and financial assistance activities. The FAC provides expert oversight, regulatory compliance knowledge, and operational experience that:

- Ensures the financial integrity of the Laboratory's books and records.
- Manages and monitors the funds control processes.
- Provides business and financial expertise procurement and business management.
- Implements and coordinates federal acquisition and assistance policies and procedures.
- Performs internal audits and compliance reviews.
- Provides strategic analysis, best practices and improved synchronization functions.

1.5 RELEVANT DEMOGRAPHIC INFORMATION

With locations in Albany, Oregon; Morgantown, West Virginia; Pittsburgh, Pennsylvania; Fairbanks, Alaska; and Sugar Land, Texas, NETL comprises 98 buildings and 14 major research facilities covering over 240 acres. As of December 31, 2018, NETL had 1,297 employees at its five locations - 466 were federal employees and 831 were site-support contractors. Previously NETL had a program office in Sugarland, Texas, two employees work from their homes.

1.6 ACCOMPLISHMENTS

NETL attained the following technology-related accomplishments in 2018.

AWARDS

- American Institute of Chemical Engineers (AIChE) Minority Affairs Committee (MAC) Distinguished Service Award

  This award recognizes an AIChE member for sustained service and outstanding achievements that advance the goals of the Minority Affairs Committee. Among these goals is reducing the underrepresentation of minorities in the Institute, the chemical engineering profession, and engineering as a whole. Up to three awards may be presented annually.

  Isaac Gamwo received the Distinguished Service Award for the impact of his efforts to reduce underrepresentation of minorities in the chemical engineering profession.

- American Institute of Chemical Engineers (AIChE) Sustainable Engineering Forum Professional Poster Competition

  AIChE is the Global home of Chemical Engineers. This technical forum is open to all disciplines to promote technical and professional development with a focus on sustainability principles and practice.

  Briggs White received first place in the Sustainable Engineering Forum Professional Poster Competition.

- Department of Energy Annual Small Business Awards

  DOE's Annual Small Business Awards Program recognizes the outstanding performance of the people and organizations responsible for promoting and expanding the Department's use of small businesses.

  The USSE2 SOS services contract received the Service-Disabled Veteran-Owned Small Business of the Year Award for accomplishments such as successful performance in the development and submission of several unsolicited proposals to integrate other areas of similar work scope into the SOS contract and their quick response to emergencies such as the Boil Water Advisory for the local area surrounding the Pittsburgh site.

- Department of Energy's Secretary of Energy Achievement Award

  The Secretary's Awards Program recognizes the career service and contributions of DOE employees to the mission of the Department and to the benefit of the nation.

  James Briones, Keith Dodrill, Don Ferguson, Robert Gross, Joesph Hanna, Robert Reed, Clark Robinson, and Walter Yamben received the Secretary of Energy Achievement Award received the Secretary of Energy Achievement Award for being part of the 2017 Hurricane Response Team. The individuals were recognized for their dedication and exemplary service instrumental to helping the Nation respond to and recover from energy disruption emergencies impacting the United States.

- Energy Technology Magazine Awards

  Energy Tech Magazine is dedicated to the Engineering, Operations & Maintenance of Electric Power Plants.

  Doug Kauffman and Dominic Alfonso received the Best of 2017 award for their paper *Electrochemical Carbon Dioxide Reduction at Nanostructured Gold, Copper, and Alloy Materials*.

- Maryland Clean Energy Awards

  The Capital Partner of the Year award is presented to an organization providing significant capital to clean energy or energy efficiency projects, or an investor who has helped bolster investment in Maryland clean energy companies.

  NETL, in a project led by Michael Nowak and Seth Lawson, received the Capital Partner of the Year Award for the investment of more than $5.7 million in three active projects with Redox Power Systems, LLC. Redox Power Systems focuses on advancing solid oxide fuel cell (SOFC) technology to provide clean, efficient, reliable and low-cost electricity for a variety of customers.

- Oregon Federal Executive Board Public Service Recognition Week Awards

  Public Service Recognition Week (PSRW) is organized annually by the Public Employees Roundtable (PER) and its member organizations to honor the men and women who serve our nation as federal, state, county and local government employees.

  Alan Hartman was recognized in the Customer Service Award category for demonstrating distinguished customer service in the capacity of the Federal Government for his skills as a leader and operational strategist in initiating effective procedures, practices, and processes for leading to improvements for safe execution of research at the laboratory.

Kelly Rose received the Exceptional Service Award for making exceptional contributions and exceeding expectations through activities such as leading a research team that created a powerful suite of computational tools that provide science-based predictions about subsurface resources and serving as a mentor and career advisor for more than 40 undergraduate, graduate, and postdoctoral fellows.

Circe Verba received the Leadership Award for activities such as volunteering at over 20 STEM events since 2016 and participating in STEM outreach to elementary school students – Circe impacted one elementary school student in Utah so much that the student wrote Circe a letter about how Circe is her role model and she wants to follow in Circe's footsteps when she grows up and become an Astrological Geologist.

- Pittsburgh Business Times Innovators of the Year Awards

  This year the Pittsburgh Business Times presents the second annual Innovator Awards, a program that recognizes the people who made extraordinary advances in their respective fields, challenging conventional thinking. They are the disruptors, creating new products and developing new approaches that challenge traditional approaches.

  Mac Gray received an Innovators of the Year Award for creating a regenerative sorbent that can remove carbon dioxide from air, remove lead from water, and recover rare earth elements (REEs).

- Pittsburgh Federal Executive Board Excellence in Government Awards

  The Pittsburgh Federal Executive Board Excellence in Government Awards honor area federal employees whose service demonstrates deep personal and professional commitment.

  Jonathan Lekse received gold in the Rookie of the Year category for several leadership roles he took on in his first year, including being the Technical Task Coordinator for the "Process and Reaction Intensification" task under the ARS field work proposal.

  Jerry Carr received bronze in the Rookie of the Year category for his research efforts in the field of Carbon Storage, focusing on taking carbon dioxide from manmade sources and permanently storing it safely within underground geologic formations in a cost-effective manner.

  Mac Gray received gold in the Contribution to Science category for his work producing a promising approach to post combustion CO_2 capture in the form of basic immobilized amine/silica sorbent (BIAS) formulations.

  Garrett Veloski received silver in the Contribution to Science category for his work using cutting-edge, drone-based airborne sensing technology and advanced data analysis to help mitigate the hazards associated with abandoned oil and gas wells, ensuring the safety of Americans.

  Jim Cox received silver in the Outstanding Administrative Employee category for his exceptional level of accountability, leadership, and efficiency in 2017, culminating in a notably successful year of implementing challenging and effective new work processes with exemplary mentorship and efficiency.

The NETL Emergency Support Function Team (James Briones, Keith Dodrill, Don Ferguson, Robert Gross, Joesph Hanna, Robert Reed, Clark Robinson, and Walter Yamben) received silver in the Outstanding Team category for going above and beyond the call of duty in their commitment to support the Federal Emergency Management Agency (FEMA) during the intense Atlantic Hurricane season.

The Ukraine Coal Team (Anthony Armaly and Chuck Taylor) received bronze in the Outstanding Team category for their expertise in sealing the Ukranian deal – which involved assisting a major electric and thermal energy producing company in Central Ukraine called Centrenergo to look for a new economical and more dependable source for coal to stockpile before winter so it could keep Ukraine's power and heat on.

- Putman Media's Smart Industry 50

  The Smart Industry 50 program was created in 2016 to recognize and honor individuals across industry who were making a difference in their organizations' pursuit and embrace of digital transformation. Nominations for this year's class of 2018 were solicited from the readers of Smart Industry, from past recipients of this recognition, and from more than 20 editors across the Putman Media family of industry publications—journalists and engineers who have developed deep relationships with the various vertical niches and functional swaths that their communities of readers represent.

  Stephen Zitney was recognized in the Smart Industry 50 class of 2018 for Process Systems Engineering Research.

- West Virginia University Academy of Distinguished Alumni Induction, Department of Mechanical and Aerospace Engineering

  The West Virginia University Academy of Distinguished Alumni recognizes successful WVU graduates for their career achievements.

  Jessica Lamp received this honor for her career accomplishments and unique employment experience in Mechanical and Aerospace Engineering.

- Federal Laboratory Consortium Mid-Atlantic Awards

  National Federal Laboratory Consortium Excellence in Technology Transfer Award recognizes employees of FLC member laboratories and non-laboratory staff who have accomplished outstanding work in the process of transferring federally developed technology.

  The City of Pittsburgh MOU Team (James Ferguson, Randy Gemmen, Robert James III, Ashley LeDonne, Mark McKoy, Dan Oryshchyn, Tom Tarka, Kristen Welsh, and Jim Wilson) received the State and Local Economic Development Award. The City of Pittsburgh MOU has provided an opportunity for NETL to demonstrate how fossil energy (FE) is a part of the clean energy future. The scope of the activities under the MOU support Pittsburgh's efforts to modernize its energy grid through a network of small-scale, distributed energy systems, thus making electricity more affordable and sustainable.

2.0 COMPLIANCE SUMMARY

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

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. The ES&H directives include orders and procedures. The ES&H Team also provides specific guidance through subject-related manuals. All standards or requirements are implemented through NETL directives. The assigned SME is required to review his or her directive every two years and update it as appropriate.

Implementation of the standards and requirements is verified through:

- 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 to be covered during the review. ES&H subject matter experts 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 all applicable standards and requirements.
- Preparation of the ASER, which requires a complete review of compliance with all major standards and requirements. Numerous SMEs participate in this effort, reviewing the past year's performance to ensure compliance with ES&H standards, and as part of the ISO 14001:2015/OHSAS 18001:2007 surveillance and certification audits.

2.1 MAJOR ENVIRONMENTAL STATUTES

Numerous inspections and audits are performed and documented throughout the year to ensure that there are no instances of environmental noncompliance. The environmental statutes considered when evaluating compliance included: 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); Atomic Energy Act of 1954 (AEA); and other related environmental statutes. Statutes that are addressed across all five locations are discussed below. However, if more specific compliance is appropriate, that compliance is included in the site-specific discussions.

2.1.1 Federal Facilities Compliance Act (FFCA)

The Federal Facility Compliance Act of 1992, Pub. Law No. 102-386, became law on October 6, 1992. It amended the waiver of sovereign immunity in the Resource Conservation and Recovery Act (RCRA). The primary purpose of FFCA is to ensure 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. Also, under section 103 of the Federal Facility Compliance Act, Congress further clarified that federal agencies are considered persons for purposes of RCRA. NETL has not had any issues regarding the FFCA.

2.1.2 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 lead 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, the NEPA office is listing both CX's approved and EQ's reviewed to support these CX determinations.

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 FY2018:

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 has been briefed on the HECA situation and the ERCs (Emission Reduction Credits). He would like the DOE to obtain ownership of the credits. This information has been passed on to the CO. The period of performance for the CA expired on December 31, 2017. A letter is being drafted by DOE to lay out options for transfer of ownership of the ERCs to DOE as part of the normal close out efforts. We have a security interest in the ERCs. If HECA doesn't want to transfer them to DOE, they will then have to pay DOE 100% of the current market value for these emission credits, as determined to be mutually acceptable between HECA and DOE. Negotiations ongoing through 2018.

DOE/EIS-0473: W.A. PARISH POST-COMBUSTION CO_2 CAPTURE AND SEQUESTRATION PROJECT

NRG Energy, Inc. was selected under CCPI Round 3 to design, construct, and operate a commercial-scale CO_2 capture facility at its existing W. A. Parish Generating Station (Parish Plant) in Fort Bend County, Texas; deliver the CO_2 via a new 80 mile pipeline to the existing West Ranch oil field in Jackson County, Texas for use in Enhanced Oil Recovery (EOR) The Record of Decision was published in the Federal Register on May 8, 2013 and a Mitigation Action Plan (MAP) was completed in June 2013. The project broke ground in September 2015. The first MAP report was submitted in February 2015 and reports have been submitted quarterly for review for environmental compliance through 2016. On January 10, 2017, NRG Energy, Inc. completed the project construction on-budget and on-schedule. Commercial operations have commenced as planned. NETL NEPA Office continues to review quarterly MAP reports through 2018.

The following EA activities took place in FY2018:

DOE/EA-2034 ADVANCED ULTRASUPERITICAL COMPONENT TEST, YOUNGSTOWN, OH

Energy Industries of Ohio (EIO) proposes a full-scale pilot plant to evaluate the effect of advanced ultrasupercritical (AUSC) steam temperature and pressure conditions and thermal/pressure cycling on the mechanical integrity of the AUSC components, including the turbine, valves, lines and headers at both anticipated commercial scale AUSC plant temperature (760 degrees Celsius) and pressure (3500 to 4000 psi). EIO would construct a pilot unit capable of generating steam at the AUSC temperature with a steam flowrate (134,00 lbs./hr.) equivalent to a 20 MW power generation facility on the Youngstown Thermal campus in Youngstown, Ohio. Youngstown Thermal, a public utility, currently operates the site using coal- and gas-fired boilers to provide steam to customers. EIO would temporarily add a separate steam generation system, consisting of two natural gas-fired package boilers, a natural gas-fired superheater and a turbine as well as other ancillary equipment. Additionally, the process would require higher water quality than that provided from the municipal supply, so a feedwater treatment facility for approximately 400,000 gallons per day would be added. The project also includes an ancillary test at high pressure (3500-4000 psi), a condition which is not available at the Youngstown site. Potential tests on AUSC steam valves and a cycling steam header may be conducted at one of two available operating power plants that currently generate steam at those pressures. The James M. Barry Electric Generating Plant and Ernest C. Gaston Electric Generating Plant are operated by Southern Company's Alabama Power. The draft EA was completed in August 2016 but has not been released to the public or stakeholders at EIO's request while they resolve financial issues related to the project.

This project has cancelled all work at Youngstown Thermal. Testing and other actions under the new modified project were relocated to Alabama Power's Plant Gaston. Therefore, EA was subsequently cancelled in June 2017, and the new work was reviewed for NEPA compliance. Categorical Exclusions were issued for the new location in 2017 and 2018 because of significant changes to the project scope.

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 are 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. During the operational phase of FORGE, applicants would propose and be selected by a panel to test geothermal methods and equipment at the site. The Final EA and FONSI for the Utah site were issued in April 2018. The Utah site was selected to host the FORGE project and work is proceeding.

The alternative FORGE project location was in Fallon, Nevada, and an EA was issued in Mar 2018 by BLM for that location *(Fallon Frontier Observatory for Research in Geothermal Energy (FORGE) Geothermal Research and Monitoring*, DOI-BLM-NV-CO10-2018-005-EA). DOE/NETL was a cooperating agency on that document.

DOE/EA-2071: SUPERCRITICAL CARBON DIOXIDE PILOT PLANT TEST FACILITY, SAN ANTONIO, TX

Power cycles based on supercritical carbon dioxide (sCO_2) as the working fluid have the potential for higher thermal efficiencies when compared to state of the art steam-based power cycles. With a higher fluid density than steam, the sCO_2 working fluid also enables the use of much smaller turbomachinery equipment, which would result in lower capital costs. The unique features of sCO_2, (i.e. the potential for lower capital cost and the compounding performance benefits from a more efficient cycle on balance of plant requirements, fuel use, emissions, water use and cost of electricity) are creating interest in the sCO_2 power cycle across multiple power generating technologies. Depending on the application, these improvements can likely be realized over a range of cycle temperatures, efficiencies, and capital costs. Recognizing these benefits, DOE formed a Supercritical Carbon Dioxide Crosscut Initiative in 2013 with the specific mission to reduce the technical barriers and risk to commercialization of the sCO_2 power cycle. The sCO_2 Crosscut Initiative is composed of the DOE Offices of Fossil Energy, Energy Efficiency and Renewable Energy, and Nuclear Energy; leveraging the capabilities and interests of these organizations toward the development of the s CO_2 power cycle. To address the mission of the s CO_2 Crosscut Initiative, DOE selected GTI's proposed project to design, construct, and operate a 10-megawatt-electric (MWe) Supercritical Carbon Dioxide (sCO_2) Pilot Plant Test Facility. The proposed project is referred to as the sCO_2 Test Facility Project and would be located at the existing Southwest Research Institute (SWRI) campus in San Antonio, Texas. Specifically, the project should demonstrate a 700°C turbine inlet temperature or higher design point, demonstrate the operability of the s CO_2 power cycle, verify the performance and integrity of the components, demonstrate a pathway toward a thermodynamic cycle efficiency greater than 50%, and show the potential for cost savings in electricity generation.

The final EA and FONSI were issued in May 2018.

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

The U.S. Department of Energy, National Energy Technology Laboratory (DOE/NETL) proposes to demolish Building 2 (B-2) at the DOE/NETL 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.

DOE/EA-2066: PROPOSED ENERGY CONVERSION TECHNOLOGY CENTER (ECTC), MORGANTOWN, WV

DOE's proposed action is to construct an Energy Conversion Technology Center (ECTC) at the former Navy site at the Morgantown campus. The ECTC will be a multi-use, high pressure combustion facility that will add research capabilities not found at any other national lab campus. A site-wide Cultural Resources Management Plan was conducted by NETL in 1993 and identified archeological and historical resources near the proposed ECTC facility. Therefore, based upon the scope and size of the ECTC project and the requirements to coordinate with the WV State Historic Preservation Officer (WV SHPO) under Section 106 of the Historic Preservation Act, an EA is the appropriate level of NEPA review.

A request for consultation with the WV SHPO was submitted by NETL in June 2017, at the beginning of the EA. Additional information was requested by WV SHPO to address architectural resources, and a Phase II archaeological evaluation was requested. DOE submitted a Phase II Work Plan and photo documentation for the Sinclair Farmstead site to WV SHPO in November 2017. WV SHPO has concurred with the Phase II Work Plan (letter dated December 15, 2017) and has requested additional documentation regarding the architectural resources at the site (letter dated December 19, 2017). The additional requested documentation is being prepared. A Preliminary Draft EA is being prepared incorporating the WVSHPO's comments and the findings of the Phase II Archeological Report; a revised Draft EA will be sent out for public comment in February 2019. Changes to the EA are currently being incorporated to reflect the 95 percent design review documents. Ongoing archaeological issues that are being addressed at the site have resulted in slippage of the original EA schedule.

MARINE GEOPHYSICAL SURVEY IN THE NORTH ATLANTIC (MATRIX)

DOE proposed participation in a project with other Federal agencies to perform seismic surveys of the Atlantic Ocean between the Hudson Canyon (NY) and Cape Hatteras, NC. An EA was completed by the U.S. Geologic Survey in August 2018. DOE adopted the EA and issued a FONSI for DOE's participation in August 2018.

These categorical exclusion (CX) activities and no cost time extensions took place in FY2018:

NO COST TIME EXTENSIONS GRANTED: 71

INTERNAL CX'S TO NETL

Morgantown, WV Site	15	
Pittsburgh, PA Site	7	
Albany, OR Site	18	
Combined ALB-MGN-PGH	2	
Combined MGN-PGH	1	
Total CXs	**43**	*[Supporting EQ's reviewed: 43]*

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

Continental U.S.	276	
Non-Continental U.S.	6	
Total CXs	**282**	*[Supporting EQ's reviewed: 662]*

GRAND TOTAL CXS FOR 2018: 325

GRAND TOTAL EQS REVIEWED FOR 2018: 705 *[of these, 43 covered work in international or non-continental U.S. locations]*

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, 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 office 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. 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 2018 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 2018, 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, and
- 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 cleanup agreements are with the State of Wyoming's Department of Environmental Quality (WYDEQ) and are the result of experiment R&D research that began in the 1960s. Specifically, the agreements include efforts for groundwater and surface remediation at two different sites in Wyoming: (1) Rock Springs Oil Shale Retort Site in Sweetwater County, Wyoming; and (2) Hoe Creek Underground Coal Gasification Site in Campbell County, Wyoming. In the 1960's and 1970's, these sites were experimental R&D field sites for in situ oil shale retorting experiments and underground-coal gasification, respectively.

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. DOE leased the property from the owner of the land, Rock Springs Grazing Association, and from the owner of the mineral rights, Rocky Mountain Energy Company. The Rock Springs facility encompassed 340 acres and contained 13 former retort sites (covering 35 acres). 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.

From 1976 to 1979, the DOE's Lawrence Livermore Laboratory conducted underground coal gasification research at Hoe Creek, which is south of Gillette, Wyoming, on 74 acres of property owned by the BLM. In 1982, responsibility for the site was transferred to the Laramie Energy Technology Center. Three separate underground coal gasification research experiments were run at three different sites: site 1 research experiments lasted 11 days; site 2 research experiments lasted for 58 days; and site 3 research experiments lasted for 47 days. After research activities ended per WYDEQ requirements, DOE conducted groundwater remediation activities from 1986 to 2007 for the contaminant benzene, including pump and treat, bioremediation and air sparging. Groundwater remediation targets, as prescribed by WYDEQ Land Quality Division (LQD), were met in 2007 and all wells were plugged and abandoned per the appropriate regulations. DOE completed decommissioning, grading, top soiling, and reseeding in the Fall of 2012. Phase 1, 2, and 3 Bond Release Verifications for Hoe Creek Coal Gasification Site, R&D #1, TFN 6 6/239 approved November 29, 2016 by the WYDEQ. Surface restoration was considered complete in September 2017 after a 2-year stability monitoring period.

In October 2017, DOE submitted a bond release request for the Hoe Creek Site to the WYDEQ, LQD, to initiate the bond release process. On November 13, 2017, the WYDEQ issued a Completeness Letter to the DOE declaring our application complete per the WYDEQ LQD Coal Rules and Regulations (R&R) Chapter 15, Section 1(b). This Letter notified DOE of the requirements for a field inspection of the reclaimed lands, within 60 days of the date of the Letter (November 13, 2017). This inspection originally occurred on November 15, 2017, and again in April 2019 with no issues identified. This Letter also notified DOE to publish a Public Notice of the Bond Release Request within 15 days of receipt of the Letter in the Gillette News Record Newspaper, Gillette, Wyoming, to run in the newspaper once a week for four consecutive weeks. This Public Notice was developed and appeared in the Gillette News Record Newspaper originally on November 27, 2017. In addition, for compliance with the Completeness Letter, DOE issued copies of the Public Notice via certified mail on November 29, 2017 to identified stakeholders, including the Campbell County Commissioners, the Wyoming Business Council, and Surface Owners of Record which overlay and abut the lands identified in the Bond Release Application. WYDEQ did not receive any written objections/ public comments to the proposed bond release request. Final documentation releasing DOE from this remediation effort and finalizing the Chapter 15 bond release process for the Hoe Creek Underground Coal Gasification Site, including a signed Bond Release from the Director of WYDEQ, has been requested.

2.5 ENVIRONMENTAL VIOLATIONS CITED BY REGULATORS/ NOTICES ISSUED

Regulators cited no environmental violations in calendar year 2018 at any of NETL's locations.

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

No Notices of Violations, Notices of Deficiency, Notices of Intent to Sue, or Other Enforcement Actions were received at any of NETL's locations during calendar year 2018.

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 five ORPS reportable items in 2018. 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 2018.

NETL underwent surveillance audits at all three facilities for the ISO 14001:2004 and OHSAS 18001:2007 standards in April, July, and November of 2018 and did not receive any nonconformities during these audits.

In addition, NETL has successfully updated its ES&H management system to the ISO 14001:2015 version of the standard. The latest version includes: a modified numbering system; changes in terminology; new requirements in terms of risk analysis; and new requirements of management titles and roles.

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 are conducted at all three sites to demonstrate continual improvement in the ES&H Management System and conformance to the ISO 14001:2004 standard to maintain these certifications. All three sites are 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 maintained its certification to the OHSAS 18001:2007 standard.

The Morgantown site underwent an upgrade audit April 24, 2018. The auditors did not identify any nonconformances or opportunities for improvement (OFI) The auditor identified two strengths: (1) linking of the ES&H operating plan goals to employee performance goals promotes accountability; and (2) the new CROps process provides a systematic way for identifying, grading, and addressing all of the ES&H risks and opportunities for R&D projects.

The Pittsburgh site underwent an upgrade audit April 25, 2018. The auditor did not identify any nonconformances or opportunities for improvement. The auditors identified three strengths: (1) the practice of human resources informing the Correction Action coordinator of personnel whose employment has come to an end enables the quick re-assignment of open findings that the ex-employee was responsible; (2) the identification of the risks and opportunities associated with the EMPs is well done; this with the ongoing management and monitoring of the EMP should contribute to meeting the established targets; and (3) the SARS process continues to provide a consistent and comprehensive approach for addressing EHS.

An upgrade audit took place at the Albany site July 17-18, 2018. The auditors identified two nonconformities: (1) the information on the external webpage regarding the ES&H Management System was not current; and (2) the Facility Construction SARS Package for the Building 1 renovation project was found to be incomplete – the Construction Permit Signature Page section entitled, “Notification of Completion of Construction” was not signed. The auditors identified the following strengths: (1) process consistency across the three locations is excellent; and (2) emergency response operation is well coordinated with the off-premise emergency response providers.

A surveillance audit took place at the Morgantown site November 14, 2018. The auditors did not identify any nonconformances, but found three OFIs: (1) it is important that the improvement of combining the facility construction and facility use manuals into the Facility Safety Analysis and Review System Manual (421.1-00.03) be executed as scheduled to ensure that the Facility Use SARS are established and maintained per Order 420.1, 7/21/2017; (2) restructuring of the NETL directives system containing Orders, Procedures, and Manuals has been progressing for several years, and although much progress has been made, there are still a number of updates to the Orders, Procedures, and Manuals that have to be finalized and a number of assessments (corrective actions) are waiting to be implemented when an Order, Procedure, or Manual is finalized; and (3) a number of corrective actions were examined. Although there was a drill-down to determine the fundamental cause, there were cases observed where a further drill-down could have led to a deeper or more fundamental root cause. This would enable a corrective action plan to be generated that would have a higher probability of preventing the nonconformity from reoccurring.

A surveillance audit took place at the Pittsburgh site November 15, 2018. No nonconformities were identified. The same three OFIs identified for the Morgantown site were identified for Pittsburgh. In addition, the following strength was also identified: the corrective action process was found to be working well; the root cause analysis process has matured to a good level (with an opportunity for further advancement in some cases as noted above) and appropriate corrective actions are being implemented.

By maintaining its ISO 14001:2015/OHSAS 18001:2007 certifications, NETL demonstrates to its work-force, the surrounding community, DOE and other stakeholders that it is committed to responsible environmental, safety, and health stewardship.

Finally, the Albany site participated in a DOE Office of Fossil Energy (FE)/Site Assistance Visit (SAV), April 18-19, 2018. In addition, the Morgantown and Pittsburgh sites also participated in DOE FE/SAV May 1-3, 2018. By the end of fiscal year 2018, FE-17 had provided an out-brief report that included a list of strengths and opportunities for improvement. These visits provided an extra review of NETL programs and an opportunity for headquarters staff to gain a better perspective on 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, 2018 Summary of Permits.

Table 2.10: 2018 Summary of Permits – Industrial Hygiene

Permit No. and Name	Site	Issue Date	Regulatory Agency	Description
PAA-180260 Asbestos Permit	Pittsburgh	04/16/2018	Allegheny County Health Department (ACHD)	Asbestos Abatement Permit for B-84, 2nd Floor Renovations
PAA-180404 Asbestos Permit	Pittsburgh	07/02/2018	Allegheny County Health Department (ACHD)	Asbestos Abatement Permit for B-920, Glasweld Panels Roof Replacement
CAC18122 Asbestos Permit	Morgantown	08/10/2018	WV DHHR	Asbestos Abatement Permit for B-9 & B-27 Demolition

2.11 EXECUTIVE ORDER 13693

E.O. 13693, *Planning for Federal Sustainability in the Next Decade*, was signed on March 19, 2015. Section 16 of E.O. 13693 revokes both E. O. 13423, *Strengthening Federal Environmental, Energy, and Transportation Management* (January 24, 2007), established sustainability goals for all federal agencies, and 13514, *Federal Leadership in Environmental, Energy, and Economic Performance.* The executive order also revoked Presidential Memorandum Implementation of Energy Savings Projects and Performance-Based Contracting for Energy Savings (2–Dec-2011); Section 1 of Presidential Memorandum Driving Innovation and Creating Jobs in Rural America through Bio based and Sustainable Product Procurement (21-February-2012); Presidential Memorandum Federal Leadership on Energy Management (5-December-2013); and Presidential Memorandum Federal Fleet Performance (24-May-2011).

The goal of E.O. 13693 is to maintain federal leadership in sustainability and greenhouse gas emission reductions. More specifically, federal agencies are being tasked, where life-cycle cost-effective, to do the following:

- Promote building energy conservation, efficiency and management by reducing agency building energy intensity 2.5 percent annually through the end of fiscal year 2025, relative to the baseline of the agency's building energy use in fiscal year 2015
- Improve data center energy efficiency at agency facilities by:
  - Ensuring the agency chief information officer promotes data center energy optimization, efficiency and performance
  - Installing and monitoring advanced energy meters in all data centers by fiscal year 2018
  - Establishing a power usage effectiveness target of 1.2 to 1.4 for new data centers and less than 1.5 for existing data centers
- Ensure that at a minimum, the following percentage of the total amount of building electric energy and thermal energy shall be clean energy, accounted for by renewable electric energy and alternative energy not less than:
  - 10 percent in fiscal years 2016 and 2017
  - 13 percent in fiscal years 2018 and 2019
  - 16 percent in fiscal years 2020 and 2021
  - 20 percent in fiscal years 2022 and 2023
  - 25 percent by fiscal year 2025, and each year thereafter
- Improve agency water use efficiency and management, including storm water management by:
  - Reducing agency potable water consumption intensity measured in gallons per gross square foot by 36 percent by fiscal year 2025 through reductions of 2 percent annually through fiscal year 2025 relative to a baseline of the agency's water consumption in fiscal year 2007
  - Installing water meters and collecting and using building and facility water balance data to improve water conservation and management
  - Reducing agency industrial, landscaping and agricultural (ILA) water consumption measured in gallons by 2 percent annually through fiscal year 2025 relative to a baseline of the agency's ILA water consumption in fiscal year 2010
  - Installing appropriate green infrastructure features on federally owned property to help with storm water and wastewater management

Improving (if an agency operates a fleet of at least 20 motor vehicles) fleet and vehicle efficiency and management by taking actions that reduce fleet-wide per-mile greenhouse gas emissions from agency fleet vehicles, relative to a baseline of emissions in fiscal year 2015, to less than 4 percent by the end of FY 2017; not less than 15 percent by the end of FY 2021; and not less than 30 percent by the end of FY 2025.

These goals were included as part of the ES&H Management System objectives and targets for FY2018. However, partially through FY2018, a new executive order was established revoking E.O. 13693.

2.12 EXECUTIVE ORDER 13834

E.O. 13693, *Planning for Federal Sustainability in the Next Decade*, was in effect until May 17, 2018. At that time, E.O. 13834, *Efficient Federal Operations*, was implemented, revoking the requirements of E.O. 13693. 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.

At the close of calendar year 2018, NETL was awaiting guidance and setting specific objectives and targets for its ES&H Management System.

3.0 COMPLIANCE BY SITE

NETL consists of three research sites and one program office site that focus 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 sites. The Albany, Morgantown and Pittsburgh sites include laboratory facilities that may present a broad array of environmental concerns. As a result, a detailed discussion is provided for each of these sites in this report. The Anchorage field office performs only administrative functions, therefore, the environmental impacts and regulatory compliance issues for this location is discussed in less detail.

3.1 MORGANTOWN

3.1.1 Site Description

The Morgantown site (Photos 3.1.1 and 3.1.1.1) 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 3.1.1: Morgantown Site.

Photo 3.1.1.1: 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 work is accomplished through both in-house R&D and externally through funding awarded for specific research. As of December 31, 2018, 583 employees worked at the Morgantown site; 217 federal employees and 366 site-support contractors.

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 percent White, 4.1 percent African American, 3.4 percent Asian, 2.6 percent Hispanic or Latino of any race, 0.1 percent Native American, 0.1 percent Pacific Islander, and 2.0 percent 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. The major employers within the Morgantown area are West Virginia University (WVU), WVU Hospitals, Mylan Laboratories, Inc., Monongalia County Board of Education, Monongalia Health System, Inc., University Health Associates, National Institute for Occupational Safety and Health, NETL, and Health South Rehabilitation Hospital.

3.1.2 Major Site Activities – Morgantown

1.) TS-11 Replacement

TS-11 Transformer C was taken out of service based on periodic oil testing results which indicated degraded conditions and increased risk of failure. This was discovered during an inspection conducted on site-wide electrical equipment. The existing transformer was an oil-filled, 3-phase, 112.5 kVA model, stepped down from 4160V to 208/120V. Removed and replaced with a new step-down transformer with new ancillary feeds conductors.

Photo 3.1.2.1: Installation of new transformer (right) replacing old transformer (left).

2.) Primary Power Distribution Switchgear

Transformer oil testing also indicated pending failure which led management to replace existing 23KV/4160V transformer A at the Main Substation and upgrade and replace the relays and controls for both A and B houses. Prior to upgrade, failures had occurred in the cubicles as equipment was 1980s vintage and replacement parts were becoming scarce. Relays in A and

B houses were replaced, three new circuit breakers were installed in B house, feeders were reconfigured to provide better system redundancy. The result of the project resulted in reduced arc flash risks, increased reliability, and full redundancy for all but one building on-site.

Photo 3.1.2.2: Installation of new transformer (right) replacing old transformer (left).

3.) Building 6 High Bay Fans

Installed high bay heating and ventilation improvements for all high bay areas of Building 6. Project improved working conditions.

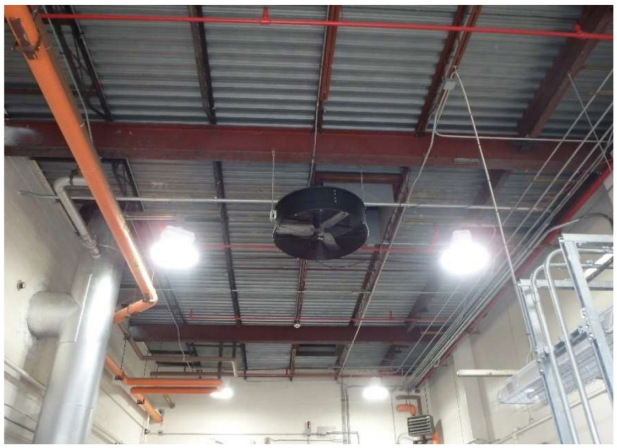


Photo 3.1.2.3: Installation of Building 6 new heating and ventilation units.

4.) Building 28 Demolition

Demolished Building 28 near the JOULE supercomputer to remove idled building and create open space near the JOULE facility. The building was in poor condition with no identified future use as the old control room for the PDU and created increased maintenance costs and safety concerns.

Photo 3.1.2.4: Building 28 Before Demolition.

5.) Building 26 Roof Replacement

Replaced existing roof due to age to prevent water, snow, and ice damage to the interior integrity of the building, installed new ladders for greater accessibility and safety, and re-skinned penthouse exterior. New roof is a 2-ply bitumen built-up system with higher insulation values compared to previous resulting in improved energy efficiency and features a 30-year warranty.

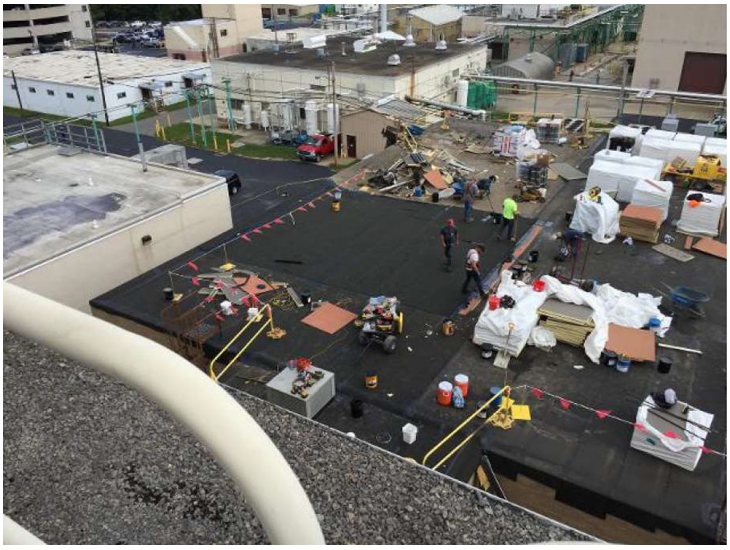


Photo 3.1.2.5: Building 26 Roof Replacement.

6.) Building 26 Foundation Repair

Installed hydraulically driven push piers and load transfer devices to support compressive service loads for the mechanical room wall in Building 26 that had experienced foundation settlement.

Photo 3.1.2.6: Building 26 Foundation Repair.

3.1.3 Environmental Restoration and Waste Management

3.1.3.1 CERCLA

Morgantown had no National Priorities List (NPL) sites in 2018 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 2018.

3.1.3.2 SARA Title III

Superfund Amendments and Reauthorization Act (SARA) Title III requires the reporting of hazardous chemicals that were present at a facility higher than certain 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. 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.

3.1.3.2.1 Emergency Planning and Community Right-to-Know Act

The Morgantown site submits a Tier II Emergency and Hazardous Chemical Inventory Information by March 1st of each year. Table 3.1.3.2 lists the chemicals reported by the Morgantown site for 2018. Agencies that received the report were: 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 maintains, through its Facility Tracking System (see Figure 3.1.3.2), an active inventory of all *hazardous* and *extremely hazardous* chemicals on site, along with a safety data sheet (SDS) for each of these substances.

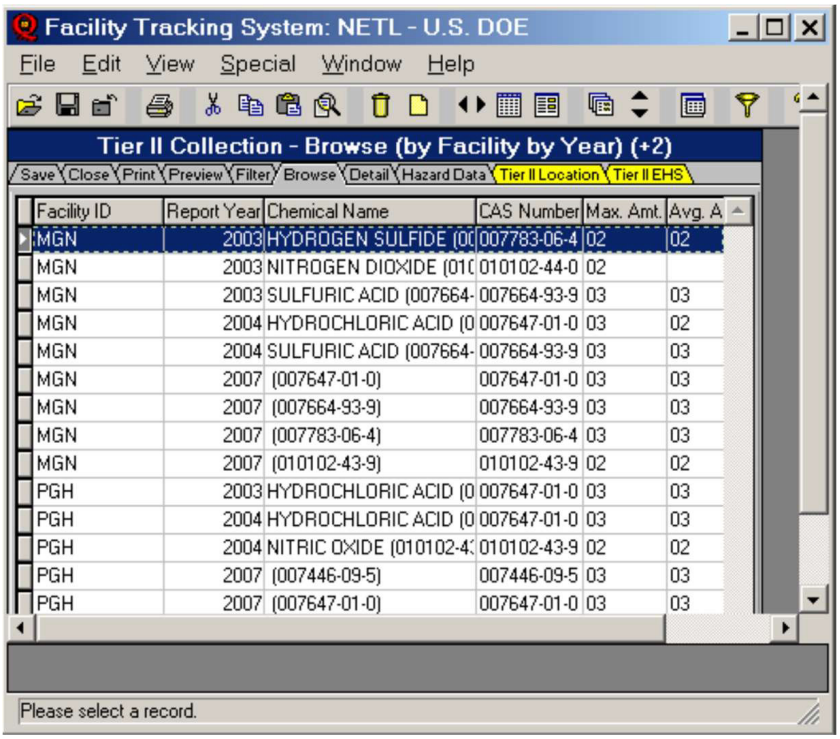


Figure 3.1.3.2: NETL Facility Tracking System.

NETL-Morgantown does not prepare a toxic release inventory (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 2018, no releases occurred that would trigger emergency notification as required by either the Emergency Planning and Community Right-to-Know Act (EPCRA) or CERCLA.

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.

Table 3.1.3.2: 2018 Tier II Chemical Inventory Reporting List—Morgantown

Chemical Name	CAS #	Avg. Amount/Max. Daily Amount (lbs.)	TPQ (lbs.)
Carbon Dioxide	124-38-9	1,680/2,848	—
Hydrochloric Acid	7647-01-0	950/1,110	500
Hydrogen Sulfide	7783-06-4	17/23	
Nitrogen, Refrigerated Liquid	7727-37-9	51,500/62,000	100

3.1.3.3 RCRA

The Resource Conservation and Recovery Act (RCRA) gives EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage and disposal of hazardous waste. RCRA also set forth a framework for the management of non-hazardous solid wastes. Under RCRA, sites that produce, manage, transport or dispose of wastes are designated as generators, transporters, or treatment, storage, and disposal (TSD) facilities. NETL's Morgantown site is regulated as a Large Quantity Generator under the jurisdiction of the West Virginia Department of Environmental Protection (WVDEP).

Although hazardous waste generation rates are low for most months, occasional laboratory activities result in the generation of larger quantities that exceed the threshold for Small Quantity Generators. (See Table 3.1.3.3: 2018 Hazardous Waste Generation – Morgantown for summary information on waste generation and management at Morgantown.) Per permit requirements, in 2018, hazardous waste materials were transported to the TSD facilities of Tradebee, Inc., located East Chicago, IN, for ultimate disposition in accordance with regulatory requirements.

Photo 3.1.3.3: Morgantown Drum Crusher.

NETL complies with all RCRA manifest requirements by initiating documentation when hazardous wastes are shipped from the Morgantown site. The Hazardous Waste Manager initiates the documentation and distributes, as appropriate, copies of the manifests, forms, waste profiles, and contracts.

NETL does not have an on-site program to treat hazardous waste or render it harmless; however, NETL does recycle some universal wastes. In 2018, NETL recycled batteries, fluorescent light bulbs, drums (Photo 3.1.3.3), and various items containing mercury.

On-site hazardous waste handling is governed by NETL Procedure 436.1-02.09, *RCRA Hazardous Waste Management*. This Procedure requires laboratory workers to place their hazardous waste in labeled containers (drums, buckets, bottles) in identified areas within their laboratories known as Satellite Accumulation Areas (SAAs), where the waste awaits transport by technicians to the Hazardous Waste Accumulation Area. The trained and certified technicians who transport the waste on site ensure that waste containers are properly labeled and contained for transport to the Hazardous Waste Central Accumulation Area.

When unidentified wastes are provided for disposal, NETL sends samples to a contracted, certified laboratory to test for RCRA hazardous characteristics (i.e., toxicity, ignitability, reactivity, and corrosiveness) and ensure proper handling. The Hazardous Waste Manager is responsible for the appropriate management of all waste at the Central Accumulation Facility prior to and during the time of pickup by the contracted transporter. This includes ensuring all required documentation (i.e. profiles, testing documentation) is 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 regulations.

Morgantown accumulates its regulated waste in Building 33, Hazardous Waste Central Accumulation Area. Extra spill protection and containment in Building 33 is provided by an epoxy coating on the concrete floor, which drains to fully contained sumps. The building is 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 is 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 ensures weekly inspections of the building and its operations are performed and records are kept of these inspections. RCRA-required worker training is mandatory for all technicians who collect and handle hazardous waste. All NETL employees take general computer-based awareness training. Employees who generate hazardous waste in the laboratories take additional training for compliance with all applicable regulations and NETL policies.

Table 3.1.3.3: 2018 Hazardous Waste Generation-Morgantown

Waste Stream	Qty. Generated (lbs.)
Poison (Toxic Solids & Liquids)	158
Mercury/Mercury Compounds	0
Flammable Solids	355
Corrosive Liquids	287
Waste Oxidizers	20
Waste Paint (Oil Based)	338
Flammable/Combustible Liquids	618
Activated Carbon	0
Other RCRA Hazardous Wastes	70
Lead Paint Debris	31
Fluorescent Light Tubes (Universal Waste)	108
Batteries (Universal Waste)	4,492
Mercury Containing Equip. (Universal Waste)	1
Corrosive Solids	215
TOTAL	**6,693**

3.1.3.4 Federal Facilities Compliance Act (FFCA)

There are no issues related to the Federal Facilities Compliance Act for the Morgantown site in 2018.

3.1.3.5 NEPA

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

3.1.3.6 TSCA

NETL-Morgantown does not manufacture chemicals and is not subject to sections of the Toxic Substance Control Act (TSCA) related to manufacturing.

No unplanned releases of air pollutants covered by CERCLA or toxic release inventory (TRI) regulations occurred during 2017. 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 2018 indicated that the materials contained fiber concentrations in excess of EPA or the State of West Virginia clearance levels (0.01 fibers/cc). Historically, there have been occasions where fiber concentrations of samples exceeded that limit, but second-level analysis has verified each time that the excess was caused by non-asbestos fibers. The observed concentrations of asbestos fibers have always been below the clearance level.

Records of known ACM are being developed into site maps with marks at each location where sampling has been conducted and references to the sampling results. This will simplify determining if disturbance of asbestos can or will be involved with a construction or maintenance project. The maps and inventory continue to be 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 was one project that required a 10-day asbestos notification permit in 2018: NETL-Morgantown B-9 & B-27 Demolition (Permit #: CAC18122).

In addition, NETL tests for lead paint before demolition projects or elimination of materials through excess property or recycling. Property recipients and haulers are notified in advance if lead is present.

3.1.3.7 FIFRA

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.

3.1.4 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 3.1.4 lists the 2018 source inventory at Morgantown.

Table 3.1.4: 2018 Radioactive Source Materials Inventory—Morgantown

Isotope	Activity/Date Determined	Source	Location
H-3	20 Ci (5/94)	Model #B100/U10, Serial #575263, SRB Technologies	B-33, HW Area
H-3	20 Ci (5/94)	Model #B100/U10, Serial #574434, SRB Technologies	B-33, HW Area
H-3	20 Ci (5/94)	Model #B100/U10, Serial #574435, SRB Technologies	B-33, HW Area
H-3	20 Ci (5/94)	Model #B100/U10, Serial #574436, SRB Technologies	B-33, HW Area
Cs-137	10 mCi (3/10)	Registration #0190/10, Geotek, Ltd	B-17, Outside, Movable Unit
Cs-137	1 µCi (1/14)	Serial #206, Spectrum Techniques	B-1, ES&H Storage room

The Morgantown site did not release any of the radiation source materials into the environment, as 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 2018.

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 2018 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.

3.1.4.1 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.

3.1.4.2 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 2018 source inventory is displayed in Table 3.1.4. 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 2018.

3.1.5 Air Quality and Protection Activities

The Ambient Air Quality Program is one of three environmental media 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, the Federal Air Quality Manager (FAQM) ensures compliance with all federal, state, and local regulations, as well as, DOE Directives. The FAQM also oversees monitoring programs, permitting, and reporting. Several previous Environmental 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 review. 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.

Also, as part of NETL's air quality management efforts, several EMPs have been established to decrease various emission categories or sources where possible. For example, one EMP calls for the reduction of Scope 1 and 2 Greenhouse Gas Emissions (GHG) attributed to facility use through life-cycle, cost-effective measures by 40 percent by FY2025, (relative to a FY2008 baseline of 59,751,816 pounds of CO_2e). A second EMP annually tracks and monitors Scope 3 GHG emissions associated with employee commuting and required travel and training.

Additionally, NETL also has 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.

There is also an EMP requiring the reduction of energy usage/square foot by 2.5 percent annually through the end of FY2025 (based on the FY2015 baseline of 165,969 Btu/ft2). This EMP reduces energy intensity in buildings to achieve GHG reductions.

The WVDEP 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 (http://www.airnow.gov/). The Morgantown site is not a significant contributor to ambient air quality issues.

In 2018, no new source reviews (i.e., Clean Air Act pre-construction reviews) occurred for any Morgantown facility, and no Morgantown facilities had the potential to emit more than 100 tons per year of any designated air pollutant.

The Morgantown site is not regulated under the National Emission Standards for Hazardous Air Pollutants (NESHAP) program. The Site does not emit more than 10 tons per year of any single designated toxic air pollutant or more than 25 tons per year in aggregate of all toxic air pollutants, which would otherwise qualify it as a major source requiring regulation under the Clean Air Act for listed toxic air pollutants. The Morgantown site does not perform nuclear program work and does not have radiological emissions, which would be covered by NESHAP. The Morgantown site estimates its air emissions 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 2018. Table 3.1.5 displays the estimated 2018 Air Emissions.

Additionally, the Morgantown site maintains two small meteorological towers, one is located on the roof of Building 39 (Photo 3.1.5) and the other is on the roof of Building 19 (Photo 3.1.5.1). 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, 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.

Photo 3.1.5: B-39 Meteorological Tower.

Photo 3.1.5.1: B-19 Rain Gauge.

Table 3.1.5: 2018 Air Emissions Inventory—Morgantown	
Pollutant	**Estimated Emissions (lbs. /yr.)**
Aldehydes	0.11
Benzene	0.07
Carbon Dioxide	4,184,393
Carbon Monoxide	4,613
Formaldehyde	4.37
Nitrogen Oxide	3,773
Particulate Matter (PM), Condensable	160.10
Particulate Matter, Filterable	134.21
Particulate Matter, Total	292.73
Particulate Matter, PM_{10}, Filterable	6.20
Particulate Matter, Total	0.80
Sulfur Dioxide	22.46
Sulfur Oxides	36.38
Toluene	0.12
TOC	214.18
VOC	492.79
Xylene, Mixed Isomers	0.01

3.1.6 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 toxic, hazardous or other pollutants into the environment; and (3) ensure the safety of workers and the public and protection of the environment. These activities include management of surface water, industrial process water and groundwater/soil.

3.1.6.1 Clean Water Act

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Subsequently, under the CWA, the EPA and the West Virginia Department of Environmental Protection (WVDEP) have implemented pollution control programs, such as setting wastewater standards for industry and water quality standards for all contaminants in surface waters. The CWA made it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained.

3.1.6.2 NPDES Permit

Morgantown's Surface Water Quality Program is controlled via NETL Manual 436.1-03.03, *Surface Water Quality Management*, which is administered by the Surface Water Quality Manager (SWQM) for the site. The procedure covers permitting and monitoring for storm water sewers and for construction-related disturbances that potentially increase 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. The NETL Morgantown site (Registration No. is **WVG610042)** is authorized to operate under WV/NPDES General Water Pollution Control Permit No. WV0111457, issued on March 3, 2014. Under this permit, the site is required to test their effluent to verify permit compliance; the test results are submitted to the WVDEP per the Discharge Monitoring Report (DMR). The permit also requires that Storm Water Pollution Prevention Plan (SWPPP) be developed and maintained to prevent or minimize storm water contamination.

On the developed portion of the Morgantown site, four drainage areas have rainwater runoff collection systems and regulated outfalls to the nearby surface streams:

- Outfall 002 drains an area that holds most of the facilities for material handling and is approximately 509,652 square feet in area.
- Outfall 003 receives drainage from a hillside beside B-17 and drains an area of 43,560 square feet; the permit does not require monitoring of this outfall.
- Outfall 005 drains an area that includes B-19 (warehouse, machine shop), B-33 (hazardous materials temporary storage) and various research facilities. It drains an area of 209,088 square feet.
- Outfall 010 (Photo 3.1.6.2) drains parking areas, offices and a large section of undeveloped land; it drains an area of 3,197,304 square feet.

Photo 3.1.6.2: Morgantown Outfall 010.

Table 3.1.6.2: 2018 NPDES Permit Storm Water Monitoring Requirements—Morgantown			
Outfall	**Pollutants of Concern**	**Low Concentration Cutoff Waiver**	**Frequency**
002	Nitrite and nitrate 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
	ammonia	Report only	6 months
	oil and grease	Report only	6 months
		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
	ammonia	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
	ammonia	Report only	6 months
	oil and grease	Report only	6 months

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

Table 3.1.6.2.2: 2018 NPDES Storm Water Analysis Results—Morgantown							
Constituents	Low Conc. Cutoff Waiver	Outfall 002		Outfall 005		Outfall 010	
		May	Sept.	May	Sept.	May	Sept.
Nitrate + Nitrite (Grab)	0.68 mg/L	0.54 mg/L	0.55 mg/L	0.57 mg/L	0.57 mg/L	0.36 mg/L	0.76 mg/L
Ammonia (Grab)	4 mg/L	0.35 mg/L	0.22 mg/L	0.35 mg/L	0.18 mg/L	0.25 mg/L	0.19 mg/L
Fecal Coliform (Grab)	---	>6000 col/ 100 mL	900 col/ 100 mL	>6000 col/ 100 mL	1500 col/ 100 mL	1400 col/ 100 mL	>6000 col/ 100 mL
TSS (Grab)	100 mg/L	130 mg/L	320 mg/L	42 mg/L	16 mg/L	170 mg/L	14 mg/L
BOD	30 mg/L	5.4 mg/L	4.8 mg/L	4.8 mg/L	5.3 mg/L	5.9 mg/L	ND (<6.0 mg/L)
pH	9.0 s.u.	8.1 s.u.	7.5 s.u.	8.1 s.u.	7.3 s.u.	7.9 s.u.	7.5 s.u.
COD	120 mg/L	11 mg/L	26 mg/L	11 mg/L	31 mg/L	12 mg/L	23 mg/L
Oil and Grease	15 mg/L	ND (<3.9 mg/L)	ND (<3.9 mg/L	ND (<4.0 mg/L)	ND (< 4.1 mg/L)	ND (<4.0 mg/L)	ND (<3.9 mg/L)

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

The effluent from these outfalls at the Morgantown site are monitored according to the WV/ NPDES Permit #WV0111457 and the Site's SWPPP. Per the SWPPP, designated storm water outfalls are sampled twice per year and tested for basic pollutants that can indicate contamination from site applications of fertilizer or leaking sewer lines (see Table 3.1.6.2). The testing results are presented in Table 3.1.6.2.2. 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.

Potential sources of spills of petroleum products and oils are aboveground storage tanks, oil-filled transformers and switches, the hazardous waste accumulation facility 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, for a total capacity of 2,850 gallons. All storage tanks are compliance with new WV 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 30 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 3.1.6.2.1, 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 3.1.6.2.1: 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, such as Photo 3.1.6.2.2, are visually inspected on a weekly basis and have their interstitial cavity checked quarterly. 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.

Photo 3.1.6.2.2: Ethanol Storage Tank.

Industrial Wastewater Program

Industrial wastewater quality is controlled by NETL Manual 436.1-02.04, Industrial Wastewater System Management Program, which is administered by the Industrial Wastewater Quality Program Manager. Industrial wastewater is wastewater conveyed from laboratory sinks and maintenance facilities to the Clarifier, Photo 3.1.6.2.3, and associated processes/equipment for sediment removal and pH adjustment. The site's Industrial Waste Discharge Permit 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 of 90,000 gallons per day. Per permit requirements, monthly sampling is performed at a laboratory chosen from a list certified by the EPA, and Discharge Monitoring Reports (DMRs) detailing this monthly sampling and analysis are provided to the MUB. Results of the DMRs for 2018 are provided in Table 3.1.6.2.3: 2018 Wastewater Effluent Analysis (lbs./d); Pretreatment Permit, Outlet No. 01, One Sample/Month – Morgantown.

Photo 3.1.6.2.3: Morgantown Clarifier.

Table 3.1.6.2.3: 2018 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	0.01	0.01	0.003	0.005	0.004	0.004	0.004	0.004	0.01	0.01	0.004	0.005
Daily Max.	0.15	0.02	0.02	0.01	0.03	0.01	0.001	0.023	0.023	0.03	0.02	0.02	0.03
BOD5													
Monthly Avg.	Monitor	ND	2.337	ND	0.11	0.26	0.24	ND	ND	ND	ND	0.09	0.09
Daily Max.	Monitor	ND	4.67	ND	0.65	0.66	0.06	ND	ND	ND	ND	0.47	0.53
TSS													
Monthly Avg.	Monitor	0.17	0.559	0.08	0.31	0.22	0.47	0.03	0.08	0.23	0.1	0.2	0.1
Daily Max.	Monitor	0.33	1.12	0.27	1.9	0.6	0.1	0.2	0.5	0.7	0.2	0.9	1
Arsenic													
Monthly Avg.	0.005	ND	ND	ND	0.00005	ND	ND	ND	ND	0.00012	ND	ND	ND
Daily Max.	0.008	ND	ND	ND	0.0003	ND	ND	ND	ND	0.0004	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	ND	ND	ND	ND	ND	ND
Daily Max.	0.011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper													
Monthly Avg.	0.04	0.0005	0.0012	0.0003	0.001	0.001	0.0004	0.0005	0.0004	0.001	0.001	0.001	0.001
Daily Max.	0.06	0.001	0.002	0.001	0.01	0.0013	0.0001	0.003	0.002	0.002	0.002	0.007	0.01
Cyanide													
Monthly Avg.	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Max.	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead													
Monthly Avg.	0.025	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Max.	0.038	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
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	ND	0.00013	0.00004	0.0001	0.0001	0.0001	0.00004	0.00004	0.0001	ND	0.00003	0.00005
Daily Max.	0.015	ND	0.0003	0.00010	0.001	0.0002	.00001	0.00021	0.00021	0.0004	ND	0.0002	0.0003
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	0.0011	0.0024	0.0005	0.001	0.001	0.001	0.001	0.001	0.001	0.001	0.0003	0.0004
Daily Max.	0.3	0.002	0.005	0.002	0.002	0.002	0.0002	0.0040	0.0033	0.0043	0.002	0.002	0.003
Iron													
Monthly Avg.	Monitor	0.013	0.039	0.01	0.01	0.01	0.05	0.01	0.01	0.02	0.01	0.01	0.02
Daily Max.	Monitor	0.03	0.08	0.03	0.02	0.02	0.01	0.04	0.06	0.07	0.03	0.06	0.11
Manganese													
Monthly Avg.	Monitor	0.001	0.02	0.006	0.01	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01
Daily Max.	Monitor	0.003	0.04	0.02	0.04	0.03	0.003	0.04	0.023	0.017	0.013	0.027	0.035

Table 3.1.6.2.4: 2018 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	0.0023	ND	0.0005	ND	0.001	ND	ND	ND	ND	ND	ND	ND
Daily Max.	Monitor	0.005	ND	0.002	ND	0.002	ND	ND	ND	ND	ND	ND	ND
TOX													
Monthly Avg.	Monitor	0.02	ND	0.004	0.003	ND	0.002	0.003	0.003	0.003	0.01	0.002	0.003
Daily Max.	Monitor	0.04	ND	0.013	0.020	ND	0.001	0.019	0.015	0.01	0.01	0.01	0.02
Organics													
Alachlor-1254	Report	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
All others	Report	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
pH (s.u.)													
Minimum	6.0	6.79	7.06	6.45	6.52	6.45	6.77	6.88	7.21	6.88	7.48	6.9	6.77
Maximum	9.0	7.67	7.61	7.69	7.66	8.00	7.66	7.89	8.5	8.20	8.10	8.12	8.05
TDS													
Monthly Avg.	Monitor	14	217	28	50	27	15	13	13	31	23	17	40
Daily Max.	Monitor	28	434	92	300	68	4	77	75	93	47	85	240

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

Table 3.1.6.2.3: 2017 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	0.010	0.01	0.003	0.004	0.004	0.002	0.006	0.004	0.0002	0.0020	0.002	0.0014
Daily Max.	0.15	0.016	0.02	0.026	0.016	0.014	0.017	0.019	0.018	0.0070	0.0130	0.016	0.0100
BOD5													
Monthly Avg.	Monitor	58.4	10.4	ND	0.1	ND	0.04	ND	ND	ND	ND	ND	ND
Daily Max.	Monitor	93.5	21.9	ND	0.3	ND	0.30	ND	ND	ND	ND	ND	ND
TSS													
Monthly Avg.	Monitor	1.5	0.6	0.1	0.1	0.1	0.2	0.4	0.1	0.007	0.043	0.07	0.028
Daily Max.	Monitor	2.4	1.3	1.2	0.5	0.5	1.3	1.3	0.4	0.300	0.300	0.50	0.200
Arsenic													
Monthly Avg.	0.005	0.0001	0.0001	ND	0.00003	0.00004	0.00003	0.00007	ND	ND	ND	0.00002	ND
Daily Max.	0.008	0.0002	0.0002	ND	0.00010	0.00020	0.00030	0.00020	ND	ND	ND	0.00020	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	ND	ND	ND	ND	ND	ND
Daily Max.	0.011	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper													
Monthly Avg.	0.04	0.003	0.004	0.001	0.014	0.001	0.001	0.001	0.0003	0.00002	0.00124	0.0002	0.0005
Daily Max.	0.06	0.005	0.009	0.010	0.060	0.003	0.010	0.004	0.0010	0.00100	0.00800	0.0020	0.0040
Cyanide													
Monthly Avg.	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Daily Max.	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Lead													
Monthly Avg.	0.025	0.0002	0.0002	ND	ND	ND	0.00002	ND	ND	ND	ND	ND	0.00001
Daily Max.	0.038	0.0003	0.0004	ND	ND	ND	0.00020	ND	ND	ND	ND	ND	0.00010
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	0.0002	0.0003	0.00004	0.00006	0.00006	0.00005	0.00012	0.00004	0.000002	.000025	0.00003	0.00002
Daily Max.	0.015	0.0003	0.0005	0.00030	0.00020	0.00020	0.00040	0.00040	0.00020	0.000100	0.000200	0.00020	0.00010
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	0.002	0.004	0.001	0.001	0.001	0.001	0.002	0.0005	0.00004	0.00063	0.0004	0.0002
Daily Max.	0.3	0.003	0.009	0.004	0.003	0.003	0.006	0.007	0.0020	0.00100	0.00400	0.0030	0.0010
Iron													
Monthly Avg.	Monitor	0.13	0.25	0.01	0.01	0.01	0.01	0.02	0.02	0.001	0.006	0.005	0.006
Daily Max.	Monitor	0.20	0.53	0.10	0.10	0.05	0.10	0.10	0.10	0.030	0.040	0.040	0.050
Manganese													
Monthly Avg.	Monitor	0.03	0.05	0.005	0.008	0.007	0.005	0.01	0.005	0.0003	0.003	0.001	0.002
Daily Max.	Monitor	0.05	0.10	0.040	0.030	0.030	0.040	0.03	0.020	0.0100	0.020	0.010	0.020

Table 3.1.6.2.4: 2017 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	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
TOX													
Monthly Avg.	Monitor	0.011	0.012	0.002	0.003	0.002	0.002	0.002	0.002	0.0001	0.0012	0.001	ND
Daily Max.	Monitor	0.017	0.025	0.017	0.010	0.007	0.017	0.008	0.008	0.0040	0.0080	0.008	ND
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	7.02	6.94	6.90	7.12	7.15	7.05	6.61	6.37	6.77	6.80	7.57	6.80
Maximum	9.0	7.80	8.30	8.20	7.70	7.83	7.62	7.62	7.80	7.44	7.83	7.88	7.76
TDS													
Monthly Avg.	Monitor	80	150	38	37	26	16	24	17	1	7	7	9
Daily Max.	Monitor	128	315	325	147	91	135	76	75	23	48	56	64

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

3.1.7 Other Environmental Statutes

3.1.7.1 Endangered Species Act

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

3.1.7.2 National Historic Preservation Act

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

3.1.7.3 Migratory Bird Treaty Act

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

3.1.8 DOE Order 436.1, Departmental Sustainability

See Section 2.2.1.

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

See Section 4.0 ES&H Management System.

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

See Section 4.0 ES&H Management System.

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

See Section 4.0 ES&H Management System.

3.1.9 Executive Orders

The Morgantown site was in full compliance with all applicable environmental Executive Orders in 2018. 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 2018, 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*.

3.1.9.1 Executive Order 11988, Floodplain Management

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

3.1.9.2 Executive Order 11990, Protection of Wetlands

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

3.1.10 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 two reports with the Department's ORPS in 2018. The first was a site-wide power failure that lasted 14 ½ hours and was due to a failed electrical equipment. The second was an inadvertent release of hazardous materials from its engineered containment.

3.1.10.1 Green and Sustainable Remediation (GSR)

There were no specific Green and Sustainable Remediation efforts related to brownfield sites at the Morgantown site in 2018.

3.1.10.2 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.

3.1.11 Continuous Release Reporting

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

3.1.12 Unplanned Releases

There were no unplanned releases at the Morgantown site.

3.1.13 Summary of Environmental Permits

A summary of environmental permits for the Morgantown site is provided in Table 3.1.13, 2018 Summary of Permits.

Table 3.1.13: 2018 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	03/03/2014, 08/31/2019	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 permit requirements. Discusses Storm Water Pollution Prevention Plan and Groundwater Protection Management Plan required by the permit.

3.1.14 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 is 132 acres with 86 acres being forest/fields. The site has a perimeter fence with other industrial sites (west and north), railroad (north), and neighborhoods (east and south).

West Virginia has a very low risk for wildfire vulnerability according to www.statesatrisk.org. The main 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. NETL has wooded areas that are

mowed and trimmed; a fire from a lawn mowing equipment malfunction is a very low possibility. Fire danger information for North America throughout the season can be found from the Wild Fire Assessment System (wfas.net), which is updated daily.

3.1.15 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.

3.2 PITTSBURGH

3.2.1 Site Description

The Pittsburgh site (Photo 3.2.1) 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. NETL-Pittsburgh shares the Bruceton Research Center with CDC-NIOSH, with DOL-MSHA occupying part of the CDC-NIOSH. It is approximately 60 miles north of the Morgantown, West Virginia, site. The facility sits within the rolling hills and steeply incised stream valleys that are tributaries of the Monongahela River. There are 591 employees; 210 federal and 381 site-support contractors. It is a partially wooded tract, with two subsites 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.

Photo 3.2.1: Pittsburgh Site.

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 Sewage Treatment Plant and a major local road. Housing development is increasing around the 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 percent of the immediately surrounding land is forested and about 25 percent is pasture or fallow field. The remainder is residential.

The Pittsburgh site focuses on technologies in scientific and engineering areas creating commercially viable solutions to national energy and environmental problems. The work is accomplished through both in-house R&D and contracted research. Most of NETL-Pittsburgh's projects are carried out through Financial Assistance Agreements with corporations, small business, universities, non-profit organizations and other national laboratories and government agencies. These agreements, awarded through competitive solicitation processes, constitute an R&D portfolio that will return benefits to the nation for generations to come.

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 percent White, 26.1 percent African American, 4.4 percent Asian, 2.3 percent Hispanic or Latino of any race, 0.2 percent Native American and 2.5 percent from two or more races.

The median income (2015 dollars) for a household in the city was $40,715. The per capita income for the city (2015 dollars) was $28,097. About 22.9 percent 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.

3.2.2 Major Site Activities

1.) B-84 Roof Replacement

This project replaced the old and leaking Building 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 3.2.2.1: B-84 Roof Replacement – New roof in foreground, old roof in background.

2.) B-94 Functional Materials Research Center (FMRC) Project 3rd Floor Renovation

B-94 Third Floor laboratories were renovated to accommodate planned research operations. New fume hoods, gas cabinets, lab benches and storage were installed. This project included renovations to the Building 94 – 3rd Floor Laboratories necessary to support completion of the renovations throughout Building 94 to accommodate planned research operations. The 3rd floor of Building 94 was only partially renovated and was unoccupied before the project. Further renovations were required to set up the 3rd floor to accommodate a new Functional Materials Research Center (FMRC).

Photo 3.2.2.2a: B-94 Third Floor – Before Renovation.

Photo 3.2.2.2b: B-94 Third Floor – After Renovation.

Photo 3.2.2.2c: B-94 Third Floor – After Renovation.

3.) B-922 Cafeteria Expansion/Renovation

This project included the demolition of existing dining area and adjacent offices and restrooms, renovation of the existing serving area and construction of the new cafeteria seating area to provide updated, functional dining area with collaborative meeting spaces.

Photo 3.2.2.3a: Cafeteria Renovation – Under Construction.

Photo 3.2.2.3b: Cafeteria Renovation – After Construction.

4.) B-920 Roof Replacement

This project replaced the roof of Building 920 with a TPO membrane roof and installed a fall protection railing system.

Photo 3.2.2.4a: B-920 Roof – Before Construction.

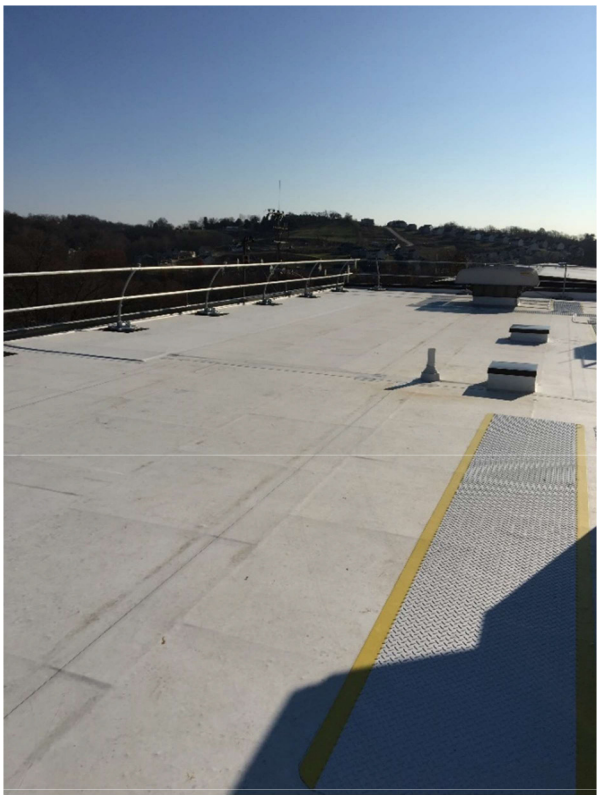


Photo 3.2.2.4b: B-920 Roof – After Construction.

5.) B-64 Roof Replacement

This project replaced the metal roof over the B-64 storage area with a new metal standing seam roof.

Photo 3.2.2.5a: B-64 Roof – Before Construction.

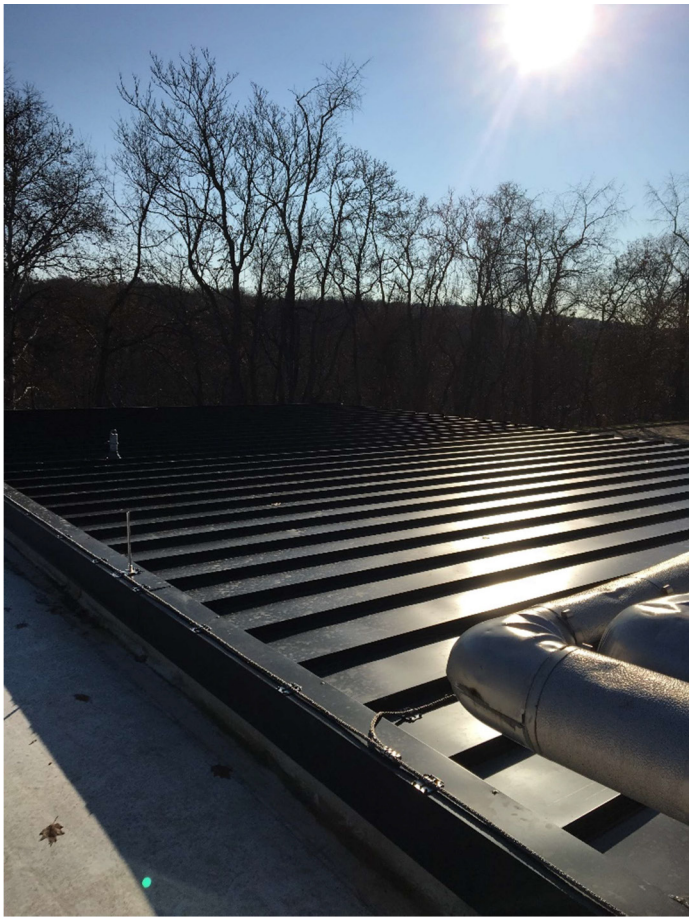


Photo 3.2.2.5b: B-64 Roof – After Construction.

3.2.3 Environmental Restoration and Waste Management

3.2.3.1 CERCLA

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. This section imposes additional regulations related to site studies and notices for the sale and other transfers of federal real property. Specifically, 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. And, 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.

The EPA administers the CERCLA program in cooperation with the Commonwealth of Pennsylvania for the Pittsburgh site. While the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database had previously listed information about the NETL-Pittsburgh site, that system has since been retired and has been replaced with the Superfund Enterprise Management System (SEMS) database. Consequently, there was no information regarding the Pittsburgh site as an NPL-site in 2018, or at any other time in the recent past, in the SEMS database.

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. Historical data on the Pittsburgh site indicates remediation for areas of concern was completed in 1997, and 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.

3.2.3.2 RCRA

Hazardous waste operations at the Pittsburgh site (see Diagram 3.2.3.2) complied with all applicable federal, state and local regulations for the handling, storage and disposal of hazardous waste in 2018. The Resource Conservation and Recovery Act (RCRA) (42 U.S. Code 6901et. seq.) is regulated through 40 CFR Parts 260-271, and the transportation of hazardous waste is regulated through 49 CFR Parts 171-179. The regulations found in 40 CFR 261, Identification and Listing of Hazardous Waste; 40 CFR 262, Standards Applicable to Generators of Hazardous Waste; and 49 CFR Parts 171-179, Department of Transportation (DOT) Hazardous Materials regulations apply to the NETL hazardous waste program. NETL Procedure 436.1-02.09, *RCRA Hazardous Waste Management*, is used to implement these regulatory requirements.

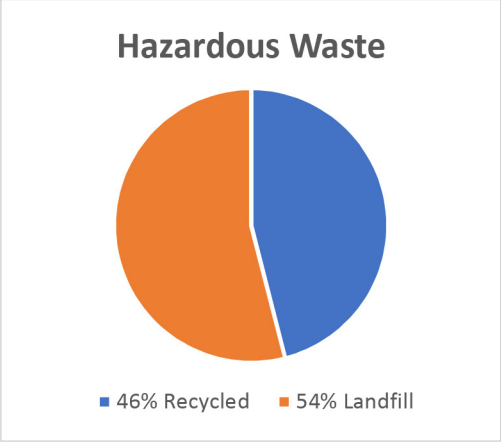


Diagram 3.2.3.2: Pittsburgh 2018 RCRA Hazardous Waste Disposition Profile.

Pennsylvania Department of Environmental Protection (PADEP) is authorized to enforce the federal and state hazardous waste management requirements at the Pittsburgh site. The 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 the hazardous waste operations training annually.

The Pittsburgh site is considered a large quantity hazardous waste generator and has an EPA Large Quantity Generator Identification Number. Although the Pittsburgh site 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.

Hazardous waste storage at NETL-Pittsburgh is limited by permit to 90 days. Most waste is shipped in laboratory packs (lab packs) (Photo 3.2.3.2) containing combinations of several different compatible chemicals within a single container.

The chemical handling support staff at the Pittsburgh site is not authorized to transport hazardous waste. In 2018, the Pittsburgh site used Tradebe Environmental Services, LLC (Tradebe) to transport five (5) shipments of hazardous waste. Tradebe combined small packages of similar wastes at their storage and treatment facilities and repackaged the waste 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.

The amount of hazardous materials and waste removed from the site remained consistent with previous years. Pittsburgh generated 7,475 pounds of hazardous waste in 2018. 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.

Liquid wastes are kept in 55-gallon drums. The Pittsburgh site does not have a storage or treatment pond, nor are underground storage tanks in Pittsburgh available to store petroleum or hazardous waste. No aboveground storage tanks for hazardous waste exist. Liquid acids and bases are collected at satellite accumulation areas and are characterized and analyzed, if necessary. Waste handling and management personnel ensure regulatory compliance by: (1) weekly walk-through inspections of the Chemical Handling Facility; (2) monthly pickups at satellite accumulation areas; (3) battery pickups at various locations; (4) participation in the SARS process; (5) participation in ERO exercises; (6) training on hazardous waste management; (7) regulatory reviews; and (8) attendance at conferences addressing hazardous waste requirements.

Pittsburgh complies with the RCRA hazardous waste manifest requirements before wastes are shipped from the site. The manifest is checked against the actual shipment to ensure accuracy when the contracted transporter is ready to ship the waste. All information collected for the manifests, including waste generation forms, waste profiles and contracts is retained by the hazardous waste manager.

At Pittsburgh, hazardous waste generators have full responsibility for managing the waste that they generate from the moment of creation until it is transferred to the waste management organization. The 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.

Waste-handling personnel who collect the hazardous wastes first inspect the container, the labels and the internal documentation to ensure that 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. In most cases, the generator is the researcher generating laboratory waste.

NETL's hazardous waste manager ensures compliance with applicable regulations by overseeing the entire 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. The hazardous waste manager also audits hazardous waste management operations, hazardous waste generators and TSD facility subcontractors.

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 copy of the RCRA manifests, biennial reports and certificates of disposal/or destruction are maintained by the hazardous waste coordinator.

The hazardous waste manager ensures that training is provided to employees who require the annual hazardous waste operations and emergency response training (HAZWOPER), so they may properly perform their duties and responsibilities. This includes instruction on the proper handling techniques and disposal methods for chemical waste.

Photo 3.2.3.2: Lab Packs.

3.2.3.3 SARA Title III

Superfund Amendments and Reauthorization Act (SARA) Title III requires the reporting of hazardous chemicals that were present at a facility in excess of certain 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 TPQ. It 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.

3.2.3.3.1 Emergency Planning and Community Right-to-Know Act

The Pittsburgh Site submits a Tier II Emergency and Hazardous Chemical Inventory Form by March 1st of each year. Table 3.2.3.3 lists the Tier II chemicals reported by the Pittsburgh site for 2018. NETL maintains an active inventory of all hazardous and extremely hazardous chemicals on site, along with Safety Data Sheets (SDS) for each substance through its Facility Tracking System (see Figure 3.2.3.3).

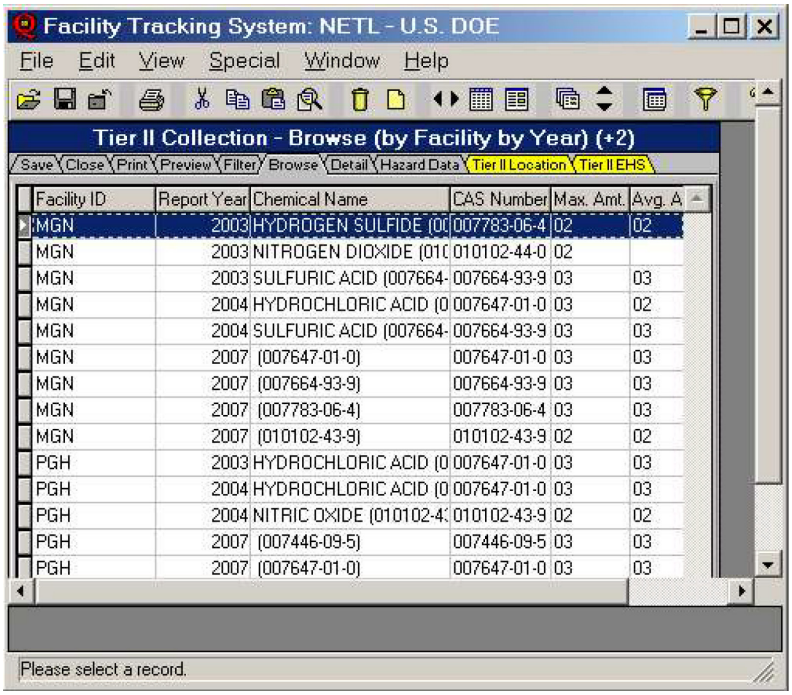


Figure 3.2.3.3: NETL Facility Tracking System.

Table 3.2.3.3: 2018 Tier II Chemical Inventory Reporting List-Pittsburgh			
Chemical Name	**CAS #**	**Daily Amount (lbs.)**	**TPQ (lbs.)**
Nitrogen, refrigerated liquid	7727-37-9	Average: 74,681 Maximum: 74,681	None
Argon, refrigerated liquid	7440-37-1	Average: 1 ,088 Maximum: 1 ,981	None

Section 312 of SARA Title III requires NETL-Pittsburgh to provide a copy of the Tier II Report, copies of the relevant SDSs and a Site Map detailing location of the reported chemicals 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.

The Pittsburgh site does not prepare a toxic release inventory report (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 2018, 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.

3.2.3.4 Federal Facilities Compliance Act (FFCA)

There were no issues regarding the Federal Facilities Compliance Act at the Pittsburgh site in 2018.

3.2.3.5 NEPA

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

3.2.3.6 TSCA

NETL-Pittsburgh does not manufacture chemicals and is not subject to sections of the Toxic Substances Control Act (TSCA) related to manufacturing.

No unplanned releases of air pollutants covered by CERCLA or toxic release inventory (TRI) regulations occurred during 2018. 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 2018 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). The observed concentrations of asbestos fibers have always been below the clearance level.

Records of known ACM are being developed into site maps with marks at each location where sampling has been conducted and references to the sampling results. This will simplify determining if disturbance of asbestos can or will be involved with a construction or maintenance project. The maps and inventory 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 table tops). 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 two projects that required a 10-day asbestos notification permit identified in 2018: (1) NETL-Pittsburgh B-84 2nd Floor Renovations (Permit #: PAA-180260); and (2) NETL-Pittsburgh B-920 Glasweld Panel Roof Replacement (Permit #: PAA-180404).

In addition, NETL-Pittsburgh also tests for lead paint before demolition projects or elimination of materials through excess property, or recycling, and notifies construction or demolition crews, property recipients, and haulers if lead is present. Smaller items that may be painted in lead paint are sent to scrap metal.

3.2.3.7 FIFRA

No restricted-use pesticides, herbicides, or defoliants, as regulated by the FIFRA were kept on site. Only general-use pesticides were kept and used for routine insect control. Professional pest control companies are subcontracted to spray around the base of office trailers, outside certain buildings as needed, daycare facility door thresholds and window sills and for pest control in the cafeteria. Herbicides are not used for weed control except in extremely limited cases. The only recurring use of an herbicide is for the fence lines and guard rails. No defoliants are used.

3.2.4 Radiation Protection Program

NETL maintains an inventory of on-site radiation sources that tracks each item, isotope(s), quantity, custodian, location, status and activity. Table 3.2.4 lists the 2018 source inventory at Pittsburgh.

Table 3.2.4: 2018 Radioactive Source Materials Inventory—Pittsburgh

Isotope	Activity/Date Determined	Source	Location
Depleted Uranium	Obsolete/Excess	Model: 6A Serial #, 75788 Victoreen Industries	B-95, Rm-07
Depleted Uranium	Obsolete/Excess	Model: 6A Serial #, 7311 Victoreen Industries	B-95, Rm-07
N/A	Obsolete/Excess	Model: 290 Serial # 681 Victoreen Industries	B-95, Rm-07
N/A	5400 CPM	Model: 290 Serial # 2429 Victoreen Industries	B-95, Rm-07
Cs^{137}*	37 kBq 1µC (01/14)	Check Source: CS137S Description: PL Yellow Spectrum Techniques for Ludlum Measurements	B-95, Rm-07

* Exempt quantity per 49 CFR 173.424: No known radiation hazard

The Pittsburgh site did not release any of the radiation source materials into the environment, as all source materials are sealed from escape or discharge. No radiation source materials were sent from the Pittsburgh site to off-site storage or disposal facilities.

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 2018 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

Use of radioactive materials at NETL-Pittsburgh is limited to research instrumentation and geologic samples that have been identified as NORM via surveys. The 2018 source inventory is displayed in Table 3.2.4. 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. Pittsburgh has two sealed-source electron capture devices that are licensed through the manufacturer. X-ray generating devices are used for analytical applications at the Pittsburgh 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 exposure events occurred in 2018.

3.2.5 Air Quality and Protection Activities

The significant requirements and responsibilities regarding air quality are included 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.

To maintain quality control with respect to its air emission monitoring, NETL-Pittsburgh subcontracts the analytical work only to certified laboratories that submit their Quality Assurance/Quality Control (QA/QC) manuals to NETL-Pittsburgh for review and approval. NETL-Pittsburgh 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.

Also, as part of NETL's air quality management efforts, several ES&H management plans (EMPs) were established to decrease various emission categories or sources when possible. For example, one EMP calls for the reduction of Scope 1 and 2 Greenhouse Gas Emissions (GHG) attributed to facility use through life-cycle, cost-effective measures by 40 percent by FY2025, (relative to a FY2008 baseline of 59,751,816 pounds of CO_{2e}). A second EMP annually tracks and monitors Scope 3 GHG emissions associated with employee commuting and required travel and training.

Additionally, NETL has 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. Finally, there is also an EMP requiring the reduction of energy usage/square foot by 2.5 percent annually through the end of FY2025 (based on the FY2015 baseline of 165,969 Btu/ft^2). This EMP will reduce energy intensity in buildings to achieve GHG reductions.

3.2.5.1 Clean Air Act

Pennsylvania's Department of Environmental Protection (PADEP) Bureau of Air Quality is responsible for addressing the goals of the federal Clean Air Act and the Pennsylvania Air Pollution Control Act. Likewise, the Allegheny County Health Department (ACHD), is authorized to administer Title V permits under the Clean Air Act Amendments.

To complete these compliance requirements, NETL's Ambient Air Quality Management Program addresses the protection of outdoor air quality, including applications for air emission permits that allow NETL to conduct research into the science of reducing air emissions. More specifically, the air quality program manager prepares permit applications, obtains permit renewals, as needed, and oversees monitoring programs and reporting.

Air emissions are reported annually in accordance with the air permit maintained at the site. On June 14, 2016, the site was issued their current Title V permit designating NETL-Pittsburgh as a synthetic minor source, with a permit expiration date of June 13, 2021. (*Note: A synthetic minor source is any source that has its emissions administratively limited below certain thresholds by means of a federally enforceable order, rule, or permit condition.*)

No new source reviews (i.e., Clean Air Act pre-construction reviews) occurred for any Pittsburgh facility in 2018. Additionally, no Pittsburgh facilities had the potential to emit more than 100 tons per year of any designated air pollutant.

Current regulatory requirements include an annual emissions inventory, which is submitted to the ACHD by March 15th for the preceding calendar year. The inventory model used by the ACHD, Bureau of Environmental Quality and PADEP's Bureau of Air Quality to calculate the emissions inventory is based on fuel usage. The model provides a worst-case scenario for potential emissions and considers the type, quantity and total burn time of the fuel to determine the estimated emission level. Results of the modeling are summarized in Table 3.2.5.2. Additionally, NETL-Pittsburgh submits semi-annual reports to ACHD in accordance with General Condition III.15.d., for data on comfort-heat boilers (B-005a through B-020b), space heaters (B-020c thru 021c), and emergency generators (EG-001 through EG-003). No Notices of Violation were received, nor were there any unplanned air emission occurrences in 2018.

3.2.5.2 National Emission Standards for Hazardous Air Pollutants

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

In addition, the Pittsburgh site also tracks meteorological data. 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 in terms of communications systems, software and sensors in 2015, and calibrated once in 2018. The data collected from HVAC systems and the meteorological towers are used to provide critical meteorological information to the ERO during emergency situations and in the models for the air emissions program. One of the meteorological towers is shown in Photo 3.2.5.2.

Table 3.2.5.2: 2018 Air Emissions Inventory—Pittsburgh

Pollutant	Estimated Emissions (lbs./yr.)
Ammonia	134.2
Benzene	0.09
Butane	8.8
Carbon Dioxide	4,926,600
Carbon Monoxide	3,522.7
Hexane	0.8
Naphthalene	0.03
Formaldehyde	3.1
Nitrogen Oxide	92.3
Lead	0.02
Pentane	10.9
Ethane	13.0
Methane	96.5
Particulate Matter, $PM_{2.5}$	1,100
Particulate Matter, PM_{10}	1,418.7
Sulfur Dioxide	25.2
Toluene	0.14
Arsenic	0.008
Barium	0.2
Cadmium	0.05
Chromium	0.06
Cooper	0.04
Manganese	0.02
Mercury	0.01
Molybdenum	0.05
Nickel	0.1
Vanadium	0.1
Zinc	1.2
VOC	230.7

Photo 3.2.5.2: Pittsburgh Meteorological Tower.

3.2.6 Water Quality and Protection Activities

The topography of the Pittsburgh site consists of rolling hills separated by the natural flow of water on the site. As a result, the surface water at Pittsburgh 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 NETL-Pittsburgh activities do not result in contamination of industrial wastewater, sanitary wastewater, or storm water discharges. All on-site research projects, support activities and construction activities are reviewed by ES&H staff 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 northern area (R&D Plateau) 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. 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 3.2.6). Final removal of metals and particulates occurs in a filter press. Prior to discharge to the 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, it is recirculated through the system from within the effluent monitoring tank. If the pH is outside the allowable range (6 to 9), a diverter valve 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. WWTF effluent is routed to the Pleasant Hills Authority Sewage Treatment Plant for final treatment.

Photo 3.2.6: Pittsburgh Plate Separator.

Pleasant Hills Authority (PHA) issued the current Industrial Sewer Use Permit to NETL-Pittsburgh on September 28, 2016. Permit conditions limit the quantity and quality of effluent constituents (total cyanide, copper, mercury, lead, cadmium and pH level) discharged to the PHA Treatment Plant. 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 3.2.6.: Industrial Sewer Use Permit (B-74) Monitoring Analysis – Pittsburgh shows the results of the 2018 wastewater analysis data collected by NETL-Pittsburgh. Although not required by the permit, NETL-Pittsburgh also collects and analyzes monthly samples (see Table 3.2.6.1: B-74 2018 Monthly Monitoring Results (mg/L). No permit limits were exceeded in 2018.

Table 3.2.6: 2018 Industrial Sewer Use Permit Monitoring Analysis—Pittsburgh						
Constituent	Total Cyanide	Copper	Mercury	Lead	Cadmium	pH
Permit Limit	3.21mg/L	0.32mg/L	0.12mg/L	10.6mg/L	0.061mg/L	6.0–9.0s.u.
April 11, 2018 Sampling Date						
Subinterceptor Location						
Composite	0.0048mg/l	0.110mg/l	0.00016mg/l	0.004mg/l	0.0002mg/l	N/A
Grab #1	N/A	N/A	N/A	N/A	N/A	6.93 s.u.
Grab #2	N/A	N/A	N/A	N/A	N/A	7.85 s.u.
Grab #3	N/A	N/A	N/A	N/A	N/A	8.09 s.u.
Grab #4	N/A	N/A	N/A	N/A	N/A	8.11 s.u.
B-74 Effluent						
Composite	ND	0.077mg/l	0.00007mg/l	0.005mg/l	ND	N/A
Grab #1	N/A	N/A	N/A	N/A	N/A	6.90 s.u.
Grab #2	N/A	N/A	N/A	N/A	N/A	6.71 s.u.
Grab #3	N/A	N/A	N/A	N/A	N/A	7.03 s.u.
Grab #4	N/A	N/A	N/A	N/A	N/A	7.17 s.u.
October 24, 2018 Sampling Date						
Subinterceptor Location						
Composite	0.0064mg/l	0.260mg/l	0.00064mg/l	0.008mg/l	0.0004mg/l	N/A
Grab #1	N/A	N/A	N/A	N/A	N/A	8.60 s.u.
Grab #2	N/A	N/A	N/A	N/A	N/A	8.23 s.u.
Grab #3	N/A	N/A	N/A	N/A	N/A	8.51 s.u.
Grab #4	N/A	N/A	N/A	N/A	N/A	8.33 s.u.
B-74 Effluent						
Composite	ND	0.024mg/l	ND	ND	ND	N/A
Grab #1	N/A	N/A	N/A	N/A	N/A	6.64 s.u.
Grab #2	N/A	N/A	N/A	N/A	N/A	6.87 s.u.
Grab #3	N/A	N/A	N/A	N/A	N/A	6.84 s.u.
Grab #4	N/A	N/A	N/A	N/A	N/A	6.72 s.u.

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

NETL-Pittsburgh also prepares an annual wastewater report of the site's industrial wastewater discharge, including the volume of wastewater discharged, the number of site employees, the type of waste discharged, and the type of pretreatment performed. The PHA also independently conducts its own sampling and analysis.

Table 3.2.6.1: B-74 2018 Monthly Monitoring Results (mg/L)—Pittsburgh													
Constituent	Permit Limit	Sampling Date											
		1/10/18	2/07/18	3/14/18	4/11/18	5/09/18	6/20/18	7/11/18	8/08/18	9/05/18	10/24/18	11/14/18	12/12/18
Aluminum	None	ND	0.041	0.028	0.150	0.049	0.180	0.040	0.034	ND	0.051	0.029	0.032
Cadmium	None	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	None	0.001	0.001	0.001	0.003	0.001	ND	0.001	ND	ND	ND	0.001	0.002
Copper	0.32	0.046	0.039	0.038	0.064	0.026	0.007	0.008	0.006	0.006	0.022	0.013	0.024
Cyanide Total	3.21	ND	ND	ND	0.0044	0.0025	ND	ND	ND	ND	0.0045	ND	ND
TOX	None	0.082	0.079	0.081	0.055	0.018	0.022	0.036	ND	0.028	0.040	0.048	0.035
Iron	None	0.620	0.670	0.620	3.700	0.330	0.250	0.660	0.110	0.240	0.250	0.910	2.200
Lead	10.6	ND	ND	ND	0.004	ND	ND	ND	ND	ND	ND	ND	ND
Mercury	0.12	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	None	0.004	0.004	0.005	0.004	0.006	ND	0.004	0.006	0.007	0.003	ND	0.002
Oil and Grease	None	1.3	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
pH (s.u.)	6.0-9.0	7.17*	6.85*	7.98*	6.92*	6.70*	7.40*	6.83*	6.60*	6.82*	6.87*	7.18*	6.72*
Phenolics	None	ND	ND	0.024	ND	0.017	ND	ND	ND	ND	ND	ND	ND
TSS	None	1.3	2.3	2.0	8.2	2.1	ND	ND	0.50	1.3	0.50	1.3	4.3
Tin	None	ND	0.003	ND	0.001	0.001	ND	ND	0.002	ND	ND	ND	ND
Trichloro-methane	None	0.0012	0.0010	0.0042	ND	ND	ND	ND	ND	ND	ND	ND	0.0077
Zinc	None	0.100	0.110	0.095	0.110	0.069	0.008	0.039	0.110	0.150	0.070	0.057	0.081

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

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 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 and require a Notice of Violation (NOV) to be issued.

SANITARY WASTEWATER

Separate from the discharge of the treated laboratory/process wastewater, sanitary sewage from the northern portion of the NETL-Pittsburgh site 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. (Note: The Mine Safety and Health Administration (MSHA), the third federal agency sharing the environment of the Bruceton Research Center (BRC) and located on the northern portion of the site, has a separate sanitary sewer line. The MSHA sanitary sewer line discharges directly into the South Park (PA) main sanitary line.)

The southern portion (Main Plateau) 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. The NETL-Pittsburgh sanitary sewage from the southern portion of the site is routed to and treated at the Clairton Municipal Sewage Treatment Plant.

STORMWATER

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

Photo 3.2.6.1: Pittsburgh Air Conditioner Condensate.

Discharges include: the salt-storage facility area, air-conditioning condensate (Photo 3.2.6.1), 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, although no discharge limits are mandated by the permit.

On the northern portion of the NETL-Pittsburgh site, storm water (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.) This 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 the sampling for the outfalls and issues a monthly Discharge Monitoring Report, which measures pH, flow, total suspended solids, manganese, iron and aluminum.

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

3.2.7 Other Environmental Statutes

3.2.7.1 Endangered Species Contract

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

3.2.7.2 National Historic Preservation Act

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

3.2.7.3 Migratory Bird Treaty Act

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

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 (2017)

See Section 4.0 ES&H Management System.

3.2.9 Executive Orders

The Pittsburgh site was in full compliance with all applicable environmental Executive Orders in 2018. 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.* The new executive order is described in more detail in Section 4.0.

In addition, other executive orders that apply to NETL-Pittsburgh, but for which no specific actions were required in 2018, 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 Pittsburgh site.

3.2.9.2 Executive Order 11990, Protection of Wetlands

There were no issues with protection of wetlands at the Pittsburgh 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 Pittsburgh site filed two ORPS reports in 2018. They were as follows:

- June 18, 2018, a fire alarm activated in Building 922. Upon investigation, it was determined that the cause of the alarm was due to two off-site fire line breaks originating with NIOSH, which had caused water pressure fluctuations (i.e. water hammer), which in turn, activated the B-922 fire alarm system. Initially, the evacuated employees were from B-922 were made to split up and relocated Building 920 and B-921, due to the hot weather conditions outside at the assembly area. Within 15 minutes, a decision was made to allow the B-922 occupants to return to the building to retrieve belongings, and then to go home for the day. The occupants were released from the building due to concerns that the fire alarm system may have re-activated due to the on-going maintenance work that was being performed to repair the NIOSH water main breaks.

- August 22, 2018, while testing a fire hydrant in the B-900 lower plateau, a break occurred in the fire-water line in the roadway in front of B-907 subsequently flooding the roadway. Due to the resulting fire suppression water outage, sprinkler service was disabled for buildings 900, 901, 902, 903, and 907. Ten fire hydrants in the B-900 lower plateau were also affected by the water fire suppression outage. NETL-Pittsburgh personnel shut the appropriate fire suppression main valve to stop the flow of water. Spill pads were used to cover two storm drains in the roadway. Fire suppression impairment signs were posted on the effected buildings. The roadway in front of B-907 was closed until repairs were completed on Friday (8/24). The Broughton Volunteer Fire Department (BVFD) was notified of the fire suppression water shutdown and its impact to the site.

3.2.10.1 Green and Sustainable Remediation (GSR)

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 2018.

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 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.

3.2.11 Continuous Release Reporting

There was no continuous release reporting required at the Pittsburgh site in 2018.

3.2.12 Unplanned Releases

There were no unplanned releases at the Pittsburgh site in 2018.

3.2.13 Summary of Environmental Permits

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

Table 3.2.13: 2018 Summary of Permits - PGH			
Permit No. and Title	**Issue Date/ Renewal**	**Regulatory Agency**	**Description**
0296 Minor Source Operating Permit	06//2009, 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	03/27/2013, 03/27/2015; 12/17/2015, 09/28/2016	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 NIOSH/CDC effective October 1, 2015.	Pennsylvania Department of Environmental Protection (PADEP)	NPDES permit for the discharge of site storm water into the public waterways of Pennsylvania (Lick Run).
ID: 02-81183 SEQ#: 008A Aboveground Storage Tank Registration Permit/Certificate	1990s, 10/04/2018	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, 10/04/2018	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, None	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, None	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.

3.2.14 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 Pittsburgh site is 132 acres is with 86 acres being forest/fields. The site has a perimeter fence with other industrial sites (west and north), railroad (north), and neighborhoods (east and south).

Pennsylvania has a very low risk for wildfire vulnerability according to www.statesatrisk.org. The main threat of a forest fire would be incidental fires from off site, or equipment use on the property. Illegal or uncontrolled burning (burning leaves, bonfires, 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. NETL-Pittsburgh has wooded areas that are mowed and trimmed; a fire from a lawn mowing equipment malfunction is a very low possibility. Fire danger information for North America throughout the season can be found from the Wild Fire Assessment System (wfas.net), which is updated daily.

3.2.15 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.

3.3 ALBANY

3.3.1 Site Description

The Albany site focuses on technologies in scientific and engineering areas creating commercially viable solutions to national energy and environmental problems. The work is accomplished through both in-house R&D and contracted research.

The Albany, Oregon, site is located in Linn County in the western part of the state (Photo 3.3.1). 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 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. There are 118 employees at the Albany site, including 36 federal employees and 82 contractors.

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 percent White, 0.7 percent African American, 1.2 percent Native American, 1.4 percent Asian, 0.2 percent Pacific Islander, 5.2 percent from other races, and 3.6 percent from two or more races. Hispanic or Latino of any race were 11.4 percent of the population.

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 percent of the population was below the poverty line. The major employers in Albany are Samaritan Health Services, Allvac-Oremet-Wah Chang Metals, Linn Benton Community College, Greater Albany Public Schools and Linn County.

Photo 3.3.1: Albany Site.

3.3.2 Major Site Activities

1.) Site Communication Cabling Upgrades

Construction was completed to upgrade the site communications cabling to increase reliability and capacity as well as ensure compliance to current standards.

Photo 3.3.2.1: Upgraded Site Communications.

2.) B-26 Roof Replacement

Construction was completed on the replacement of the aging and degraded Building 26 roof system to ensure the integrity of the roof.

Photo 3.3.2.2: B-26 Roof Upgrade.

3.) B-33 Sidewalk & Stairs Replacement

Construction was completed on the replacement of significantly damaged sidewalks and stairs to ensure safety and code compliance.

Photo 3.2.2.3: B-33 Sidewalk & Stairs Replacement.

4.) Site Potable Water System Upgrades

Construction was completed to allow for the capability to isolate the potable water system in various sections of the site and individual buildings as well as provide for a 2nd potable water entry to the site.

Photo 3.2.2.4: Site Potable Water System Upgrade.

3.3.3 Environmental Restoration and Waste Management

3.3.3.1 CERCLA

The Albany site had no off-site remediation activities during 2018. There were no National Priorities List sites for which the Albany site had liability under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Superfund Amendments and Reauthorization Act (SARA).

3.3.3.2 RCRA

There were no EPA compliance issues in 2018. There were no Notices of Violation, corrective actions, or best management practices associated with the inspection or operations of hazardous waste handling during 2018. There were no RCRA compliance inspections completed by the Oregon Department of Environmental Quality (DEQ) at the Albany site during 2018. There were no EPA, Region 10 inspections during 2018.

DOE Headquarters (FE-7) completed a Staff Assistance Visit (SAV) in June 2018 at the Albany site. During this SAV, the RCRA program was assessed and the following opportunities for improvement were noted:

- Several issues were noted with the NETL hazardous waste hauler at the Albany site that warrants their replacement. A re-competed bid process was completed, and a new hazardous waste hauler should be in place shortly.
- NETL will submit test results from a waste stream generated from an R&D process to request approval from the City of Albany Pretreatment Officer to dispose of the process waste under the Industrial Waste Water Permit. Since this waste regularly meets permit discharge standards, direct discharge of this waste stream would save time and money for NETL.

These opportunities for improvement have been completed. All opportunities for improvement identified during prior SAVs have been appropriately addressed.

3.3.3.3 Federal Facilities Compliance Act (FFCA)

There were no issues identified during 2018 regarding the Federal Facilities Compliance Act at the Albany site.

3.3.3.4 NEPA

Project managers completed questionnaires regarding the potential for environmental impacts associated with project proposals that are under consideration for funding or financial support. In 2017, all funded projects at the Albany site were determined to be categorically excluded.

3.3.3.5 TSCA

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 2018 at the Albany site. TSCA waste generated during 2018 included asbestos and spent PCB waste, which was disposed of in accordance with Federal, state and local requirements.

3.3.3.6 FIFRA

No restricted-use pesticides, herbicides or defoliants were kept or used at the Albany site during 2018. Only general-use herbicides were kept and 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.

3.3.4 Radiation Protection Program

The Albany site has legacy radiological issues, which include the presence of ores that are naturally-occurring radioactive materials (NORM) and 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 2018. 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 2018 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

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 3.3.4.2 lists the X-ray radiation generating devices at the Albany site. These devices are examined 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 2018.

Table 3.3.4.2: 2018 Albany X-Ray Radiation Generating Devices

Device	Quantity	Location
X-Ray Florescence Instrument	1	B-31, Room 104B
X-Ray Diffraction Instrument	2	B-31, Rooms 104A & 105
Scanning Electron Microscope/Microprobe	2	B-31, Rooms 103B & 103A
Transmission Electron Microscope	1	B-31, Room 101
Mail X-Ray Instrument	1	B-22, Room 123
Sedigraph/Particle Analyzer	1	Not currently permitted for operation (in storage in B-21)

3.3.5 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. For example, one EMP calls for the reduction of Scope 1 and 2 Greenhouse Gas Emissions (GHG) attributed to facility use through life-cycle, cost-effective measures by 40 percent by FY2025, relative to a FY2008 baseline (59,751,816 pounds of CO_2e) and reduction of Scope 3 GHG emissions associated with employee commuting and travel (for work or training) by 40 percent by FY2025, relative to a FY2008 baseline (14,302,252 lbs. CO_2e). Specific goals for 2018 were a 25 percent reduction in the Scope 1 and 2 GHG emissions, with an 9 percent reduction in Scope 3 GHG emissions. Another EMP tracks a NETL comprehensive GHG inventory for FY2018, 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 by 2.5 percent annually through the end of FY2025 based on the FY2015 baseline of 153,588 Btu/ft^2. This EMP will reduce energy intensity in buildings to achieve GHG reductions. Finally, 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.

3.3.5.1 Clean Air Act

Albany has no emissions that require monitoring, reporting or permitting based on current operations. In 2018, 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).

3.3.5.2 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 3.3.5.2 displays the estimated 2018 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 3.3.5.2: 2018 Air Emissions Inventory—Albany

Pollutant	Estimated Emissions (lbs./yr.)
Volatile Organic Compounds	15.99
Nitrogen Oxide	291.28
Carbon Monoxide	243.65
Sulfur Dioxide	6.04
Total Suspended Particulates	154.01
Particulate Matter 10 (PM_{10})	50.63

3.3.6 Water Quality and Protection Activities

3.3.6.1 Clean Water Act

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Subsequently, under the CWA, the EPA and the Oregon Department of Environmental Quality (DEQ) have implemented pollution control programs, such as setting wastewater standards for industry and water quality standards for all contaminants in surface waters. The CWA made it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained.

3.3.6.2 Industrial Wastewater Program

The Albany site holds a wastewater discharge permit with the City of Albany, which was last issued in December 2018 on a four-year renewal cycle. Quarterly monitoring is required in accordance with the permit. Table 3.3.6.2 provides the results of the 2018 monitoring, with all results within permit limits. In addition, Albany has filed a slug discharge control plan with the city, which must be renewed every two years and was completed in March 2017. Elementary neutralization units have been installed at several laboratory buildings (see Photo 3.3.6.2) 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 2018, which were completed in accordance with NETL's industrial wastewater permit and slug discharge permit. City of Albany personnel inspected the facility in July 2018, and no issues were documented.

Photo 3.3.6.2: Elementary Neutralization System.

Table 3.3.6.2: 2018 Industrial Wastewater Discharge Permit Monitoring Analysis—Albany					
Constituent	Permit Limits	Sample Date			
		01/05/18	04/06/18	07/10/18	10/12/18
Arsenic	1.0 mg/L	0.0013 mg/L	ND	ND	ND
Cadmium	0.6 mg/L	ND	ND	ND	ND
Chromium	2.8 mg/L	0.0032 mg/L	0.0026 mg/L	0.0016 mg/L	0.0018 mg/L
Copper	3.4 mg/L	0.017 mg/L	0.014 mg/L	0.011 mg/L	0.028 mg/L
Cyanide (Total)	1.2 mg/L	ND	ND	0.0021 mg/L	ND
Lead	0.7 mg/L	0.0059 mg/L	0.0033 mg/L	0.0028 mg/L	0.0024 mg/L
Mercury	0.08 mg/L	0.00012 mg/L	ND	0.00025 mg/L	ND
Molybdenum	4.0 mg/L	0.0028 mg/L	ND	ND	ND
Nickel	1.6 mg/L	0.0044 mg/L	0.0036 mg/L	0.0043 mg/L	0.0047 mg/L
Selenium	3.0 mg/L	ND	0.0000311 mg/L	0.00039 mg/L	0.000681 mg/L
Silver	1.1 mg/L	ND	ND	ND	ND
Zinc	2.6 mg/L	0.061 mg/L	0.032 mg/L	0.036 mg/L	0.088 mg/L

3.3.6.3 NPDES Permit

The Albany site holds no stormwater permit, since regulation is augmented by the City of Albany through its stormwater program. Since the City of Albany now has a population that exceeds 50,000, the City of Albany is required to comply with NPDES MS4 Phase II requirements as implemented by the Oregon DEQ. Oregon DEQ manages NPDES compliance via permit that requires a Stormwater Management Plan specific to the City of Albany; however, that permit has yet to issued pending litigation. The final permit will likely specify many activities that the City of Albany must complete and it is unknown if that will include specific permitting or other requirements for the Albany site. The City of Albany initiated a stormwater service charge based on impervious surface area on a given property in 2017 with proceeds slated to maintain the city's stormwater system.

3.3.6.4 Stormwater Management and Energy Independence and Security Act of 2007

There were no issues in 2018 regarding the Stormwater Management and Energy Independence and Security Act of 2007 at the Albany site.

3.3.7 Other Environmental Statutes

3.3.7.1 Endangered Species Contract

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

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 may impact the Albany Site Historic District. NETL is pursuing an update to its Programmatic Agreement with

the Oregon State Historic Preservation Office (SHPO), which was prepared via contract and reviewed by Laboratory Operations, General Counsel and the Chief Operating Officer. NETL presented the proposed updated Programmatic Agreement to the Oregon SHPO in December 2016 and continues to meet and have discussions with representatives from the Oregon SHPO concerning requirements for an updated agreement. NETL continues to work with the Oregon SHPO under its existing Programmatic Agreement, including reviews and potential mitigations associated with all major projects accomplished at the Albany site.

3.3.7.3 Migratory Bird Treaty Act

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

3.3.8 DOE Order 436.1, Departmental Sustainability

See Section 2.2.1.

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

See Section 4.0 ES&H Management System.

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

See Section 4.0 ES&H Management System.

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

See Section 4.0 ES&H Management System.

3.3.9 Executive Orders and DOE Orders

The Albany site was in full compliance with all applicable environmental Executive Orders in 2018. 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 2018, 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*.

3.3.9.1 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.

3.3.9.2 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.

3.3.10 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 Albany site filed one ORPS "low" level informational report in 2018, related to a hazardous waste manifest error noted during the waste shipment from the NETL-Albany site on September 13, 2018. During this shipment, one drum of concrete cutting waste material was improperly characterized on the uniform hazardous waste manifest (hazardous verses non-hazardous waste) during the shipment, whereas the waste was determined to be corrosive after initial shipment (pH>12.5 standard units – s.u.). The waste material was otherwise transported and properly accounted for/disposed of as hazardous waste, with no other issues noted.

3.3.10.1 Green and Sustainable Remediation (GSR)

There were no specific Green and Sustainable Remediation efforts related to brownfield sites at the Albany site in 2018.

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 Albany site in 2018.

3.3.12 Unplanned Releases

There were no unplanned releases at the Albany site during 2018.

3.3.13 Summary of Environmental Permits

A summary of environmental permits for the Albany site is provided in Table 3.3.13, 2018 Summary of Permits.

Table 3.3.13: 2018 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 in 2018)	City of Albany Public Works Department	Authorization to discharge industrial wastewater to the City of Albany sewer system.
G2140 Site Use Permit	Albany	03/01/2018 – 02/28/2019 (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.

3.3.14 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 Albany site is 42 acres is with 10 acres being vacant forest/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.

3.3.15 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.

3.4 ANCHORAGE

3.4.1 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.

Photo 3.4.1: City of Anchorage.

A reduction in Arctic Energy Office lease space requirements led to the relinquishing of the Fairbanks lease space at the end of FY2012. The Anchorage office remains the sole NETL Arctic Energy Office lease space in Alaska. Since 2015, a site support contractor employee has been staffing and providing Oil & Gas technical support from the Anchorage office. The site support contractor's efforts are managed under the NETL Oil & Gas Program. NETL shares the office space with two employees of the DOE Office of Indian Energy Policy and Programs. The Alaska Program Manager and support staff are responsible for the 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 3.4.1) 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 percent White, 8.1 percent Asian, 7.9 percent Native American, 7.6 percent Hispanic or Latino, 5.6 percent African American, 2.0 percent Pacific Islander, and 8.1 percent 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 percent 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.

The Anchorage office consists of commercial lease space rented by the U.S. General Services Administration (GSA) on behalf of NETL. The lease includes 725 square feet of usable space, as well as one covered and one surface parking space. The Anchorage office is in the same building and on the same floor as the U.S. Arctic Research Commission and the U.S. Small Business Administration. The five-story building additionally provides office space to several private companies, as well as storefront space to one restaurant. The building is in downtown Anchorage and is surrounded by numerous other commercial office buildings, parking facilities, retail businesses, hotels and restaurants.

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.

GSA implements random inspections of the Anchorage lease space on a multi-year basis to ensure the building is compliant with all government requirements and local codes. The GSA inspected the office space during 2015 as part of a determination of the need for upgrades. As a result, the office was painted.

3.4.2 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 2018 to alter the facility or operations in a manner that could change the current impacts on the environment in or around the Anchorage office.

The Anchorage 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 ongoing in 2018. NETL-Anchorage had no liability for National Priorities List sites under CERCLA/SARA. No cleanups or surveillance activities for leaks or spills or other activities occurred that would lead to Resource Conservation and Recovery Act cleanups.

3.4.2.1 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. These actions typically involve contract awards to other governmental organizations, educational institutions and private industry. Project proponents

fill out a questionnaire addressing the potential for environmental impacts associated with project proposals that are under consideration for funding or financial support. NETL's NEPA compliance office reviews the completed questionnaire to determine the appropriate level of NEPA review (i.e., Environmental Impact Statement or Environmental Assessment), or whether it qualifies for a Categorical Exclusion). In 2018, no new projects were supported by the Arctic Energy Office and thus no projects managed through the Anchorage office were subject to NEPA review.

3.4.2.2 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.

3.4.2.3 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), the Anchorage office is not a major source of air emissions; therefore, it is unnecessary to implement air quality monitoring, regulation or protection programs.

3.4.2.4 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.

3.4.2.5 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. No citations for violations of ES&H laws, regulations, or ordinances occurred in 2018.

The Anchorage office landlord additionally practices affirmative procurement and has been phasing out low-cost, low-efficiency T12 (fluorescent) lamps with higher efficiency replacements, per DOE's 2009 energy efficiency standards for general-service fluorescent lamps.

3.4.2.6 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 2018 under the sponsorship of DOE Headquarters, independent regulators or other independent third parties.

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 R&D activities, site operations 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 and childcare facilities.

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. ISM, ISO 14001:2015, and OHSAS 18001:2007 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. As a follow-up to the recertification audit, five surveillance audits were conducted between 2007 and 2009. The Albany site underwent an ISO 14001:2004 recertification audit by Orion Registrar, Inc., on November 23–24, 2009.

Subsequently, all three sites were recertified to the same scope by Orion Registrar, Inc., in 2010. The Morgantown and Pittsburgh sites underwent an ISO 14001:2004/OHSAS 18001:2007 recertification audit in June 2010, along with an ISO 9001 pre-assessment. The Albany site underwent an ISO 14001:2004 recertification audit, an OHSAS 18001:2007 certification audit and an ISO 9001 pre-assessment in August 2010. (The Sugar Land and Anchorage sites 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)*.

To maintain ISO 14001:2004 and OHSAS 18001:2007 certifications, recertification audits were conducted September 5–6, 2013, at the Albany site and September 9–13, 2013, at the Morgantown and Pittsburgh sites. Additionally, surveillance audits were conducted March 19-20, 2015, at the Pittsburgh and Morgantown sites; July 15, 2015, at the Albany site; and November 18-19, 2015, at the Pittsburgh and Morgantown sites. Subsequently, the Morgantown site underwent a surveillance audit March 19, 2015. The Albany site underwent a surveillance audit July 14, 2015. Finally, the Morgantown and Pittsburgh sites underwent a surveillance audit November 18-19, 2015.

For the most recent certifications, the Pittsburgh site underwent an ISO 14001:2004/OHSAS 18001:2007 recertification audit August 16-19, 2016. The Morgantown site underwent an ISO 14001:2004/OHSAS 18001:2007 recertification audit August 9-12, 2016. The Albany site underwent an ISO 14001:2004/OHSAS 18001:2007 recertification audit September 13-17, 2016. These audits demonstrated NETL's commitment to continual improvement in the ES&HMS and conformance to the ISO 14001:2004 and OHSAS 18001:2007 standards. By maintaining these certifications, NETL demonstrates to its workforce, the surrounding community, DOE and other stakeholders that it is committed to responsible environmental stewardship. In 2017, Orion Registrar, Inc., conducted the following surveillance audits at NETL: Morgantown site,

April 25-26, 2017; Pittsburgh site, April 27-28, 2017; Albany site, July 25-26, 2017; Morgantown site, November 14-15, 2017; and Pittsburgh site, November 16-17, 2017.

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.

In 2018, NETL upgraded to the ISO 14001:2015 version of the standard, and maintained its certification to the OHSAS 18001:2007 standard.

The Morgantown site underwent an upgrade audit April 24, 2018. The auditors did not identify any nonconformances or opportunities for improvement (OFI) The auditor identified two strengths: (1) linking of the ES&H operating plan goals to employee performance goals promotes accountability; and (2) the new CROps process provides a systematic way for identifying, grading, and addressing all of the ES&H risks and opportunities for R&D projects.

The Pittsburgh site underwent an upgrade audit April 25, 2018. The auditor did not identify any nonconformances or opportunities for improvement. The auditors identified three strengths: (1) the practice of human resources informing the Correction Action coordinator of personnel whose employment has come to an end enables the quick re-assignment of open findings that the ex-employee was responsible; (2) the identification of the risks and opportunities associated with the EMPs is well done; this with the ongoing management and monitoring of the EMP should contribute to meeting the established targets; and (3) the SARS process continues to provide a consistent and comprehensive approach for addressing EHS.

An upgrade audit took place at the Albany site July 17-18, 2018. The auditors identified two nonconformities: (1) the information on the external webpage regarding the ES&H Management System was not current; and (2) the Facility Construction SARS Package for the Building 1 renovation project was found to be incomplete – the Construction Permit Signature Page section entitled, "Notification of Completion of Construction" was not signed. The auditors identified the following strengths: (1) process consistency across the three locations is excellent; and (2) emergency response operation is well coordinated with the off-premise emergency response providers.

By maintaining its ISO 14001:2015/OHSAS 18001:2007 certifications, NETL demonstrates to its work-force, 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 reduce injuries to the workforce and to minimize hazards to the public and the environment. 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, when also adding the Albany site 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.

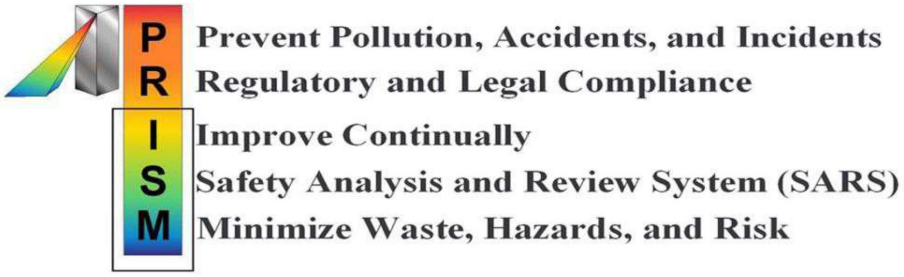


Diagram 4.1: Illustration of NETL's Environmental Policy.

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 displayed widely at the sites and is provided to each employee in badge form, as a reminder of the policy. The PRISM logo was updated in 2006 to include safety and health, to support the OHSAS 18001:2007 certification.

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 FY2018 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 existing significant aspects: High-Performance Sustainable Building Implementation; Greenhouse Gas Air Emissions; Energy and Fuel Management; Workplace Health and Safety Issues; Alarm Infrastructure Management; Ambient Workplace Quality Characteristics; and Landscape Management.

- It was determined that the aspect for High-Performance Sustainable Building Implementation should remain because the new executive order (13834) requires that NETL ensure new construction and major renovations conform to applicable building energy efficiency requirements and sustainable design principles. NETL is currently meeting the requirement that 15% of existing facilities above 5,000 gross square feet meet the Guiding Principles. NETL continues to annually assess and report on building conformance to sustainability metrics.

- 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.
- The Energy and Fuel Management aspect includes Energy Use, Renewable Energy, and Fleet Management. These will continue to be tracked. NETL is still required to comply with EPAct 2005, which requires a reduction of 7.5 % of total energy use. (Note: due to its implementation in May 2018, the current EMP was revised to change the metric from a 10% energy use reduction to 7.5%, per EPAct 2005.) NETL purchased renewable energy credits (RECs) at $900 to meet this goal in 2018.
- In terms of Fleet Management, NETL installed electric charging stations at the Pittsburgh and Morgantown sites, to be used with government vehicles commuting between the sites. This project addressed the objective to lease GSA passenger ZEV (zero emission vehicles)/ Plug-in hybrids vehicles. In FY2018, NETL received two vehicles (two of six to be leased) for NETL to meet this goal.
- For Workplace Health and Safety, NETL is still tracking both Non-NRTL equipment and NORM. For the Non-NRTL goal, once the equipment is tracked to completion, the ES&H Management Plan will be removed. Tracking the NORM ES&H Management Plan also includes revising procedures/manuals and possibly incorporating the tracking with the new chemical inventory software. This will remain in place until these are completed.
- Also, under the Workplace Health and Safety aspect, consideration was given to adding an EMP to track Electrical Personal Protective Equipment (PPE), with the objective of having no PPE in use that are not currently inspected. In the 1st quarter, the metric would be to identify the inventory (gloves, grounds, etc.) and develop an inventory checklist, 2nd quarter metric would be to complete an initial semiannual inspection; and the 4th quarter metric would be to complete a 2nd semiannual inspection.
- For the Alarm Infrastructure Management aspect, the goal was achieved earlier than expected. One facility, B-36, was the source of a sizable portion of the alarms used as data for this EMP. Since the initiation of this EMP, B-36 was the first facility to get a major upgrade and modernization. With the success of identifying the largest problem, and the reduction of devices that might cause alarms, the occurrence of gas alarm signals will continue through the next heating season and then it will be eliminated.
- For the Ambient Workplace Quality/Characteristics aspect, the results of the tracking indicate that in the 2nd quarter, only two data points were identified. These data points did not provide measurable data to develop trends or to address specific workplace quality issues and the aspect was removed.
- Under Landscape Management, the Presidential Memorandum, *Creating a Federal Strategy to Promote the Health of Honey Bees*, has not been rescinded, so the ES&H Management Plan remained. The focus was 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 pollinator with minimal budget.

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 November 6, 2018, the MRB approved the list of significant aspects (see Table 4.2: Environmental, Safety, and Health Significant Aspects for FY2019), the objectives, and the targets for FY2018.

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 FY2018, are presented in Table 4.3: FY2018 Environmental Management Plan Metrics for Albany, Morgantown, and Pittsburgh, and the performance data for the first quarter of FY2019 are presented in Table 4.4. The following discussion presents the significant "environmental" aspects and their respective EMP results for Fiscal Year 2018. (Note: safety and health significant aspects are not included in this discussion.)

4.2.1 Waste Minimization, Pollution Prevention, and Recycling

For FY2018, EMPs addressing nonhazardous waste recycling, and construction waste recycling included objectives and targets that address the requirements of E.O. 13693. As an example, the objective of the FY2018 *EMP for Nonhazardous Waste Recycling* was to increase diversion of nonhazardous solid waste from disposal by 50 percent. By the end of FY2018, NETL had recycled 47 percent of the nonhazardous waste stream (351,031 lbs. out of 751,608 lbs.). In addition, NETL the objective for *EMP for Recycling Construction Waste* is to recycle a minimum of 50 percent of construction/demolition waste and divert it from landfill disposal by the end of FY2018. NETL diverted 79 percent of its construction/demolition waste to recycling.

4.2.2 Hazardous Materials Procurement, Consumption, and Storage

For FY2018, the significant aspect for addressing hazardous materials procurement, consumption, and storage focused on NETL's chemical inventory and its compressed gas cylinder 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 9.61 percent increase in the number of containers (1,386 containers) and only a 2.47 percent increase (7,019 pounds) in chemicals by weight, compared to the baseline established in FY2012. Both the number of containers and pounds of chemicals are within the no net gain of (+/- 10 percent) target for FY2018. Also, as part of this EMP, NETL has ensured the Global Harmonization System (GHS) training has been fully implemented.

For the *EMP for Compressed Gas Cylinder Inventory*, NETL planned to consider a life-cycle analysis of compressed gas cylinder storage; develop a strategy to deal with the extensive quantity, safety issues, integrity of the cylinders, and emergency response issues. Ultimately, as part of the EMP, NETL worked to identify quantifiable targets for reducing the number of cylinders at each site.

4.2.3 Green Purchasing

The FY2018 EMP for Environmentally Preferred Products focused on various aspects of E.O. 13693, 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 percent post-consumer fiber; reducing printing paper use; ensuring that 95 percent of new contract actions for products and services are energy and water efficient; have

io-based and environmentally preferable, non-ozone depleting, recycled content; and are non-toxic or less toxic than alternatives. The FY2018 targets were to achieve the following: 95 percent 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 percent of all products that can be purchased "green" under the site support and construction contracts are of environmentally preferred products; and 98 percent of copier and printer paper shall contain a minimum of 30-percent recycled post-consumer fiber. In FY2018, NETL achieved the following: 98 percent 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; 96 percent of janitorial cleaning products are environmentally preferred products through its storeroom purchases; and 98 percent of copier and printer paper contains a minimum 30 percent recycled post-consumer fiber through storeroom purchases.

4.2.4 Electronic Stewardship

To further address the goals of E.O. 13693, the *EMP for Purchase of Electronic Products* had the objective of ensuring that the procurement of EPEAT-registered electronic products, and the procurement of Energy Star and Federal Emergency Management Program (FEMP)-designated electronic equipment. In FY2018, NETL acquired 99 percent of its electronic products as EPEAT-registered. In addition, in FY2018 the objective for the *EMP for Operation and Maintenance of Electronic Products* was to enable power management, duplex printing and other energy-efficient or environmentally preferable features on all eligible DOE electronic products. In FY2018, 100 percent of eligible electronic products (printers and workstations) had power management settings in place.

4.2.5 Pest and Other Landscaping Management

To further address the goals of E.O. 13514, NETL expanded the *EMP for Pest and Other Landscaping Management* with the continued objectives of maintaining the deer population at a sustainable level per the wildlife management plan and implementing pest management and other landscaping management practices. In 2018, USDA representatives in West Virginia performed a deer reduction operation in Morgantown. In Pittsburgh, the deer survey and culling for 2018 was not conducted because it was anticipated that it would be handled by NIOSH at the Pittsburgh site. Other wildlife management issues on DOE property will be handled as the situations/conditions arise.

To address the Presidential Memorandum, *Creating a Federal Strategy to Promote the Health of Honey Bees*, NETL implemented an *EMP for Pollinator Protection Zones*. The objective of the EMP is 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. In 2018, a pollinator protection zone was designated and planted near the Pines Parking Area at the Pittsburgh site. The seed mix that was selected was composed of perennial plants native to Pennsylvania and was designed specifically for supporting native pollinators.

4.2.6 Water Use

To address the goals of E.O. 13693, 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 percent annually through FY2020, or 36 percent by the end of FY2025 using a baseline of FY2007. NETL's FY2018 potable water intensity was 7.72 gal/gsf. This equates to a 66.9 percent reduction in water consumption.

4.2.7 Energy and Fuel Use

EO 13693 set a new energy intensity reduction goal of 25 percent by FY 2025 based on a new baseline year of FY 2015, or 2.5 percent per year. While this has been revoked by EO 13834, NETL has set an internal goal based on the values set forth by EO 13693. NETL's FY 2018 energy intensity was 143,914 Btu/GSF, a 6.4 percent decrease from the FY 2015 baseline, which slightly falls short of the FY 2018 reduction goal of 7.5 percent. This reduction is less than the 11.5% reduction of FY 2017. Analysis of FY 2018 energy consumption and degree day data found that NETL's Pittsburgh and Morgantown Campuses experienced colder winter and warmer summer weather than in FY 2017. Monthly building meter analysis found monthly energy consumption mostly followed the monthly degree day data, indicating that operational increases were not responsible for the increased energy consumption in FY 2018. NETL will continue to strive to meet the goal through continued energy conservation measures in new and existing buildings and systems.

The objectives for the FY2018 *EMP for Renewable Energy* include increasing renewable energy consumption to meet the renewable energy on site usage goals as defined in EPAct 2005, E.O. 13693, DOE Order 436.1, and EISA 2007. However, E.O. 13693 was revoked by E.O. 13834, thus NETL was only required to meet the renewable energy targets of EPACT 2005. NETL annual renewable electrical energy on-site generation equates to 0.3 percent of its total electric energy usage based on the EPACT 2005 double bonus for onsite renewable energy. NETL met the remainder of the 7.5 percent renewable electric energy requirement by purchasing RECs. With these RECs, which also reduced NETL's Scope 2 GHG emissions, NETL's renewable electric energy totaled 12.3 percent of NETL's FY 2017 total electric consumption of 25,130 MWh.

In FY2010, NETL developed a *Data Center Energy Efficiency Optimization Plan* and submitted it to DOE Headquarters. The objective of the plan is to implement best management practices in energy efficient management of servers and federal data centers. In FY2018, the objectives for the *EMP for Management of Servers and Data Center*s were to install and monitor advanced energy meters in all core data centers by the end of fiscal year 2018 and 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. The Morgantown B-39 data center meters have been installed. The design for the new Albany data center will include meters and will be designed to have a PUE between 1.2 to 1.4. The Morgantown B-39 data center has a PUE goal of less than 1.5.

The objectives for the FY2018 *EMP for Fleet Management* were to reduce fleet-wide per-mile greenhouse gas emissions (GHG) by 8.75 percent relative to a FY2014 baseline of 276 grams CO_2e per fleet-wide mile, which creates a target of 252 grams CO_2e per fleet-wide mile. NETL met the target for FY2018 by having GHG emissions of 175 grams CO_2e per fleet-wide mile. NETL installed electric vehicle charging stations in Pittsburgh and Morgantown in FY 2018 and exchanged two E85 alternative fuel vehicles for two electric vehicles (Chevrolet Bolts) in FY 2018. The electric vehicles are used for inter-site travel between the Pittsburgh and Morgantown sites.

4.2.8 Air Emissions/Greenhouse Gas Emissions

The objectives for FY2018 *EMP Addressing GHG Emissions*: (1) to reduce Scope 1 and 2 GHG emissions by 40 percent by FY2025, using an FY2008 baseline of 27,100 metric tons (MT) CO_2 equivalent (CO_{2e}); (2) reduce Scope 3 GHG emissions by 40 percent by FY2025, using an FY 2008 baseline of 6,617 $MTCO_{2e}$; and (3) annually monitor and track Scope 3 greenhouse gas emissions associated with employee commuting and required travel and training. Other objectives of the FY2018 *EMP GHG Emission Reporting* supporting E.O. 13693 include reporting a comprehensive GHG emission inventory annually by the end of January each subsequent year; implementing

transit, travel, training and conferencing strategies to support low-carbon commuting and travel; and implementing innovative policies to address Scope 3 emissions unique to agency operations. In addition, NETL was required to develop a policy for handling, leak detection/repair and capture of sulfur hexafluoride (SF_6).

In terms of FY2018 Scope 3 emissions, NETL reported 3,994 $MTCO_{2e}$, relative to FY2008 emissions of 6,617 $MTCO_{2e}$, meaning NETL decreased its Scope 3 emissions by 39.6 percent, which meets the FY2018 goal of reducing Scope 3 GHG emissions by 11 percent from the FY2008 baseline. NETL has developed a plan and methodology to continue to reduce its Scope 3 emissions.

NETL's FY2018 Scope 1 and 2 GHG emissions were 15,029 $MTCO_{2e}$ (a 44.5 percent decrease from the FY2008 baseline), which meets the FY2018 goal of reducing Scope 1 and 2 GHG emissions by 28 percent from the FY2008 baseline. NETL's purchase of RECs (renewable energy credits) also contributed to the reduction of Scope 2 GHG emissions in FY2018.

Finally, NETL ensured that SF_6 emissions were addressed in standard operating procedures documented in its Safety Analysis and Review System (SARS) packages.

4.2.9 High-Performance Sustainable Building Implementation

E. O. 13834 revoked E.O. 13693. Section 2 of E. O. 13834 states "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". High-performance green federal buildings are based on 42 USC §6834, 42 USC §8253, 42 USC §8254, and 42 USC §17091 to §17094. DOE Order 430.2b, Departmental Energy, Renewal Energy, and Transportation Management, states that any new building or facility designed and built to U.S. Green Building Council's (USGBC) rating system of "Leadership in Energy and Environmental Design" (LEED) specification and is awarded LEED Gold certification meets the HPSB requirements. In FY2009 and FY2010, NETL performed an assessment of all existing buildings to develop a cost-effective HPSB plan. Analysis of the assessment identified the seven buildings to be renovated to comply with the five guiding principles of HPSB by FY2015 (Table 4.2.9.1: HPSB Guidelines for Buildings). NETL has incorporated these projects into the NETL Ten-Year Site Plan and General Plant Project (GPP) planning. Five of the seven buildings in the HPSB Plan were retro-commissioned in FY2011 as part of the EERE FEMP's E4 Project (Morgantown Building 40 and Pittsburgh Building 900 were under construction).

Per the DOE *Strategic Sustainability Performance Plan*, DOE considers any new building that achieves a rating of Gold or better for the LEED Green Building Rating System for New Construction to comply with the requirements of the HPSB guiding principles. In FY2011, one NETL building met the HPSB guiding principles with a LEED Gold certification: Morgantown Building 39. In FY 2014, a second NETL building met the HPSB guiding principles with a LEED Gold certification: Morgantown Building 40.

In FY 2017, two more NETL buildings, B-900 and B-920 in Pittsburgh, were confirmed to meet 100 percent of the 2008 HPSB Guiding Principles. The progress towards meeting the Guiding Principles has been tracked in the Energy Star Portfolio Manager Sustainable Buildings Checklist.

Per the *Guiding Principles for Sustainable Federal Buildings* and *Associated Instructions* (February 2016), the 2008 Guiding Principles for existing buildings can continue to be used through September 30, 2017 to qualify buildings as meeting the Guiding Principles, where agencies have already taken significant action and made substantial progress in transforming the building to meet the Guiding Principles. Based on this, NETL continued efforts in FY 2017 to have B-900 and B-920 meet the 2008 Guiding Principles before the deadline.

In FY 2018, NETL has seven buildings that meet the HPSB Guiding Principles (B-58, B-900, B-920 and B-921 in Pittsburgh and B-1, B-39 and B-40 in Morgantown).

This means that 15.2 percent of NETL buildings over 5,000 GSF have met the 2008 HPSB Guiding Principles. By percentage of GSF, 23.6 percent of NETL's buildings were HPSB compliant in FY 2018. DOE has kept the E. O. 13693 FY 2025 target of 15 percent. Interim DOE targets have not been set yet.

Starting October 1, 2017, the 2016 HPSB Guiding Principles will be applicable. The NETL HPSB Plan has been revised based on the 2016 HPSB Guiding Principles to continue progressing towards 100 percent as much as possible. Future building renovation designs will consider the 2016 HPSB Guiding Principles to meet or exceed the 15 percent goal by FY 2025.

NETL entered data into the DOE Sustainability Dashboard per DOE Sustainability Performance Office requirements to meet the requirements of DOE's *Strategic Sustainability Performance Plan* (SSPP). The plan included strategies and annual implementation steps to ensure compliance with EPAct05; DOE Order 436.1, Departmental Sustainability; and the Energy Independence and Security Act of 2007 (EISA07). The plan also includes requirements consistent with DOE Order 430.2.

As a part of every decision to undertake new projects and investments, NETL performs life-cycle cost analyses. In 2018, these analyses were used for projects involving equipment retrofit and replacement; renewable energy; lighting retrofit; water savings; and HVAC control. These analyses, coupled with energy efficiency, renewable energy, and water efficiency mandates by DOE, help to determine the optimum time to undertake a retrofit project during the life span of equipment or facilities. NETL's *Annual Lab Plan* includes energy efficiency upgrades and water conservation projects in its general plant project (GPP) budget requests.

DOE Order 430.2 and E.O. 13834 also recommend that sites maximize utilization of third-party financing; energy savings performance contracts (ESPC), to accomplish the mandated goals associated with the previously mentioned federal government directives. Under that premise, on August 28, 2009, NETL awarded the Biomass Alternative Methane Fuel Energy Savings Performance Contract (BAMF ESPC) to Constellation Energy, a Mid-Atlantic Energy Services Company. The BAMF ESPC contract incorporates installation and implementation of 13 energy conservation measures (ECMs) (Table 4.2.9.2) at the laboratory's sites in Morgantown, Pittsburgh, and Albany.

The annual energy savings guaranteed by the BAMF ESPC are 23.8 BBtu with an annual guaranteed cost savings of $757,929. Of the 13 ECMs identified in the BAMF ESPC, seven were completed in CY2009 and four were completed in CY2010.

The remaining two ECMs, ECM #2 natural gas utilization and ECM#10 B25 hood control project, both at Morgantown, were replaced with a project to retrofit the Morgantown parking garage lighting system with a high-efficiency LED lighting and control system. This project will reduce NETL's overall energy consumption by approximately 13,500 kilowatt-hours annually. This project will aid in reducing NETL's energy intensity and Scope 2 GHG emissions relative to electric energy usage.

Implementation of the BAMF ESPC will provide NETL with an energy savings of 24 percent from its FY2003 baseline, which is the equivalent to meeting 79 percent of its 2015 goal. The BAMF ESPC, when fully implemented using 2007 usage as a baseline, will provide NETL with a 13 percent water intensity savings, which equates to meeting 65 percent of its 2020 savings goal. This project did not require any capital equipment cost outlays by NETL. The guaranteed annual energy cost savings provides the funding for Constellation Energy to implement the project.

Table 4.2.9.1: HPSB Guidelines for Buildings

Building	FY	Compliance	Status	GSF Total = 1,029,142	Cumulative % GSF	Cumulative % BLDGS (Total = 46)	Action
MGN B-39	2009	LEED Gold	Meets HPSB Criteria Grandfathered	106,522	10.4	2.2	Complete
MGN B-40	2013	LEED Gold	Meets HPSB Criteria Grandfathered	9,411	11.3	4.3	Complete
PGH B-58	2015	HPSB	Meets HPSB Criteria Grandfathered	32,240	14.4	6.5	Complete
MGN B-1	2016	HPSB	Meets HPSB 2008 GP Criteria Per CEQ Instructions	51,598	19.4	8.7	Complete
PGH B-921	2016	HPSB	Meets HPSB 2008 GP Criteria Per CEQ Instructions	25,033	21.8	10.9	Complete
PGH B-920	2017	HPSB	Meets HPSB 2008 GP Criteria Per CEQ Instructions	11,681	23.0	13.0	Complete
PGH B-900	2017	HPSB	Meets HPSB 2008 GP Criteria Per CEQ Instructions	6,065	23.6	15.2	Complete
MGN B-26	2018	HPSB	Meets 92%of HPSB 2008 GPs. Energy Efficiency/IAQ	63,616	29.7	17.4	Data Collection
ALB B-1	2019	HPSB/LABS 21	Meets 62%of HPSB 2008 GPs. Commissioning// Energy Efficiency/ M&V/Benchmarking/ IAQ/Water	23,348	32.0	19.6	HVAC Upgrades/ Data Collection
PGH B-925	2019	HPSB	Meets 88%of HPSB 2008 GPs. Energy Efficiency/IAQ/ Water	9,326	32.9	21.7	Data Collection

Table 4.2.9.2: BAMF ESPC through Constellation				
ECM No.	Energy Conservation Measure	Location	Estimated Total Energy Savings MBtu/yr.	Completed Y/N
1.	Steam Biogas Conversion	Pittsburgh	13,786	Y
2.	Utilize On-Site Natural Gas	Morgantown	-	N
3.	Water Saving ECMs	Pittsburgh	34	Y
4.	Water Saving ECMs	Albany	4	Y
5.	Renewable Energy Systems	Pittsburgh	2	Y
6.	Renewable Energy Systems	Morgantown	27	Y
7.	Lighting Improvements	Pittsburgh	2,509	Y
8.	Lighting Improvements	Morgantown	1,390	Y
8.a.	Retrofit LED Parking Garage Lighting	Morgantown	127	Y
9.	HVAC Control Improvements	Morgantown	2,078	Y
10.	Lab Hood Control Improvements	Morgantown	-	N
11.	Vending Machine Controls	Pittsburgh	51	Y
12.	Compressed Air Improvements	Pittsburgh	79	Y
13.	Advanced Metering	Pittsburgh	1,725	Y
	Total Savings	**All**	**21,788**	

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 and 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.

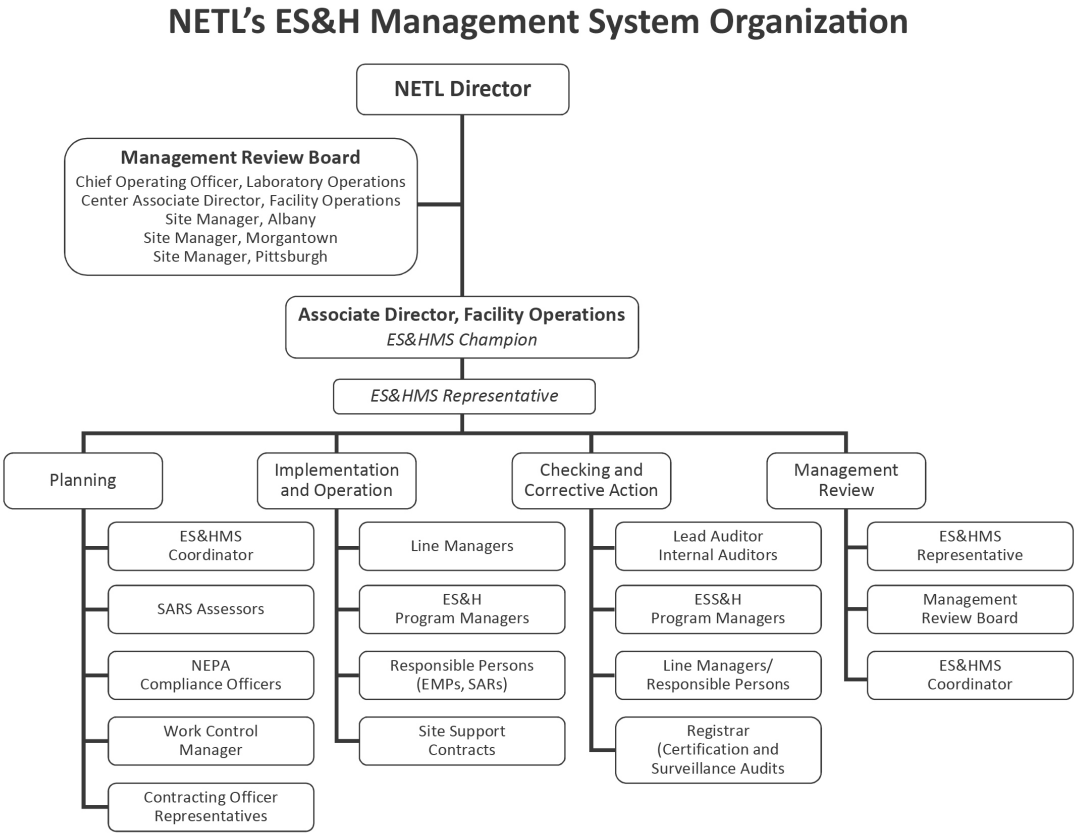


Diagram 4.3: NETL's ES&H Management System Organization.

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/OHSAS 18001 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.
- An Affirmative Procurement Program that has been established that requires certain procurements use environmentally preferred products, as outlined in NETL Procedure 541.2-00.01, *Affirmative Procurement Program*.
- 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 self-assessment procedures to improve ES&H performance through identification of nonconformities and tracking of corrective and preventive actions. Several practices are employed, including internal audits, project reviews, and inspections; independent assessments; and reporting through NETL's corrective action tracking system, the Assessment Input Information System (AIIS).

NETL conducts both internal and external audits of its ES&HMS as required by the ISO 14001:2015 and OHSAS 18001:2007 standards. This process is defined in Manual 450.4-01.02, *ES&H Assessments Process*. An annual planning schedule is used to ensure that all sections of the ISO14001:2015 and OHSAS 18001:2007 standards are audited against. Seven ES&HMS audits were performed in 2018, including two internal audits and three upgrade audits (in Morgantown, Pittsburgh, and Albany) and two surveillance audits (in Morgantown and Pittsburgh) conducted by the ISO 14001/OHSAS 18001 registrar.

Management's commitment to the ES&H Management System is evidenced by its roles in the ES&HMS and management review of ES&H assessments. 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 codes, National Electric Code, and other environmental, safety, and health requirements]. Findings from the audits and inspections are entered into 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, SARS assessments are performed on new and modified R&D projects, construction activities, facilities and support operations. Subsequently, annual SARS assessments are performed to ensure continued ES&H compliance for these projects, facilities and support operations. A full discussion of the SARS process can be found in Section 6.0, Quality Assurance.

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 remain in compliance with both external regulatory and NETL requirements. These reviews are informal and may vary in scope and detail. Responsible program managers verify the requirements stated in the NETL directives are relevant and are being met. When discrepancies are identified, program managers decide whether to eliminate a specific requirement from the directive or to enforce it. Some programmatic reviews occur more frequently or focus on monitoring results. Reviews look for trends, with the goal of identifying correctable problems and promptly acting.

Site-support contractor employees periodically inspect higher risk items, document their findings and provide the results to program managers. For example, daily inspections are performed at the hazardous waste facility, selected potential spill sources and storm water outfalls. Weekly inspections are made at industrial wastewater discharge points. Quarterly discharge monitoring reports are compiled and reviewed to determine if permit limits have been exceeded. Semi-annual surface water monitoring reports are compiled and reviewed. This information provides program managers with opportunities to assess the effectiveness of their programs.

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 websites of selected government agencies and DOE's Office of Health, Safety, and Security (HS-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 Corrective Action Tracking System (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 Procedure 231.1-00.02, *Injury/Illness Investigation and 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 semi-annual review meetings 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 April 12, 2018, and on November 6, 2018. The MRB meeting in May focused on progress towards NETL's FY2018 objectives and targets. The meeting in November focused on ensuring that the aspects, objectives and targets were appropriate for FY2019.

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 FY2018 are contained in Table 4.7. 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 Performance Management Metrics

Metric	Objective	Target Green (met) Red (missed)	FY 2018 Performance	Organizational Strategic Objective
Days Away, Restricted, Transfer Rate	Maintain low Days Away, Restricted, and Transfer (DART) case rate.	<= 0.4 >0.6	0.16	Ensuring a Safe Working Environment
Environmental Releases	Maintain low reportable environmental releases.	0 >2	0	Institutional Security and Environmental Safeguards
ES&H Objectives and Targets Achievement	Achieve ES&H objectives and targets.	>= 85% < 65%	88.1%	Institutional Security and Environmental Safeguards
Facility Security Violations	Maintain low number of security violations and breaches.	0 >2	1	Institutional Security and Environmental Safeguards
Notices of Violation	Maintain low notices of violation (NOVs).	0 >2	0	Institutional Security and Environmental Safeguards
Recordable Case Rate	Maintain low recordable case rate.	>=1.0 >1.5	0.47	Ensuring a Safe Working Environment

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 4.7.1: 2018 Surveillance Monitoring.

Table 4.7.1: 2018 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.

Each site has specific reasons for monitoring its groundwater. For example, 20 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.

Similarly, 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.

Finally, 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 are 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 to document groundwater and contaminant trends. Once the model is complete, and subject to funding, NETL will assess the results and plan future remediation activities. NETL will continue to provide the ODEQ monitoring reports.

5.1 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.

Photo 5.1: Morgantown Monitoring Wells.

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 5.1.1: 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 5.1.2: 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 2018 are presented in the Appendix as Table 5.1.1 through Table 5.1.6.

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 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 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. Some of this flow also discharges as springs on the hillsides or in the valleys.

Photo 5.2: 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.

Recently, due to the poor condition of the weir and the piezometer (used to help measure groundwater-surface water interactions) at Lick Run, NETL initiated a project to remove the piezometer and the weir at Lick Run. All the appropriate permits were submitted to the Army Corps of Engineering, Allegany County Conservation District, and the Pennsylvania Department of Environmental Protection (PADEP), with the plan to have the weir and piezometer removed in the spring of 2019.

Photo 5.2.1: Pittsburgh Groundwater Monitoring.

Groundwater monitoring (Photo 5.2.1) in 2018 was performed per the NETL-Pittsburgh 2018 Groundwater Detection Monitoring Plan. The results of the NETL-Pittsburgh Groundwater Detection Monitoring Program are presented in Table 5.2. The results were compared against federal and state standards for groundwater. None of the results are above any regulatory limits. The total petroleum hydrocarbon (TPH) values are consistent with historical data for TPH.

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 2018 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, VFW-9 and VFW-12 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.

5.3 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.

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 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 concern 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 efforts to execute this action will be taken 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 5.3 for well locations). The results of the 2018 monitoring program are presented in Tables 5.3.1-5.3.7.

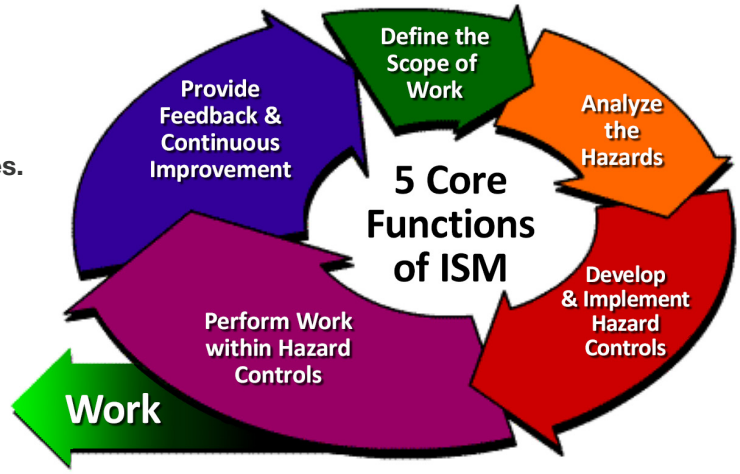
NETL continues its site investigation activities, periodic monitoring, and remedial actions at the Albany site in accordance with Oregon DEQ requirements, and will evaluate and pursue actions to protect human health and the environment by eliminating risk and minimizing potential exposures. Copies of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

6.0 QUALITY ASSURANCE

NETL is responsible for 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 the management and oversight functions related to these activities.

NETL's Quality Assurance (QA) Program provides, through the NETL Quality Assurance Plan the tools to ensure that this work is accomplished safely while minimizing potential hazards to the public, site workers, the environment and facilities and operations. The QA Program is based on DOE Order 414.1, *Quality Assurance* and complements DOE's Integrated Safety Management (ISM) principles (see Diagram 6, ISM core functions). NETL's ISM and QA programs are well integrated. Line management accountability for ES&H issues is an integral part of the QA Program and ISM. NETL implements this through work performance goals for which all line managers are accountable. Internal assessments and audits also ensure that line managers are accountable for their ES&H responsibilities.

Diagram 6.0: DOE's ISM Principles.



The SARS process is the backbone of NETL's QA Program for ES&H. Hazards and environmental impacts are identified and mitigated through this process; therefore, its effective performance is important. NETL has four distinct SARS processes: R&D projects, facility construction, facility use and support operations.

The R&D SARS provides the process for a safety analysis and review of on-site R&D projects. Risks associated with on-site R&D projects are identified, analyzed and then eliminated, mitigated, or controlled to a degree acceptable by line management. Following the SARS review, R&D projects receive a SARS operating permit. An annual review is conducted on all SARS-permitted R&D projects by a team comprising the project's responsible person, an ES&H representative, a project QA engineer and the site's environmental manager. The assessment includes (1) checking for significant modifications made to the project without appropriate 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 project's SARS file. Findings from the annual assessment are sent to the responsible person for correction and tracked in the corrective action tracking system.

The Facility SARS addresses on-site facilities including buildings, trailers, utilities, services, structures, roads and walkways. The Facility SARS ensures that NETL construction activities and facility operation are conducted in a safe and environmentally compliant manner. The result of the SARS review is an approved construction permit issued prior to construction activities and a facility use permit once construction is completed and the facility is ready for occupation. The purpose of Facility SARS is to ensure that facilities are operated, maintained, and modified in compliance with applicable 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 applicable codes and standards; documenting any deviations of the facility from applicable 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 in the near term. The procedure also establishes the requirements for obtaining a facility use permit.

The Support Operations SARS addresses on-site support operations conducted by site-support contractors. It includes construction, operations, maintenance and renovation activities for which the site support contractors are responsible and ensures that associated risks are analyzed, understood, and then eliminated, mitigated, or con- trolled to a degree acceptable by responsible line management prior to initiation of the project or operation. An annual assessment is conducted on all SARS-permitted support operations. The purpose of the annual assessment is to determine the continued validity of the SARS package and to address any changes in the operations. Typical items that might be reevaluated include changes in site conditions, worker training, operating procedures, and the effectiveness of controls. Findings from the annual assessment are sent 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 as required by ISO 14001/OHSAS 18001 certification, external surveillance and certification audits related to the ISO 14001/OHSAS 18001 certification, monthly focused inspections, facility inspections, internal reviews and annual emergency response drills and exercises.

Many of the directives, operating manuals and employee handbooks that govern the ES&H programs also contain monitoring requirements which ensure that the ES&H programs comply with the directives. For example, the Fire Protection Program requires that fire protection appraisals be conducted every three years to ensure that hazards to life and property from fires, explosions, or related risks has been evaluated and reduced to acceptable levels; the adequacy of the local fire protection and prevention programs to minimize injury and protect DOE property has been evaluated; and written reports to responsible management, which include recommendations for appropriate action, have been provided.

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

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

Table 4.1: Environmental, Safety, and Health Significant Aspects for FY2018
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
Alarm Infrastructure Management
Ambient Workplace Quality Characteristics
Landscape Management
Climate Change Adaptation

Table 4.2: Environmental, Safety, and Health Significant Aspects for FY2019
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
Alarm Infrastructure Management (1st and 2nd Quarter)
Landscape Management
Climate Change Adaptation

Table 4.3: FY2018 Environmental Management Plan Metrics				
Environmental Management Plan	**Objective/ Target**	**Baseline**	**Target**	**Actual**
Waste Minimization, Pollution Prevention, and Recycling				
Recycling	Divert at least 50% of nonhazardous solid waste from disposal annually. (E.O. 13693) Pursue opportunities for net-zero waste or additional diversion opportunities. (E.O. 13693)		50% of Nonhazardous Waste Produced is Recycled (lbs./tons)	351,031 lbs. out of 751,608 lbs. recycled in FY2018 = 47%.
			Identify opportunities to reduce nonhazardous waste in FY2018.	Ten R&D projects were reviewed in order to reduce nonhazardous waste in FY2018.
Recycling Construction Waste	Divert (Recycle) a minimum of 50% of construction/demolition waste from landfill disposal annually. (E.O. 13693)		50%	80%
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. 13693) Ensure at least 15% of existing facilities above 5,000 gross square feet meet the Guiding Principles and are net-zero energy, waste, or water by FY 2025. (E.O. 13693) Make annual progress towards 100% conformance with the Guiding Principles. (E.O. 13693) Ensure at least 15% of existing facilities above 5,000 gross square feet meet the Guiding Principles by FY2025. (E.O. 13693)		Track the design packages to ensure they contain High Performance Sustainable Building (HPSB) requirements.	As of the end of the fiscal year, 7 out of 46 applicable buildings (15.2%) were certified to the Guiding Principles.
				All construction/ renovation projects that were designed in FY2018 included HPSB Guiding Principles conformance.
			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 12/9/17.
Hazardous Materials Procurement, Consumption, and Storage				
Chemical Inventory	Reduce the quantity of toxic and hazardous chemicals and materials acquired, used, and disposed during FY2017 using FY2012 as a baseline. (E.O. 13693)	13,035 containers 277,419 lbs.	No net gain (less than 10% of baseline) of chemicals (by number of containers and/or weight in pounds).	14,421 containers (9.6% increase) 284,438 pounds (2.5% increase)

Table 4.3: FY2018 Environmental Management Plan Metrics				
Environmental Management Plan	**Objective/ Target**	**Baseline**	**Target**	**Actual**
Electronic Stewardship				
Purchase of Electronic Products	Ensure that processes are in place to evaluate requisitions that have been identified for EPEAT-certified electronic equipment. (E.O. 13693) Inspect procurement reference for EPEAT-registered electronic products and the procurement of Energy Star- and FEMP-designated electronic equipment. (E.O. 13693)		95% of all products purchased that have EPEAT standards are EPEAT registered.	95% of products are EPEAT-registered.
			95% of specific electronic products are Energy Star- and FEMP-designated.	95% 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. 13693)		Ensure that 90% of managed workstations and printers have power management settings in place.	100% or printers and 92.3% 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. 13693)		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 FY2018.	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 = 48,019 lbs.
			Verify a process is in place to determine the appropriate hierarchy for all excess/surplus electronic products.	NETL F 450.1-1, ES&H End of Life Management of Electronic Products is used as part of the process for the hierarchy.

Table 4.3: FY2018 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 40%by FY2025, using an FY2008 baseline of 59,715,816 pounds CO_2e. (E.O. 13693)	59,751,816 lbs. CO_2e	44,813,862 lbs. CO_2e (25%)	33,132,933 lbs. CO_2e (45%)
	Reduce Scope 3 GHG emissions by 40% by FY2025, using an FY 2008 baseline of 14,587,838 pounds CO_2e. (E.O. 13693)	14,587,838 lbs. CO_2e	13,274,933 lbs. CO_2e (9.0%)	8,805,834 lbs. CO_2e (40.0%)
	Annually monitor and track Scope 3 greenhouse gas emissions associated with employee commuting and required travel and training. (E.O. 13693)		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 (to SSP and EMS Report Card) annually by the end of January. (E.O. 13693)		Report emission inventories on a quarterly basis for year-end (FY) wrap up by January 31, 2019. Specifically: CO_2, CH_4, N_2O, SF_6, hydrofluorocarbons and perfluorocarbons, and NF_3.	Total emissions = 41,938,767.2 lbs. CO_2e
			Develop handling, leak detection/ repair, and capture program for SF_6 (Morgantown and Albany).	All projects that use SF6 follow standard operating procedures, which are documented in SARS packages.

Table 4.3: FY2018 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Green Purchasing				
Environmentally Preferred Products	Purchase products that are: recycled, BioPreferred, Energy Star, FEMP-designated, EPEAT, Water Sense - or otherwise water efficient. (E.O. 13693)		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.	98% 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. 13693)		Ensure 98% of copier and printer paper shall contain a minimum of 30% recycled post-consumer fiber.	98.2% 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 BioPreferred, 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. 13693)		Ensure that 80% of all products that can be purchased "green" under the site support and construction contracts are of environmentally preferred products (EPPs).	96% of products purchased are "green" purchases.

Table 4.3: FY2018 Environmental Management Plan Metrics				
Environmental Management Plan	**Objective/ Target**	**Baseline**	**Target**	**Actual**
Energy and Fuel Management				
Energy Use	Reduce energy usage/square foot by 2.5% annually through the end of FY2025, based on the FY2015 baseline of 153,544 Btu/sq ft. (E.O. 13693)	153,544 BTU/ft^2	145,866.8 BTU/ft^2 (5.0%)	143,914 BTU/ft^2 (6.7%)
Management of Servers and Data Centers	Install and monitor advanced energy meters in all core data centers by fiscal year 2018. (E.O. 13693) 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. 13693)		Have dedicated smart meters installed in MGN, PGH, and ALB data centers to measure a monthly PUE.	MGN B-39 data center electric meter installation has been completed. ALB data center electric meter installation will be completed.
			Identify a plan (consolidation, hot/cold row, reduced footprint) to optimize the PUE for the data centers.	Energy efficiency measures for B-39 data center will be reviewed/ designed as part of IT projects. A PUE target of less than 1.5 will be established. ALB B-1 design will include energy efficiency measures.
Renewable Energy	Ensure that NETL's total electrical energy consumption includes 10% renewable energy in FY2017. (E.O. 13693) (Total renewable electrical energy consumption is estimated to be 2,870 MWh). Total energy consumption is estimated to be 28,700 MWh.	10% of renewable energy consumption	10% 2,870 MWh (718 MWh/qtr.)	12.3% 3.079 MWh
	Ensure that not less than 10% of the total amount of facility electric and thermal energy is clean energy from renewable electric and alternative energy. (E.O. 13693) The objective is 10% of 195,170 MMBTU.	19,517 MMBTU	19,517 MMBTU (4,880 MMBTU/qtr.)	10,534 MMBTU = 6.4%
	Procure Renewable Energy Credits to meet 10% renewable electric energy and clean energy goals. (E.O. 13693)		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: FY2018 Environmental Management Plan Metrics				
Environmental Management Plan	**Objective/ Target**	**Baseline**	**Target**	**Actual**
Energy and Fuel Management (cont.)				
Fleet Management	Reduce fleet-wide per-mile greenhouse gas emissions from fleet vehicles. Plan for appropriate charging or refueling infrastructure or other power storage technologies for zero-emission or plug-in hybrid vehicles and opportunities for additional services to support vehicle-to-grid technology. (E.O. 13693)	276 grams CO_2e/mile	Reduce greenhouse gas emissions by 8.75% in FY 2018 relative to a FY 2014 baseline = 251.9 grams CO_2e per fleet-wide mile.	175.2 grams CO_2e per fleet-wide mile (36.5%)
		No baseline	Attain 12% (approx. 1) zero-emission or plug-in hybrid vehicles of all new passenger vehicles provided by GSA by September 30, 2018.	2 of the 6 new passenger vehicle replacements from GSA will be zero-emission vehicles. 33.3%
		No baseline	Identify/install charging/refueling infrastructure required to support ZEV or PHEV usage at NETL, or other technologies (hybrid/fuel cell gas) by September 30, 2017.	Electric Vehicle Charging Stations were installed in the 2nd/3rd Quarter of FY 2018.

Table 4.3: FY2018 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Water Usage				
Potable Water Consumption	Reduce potable water consumption at the NETL sites relative to the 2007 baseline of 27,000,000 gallons which equates to a water intensity of 23.3 gal/gsf by 2% per year through life-cycle cost-effective measures through FY2025 or 36 % by the end of FY2025. (E.O. 13693)	23.3 gal/gsf	18.17 gal/gsf (22% Reduction)	7.72 gal/gsf (66.9% Reduction)
Workplace Health and Safety Issues				
Non-Nationally Recognized Testing Laboratory Listed Equipment	To systematically inspect all non-NRTL listed equipment to either receive authority having jurisdiction (AHJ) approval or reject as unsafe and remove from use.		Implement the non-NRTL listed equipment inspection/ acceptance program by inspecting 275 pieces annually to ultimately accept or reject and subsequently remove from the non-NRTL listed equipment list	221 pieces inspected and removed.

Table 4.3: FY2018 Environmental Management Plan Metrics				
Environmental Management Plan	**Objective/ Target**	**Baseline**	**Target**	**Actual**
Workplace Health and Safety Issues (cont.)				
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. Ensure appropriate controls are implemented to maintain accountability through inventory systems (or other means).		Continue/update radiological surveys using appropriate equipment to complete/verify surveys of materials/ samples associated with R&D SARS packages that use or are suspected to contain NORM/ TE-NORM (i.e., geologic samples, zirconia crucibles, etc.) as well as rare earth elements projects.	Surveys continue to be performed to ensure that suspected NORM/ TE-NORM materials are identified and then properly managed. Generally, 2-20 surveys are completed at each site per quarter.
			Implement radiological control procedures to implement appropriate NORM/ TE-NORM controls and update radiological control requirements of R&D SARS packages associated with NORM/TE-NORM.	R&D SARS packages with noted NORM/TE-NORM have been/ will be identified for additional controls, as warranted. Procedures are being combined and converted to manuals format, with additional assistance requested from ORISE and SSC. R&D SARS packages are planned to be reviewed as part of annual assessments.
			Ensure NORM/TE-NORM inventory is appropriately tracked via an approved tracking system (yet to be provided by NETL).	With continued lack of chemical inventory mechanism to track NORM/TE-NORM materials, NETL has reverted to tracking NORM/ TE-NORM via MS Excel spreadsheet. Initial draft process was implemented in March 2018.

Table 4.3: FY2018 Environmental Management Plan Metrics				
Environmental Management Plan	Objective/ Target	Baseline	Target	Actual
Alarm Infrastructure Management				
Alarm Infrastructure Management	Implement a program/process to address NETL alarms that have been failing due to aging infrastructure, system issues, etc. Implement a safety protocol so that despite the many alarm activations, employees do not ignore alarms, turn off alarms, etc., because they are considered unreliable.		Determine if there is a high incident rate of false alarms. If yes, identify the cause of the false alarm and address the situation.	Trouble areas were identified and issues were resolved as they occurred.
Ambient Workplace Quality Characteristics				
Ambient Workplace Quality Characteristics	Track concerns regarding office environments, including, but not limited to: ventilation; allergen exposure; temperature variation; odor concerns; mold concerns; VOC exposure; fumes, vapors, and dust exposures; lighting concerns; and noise exposures.		Maintain the processes that address the concerns with regards to, but not limited to: date of occurrence notification, site, building and office location, concern type, description of concern, date the area was monitored, results of monitoring, recommended mitigations, date mitigation completed, and individual sensitivity.	Continue working with IH SSC to provide appropriate input for tracking.
Pollinator Protection Zones	Promote the health of pollinators and enhance pollinator habitat on NETL-managed lands and facilities.		Potential areas to establish pollinator protection zones will be identified, plant species selected, and sites prepared during FY2017 and planted late FY2017 or early FY2018.	Sites have been identified, plant species selected, but the sites have not been prepared properly nor has the planting occurred this fiscal year.

Objective/target not met in FY2018

Objective/target partially met in FY2018

Objective/target met in FY2018

Table 4.4: FY2019 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 50% of non-hazardous waste produced.	26,171 lbs. recycled out of a total of 37,465 lbs. 70%
	Pursue opportunities for net-zero waste or additional diversion opportunities. (E.O. 13834)		Identify opportunities to reduce non-hazardous waste in FY2019.	4 projects have been reviewed as part of their SARS packages, resulting in the creation of 3 new SAA containers in PGH.
Recycling Construction Waste	Divert/recycle construction/ demolition (C&D) waste from landfill disposal. Track disposition of C&D waste separate from non-hazardous solid waste streams and where feasible and where data is available, report on volume and disposition of C&D waste in annual Sustainability Plan. (E.O. 13834)		Divert/recycle C&D waste from landfill disposal to the maximum extent economically feasible in FY 2019.	No waste was recycled this quarter.
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.	All construction and renovation projects that have been designed in FY2018/2019 included HPSB Guiding Principles conformance.
	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.	Site Sustainability Plan submitted to DOE-HQ on December 17, 2018.
			Submit Site Sustainability Plan (SSP) to DOE-HQ.	Site Sustainability Plan submitted to DOE-HQ on December 17, 2018.

Table 4.4: FY2019 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 2019 using FY 2012 as a baseline. (E.O. 13834)	13,035 containers 277,419 pounds	No net gain (+/- 10% of baseline) of chemicals (by number of containers and/or weight in pounds) based on the baseline of 13,035 containers and 277,419 pounds.	14,376 containers (10%) 281,530 pounds (1.5%)
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.	100% 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% of printers and 98% of workstations have power management settings in place.

Table.4.4: FY2019 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 FY2019.	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.	0 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.4.4: FY2019 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 40 percent by FY 2025, using a FY 2008 baseline of 59,715,816 pounds CO_2e.	59,751,816 lbs. CO_2e (27,103 MT)	43,021,308 lbs. CO_2e (19,514.3 MT) (28%)	13,901,105.97 lbs. CO_2e (6,305.5 MT) (6.9%)
	Reduce Scope 3 GHG emissions by 40% by FY 2025, using a FY 2008 baseline of 14,587,838 pounds CO_2e.	14,587,838 lbs. CO_2e (6,617 MT)	12,983,176 lbs. CO_2e (5,889.1 MT) (11%)	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.	NETL is reducing travel for training and conferences to reduce greenhouse gas emissions.
GHG Emission Reporting	Report comprehensive GHG emission inventory (to SSP and PPTRS) annually by the end of January. (E.O. 13693)		Report inventories on a quarterly basis for fiscal year-end wrap up by January 31, 2020.	Calculated at the end of FY2019.

Table 4.4: FY2019 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	**Objective/Target**	**Baseline**	**Target**	**Actual**
Green Purchasing				
Environmentally Preferred Products	Purchase products that are: recycled, BioPreferred, Energy Star, FEMP-designated, EPEAT, Water Sense - or otherwise water efficient. (E.O. 13693)		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.	95% of new contract actions for products and services were for items that 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. 13693)		Ensure 98% of copier and printer paper shall contain a minimum of 30% recycled post-consumer fiber.	99.18% of the paper contains 30% post-consumer product.
	Maximize site use of environmentally preferred products (EPPs) including those that have recycled content, are BioPreferred, 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. 13693)		Ensure that 80% of all products that can be purchased "green" under the site support and construction contracts are of environmentally preferred products (EPPs).	For janitorial supplies and construction materials purchased by PACE and USSE2, 96.2% are "green" purchases.

Table 4.4: FY2019 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 0.5% in FY 2019 from FY 2018.	153,588 BTU/ft2	142,073.65 BTU/ft2 7.5% reduction	44,048 BTU/ft2 (8.8%)
Management of Servers and Data Centers	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 to measure a monthly PUE.	The B-39 meter was installed during President's Day 2018 data center outage. ALB Data Center is being moved to B-1.and is being installed as part of the B-1 renovation.
			Identify a plan (consolidation, hot/cold row, reduced footprint) to optimize the PUE for the data centers.	Energy efficiency measures for B-39 data center will be reviewed/ designed as part of IT projects. A PUE target of less than 1.5 will be established. ALB B-1 design will include energy efficiency measures.

Table 4.4: FY2019 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	**Objective/Target**	**Baseline**	**Target**	**Actual**
Energy and Fuel Management (cont.)				
Renewable Energy	Ensure that NETL's total electrical energy consumption includes 7.5% renewable energy in FY 2019. (Total renewable electrical energy consumption is estimated to be 2,178 MWh). Total energy consumption is estimated to be 29,034 MWh.		10% 2,891 MWh (723 MWh/qtr.)	0.14% 39.3 MWh
	Maximize the installation of on-site renewable energy projects where economically feasible reducing NETL's annual electric and thermal energy consumption and costs.		Determine economically feasible renewable energy project.	Continually look for economically feasible renewable energy projects.
	Procure Renewable Energy Credits to meet the 7.5% renewable electric energy and clean energy goals.		Procure RECs to meet the renewable electric energy and clean energy goals.	NETL will purchase Renewable Energy Certificates (RECs) to meet this goal.
Fleet Management	Reduce FY 2019 petroleum consumption 2% from FY 2018 level. (E.O. 13834)	5,749 gallons	Reduce FY 2019 fleet petroleum consumption by 2% from FY 2018 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 5,634 gal.	2,122 gallons 47.6% increase
			Maintain on-site refueling infrastructure and maintain/expand electric vehicle charging stations as necessary to support zero-emission or plug-in hybrid vehicles.	Electric Vehicle Charging Stations were installed in the 2nd/3rd Quarter of FY 2018.

Table 4.4: FY2019 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 FY2018.	7.72 gal/gsf	7.68 gal/gsf	2.06 gal/gsf **(64.6%)**
Workplace Health and Safety Issues				
Non-Nationally Recognized Testing Laboratory Listed Equipment	To systematically inspect all non-NRTL listed equipment to either receive authority having jurisdiction (AHJ) approval or reject as unsafe and remove from use.		Implement the non-NRTL listed equipment inspection/ acceptance program by inspecting 200 pieces annually to ultimately accept or reject and subsequently remove from the non-NRTL listed equipment list.	Inspected 47 pieces

Table 4.4: FY2019 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Workplace Health and Safety Issues (cont.)				
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/update radiological surveys using appropriate equipment to complete/verify surveys of materials/samples associated with R&D SARS packages that use or are suspected to contain NORM/TE-NORM (i.e., geologic samples, zirconia crucibles, etc. including the rare-earth elements projects).	Surveys continue to be performed to ensure that suspected NORM/TE-NORM materials are identified and then properly managed. Generally, 2-20 surveys are completed at each site per quarter.
			Implement radiological control procedures to implement appropriate NORM/TE-NORM controls and update radiological control requirements of R&D SARS packages associated with NORM/TE-NORM.	R&D SARS packages with noted NORM/TE-NORM have been/will be identified for additional controls, as warranted. Procedures are being combined and converted to manuals format, with additional assistance requested from ORISE and SSC. R&D SARS packages are planned to be reviewed as part of annual assessments.
			Ensure NORM/TE-NORM inventory is appropriately tracked via an approved tracking system (system yet to be provided by NETL, alternative tracking methods available).	Once the chemical inventory mechanism is procured by NETL, NETL will transition tracking of NORM/TE-NORM from its current MS Excel spreadsheet to the new Chemical Inventory Management System software. Initial procurement process was implemented in 2018, with scheduled procurement to be completed in April 2019. Once installed, NORM/TE-NORM will then be tracked via the new Chemical Inventory Management System software (estimated to start in April 2019).

Table 4.4: FY2019 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Workplace Health and Safety Issues (cont.)				
Electrical Personal Protective Equipment	Ensure that PPE related to electrical safety is properly inventoried, tested, and inspected as required by OSHA.		Ensure that 100% of all electrical PPE meets the requirements.	All inspectiosn have been completed this quarter as required.
Alarm Infrastructure Management				
Alarm Infrastructure Management	Track CO gas alarms at B-36. Follow up on each occurrence, both warning alarms and actual alarms. Find out activities going on at the time of the alarm, and assess the data from the monitoring equipment to trend the rise and fall of the CO. Determine if there are modifications that can be made of the activities to keep CO levels below even the early warning level, and definitely below the actual alarm level.		Reduce potential for actual hazard, and reduce frequency of warning alarms that consume time and require effort despite being early warnings rather than indications of presence actual hazard.	Zero data points have been collected this quarter.
Landscape Management				
Pollinator Protection Zones	To promote the health of pollinators and enhance pollinator habitat on NETL-managed lands and facilities.		Potential areas to establish pollinator protection zones will be identified, plant species selected, and sites prepared during FY2019 and planted late FY2019.	The selected area near the Pines Lot was planted in November 2018 with a wildflower mix specifically designed for pollinators and native to Pennsylvania.

Table 5.1.1: May 2018 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.	6.05	6.30	5.40	6.67	5.40	5.87	4.30	4.45	6.06	6.03
Specific Conductance (field)	µmhos	35	251	45	286	1385	1566	1783	1689	480	364
Temperature (field)	deg. C	15.90	15.47	15.90	16.01	14.79	14.05	12.39	15.01	15.03	19.00
Cadmium	ug/L	NT	NT	NT	ND	2.2	2.3	2.0	3.0	NT	NT

Table 5.1.2: May 2018 Data for "B-C" Aquifer—Morgantown						
Parameter	UNITS	Sample Location				
		11	31	32-A	GAS-5	SP2-BC
pH (field)	S.U.	6.11	5.52	5.11	6.19	6.09
Specific Conductance (field)	µmhos	182	1044	1910	1968	56
Temperature (field)	deg. C	14.91	16.97	15.90	13.75	13.90

Table 5.1.3: May 2018 Data for Morgantown Aquifer				
Parameter	UNITS	Sample Location		
		D1-M	D2-M	D4-M
pH (field)	S.U.	6.34	8.61	7.23
Specific Conductance (field)	µmhos	464	669	586
Temperature (field)	deg. C	17.70	15.65	18.70

Table 5.1.4: Oct. 2018 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.	6.42	7.52	7.33	7.38	5.30	7.46	6.50	4.41	7.43	6.16
Specific Conductance (field)	µmhos	289	240	434	262	1339	1024	1609	1642	468	353
Temperature (field)	deg. C	14.51	14.40	15.83	14.91	15.18	15.60	17.45	13.97	14.49	14.69
Cadmium	ug/L	NT	NT	NT	ND	2.1	1.0	2.2	2.6	NT	NT

Table 5.1.5: Oct. 2018 Data for "B-C" Aquifer—Morgantown						
Parameter	UNITS	Sample Location				
		11	31	32-A	GAS-5	SP2-BC
pH (field)	S.U.	5.92	7.16	7.31	6.12	6.22
Specific Conductance (field)	µmhos	175	1106	2802	1810	413
Temperature (field)	deg. C	13.96	18.89	18.59	17.41	14.73

Table 5.1.6: Oct. 2018 Data for Morgantown Aquifer				
Parameter	UNITS	Sample Location		
		D1-M	D2-M	D4-M
pH (field)	S.U.	8.04	9.23	7.43
Specific Conductance (field)	µmhos	463	526	351
Temperature (field)	deg. C	14.27	15.62	18.18

ND = not detected NT = not tested

Table 5.2: 2018 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	
	05/30/18	10/31/18	05/30/18	10/31/18	05/30/18	10/31/18	05/30/18	10/31/18
TPH-DRO (mg/L)	ND	ND	ND	ND	0.120	ND	0.140	ND
pH (standard units)	6.80	8.25	5.99	6.86	7.07	6.82	7.42	8.59
Specific Conductance (uS/cm)	5,843	3,863	2,857	2,924	6,617	6,512	1,389	1,288
Temperature (0C)	13.6	14.7	16.9	16.8	14.5	13.3	13.8	16.5
Constituent	Well Number, Sample Date							
	VFW-10		VFW-11		VFW-12		VFW-14	
	05/30/18	10/31/18	05/30/18	10/31/18	05/30/18	10/31/18	05/30/18	10/31/18
TPH-DRO	0.110	ND	0.130	ND	0.810	ND	0.120	ND
pH (standard units)	7.07	8.00	6.83	8.28	6.89	8.50	6.66	6.82
Specific Conductance (uS/cm)	3,549	3,205	3,150	3,468	2,321	2,174	4,193	3,215
Temperature (0C)	13.8	15.4	13.0	13.2	14.8	16.6	14.8	18.0

ND = not detected NS = not sampled

Table 5.3.1: NETL-Albany 2018 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	03/19	08/20	03/20	08/20	03/21	08/22	03/21	08/22	03/20	08/20	03/20	08/21
1,1,1,2-Tetrachloroethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	NS	NS	NS	NS	ND	ND	ND	ND	1.9	3.4	ND	ND	ND	ND	ND	ND

Table 5.3.1: NETL-Albany 2018 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	03/19	08/20	03/20	08/20	03/21	08/22	03/21	08/22	03/20	08/20	03/20	08/21
Chloromethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	1.2	ND	ND	ND	ND
cis-1,3-Dichloropropene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert butyl ether	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyl toluene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene, Total	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not detected NS = Not Sampled

Exceeds Groundwater Quality Standards

Table 5.3.2: NETL-Albany 2018 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	
	03/20	08/21	03/22	08/21	03/21	08/22	N/A	N/A	03/19	08/21	03/19	08/20	03/22	08/22	03/20	08/20
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	2.0	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	0.94	ND	ND	NS	NS	ND	ND	ND	ND	22	20	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	4.1	2.2	7.6	7.1	ND	ND

Table 5.3.2: NETL-Albany 2018 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	
	03/20	08/21	03/22	08/21	03/21	08/22	N/A	N/A	03/19	08/21	03/19	08/20	03/22	08/22	03/20	08/20
Chloromethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	0.98	0.87	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert butyl ether	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyl toluene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	700	480	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Xylene, Total	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not detected NS= Not Sampled

Exceeds Groundwater Quality Standards

Table 5.3.3: NETL-Albany 2018 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	
	03/19	08/23	03/22	08/22	03/20	08/21	03/22	08/21	N/A	N/A	03/19	08/21	03/19	08/21	03/21	08/22
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	0.39	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	0.25
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
2-Butanone	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Bromobenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	0.64	5,900	690	ND	ND	2,400	1,500	NS	NS	23	18	6.1	1.1	88	80
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	850	89	ND	ND	240	160	NS	NS	2.8	2.4	4.5	1.3	11	11

Table 5.3.3: NETL-Albany 2018 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	
	03/19	08/23	03/22	08/22	03/20	08/21	03/22	08/21	N/A	N/A	03/19	08/21	03/19	08/21	03/21	08/22
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	12	1.1	ND	ND	ND	ND	NS	NS	2.5	2.2	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Dibromomethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	ND	ND	ND	0.87	ND	ND	ND	ND	NS	NS	ND	ND	0.15	ND	ND	0.49
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	2.0	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Methyl tert butyl ether	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
n-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
p-Isopropyl toluene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	ND	ND	280	41	ND	ND	9.9	5.2	NS	NS	1.4	1.3	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	0.85	ND	ND	ND	ND	ND	NS	NS	0.47	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	2.9	12	440	91	ND	ND	320	160	NS	NS	10	8.9	4.8	0.88	57	51
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Xylene, Total	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND

ND = Not detected NS= Not Sampled

Exceeds Groundwater Quality Standards

Table 5.3.4: NETL-Albany 2018 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	
	03/20	08/21	03/19	08/20	03/22	08/22	03/22	08/22	03/20	08/20	03/21	08/22	03/21	08/22
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND	100	85	7.1	ND	ND	ND	ND	0.50	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	19	17	ND	ND	ND	ND	ND	ND	ND	ND

Table 5.3.4: NETL-Albany 2018 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	
	03/20	08/21	03/19	08/20	03/22	08/22	03/22	08/22	03/20	08/20	03/21	08/22	03/21	08/22
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.2	6.4	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert butyl ether	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyl toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	ND	ND	ND	ND	ND	ND	0.68	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.74	0.53	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylene, Total	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not detected NS= Not Sampled

Exceeds Groundwater Quality Standards

Table 5.3.5: NETL-Albany 2018 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	
	03/21	08/23	03/21	08/23	03/21	08/23	N/A	08/23
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	NS	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	NS	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	NS	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	NS	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	NS	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	NS	ND
1,1-Dichloropropene	ND	ND	ND	ND	ND	ND	NS	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	ND	NS	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	ND	NS	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	NS	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	NS	ND
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	ND	NS	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND	ND	NS	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	NS	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	NS	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	NS	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	ND	NS	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	NS	ND
1,3-Dichloropropane	ND	ND	ND	ND	ND	ND	NS	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	NS	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	ND	NS	ND
2-Butanone	ND	ND	ND	ND	ND	ND	NS	ND
2-Chlorotoluene	ND	ND	ND	ND	ND	ND	NS	ND
2-Hexanone	ND	ND	ND	ND	ND	ND	NS	ND
4-Chlorotoluene	ND	ND	ND	ND	ND	ND	NS	ND
4-Methyl-2-pentanone	ND	ND	ND	ND	ND	ND	NS	ND
Benzene	ND	ND	ND	ND	ND	ND	NS	ND
Bromobenzene	ND	ND	ND	ND	ND	ND	NS	ND
Bromochloromethane	ND	ND	ND	ND	ND	ND	NS	ND
Bromoform	ND	ND	ND	ND	ND	ND	NS	ND
Bromomethane	ND	ND	ND	ND	ND	ND	NS	ND
Carbon Disulfide	ND	ND	ND	ND	ND	ND	NS	ND
Carbon Tetrachloride	ND	0.44	ND	ND	ND	ND	NS	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	NS	ND
Chloroethane	ND	ND	ND	ND	ND	ND	NS	ND
Chloroform	ND	ND	ND	ND	ND	ND	NS	ND

Table 5.3.5: NETL-Albany 2018 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	
	03/21	08/23	03/21	08/23	03/21	08/23	N/A	08/23
Chloromethane	ND	ND	ND	ND	ND	ND	NS	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	0.47	ND	NS	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	NS	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	NS	ND
Dibromomethane	ND	ND	ND	ND	ND	ND	NS	ND
Dichlorobromomethane	ND	ND	ND	ND	ND	ND	NS	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	NS	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	NS	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	NS	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	NS	ND
Methyl tert butyl ether	ND	ND	ND	ND	ND	ND	NS	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	NS	ND
Naphthalene	ND	ND	ND	ND	ND	ND	NS	ND
n-Butylbenzene	ND	ND	ND	ND	ND	ND	NS	ND
n-Propylbenzene	ND	ND	ND	ND	ND	ND	NS	ND
p-Isopropyl toluene	ND	ND	ND	ND	ND	ND	NS	ND
sec-Butylbenzene	ND	ND	ND	ND	ND	ND	NS	ND
Styrene	ND	ND	ND	ND	ND	ND	NS	ND
tert-Butylbenzene	ND	ND	ND	ND	ND	ND	NS	ND
Tetrachloroethene (PCE)	ND	ND	ND	ND	ND	ND	NS	ND
Toluene	ND	ND	ND	ND	ND	ND	NS	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	NS	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	NS	ND
Trichloroethene (TCE)	1.7	29	1.2	2.3	21	12	NS	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	NS	ND
Vinyl chloride	ND	ND	ND	ND	ND	ND	NS	ND
Xylene, Total	ND	ND	ND	ND	ND	ND	NS	ND

ND = Not detected

Exceeds Groundwater Quality Standards

Table 5.3.6: NETL-Albany 2018 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–Metals (mg/L)

Constituent	Well Number, Sample Date							
	MW-3	MW-4	MW-6	MW-13	MW-14	MW-15	MW-16	MW-17
	08/20	08/20	08/22	08/21	08/20	08/22	08/20	08/23
Aluminum	0.32	ND	0.16	0.26	0.79	0.0012	1.0	0.11
Antimony	ND	ND	ND	ND	ND	ND	0.00025	ND
Arsenic	0.00056	0.0014	0.00052	0.0023	0.00068	0.0010	0.41	0.0012
Barium	0.0078	0.043	0.013	0.022	0.0067	0.029	0.41	0.0050
Beryllium	ND	ND	ND	ND	ND	ND	0.00050	ND
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	25	36	12	16	13	330	46	36
Chromium	0.0015	0.00056	0.0014	0.0016	0.0019	0.0039	0.0013	0.00067
Cobalt	0.00055	0.00022	0.000091	0.00028	0.0012	0.00090	0.0016	0.000086
Copper	0.00061	0.00065	ND	0.0020	0.0017	ND	0.0039	0.0012
Iron	0.68	0.35	0.26	0.25	1.4	ND	260	ND
Lead	ND	ND	ND	0.00062	0.00031	ND	0.00050	ND
Magnesium	14	18	6.8	8.2	5.4	160	17	18
Manganese	0.017	0.38	0.018	0.46	0.075	0.070	1.7	0.080
Mercury	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	0.00087	0.0026	0.00052	0.0085	0.0018	0.0026	0.0040	0.00046
Potassium	0.68	1.3	0.41	0.95	0.62	3.6	1.4	1.1
Selenium	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	9.9	18	8.2	7.2	8.8	79	14	15
Thallium	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	0.0079	0.0054	0.0052	0.0085	0.0094	0.0043	0.0072	0.0063
Zinc	0.0026	ND	0.0029	0.0078	0.0048	0.0049	0.0062	ND

ND = Not detected

Exceeds Groundwater Quality Standards

Table 5.3.7: NETL-Albany 2018 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–Metals (mg/L)

Constituent	Well Number, Sample Date					
	MW-18	MW-19	MW-20	MW-22	MW-23	MW-24
	08/22	08/21	08/21	08/21	08/21	08/22
Aluminum	ND	ND	ND	ND	ND	0.81
Antimony	ND	ND	ND	ND	ND	ND
Arsenic	0.00079	0.00037	0.0014	0.0014	0.00096	0.0015
Barium	0.0053	0.0097	0.012	0.0070	0.0053	0.011
Beryllium	ND	ND	ND	ND	ND	ND
Cadmium	ND	ND	ND	ND	ND	ND
Calcium	31	15	28	24	35	23
Chromium	0.0012	0.00025	0.00070	0.00025	0.00076	0.0018
Cobalt	ND	0.00058	0.00046	0.00042	ND	0.0011
Copper	ND	ND	ND	ND	ND	0.0024
Iron	ND	ND	ND	ND	ND	2.0
Lead	ND	ND	ND	ND	ND	0.00080
Magnesium	15	7.5	13	11	20	13
Manganese	0.0021	0.53	0.95	0.075	ND	0.029
Mercury	ND	ND	ND	ND	ND	ND
Nickel	0.00037	0.00057	0.0030	0.00079	0.00013	0.0015
Potassium	0.59	0.49	0.57	0.93	1.0	1.1
Selenium	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND
Sodium	15	8.5	18	22	14	22
Thallium	ND	ND	ND	ND	ND	ND
Vanadium	0.0082	0.0015	0.010	0.0026	0.0085	0.014
Zinc	ND	ND	ND	ND	ND	0.0075

ND = Not detected

Exceeds Groundwater Quality Standards

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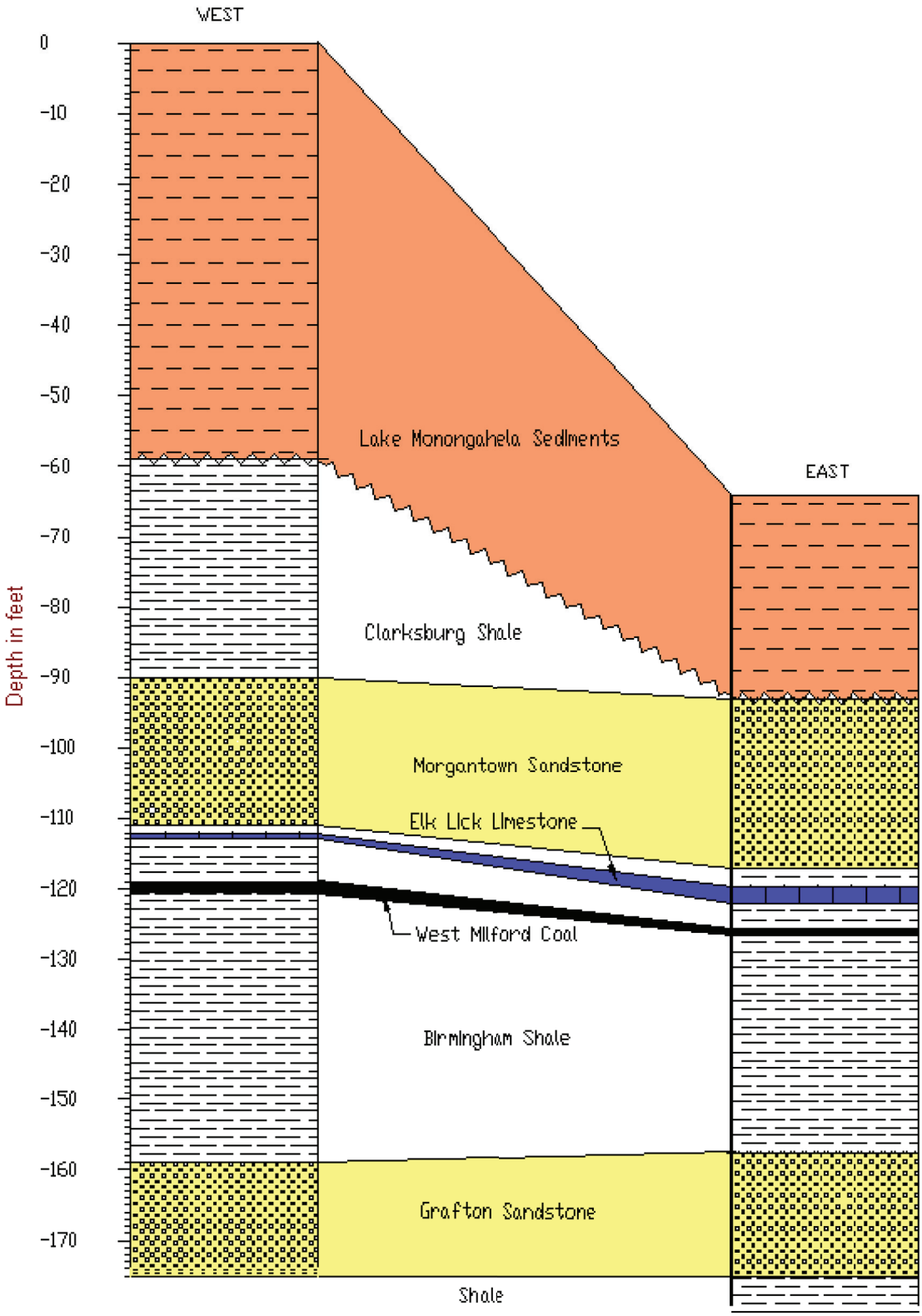

Figure 5.1.2: Generalized Cross-Section of Aquifer Units at the Morgantown Site.

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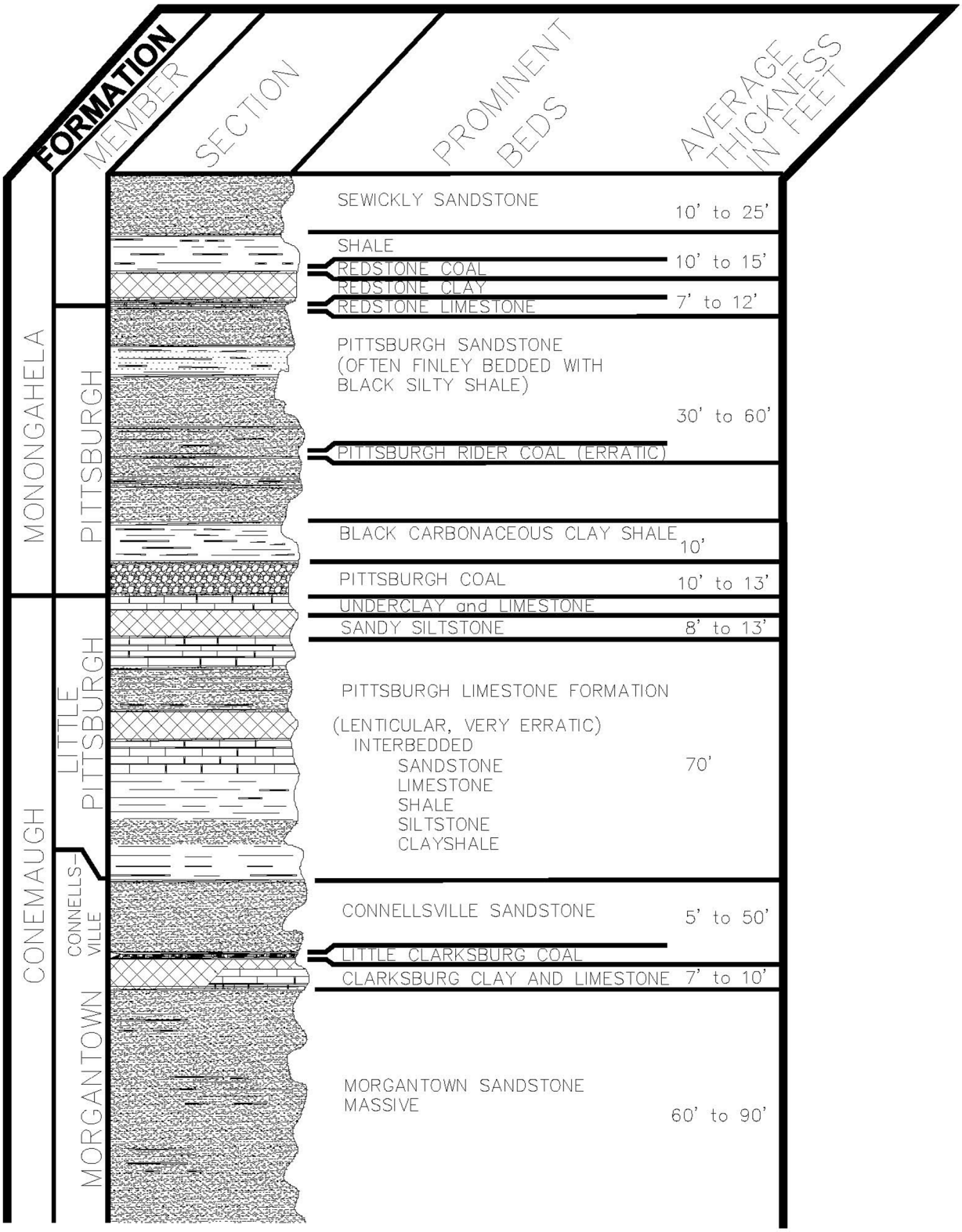

Figure 5.2.2: General Geologic Column—Pittsburgh.

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