NATIONAL ENERGY TECHNOLOGY LABORATORY

2019 Annual Site

Environmental Report

September 30, 2020

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

DISCLAIMER

2019 Annual Site Environmental Report

U.S. Department of Energy

National Energy Technology Laboratory

Albany, Oregon

Anchorage, Alaska

Houston, Texas

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 to create commercially viable solutions to national energy and environmental problems.

NETL continued to implement its Environmental, Safety and Health (ES&H) programs throughout 2019 at the Albany, Anchorage, Houston, Morgantown and Pittsburgh sites. Previously NETL had a program office in Sugarland, Texas, however, this office was closed in 2017; NETL leased new office space in Houston, Texas in 2019. NETL maintained its certification to the International Organization for Standardization (ISO) 14001:2015, Environmental Management System Series, and was certified to ISO 45001:2018, Occupational Health and Safety Management System Series.

Certification audits to the ISO 14001:2015 and ISO 45001:2018 standards were conducted July 30 – August 1, 2019, at the Albany site; August 13-15, 2019, at the Pittsburgh site; and August 27-29, 2019, at the Morgantown site. Certification to these standards demonstrates 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 achieved 94 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 and Houston, Texas. The program office in Sugar Land, Texas was closed in 2017, however, new office space was leased in 2019.

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. Then on the northwest side of the site is the Monongahela river. All surface water drains into these two streams and river. Land use immediately surrounding the Morgantown site is a combination of residential, commercial, deciduous forest and pasture.

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 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.

NETL's Sugar Land office was closed in 2017, however, the office was reopened in Houston in March 2019. Three employees worked in the leased office space in 2019.

1.3 LABORATORY MISSION

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

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

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

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

1.4 PRIMARY OPERATIONS AND ACTIVITIES AT THE SITES

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

OFFICE OF THE DIRECTOR

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

- Science & Technology Strategic Plans & Programs, including the Research & Innovation Center and Technology Development & Integration Center;
- Laboratory Operations Center, including Facility Operations, Information Technology and Strategic Support;

- Office of S&T Career Management including Diversity, University Partnership and Graduate Education and Community Education and Outreach; and
- Finance & Acquisition Center, including Accounting, Budget & Analysis and Acquisition.

SCIENCE AND TECHNOLOGY STRATEGIC PLANS AND PROGRAMS

The Science and Technology Strategic Plans and Programs leads the planning and integration of current existing capabilities and develops the strategic plans and partnerships with an understanding of the existing environment (technology needs, regulatory, political) and the anticipation of the future environment. This includes:

- Leading the development of the NETL Strategic Plan including identifying future competencies required;
- Development of Technology Roadmaps;
- Defining technical capabilities to invest in for long-term strength of NETL including any budgetary requirements needed to achieve these capabilities;
- Develop a collective strategy and engagement plan for external stakeholders;
- Strategic Partnerships with other agencies and state governments;
- Partnerships with other national laboratories, industry and academia; and
- Development and implementation of a strategic plan for international efforts to advance the overall strategy of NETL research focus.

The Science and Technology Strategic Plans and Programs performs the above functions in conjunction with and through the Research and Innovation Center and the Technology Development and Integration Center. Strategic planning efforts are led and centered on NETL enduring missions in effective resource development, efficient energy conversion, and environmental sustainability.

RESEARCH AND INNOVATION CENTER

Through effective leverage of its technical core competencies, and in collaboration with partners from industry, academia, and other government laboratories, the Research & Innovation Center delivers the knowledge and technologies that can enable the affordable, sustainable access and utilization of our abundant, domestic energy resources, by:

- Developing and proving solutions to key barriers to the implementation of emerging energy technologies;
- Exploring and maturing transformational new concepts for next generation energy systems;
- Leveraging core competencies to rapidly respond to issues of National concern.

The Research & Innovation Center is responsible for safe and efficient research operations at its Albany, Morgantown, and Pittsburgh sites; and for implementation of an R&D portfolio that effectively leverages core technical competencies to meet customer needs. Research projects effectively combine science-based simulations with targeted experimental validation from laboratory to demonstration scales, to accelerate the technology development process.

Research conducted by the Research & Innovation Center in its laboratories will typically focus on concepts with technology readiness levels (TRL) between two and four. For higher TRL-level concepts, research is coordinated with extramural projects as appropriate, to more effectively enable eventual commercial deployment. The Research & Innovation Center is also responsible for nurturing the human capital, and designing and implementing the laboratory capabilities, necessary to assure the world-class stature of its technical core competencies.

TECHNOLOGY DEVELOPMENT AND INTEGRATION CENTER

The Technology Development & Integration Center leads integrated technical and business teams to define, solicit, negotiate, award, manage, and deliver federally sponsored research & development benefits to the nation. Our work includes:

- Defining project technical and budgetary requirements to achieve research objectives;
- Leading program/project teams to prepare and issue competitive solicitations (e.g. Funding Opportunity Announcements) to access the best research capabilities in the nation to achieve program goals and objectives;
- Negotiating and managing projects with industry, universities, and national laboratories;
- Coordinating and communicating project results and accomplishments;
- Maintaining a qualified and experienced workforce through training and job assignments; and
- Supporting DOE and NETL program planning, development, analysis, execution, outreach and communication efforts.

LABORATORY OPERATIONS CENTER

Laboratory Operations Center is responsible for the development, implementation, integration, and monitoring, as well as continuous improvement, of products and services necessary to support NETL business and laboratory functions. This includes:

- Performance and Metrics, to include: Performance and Metrics; Internal Audit and Compliance;
- Strategy and Integration, to include: Strategic Analysis; Best Practices; and Improved Synchronization;
- Engineering and Facilities and on-site property management;
- Personnel and Environmental Safety and Health;
- Security and Counterintelligence;
- Enterprise Architecture, Information Technology, Records Management and Cyber Security;
- Human Resources;
- Equal Employment Opportunity; and
- Communications.

FINANCE AND ACQUISITION CENTER

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

- Serve as liaison with the DOE CFO, DOE Procurement offices, and Fossil Energy leadership for budget, procurement, and financial assistance matters;
- Provide contractual and financial expertise for sound procurement and business management;
- Implement and coordinate Federal acquisition and assistance policies and procedures;
- Develop and implement the Laboratory's financial policies;
- Develop budget forecasts, revisions, reports and analyses to support the integrity of the Laboratory's financial operations; and
- Manage and monitor the funds control process.

1.5 RELEVANT DEMOGRAPHIC INFORMATION

With locations in Albany, Oregon; Morgantown, West Virginia; Pittsburgh, Pennsylvania; Anchorage, Alaska; and Houston, Texas, NETL comprises 98 buildings and 14 major research facilities covering over 240 acres. As of December 31, 2019, NETL had 1,342 employees at its five locations – 459 were federal employees and 883 were site-support contractors.

1.6 ACCOMPLISHMENTS

NETL attained the following technology-related accomplishments in 2019.

AWARDS

- American Institute of Chemical Engineers (AIChE) Conference Chair for Carbon Management Technology Conference – The Carbon Management Technology Conference focuses on carbon capture, utilization, and storage (CCUS) technologies that provide options for lowering greenhouse gas emissions while maintaining fuel diversity for sustainable growth. Jose Figueroa was awarded an appreciation plaque for his role as Chair at the Carbon Management Technology Conference. ASFE Steven Winberg also attended.

- Carnegie Science Awards – The Carnegie Science Awards program honors and celebrates the innovators whose outstanding science and technology achievements make western Pennsylvania great and inspire the next generation.
  - Global Oil and Gas Infrastructure (GOGI) Team won under the Innovation in Energy category.
  - Permeability Engineering Through Strain Annealing Team won under the Advanced Materials and Manufacturing category.

- Technology Transfer Working Group (TTWG) – Best in Class Awards
  - Awards celebrating DOE's work in turning research into reality through commercialization. The group is comprised of the leading staff in technology transfer across DOE's 17 National Laboratories, the "crown jewels" of the Department's R&D enterprise. These awards celebrate the excellent work done by the labs to streamline and improve the commercialization process and focus on specific mission areas that ensure American competitiveness and security.
  - ExxonMobil Research and Engineering Partnership consisting of Jessica Lamp, Lisa Baker, Leah Bower, Adam Bratis (NREL), Bill Farris (NREL), Anne Miller (NREL), Ron Schoon (NREL), Eric Payne (NREL), John Stolpa (NREL), Leah Guzowski (INL), Rachel Taoq (INL) and Mark Olsen (INL).

- University of Pittsburgh Innovation Institute – James "Chip" Hanlon Volunteer Mentor Award, recognizes mentors who exemplify dedication and enthusiasm for helping Pitt innovators advance their ideas from the lab or the classroom to the market.
  - Paula Grendys volunteered her time for Pitt innovators in the First Gear program for the last five years and has been involved in other pitch competitions as a mentor and judge.

- Pittsburgh Federal Executive Board Excellence in Government Awards – These awards honor area federal employees whose service demonstrates deep personal and professional commitment.
  - Ken Mechling – Administrative Employee category for his leadership of NETL's K-12 STEM Education and Outreach program. Mechling tirelessly works to initiate and manage a robust K-12 STEM outreach program — despite limited resources and without a formal structure to work from. The result is a noteworthy program with far-reaching impacts and an emphasis on active learning. Because of Ken's efforts, NETL is effectively improving energy literacy and helping to train the next generation of American scientists, engineers and energy researchers to support the nation's economy and cultivate innovation.
  - Allen Lichvar – Outstanding Supervisor/Manager in a Professional Series category for his role as Site Manager (SM) manages real property facilities and facility-related operations in a manner that promotes operational readiness, personnel and environmental safety and health, and property preservation consistent with the NETL mission and in accordance with applicable law, federal policy and best practices. This role is critical to NETL operations, risk management and delivering the mission.
  - Dave Hopkinson – Professional Employee (All Other Professional Fields) category for his role as a research engineer. Hopkinson's research is primarily focused on the development of innovative materials for gas separations, with an emphasis on carbon capture. He is a technical portfolio lead for the $7M carbon capture field work proposal, which is a comprehensive body of research activities that are focused on materials and process development for reducing the cost for capturing CO_2 from fossil-fueled power generation. He is responsible for the success of this important NETL intramural research portfolio and provides technical guidance to multiple staff research scientists.

- R&D 100 Awards – This is the only S&T (science and technology) awards competition that recognizes new commercial products, technologies and materials for their technological significance that are available for sale or license.
  - LIBSense Monitoring Tool won in category of Analytical/Test. Team: Dustin McIntyre, Jinesh Jain, Dan Hartzler and CR Bhatt.
  - Co-Based Nanocrystalline Alloys for Gapless Inductors and Sensors won for the Mechanical/Materials category. Team: Paul Ohodnicki, Kevin Byerly, Michael McHenry (CMU), Alex Leary (NASA), Vladimir Keylin (NASA), Eric Theisen (Metglas) and Geraldo Nojima (Eaton).
  - Offshore Risk Modeling (ORM) Suite won for the Software/Services category. Team: Kelly Rose, Jennifer Bauer, Lucy Romeo, Patrick Wingo, MacKenzie Mark-Moser, Jake Nelson, Vic Baker (MATRIC) and Aaron Barkhurst (MATRIC).

- National Science and Technology Council (NSTC) Presidential Early Career Award for Scientists and Engineers (PECASE) The PECASE Award is the highest honor bestowed by the U.S. government on outstanding scientists and engineers beginning their independent careers. The awards are conferred annually at the White House following recommendations from participating agencies. Recipients: Shiwoo Lee, Douglas Kauffman and Jordan Musser.

- Federal Laboratory Consortium National 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.

- Going the Extra Mile Award (GEM) – The GEM Award recognizes employees who go above and beyond in their support of the Office of Fossil Energy and its primary mission — to ensure the nation can continue to rely on traditional resources for clean, secure and affordable energy while enhancing environmental protection.
  - Don Ferguson – Through his educational outreach efforts, Don Ferguson, Ph.D., exceeds his role as an energy researcher by cultivating children's passion for learning in his community.
  - Circe Verba – She always goes above and beyond her role as a research geologist at NETL by leading STEM outreach efforts to inspire underrepresented populations in rural Oregon.

  - Nancy Feeser – As an extraordinary administrative assistant, Nancy Feeser consistently completes tasks that would otherwise fall onto the shoulders of researchers, allowing them to focus on the important work to secure the nation's energy future.
  - Justin Adder – An exceptional employee who has applied his expertise as an experienced economist to provide vital energy analysis to the President and Congress while simultaneously excelling in demanding roles as a contracting officer representative and acting Energy Markets Analysis Team supervisor.
  - Jan Steckel – Her contributions in research and mentorship shine a positive light on NETL's continued efforts to enhance the nation's energy foundation and encourage the next generation of scientists to reach their career goals.

- United Scientific Group – International Conference on Gas, Oil, and Petroleum Engineering
  - This group bridges the gap between knowledge sharing needed to create platforms that are easily accessible and be efficiently utilized to discuss the bottle-neck issues and recent research advances that need to be addressed and updated.
  - Isaac Gamwo was honored to be the Keynote Speaker.

- Oregon Federal Executive Board – Public Service Recognition Week Awards recognizes the extraordinary work our federal workforce and community partners are doing in support of the mission and vocation of public service each and every day.
  - Steve Curfman was awarded the Unsung Hero award for his work on environmental, safety and health improvements. During that time, he has amassed a wealth of knowledge about the details of the work effort and the successes possible through cool logic and a personal approach to environment, safety and health. He is a believer in teamwork, nonconfrontational problem solving, and cultivation of working relationships that help eliminate difficulties before they occur. But, most importantly, he pursues his work with a low-key unobtrusive manner that typifies the contributions of an unsung hero.

- Who's Next: Environment & Energy Awards given by The Incline to people making Pittsburgh cleaner, greener, and more energy efficient.
  - Alexandra Hakala – is working to reduce the environmental impacts of shale gas production by improving our understanding of the chemicals used. As a research geochemist and onshore unconventional resources technical portfolio lead, her work is primarily focused on understanding impacts of the chemicals used in hydraulic fracturing and on identifying more environmentally sound options.
  - Doug Kauffman – a research chemist, works to reduce the environmental impact of fossil fuels by finding new uses for carbon dioxide, a potent greenhouse gas. Kauffman is looking for ways to convert carbon dioxide or CO_2 into more useful chemicals and fuels, part of what's been called a "carbon dioxide–recycling revolution."

- American Center for Life Cycle Assessment (ACLCA) - LCA Awards, This award honors individuals and organizations that have demonstrated excellence in advancing LCA and life cycle thinking. The annual awards program is an opportunity to recognize those leaders at all levels, in all areas that have shown powerful support and a clear vision for the implementation and application of LCA.
  - Timothy Skone received the Government Leadership in LCA Award - He is a Senior Environmental Engineer, a leader in Life Cycle Analysis Research efforts within the Office of Fossil Energy on carbon utilization technologies, methane emissions from the natural gas value chain, alternative transportation fuels, and advanced power generation systems.

- American Society of Mechanical Engineers (ASME) – Best Paper Award
  - Supercritical CO_2 Power Cycle Committee. Team: Nathan Weiland, Sandeep Pidaparti, Black Lance (SNL).

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/ISO 45001:2018 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 four 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 led to a reduced number of CX's issued by NETL. However, it has not necessarily reduced the number of Environmental Questionnaires (EQ) evaluated to process these CX determinations. For these reasons, the NEPA office is listing both CX's approved and EQ's reviewed to support these CX determinations. In general, overall CX reviews by the NEPA Office has increased over 2018.

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 FY2019:

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 CO2 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 Contracting Officer. The period of performance for the Cooperative Agreement (CA) expired on December 31, 2017. A letter was drafted by DOE and sent to HECA on January 7, 2020 requesting HECA to disposition the ERCs by transferring title of all the remaining ERCs to DOE with no further compensation to HECA. HECA was asked to provide any documentation necessary to facilitate the transfer no later than January 31, 2020. HECA responded on February 13, 2020 that they were meeting with officials interested in possibly restarting HECA and requested a delay in the transfer. A follow-up email was sent by DOE on February 19, 2020 requesting a response by February 21, 2020, for a date when they will affirmatively know if the project is restarting. There has been no response to-date.

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 CO2 capture facility at its existing W. A. Parish Generating Station (Parish Plant) in Fort Bend County, Texas; deliver the CO2 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 continued to review quarterly MAP reports through April 2019. Quarterly MAP report obligation concludes in 2019 and will be the last year of listing.

The following EA activities took place in FY2019:

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

Funding issues resulted in cancellation of all work at Youngstown Thermal. Testing and other actions under the new modified project were relocated to Alabama Power's Plant Gaston. As a result of de-scoping and location changes, Categorical Exclusions were issued for the new location in 2018 and 2019.

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. The Final EA and FONSI for the Utah site were issued in April 2018.

During the operational phase of FORGE, applicants will propose and be selected by a panel to test geothermal methods and equipment at the site. The FORGE site is expected to begin receiving Research and Development project proposals in 2020, which will be reviewed for compliance with the existing EA and FONSI by NETL's NEPA office.

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. The NEPA office has requested a thorough structural analysis to be incorporated into the EA to determine if the reconstruction of Building 2 could be considered a viable alternative in the EA. Delays have occurred with the structural analysis when asbestos concerns were revealed. An asbestos mitigation contract will need completed, prior to commencement of the structural report. Begin preparation of Draft EA projected to begin mid-FY2020.

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

DOE prepared an EA to evaluate the potential environmental impacts that would occur as a result of construction and operation of the proposed 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 prepared by NETL in 1993 which 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 National Historic Preservation Act (NHPA), an EA was 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 process to satisfy Section 106 of the NHPA. A draft EA was released for public review and comment on March 28, 2019. DOE received correspondence in a letter dated April 22, 2019 from WVSHPO supporting a determination of "no effect on historic properties." In addition, three federally recognized Native American tribes with possible interests in Monongalia County, West Virginia, the U.S. Fish and Wildlife Service (USFWS) and the U.S. Environmental Protection Agency (USEPA) were provided copies of the Draft EA. Two of the tribes responded, both with letters of concurrence. In a letter to DOE dated April 8, 2019, USFWS stated that the project is not likely to adversely affect the Indiana Bat, or affect any known long-eared bat hibernacula or roost trees, and therefore, no conservation measures were required. Comments received (by email) from USEPA were addressed in an email dated April 30, 2019 and are included in the EA. On May 30, 2019, the Director, NETL signed Finding of No Significant Impact (FONSI) and the Final EA was issued.

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

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

The plant would be configured to co-produce several saleable products including electricity, pyrolysis liquids (oils and tars), and low-pressure steam. This pilot system would be added to the existing combined heat and power (CHP) plant on the campus. The CHP plant is currently undergoing an unrelated retrofit of the coal-fired boilers with a circulating fluidized bed system. A small structure of approximately 180 square feet would be added to the existing building. Additionally, tanks of ammonium hydroxide would be placed outside of the building.

The preliminary design phase of this project has been completed. If selected to continue this project, the University would construct and operate the pilot modular gasification system. The EA has not commenced, was put on hold by direction of project recipient due to site selection delays.

These categorical exclusion (CX) activities and no cost time extensions took place in FY2019:

NO COST TIME EXTENSIONS GRANTED: 79

INTERNAL CX'S TO NETL

Morgantown, WV Site	26	
Pittsburgh, PA Site	7	
Albany, OR Site	10	
Combined ALB-MGN-PGH	1	
Combined MGN-PGH	1	
Total CXs	**45**	*[Supporting EQ's reviewed: 46]*

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

Continental U.S.	317	
Non-Continental U.S.	5	
Total CXs	**322**	*[Supporting EQ's reviewed: 716]*

GRAND TOTAL CXS FOR 2019: 2019: 367 *(**325** in 2018)*

GRAND TOTAL EQS REVIEWED FOR 2019: 762 *[of these, 19 covered work in international or non-continental U.S. locations] (**705** in 2018)*

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; 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 2019 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 2019, 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 experimental 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. 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. 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 was received in June 2019.

2.5 ENVIRONMENTAL VIOLATIONS CITED BY REGULATORS/ NOTICES ISSUED

Regulators cited no environmental violations in calendar year 2019 at the Albany and Pittsburgh Sites.

The Morgantown Site had one minor notice of violation that was issued from the Morgantown Utility Board on April 15, 2019. NETL was found to have submitted its November 2018 self-monitoring report required under a discharge permit issued by the Morgantown Utility Board in excess of forty-five days after the required due date. The Morgantown Utility Board considers reports submitted in excess of forty-five days after their due date to constitute permit noncompliance as defined in Code of Federal Regulations 40 part 403.8 (f) (2) (vii). The self-monitoring report was submitted February 2019. No corrective actions were required for this minor NOV.

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

NETL had one minor NOV that was issued from the Morgantown Utility Board on April 15, 2019. For more information about the NOV see section 2.5.

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

The Department's Occurrence Reporting and Processing System (ORPS) provides timely notification to the DOE complex of events that could adversely affect: public or DOE worker health and safety, the environment, national security, DOE's safeguards and security interests, functioning of DOE facilities, or the Department's reputation. NETL had four ORPS reportable items in 2019. 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 2019.

NETL underwent surveillance audits at all three facilities for the ISO 14001:2015 and ISO 45001:2018 standards in July, and August of 2019 and Albany and Morgantown did not receive any nonconformities during these audits. However, Pittsburgh received two minor nonconformities. Pittsburgh corrected the two minor nonconformities and all three sites were able to maintain their certifications.

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

The Pittsburgh and Morgantown sites originally received certification to the ISO 14001:1996 standard on August 31, 2003. The Albany site received certification to the ISO 14001:2004 standard June 9, 2005. All three sites were recertified to the same scope by Orion Registrar, Inc., in 2010. Recertification and surveillance audits 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 were also certified to the OHSAS 18001:2007 standard.

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

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

In 2019, all three sites underwent recertification audits to ISO 14001:2015 and certification audits to ISO 45001:2018 (which specifies requirements for an occupational health and safety, OH&S, management system). Audits were held July 30 - August 1, 2019 in Albany, OR; August 13-15, 2019, in Pittsburgh, PA; and August 27-29, 2019 in Morgantown, WV. Over the course of the three audits, Orion Registrar, Inc. identified two minor nonconformities; three opportunities for improvement; and 13 strengths. The two nonconformities involved an off-site electrical contractor not being aware that they had been trained on the details of an activity hazard analysis for the construction activity they were working on; and the Safety Analysis and Review System package for cafeteria operations not being kept current. NETL provided and implemented corrective actions to Orion Registrar for the nonconformities and these have been closed out.

By maintaining its ISO 14001:2015/ISO 45001:2018 certifications, NETL demonstrates to its workforce, the surrounding community, DOE and other stakeholders that it is committed to responsible environmental, safety, and health stewardship.

Finally, the Morgantown and Pittsburgh sites participated in a DOE Office of Fossil Energy (FE)/ Site Assistance Visit (SAV), June 18-20, 2019. In addition, the Albany site also participated in DOE FE/ SAV, August 13-14, 2019. 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, 2019 Summary of Permits.

Table 2.10: 2019 Summary of Permits – Industrial Hygiene

Permit No. and Name	Site	Issue Date	Regulatory Agency	Description
10-18-1081 Pacific Northwest Environmental, LLC *(License: FSC750)*	Albany	1/02/2019 – 2/15/2019	ORDEQ	B-1 Second Floor Renovations ASN6 – NON-FRIABLE ACM *Removal of CAB Pipe and VAT. Approximate Quantity = 60 linear feet of pipe & 75ft^2 of VAT.*
10-18-1081 Pacific Northwest Environmental, LLC *(License: FSC750)*	Albany	1/02/2019 – 2/15/2019	ORDEQ	B-1 Second Floor Renovations ASN1 – FRIABLE ACM *Removal of GWB/Joint Compound from Rooms 203, 204, 209A/B, 210A/B, 211, 215, 217, 221-223. Removal of CAB Exhaust Duct (mechanical chases running between 2nd-3rd floor). Removal of VAT and mastic throughout entire 2nd floor. Approximate Quantity = 15,692ft^2.*
10-18-1081 Pacific Northwest Environmental, LLC *(License: FSC750)*	Albany	1/19/2019 – 2/19/2019	ORDEQ	B-1 Second Floor Renovations ASN6 – NON-FRIABLE ACM *Removal of CAB Pipe. Approximate Quantity = 60 Linear feet*
10-18-1081 Pacific Northwest Environmental, LLC *(License: FSC750)*	Albany	1/19/2019 – 2/20/2019	ORDEQ	B-1 Second Floor Renovations ASN1 – FRIABLE ACM *Removal of GWB/Joint Compound from Rooms 203, 204, 209A/B, 210A/B, 211, 215, 217, 221-223. Removal of CAB Exhaust Duct (mechanical chases from 2nd & 3rd floor). Removal of VAT and mastic (throughout entire 2nd floor). Approximate Quantity = 13,560ft^2.*
CAC19273 (Courtesy Notice) Cira & Associates Consulting, LLC *(License: AC002710)*	Morgantown	11/18/2019 – 11/19/2019	WVDHHR	B-2 Exterior Door Replacement (Phase 2) – NON-FRIABLE ACM *Encasement of presumed cement board siding (Transite panel) for the SE Exterior Door Frame install. Approximate Quantity = 6ft^2.*

Table 2.10: 2019 Summary of Permits – Industrial Hygiene				
Permit No. and Name	**Site**	**Issue Date**	**Regulatory Agency**	**Description**
19-15 Neumeyer Environmental Services *(License: AC002796)*	Morgantown	11/4/2019 – 11/15/2019 *(Amended due to other scheduled GPP Projects. See below for updates)*	WVDHHR	Baltimore Air Cooler (BAC), Cooling Tower – NON-FRIABLE ACM *Removal of caulking between panels. Approximate Quantity = 56 linear feet.*
		1/2/2020 – 1/24/2020 UPDATE	WVDHHR	
CAC19283 (Courtesy Notice) Cira and Associates Consulting, LLC *(License: AC002710)*	Morgantown	12/5/2019	WVDHHR	B-25 Room 112 Laboratory Hood Removal (B25HOOD01 and B25HOOD02) – NON-FRIABLE PACM Removal of transite panels within laboratory hoods. *Approximate Quantity = 90ft².*

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 was to maintain federal leadership in sustainability and greenhouse gas emission reductions. It tasked federal agencies, 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 (PUE) 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; and
  - 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; and
  - Installing appropriate green infrastructure features on federally owned property to help with storm water and wastewater management.
- Improve (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.

While these goals were included as part of the ES&H Management System objectives and targets for FY2018, within FY2018, a new executive order (13834) was established revoking portions of these goals.

2.12 EXECUTIVE ORDER 13834

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

The goals set forth for federal agencies were to:

- Achieve and maintain annual reductions in building energy use and implement energy efficiency measures that reduce costs;
- Meet statutory requirements relating to the consumption of renewable energy and electricity;
- Reduce potable and non-potable water consumption, and comply with stormwater management requirements;
- Utilize performance contracting to achieve energy, water, building modernization, and infrastructure goals;
- Ensure that new construction and major renovations conform to applicable building energy efficiency requirements and sustainable design principles, consider building efficiency when renewing or entering into leases, implement space utilization and optimization practices; and annually assess and report on building conformance to sustainability metrics;
- Implement waste prevention and recycling measures and comply with all Federal requirements with regard to solid, hazardous, and toxic waste management and disposal;
- Acquire, use, and dispose of products and services, including electronics, in accordance with statutory mandates for purchasing preference, Federal Acquisition Regulation requirements, and other applicable Federal procurement policies; and
- Track and report on energy management activities, performance improvements, cost reductions, greenhouse gas emissions, energy and water savings, and other appropriate performance measures.

NETL considered the requirements of the executive order when establishing specific objectives and targets for its FY2019 ES&H Management System. It was anticipated that E.O. 13834 will remain in effect for FY2020.

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.

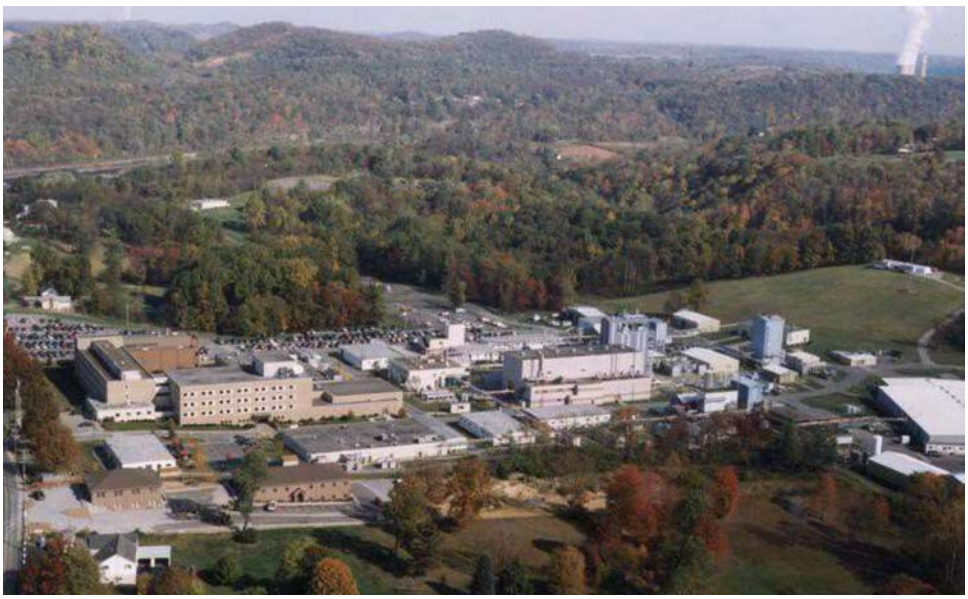


Photo 3.1.1: Morgantown Site.

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, 2019, 615 employees worked at the Morgantown site; 210 federal employees and 405 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 according to the Morgantown Area Partnership are West Virginia University, WVU Medicine, Monongalia County Board of Education, Monongalia General Hospital, National Energy Technology Laboratory, Mylan Pharmaceuticals, and U.S. Centers for Disease Control.

3.1.2 Major Site Activities – Morgantown

1.) Building 14 Control Room Envelope Insulation

Utilizing spray foam insulation, the project improved the insulation of approximately 500 square feet of the east and west exterior walls of the Building 14 Control Room.

Photo 3.1.2.1: Control Room Insulation.

2.) Building 4 Lower Roof Replacement

Replaced existing roof due to age to prevent water, snow, and ice damage to the interior integrity of the building. The new roof is a 2-ply modified bitumen built-up system with higher insulation values compared to previous resulting in improved energy efficiency and features a 30-year warranty.

Photo 3.1.2.2: Building 4 Lower Roof Replacement.

3.) Building 4 Exterior Insulation Finish System (EIFS)

Replaced/Repaired/Refinished Deteriorated (EIFS) on Building 4. The existing EIFS had many areas of patching of deteriorated panels over the years and had several areas of delamination. Replaced three man doors with new fiberglass doors and paint all existing man doors, garage doors, railings, window framing, conduits, and trims. The project also included replacing all building exterior lights with new LED light fixtures and a lighting bar to light up the building sign.

Photo 3.1.2.3: Building 4 EIFS After Renovation.

4.) Building 4 HVAC Replacement

Replaced three HVAC units that have reached the end of their life cycle with two new energy efficient HVAC units. The new units will supply heating and cooling to the mezzanine offices and to a control room and restroom on the south west side of Building 4.

Photo 3.1.2.4: Building 4 HVAC Replacement.

5.) Building 39 Boiler Replacement

Replaced a natural gas hot water boiler that had failed in Building 39 with an in-kind boiler. The boiler is one of a series of 3 boilers that provide heat to Building 39.

Photo 3.1.2.5: Building 39 Boiler.

6.) Building 19 Sewer Line Project

The sanitary sewer line for the south portion of Building 19, which produces most of the sewage in Building 19, was originally routed to a sewage lift station. This line was re-routed to the main site gravity drain sanitary sewer line. This rerouting will decrease the maintenance occurrences for the lift station.

Photo 3.1.2.6: Main Sanitary Gravity Drain Line and the Building 19 South Line.

7.) Building Demolition Projects

Building 9, Building 11, Building 18, Building 27, and Building 27A were demolished. They had reached the end of their useful life and were no longer functional.

Photo 3.1.2.7: Building 18 Demolition.

8.) Phase II Sitewide Door Replacement Projects

Replaced 1 single and four sets of double doors that had reached their end of life. The doors were replaced with FRP (Fiberglass Reinforce Plastic) units to prevent corrosion and extend the longevity of the door.

Photo 3.1.2.8: Door Replacement Before and After.

3.1.3 Environmental Restoration and Waste Management

3.1.3.1 CERCLA

Morgantown had no National Priorities List (NPL) sites in 2019 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 2019.

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.

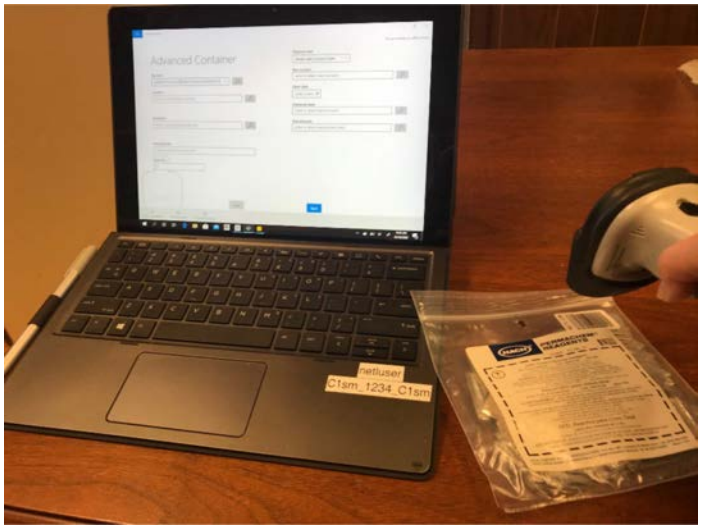


Photo 3.1.3.2: Bar Code Scanning of Chemicals.

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 2019. 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.

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 2019, 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.

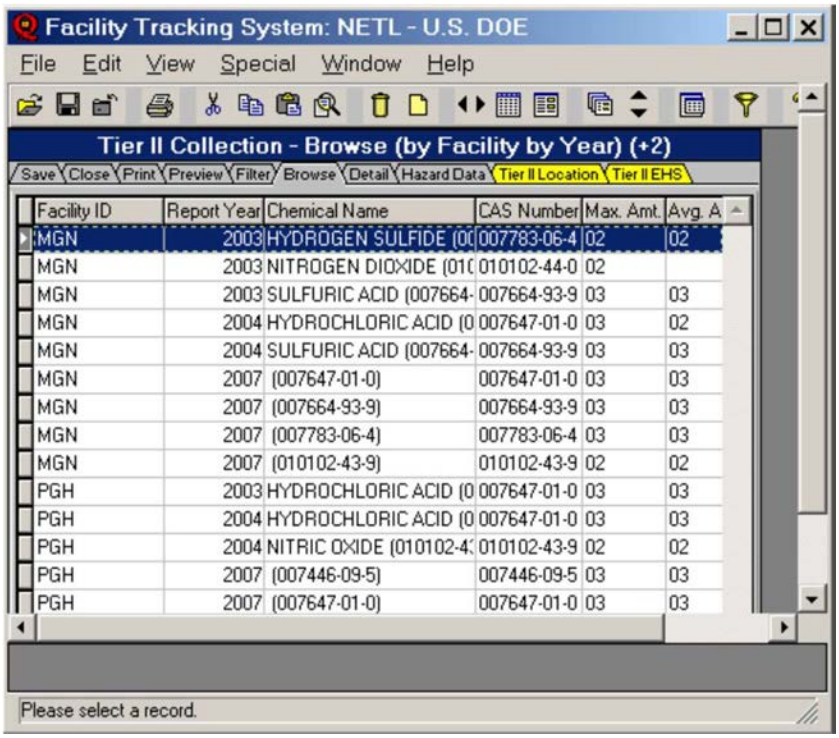


Figure 3.1.3.2: NETL Facility Tracking System.

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 2019, 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: 2019 Tier II Chemical Inventory Reporting List—Morgantown

Chemical Name	CAS #	Avg. Amount/Max. Daily Amount (lbs.)	TPQ (lbs.)
Carbon Dioxide	124-38-9	1,750/2,845	—
Hydrochloric Acid	7647-01-0	450/573	500
Hydrogen Sulfide	7783-06-4	20/22	
Nitrogen, Refrigerated Liquid	7727-37-9	52,000/62,500	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).

There were no RCRA non-compliances in 2019. 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: 2019 Hazardous Waste Generation – Morgantown for summary information on waste generation and management at Morgantown.) Per permit requirements, in 2019, hazardous waste materials were transported to the TSD facilities of Tradebee, Inc., located in East Chicago, IN, for ultimate disposition in accordance with regulatory requirements.

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 2019, NETL recycled batteries, fluorescent light bulbs, drums (Photo 3.1.3.3), and various items containing mercury.

Photo 3.1.3.3: Morgantown Drum Crusher.

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 Central 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: 2019 Hazardous Waste Generation-Morgantown

Waste Stream	Qty. Generated (lbs.)
Poison (Toxic Solids & Liquids)	499
Mercury/Mercury Compounds	11
Flammable Solids	462
Corrosive (Liquids & Solids)	421
Waste Oxidizers	44
Waste Paint (Oil Based)	238
Flammable/Combustible Liquids	241
Activated Carbon	1
Other RCRA Hazardous Wastes	35
Lead Paint Debris	125
Fluorescent Light Tubes (Universal Waste)	234
Batteries (Universal Waste)	253
TOTAL	**2564**

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 2019.

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

The Toxic Substances Control Act of 1976 mandated the EPA to regulate the commercial production, sale, and use of listed chemicals.

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 2019. 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 Morgantown site is inventoried and maintained. No samples taken in 2019 indicated that the materials contained fiber concentrations in excess of EPA or the State of West Virginia clearance levels (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.

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 2019: (1) Baltimore Air Cooling (BAC) Tower Demolition (Permit #: 19-15). There were two separate projects that submitted a courtesy notice to the WV DHHR in 2019: (1) B-2 Exterior Door Encasement (Permit #: CAC19273); and (2) B-25 Room 112 Laboratory Fume Hood Removal (Permit #: CAC19283).

In addition to asbestos abatement, NETL tests for lead-based 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. There were no non-conformances related to asbestos or lead activities.

3.1.3.7 FIFRA

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

3.1.4 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 3.1.4.1 lists the 2019 source inventory at Morgantown. Table 3.1.4.2 contains the 2019 X-Ray radiation generating devices.

Table 3.1.4.1: 2019 Radioactive Source Materials Inventory—Morgantown		
Isotope	Activity/Date Determined	Source
H-3	20 Ci (5/94)	Model #B100/U10, Serial #575263, SRB Technologies
H-3	20 Ci (5/94)	Model #B100/U10, Serial #574434, SRB Technologies
H-3	20 Ci (5/94)	Model #B100/U10, Serial #574435, SRB Technologies
H-3	20 Ci (5/94)	Model #B100/U10, Serial #574436, SRB Technologies
Cs-137	10 mCi (3/10)	Registration #0190/10, Geotek, Ltd
Cs-137	1 µCi (1/14)	Serial #206, Spectrum Techniques

Table 3.1.4.2: 2019 Morgantown X-Ray Radiation Generating Devices	
Device	**Quantity**
Dual Anode X-Ray Source Perkin-Elmer Monochromator X-Ray Source Perkin-Elmer	2
X-Ray Diffractometer PANalytical	2
Astrophysics Inc. Model: X1S100X	1
CT Scanner Toshiba (X-ray tube: Model: CXB-750D	1
Micro CT Scanner Xradia xCT-400	1
Comet X-Ray System	1
Olympus Innov-X-Delta XRF	1
Scanning Microscope JEOL Field Emission Electron Microscope JEOL	2
PANalytical XRF	1
Yxlon International MGC 41	1

The Morgantown site did not release any of the radiation source materials into the environment, 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 2019.

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 2019 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 2019 source inventory is displayed in Table 3.1.4.1. NETL-Morgantown does not generate or treat any radioactive material, nor does it have any temporary or permanent facility for radioactive waste disposal on-site. An inventory of radiation sources is maintained and monitored by the radiation safety officer. Information is retained about the item, isotope, quantity, custodian, location, status and sealed-source activity. All radioactive sources are sealed and are used in instrumentation/ equipment or as check sources.

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

No radiation leakage, release, or abnormal exposure events occurred in 2019.

3.1.5 Air Quality and Protection Activities

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

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

Also, as part of NETL's air quality protection activities, several Environmental Management Plans (EMP)s have been established to decrease various emission sources, reduce energy usage, and reduce the use of petroleum-based fuels/ increase the use of alternative fuels and renewable energy, 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. 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 reduces energy intensity in buildings to achieve GHG reductions.

The West Virginia Division of Air Quality's (WVDAQ) Permitting Section implements West Virginia's permit program established under the State's Air Pollution Control Act. West Virginia's permit program includes review of applications, determination of permit applicability and issuance of permits for both minor and major sources. Per the WVDAQ, (http://www.dep.wv.gov/daq/General/Pages/AirQualityDefinitions.aspx), a source or stationary source is defined as any governmental, institutional, commercial or industrial structure, installation, plant, building or facility that emits or has the potential to emit any regulated air pollutant under the Clean Air Act. Per WVDAQ, NETL-MGN's operations (laboratory facilities associated with R&D activities) fall under 45CSR13 (http://www.dep.wv.gov/daq/planning/Documents/45-13.pdf). Specifically, 45CSR13B *The Permitting of Laboratories Under 45CSR13*, provides guidance and clarification regarding any necessary permitting for construction and operation of stationary sources of air pollutants from laboratory facilities (http://www.dep.wv.gov/daq/planning/Documents/45-13B.pdf). The Morgantown site had no new source reviews in 2019 and does not meet the criteria for a stationary source; therefore, no permit or regulatory reporting is required.

WVDAQ generally evaluates air quality on a county-by-county basis, although the regional data may be aggregated into Air Quality Control Region #6, for north central West Virginia. Monitoring is performed in Monongalia County daily at several sites, and the data is made available from the WVDEP website's air-quality index and from the EPA AirNOW webpage (http://www.airnow.gov/). Although, the Morgantown site is not a significant contributor to ambient air quality issues, air emissions are estimated in quarterly and annual air emission inventories to analyze the cumulative effect of all the projects and facilities. This analysis showed that no regulatory or other environmental impact occurred during 2019. Table 3.1.5 displays the estimated 2019 Air Emissions.

In addition, 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.

Table 3.1.5: 2019 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, PM10, 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

Photo 3.1.5: B-39 Meteorological Tower.

Photo 3.1.5.1: B-19 Rain Gauge.

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. More details are provided in the following subsections.

Photo 3.1.6: Morgantown Storm Water Sampling Point.

3.1.6.1 Clean Water Act

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. 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.

Photo 3.1.6.1: Morgantown Wastewater Permit Sampling Point.

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. The MGN Site's Stormwater Permit Re-Issue Application was submitted to WVDEP on March 27, 2020.

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 3.1.6.2.1) drains parking areas, offices and a large section of undeveloped land; it drains an area of 3,197,304 square feet.

Photo 3.1.6.2.1: Morgantown Outfall 010.

Table 3.1.6.2: 2019 NPDES Permit Storm Water Monitoring Requirements—Morgantown			
Outfall	**Pollutants of Concern**	**Low Concentration Cutoff Waiver**	**Frequency**
002	Nitrite and nitrate Fecal	Report only	6 months
	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
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: 2019 NPDES Storm Water Analysis Results—Morgantown							
Constituents	Low Conc. Cutoff Waiver	Outfall 002		Outfall 005		Outfall 010	
		Apr.	Oct.	Apr.	Oct.	Apr.	Oct.
Nitrate + Nitrite (Grab)	0.68 mg/L	0.76 mg/L	0.45 mg/L	NS	NS	NS	NS
Ammonia (Grab)	4 mg/L	0.44 mg/L	0.28 mg/L	0.24 mg/L	0.22 mg/L	0.15 mg/L	<0.1 mg/L
Fecal Coliform (Grab)	---	387.3 col/ 100 mL	>600 col/ 100 mL	22.3 col/ 100 mL	>600 col/ 100 mL	290.9 col/ 100 mL	>600 col/ 100 mL
TSS (Grab)	100 mg/L	170 mg/L	22 mg/L	35 mg/L	15 mg/L	180 mg/L	48 mg/L
BOD	30 mg/L	14 mg/L	4 mg/L	5.5 mg/L	NR	2.9 mg/L	7 mg/L
pH	9.0 s.u.	7.1 s.u.	8.5 s.u.	7.4 s.u.	8.6 s.u.	7.6 s.u.	8.0 s.u.
COD	120 mg/L	45 mg/L	22 mg/L	32 mg/L	<10 mg/L	26 mg/L	33 mg/L
Oil and Grease	15 mg/L	ND (<4.0 mg/L)	ND (<5.1 mg/L)	ND (<3.9 mg/L)	ND (< 5.1 mg/L)	ND (<3.9 mg/L)	ND (<5.1 mg/L)

ND = not detected; NS = not sampled; NR = not reported; 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 3.1.6.2.1). 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. The permit does not have reporting limits but only requires NETL to report the monitoring results. NETL satisfied the requirements of the permit.

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 3.1.6.2.2, 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 3.1.6.2.2: 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 3.1.6.2.3, 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 3.1.6.2.3: 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 3.1.6.2.4, 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 2019 are provided in Table 3.1.6.2.3: 2019 Wastewater Effluent Analysis (lbs./d); Pretreatment Permit, Outlet No. 01, One Sample/Month – Morgantown.

Photo 3.1.6.2.4: Morgantown Clarifier.

Table 3.1.6.2.3: 2019 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	0.007	0.01	0.005	0.01	0.01	0.01	0.01	0.01	0.005	0.004	0.003	0.005
Daily Max.	0.15	0.03	0.03	0.01	0.02	0.02	0.02	0.028	0.02	0.02	0.011	0.01	0.02
BOD5 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
TSS Monthly Avg.	Monitor	0.09	9.12	0.05	0.12	0.11	0.23	0.28	0.15	0.04	0.13	0.03	0.5
Daily Max.	Monitor	0.4	0.5	0.1	0.3	0.2	0.5	0.7	0.3	0.2	0.3	0.1	1.6
Arsenic Monthly Avg.	0.005	0.00005	ND	ND	ND	0.0001	ND	ND	ND	ND	ND	ND	0.00004
Daily Max.	0.008	0.0003	ND	ND	ND	0.0001	ND	ND	ND	ND	ND	ND	0.0001
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	0.0001	0.001	0.0003	0.0008	0.0022	ND	0.001	0.0006	0.0002	0.0003	0.0004	0.0025
Daily Max.	0.06	0.0003	0.002	0.001	0.002	0.004	ND	0.002	0.001	0.001	0.001	0.0013	0.0081
Cyanide Monthly Avg.	0.02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0005
Daily Max.	0.03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.01
Lead Monthly Avg.	0.025	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00003	0.00021
Daily Max.	0.038	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.0001	0.0007
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	0.0001	0.0001	0.00005	0.0001	0.0001	ND	ND	ND	ND	0.00004	0.00003	0.00008
Daily Max.	0.015	0.0003	0.0004	0.0001	0.0002	0.0001	ND	ND	ND	ND	0.0001	0.0001	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	0.001	0.001	0.001	0.002	0.001	ND	0.002	0.002	0.001	0.001	0.0003	0.002
Daily Max.	0.3	0.0028	0.0055	0.0023	0.0062	0.0021	ND	0.0056	0.003	0.002	0.002	0.001	0.007
Iron Monthly Avg.	Monitor	0.02	0.02	0.02	0.03	0.03	ND	0.027	0.012	0.007	0.017	0.006	0.075
Daily Max.	Monitor	0.08	0.08	0.04	0.08	0.05	ND	0.063	0.023	0.028	0.046	0.019	0.24
Manganese Monthly Avg.	Monitor	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.002	0.002	0.002	0.012
Daily Max.	Monitor	0.033	0.04	0.017	0.024	0.014	0.028	0.026	0.013	0.01	0.005	0.005	0.037

Table 3.1.6.2.3: 2019 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	0.0003	ND
Daily Max.	Monitor	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.001	ND
TOX													
Monthly Avg.	Monitor	0.009	0.009	0.006	0.007	0.01	0.01	0.003	0.01	0.005	0.003	ND	0.004
Daily Max.	Monitor	0.04	0.04	0.02	0.02	0.01	0.03	0.019	0.02	0.02	0.01	ND	0.01
Organics													
Alachlor-1254	Report	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS
All others	Report	NS	NS	NS	ND	NS	NS	NS	NS	NS	NS	NS	NS
pH (s.u.)													
Minimum	6.0	6.63	6.54	6.55	6.23	6.0	6.76	7.06	6.72	6.72	6.72	6.63	6.77
Maximum	9.0	7.73	7.71	7.52	7.28	7.42	7.70	7.70	7.69	7.69	7.69	7.44	7.83
TDS													
Monthly Avg.	Monitor	29	82	33	35	48	37	39	25	15	12	19	20
Daily Max.	Monitor	125	351	87	98	82	80	91	50	62	33	63	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 2019. 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 one report with the Department's ORPS in 2019 based on a single Notice of Violation for failing to provide timely report related to NETL's discharge permit with the Morgantown Utility Board, see Section 2.5 for details.

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 2019.

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) Program Manager represents NETL on local emergency planning committees, and is available to review hazard-based risks to a particular region, for example, high-priority impacts from high-water levels and storm damage due to weather events of increasing intensity.

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

Photo 3.1.10.2: ERO Exercise in Morgantown.

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, 2019 Summary of Permits.

Table 3.1.13: 2019 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, 03/30/2020	WV Department of Environmental Protection (WVDEP), Division of Water and Waste Management	MGN Site (NPDES Stormwater Permit Registration Number: WVG610042) is authorized to operate under WV/NPDES General Water Pollution Control Permit No. WV0111457 and subject to the provisions of Section W-1 of the General Permit. Semi-annual stormwater samples are collected and submitted as per Water Pollution Prevention Plan and Groundwater Protection Management Plan required by the permit.

3.1.14 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.

NETL does not have a fire fighting program, other than an OSHA required 'fire watch' person taking response when 'hot work' is taking place, and those persons are trained. Voluntary fire extinguisher usage is allowed but not required. NETL's essential response to any fire- facility, project area, vehicle, wildfire, or any other, would be to call the local fire department.

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 599 employees; 212 federal and 387 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.

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.

Photo 3.2.1: Pittsburgh Site.

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 (2018 dollars) for a household in the city was $45,831. The per capita income for the city (2018 dollars) was $31,972. About 21.4 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-94 Functional Materials Research Center (FMRC) Project 2nd Floor Renovation

B-94 second 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 B-94 – 2nd floor laboratories necessary to support completion of the renovations throughout B-94 to accommodate planned research operations. The 2nd floor of B-94 was only partially renovated and was unoccupied before the project. Further renovations were required to set up the 2nd floor to accommodate a new FMRC.

Photo 3.2.2.1a: B-94 Second Floor – Before Renovation.

Photo 3.2.2.1b: B-94 Second Floor – After Renovation.

Photo 3.2.2.1c: B-94 Second Floor – After Renovation.

2.) B-922 Legal Area Renovation

This project included renovations and modifications to the B-922 legal area to increase the number of offices and refresh the carpet and wall paint.

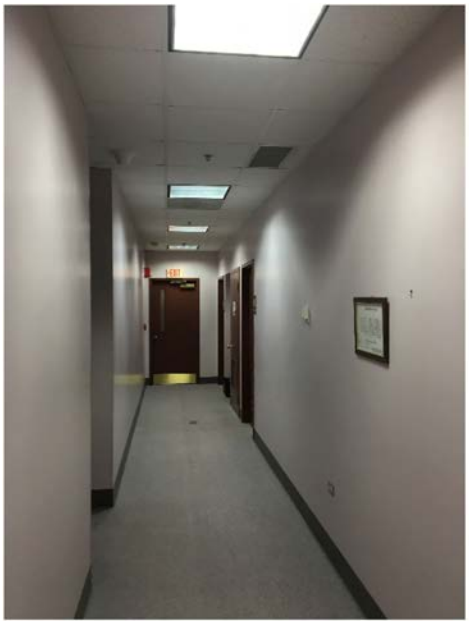


Photo 3.2.2.2a: B-922 Legal Area – Before Construction.

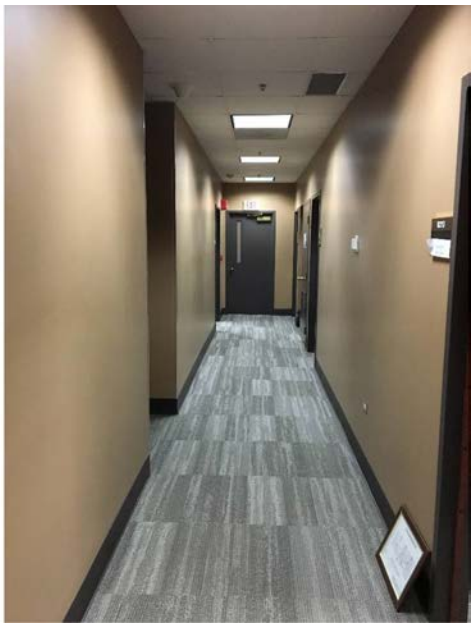


Photo 3.2.2.2b: B-922 Legal Area – After Construction.

3.) B-94 Room 103 Computer Machine Learning Cluster

This project included the renovation of Room 103 in B-94 to accommodate installation of a computer machine learning cluster.

Photo 3.2.2.3a: B-94 Room 103 – Before Construction.

Photo 3.2.2.3b: B-94 Room 103 – After Construction.

4.) B-922 – 2nd Floor Renovation Project

This project included the renovation of the 2nd floor of B-922 to replace existing carpet, kitchenette renovation, and painting of existing walls.

Photo 3.2.2.4a: B-922 - 2nd Floor – Before Construction.

Photo 3.2.2.4b: B-922 - 2nd Floor – After Construction.

5.) B-922 Director's Area Carpet Replacement

This project included replacement of the carpet in the B- 922 Director's Area.

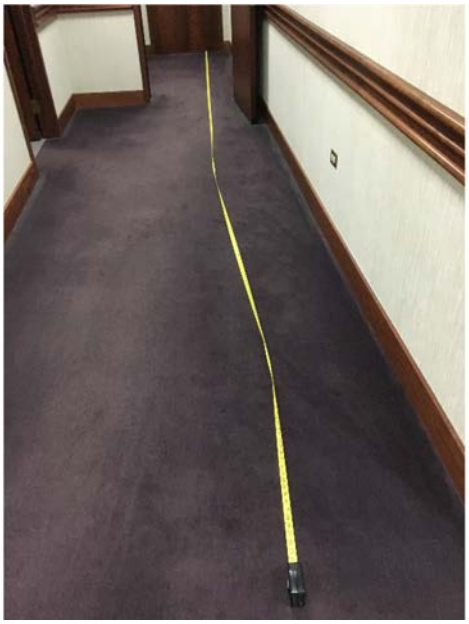


Photo 3.2.2.5a: B-922 Director's Area – Before Construction.

Photo 3.2.2.5b: B-922 Director's Area – After Construction.

6.) B-922 Room 102 Conference Room Renovation

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

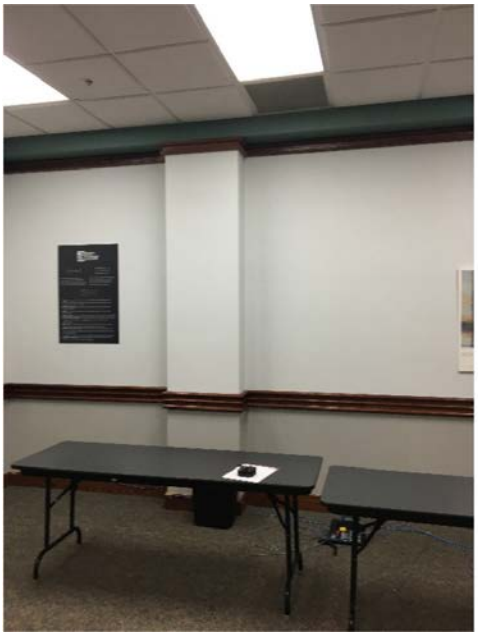


Photo 3.2.2.6a: B-922 Room 102 – Before Construction.

Photo 3.2.2.6b: B-922 Room 102 – After Construction.

7.) B-84 Roof Replacement

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

Photo 3.2.2.7: B-84 Roof Replacement – New roof in foreground, old roof in background.

8.) 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 3.2.2.8a: Cafeteria Renovation – Under Construction.

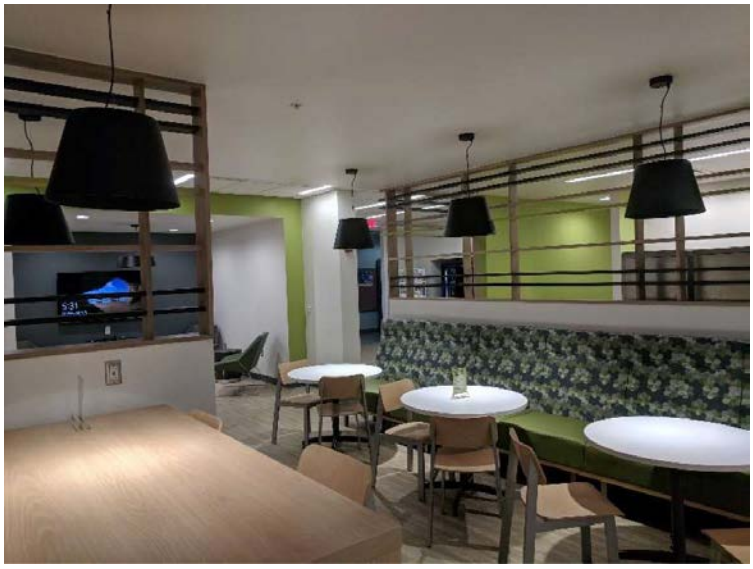


Photo 3.2.2.8b: Cafeteria Renovation – After Construction.

9.) B-911 Water Pit Cover Replacement

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

Photo 3.2.2.9: B-911 Water Pit Cover – Under Construction.

10.) B-922 Boiler Replacement Design and Award

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

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

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

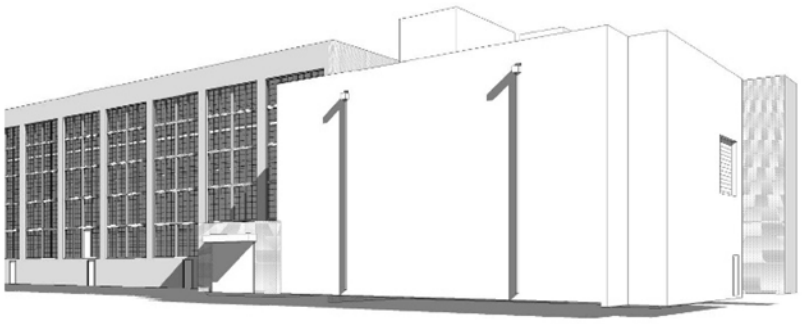


Photo 3.2.2.11: B-83 CDAML – Building Addition Rendering.

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 2019, 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

Pennsylvania Department of Environmental Protection (PADEP) is authorized to enforce the federal and state hazardous waste management requirements at the Pittsburgh site. (Diagram 3.2.3.2 details the breakdown of hazardous waste recycled and landfilled at the Pittsburgh site in 2019.) Hazardous waste operations personnel frequently review current waste industry newsletters and bulletins, receive information from the Alliance of Hazardous Materials Professionals, study NETL’s regulatory compliance reviews, attend hazardous materials transportation training every three years, and attend hazardous waste operations training each year. There were no RCRA non-compliances in 2019.

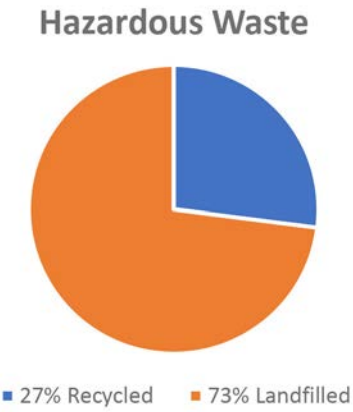


Diagram 3.2.3.2: Pittsburgh 2019 RCRA Hazardous Waste Disposition Profile.

Due to the amount of waste typically generated, the Pittsburgh site is considered a large quantity hazardous waste generator [generating greater than 2,200 lbs. (1,000 kg) of hazardous waste or greater than 2.2 lbs. (1 kg) of acutely hazardous waste per calendar month] and has an EPA Large Quantity Generator Identification Number. While the Pittsburgh site 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. As a large quantity generator, hazardous waste storage at NETL-Pittsburgh is limited by permit to up to 90 days. Most of the waste is packaged and shipped in laboratory packs (lab packs) (Photo 3.2.3.2) containing combinations of several different compatible chemicals within a single container.

Photo 3.2.3.2: Lab Packs.

The chemical handling support staff at the Pittsburgh site is not authorized to transport hazardous waste. In 2019, 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 then 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 10,774 pounds of hazardous waste, in 2019. (Pittsburgh also generated 1,905 pounds of universal waste.)

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

Liquid wastes are kept in 55-gallon drums. The Pittsburgh site does not have a storage or treatment pond, nor does the Pittsburgh site have underground storage tanks to store petroleum or hazardous waste, or aboveground storage tanks to store hazardous waste. Liquid acids and bases are collected at satellite accumulation areas (SAAs) and are characterized and analyzed, as necessary. Waste 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) periodic 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.

NETL-Pittsburgh complies with the RCRA hazardous waste manifest requirements before wastes are shipped from the site. Each manifest is checked against the actual shipment to ensure accuracy when the contracted transporter is ready to pick up 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. Waste generators ensure that all hazardous or potentially hazardous wastes are properly contained and identified at the point of generation. Generators are held accountable for wastes that are not properly contained or identified, or are otherwise mismanaged.

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

NETL's hazardous waste manager ensures compliance with applicable regulations by overseeing the 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 (Treatment, Storage, and Disposal) 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 proper handling techniques and disposal methods for chemical waste.

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 2019. 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).

Table 3.2.3.3: 2019 Tier II Chemical Inventory Reporting List-Pittsburgh

Chemical Name	CAS #	Daily Amount (lbs.)	TPQ (lbs.)
Nitrogen, refrigerated liquid	7727-37-9	Average: 74,500 Maximum: 74,681	None
Argon, refrigerated liquid	7440-37-1	Average: 1,578 Maximum: 1,981	None

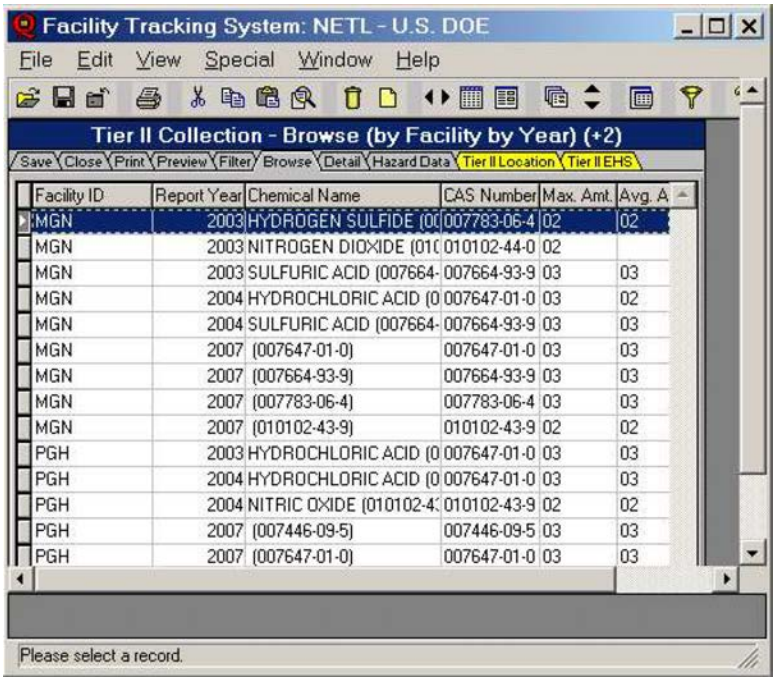


Figure 3.2.3.3: NETL Facility Tracking System.

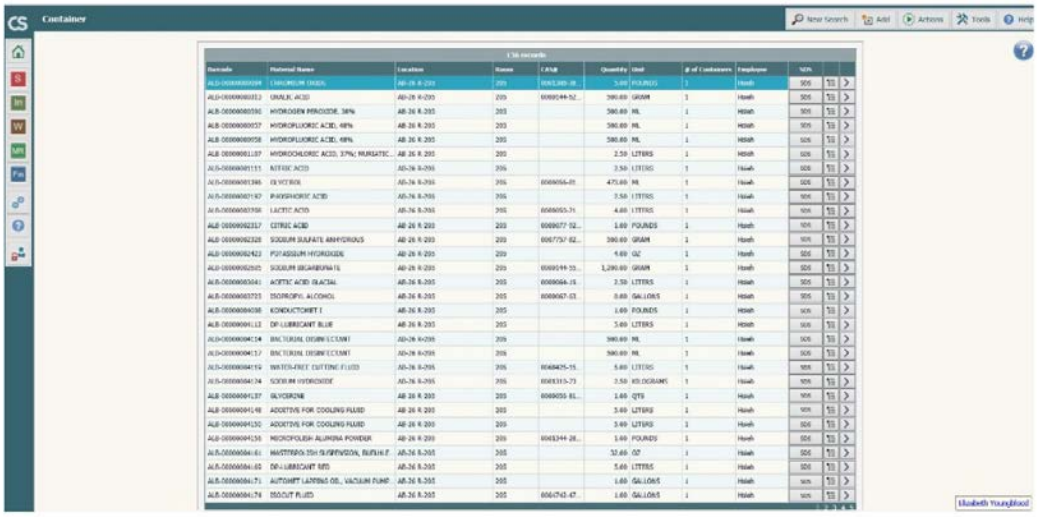


Figure 3.2.3.3.1: Chemical Inventory Tracking Software.

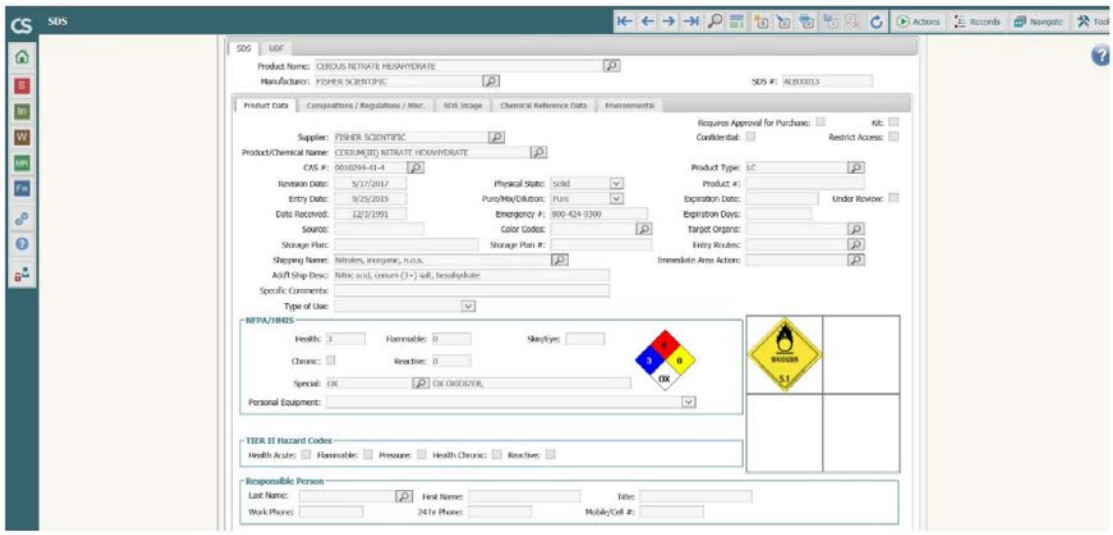


Figure 3.2.3.3.2: Safety Data System Database Software.

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 2019, 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 2019.

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. There were no TSCA non-compliance issues in 2019.

No unplanned releases of air pollutants covered by CERCLA or toxic release inventory (TRI) regulations occurred during 2019. 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 2019 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.

Most ACM is floor tile and floor tile mastic installed in various laboratory buildings (e.g., B-94 and B-901). The remainder of ACM is contained in roofing materials, caulking, or laboratory furniture. Asbestos remaining inside buildings are well encapsulated by the matrix material (e.g., floor tiles and laboratory tabletops). In addition, asbestos was also found in some gaskets and inside some laboratory devices, such as muffle and tube furnaces. When asbestos is removed as part of any remodeling or reworking in a room, building, or facility, it is handled by a licensed Asbestos Abatement/Removal Contractor (AA/RC). There were no projects that required a 10-day asbestos notification permit identified in 2019.

In addition, NETL 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. A professional pest control company is subcontracted to spray inside certain offices as needed, cafeteria drains, certain lunch areas, certain basement areas, and the daycare facility. Herbicides are not used for 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 and tracks each item, isotope(s), quantity, custodian, location, status and activity. Table 3.2.4.1 lists the 2019 source inventory at Pittsburgh. Table 3.2.4.2 contains the 2019 x-ray radiation generating devices.

Table 3.2.4.1: 2019 Radioactive Source Materials Inventory—Pittsburgh

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

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

Table 3.3.4.2: 2019 Pittsburgh X-Ray Radiation Generating Devices

Device	Quantity
X-Ray Florescence Instrument	1
X-Ray Photoelectron Spectrometer (Physical Electronics, Model 5600ci)	1
X-Ray Diffraction (Phillips X'PERT MPD)	1
X-Ray Diffractometer (Rigaku D/maX Rapid II)	1
Mail X-Ray Instrument	1

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. Two low-level radioactive waste (LLRW) disposal shipments were required in 2019. In February 2019, 60 pounds of LLRW was properly disposed of at a licensed facility in Texas. Another LLRW shipment occurred in May 2019, 11 pounds and was properly disposed of at a licensed facility in Texas.

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 2019 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 2019 source inventory is displayed in Table 3.2.4.1. NETL-Pittsburgh does not generate or treat any radioactive material, nor does it have any temporary or permanent facility for radioactive waste disposal on-site.

An inventory of radiation sources is maintained and monitored by the radiation safety officer. Information is retained about the item, isotope, quantity, custodian, location, status and sealed-source activity. All the radioactive sources are sealed and are used in instrumentation/equipment or as check sources. 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 2019.

3.2.5 Air Quality and Protection Activities

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 2019. 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 2019.

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 2019. 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: 2019 Air Emissions Inventory—Pittsburgh	
Pollutant	**Estimated Emissions (lbs./yr.)**
Ammonia	126.6
Benzene	0.08
Butane	8.3
Carbon Dioxide	4,639,740
Carbon Monoxide	3,322.5
Hexane	0.7
Napthalene	0.02
Formaldehyde	3.0
Nitrogen Oxide	87.0
Lead	0.02
Pentane	10.3
Ethane	12.3
Methane	91.0
Particulate Matter, $PM_{2.5}$	1,100
Particulate Matter, PM_{10}	1,400.6
Sulfur Dioxide	23.7
Toluene	0.13
Arsenic	0.008
Barium	0.2
Cadmium	0.04
Chromium	0.06
Cooper	0.03
Manganese	0.02
Mercury	0.01
Molybdenum	0.04
Nickel	0.1
Vanadium	0.1
Zinc	1.1
VOC	217.5

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 2019 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 2019 Monthly Monitoring Results (mg/L). No permit limits were exceeded in 2019.

Table 3.2.6: 2019 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 17, 2019 Sampling Date						
Subinterceptor Location						
Composite	0.0080 mg/l	0.063 mg/l	ND	N/A	ND	N/A
Grab #1	N/A	N/A	N/A	N/A	N/A	7.81 s.u.
Grab #2	N/A	N/A	N/A	N/A	N/A	8.58 s.u.
Grab #3	N/A	N/A	N/A	N/A	N/A	8.78 s.u.
Grab #4	N/A	N/A	N/A	N/A	N/A	8.68 s.u.
B-74 Effluent						
Composite	ND	0.027mg/l	ND	N/A	ND	N/A
Grab #1	N/A	N/A	N/A	N/A	N/A	6.68 s.u.
Grab #2	N/A	N/A	N/A	N/A	N/A	6.76 s.u.
Grab #3	N/A	N/A	N/A	N/A	N/A	6.71 s.u.
Grab #4	N/A	N/A	N/A	N/A	N/A	6.69 s.u.
October 16, 2019 Sampling Date						
Subinterceptor Location						
Composite	0.012 mg/l	0.085 mg/l	0.0018 mg/l	N/A	0.0003 mg/l	N/A
Grab #1	N/A	N/A	N/A	N/A	N/A	7.07 s.u.
Grab #2	N/A	N/A	N/A	N/A	N/A	8.18 s.u.
Grab #3	N/A	N/A	N/A	N/A	N/A	7.87 s.u.
Grab #4	N/A	N/A	N/A	N/A	N/A	7.63 s.u.
B-74 Effluent						
Composite	0.0084 mg/l	0.025mg/l	ND	N/A	ND	N/A
Grab #1	N/A	N/A	N/A	N/A	N/A	7.17 s.u.
Grab #2	N/A	N/A	N/A	N/A	N/A	6.76 s.u.
Grab #3	N/A	N/A	N/A	N/A	N/A	6.65 s.u.
Grab #4	N/A	N/A	N/A	N/A	N/A	6.82 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 2019 Monthly Monitoring Results (mg/L)—Pittsburgh													
Constituent	Permit Limit	Sampling Date											
		1/09/19	2/13/19	3/13/19	4/17/19	5/16/19	6/12/19	7/10/19	8/08/19	9/11/19	10/16/19	11/14/19	12/11/19
Aluminum	None	ND	0.050	0.600	0.060	0.031	0.032	ND	ND	ND	ND	ND	0.083
Cadmium	None	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	None	0.001	0.001	0.002	0.001	ND	ND	0.003	0.001	ND	ND	ND	0.001
Copper	0.32	0.023	0.015	0.034	0.029	0.014	0.012	0.013	0.005	0.004	0.029	0.024	0.030
Cyanide Total	3.21	0.015	ND	ND	ND	ND	ND	ND	0.006	ND	0.008	0.007	0.006
TOX	None	0.093	0.055	0.042	0.065	0.130	0.094	ND	0.030	0.020	0.083	0.041	0.035
Iron	None	0.820	0.280	0.860	1.200	0.230	0.180	0.270	0.310	0.130	1.100	0.450	0.820
Lead	10.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.003	ND	ND
Mercury	0.12	ND	0.00012	ND	ND	ND	ND	ND	ND	ND	ND	0.00026	ND
Nickel	None	0.002	0.003	0.006	0.005	0.003	0.003	0.002	0.003	0.002	0.004	0.002	0.003
Oil and Grease	None	ND	ND	ND	ND	ND	2.7	ND	ND	ND	ND	2.1	ND
pH (s.u.)	6.0-9.0	6.72*	7.26*	6.85*	6.79*	6.68*	6.81*	6.80*	7.10*	8.11*	6.76*	7.61*	7.43*
Phenolics	None	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.027	ND	ND
TSS	None	1.50	ND	0.60	ND	ND	ND	0.070	ND	0.50	9.20	1.00	0.90
Tin	None	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloro-methane	None	ND	ND	ND	0.0010	ND	ND	0.0009	0.0007	ND	ND	0.0006	ND
Zinc	None	0.079	0.059	0.150	0.110	0.063	0.071	0.049	0.056	0.046	0.082	0.088	0.110

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.

In December 2019, NETL-PGH received a visit from a U.S. EPA inspector in conjunction with his inspection of the PHA treatment plant. The EPA inspector toured the B-74 wastewater treatment facility and spoke with two operators. The EPA inspector found NETL to be in full compliance with its permit.

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 four outfalls associated with NETL: the North Outfall (001), the South Outfall (002), the North Outfall Extension (101), and the South Outfall Extension (102). Contaminants to the storm water effluent are regulated by this permit.

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.

Photo 3.2.6.1: Pittsburgh Air Conditioner Condensate.

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 2019. 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 2019, 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 2019. They were as follows:

- On June 12, 2019, a site employee was working on a ladder to replace a light ballast in the ceiling of 1st floor, lobby area in B922. The employee reported that while lowering the ballast, his arms were extended slightly away from the body midline and slightly upward. While in this position, the employee felt a pop in his left shoulder and suspected that it was dislocated. The employee felt himself falling and grasped a nearby pipe to prevent falling and then injured his right shoulder. The employee descended the ladder and lay on the floor and attempted a self-reduction of the right shoulder dislocation while waiting for assistance. When walking with a fellow employee to report to the occupational health unit (OHU) for evaluation, the employee raised his arms and felt the left shoulder pop a second time. Following evaluation at the OHU, the employee was subsequently transported to an off-site medical facility for evaluation and treatment. A follow-up medical evaluation of the employee on 6/28 resulted in a diagnosis of a fractured head of the right humerus. The diagnosis was subsequently reported to the NETL occupational health staff on 7/1. The employee was initially accompanied to the NETL occupational health unit by a co-worker to report the injury. The employee was in extreme pain unable to move his left shoulder. Ice therapy was applied to the left and right shoulders and over the counter medication provided for pain. The employee was subsequently transported by a family member to an off-site medical facility for evaluation and treatment.

- June 20, 2019, there were two short duration electrical interruptions experienced at the Pittsburgh site. During recovery efforts an electrical air switch was found with the service door open and it was observed that electrical arcing was occurring inside the switch. The switch was located at near B- 921 and provides electricity to the 920 plateau. In response to the degraded condition and possible eminent failure, the emergency operations center (EOC) was activated. It was immediately suspected that an internal item within the switch had failed causing the arcing observed inside the electrical switch. In response to this issue the decision was made to close buildings 920, 921, and 922 so that the electrical supply to the area could be shutdown to prevent further damage and to inspect the switch. After evaluation, it was determined that the unit heaters operating within the substation had failed which allowed a build-up of condensation within the housing which then led to the electrical arcing and additional damage to the switch. It was subsequently determined that the repairs needed to correct the issue would be unable to be completed until 6/21. As a result, all non-essential employees occupying these buildings were granted administrative leave from approximately 9:30 a.m. 6/20 and all day 6/21 so that the needed repairs could be completed. Electrical repairs were coordinated with DOE, USSE2, and West Penn Power representatives. A generator ensured that the sites IT Data Center remained operational during this time period. Power was restored to the effected buildings on 6/21. Fire detection systems were subsequently analyzed for proper re-start actions. Facility systems (HVAC, etc.) were reviewed as well. The buildings were opened for normal operations on 6/22. Buildings 920, 921, and 922 were closed at on 6/20 and remained closed through 6/22 with all non-essential employees occupying these buildings granted administrative leave. Personnel within the listed buildings with a continued need to work

on-site were provided alternate workspaces on the Research Plateau that was authorized on a first-come, first-served basis. Site buildings were swept to ensure all non-essential personnel had departed the buildings after the closure announcement was made. Repairs to the electrical system were completed and the items tested prior to restoration of service.

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 2019.

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.

Photo 3.2.10.2: ERO Exercise in Pittsburgh.

3.2.11 Continuous Release Reporting

There was no continuous release reporting required at the Pittsburgh site in 2019.

3.2.12 Unplanned Releases

There were no unplanned releases at the Pittsburgh site in 2019.

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: 2019 Summary of Permits - PGH			
Permit No. and Title	**Issue Date/ Renewal**	**Regulatory Agency**	**Description**
0296 Minor Source Operating Permit	06/14/2016, 06/13/2021	Allegheny County Health Department, Air Quality Program	Establishes NETL-PGH as a minor source for particulate matter (PM), particulate matter of 10 microns or less in diameter (PM_{10}), sulfur dioxide (SO_2), volatile organic compounds (VOCs), nitrogen oxides (NO_x), carbon monoxide (CO) and Hazardous Air Pollutants (HAPs), as defined in section 2101.20 of Article XXI Air Pollution Control of the Allegheny County Health Department, Rules and Regulations.
GF 47497.009 Industrial Sewer Use Permit	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, 10/04/2020	PADEP Bureau of Environmental Cleanup and Brownfields	Permit for above ground storage tank containing ferric chloride at Pittsburgh's wastewater treatment facility (B-74).
ID: 02-81183 SEQ#: 009A Aboveground Storage Tank Registration Permit/ Certificate	1990s, 10/04/2020	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 located in the Willamette Valley, which is structural and erosional lowland between the uplifted marine rocks of the Coast Range and the volcanic rocks of the Cascade Range. The Albany site covers approximately 42 acres with approximately 248,000 square feet of building working area. The site is relatively flat and located on a higher section of town away from any flood plains. The Calapooia River is located west of the laboratory, flowing in a broad arcuate pattern from southeast of the laboratory west to north, emptying into the Willamette River. Land use immediately surrounding the Albany site is a combination of residential housing developments, small businesses and public-school properties. There are 123 employees at the Albany site, including 35 federal employees and 88 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.

Photo 3.3.1: Albany Site.

The median income for a household in the city was $45,390. The per capita income for the city was $22,230. About 15.5 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.

3.3.2 Major Site Activities

1.) B-1 Second Floor Renovation

Construction was completed to renovate the second floor of Building 1 to provide needed code compliant office space. Also, the building exterior was painted and a sidewalk was added on the north side.

Photo 3.3.2.1: B-1 Second Floor Renovation

2.) B-21 Heated Storage Room

Construction was completed to provide an additional heated storage room in the warehouse for storing items sensitive to cold temperatures.

Photo 3.3.2.2: B-21 Heated Storage Room.

3.) B-24, Room 106 Ventilation Upgrade

Construction was completed to provide an upgraded ventilation system in support of the MHD laboratory.

Photo 3.3.2.3: B-24, Room 106 Ventilation System.

3.3.3 Environmental Restoration and Waste Management

3.3.3.1 CERCLA

The Albany site had no off-site remediation activities during 2019. 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 2019. There were no Notices of Violation, corrective actions, or best management practices associated with the inspection or operations of hazardous waste handling during 2019. There were no RCRA compliance inspections completed by the Oregon Department of Environmental Quality (DEQ) at the Albany site during 2019. There were no EPA, Region 10 inspections during 2019.

DOE Headquarters (FE-17) completed a Staff Assistance Visit (SAV) in August 2019 at the Albany site. During this SAV, the RCRA program was assessed and the following opportunities for improvement were noted:

- FE-17 recommends cleaning the top of caustic soda drums used to neutralize acidic waste located at the hazardous waste storage area (HAZWASTE) to prevent unnecessary exposure.
- FE-17 recommends that Veolia not remove any labels from any hazardous waste drum or attach labels to any hazardous waste drums over existing labeling.

These opportunities for improvement have been addressed/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 2019 regarding the Federal Facilities Compliance Act at the Albany site.

3.3.3.4 NEPA

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

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 2019 at the Albany site. TSCA waste generated during 2019 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 2019. 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 2019. 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 2019 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 2019.

Table 3.3.4.2: 2019 Albany X-Ray Radiation Generating Devices

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

3.3.5 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 CO2e) 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. CO2e). 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 2019, 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 2019 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: 2019 Air Emissions Inventory—Albany	
Pollutant	**Estimated Emissions (lbs./yr.)**
Volatile Organic Compounds	23.41
Nitrogen Oxide	426.18
Carbon Monoxide	356.36
Sulfur Dioxide	9.32
Total Suspended Particulates	185.55
Particulate Matter 10 (PM_{10})	28.70

3.3.6 Water Quality and Protection Activities

3.3.6.1 Clean Water Act

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.

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 five-year renewal cycle. Quarterly monitoring is required in accordance with the permit. Table 3.3.6.2 provides the results of the 2019 monitoring, with all results within permit limits. In addition, Albany submitted a slug discharge control plan with the city, which must be renewed every two years and was completed in March 2019 and then updated in April 2019. 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 2019, which were completed in accordance with NETL's industrial wastewater permit and slug discharge permit. City of Albany personnel inspected the facility in August 2019, and no issues were documented.

Photo 3.3.6.2: Elementary Neutralization System.

Table 3.3.6.2: 2019 Industrial Wastewater Discharge Permit Monitoring Analysis—Albany					
Constituent	Permit Limits	Sample Date			
		01/11/19	04/05/19	08/09/19	10/11/19
Arsenic	1.0 mg/L	ND	ND	ND	ND
Cadmium	0.44 mg/L	ND	ND	ND	ND
Chromium	2.8 mg/L	ND	0.0014 mg/L	0.00089 mg/L	0.0048 mg/L
Copper	3.4 mg/L	0.0064 mg/L	0.0064 mg/L	0.0051 mg/L	0.027 mg/L
Cyanide (Total)	1.2 mg/L	ND	0.012 mg/L	ND	ND
Lead	0.7 mg/L	ND	ND	ND	0.0095 mg/L
Mercury	0.08 mg/L	ND	ND	ND	0.00027 mg/L
Molybdenum	0.84 mg/L	0.0023 mg/L	ND	ND	ND
Nickel	1.6 mg/L	ND	0.0023 mg/L	0.0014 mg/L	0.0058 mg/L
Oil & Grease (Total)	300 mg/L	ND	ND	5.8 mg/L	N/A
Selenium	0.72 mg/L	0.00012 mg/L	0.000105 mg/L	ND	0.000118 mg/L
Silver	1.1 mg/L	ND	ND	ND	0.0043 mg/L
Zinc	1.5 mg/L	0.028 mg/L	ND	ND	0.098 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 be 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 2019 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.

3.3.7.2 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 continues to pursue 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 2019. 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 2019, 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 Level I report in 2019, related to a DOT Hazardous Materials Requirement shipping violation due to a hazardous waste manifest error noted during the waste shipment from the NETL-Albany site on June 10 2019. During this shipment, a drum of waste material was mistakenly recorded on the manifest documents as non-hazardous waste during the shipment when it was actually hazardous waste. The entire waste shipment included three uniform hazardous waste manifests and two bills of lading, which shipped 35 containers/3,844 pounds of waste consisting of Resource Conservation and Recovery Act hazardous waste, universal waste, and non-hazardous waste. As identified during post-shipment records review on June 12, 2019, the shipment included three 55-gallon drums and two 5-gallon containers of metal-machining coolant from various cutting activities across the site identified for disposal, with one of the 55-gallon drums of fluid being classified as hazardous waste based on sampling results. The remaining drums/containers were determined to be non-hazardous based on sampling results. During the preparation of the offsite hazardous materials shipment, the 55-gallon hazardous waste drum was inadvertently mislabeled as non-hazardous by the subcontracted waste vendor and shipped/transferred to the vendor's 10-day holding facility as a nonhazardous waste using a bill of lading. The mislabeled drum was re-labeled and the associated manifest documentation was updated accordingly prior to continuation of the hazardous waste shipment beyond the 10-day holding facility. This incident was also properly reported to the Oregon Department of Environmental Quality (DEQ).

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 2019.

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 monthly basis to review hazards-based risks to the region including high-priority impacts from high-water levels and storm damage due to weather events of increasing intensity.

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.

Photo 3.3.10.2: ERO Exercise in Albany.

3.3.11 Continuous Release Reporting

There was no continuous release reporting required at the Albany site in 2019.

3.3.12 Unplanned Releases

There were no unplanned releases at the Albany site during 2019.

3.3.13 Summary of Environmental Permits

A summary of environmental permits for the Albany site is provided in Table 3.3.13, 2019 Summary of Permits.

Table 3.3.13: 2019 Summary of Permits - ALB

Permit No. and Name	Site	Issue Date - Exp. Date	Regulatory Agency	Description
8731-02 Industrial Wastewater Discharge Permit	Albany	12/15/2018 – 12/14/2023 (updated every 5 years)	City of Albany Public Works Department	Authorization to discharge industrial wastewater to the City of Albany sewer system.
G2140 Site Use Permit	Albany	03/01/2019 – 02/28/2020 (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 with 10 acres being vacant fields. The site has a perimeter fence with neighborhoods surrounding the property.

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

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

3.3.15 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 HOUSTON OFFICE

3.4.1 Site Description

The Houston office (Photo 3.4.1), which has no laboratory facilities, does not engage in the same compliance assessment processes as the Morgantown, Pittsburgh, or Albany sites. Because building and facility operations and maintenance are under the control of the landlord, the Houston office itself must comply with few ES&H regulations. The Houston office does not undertake in-house audits, external audits, or subject matter reviews. Regulatory agencies do not conduct ES&H inspections or investigations of activities. However, in-house inspections and regulatory agency inspections (e.g., by the local fire marshal or municipal building inspectors) of the building and facilities could occur, with any subsequent findings assessed against the landlord. Three employees work at the Houston location; two are federal employees and one site support contractor.

Building occupants participate in fire drills, which are conducted according to local fire marshal requirements and in cooperation with the building management. Volunteer fire wardens conduct roll call during drills and facilitate orderly evacuations. Tornado drills are announced through a building-wide public address system and are conducted in accordance with OSHA emergency response requirements.

Photo 3.4.1: Houston Office.

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

No citations for violations of ES&H laws, regulations, or ordinances occurred in calendar year 2019.

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

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

3.4.2 Major Site Activities

The NETL Houston office is located at 1011 Highway 6, South, Suite 309, Houston, Texas 77077. NETL leases the office space under its own leasing authority. In 2019, the Houston office undertook actions to add three offices, cubicle space and a reception area.

3.4.3 Environmental Restoration and Waste Management

The Houston office had no off-site remediation activities, no on-site Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Superfund Amendments and Reauthorization Act (SARA) cleanups, and no spills or leaks from facilities or operations that were ongoing in 2019. No National Priorities List sites which NETL-Houston had liability under CERCLA/SARA exist. No cleanups or surveillance activities for leaks or spills or other activities that would lead to Resource Conservation and Recovery Act (RCRA) cleanups occurred in prior years.

Houston office does not have a program to deal with hazardous waste; however, building management does recycle some RCRA universal (hazardous) waste materials through an E-cycling program. This program is designed for pickup and disposal of electronics, dry-cell batteries, etc. through a local vendor on a biannual basis.

3.4.3.1 NEPA

The Houston office does not conduct National Environmental Policy Act (NEPA) reviews for proposed off-site federal actions. These actions relate to contract awards or grants to other governmental organizations, educational institutions, and private industry, and were completed by NEPA staff at Morgantown, West Virginia, and Pittsburgh, Pennsylvania. Project manager's complete questionnaires regarding the potential for environmental impacts associated with project proposals under consideration for funding or financial support. The completed forms are evaluated by the NEPA compliance officer for a determination of the appropriate level of NEPA review (i.e., Environmental Impact Statement, Environmental Assessment, or categorical exclusion). In 2019, all funded projects were determined to be categorical exclusions.

3.4.3.2 TSCA and FIFRA

The Houston office housed no substances regulated by the Toxic Substances Control Act, and no restricted-use pesticides, herbicides, or defoliants were kept within the offices in 2019 or any other years. The landlord and building management organization provide pest control services and grounds-keeping services.

3.4.3.3 Radiation Protection

This does not apply to the Houston office.

3.4.3.4 Ionizing Radiation Program

No ionizing radiation sources are at Houston.

3.4.3.5 Air Quality and Protection Activities

Because it is strictly a project management office implementing oil and gas programs, Houston has no air quality protection program and no emissions that require monitoring, reporting, or permits. In 2019, no New Source (Pre-Construction) Reviews for any facilities or projects owned or managed by the Houston office occurred. Operation of the Houston office does not contribute significantly to any violations of National Ambient Air Quality Standards. No Houston office facilities or projects are regulated under the National Emission Standards for Hazardous Air Pollutants program. Houston office facilities and projects do not 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.

Any ozone-depleting refrigerants used for air conditioning inside the offices are under the control of the building management organization. No plans or activities are planned related to phasing out ozone-depleting substances at Houston.

3.4.3.6 Water Quality and Protection Activities

The building landlord and the landlord's building management contractor deal with sewer use permits and storm water runoff control and permits. The level of impact on surface water is assumed to be about the same as for other office complexes in the region. Houston office activities in 2019 resulted in no unplanned releases, leaks, or spills that would require reporting to governmental agencies.

Potable water supplies are managed by six community public water systems and are tested to verify compliance with Safe Drinking Water Act standards. All testing has been performed by the City of Houston (municipal water authority) in compliance with the Safe Drinking Water Act standards, and the report can be reviewed at City of Houston Water Quality Report 2019.

3.5 ANCHORAGE

3.5.1 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.

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 3.5.1) 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.

Photo 3.5.1: City of Anchorage.

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

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.

3.5.2 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 2019 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 2019. 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.

3.5.2.1 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 2019, no new projects were supported by the Arctic Energy Office and thus no projects managed through the Anchorage office were subject to NEPA review.

3.5.2.2 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.

3.5.2.3 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.

3.5.2.4 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.

3.5.2.5 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 2019.

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.

3.5.2.6 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 2019 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 ISO 45001:2018 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, 2014, at the Pittsburgh and Morgantown sites; July 15, 2014, at the Albany site; and November 18-19, 2014, 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.

In 2016, the Pittsburgh site underwent an ISO 14001:2004/OHSAS 18001:2007 recertification audit August 16-19. 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: 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.

In 2019, all three sites underwent recertification audits to ISO 14001:2015 and certification audits to ISO 45001:2018 (which specifies requirements for an occupational health and safety, OH&S, management system). Audits were held July 30 - August 1, 2019 in Albany, OR; August 13-15, 2019, in Pittsburgh, PA; and August 27-29, 2019 in Morgantown, WV. Over the course of the three audits, Orion Registrar, Inc. identified two minor nonconformities; three opportunities for improvement; and 13 strengths. The two nonconformities involved an off-site electrical contractor not being aware that they had been trained on the details of an activity hazard analysis regarding the construction activity they were working on and the Safety Analysis and Review System package for cafeteria operations not being kept current. NETL provided and implemented corrective actions to Orion registrar for the nonconformities and these have been closed out. By maintaining its ISO 14001:2015/ISO 45001:2018 certifications, NETL demonstrates to its workforce, the surrounding community, DOE and other stakeholders that it is committed to responsible environmental, safety, and health stewardship.

4.1 ENVIRONMENTAL, SAFETY, AND HEALTH POLICY

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

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

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

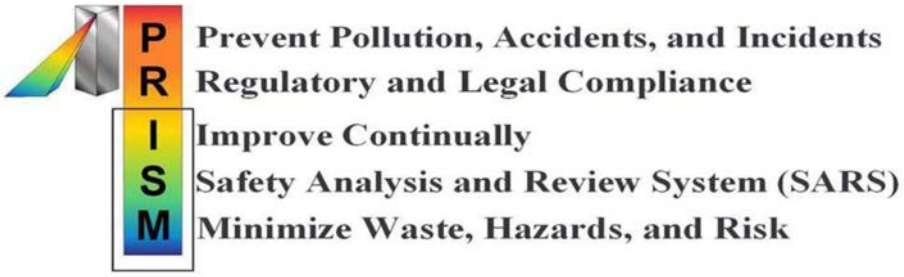


Diagram 4.1: Illustration of NETL's Environmental Policy.

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

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

Table 4.1: Environmental, Safety, and Health Significant Aspects for FY2019 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; 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. The respective EMP's for FY 2019 were developed based on the goals of the draft DOE 2019 Sustainability Report and Implementation Plan (SRIP) since the SRIP was not issued in final until June 2019.
- NETL's FY 2019 Energy Intensity EMP was revised to 0.5 percent reduction in FY19 energy intensity from a FY18 baseline per the draft DOE SRIP. Note that the final SRIP Energy Intensity goal was revised to a 1 percent reduction.
- The Renewable Energy EMP was revised per the draft DOE SRIP to meet the EPACT 2005 requirement that renewable electric account for 7.5 percent of total electric consumption. NETL purchased 3,000 MWh of renewable energy credits (RECs) for $2,100. Note that the DOE 2019 SRIP Renewable Energy Goal was revised from 7.5 percent to 30.5 percent too late in the fiscal year for NETL to purchase additional RECs to meet the revised goal.
- In terms of Fleet Management, the FY2019 EMP was revised to a 2.0 percent reduction in FY19 from a FY18 baseline per the DOE SRIP.
- 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 2019 100% of the Electrical PPE was inspected prior to use.

- 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 observations of alarm signals will continue through the first and second quarter of FY2019.
- 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 18, 2019, the MRB approved the list of significant aspects (see Table 4.2: Environmental, Safety, and Health Significant Aspects for FY2020), the objectives, and the targets for FY2020.

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 FY2019, are presented in Table 4.3: FY2019 Environmental Management Plan Metrics for Albany, Morgantown, and Pittsburgh, and the performance data for the first quarter of FY2020 are presented in Table 4.4. The following discussion presents the significant "environmental" aspects and their respective EMP results for Fiscal Year 2019. (Note: safety and health significant aspects are not included in this discussion.)

4.2.1 Waste Minimization, Pollution Prevention, and Recycling

For FY2019, 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 FY2019 *EMP for Nonhazardous Waste Recycling* was to increase diversion of nonhazardous solid waste from disposal by 50 percent. By the end of FY2019, NETL had recycled 49 percent of the nonhazardous waste stream (586,495 lbs. out of 1,206,315 lbs.). In addition, 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 FY2019. NETL diverted 84.9 percent of its construction/demolition waste to recycling.

4.2.2 Hazardous Materials Procurement, Consumption, and Storage

For FY2019, the significant aspect for addressing hazardous materials procurement, consumption, and storage focused on NETL's chemical inventory. The primary objective of the *EMP for Chemical Inventory* was to reduce and minimize the quantity of toxic and hazardous chemicals and materials acquired, used, and disposed based on E.O. 13693. NETL had a 5.6 percent increase in the number of containers (772 containers) and a 1.8 percent decrease in chemicals by weight (4,692 pounds), 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 FY2019. As part of this EMP, the accelerated chemical inventory verifications were completed as planned and the new chemical inventory and SDS tracking system (EMS) was launched.

4.2.3 Green Purchasing

The FY2019 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 bio-based and environmentally preferable, non-ozone depleting, recycled content; and are non-toxic or less toxic than alternatives. The FY2019 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 FY2019, NETL achieved the following: 96 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; 97 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

The *EMP for Purchase of Electronic Products* for 2018 was focused on further addressing the goals of E.O. 13693. The objective was to ensure the procurement of EPEAT-registered electronic products, and the procurement of Energy Star and Federal Emergency Management Program (FEMP)-designated electronic equipment. On May 17, 2018, E.O. 13693 was revoked and replaced with E.O. 13834, Efficient Federal Operations. The new executive order goal was to "acquire, use, and dispose of products and services, including electronics, in accordance with statutory mandates for purchasing preference, Federal Acquisitions Regulation requirement, and other applicable Federal procurement policies." To that end, in FY2019, NETL continued to track its electronic purchases with the targets being that 95 % of all products purchased that have EPEAT standards are EPEAT registered; and 95% of specific electronic products are Energy Star- and FEMP-designated. In FY2019, 100% of products are EPEAT registered and 100% of electronic products are Energy Star and FEMP-designated. In addition, in FY2019 the objective for the *EMP for Operation and Maintenance of Electronic Products* continued to be to enable power management, duplex printing and other energy-

efficient or environmentally preferable features on all eligible DOE electronic products. In FY2019, when exempt monitors and computers are accounted for, 100% of monitors and computers have power management settings in place.

4.2.5 Landscaping Management

To address the Presidential Memorandum, *Creating a Federal Strategy to Promote the Health of 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.

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

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

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

4.2.6 Water Use

To address the goals of E.O. 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 FY2019 potable water intensity was 10.53 gal/gsf. This equates to a 53.3% decrease in potable water intensity from FY2018.

4.2.7 Energy and Fuel Use

E.O. 13834, Efficient Federal Operations, directs Federal agencies to manage their buildings, vehicles, and overall operations to optimize energy and environmental performance, reduce waste, and cut costs. DOE's Sustainability Report and Implementation Plan (SRIP) dated June 2019 is DOE's action plan to carry out Executive Order 13834.

DOE 2019 SRIP Facility Energy Efficiency goal is a 1 percent reduction in FY2019 from FY2018. NETL's FY2019 energy intensity was 148,867 BTU/GSF, a 3.5 percent increase from FY2018 which does not meet the 2019 SRIP goal.

Analysis of FY2019 electricity and natural gas usage compared to FY2018 found that electricity usage at all three NETL laboratory sites increased significantly. The Albany, Morgantown and Pittsburgh sites' electricity consumption increased by 2.1 percent, 8.6 percent and 7.3 percent, respectively; while natural gas usage stayed essentially the same. Note that the Morgantown increase does not include the increased electricity consumption of the Joule supercomputer which does not contribute to energy intensity as it is exempt as a HEMSF. The Joule's increased electricity consumption in FY 2019 is addressed in the Electronics Stewardship/High Performance Computing Centers Section of this report.

The increase in electricity consumption and resultant increase in energy intensity was mainly due to the expansion of NETL research capabilities in FY2019:

- Albany: Research-related electric furnaces were installed in Building 4 and began operations in FY 2019.
- Morgantown: Building 6 Combustion Facility added two additional test systems which required use of the site's 700 psig air compressors, natural gas compressor and process cooling water system.
- Morgantown: The Reaction Analysis & Chemical Transformation Laboratory (ReACT) introduced six new reactors and the facility increased from single shift operations to 24-hour operations in FY2019.
- Pittsburgh: The 3rd Floor of Building 94 was renovated into laboratory space in FY2018 and was commissioned in early FY2019. This renovation created 4,700 GSF of new lab space including 16 fume hoods, nine exhaust snorkels and five gas cabinets with a total potential lab exhaust of 19,470 cfm.

DOE 2019 SRIP Renewable Energy goal is 30.5 percent of total electricity in FY2019. To meet the EPACT 2005 requirement that renewable electric account for 7.5 percent of total electric consumption, NETL purchased Renewable Energy Credits (RECs). NETL's annual on-site renewable electrical energy generation equates to 0.5 percent of its total electric energy usage based on the EPACT 2005 double bonus for onsite renewable energy. NETL will meet the remainder of the 7.5 percent renewable electric energy requirement by purchasing RECs. With these RECs, NETL's renewable electric energy totaled 9.7 percent of NETL's FY2019 total electric consumption of 32,460 MWh. The DOE 2019 SRIP Renewable Energy Goal was revised from 7.5 percent to 30.5 percent too late in FY2019 for NETL to purchase additional RECs to meet the revised goal.

NETL has a data center business case with FITARA approval that outlines NETL's full data center strategy. A summary of this strategy is below. The Albany datacenter is relocating to the first floor of B-1 with design plans having been accepted by NETL. The new datacenter will be fully metered and have an estimated PUE of 1.3. Data center infrastructure management (DCIM) software (Nlyte) provided by DOE HQ will be implemented in the Albany data center. The Morgantown datacenter will undergo a remodel and consolidate racks into a smaller, contained space. This will significantly save on power and cooling costs. It will be metered and managed by Nlyte as well with an estimated PUE of 1.14. Pittsburgh is in the design phase of a new datacenter in Building 83 that will combine high performance computing, research IT equipment, and commodity enterprise IT equipment. This consolidation will eliminate the need for multiple datacenters on site. It will also

be fully metered and managed with DCIM software. All three sites are currently going through a physical to virtual migration of our applications and services. Physical servers will be virtualized and placed on shared hardware to save on power and cooling, thus reducing PUE.

The 2019 DOE SRIP Fleet Goal was to reduce petroleum usage by 2.0 percent as compared to FY2018. NETL's consumption of petroleum fuel increased in FY2019 by 11 percent from FY2018 petroleum consumption. Review of NETL fleet data found the petroleum consumption increase was due to:

- Two Flex Fuel Vehicles were replaced with two gasoline only Hyundai Tucson's in FY2018.
- Three Flex Fuel Vehicles were replaced with three gasoline only Hyundai Elantra's in FY2019.

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

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

NETL installed electric vehicle charging stations in Pittsburgh and Morgantown in FY2018 and currently has four electric vehicles (Chevrolet Bolts). The electric vehicles are used for inter-site travel between the Pittsburgh and Morgantown sites (130 miles round trip). Using the all-electric Chevy Bolts between Sites can save NETL between $12 to $20 per round trip. Each round trip also saves four to six gallons of gas, reducing NETL's greenhouse gas emissions and helping to reduce the petroleum usage increase from the five gasoline-only Hyundai's mentioned above.

4.2.8 Air Emissions/Greenhouse Gas Emissions

Per the Implementing Instructions for Executive Order 13834, *Efficient Federal Operations* by the Council on Environmental Quality (CEQ) Office of Federal Sustainability dated April 2019, Agencies are instructed to track and report Scope 1 and 2 GHG emissions in accordance with CEQ's *Federal Greenhouse Gas Accounting Guidance (Accounting Guidance)*. Tracking of Scope 3 GHG emissions was not required for FY2019.

DOE's action plan to carry out Executive Order 13834, *DOE Sustainability Report and Implementation Plan* required tracking of FY2019 Scope 1 and 2 GHG emissions.

The CEQ Implementing Instructions and the DOE SRIP did not set target reductions for FY2019 Scope 1 and 2, or Scope 3 GHG emissions.

NETL's FY2019 Scope 1 and 2 GHG emissions were 19,088.2 $MtCO_2e$. NETL will continue efforts to reduce energy intensity by implementing energy conservation projects to meet the DOE SRIP goal of an annual one percent year-over-year reduction in energy intensity.

4.2.9 High-Performance Sustainable Building Implementation

DOE 2019 SRIP High Performance Sustainable Building goal is 14 percent of buildings > 10,000 GSF. In FY 2019, NETL met the DOE 2019 SRIP goal of having at least 14 percent of existing buildings, larger than 10,000 GSF meet the HPSB GPs. NETL had 18.5 percent of applicable buildings and 21.2 percent of applicable building GSF meet the HPSB GPs, including the bonus credit for two buildings below 10,000 GSF meeting the HPSB GPs.

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

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

NETL will incorporate planned building modifications into the Annual Lab Plan and 5 Year GPP Plan. NETL will continue to incorporate the planning and funding required for the buildings in the NETL HPSB Plan to meet HPSB compliance by FY 2025 into the NETL EMS, Annual Lab Plan and GPP planning. The NETL HPSB Plan through FY 2022 is attached in Supporting Documents, which indicates that 31 percent of NETL's buildings by count and 29.6 percent of NETL's building GSF could comply with the HPSB GPs by FY 2022.

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

Table 4.2.9.1: NETL FY 2020 HPSB PLAN							
Building	FY Compliance	Compliance	Current Status	GSF Total = 1,143,803	Cumulative % GSF	Cumulative % BLDGS >10,000 GSF (Total = 271) Add 2 for B-40 + B-900 29	Action
MGN B-39	2009	LEED Gold	Met HPSB Criteria Grandfathered	106,522	9.3%	3.4%	Complete
PGH B-58	2015	HPSB	Met HPSB Criteria Grandfathered	32,240	12.1%	6.9%	Complete
MGN B-1	2016	HPSB	Met HPSB 2008 GP Criteria Per CEQ Instructions	51,598	16.6%	10.3%	Complete
PGH B-921	2016	HPSB	Met HPSB 2008 GP Criteria Per CEQ Instructions	25,033	18.8%	13.8%	Complete
PGH B-920	2017	HPSB	Met HPSB 2008 GP Criteria Per CEQ Instructions	11,681	19.9%	17.2%	Complete
MGN B-40	2013	LEED Gold	Met HPSB Criteria Grandfathered	9,411	20.7%	20.7%	Complete - Bonus Credit < 10,000
PGH B-900	2017	HPSB	Met HPSB 2008 GP Criteria Per CEQ Instructions	6,065	21.2%	24.1%	Complete - Bonus Credit < 10,000
MGN B-26	2021	HPSB	Meets 92 percent of HPSB 2008 GPs. Energy Efficiency/IAQ	63,616	26.8%	27.6%	2016 GPs Apply
PGH B-925	2021	HPSB	Meets 88 percent of HPSB 2008 GPs. Energy Efficiency/IAQ	9,326	27.6%	–	2016 GPs Apply (Bonus Credit)
ALB B-1	2022	HPSB	Meets 62 percent of HPSB 2008 GPs. Energy Efficiency/IAQ	23,348	29.6%	31.0%	2016 GPs Apply

4.3 IMPLEMENTATION AND OPERATIONAL CONTROLS

The ES&H Management System is implemented through an organizational structure shown in Diagram 4.3. Senior-level positions include the NETL Director, who serves as the ultimate authority for the ES&H Management System; Chief Operating Officer, Laboratory Operations Center, the lead member on the MRB; the Associate Director for Facility Operations, who is the environmental, safety, and health steward and champion; the Site Manager for Albany; the Site Manager for Morgantown; and the Site Manager for Pittsburgh, who also acts as the ES&H Management System Representative. (Site-specific ES&H leads are consulted by the MRB, as necessary.) Mid-level titles 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.

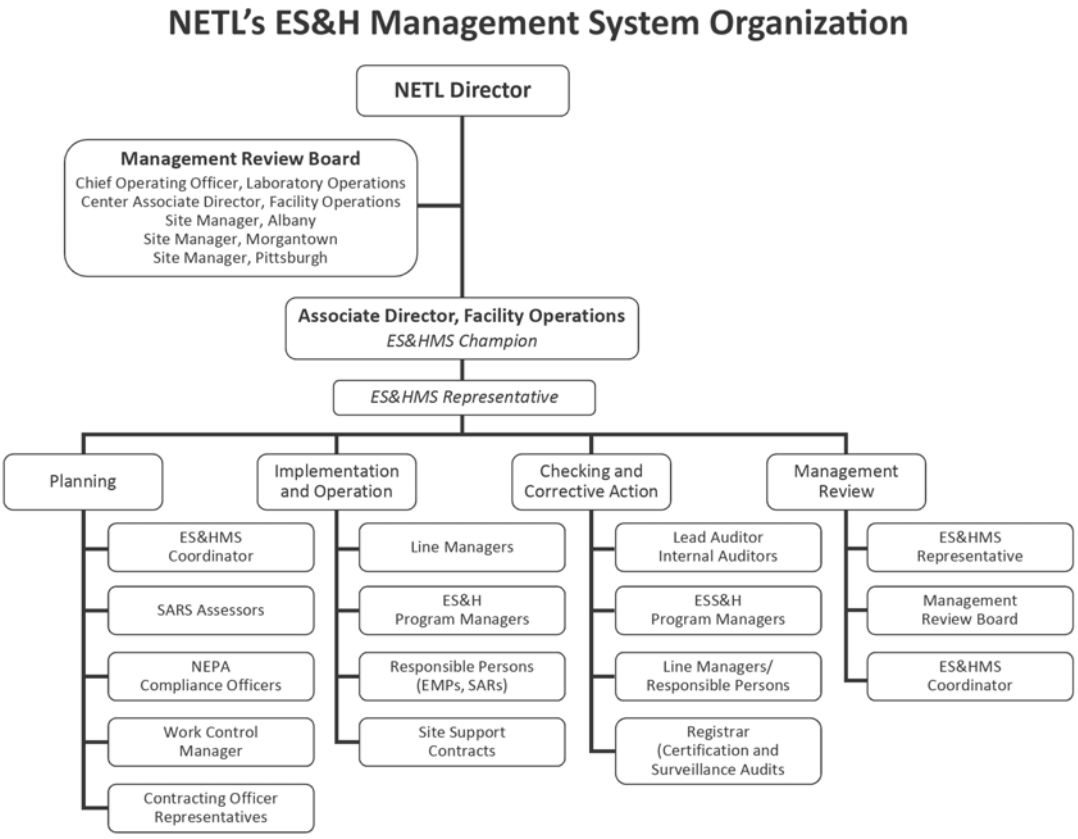


Diagram 4.3: NETL's ES&H Management System Organization.

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 14001:2015/ISO 45001:2018 Roadmap" that provides an overview of available information about the NETL ES&H Management System.

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

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

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

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

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

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

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

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

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

4.4 SELF-ASSESSMENT PROCEDURES

NETL uses 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 ISO 45001:2018 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 ISO 14001:2015 and ISO 45001:2018 standards are audited against. Seven ES&HMS audits were performed in 2019, including two internal audits and recertification audits (in Morgantown, Pittsburgh, and Albany) and two surveillance audits (in Morgantown and Pittsburgh) conducted by ISO 14001:2015 and ISO 45001:2018 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 (AU-1).
- Private sector publications, including "Environmental Compliance in West Virginia," a quarterly regulatory update bulletin published by Business and Legal Reports, Inc.; environmental compliance updates published by the Bureau of National Affairs; and various trade journals.
- Pennsylvania Bulletin and the Pennsylvania Code, (produced by the Commonwealth of Pennsylvania) and the Code of Federal Regulations (published by the National Archives).
- NETL's library subscriptions that are relevant to regulatory documents are available electronically on the NETL intranet or in the library.
- Updated lists of hazardous or regulated chemicals, as needed.
- Websites of regulatory agencies, such as the West Virginia Department of Environmental Protection (WVDEP), the Pennsylvania Department of Environmental Protection (PADEP), and the Oregon Department of Environmental Quality (ORDEQ).
- A regulatory review service, RegScan™ (in Albany) provides regular review of federal and Oregon state regulatory changes.
- Training classes on relevant statutes and regulations.

4.5 CORRECTIVE AND PREVENTIVE ACTION PROGRAM:

- Nonconformance with any of the appropriate regulations or standards identified during any of the self-assessment audits (or external assessments/audits) mentioned above would be documented using NETL's current Corrective and preventive Action Tracking System, the Assessment Input Information System (AIIS).
- NETL Manual 450.4-01.04, Corrective and Preventive Action Process, outlines how corrective and preventive action items identified in the various assessments are captured, prioritized, assigned, analyzed for their root cause, tracked, closed, and incorporated, as appropriate, into the lessons learned and training systems. This process holds responsible persons and line management accountable for timely closure of corrective actions within their programs, organizations, or facilities, and disseminates lessons learned across appropriate organizational elements.

- After completion of an assessment, the lead assessor uses the AIIS to generate an assessment record. When a finding is entered into the system, a unique identifying number is assigned and cataloged in the database with the associated assessment record. A notification of the finding is sent electronically to the responsible person and their line manager. All corrective actions taken regarding the finding are then documented in AIIS. To ensure findings have been fully addressed, a follow up is done through the internal auditing process. Each month, several closed findings undergo verification audits to determine if the corrective actions taken address the closed findings appropriately. Open findings are generated into a monthly report and sent out to appropriate line management to further address and complete accordingly.
- Other processes used for reporting corrective actions include: Manual 151.1-01.02, *Emergency Categorizations, Classifications, and Notifications*, a procedure used to catalog and investigate major nonconformities related to emergencies, as required by DOE; and Manual 231.1-00.02, *Injury/Illness Reporting*, which sets forth the minimum reporting requirements for injury or illness classification investigation for NETL.

4.6 MANAGEMENT REVIEW PROCESS

Management review of the ES&H Management System ensures the ES&H policy and management system remain appropriate and effective. The ES&H Management System Representative conducts 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, 2019, and on November 18, 2019. Since objectives and targets are on a fiscal year basis, the MRB meeting in May focused on progress towards NETL's FY2019 objectives and targets. The meeting in November focused on ensuring that the aspects, objectives and targets were appropriate for FY2020.

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 FY2019 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 2019 Performance**	**Organizational Strategic Objective**
Days Away, Restricted, Transfer Rate	Maintain low Days Away, Restricted, and Transfer (DART) case rate.	<= 0.4 >0.6	0.29	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%	88.9%	Institutional Security and Environmental Safeguards
Facility Security Violations	Maintain low number of security violations and breaches.	0 >2	0	Institutional Security and Environmental Safeguards
Notices of Violation	Maintain low notices of violation (NOVs).	0 >2	1	Institutional Security and Environmental Safeguards
Recordable Case Rate	Maintain low recordable case rate.	>=1.0 >1.5	0.36	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: 2019 Surveillance Monitoring.

Table 4.7.1: 2019 Surveillance Monitoring
Type of Surveillance
SARS Assessments
Transformer Inspections
Storage Tank Inspections
Interstitial Storage Tank Monitoring (MGN)
Back-up Generator Inspections
Chemical Handling Facility Inspections (PGH)

5.0 GROUNDWATER PROTECTION PROGRAM

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

Photo 5.1: Morgantown Monitoring Wells.

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 were originally sampled for a broad range of contaminants, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, nitrates and PCBs. Current plans include the continued development of a conceptual site model (CSM) to document groundwater and contaminant trends. The CSM is a living document and is updated periodically. NETL will continue to assess the results of periodic monitoring, update the CSM, and plan for future remediation activities (subject to available funding). NETL will continue to provide the ODEQ monitoring reports.

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.

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 2019 are presented in the Appendix as Table 5.1.1 through Table 5.1.6.

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

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

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

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. The weir and piezometer were removed in the spring of 2019.

Groundwater monitoring (Photo 5.2.1) in 2019 was performed per the NETL-Pittsburgh 2019 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.

Photo 5.2.1: Pittsburgh Groundwater Monitoring.

Statistical analysis was conducted on the indicators of groundwater contamination (pH and specific conductance) for eight of the NETL-Pittsburgh Valley Fill Groundwater Monitoring Wells on the 2019 monitoring data. The analysis compared the upgradient wells (VFW-2 and VFW-10) to the downgradient wells. The results of the statistical analysis for pH showed that, for the tolerance interval two-tailed method, no wells were outside of the background-tolerance intervals. The results of the statistical analysis for specific conductance showed that, for the tolerance interval two-tailed method, VFW-7 was outside the upper tolerance limit.

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

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

There are only two documented historical discharges at the site in 1999-2000 associated with facility equipment failure and maintenance (no history of discharges associated with facility fires), with appropriate notifications being made at the times of the noted discharges. NETL maintains and tracks all chemicals on-site using a chemical inventory management system that ensures proper disposal at the end of chemical life, either via recycling or hazardous waste disposal. Accordingly, Pittsburgh does not have an active sampling, analysis, tracking, and monitoring program for PFAS-related compounds, as it is not required per the site's industrial wastewater or stormwater NPDES permits. While there is an active groundwater monitoring program, PFAS-related substances are not a regular analyte and have never been part of any historical sampling. Drinking water is provided by the local public drinking water system and site groundwater or surface water is not used as a drinking water source.

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

5.3 GROUNDWATER AND SOIL QUALITY PROTECTION ACTIVITIES - ALBANY

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

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

Photo 5.3: Albany Groundwater Sampling.

VOC detections during periodic monitoring prompted Albany to further investigate areas of suspected contamination, with planning efforts starting in September 2004 and on-site work initiated in January 2005. Results from samples taken in February 2005 showed contaminants of potential concern (COPCs) were likely crossing the eastern boundary of the site and migrating toward Liberty Elementary School. After meeting with Oregon DEQ and the Greater Albany Public School (GAPS) District personnel, investigations were made on-site and offsite during March- December 2005. Results of the site investigation showed no concern over surface soils, subsurface soils, soil gas, or ambient air at offsite properties. The only issue identified was with elevated levels of COPCs in groundwater at depth, including trichloroethene (TCE), carbon tetrachloride, and chloroform.

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

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

Additional monitoring wells have been installed over the years to enhance the groundwater investigation both on site and off site at Liberty Elementary School property, adjacent to the site (see Figure 5.3 for well locations). Regular periodic monitoring is performed twice per year during the wets season (March-April) and during the dry season (August-September), with sampling performed in accordance with the Albany Groundwater Monitoring Plan. Sampling is currently limited to volatile organic compounds (VOCs) and metals. The results of the 2019 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.

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

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

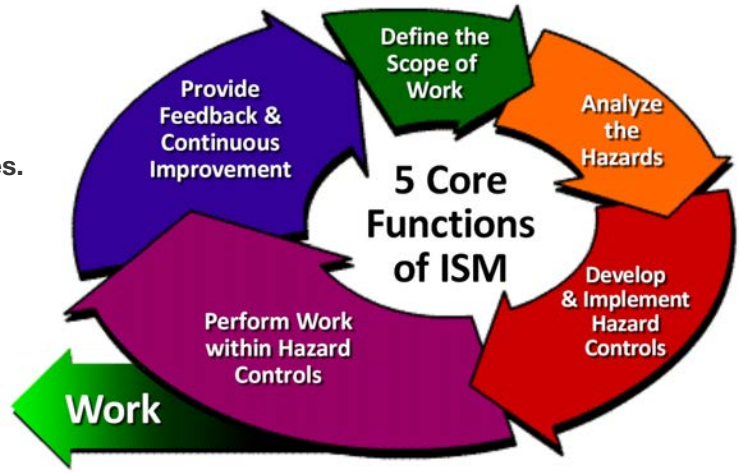
NETL will continue to review historical records associated with past activities, will proactively manage risks associated with PFAS-related substances, and will continue to manage chemical inventories to ensure proper management of any PFAS-related wastes. Pending budget availability, NETL will program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

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 directives (orders and procedures), manuals, handbooks, and forms, 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 6.0, 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 procedure, NETL Procedure 421.1-01, describes 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 the 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 Construction Permit SARS manual, NETL Manual 421.1-00.04, ensures that NETL construction activities 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. Initially, the selected contractor will develop and document an ES&H plan. Activity hazard analyses (AHAs) will be conducted for construction activities not explicitly covered in the contractor ES&H plans. Similarly, potential environmental impacts due to construction are considered and appropriate mitigations are developed in accordance with applicable codes and standards.

The Facility SARS manual, NETL Manual 421.1-00.03, addresses on-site facilities including buildings, trailers, utilities, services, structures, roads, and walkways. Its purpose 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 manual also establishes the requirements for obtaining a facility use permit.

The Support Operations SARS procedure, NETL Procedure 421.1-00.02, addresses on-site support operations conducted by site-support contractors. It includes construction, operations, maintenance, and renovation activities for which the site support contractors are responsible for and ensures that associated risks are analyzed, understood, and then eliminated, mitigated, or controlled 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/ISO 45001 certifications, external surveillance and certification audits related to the ISO 14001/ISO 45001 certifications, monthly focused inspections, facility inspections, internal reviews, and annual emergency response drills and exercises.

Many of the directives, manuals, and handbooks that govern the ES&H programs also contain monitoring requirements which ensure that the ES&H programs comply with the directives and other legal requirements. 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 programs.

APPENDIX

ACRONYM LIST

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

COPC	Contaminants of Potential Concern
CRADA	Cooperative Research and Development Agreement
CWA	Clean Water Act
CX	Categorical Exclusion
CY	Calendar Year
DMR	Discharge Monitoring Report
DOE	U.S. Department of Energy
DOEGRIT	DOE Green IT
DOT	Department of Transportation
EA	Environmental Assessment
ECM	Energy conservation measure
EISA	Energy Independence and Security Act
EIS	Environmental Impact Statement
EMP	ES&H Management Plan
EMS	Environmental Management System
E.O.	Executive Order
EOR	Enhanced Oil Recovery
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EPEAT	Electronic Product Environmental Assessment Tool
EPP	Environmentally Preferred Product
ERO	Emergency Response Organization
ES&H	Environmental, Safety, and Health
ES&HMS	Environmental, Safety, and Health Management System
ESPC	Energy Savings Performance Contract
ES&H	Environmental, Safety, Security, and Health
FCOG	Facility Contractors Group
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	Hazardous Waste Program
Air Quality Program	Hearing Conservation Program
Alarms Oversight Program	Illumination Quality Program
Asbestos and Lead Abatement Program	Inactive Waste Sites/Off-Site Remediation Program
Authority Having Jurisdiction (AHJ)/Exemptions Program	Indoor Air Quality and Ventilation Program
Assessment Information Input System (AIIS) Program	Industrial Hygiene Program
Computerized Accident/Incident Report System (CAIRS) Program (Injury/Illness Reporting)	Industrial Wastewater Quality Program
Chemical Handling Facility	Laser Safety Program
Chemical Hygiene Program	Lessons Learned Program
Chemical Inventory and Safety Data Sheet (SDS) Program	Life Safety Program
Confined Space Program	Medical Monitoring Program
Construction and Maintenance Safety Program	National Environmental Policy Act (NEPA) Compliance Program
Cryogenic Safety Program	Resource Conservation and Recovery Act (RCRA) Nonhazardous Waste Program
Directives Program	Occupational Medicine Program
Electrical Safety Program	Occurrence Reporting and Processing System (ORPS) Program
Emergency Preparedness Program/Emergency Response Program	Organization Incident Reporting Program
Environment, Safety, and Health Management System (ESHMS)— Management Review Program	OSHA Safety Program
Environmental Program	R&D Projects Program
Ergonomics Program	Radiation Safety Program
ES&H Communications Program	Records Program
ES&H Training Program	Respiratory Protection Program
Facility and Area Custodian Program	Safety & Health Program
Facility Work Authorization Program (Site Operations Division)	Superfund Amendments and Reauthorization Act (SARA) Title III Program
Facility Safety Committee Program	Safety Analysis and Review System (SARS) Program
Fire Protection Program	Soil Quality Program
Fire Warden Program	Storage Tank Program
Ground Water Quality Program	Surface Water Quality Program
Hazard Communication Program	Waste Management Oversight Program
	Waste Minimization and Pollution Prevention Program
	Water Quality Program

Table 4.1: Environmental, Safety, and Health Significant Aspects for 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
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: FY2019 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: FY2019 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: FY2019 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: FY2019 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: FY2019 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: FY2019 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: FY2019 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: FY2019 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: FY2019 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: FY2020 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: FY2020 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: FY2020 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: FY2020 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: FY2020 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: FY2020 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: FY2020 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Energy and Fuel Management (cont.)				
Renewable Energy	Ensure that NETL'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: FY2020 Environmental Management Plan Metrics—First Quarter				
Environmental Management Plan	Objective/Target	Baseline	Target	Actual
Water Usage				
Potable Water Consumption	Reduce potable water consumption by 0.5% from the final number for 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: FY2020 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: FY2020 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 2019 Data for "A" Aquifer—Morgantown											
Parameter	UNITS	Sample Location									
		A	B	GAS-4	I	J	L	M	N	SP1-A	SP4-A
pH (field)	S.U.	6.43	6.30	5.90	6.66	5.04	5.30	3.85	4.36	6.09	5.94
Specific Conductance (field)	µmhos	1383	227	384	300	1182	924	2091	1450	499	325
Temperature (field)	deg. C	16.40	12.70	18.50	16.10	11.64	11.42	13.10	11.91	16.10	13.09
Cadmium	ug/L	NT	NT	NT	< 0.21	1.8	1.7	1.9	2.5	NT	NT

Table 5.1.2: May 2019 Data for "B-C" Aquifer—Morgantown						
Parameter	UNITS	Sample Location				
		11	31	32-A	GAS-5	SP2-BC
pH (field)	S.U.	6.21	8.74	6.44	6.21	8.74
Specific Conductance (field)	µmhos	522	558	577	522	558
Temperature (field)	deg. C	12.27	16.26	15.43	12.27	16.26

Table 5.1.3: May 2019 Data for Morgantown Aquifer				
Parameter	UNITS	Sample Location		
		D1-M	D2-M	D4-M
pH (field)	S.U.	6.61	8.93	7.50
Specific Conductance (field)	µmhos	462	2490	528
Temperature (field)	deg. C	15.70	15.90	14.36

Table 5.1.4: Oct. 2019 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.	6.17	5.98	5.15	6.65	4.97	5.51	3.90	4.20	5.83	5.72
Specific Conductance (field)	µmhos	311	277	419	270	1389	1842	1694	1663	528	380
Temperature (field)	deg. C	11.88	11.25	13.21	15.87	15.04	15.51	16.80	14.77	11.54	13.70
Cadmium	ug/L	NT	NT	NT	< 0.21	2.2	0.92 J	< 2.1	1.9	NT	NT

Table 5.1.5: Oct. 2019 Data for "B-C" Aquifer—Morgantown						
Parameter	UNITS	Sample Location				
		11	31	32-A	GAS-5	SP2-BC
pH (field)	S.U.	6.17	5.46	4.99	5.92	6.40
Specific Conductance (field)	µmhos	168	1064	2571	2272	496
Temperature (field)	deg. C	14.81	18.22	18.13	13.74	11.19

Table 5.1.6: Oct. 2019 Data for Morgantown Aquifer				
Parameter	UNITS	Sample Location		
		D1-M	D2-M	D4-M
pH (field)	S.U.	6.21	8.74	6.44
Specific Conductance (field)	µmhos	522	558	577
Temperature (field)	deg. C	12.27	16.26	15.43

ND = not detected NT = not tested

Table 5.2: 2019 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	
	05/30/19	10/23/19	05/30/19	10/23/19	05/30/19	10/23/19	05/30/19	10/23/19
TPH-DRO (mg/L)	ND	0.230	0.088	0.210	ND	0.230	0.099	0.210
pH (standard units)	7.37	6.99	6.81	7.46	7.58	6.77	7.02	7.09
Specific Conductance (uS/cm)	5,981	3,793	2,268	1,262	5,952	6,315	1,289	1,443
Temperature (0C)	11.9	14.2	16.7	11.9	13.5	9.4	11.8	9.8
Constituent	Well Number, Sample Date							
	VFW-10		VFW-11		VFW-12		VFW-14	
	05/30/19	10/23/19	05/30/19	10/23/19	05/30/19	10/23/19	05/30/19	10/23/19
TPH-DRO	ND	0.260	ND	ND	0.270	0.290	ND	0.260
pH (standard units)	7.22	7.05	7.08	6.99	6.38	7.21	6.96	6.71
Specific Conductance (uS/cm)	2,802	4,267	3,494	3,671	2,139	2,178	3,399	4,225
Temperature (0C)	13.1	9.8	16.7	8.6	13.8	9.8	14.6	15.7

ND = not detected

Table 5.3.1: NETL-Albany 2019 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	03/25	08/26	03/26	08/27	03/26	08/28	03/26	08/28	03/28	08/26	03/27	08/26
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	0.69	1.9	ND	ND	ND	ND	ND	ND

Table 5.3.1: NETL-Albany 2019 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	03/25	08/26	03/26	08/27	03/26	08/28	03/26	08/28	03/28	08/26	03/27	08/26
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	0.92	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 2019 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	
	03/27	08/27	03/27	08/27	03/28	08/28	N/A	N/A	03/25	08/29	03/25	08/29	03/26	08/27	03/28	08/26
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	13	ND	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	1.0	0.84	ND	ND	NS	NS	ND	ND	ND	ND	19	16	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	2.0	0.95	4.9	6.7	ND	ND

Table 5.3.2: NETL-Albany 2019 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	
	03/27	08/27	03/27	08/27	03/28	08/28	N/A	N/A	03/25	08/29	03/19	08/29	03/26	08/27	03/28	08/26
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	1.6	1.3	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	3100	1400	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 2019 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	
	03/25	08/28	03/28	08/62	03/27	08/27	03/27	08/27	N/A	N/A	03/25	08/29	03/25	08/29	03/28	08/28
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	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
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	0.60	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	0.97
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	0.40	4,900	270	ND	ND	1,800	1,400	NS	NS	20	13	3.6	2.9	120	95
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	750	34	ND	ND	210	160	NS	NS	3.2	1.6	4.6	3.3	15	13

Table 5.3.3: NETL-Albany 2019 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	
	03/25	08/23	03/28	08/26	03/27	08/27	03/27	08/27	N/A	N/A	03/25	08/29	03/25	08/29	03/28	08/28
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	9.8	1.1	ND	ND	0.72	ND	NS	NS	1.7	1.7	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	ND	ND	ND	ND
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	2.5	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	390	22	ND	ND	13	8.1	NS	NS	1.1	0.53	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	1.2	ND	ND	ND	ND	ND	NS	NS	ND	0.39	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)	1.3	14	410	56	ND	ND	270	160	NS	NS	7.5	6.5	2.5	2.3	62	56
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 2019 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	
	03/27	08/26	03/25	08/26	03/26	08/27	03/28	08/26	03/26	08/27	03/26	08/28	03/26	08/28
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	74	78	2.6	ND	ND	ND	ND	ND	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	16	19	ND	ND	ND	ND	ND	ND	ND	ND

Table 5.3.4: NETL-Albany 2019 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	
	03/27	08/26	03/25	08/26	03/26	08/27	03/28	08/26	03/29	08/27	03/26	08/28	03/26	08/28
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	5.8	6.3	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	ND	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	ND	0.55	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 2019 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	
	03/27	08/28	03/27	08/28	03/27	08/28	03/27	08/29
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromoethane	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND
2-Butanone	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND
4-Methyl-2-pentanone	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	0.30	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	ND	ND	ND

Table 5.3.5: NETL-Albany 2019 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	
	03/27	08/28	03/27	08/28	03/27	08/28	03/27	08/29
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	0.73	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND
Dibromomethane	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert butyl ether	ND	ND	ND	ND	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
p-Isopropyl toluene	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	1.4	5.9	1.5	2.3	20	10	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND
Xylene, Total	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not detected

Exceeds Groundwater Quality Standards

Table 5.3.6: NETL-Albany 2019 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
	03/25	03/26	03/26	03/25	03/25	03/26	03/28	03/25
Aluminum	ND	ND	0.21	ND	ND	0.40	0.23	ND
Antimony	ND	ND	ND	ND	ND	ND	0.00019	ND
Arsenic	0.00048	0.0021	0.00035	0.0011	0.00031	0.0011	0.35	0.00091
Barium	0.0058	0.044	0.0091	0.015	0.0031	0.031	0.37	0.0037
Beryllium	ND	ND	ND	ND	ND	ND	0.00036	ND
Cadmium	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	22	36	7.5	17	10	340	47	25
Chromium	0.0012	0.00064	0.0017	0.0016	0.0017	0.020	0.00039	0.00053
Cobalt	0.00022	0.00027	ND	0.000094	0.00013	0.0017	0.0013	0.000059
Copper	ND	0.0012	ND	0.0025	0.00079	0.0014	0.0024	0.00092
Iron	0.21	0.56	ND	0.15	ND	0.51	210	ND
Lead	0.00023	0.00035	ND	0.00038	0.00031	0.00031	ND	ND
Magnesium	12	19	4.0	8.6	3.6	160	18	13
Manganese	0.0050	0.42	0.0018	0.10	0.0066	0.14	1.6	0.056
Mercury	ND	ND	ND	ND	ND	ND	0.00068	ND
Nickel	0.00058	0.0027	0.00037	0.0022	0.00050	0.0035	0.0030	0.00026
Potassium	0.65	1.2	ND	0.86	0.44	4.2	1.4	0.93
Selenium	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	9.4	19	6.7	7.2	11	87	16	13
Thallium	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	0.0052	0.0050	0.0034	0.0070	0.0042	0.0040	0.0036	0.0055
Zinc	ND	0.0024	ND	0.0049	0.0063	0.0076	0.023	0.0019

ND = Not detected

Exceeds Groundwater Quality Standards

Table 5.3.7: NETL-Albany 2019 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
	03/28	03/27	03/27	03/25	03/25	03/28
Aluminum	ND	ND	ND	ND	5.5	0.20
Antimony	ND	ND	ND	ND	0.00035	ND
Arsenic	0.0011	0.00058	0.0015	0.0013	0.0024	0.0013
Barium	0.0052	0.011	0.016	0.0066	0.030	0.0073
Beryllium	ND	ND	ND	ND	0.00021	ND
Cadmium	ND	ND	ND	ND	ND	ND
Calcium	28	15	34	24	33	25
Chromium	0.00052	ND	0.00062	0.00026	0.0060	0.00089
Cobalt	0.000051	0.00051	0.00072	0.00038	0.015	0.00021
Copper	ND	ND	ND	0.00065	0.010	0.00071
Iron	ND	0.19	ND	ND	12	0.29
Lead	ND	ND	ND	ND	0.0024	0.00020
Magnesium	14	7.6	16	11	19	15
Manganese	0.0014	0.62	1.2	0.043	0.29	0.0052
Mercury	ND	ND	ND	ND	ND	ND
Nickel	0.00033	0.00047	0.0059	0.00063	0.013	0.00027
Potassium	0.79	0.46	1.2	1.1	1.5	1.1
Selenium	ND	ND	ND	ND	ND	ND
Silver	ND	ND	ND	ND	ND	ND
Sodium	20	9.5	27	23	19	20
Thallium	ND	ND	ND	ND	0.000086	ND
Vanadium	0.0098	0.0017	0.011	0.0042	0.042	0.011
Zinc	ND	0.0019	0.0036	0.0040	0.018	0.0023

ND = Not detected

Exceeds Groundwater Quality Standards

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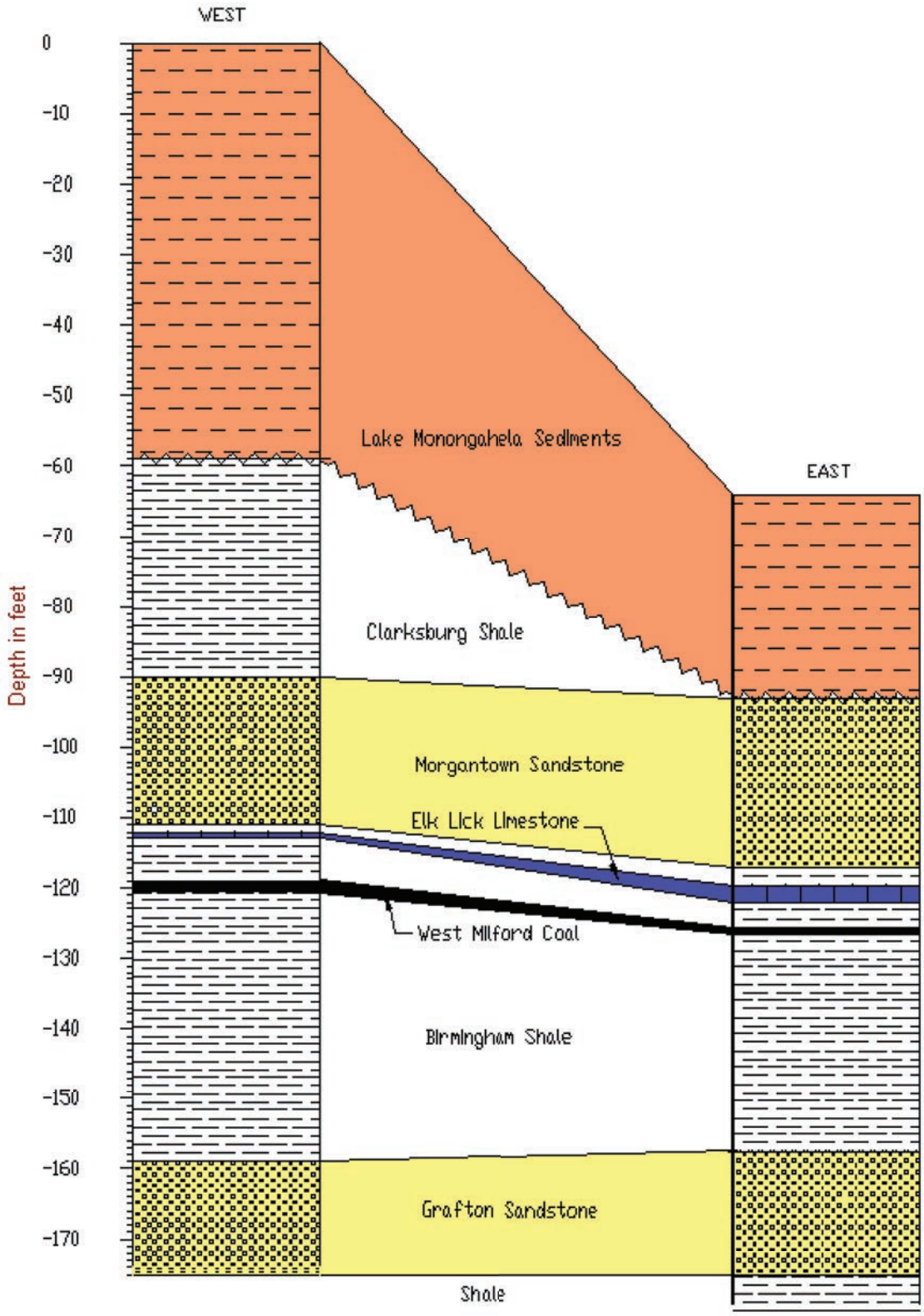

Figure 5.1.2: Generalized Cross-Section of Aquifer Units at the Morgantown Site.

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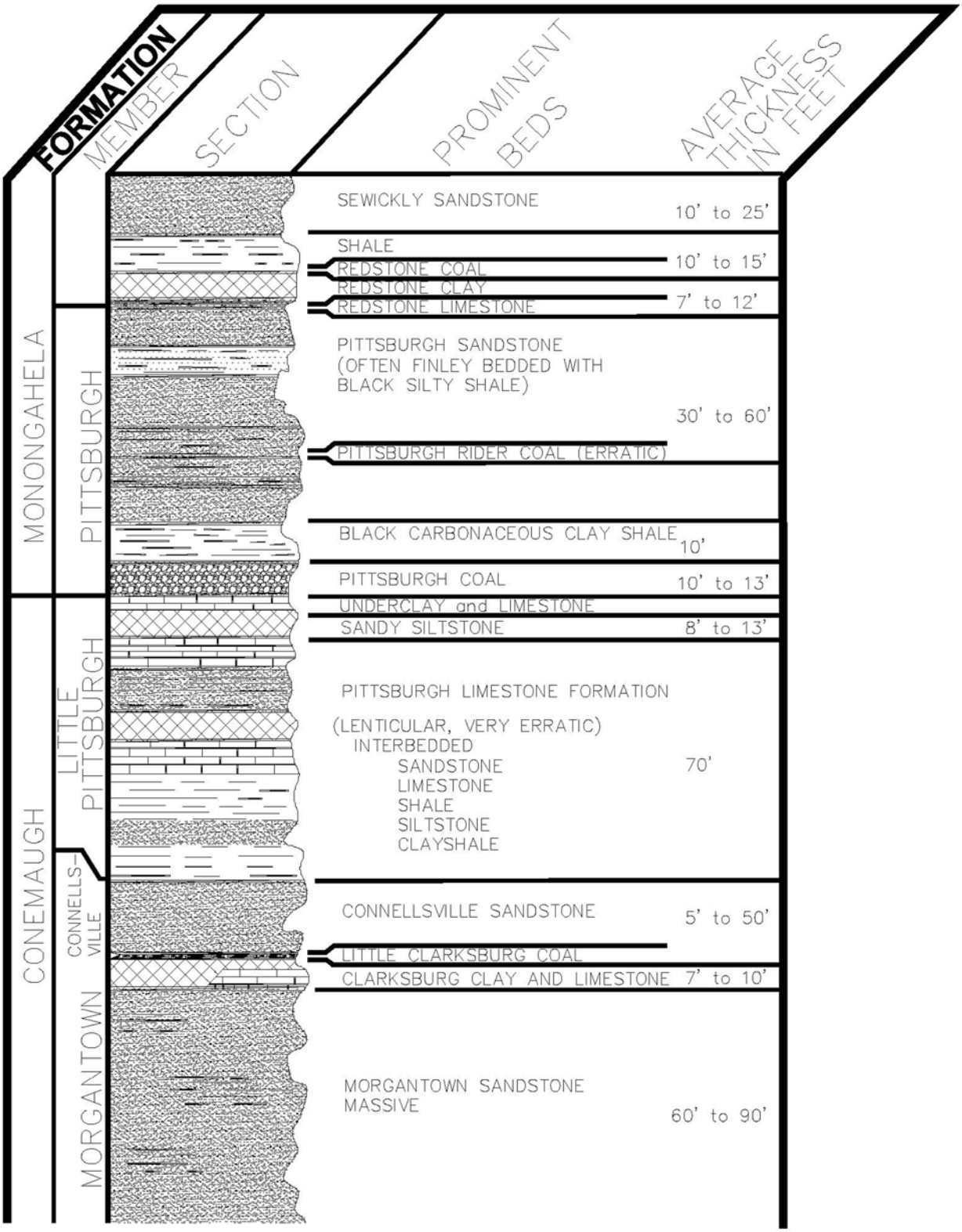

Figure 5.2.2: General Geologic Column—Pittsburgh.

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