NATIONAL ENERGY TECHNOLOGY LABORATORY

2023 ANNUAL SITE ENVIRONMENTAL REPORT

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

September 27, 2024

DISCLAIMER

2023 ANNUAL SITE ENVIRONMENTAL REPORT

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

ALBANY, OREGON

PITTSBURGH, PENNSYLVANIA

MORGANTOWN, WEST VIRGINIA

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EXECUTIVE SUMMARY

The U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL) develops the Annual Site Environment Report (ASER) to provide a comprehensive status of its environmental compliance in three states. This annual report verifies and documents NETL's mission to drive innovation and deliver solutions for an environmentally sustainable and prosperous energy future: ensuring affordable, abundant, and reliable energy that drives a robust economy and national security, while developing technologies to manage carbon across the full life cycle and enabling environmental sustainability for all Americans.

The Laboratory implements a wide range of energy and environmental research and development (R&D) programs that supports critical domestic energy initiatives that touch the lives of virtually all Americans. Our innovations support decarbonization and responsible stewardship of our environment, create valuable products from domestic resources and inform energy strategies that work toward achieving net-zero CO_2 emissions by mid-century. Additionally, our efforts contribute to a clean energy economy that creates good-paying jobs, spurs economic revitalization, advances environmental justice, remediates environmental degradation and supports energy workers in communities across the country.

Throughout 2023, NETL continued to implement its Environmental, Safety and Health (ES&H) programs at the Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania locations. As part of these programs, NETL maintained its certification to the International Organization for Standardization (ISO) 14001:2015, Environmental Management System Series, and as well as maintaining certification ISO 45001:2018, Occupational Health and Safety Management System Series. Certification to these standards demonstrates NETL's commitment to continual improvement, as well as conformance to its ES&H Management System. NETL continues to demonstrate to its workforce, the surrounding community, DOE, and other stakeholders that it is committed to responsible environmental stewardship.

NETL's environmental operating experience and performance measure programs exist as part of its ES&H Management System. Integral to these programs are the Safety Analysis and Review System (SARS) programs, which focus on R&D activities and 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. More information on each of the areas covered above, as well as details on other NETL ES&H programs, can be found in this document. This report seeks to address questions the public may have about NETL's efforts to protect the environment at its locations. Comments and concerns are always welcome and should be addressed, in writing to Jamie Brown, U.S. Department of Energy—NETL, M/S P04D, 3610 Collins Ferry Road, Box 880, Morgantown, WV 26507; or by email to Jamie.Brown@netl.doe.gov.

1.0 INTRODUCTION

1.1 SITE LOCATIONS

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

1.2 GENERAL ENVIRONMENTAL SETTING

NETL-Albany is in Linn County in western Oregon. 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. NETL-Albany covers approximately 42 acres and has approximately 248,000 square feet of building working area. The site is relatively flat, located on a higher section of town and away from floodplains. The Calapooia River is located one-half mile west of the laboratory.

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

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

1.3 LABORATORY MISSION

For more than 100 years, NETL has advanced the development of innovative technologies to ensure affordable, abundant and reliable energy that drives a robust economy and national security. NETL comprises multiple sites operating as one laboratory system. NETL's three labs are located in Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania. The Lab also has strategic offices located in Anchorage, Alaska, and Houston, Texas. As an applied laboratory, NETL's research laboratories develop advanced energy technologies and accelerate their maturation from discovery to commercialization in the United States and around the world. This approach is exemplified through impactful research partnerships with industry, academia and other national laboratories and government organizations to enhance and further develop the Laboratory's energy research and analysis portfolios while enabling environmental sustainability for all Americans. NETL applies its technical project management expertise to productive collaborations nationwide.

With NETL's wide-ranging expertise in areas such as geological and environmental systems, materials engineering, energy conversion, strategic systems analysis, computational science and program execution, the Lab is striving to reduce carbon dioxide (CO_2) emissions and enable the carbon-free energy systems of the future. NETL has been at the forefront of developing technologies to manage carbon across the full life cycle. These efforts are making important advances toward achieving a carbon-free power sector by 2035 and a net-zero economy by 2050.

The Lab's research portfolio supports critical domestic energy initiatives that touch the lives of virtually all Americans. Work from the Lab supports decarbonization and responsible stewardship of our environment, creates valuable products from domestic resources and informs energy strategies that work toward achieving net-zero CO_2 emissions by mid-century. Additionally, NETL efforts contribute to a clean energy economy that creates good-paying jobs, spur economic revitalization, advance environmental justice, remediate environmental degradation and support energy workers in communities across the country.

The nation realizes an effective return on research investment when energy solutions transfer to the commercial marketplace and support economic activity and workforce development. Licensing agreements with large and small American companies bring viable solutions to market. At the same time, 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 Lab breakthroughs are shared openly with decision-makers, stakeholders and other researchers around the globe.

Most importantly, all NETL activities support the DOE mission to ensure America's security and prosperity by addressing its energy and environmental challenges through transformative science and technology solutions. NETL is committed to fostering an environment of inclusivity where diversity strengthens the organization and energy equality guides our mission.

One of three applied labs, NETL is the research arm of DOE's Office of Fossil Energy and Carbon Management (FECM), and the only government-owned, government-operated national laboratory.

1.4 PRIMARY OPERATIONS AND ACTIVITIES AT THE SITES

NETL's staff exceeds 1,800 personnel, comprising federal employees and site support contractor employees. This diverse staff includes scientists, engineers, economists, procurement specialists, legal professionals, research support staff, technical project managers and research associates at multiple academic levels. Personnel are organized into six functional areas to accomplish NETL's mission and to provide flexible, dynamic expertise and capabilities to its public and private sector customers throughout the nation. The functional areas include: **Office of the Director; Science & Technology Strategic Plans & Programs; Technology Development Center; Finance & Acquisition Center; Research & Innovation Center;** and **Laboratory Operations Center.**

OFFICE OF THE DIRECTOR

The Office of the Director has span, control and authority, including delegated authority, over the complete NETL complex. This includes responsibility and authority for delivery and execution of NETL's mission: To drive innovation and deliver solutions for an environmentally sustainable and prosperous energy future. In continuous pursuit of this mission and to sustain NETL as a world-class research and development (R&D) enterprise, the Office of the Director promotes organizational direction and vigor toward sustainability, consistency, effectiveness and efficiency in research efforts and business practices.

SCIENCE & TECHNOLOGY STRATEGIC PLANS & PROGRAMS

Science & Technology Strategic Plans & Programs develops strategic direction for programs and activities within NETL and identifies future competencies required so that NETL can best utilize existing capabilities (reposition and redeploy as needed) and invest in new capabilities to sustain and grow NETL.

TECHNOLOGY DEVELOPMENT CENTER

The Technology Development Center implements national research, development and demonstration programs in Fossil Energy and Carbon Management (FECM) and other DOE programs with industry, institutes of higher education, nonprofit organizations, small businesses and other federal agencies and national laboratories to develop and mature technologies that will accomplish programmatic goals and objectives. The Technology Development Center performs the above functions through four organizational elements: Resource Sustainability, Carbon Management, Energy Efficiency & Manufacturing, and Energy Delivery & Security.

FINANCE & ACQUISITION CENTER

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

The remaining two functional areas, the **Research & Innovation Center** and the **Laboratory Operations Center**, are responsible for implementing on-site research activities and the support functions that enable those research activities.

RESEARCH & INNOVATION CENTER

The Research & Innovation Center (RIC) develops, nurtures and exercises the core technical competencies that enable NETL to be an international resource for carbon management discovery, development and deployment. RIC's technical core competencies, which combine world-class expertise with mission-relevant laboratory facilities, include **Computational Science & Engineering, Energy Conversion Engineering, Geological & Environmental Systems, Materials Engineering & Manufacturing, Research Partnerships & Tech Transfer, Research Planning & Delivery, and Strategic Systems Analysis & Engineering.**

Functions:

- Drives technology innovation and delivers technical solutions while advancing knowledge within the community through effectively leveraging its technical core competencies and collaborating with partners from industry, academia and other government laboratories.
- Ensures safe and efficient research operations at NETL-Albany, NETL-Morgantown, and NETL-Pittsburgh.
- Implements an R&D portfolio that effectively leverages core technical competencies to exceed customer needs.
    - Research projects effectively combine science-based large-laboratory scales to accelerate the technology development process. The research RIC conducts in its laboratories will typically focus on concepts with technology readiness levels (TRL) between two and four.
    - For higher TRL-level concepts, research is coordinated with extramural partners as appropriate to enable eventual commercial deployment more effectively.

- Designs and implements laboratory capabilities necessary to assure the world-class stature of its technical core competencies.

Computational Science & Engineering — In support of the DOE and NETL missions, the computing capabilities coupled with mission-unique computational tools enable the effective application of high-performance computing and data analytics to enhance the NETL research effort, generating information and understanding beyond the reach of experiments alone across time and length scales.

Energy Conversion Engineering — The capabilities maintained enable the development and evaluation of new concepts for advanced energy conversion devices and systems that exceed DOE and NETL goals for efficiency, sustainability and affordability.

Geological & Environmental Systems — The capabilities maintained enable a better understanding of the behavior of engineered natural systems and the development of the science and technologies that will enable safe, sustainable production and utilization of domestic energy resources in support of the DOE and NETL missions.

Materials & Manufacturing Engineering — The capabilities maintained enable the discovery and development of affordable, high-performance materials that can endure the harsh service environments typical of advanced energy systems in support of the DOE and NETL missions. Capabilities include the ability to translate lab-scale materials concepts to affordable industrial practice using advanced manufacturing methodologies.

Research Partnerships & Tech Transfer — Nurtures relationships to advance the missions of NETL as a premier research organization while also exercising the Laboratory's intellectual property to the national benefit and does so under the guidance of the senior fellows and direction of the RIC associate laboratory director.

Research Planning and Delivery — Maintains and exercises the critical business functions required to plan and deliver quality, impactful and relevant research products exceeding the expectations of FECM and does so under the guidance of the senior fellows and direction of the RIC associate laboratory director.

Strategic Systems Analysis & Engineering — The capabilities maintained enable the utilization of models, simulations and optimizations to guide and support NETL's existing research portfolio; provide insight on the potential of new technology ideas; identify new energy concepts; and analyze interactions between energy systems at plant, regional, national and global scales.

LABORATORY OPERATIONS CENTER

The Laboratory Operations Center delivers an effective, efficient and quality work environment and support services that advance the NETL mission. The Laboratory Operations Center develops, implements, integrates, monitors and ensures the continuous improvement of products and services necessary to support NETL business and laboratory functions.

The Laboratory Operations Center performs the above functions through five organizational elements: Business Integration, Office of Career Management and Education Programs, Information Technology, Facility Operations, and Security.

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

Career Management and Education Programs — Inspires, attracts, develops and retains a skilled, motivated workforce to fulfill the scientific, technical, professional and administrative functions of the Laboratory, including the development of a talent pipeline via educating the next generation through science, technology, engineering and mathematics (STEM) outreach and internship programs.

Information Technology — Maintains a comprehensive information technology and cybersecurity program that provides fully integrated, enterprise-wide systems in support of the NETL mission.

Functions:

Manages, oversees, and delivers integrated, secure, reliable and quality systems to support NETL's information technology needs.

Facility Operations — Assures safe, environmentally friendly and reliable operations at all NETL sites consistent with the NETL mission and in accordance with applicable law, federal policy and best practices under direction of the executive director and chief operating officer.

Functions:

- Manages real property assets, including daycares, fitness centers and cafeterias, and facility-related operations.
- Ensures the property assets are maintained in a manner that promotes operational readiness, personnel and environmental safety and health, property preservation and life-cycle cost-effectiveness.

These functions are carried out through the following competencies:

- **R&D Engineering**, which oversees and conducts engineering design, specification development, procurement, construction and operation through all project life cycle phases of NETL's on-site innovative research facilities and related infrastructure.
- **Facility Operations**, which oversees the planning, design and construction of all facility-related projects, including buildings and structures, roads and sidewalks, utilities and services, real estate development, site-related Environment, Safety and Health projects and physical security systems and provides facility operations and maintenance, grounds maintenance and janitorial services, on-site and off-site real property assets, and space utilization management.
- **Safety and Health**, which oversees the development and maintenance of a safe and healthy work environment. This effort includes safety analysis and review, chemical and industrial hygiene, hazard communications, chemical inventory maintenance, Occupational Safety and Health Administration and facilities compliance, laser and radiation safety, and ergonomics.
- **Environmental**, which oversees and coordinates on-site environmental compliance activities, including environmental monitoring activities; groundwater, air (ambient air and meteorological), storm water, wastewater, soil, and biota sampling; a hazardous

waste management and waste disposal program; a waste minimization and pollution prevention awareness program. This includes coordinating, monitoring, and evaluating NETL's performance in meeting emission requirements established at the local, state and federal levels.

- **Emergency Management**, which oversees the elements of a comprehensive emergency management system, including coordination with continuity of operations and providing analysis of laboratory safety and risks.
- **Security —** Establishes, develops and maintains a security operation that includes the separate programs of safeguards and security, personnel security, foreign access review and approval management, counterintelligence, controlled unclassified information management, operational security, and continuity of operations.

1.5 RELEVANT DEMOGRAPHIC INFORMATION

With locations in Albany, Oregon; Morgantown, West Virginia; and Pittsburgh, Pennsylvania, NETL comprises 98 buildings and 14 major research facilities covering over 240 acres. As of December 31, 2023, NETL had 1,820 employees at its three locations – 622 were federal employees (Pittsburgh 230, Morgantown 203, Albany 47, Remote 142) and 1,190 were site-support contractors (Pittsburgh 332, Morgantown 272, Albany 85, Remote 501).

1.6 ACCOMPLISHMENTS

NETL achieved the following technology-related accomplishments in 2023.

AWARDS

- DOE HC-NET Arthur S. Flemming Award - Established in 1948, the Flemming Awards recognize outstanding early to mid-career federal employees who go beyond what is expected and whose federal government achievements have a broad, positive impact on society.
  - NETL's Natalie Pekney, Ph.D., an environmental engineer leading research to mitigate methane emissions from abandoned oil and gas wells, has been named the recipient of a 2022 Arthur S. Flemming Award, one of the nation's top honors presented to federal employees.
- DOE – Oppenheimer Fellows - Named after J. Robert Oppenheimer, head of the Los Alamos National Laboratory during World War II, The Oppenheimer Science and Energy Leadership Program (OSELP) was established in 2016 to introduce the next generation of DOE leaders to the breadth and depth of the national laboratory system and equip them with the knowledge, experiences and professional networks to succeed.
  - NETL's Christina Wildfire, Ph.D., and Don Ferguson, Ph.D., researchers who are driving technological breakthroughs to advance the nation's decarbonization efforts, have been selected to serve as Fellows in the 2024 OSELP Cohort.

- Federal Laboratory Consortium National (FLC) Awards - The FLC Awards Program annually recognizes federal laboratories and their industry partners for outstanding technology transfer achievements. The FLC's 30 plus years of advancing tech transfer to meet the needs of our nation's economy would not have been possible without the creativity and dedication of the federal scientists and inventors that the FLC recognizes through the awards program and the innovative professionals who work alongside them to achieve their goal of creating available technologies to countless people around the world.
    - NETL specialist, Chris Bond, whose work significantly reduced the complexity of transferring the Lab's technologies to the private sector and increased the number of agreements executed by 27% is being recognized as the "Rookie of the Year."
    - An NETL specialist whose work significantly reduced the complexity of transferring the Lab's technologies to the private sector and increased the number of agreements executed by 27% is being recognized as the "Best in Region" for the Mid-Atlantic region.
- University of Pittsburgh Department of Chemistry Distinguished Alumni Award - The biennial Alumni Award Celebration is a cherished event that provides opportunities for our awardees to interact with department faculty, students and staff. Through two days of roundtable discussions, department tours and informal meetings, the awardees inspire graduate and undergraduate students by their accomplishments in many spheres. They are presented with the awards at a dinner with faculty and staff.
    - NETL's McMahan Gray will be presented with a prestigious honor from the institution where he learned critical skills to thrive as a nationally renowned research scientist.
- University of Illinois, Urbana-Champaign, Department of Chemical and Biomolecular Engineering Distinguished Alumni Award - This award recognizes professional distinction through outstanding leadership, contributions to the field, creativity and entrepreneurship and service to society, the professional community and the department, college or university.
    - NETL's Charles Damianides, Ph.D., received the Distinguished Alumni Achievement Award. Damianides serves as executive director of the Center for Sustainable Fuels and Chemicals, a technology incubation center that develops technical solutions for the U.S. chemicals industry to retool its products and operations to reach net-zero emissions.
- North American Membrane Society (NAMS) – NAMS is a U.S. scientific society that promotes inquiry in the field of membrane science. NAMS is a 5013 nonprofit organization. It holds an annual national meeting featuring seminars by prominent membrane scientists, engineers and industry professionals.
    - Lingxiang Zhu, NETL's Lingxiang Zhu, a researcher who specializes in the development of membranes to capture CO_2 from industrial sources, will receive the 2023 Young Membrane Scientist Award. Zhu was nominated for the award by David Hopkinson, the technical portfolio lead for Point Source Carbon Capture at NETL. Zhu has worked under Hopkinson's technical supervision as a postdoctoral fellow and then as a staff scientist on NETL's site support contract since May 2018.

- Stanford University — Stanford University lists the top 2% of world scientists based on composite indicator score: one list for career-long impact and another for single-year impact.
    - Current and former NETL researchers listed in the top 2% for career-long impact were Dominic Alfonso, David E. Alman, Sofiane Benyahia, Ray Boswell, Ronald W. Breault, Yuhua Duan, Michael C. Gao, Randall S. Gemmen, Angela L. Goodman, Evan J. Granite, Jeffrey Hawk, Gordon R. Holcomb, Mehrdad Massoudi, James Rawers, Wissam Saidi, Harpreet Singh, Ranjani Siriwardane, Dan C. Sorescu, D.H. Smith, Phuoc Tran and C.M. White.
- WTWH Media — The R&D 100 Awards have served as the most prestigious innovation awards program since 1963, honoring great R&D pioneers and their revolutionary ideas in science and technology. The awards not only recognize the efforts of the development team and partners, they also provide a mark of excellence known to industry, government and consumers.
    - Transformer Watchman — an innovative sensor technology, developed by NETL and its partners at the University of Pittsburgh and the Pittsburgh-based company Sensible Photonics Inc., that can protect the nation's energy infrastructure, help save lives and save the economy billions of dollars by preventing electric service downtime has scored a 2023 R&D 100 award in the topic area of IT/Electrical.

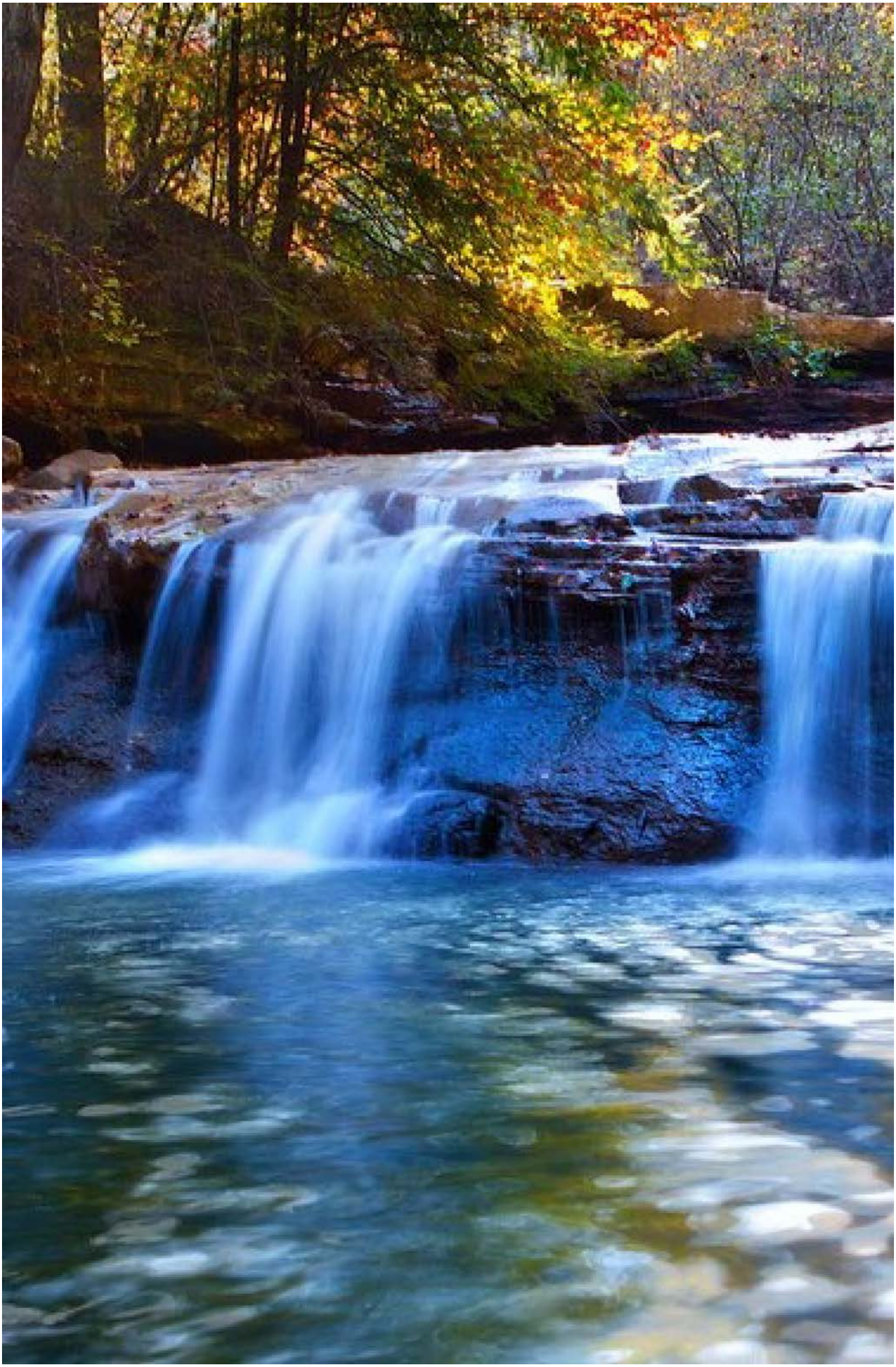
1.7 ENVIRONMENTAL JUSTICE

There are four Executive Orders (E.O.) that require Departments to address environmental justice (E.J.). These are E.O. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations; E.O. 14008, Tackling the Climate Crisis at Home and Abroad; E.O. 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability and E.O. 14096, Revitalizing Our Nation's Commitment to Environmental Justice for All.

In addition, DOE O 436.1A, Departmental Sustainability, requires that sites develop and implement environmental justice programs and activities to secure environmental justice for disadvantaged communities that have been historically marginalized and overburdened by climate-related impacts.

NETL incorporates E.J. in the organization's Environmental, Safety and Health Management System. The site's Environmental Management System (EMS) representative works with E.J. colleagues to ensure that outreach to E.J. communities is reflected in the EMS. Also, NETL organizations such as the NEPA Compliance Program and Science & Technology Strategic Plans & Programs address E.J. as part of their work activities.

Additionally, the Fossil Energy and Carbon Management's Environmental, Security, Safety and Health (ES&H) team utilized the Environmental Protection Agency's E.J. Screening and Mapping Tool to evaluate the likelihood of E.J. communities near NETL locations. It was determined that no impacted communities surrounded the NETL sites.



2.0 COMPLIANCE SUMMARY

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

Standards and requirements that subject matter experts (SMEs) determine to be applicable to environmental, safety and health (ES&H) activities are incorporated into one or more directives, which provide the NETL policies, programs and procedures used at the Laboratory. ES&H directives include orders and procedures. The ES&H Team also provides specific guidance through subject-related manuals. Assigned SMEs review their directives every three years and update, as appropriate.

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

- A rigorous safety analysis and review system (SARS) designed to review the details of a project before authorizing any significant activities to proceed. Checklists have been developed for SARS to facilitate verification of the standards and requirements covered during the review. ES&H SMEs support the SARS process and ensure that all applicable ES&H standards and requirements are addressed.
- Regular walk-through inspections of site facilities to ensure that all NETL facilities are inspected on an annual basis. Various ES&H SMEs visually verify that NETL follows applicable standards and requirements.
- Preparation of this ASER, which requires a complete review of compliance with all major environmental standards and requirements. Numerous SMEs participate in this effort, reviewing the past year's performance.

2.1 MAJOR ENVIRONMENTAL STATUTES

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

2,1.1 COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT (CERCLA)

CERCLA Section 120 (40 CFR 300-310; 43 CFR 11) requires federal facilities to comply with the provisions of the act. More specifically, Section 120 imposes additional regulations related to site studies and notices for the sale and other transfer of federal real property. This section makes all CERCLA guidelines, rules, regulations and criteria applicable to federally owned or operated facilities, including requirements for: (1) preliminary assessments for facilities at which hazardous substances are located; (2) possible inclusion of such facilities on the National Priority List (NPL); and (3) remedial actions at these sites. However, federal facilities are not required to comply with CERCLA provisions regarding financial responsibility and removal/remediation contracts with state governments. While federal facilities not on the NPL may be subject to state laws concerning removal and remediation actions, these state laws and regulations may not impose provisions more stringent than those applicable to non-federal facilities. NETL did not have any CERCLA violations in 2023 at any of its sites.

2.1.2 SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) AND COMMUNITY RIGHT-TO-KNOW

SARA Title III requires facilities to report hazardous chemicals that were present at a facility and that exceeded certain established quantities during the preceding year. This includes gaseous, liquid and solid chemicals designated as extremely hazardous substances in amounts greater than or equal to 500 pounds, liquids in amounts greater than or equal to 55 gallons or amounts greater than or equal to the threshold planning quantity. SARA Title III also requires reporting of all other hazardous chemicals present at the facility during the preceding calendar year in amounts equal to or greater than 10,000 pounds.

NETL 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.

To meet these targets and regulatory requirements, NETL maintains an active inventory of all hazardous and extremely hazardous chemicals on-site, along with the safety data sheets for each substance with the Lab's Environmental Management System (EMS)

NETL did not have any hazardous chemicals over the Title III reporting thresholds in 2023 at any of its sites.

2.1.3 RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)

RCRA is the public law that creates the framework for the proper management of hazardous and nonhazardous solid waste. The law describes the waste management program mandated by Congress that gave the U.S. Environmental Protection Agency (EPA) authority to develop the RCRA program. Under RCRA, the EPA has the authority to control hazardous waste from the "cradle-to-grave," including generation, transportation, treatment, storage and disposal of hazardous waste. Sites that produce, manage, transport or dispose of hazardous wastes are designated as generators, transporters, or treatment, storage, and/or disposal (TSD) facilities.

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

All 2023 hazardous waste management activities were performed in a safe and environmentally sound manner and in compliance with Title 40 Part 262, Standards Applicable to Generators of Hazardous Waste, and all applicable federal, state, and local laws and regulations, as well as, DOE/ NETL policies. NETL complied with all the recordkeeping and reporting requirements specified in 40 CFR 262 Subpart D — Recordkeeping and Reporting Applicable to Small and Large Quantity Generators.

NETL's hazardous waste program manager ensures compliance with applicable regulations by overseeing the hazardous waste program. The hazardous waste program 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 for Pittsburgh and Morgantown and the submission of the Annual Hazardous Waste report for Albany, and any other reporting required by DOE headquarters.

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

Per 40 CFR 262.11, determinations were made as to whether wastes were hazardous wastes to ensure compliance with applicable RCRA regulations. When unidentified wastes were provided for disposal, NETL sent samples to a contracted certified laboratory to test for hazardous characteristics (i.e., toxicity, ignitability, reactivity, and corrosiveness) and to ensure proper handling. NETL did not have any RCRA violations in 2023 at any of its sites.

2.1.4 FEDERAL FACILITIES COMPLIANCE ACT (FFCA)

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

2.1.5 NATIONAL ENVIRONMENTAL POLICY ACT (NEPA)

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 CXs was modified, so that 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 CXs issued by NETL. However, it has not necessarily reduced the number of environmental questionnaires (EQ) evaluated to process these CX determinations. For these reasons, both CXs approved and EQs reviewed to support CX determinations are included below.

NETL conducts NEPA reviews for both on-site and off-site actions proposed for funding by the federal government. These include actions planned in cooperation with other governmental organizations, educational institutions, and private industry. These NEPA reviews, particularly for EA and EIS-level actions, include analyses of potential impacts to Environmental Justice resulting from the proposed actions. Each EA and EIS provides a discussion of potential direct, indirect, and cumulative effects to Environmental Justice. Analysis of Environmental Justice includes, but is not limited to, using EPA's EJScreen tool to inform potential impacts, referencing community benefits plans/equity plans submitted by the project applicant, and consulting with Native American tribal nations as part of the EA/EIS consultation process.

The following EIS activities took place in calendar year 2023:

- **DOE/EIS-0512-S1: ALASKA LNG PROJECT —** On April 15, 2021, the DOE Office of Fossil Energy and Carbon Management (DOE/FECM) granted a request for rehearing of a final Order issued to Alaska LNG Project LLC (Alaska LNG) for the export of liquefied natural gas (LNG) produced from Alaskan sources to non-free trade agreement

countries pursuant to the Natural Gas Act. In the rehearing order, DOE stated that it was granting a rehearing for the purpose of conducting two Alaska-specific environmental studies (collectively, the Alaska environmental study proceeding). On July 2, 2021, DOE announced its intent to prepare a supplemental environmental impact statement (SEIS) for the Alaska environmental study proceeding (DOE/EIS–0512–S1), consistent with NEPA. DOE announced availability of the draft SEIS on June 29, 2022, and held a virtual public meeting on July 20, 2022. A 45-day public comment period ran from July 1, 2022, to Aug. 15, 2022. The SEIS included analysis of the potential environmental impacts associated with natural gas production on the North Slope of Alaska and a life cycle analysis calculating the greenhouse gas (GHG) emissions for LNG exported from the proposed Alaska LNG Project.

The notice of availability for the final SEIS was issued in January 2023, and the amended ROD was issued in April 2023.

The following EA activities took place in calendar year 2023:

- **DOE/EA-2057: BUILDING 2 DEMOLITION, ALBANY, OREGON —** NETL proposes to demolish building 2 (B-2) at NETL-Albany. 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 intended to eliminate the current unsafe condition of B-2 and reduce NETL's inventory of obsolete and unused buildings. NETL is incurring annual maintenance costs for B-2, which has been secured and abandoned since the early 1990s. By demolishing B-2, total expenditures for sustaining facilities would be reduced and safety would be increased.

  Since the Oregon State Historic Preservation Office (SHPO) determined that B-2 contributes to NETL-Albany's eligibility for listing as a historic district, demolition of the structure would have an adverse effect (SHPO letter dated Oct. 9, 1997). An EA was determined to be the appropriate level of analysis under DOE's 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 the EA's development.

  In anticipation of demolition funding being available in FY 2025, a draft EA was initiated in 2023. The EA process continued into 2024.

- **DOE/EA-2191: UNIVERSITY OF TEXAS – MARINE GEOPHYSICAL SURVEYS IN THE NORTHWESTERN GULF OF MEXICO —** The proposed action is for DOE to provide funding to the University of Texas to conduct high-resolution three-dimensional marine seismic surveys from the research vessel Brooks McCall in the Gulf of Mexico, off the coast of Texas.

  The EA process was initiated in 2022 and proceeded throughout 2023, ending with the issuance of a FONSI in December 2023.

- **DOE/EA-2194: WYOMING CarbonSAFE —** DOE's proposed action is to provide cost-shared funding to the University of Wyoming (UW) for phase IV of the Wyoming CarbonSAFE project. UW's proposed project is to construct carbon capture and storage facilities needed to inject and monitor commercial quantities (50 million metric tons) of CO_2 in geologic formations.

The proposed project would capture CO_2 from Dry Fork Station in Gillette, Wyoming, compress the CO_2 into a supercritical fluid, transport it via pipeline to injection wells and inject it into the Sundance Group (approximately 8,170 feet below ground level) and the Minnelusa Sandstone (approximately 9,340 feet below ground level). The project would require construction of a CO_2 capture unit, associated compression facilities, approximately 28 miles of CO_2 pipeline, and multiple Class VI-permitted injection wells, along with various monitoring wells and instrument arrays.

Development of the draft EA continued throughout 2023, and the draft EA was issued for public comment in early 2023. The EA process will continue in 2024.

- **DOE/EA-2196: ESTABLISHING AN EARLY CO_2 STORAGE COMPLEX IN KEMPER COUNTY, MISSISSIPPI: PROJECT ECO$_2$S —** DOE proposes to provide cost-shared funding to the Southern States Energy Board (SSEB) for phase IV of Establishing an Early CO_2 Storage Complex in Kemper County, Mississippi: Project ECO2S. SSEB's proposed project is to capture up to 1.7 million metric tons per year of CO_2 from Mississippi Power's Plant Ratcliffe, a natural gas combined-cycle unit in Kemper County, Mississippi. The CO_2 would be compressed to supercritical state, transported via a short connector pipeline, and stored in a series of stacked saline reservoirs. The 30,000-acre CO_2 storage complex is co-located with Plant Ratcliffe.

  The proposed project would involve the construction of a Linde BASF CO_2 capture unit and associated compression equipment, piping and instrumentation; a short trunkline to pipe CO_2 from the plant to the storage complex; and multiple class VI injection wells with associated monitoring wells and instrumentation.

  Development of the draft EA continued throughout 2023 and will continue in 2024.

- **DOE/EA-2197: NORTH DAKOTA CarbonSAFE; PROJECT TUNDRA —** The proposed action is for DOE to provide cost-shared funding to the Energy and Environmental Research Center (EERC) for phase IV of the North Dakota CarbonSAFE project. EERC's proposed project is to construct carbon capture and storage facilities at Milton R. Young Station, an existing lignite-fired plant in Oliver County, North Dakota.

  The proposed project would use Fluor Corporation's (Fluor) Econamine FG Plus technology to capture an average of 4 million metric tons per year of CO_2. The CO_2 would be compressed, piped via 0.25-mile trunkline to the storage complex; and injected into deep geologic reservoirs. The CO_2 storage complex is co-located on the power plant property. The proposed project would include the construction of the CO_2 capture facility, approximately 0.25-miles of CO_2 pipeline, 3 class VI injection wells, well pads, monitoring wells and other associated equipment. In addition, the project would require upgrades to the existing water treatment system and two class I injection wells to dispose of the process wastewater.

  Development of the draft EA continued throughout 2023. Based on comments received in 2023, a second version of the draft EA will be developed and released for a 30-day public comment period in early 2024.

- **DOE/EA-2205D: ASCEND ELEMENTS — APEX: INTEGRATED SUSTAINABLE BATTERY ACTIVE MATERIAL AND PRECURSOR PRODUCTION PLANT —** The proposed action is for DOE to provide cost-shared funding to Ascend Elements to construct an industrial scale facility (Project Apex) for production of sustainable, low-cost, precursor cathode materials by integrating the separation of critical cathode materials from spent lithium-ion batteries (LiBs) with the production of both precursor cathode active materials (CAM) and metal salts, to support domestic production of CAM for U.S. electric vehicle battery production. Once operational, the facility would produce enough material to supply over 250,000 electric vehicles annually. This facility would be located within Commerce Industrial Park II in Hopkinsville, Christian County, Kentucky.

  The EA process was started in 2023 and included EA scoping, development, consultation, and public comment. The EA process will be completed in 2024 with the issuance of a FONSI.

- **DOE/EA-2213: CIRBA SOLUTIONS — LITHIUM-ION BATTERY RECYCLING TO PRODUCE BATTERY-GRADE RAW MATERIALS —** The proposed action is for DOE to provide cost-shared funding to Cirba Solutions to expand its industrial scale spent LiB recycling facility in Lancaster, Ohio. The facility expansion would consist of retrofitting an existing building (B-295) at the current Cirba Solutions Facility to increase LiB processing capacity, as well as developing new buildings (B-395 and Building Complex 495) to house advanced hydrometallurgical processing lines, which will allow for more refined processing of spent LiBs.

  The EA process was started and completed in 2023, including EA scoping, development, consultation, public comment, and issuance of a FONSI in September 2023.

- **DOE/EA-2214D: SILA NANOTECHNOLOGIES — AUTO SCALE SILICON ANODE PLANT —** The proposed action is for DOE to provide cost-shared funding to Sila Nanotechnologies to construct a silicon anode manufacturing facility in Moses Lake, Washington. Activities would include modifying an existing 613,000 square foot industrial building, plus site improvements, installation of new equipment and other infrastructure upgrades.

  The EA process was initiated in 2023, and EA scoping, development, and consultation was completed in 2023. A draft EA was issued for public comment in early 2024, and the EA process will be continued in 2024.

- **DOE/EA-2220: GROUP14 TECHNOLOGIES — BATTERY ACTIVE MATERIALS PLANT —** The proposed action is for DOE to provide cost-shared funding to Group14 Technologies to construct a commercial-scale facility in Moses Lake, Washington, referred to as Battery Active Materials Factory, which will produce a LiB anode material for the growing electric vehicle market. Group14's product is a silicon-carbon composite material that improves the energy density and reduces the cost of LiBs. Group14's goal is to install six process module buildings to meet a 12,000 metric ton per year capacity.

  The EA process was initiated in 2023, and EA scoping, development, and consultation was completed in 2023. The EA process will continue in 2024, including issuance of the draft EA for public comment.

- **DOE/EA-2223: 6k – PLASMA LOW-COST ULTRA SUSTAINABLE CATHODE ACTIVE MATERIALS —** The proposed action is for DOE to provide cost-shared funding to 6k Energy to construct a facility that would produce multiple battery chemistries, namely NMC811 and lithium iron phosphate (LFP) using its patented 6K's UniMelt microwave plasma processing technology. This facility would be located within the Airport Industrial Park in Jackson, Tennessee.

The EA process was started and completed in 2023, including scoping, development, consultation, public comment and issuance of a FONSI in December 2023.

- **DOE/EA-2229D: ICL SPECIALTY PRODUCTS – COMMERCIAL PRODUCTION OF LITHIUM IRON PHOSPHATE CATHODE POWDER FOR THE GLOBAL LITHIUM BATTERY INDUSTRY —** The proposed action is for DOE to provide cost-shared funding to ICL Specialty Products to construct a 30,000 MT LFP CAM plant within ICL's facility in St. Louis, Missouri (Carondelet plant). This plant will cover roughly 2-3 acres and be approximately 140,000 square feet.

  The EA process started in 2023, and included scoping, development, and consultation. The proposed facility site was changed during the EA process, which has been re-started to accommodate the new site location. The EA process will continue in 2024.

- **DOE/EA-2236D: MEXICHEM FLUOR, INC. – LiPF6 MANUFACTURING PLANT IN ST. GABRIEL, LOUISIANA —** The proposed action is for DOE to provide cost-shared funding to Mexichem Fluor to construct a manufacturing plant to produce lithium hexafluorophosphate adjacent to an existing Mexichem plant located in St. Gabriel, Louisiana.

  The EA process started in 2023 and included initial scoping and consultation planning. The EA process will continue in 2024 as the applicant finalizes site design details.

- **DOE/EA-2237D: SOLVAY SPECIALTY POLYMERS USA – BATTERY-GRADE POLY VINYLIDENE MANUFACTURING FACILITY —** The proposed action is for DOE to provide cost-shared funding to Solvay Specialty Polymers to construct a chemical manufacturing facility to produce polyvinylidene fluoride. The facility is in Augusta, Georgia.

  The EA process was started in 2023, and scoping, development, and consultation steps are in progress. The EA process will continue in 2024.

- **DOE/EA-TBD: TALON NICKEL (USA) LLC – PROJECT OMNIVORE: AN ADVANCED DOMESTIC BATTERY MINERALS PROCESSING FACILITY —** The proposed action is for DOE to provide cost-shared funding to Talon Nickel to construct a battery material processing facility, including facilities for rail loading/unloading, a mineral separation plant and supporting infrastructure. The facility will be in North Dakota.

  The EA process was started in 2023 and was limited to initial scoping and consultation planning as the applicant finalizes facility location details. The EA process will continue in 2024.

- **DOE/EA-TBD: AMERICAN BATTERY TECHNOLOGY COMPANY — LARGE-SCALE DEMONSTRATION OF DOMESTIC MANUFACTURING OF LOW-COST AND LOW-ENVIRONMENTAL IMPACT BATTERY-GRADE LITHIUM HYDROXIDE FROM UNCONVENTIONAL DOMESTIC SEDMIENTARY RESOURCES —** The proposed action is for DOE to provide cost-shared funding to the American Battery Technology Company to construct a pre-commercial scale demonstration facility to process unconventional Nevada-based lithium-bearing claystone resources to manufacture battery-grade lithium hydroxide monohydrate. The facility will be located near Tonopah, Nevada on land administered by the Bureau of Land Management (BLM).

  The NEPA process for this award was started in 2023 and was limited to initial scoping and planning between DOE, American Battery, and BLM. The level of NEPA review (EA vs. EIS) has not yet been determined and it is anticipated that DOE will serve as a cooperating agency to BLM for the NEPA document when the level of NEPA review is determined. The NEPA process will continue in 2024.

The following CX and no-cost time extension activities took place in calendar year 2023. These CX and no-cost time extensions were approved in 2023:

NO COST TIME EXTENSIONS GRANTED: 38

INTERNAL CXs TO NETL

NETL-Morgantown	24	
NETL-Pittsburgh	11	
NETL-Albany	18	
Multiple NETL Sites	2	
Total Internal CXs	55	*[Supporting EQs reviewed: 57]*

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

Continental U.S.	379	
Non-continental U.S.	11	
Total External CXs	390	*[983 Supporting EQs reviewed: 29 of these covered work in international or non-continental U.S. locations]*

GRAND TOTAL CXs APPROVED FOR 2023: 445

GRAND TOTAL EQs REVIEWED FOR 2023: 1,040

2.1.6 TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA of 1976 gives EPA the authority to require reporting, recordkeeping, testing requirements, and restrictions relating to chemical substances and/or mixtures. Specifically, TSCA addresses the production, importation, use and disposal of chemicals including polychlorinated biphenyls, asbestos, radon and lead-based paint. No NETL sites manufacture chemicals and are not subject to sections of TSCA related to manufacturing. No spills or releases of substances regulated by TSCA were reported in 2023 at any of the sites. In most cases, TSCA compliance at NETL relates to asbestos and lead-based paint. Given the Laboratory's unique history related to construction and maintenance activities and infrastructure at each NETL facility, the activities at each site related to TSCA compliance in 2023 are addressed in the site-specific sections.

2.1.7 FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (FIFRA)

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

2.1.8 CLEAN AIR ACT (CAA)/AIR QUALITY AND PROTECTION ACTIVITIES

CAA regulates air emissions from both stationary and mobile sources. The act establishes national ambient air quality standards to protect public health and public welfare and regulates emissions of hazardous air pollutants. Each NETL site tracks its emissions via a quarterly air emissions inventory. Specific air quality compliance requirements are addressed in the site-specific sections. No air quality violations were identified at any of the sites in 2023.

Several ES&H management plans (EMPs) direct continuous improvement efforts in air-quality protection and reduction of GHG emissions. One EMP tracks an NETL comprehensive GHG inventory for FY 2023 and executes renewable energy generation projects and purchase of renewable energy credits (to make up any differences) at all NETL sites. Another EMP requires reduction of energy usage/ square foot (Btu/ft^2) by 0.7% in FY 2023. This EMP will reduce energy intensity in buildings to achieve GHG reductions. NETL also has EMPs that call for reducing petroleum-based fuels and increasing the use of alternative fuels and renewable energy to reduce NETL's impact on ambient air quality.

Additionally, hydrofluorocarbon is tracked at each site and efforts to prepare for the phasedown are underway. Details are provided in the site specific sections.

2.1.9 CLEAN WATER ACT (CWA)

CWA regulates the discharge of pollutants into the waters of the United States. The regulations include setting wastewater standards for industry, as well as national water quality criteria recommendations for pollutants in surface waters. Under the CWA, it is unlawful to discharge any pollutant from a point source into navigable waters, unless a National Pollutant Discharge Elimination System (NPDES) permit is obtained. Currently only NETL-Morgantown holds an NPDES permit. NETL-Pittsburgh is required to comply with the NPDES permit for the Bruceton Research Center (BRC) held by the Centers for Disease Control and Prevention/National Institute for Occupational Safety and Health (CDC/NIOSH), a co-located agency with NETL at the BRC. NETL-Albany does not have an NPDES permit. Compliance with the CWA, as well as other water quality requirements is detailed under the site-specific discussions.

2.2 DOE INTERNAL ENVIRONMENTAL AND RADIATION PROTECTION ORDERS

2.2.1 DOE ORDER 436.1, DEPARTMENTAL SUSTAINABILITY

NETL was in full compliance with DOE Order 436.1, Departmental Sustainability. This order addresses the requirements and responsibilities for managing sustainability and includes an emphasis on reducing GHG and achieving the goals established in applicable laws, regulations and E.O.s. 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, sealed radioactive sources, naturally occurring radioactive materials (NORM), technologically enhanced naturally occurring radioactive materials (TENORM), and legacy radioactive materials. Radiation protection activities are discussed, as necessary, in this document based on location.

Use of radioactive materials at NETL is limited to research instrumentation and geologic samples that have been identified as NORM via surveys. 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.

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 ES&H information. NETL's procedure addresses reports required on a scheduled basis by DOE or by regulation and are essential for evaluating NETL operations and identifying opportunities for improvement for planning purposes. NETL's internal procedure applies to all NETL employees and research associates at the NETL sites. Reports must be compiled and submitted for NETL-Albany, NETL-Morgantown, and NETL-Pittsburgh as warranted. The directive requires that reports, documents, and other submissions listed in this procedure detail roles, responsibilities, record keeping, and required timelines for reporting, and are prepared and submitted in accordance with DOE Order 231.1.

2.2.4 DOE ORDER 435.1, RADIOACTIVE WASTE MANAGEMENT

The objective of DOE Order 435.1, Radioactive Waste Management, is to ensure that all DOE radioactive waste is managed in a manner that protects worker and public health and safety and the environment. It requires that DOE radioactive waste management activities be systematically planned, documented, executed and evaluated. Radioactive waste is to be managed to: (1) protect the public from exposure to radiation from radioactive materials; (2) protect the environment; (3) protect workers; and (4) comply with applicable federal, state, and local laws and regulations. NETL ensures that such activities comply with DOE Order 435.1, and any other applicable E.O.s 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 its workers and the public. DOE orders, EPA regulations, and Nuclear Regulatory Commission regulations are 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 NNSA national laboratories.

Radiation exposure at NETL is managed based on the "as low as reasonably achievable" principle. More information is provided within the site-specific sections of this report. Radiation monitoring performed at NETL 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 SARS packages. Radiation field survey of all the site radiation-generating devices is completed on a semi-annual basis. NETL also maintains an inventory of radioactive sources and their respective custodians at each site.

2.3.1 ENVIRONMENTAL RADIOLOGICAL PROTECTION PROGRAM AND DOSE ASSESSMENT

The cumulative annual dose for all personnel performing operations at NETL-Albany, NETL-Morgantown, and NETL-Pittsburgh during 2023 was less than 1,000 millirem (roentgen equivalent man, <10 millisievert), with an average annual dose of less than 12 millirem (<0.12 millisievert) per person working in the radiation monitoring program. NETL does not currently monitor for any specific radionuclides.

2.3.2 RADIOLOGICAL DISCHARGES

NETL did not discharge any radiological materials to the environment in 2023.

- No doses to humans based on releases or potential releases were identified.
- No radiological materials have been released to air or water.
- No groundwater radiological monitoring was required.

2.3.3 CLEARANCE OF PROPERTY CONTAINING RESIDUAL RADIOACTIVE MATERIALS

No property at NETL was excessed in 2023 that required a residual radioactive material clearance.

2.3.4 UNPLANNED RADIOLOGICAL RELEASES

There was one unplanned radiological release in 2023 at NETL-Morgantown. Details are contained in section 3.3.4.1.

2.3.5 ENVIRONMENTAL RADIOLOGICAL MONITORING

NETL did not conduct any environmental radiological monitoring in 2023.

2.3.6 FUTURE RADIOLOGICAL MONITORING

NETL is not planning to conduct radiological monitoring in the future.

2.3.7 RESIDUAL RADIOACTIVITY (RESRAD)-BIOTA

No radiation protection program activities at NETL require the use of RESRAD-BIOTA code. No radionuclide air emissions (under National Emissions Standards for Hazardous Air Pollutants – NESHAPs) have been identified. Therefore, no reporting is required.

2.4 COMPLIANCE AND/OR CLEANUP AGREEMENTS

NETL's existing cleanup agreements are with the state of Wyoming's Department of Environmental Quality (WYDEQ) and are the result of experimental R&D research that began in the 1960s. Specifically, the agreements include efforts for groundwater and surface remediation at Rock Springs Oil Shale Retort Site in Sweetwater County, Wyoming.

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. Site 5 has reached the remediation goal. A two-year stability monitoring period was started for sites 4 and 7 in September 2023. The three remaining sites (i.e., 6, 9, and 12) are currently in

active groundwater remediation involving periods or cycles of air sparging, contaminant rebound, and monitoring. Once the restoration goal is reached, or WYDEQ approves groundwater remediation at each retort site, DOE will perform surface revegetation and decommissioning prior to closing each site.

2.5 ENVIRONMENTAL VIOLATIONS CITED BY REGULATORS/ NOTICES ISSUED

Regulators cited no environmental violations in calendar year 2023 at NETL-Albany, NETL-Morgantown, or NETL-Pittsburgh.

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

NETL had no notices of violation, no notices of deficiency, no notices of intent to sue, and no other enforcement actions during calendar year 2023.

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 2023. Details pertaining to the reports are in the Albany and Pittsburgh sections.

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

NETL underwent surveillance audits for all three facilities with respect to the ISO 14001:2015 and ISO 45001:2018 standards in October and November 2023 with Government and Military Certification Systems Inc. During the audits, NETL received one major nonconformance and eight minor nonconformances. These issues are being addressed as part of the 2024 surveillance audits.

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

NETL uses a variety of self-assessment procedures to improve ES&H performance including internal audits, project assessments and inspections, independent assessments and reporting through NETL's corrective action tracking system (CATS). Self-assessments enable NETL to identify strengths, opportunities for improvement and nonconformance, which are tracked in CATS.

NETL completed the required external ISO surveillance audit conducted by Government and Military Certification Systems in October/November 2023. The nonconformances identified are expected to be addressed by June 2025.

In addition to the regular third-party certification audits the sites participated in a Site Assistance Visit (SAV) with DOE's Office of Fossil Energy and Carbon Management (FECM) in May 2023. The SAV provide an extra review of NETL programs and an opportunity for DOE headquarters staff to gain a better perspective on ES&H, Emergency Response, Security and Continuity of Operations (COOP) activities that occur at NETL.

2.10 SUMMARY OF ENVIRONMENTAL PERMITS

Under Section 112 of the CAA, Congress gave the EPA the responsibility for enforcing regulations relating to asbestos renovation and demolition activities. The CAA allows the U.S. EPA to delegate authority to state and local agencies. Even after the U.S. EPA delegates responsibility to a state or local agency, EPA retains authority for overseeing agency performance and enforcing the federal NESHAP for asbestos per 40 CFR 61, Subpart M. A 2023 Summary of Environmental Permits (e.g., asbestos permits, lead permits, IAQ – radon, assumed microbial growth events, and radiation events) per site is provided in Table 2.10.

NETL-Albany removed 13,690 Sq-ft of Asbestos, NETL-Pittsburgh removed 4,350 sq-ft of Asbestos, and NETL-Morgantown removed 940 linear feet of Asbestos.

Table 2.10: 2023 Summary of Permits				
Permit	**Category**	**Site**	**Issuing Agency**	**Status**
Industrial Wastewater Discharge Permit. Permit No. 8731-02	Wastewater	ALB	City of Albany	Active
Site-use permit to allow for low-level radioactive waste disposal at the regional disposal facility. Permit No. G2140	low-level radioactive waste disposal	ALB	Washington. Department of Public Health	Active.
B-28 (Phase I & Phase II) ATEZ, Inc. License No. FS-2023-00535CCB License No.64090	Asbestos Removal	ALB	Oregon Department. of Environmental Quality (ORDEQ)	Completed
B-2 Vermiculite ATEZ, Inc. License No. FS-2023-00535 CCB License No.64090	Asbestos Removal	ALB	ORDEQ	Completed
Minor Source Operating Permit (Allegheny County) • Generator was added to the permit during the reporting year.	Air	PGH	Allegheny County Health Department (ACHD)	Active
Industrial Wastewater Permit (NPDES). Permit No. PHA 052622	Wastewater	PGH	Pleasant Hills Authority	Active
Storage Tank Registration Permit. Tank ID: 589842 and 589843	Stormwater/ Petroleum Products	PGH	Pennsylvania Department of Environmental Protection (PADEP)	Active
B-83 CAML Renovations Bristol Environmental, Inc. License #: ACAL-23908, C0160A	Asbestos Removal	PGH	ACHD	Completed
B-901 Roofing Renovations KLA Roofing & Construction, LLC License #: ACAL-23925, C0578A	Asbestos Removal	PGH	ACHD	Completed
B-167 Roofing Renovations KLA Roofing & Construction, LLC License #: ACAL-23925, C0578A	Asbestos Removal	PGH	ACHD	Completed
B-84 DAC (Highbay) Renovations Bristol Environmental, Inc. License #: ACAL-23908, C0160A	Asbestos Removal	PGH	ACHD	Completed
B-84 DAC (Highbay) Renovations Bristol Environmental, Inc. License #: ACAL-23908, C0160A	Asbestos Removal	PGH	ACHD	Completed
B-84 DAC (Highbay) Renovations, Floor Grind Abrasive Blasting Project Bristol Environmental, Inc. License #: C00004	Lead Abatement	PGH	ACHD	Completed
Industrial Wastewater Discharge Permit (NPDES). Permit No. MUB 012	Wastewater	MGN	West Virginia Department of Environmental Protection (WVDEP) Morgantown Utility Board	Active
Stormwater WV/NPDES Permit No. WV0111457	Stormwater	MGN	WVDEP	Active
B-13 Exterior Refresh Renovation Baxter Environmental License #: C0002A	Asbestos Removal	MGN	West Virginia Department of Health and Human Resources (WVDHHR)	Completed
Stormwater WV/NPDES Permit No. WV0111457	Stormwater	MGN	WVDEP	Active
B-13 Exterior Refresh Renovation Baxter Environmental License #: C0002A	Asbestos Removal	MGN	West Virginia Department of Health and Human Resources (WVDHHR)	Completed

2.11 EXECUTIVE ORDER 14057

E.O. 14057, Catalyzing Clean Energy Industries and Jobs through Federal Sustainability, was implemented, Dec. 8, 2021. It revoked the requirements of E.O. 13834, Efficient Federal Operations. The purpose of E.O. 14057 is to affirm the policy of the United States that the federal government will lead by example to achieve a carbon-free electricity sector by 2035, with net-zero emissions by no later than 2050.

NETL will be expected to meet the following requirements:

- Reduce scope 1, 2, and 3 GHG emissions by establishing targets for fiscal year 2030 using a FY 2021 baseline.
- Ensure that NETL's total electrical energy consumption includes the EPACT 2005 requirement of 7.5% renewable energy in FY 2023. Ensure 100% of light-duty vehicle acquisitions are ZEVs by 2027. Ensure 100% medium-duty vehicle and heavy-duty vehicle acquisitions are ZEVs by 2035. (E.O. 14057 and EISA 2007). Achieve 50% diversion of nonhazardous construction and demolition debris by FY 2025 and 75% diversion by FY 2030. (E.O. 14057)

- Ensure all new construction and major renovations comply with the 2020 Guiding Principles for Sustainable Federal Buildings (EISA 2007 "Energy Independence and Security Act 2007").

The Implementing Instructions for E.O. 14057, issued August 2022, provides instructions to federal agencies regarding the implementation of E.O. 14057, including agency planning, reporting requirements and accountability.

Ensure all new construction and major renovations comply with the 2020 Guiding Principles for Sustainable Federal Buildings (EISA 2007 "Energy Independence and Security Act 2007"). The Implementing Instructions for E.O. 14057, issued August 2022, provides instructions to federal agencies regarding the implementation of E.O. 14057, including agency planning, reporting requirements and accountability.

Agencies must issue or revise existing agency policies, directives and guidance, as appropriate including employee training, to ensure alignment with the goals and requirements of the E.O. 14057, the implementing instructions and further guidance issued to implement the E.O. Agencies are to continue to use effective management strategies, such as EMS and energy management systems, if they align with and support their agency needs and facilitate implementation and progress toward E.O. goals.

2.12 ORGANIZATIONAL RESILIENCE

Organizational resilience is defined as an organization's ability to anticipate, prepare for, respond and adapt to incremental change and sudden disruptions 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, energy/water supplies and developed initial response procedures. In addition, NETL's Emergency Response Organization meets with local emergency planning committees quarterly 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 continues to track the progress of the vulnerability assessment and resilience plan (VARP) resilience solutions. The dashboard tracking module was updated in November 2023.

NETL will review the solutions tracking module and incorporate the resilience solutions into NETL's Strategic Facilities Master Plan and capital investment planning to implement the solutions in the projected time frames in the solutions tracking module.

One of the resilience solutions identified in the FY 2022 NETL VARP was installation of back-up/alternative power to reduce Albany's carbon footprint and load on the power grid. The project to add a 250 KW solar array was started with design in FY 2023.

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.

2.13 PFAS AND ADDITIONAL EMERGING CONTAMINANTS

Emerging contaminants refers to chemicals that can enter the water supply and have a detrimental affect on aquatic species and nonaquatic species (bioaccumulating up the food web). EPA has identified several emerging contaminants that present unique issues and challenges to the environmental community, including per- and polyfluoroalkyl substances (PFAS).

These chemicals are of particular concern to the department since they do not break down easily in the environment or the human body because of their strong carbon-fluorine bond. According to the department's policy statement regarding PFAS on Sept. 16, 2021, the use of PFAS-containing aqueous film forming foam (AFFF) should be discontinued, except in cases of actual fire emergencies; fire protection personnel must use appropriate PPE to minimize exposure to PFAS; and sites may continue to store quantities of PFAS-containing AFFF on-site for emergencies, but disposal is suspended and will be considered on a case-by-case basis with approval by the head of the departmental element.

In 2023, NETL continued to work to ensure compliance with the new DOE and EPA policies regarding PFAS.

- NETL revised its inventory of PFAS-containing AFFF systems, and new ones were identified.
- Two systems were newly identified at NETL-Albany.
- A new system was identified at NETL-Pittsburgh. Two PFAS-containing systems were previously identified for a total of three systems.
- Four PFAS-containing systems were newly identified at NETL-Morgantown.
- NETL is currently planning to replace most of its PFAS-containing AFFF except for the two relatively new installed systems in Albany.

- The systems would only be discharged in a fire emergency (per DOE's PFAS policy memo).
- Drinking water supplies at each site come from public drinking water systems. NETL does not test or monitor PFAS content in public drinking water. Groundwater and surface water sources do not provide drinking water.

2.14 EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT REPORTING STATUS TABLE

EPCRA Section	Description of Reporting	Status
EPCRA Sec. 302-303	Requires a facility to notify state and local emergency response agencies if any extremely hazardous substances are present in quantities exceeding threshold quantities.	There were no extremely hazardous substances stored in excess of the threshold planning quantities.
EPCRA Sec. 304	Requires a facility to notify state and local emergency response and planning agencies there is an accidental spill or release in excess of the reportable quantity of hazardous substance.	There were no releases of hazardous substances which required reporting under Section 304.
EPCRA Sec. 311-312	Section 311 requires one-time submittal of Safety Data Sheets to state and local emergency response agencies for chemicals stored onsite in quantities greater than the threshold planning quantities. Section 312 requires an annual report of EPCRA Section 311 information.	EPCRA Section 311 reporting was not required. Section 312 Tier II hazardous substance reports were submitted for the MGN and PGH facilities. (Albany) was required submit a State-specific report which meets the Section 312 reporting requirements but has lower reporting thresholds.
EPCRA Sec. 313	Section 313 requires that a toxic chemical release inventory report be filed with the EPA in the event of an environmental release of any chemical that is manufactured, processed or otherwise used in quantities exceeding the regulatory thresholds.	EPCRA Section 313 TRI reporting was not required.

3.0 COMPLIANCE STATUS BY SITE

3.1 ALBANY, OREGON

3.1.1 SITE DESCRIPTION

NETL-Albany focuses on technologies in scientific and engineering areas creating commercially viable solutions to national energy and environmental problems. These areas include materials performance, multi-environmental materials characterization, alloy development/manufacture, and geospatial data analysis. The work is accomplished through both in-house R&D and contracted research. There are 132 employees at NETL-Albany, including 47 federal employees and 85 contractor employees.

Photo 3.1.1a: NETL-Albany and Surrounding Area.

GEOGRAPHY, SURFACE WATER & HYDROLOGY

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. NETL-Albany 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.

NETL-ALBANY

NETL-Albany has two relatively shallow aquifers, including a perched aquifer and a deeper gravel aquifer separated by a clay lens. The facility has 35 groundwater monitoring wells, which are sampled and reported on twice a year. The figures below show the groundwater contours on the perched and gravel aquifers.

LAND USE

NETL-Albany is located in Linn County, Oregon, in the western part of the state (Photo 3.1.1a). 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. Land use immediately surrounding NETL-Albany is a combination of residential housing developments, small businesses and public-school properties.

Albany's population, per the 2023 U.S. Census estimates, is 56,898 people and 20,880 households. The population density was 3,219.6 per square mile. In the most current available information, There were 20,979 housing units at an average density of 1,198.8 per square mile were listed in the most current available information. The city's racial makeup of the city was 85.0% White, 0.4% African American, 1.1% Native American, 2.0% Asian, 0.0% Pacific Islander, and 7.8% from two or more races. Hispanic or Latino of any race were 13.2% of the population.

The median income for a household in the city was $65,587. The per capita income for the city was $19,895. About 11.1% of the population lives below the poverty line. The major employers in Albany are Samaritan Health Services, Linn Benton Community College, Greater Albany Public Schools ATI, Greater Target Distribution Center, and Linn County.

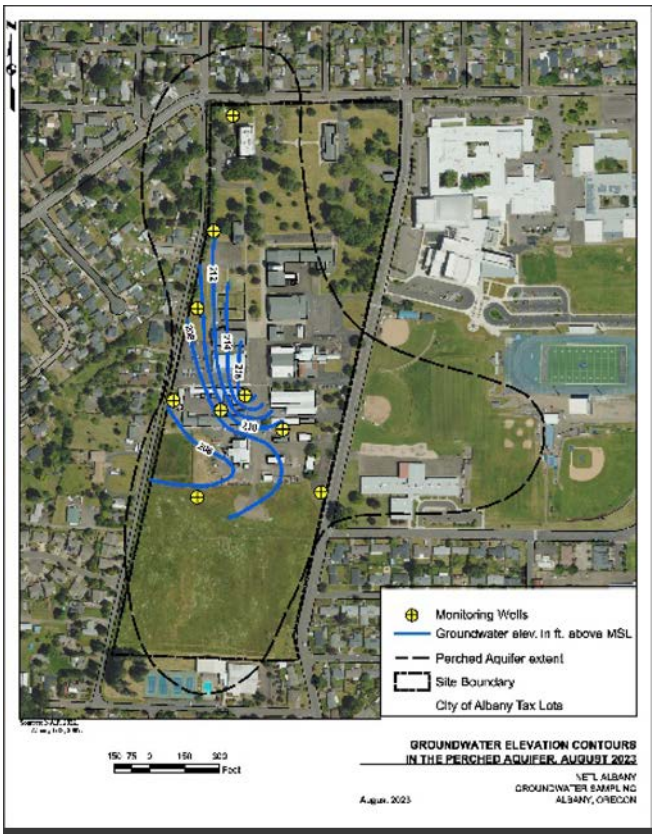


Photo 3.1.1b: Perched aquifer.

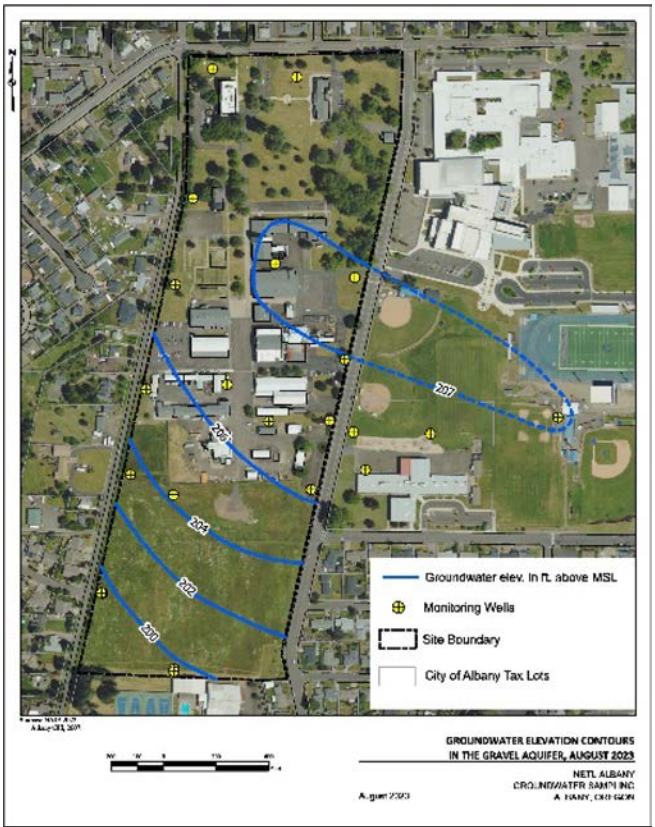


Photo 3.1.1c: Gravel aquifer.

3.1.2 MAJOR SITE ACTIVITIES

1.) B-28 ELECTRICAL VAULT UPGRADES

Construction continued to upgrade the electrical infrastructure of B-28 for reliability and capacity to ensure code compliance and more effectively support current and future research capabilities.

Photo 3.1.2a: B-28 electrical vault upgrades.

2.) ENERGY & WATER SURVEY

Evaluate the utility usage and billing, observe how the energy-using systems are operated and maintained, and to develop low-cost and no-cost recommendations to improve efficiency and reduce utility consumption at the DOE-NETL Albany facility.

Photo 3.1.2b: Rooftop air handling unit.

3.) MAIN GATE DRIVEWAY WIDENING

Completed the widening of the site's main entry gate driveway was widened to provide, providing better access to the site. As part of this effort, additional visitor parking was added.

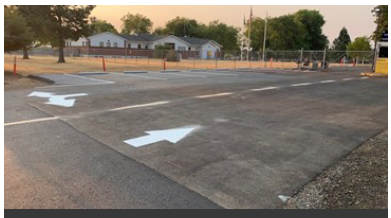


Photo 3.1.2c: Main gate driveway widening.

4.) B-24 METAL ROOF REPLACEMENT

The degraded metal roof and gutters on B-24 were replaced, improving the roof's integrity, insulation, drainage, and appearance.

Photo 3.1.2d: B-24 metal roof replacement.

5.) B-28 HVAC AND ARCHITECTURAL UPGRADES

Construction began to upgrade the heating, ventilating and air conditioning (HVAC) infrastructure, ensure fire code compliance, improve Americans with Disabilities Act (ADA) accessibility, and improve the general appearance and functionality of laboratories in B-28 to support current and future research capabilities more effectively.

Photo 3.1.2e: B-28 HVAC and architectural upgrades.

3.1.3 ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

3.1.3.1 CERCLA

NETL-Albany had no off-site remediation activities during 2023. There were no National Priorities List (NPL) sites for which NETL-Albany had liability under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)/Superfund Amendments and Reauthorization Act (SARA).

3.1.3.2 RCRA

There were no U.S. Environmental Protection Agency (EPA) compliance issues in 2023. There were no notices of violation, corrective actions, or best management practices associated with the inspection or operations of hazardous waste handling during 2023. There were no Resource Conservation and Recovery Act (RCRA) compliance inspections completed by the Oregon Department of Environmental Quality (DEQ) at NETL-Albany during 2023. There were no EPA, Region 10 inspections during 2023.

3.1.3.3 FEDERAL FACILITIES COMPLIANCE ACT (FFCA)

There were no issues identified during 2023 regarding the FFCA at NETL-Albany.

3.1.3.4 NEPA

See Section 2.1.5 National Environmental Policy Act (NEPA) for information on Albany requirements.

3.1.3.5 TSCA

NETL-Albany does not manufacture chemicals and is not subject to sections of the Toxic Substance Control Act (TSCA) related to manufacturing. No spills or releases of substances regulated by the TSCA of 1976 (with amendments, et. seq.) including pesticides, polychlorinated biphenyls (PCBs), formaldehyde, methylene chloride, asbestos, etc. were reported in 2023 at NETL-Albany. TSCA waste generated during 2023 included asbestos, lead-based paint, and spent PCB waste which was disposed of in accordance with federal, state, and local requirements.

ASBESTOS

No unplanned releases of air pollutants covered by CERCLA, or toxic release inventory (TRI) regulations occurred during 2023. All known friable asbestos-containing material (ACM) has either been removed or encapsulated. Non-friable asbestos present at the NETL-Albany site is inventoried and maintained. No samples taken in 2023 contained fiber concentrations exceeding EPA or state of Oregon clearance levels (0.01 fibers/cc). Asbestos engineering drawings based on NETL-Albany inventory continue to be maintained and updated.

Evaluations, tests, and sample collection continues to be conducted by an accredited Oregon -licensed asbestos building inspector (ABI) certified for Class III Asbestos Activities per 40 CFR 763.92(a)(2) or a Certified Industrial Hygienist (CIH). Analysis of bulk or presumed ACM is performed by persons/ laboratories with proficiency demonstrated by current successful participation in a nationally recognized testing program, such as the National Voluntary Laboratory Accreditation Program (NVLAP), the National Institute for Standards and Technology (NIST), or the Round Robin for bulk samples administered by the American Industrial Hygiene Association (AIHA) or an equivalent nationally recognized round robin testing program per OSHA 29 CFR 1910.1001(j)(8)(ii)(B) and OSHA 29 CFR 1926.1101(k)5)(ii)(B).

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) and adheres to OSHA 29 CFR 1910.1001 (Asbestos-General Industry), OSHA 29 CFR 1926.1101 (Asbestos-Construction), OSHA Instruction CPL 2-2.40, 40 CFR 61 (subpart M, NESHAPs), and applicable state regulations (Oregon Administrative Rules, Division 2 [General Industry] & Division 3 [Construction]).

Two projects required a 10-day asbestos notification permit to Oregon DEQ in 2023:

- B-28 HVAC & architectural (phase I & phase II) conducted by ATEZ, Inc. (license #: FS-2023-00535). Approximately 3,310 square feet of floor tile/mastic removed from rooms 102, 103, 123, 124, 201, 205, and 206; 100 square feet of cementitious fume hood from room 206; 640 square feet of cementitious wall panels from room 201 and attic; 3,500 square feet of cementitious ceiling panels from room 201 and attic; 150 square feet of exterior cementitious window panels from rooms 102, 115, and 116 were removed and disposed at Coffin Butte Landfill.
- B-2 vermiculite removal conducted by ATEZ, Inc. (license #: FS-2023-00535). Approximately 5,990 square feet of vermiculite from offices, utility room, storage room, labs, mechanical room, and attic space were removed and disposed at Coffin Butte Landfill.

Four asbestos sampling events were conducted in 2023 related to operation/ maintenance projects (one event) and construction projects (three events). Samples were collected by a licensed ABI (license #: IR-20-2163B).

Preventive operation and maintenance included:

- B-2 air samples taken Oct. 19, 2023, from the B-2 southeast sidewalk, northeast sidewalk, and southwest parking lot were found to be below the OSHA permissible exposure limit (PEL) of 0.1 f/cc.

Construction projects included:

- B-2 abatement parallel air samples taken Nov. 7, 8, 9, 13, 14, 2023 from the B-2 southeast sidewalk, northeast sidewalk, and southwest parking lot were found to be below the OSHA PEL of 0.1 f/cc.
- Non-detect samples for:
    - B-28 HVAC and architectural (phase I & phase II) (brown adhesive).
    - B-28 electrical vault, room 103 window (caulking/glazing), and room 123 north upper wall (adhesive).
    - B-20 renovation cementitious and filamentous patch (silver/gray).

- Positive samples for:
    - The B-28 electrical vault, exterior T-111 (siding caulking/glazing).

Lead-Based Paint

NETL-Albany tests for lead-based paint before demolition, renovation, and maintenance projects or elimination of materials through excess property or recycling.

Three lead-based paint sampling events were conducted in 2023 related to operation/maintenance projects (two events) and/or construction projects (one event). Paint renovation work for the positive samples was conducted in accordance with OSHA 29 CFR 1910.1025, Lead (General Industry), and OSHA 29 CFR 1926.62, Lead (Construction).

Preventive operation/maintenance projects included:

- B-20 parallel air samples taken between Aug. 21-23, 2023, for the lathe lead stabilization work activities. All area samples were found to be below the OSHA action level of 30 µg/m3.
- Presumed lead-based paint on the B-27 blower prep and paint work activity.

Construction projects included:

- Positive samples as part of:
    - B-20 renovations, center truss (white and robin egg paint), second truss (white paint), east truss (white paint), east wall (robin egg paint), west wall/wooden shroud (robin egg paint), south wall (robin egg paint), and northeast wall (robin egg paint).

3.1.3.6 FEDERAL INSECTICIDE, FUNGICIDE, AND RODENTICIDE ACT (FIFRA)

No restricted-use pesticides, herbicides or defoliants were used at NETL-Albany during 2023. Only general-use herbicides were used for routine vegetation control along fence lines, guard rails and flower beds. Rodent control was provided via traps with commercial-use baits.

3.1.4 RADIATION PROTECTION PROGRAM

NETL-Albany has legacy radiological issues, which include the presence of ores that are naturally occurring radioactive materials, as well as areas that have not been completely released from radiological controls (due to configuration and inability to complete release surveys).

The cumulative annual dose for all personnel performing all operations at NETL-Albany during 2023 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 in the radiation monitoring program. See Table 3.1.4a ALB 2023 Annual Exposure Rate.

Table 3.1.4a ALB 2023 Annual Exposure Rate				
Exposure Range (mrem)			**Count**	**TED**
No measurable exposure			33	0
Measurable	<	100	0	0
100	-	250	0	0
250	-	500	0	0
500	-	750	0	0
750	-	1000	0	0
1000	-	2000	0	0
2000	-	3000	0	0
3000	-	4000	0	0
4000	-	5000	0	0
5000	-	6000	0	0
6000	-	7000	0	0
7000	-	8000	0	0
8000	-	9000	0	0
9000	-	10000	0	0
10000	-	11000	0	0
11000	-	12000	0	0
>=		12000	0	0
Number with Measurable TED:			0	N/A
Total Monitored: Total Collective TED (mrem):			33 0	N/A 0
Total CED:			N/A	0
Total CEqD: Num Individuals with Uptake:			0	316
Validation Status Errors:			0	N/A
Warnings:			0	N/A
Exposure Range (mrem)			**Count**	**TED**
No measurable exposure			33	0
Measurable	<	100	0	0
100	-	250	0	0
250	-	500	0	0
500	-	750	0	0
750	-	1000	0	0
1000	-	2000	0	0
2000	-	3000	0	0
3000	-	4000	0	0
4000	-	5000	0	0
5000	-	6000	0	0
6000	-	7000	0	0
7000	-	8000	0	0
8000	-	9000	0	0
9000	-	10000	0	0
10000	-	11000	0	0
11000	-	12000	0	0
>=		12000	0	0
Number with Measurable TED:			0	
Total Monitored: Total Collective TED (mrem):			33 0	 0
Total CED:				0
Total CEqD: Num Individuals with Uptake:			0	316
Validation Status Errors:			0	
Warnings:			0	

* TED = Total Effective Dose
CED = Committed Effective Dose
CeqD = Committed Equivalent Dose

This table is from the REMS data summary report that is provide by Oak Ridge Institute for Science and Education.

There are no sealed source materials at NETL-Albany.

X-ray generating devices are used for analytical applications at NETL-Albany, including scanning and transmission electron microscopes, X-ray diffraction and fluorescence instruments, and a particle-size analyzer. Table 3.1.4b lists the X-ray radiation generating devices at NETL-Albany. These devices are examined semi-annually for leaks and safety interlocks/controls to ensure employee safety

Table 3.1.4b: 2023 Albany X-Ray Radiation Generating Devices

Device	Quantity
X-Ray Florescence Instrument	1
X-Ray Diffraction Instrument	1
Terra Rock, and Mineral Analyzer (XRD/XRF)	1
Handheld/Portable XRF	1
Scanning Electron Microscope/Microprobe	2
Transmission Electron Microscope	1
Mail X-Ray Instrument	1
Sedigraph/Particle Analyzer	1
Ion Polisher	2

3.1.4.1 DOE ORDER 435.1, RADIOACTIVE WASTE MANAGEMENT

Minor amounts of legacy items continue to be 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, U.S. Ecology Washington. Radiological waste generated at NETL-Albany is packaged for proper waste disposal as LLRW in accordance with applicable regulations. One LLRW disposal occurred in 2023, which included five tons of zircon furnace debris. The material was shipped to U.S. Ecology Idaho, via non-hazardous waste manifest number 110293.

Photo 3.1.4.1: Electron microscope at NETL Albany with specialized equipment for minerals and metals analysis.

3.1.5 CLEAN AIR ACT/ AIR QUALITY AND PROTECTION ACTIVITIES

Albany has no project-related emissions that require monitoring, reporting, or permitting based on current operations. In 2023, there were no New Source (Pre-Construction) Reviews. Operation of NETL-Albany does not contribute significantly to any emissions under the National Ambient Air Quality Standards.

3.1.5.1 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 3.1.5.1 displays the estimated 2023 air emissions for both facility operations and R&D projects.

Table 3.1.5.1 Albany 2023 Air Emissions Inventory

Pollutant	Estimated Emissions (lbs/yr)
Volatile Organic Compounds	16.59
Nitrogen Oxide	428.78
Carbon Monoxide	286.79
Sulfur Dioxide	3.26
Total Suspended Particulates	152.16
Particulate Matter-10 (PM_{10})	55.03
Total Organic Carbon	Not Calculated

3.1.5.2 HYDROFLUOROCARBON (HFC) PHASEDOWN

Table 3.1.5.2 Albany HFC Phaseout Inventory Summary shows current HFC uses, replacements, procurement, and repository development at NETL-Albany. Planning to address the phaseout continues. There were no issues in 2023 regarding compliance HFC phasedown at Albany.

Table 3.1.5.2 2023 ALB HFC Phaseout Inventory Summary

(All values in pounds)

Refrigerant	Amount in Equipment Dec. 31, 2022	Amount in Equipment Dec. 31, 2023	Amount in Storage Dec. 31, 2022	Amount in Storage Dec. 31, 2023	Amount purchased in 2023	Amount removed from equipment in 2023	Leaks in 2023
R134A-HFC	25.50	25.50	0	0	0	0	0

3.1.6 WATER QUALITY AND PROTECTION ACTIVITIES

3.1.6.1 CLEAN WATER ACT (CWA)

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

3.1.6.2 INDUSTRIAL WASTEWATER PROGRAM

NETL-Albany holds an industrial wastewater discharge permit with the city of Albany, which was renewed in December 2023 on a five-year renewal cycle. Biannual monitoring is required in accordance with the permit. Table 3.1.6.2 provides the results of the 2023 monitoring. All results within permit limits.

Based on permit, Albany is required to submit a Slug Discharge Control Plan to the city, when the permit is renewed. The Slug Discharge Control Plan was updated in October 2023 to reflect an increase in chemical storage due to new equipment installation. Elementary neutralization units have been installed at several laboratory buildings (see Photos 3.1.6.2a and 3.1.6.2b) to prevent potential pH excursions from laboratories even though procedures prohibit disposition of chemicals via laboratory drains. City of Albany Environmental Services personnel inspected the facility in July 2023, and issued a letter confirming compliance.

3.1.6.2a: Elementary neutralization system.

3.1.6.2b Elementary neutralization system.

Table 3.1.6.2: 2023 Industrial Wastewater Discharge Permit Monitoring Analysis — Albany			
Constituent	Permit Limits	Sample Date	
		Jan. 13, 2023	Aug. 11, 2023
Arsenic	1.0 mg/L	ND	ND
Cadmium	0.44 mg/L	ND	ND
Chromium	2.8 mg/L	ND	0.00061 mg/L
Copper	3.4 mg/L	0.0038 mg/L	0.0053 mg/L
Cyanide (Total)	1.2 mg/L	ND	ND
Lead	0.7 mg/L	ND	ND
Mercury	0.08 mg/L	ND	ND
Molybdenum	0.84 mg/L	ND	0.0015 mg/L
Nickel	1.6 mg/L	ND	0.0016 mg/L
Oil & Grease (Total)	300 mg/L	ND	11 mg/L
Selenium	0.72 mg/L	ND	ND
Silver	1.1 mg/L	ND	ND
Zinc	1.5 mg/L	0.038 mg/L	0.045 mg/L

3.1.6.3 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT

NETL-Albany does not hold a stormwater permit, but is subject to the City of Albany stormwater program.

The City of Albany continues to work with Oregon DEQ concerning its NPDES MS4 Phase II requirements, including a Stormwater Management Plan. NETL will be required to comply with the final permit when issued.

3.1.6.4 STORMWATER MANAGEMENT AND ENERGY INDEPENDENCE AND SECURITY ACT OF 2007

There were no issues in 2023 regarding the Stormwater Management and Energy Independence and Security Act of 2007 at NETL-Albany.

3.1.6.5 SAFE DRINKING WATER ACT

There were no issues in 2023 regarding compliance with the Safe Drinking Water Act. Potable water is supplied by the local water utility, which publishes Safe Drinking Water Act compliance reports detailing water quality testing. Drinking water fixtures on -site are filtered, with filters and plumbing maintenance performed during period scheduled preventative maintenance.

3.1.6.6 PFAS AND ADDITIONAL EMERGING CONTAMINANTS

See Section 2.14 for Information regarding PFAS at NETL.

3.1.7 OTHER ENVIRONMENTAL STATUTES

3.1.7.1 ENDANGERED SPECIES ACT

There were no issues at NETL-Albany regarding the Endangered Species Act during 2023.

3.1.7.2 E.O. 13751 SAFEGUARDING THE NATION FROM THE IMPACTS OF INVASIVE SPECIES

There were no issues at NETL-Albany regarding impacts of invasive species during 2023.

3.1.7.3 NATIONAL HISTORIC PRESERVATION ACT

As part of its renovation efforts, NETL-Albany must identify work with Oregon State Historic Preservation Office (SHPO) regarding potential historical properties, since renovations at the site may impact the Albany Site Historic District. NETL continues to work with the Oregon SHPO regarding all major projects accomplished at NETL-Albany.

3.1.7.4 MIGRATORY BIRD TREATY ACT

There were no issues at NETL-Albany regarding the Migratory Bird Treaty Act during 2023.

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 GREENHOUSE GAS (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 (2016)

See Section 4.0 ES&H Management System.

3.1.9 EXECUTIVE ORDERS AND DOE ORDERS

NETL-Albany was in full compliance with all applicable environmental Executive Orders (E.O.) in 2023. Throughout the year, numerous inspections and audits were performed and documented to ensure there were no instances of noncompliance. E.O. 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability was implemented as part of NETL's ES&H management system.

Additional E.O. that apply to NETL, but for which no specific actions were required in 2023, 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 E.O. 11988, FLOODPLAIN MANAGEMENT

There are no designated floodplains on NETL-Albany.

3.1.9.2 E.O. 11990, PROTECTION OF WETLANDS

There are no designated wetlands at NETL-Albany. A wetland determination performed in support of renovation activities found that the subject area does not contain any wetlands subject to regulation.

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. NETL-Albany had two ORPS reportable incidents in 2023.

1. May 15, 2023, it was discovered that a laboratory had been quenching metal research samples and then discharging the resulting wastewater on the ground resulting in a non-permitted stormwater discharge. A report was filed with the regulatory authority and analytical samples were collected from the research process quench water. The results of the sampling were submitted to the regulatory authority; however, a notice of violation was not issued.
2. On July 17, 2023, a facility HVAC system failure resulted in a loss of air conditioning in the facility server room, which resulted in the equipment approaching its maximum operating temperature. An orderly equipment shut down was initiated resulting in loss of IT systems including phones, emergency notification systems, security card access readers and hazardous gas monitoring systems. As a result, the facility was closed to non-essential personnel while the facility HVAC system was repaired. The site was reopened for normal business the following business day.

3.1.10.1 NATURAL RESOURCES CONSERVATION PROGRAMS AND PROJECTS

Natural resources conservation programs and projects help reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. In 2023 no issues in this area were uncovered at NETL-Albany.

3.1.10.2 SUSTAINABLE RESILIENT REMEDIATION (SRR)

There are no hazardous waste sites suitable for SRR at NETL-Albany in 2023.

3.1.11 CONTINUOUS RELEASE REPORTING

There was no continuous release reporting required at NETL-Albany in 2023.

3.1.12 UNPLANNED RELEASES

There were no unplanned releases at NETL-Albany during 2023.

3.1.13 SUMMARY OF ENVIRONMENTAL PERMITS

A summary of environmental permits is contained in Section 2.10.

3.1.14 FIRE PROTECTION MANAGEMENT AND PLANNING

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 for all occupied buildings to allow all employees to practice evacuation and accountability protocols. During a fire, employees must know 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, Security would notify 911 immediately to initiate off-site Albany Fire Department response. The site maintains a Memorandum of Understanding (signed in December 2022) with the Albany Fire Department for the purpose of planning, preparedness, and response for emergency situations at NETL.

A wildfire is an uncontrolled fire in an area of combustible vegetation that occurs in the countryside or rural area. NETL-Albany is 42 acres with 10 acres of 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. Additionally, illegal or uncontrolled burning (burning leaves, bon fires, etc.) where debris travels into the woods or fields can ignite a fire during drought conditions, along with misuse of fireworks from the surrounding neighborhoods could lead to fires in dry/hot summer conditions.

3.1.15 RECREATIONAL HUNTING AND FISHING

NETL-Albany 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, PENNSYLVANIA

3.2.1 SITE DESCRIPTION

NETL-Pittsburgh (Photo 3.2.1) lies within Allegheny County, Pennsylvania, at the Bruceton Research Center. NETL-Pittsburgh comprises 63 acres approximately, 13 miles south of Pittsburgh in South Park Township (approximately 60 miles north of Morgantown, West Virginia). NETL-Pittsburgh shares the Bruceton Research Center with the Centers for Disease Control and Prevention-National Institute for Occupational Safety and Health (CDC-NIOSH) and U.S. Department of Labor, Mine Safety and Health Administration (who occupies part of the CDC-NIOSH portion of the site). The facility sits within the rolling hills and steeply incised stream valleys that are tributaries of the Monongahela River. It is a partially wooded tract, with two subsites having both industrial and office buildings.

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

Photo 3.2.1: NETL-Pittsburgh Aerial.

NETL-Pittsburgh focuses on technologies in scientific and engineering areas that create commercially viable solutions to national energy and environmental problems. These areas include process systems engineering, decision science, functional materials, environmental sciences, and energy systems optimization. The work is accomplished through both in-house research and development and through funding awarded externally for specific research. As of Dec. 31, 2023, there were 647 employees at NETL-Pittsburgh: 202 federal and 415 site-support contractors.

According to As of 2023 U.S. Census estimates, Pittsburgh's population consisted of 303,255 people and 137,226 households within the city limits. The population density was 5,471.3 per square mile. There were 137,747 housing units at an average density of 2,820.39 per square mile. The city's racial makeup was 65.54% White, 23.2% African American, 5.6% Asian, 3.6% Hispanic or Latino of any race, 0.2% Native American and 5.3% from two or more races.

The median income for a household in the city was $60,187. The per capita income for the city was $41,146. About 19.4% of the population lives below the poverty line. The major employers in Pittsburgh are University of Pittsburgh and affiliated medical center, Highmark Health, and PNC Bank.

3.2.2 MAJOR SITE ACTIVITIES

1. **B-83 Center for Data Analytics and Machine Learning (CAML)**
   This project is to renovate the north end of the first floor of B-83 and to build an addition that will ultimately house a new machine learning data center, visualization laboratory, and necessary office, mechanical, and electrical spaces. Highlights from 2023 include the installation of a new two-megawatt generator and installation of the Igloo Vision 270-Degree Cylinder.

Photo 3.2.2a: B-83 CDAML – building addition.

Photo 3.2.2b: B-83 CDAML – a new two-megawatt generator.

2. B-922 Conference Center Renovation

This project will renovate the B-922 conference rooms 101, 102, 103, 104, 106, and M-2. The north entrances, corridors, and restroom are also being renovated, as is the kitchenette M-2A.

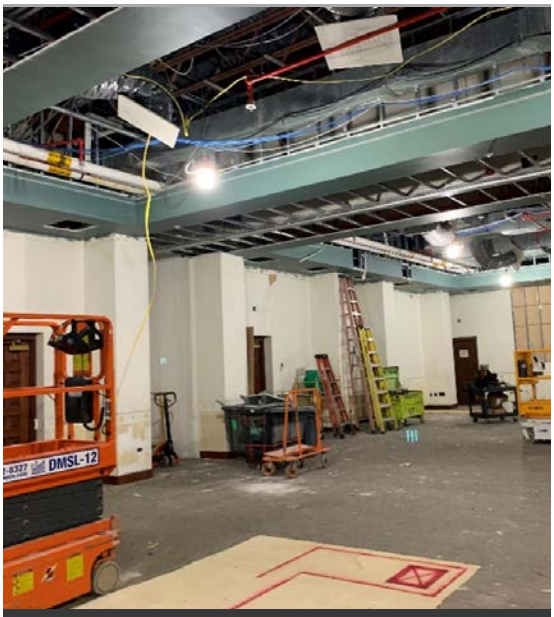


Photo 3.2.2c: B-922 conference center renovation – room 106.

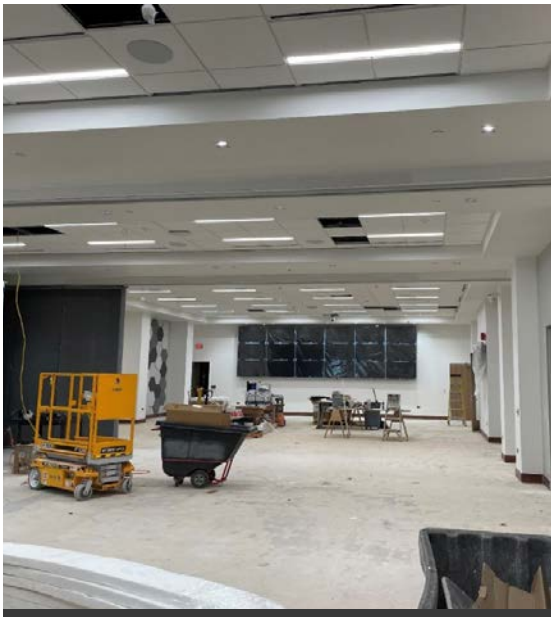


Photo 3.2.2d: B-922 conference center renovation – room 106 cont.

3. 920 Plateau Load Interrupter Switch Project

The project includes replacing the out-of date 920 load interrupter switch.

Photo 3.2.2e: 920 existing switchgear.

Photo 3.2.2f: New switchgear and enclosure.

Photo 3.2.2g: Inside of the switchgear enclosure.

4. **Electric Vehicle (EV) Charging Station**
   This project is to install multiple EV charging stations throughout NETL-Pittsburgh and NETL-Morgantown. Recently, four new stations were installed at NETL-Pittsburgh and one new station at NETL-Morgantown. The current project is installing infrastructure for four new charging stations at Pittsburgh and Morgantown.

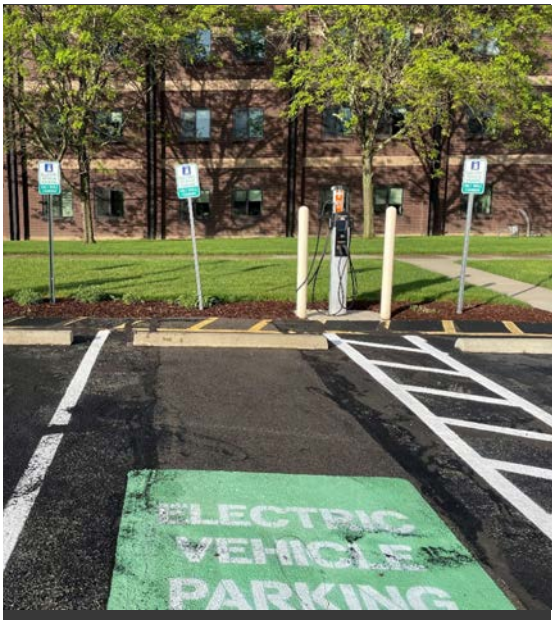


Photo 3.2.2h: B920 EV charging station.

5. **B-84 High Bay – Direct Air Capture Center**
   In this project, the existing B-84 high bay space will be renovated to house the new Direct Air Capture (DAC) Center. The DAC Center will include a 4,000 square foot multi-level high bay space outfitted with two environmental simulation chambers capable of testing pilot-scale technologies at varied atmospheric conditions. Each chamber is designed to continuously supply skid-mounted technologies up to 3,000 standard cubic feet per minute of air at temperatures between -10 to 40 degrees Celsius with full range of relative humidity. The ability to operate over a wide range of conditions will help the developers to understand how their technologies respond in different climates from summer to winter and arid to tropical; various CO_2 sorption materials may have different regeneration conditions, which must also be supported. The DAC Center will accelerate the development and deployment of DAC technologies by offering a highly instrumented research facility for prototyping and qualifying DAC technologies in test campaigns ranging from as little as one month to possibly six months.

   The center's Issued for Construction set of drawings was completed as of April 2024, and NETL is actively awarding the remainder of the environmental skid room construction. To date, hazmat renovation efforts in the space have been largely completed and a new 10-ton Gantry crane has been installed. Construction is expected to recommence in September 2024 and conclude summer of 2025.

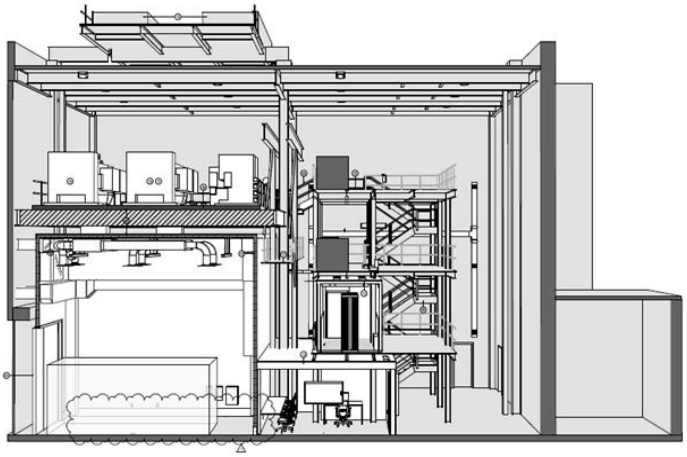


Photo 3.2.2i: B-84 high-bay space drawing.

3. B-901 Roof Replacement Project

This project will provide a new single- ply roofing membrane over the existing roof on B-901. The existing metal roof will receive rigid insulation to fill flutes of the existing surface and provide a flat surface to fully adhere a new single-ply roofing membrane. A fall protection system and lighting protection system will be installed as well.

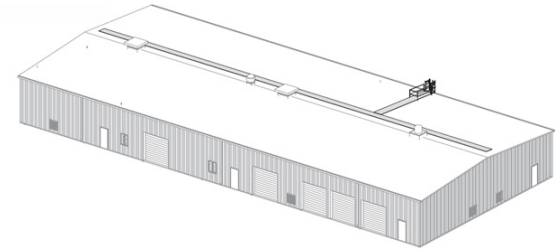


Photo 3.2.2j: B-901 roof drawing.

Photo 3.2.2k: B-901 — new roof with fall protection and lighting protection system.

4. B-167 Roof Replacement Project

This project will provide a new single-ply roofing membrane over the existing roof on B-167. The existing metal roof will receive rigid insulation to fill flutes of the existing surface and provide a flat surface to fully adhere a new single- ply roofing membrane. A fall protection system and lighting protection system will be installed as well.

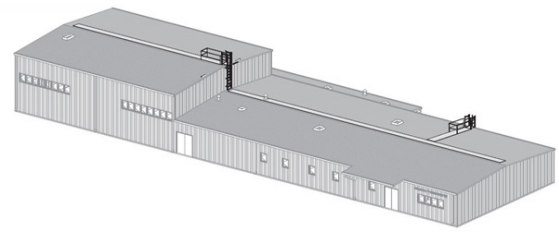


Photo 3.2.2l: B-167 roof drawing.

Photo 3.2.2m: B-167-— new roof with fall protection and lighting protection system.

3.2.3 ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

3.2.3.1 CERCLA

The EPA administers the CERCLA program in cooperation with the Commonwealth of Pennsylvania for NETL-Pittsburgh.

NETL has verified that no information regarding NETL-Pittsburgh is included for calendar year CY2023, nor has the site been listed as an NPL site at any other time in the recent past.

3.2.3.2 RCRA

Pittsburgh is considered a large -quantity hazardous waste generator, i.e., generating 1,000 kg per month or more of hazardous or more than 1 kg per month of acutely hazardous waste). While NETL-Pittsburgh typically generates lesser amounts of hazardous waste most months, occasionally laboratory activities generate larger quantities that exceed the threshold for a small-quantity generator. By permit, the generator status limits hazardous waste storage to up to 90 days. Most of the waste is packaged and shipped in laboratory packs (lab packs) (photos 3.2.3.2a-c) containing combinations of several different compatible chemicals within a single container.

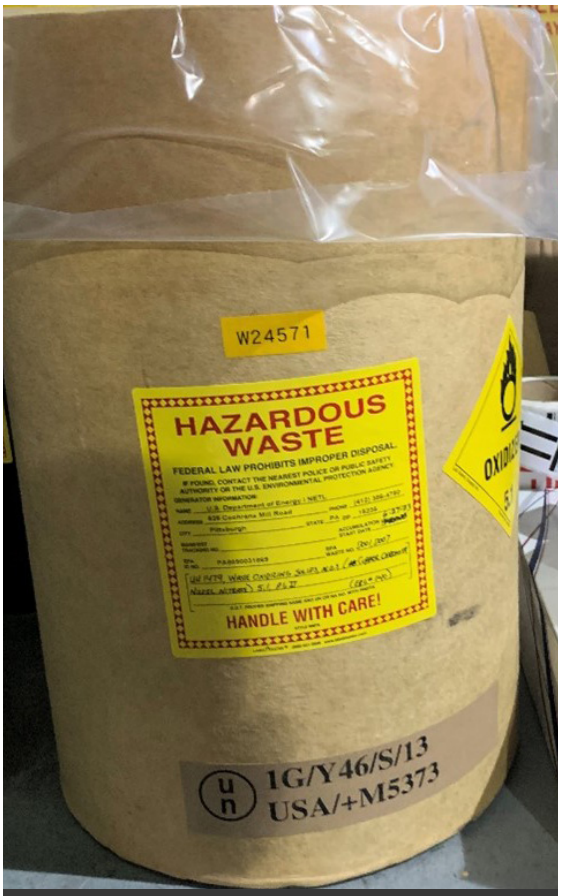
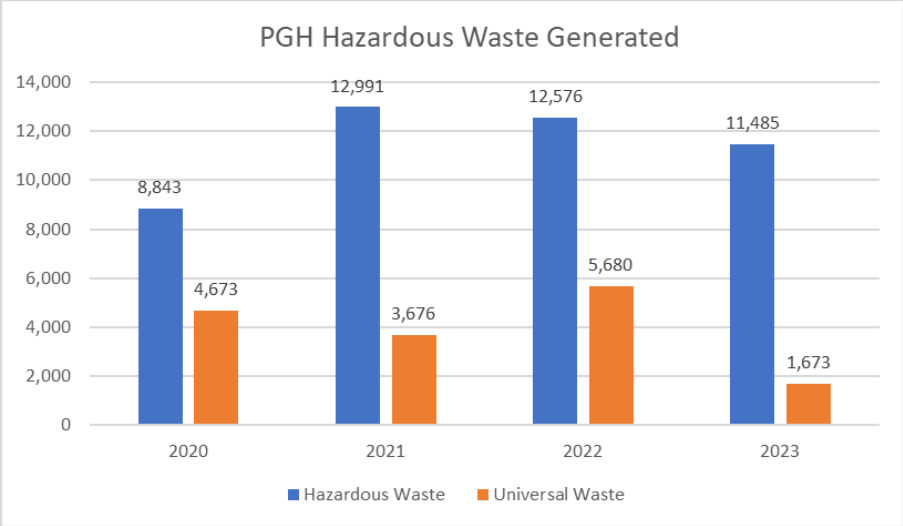


Photo 3.2.3.2a: Lab packs.

Photo 3.2.3.2b: Lab packs.

Photo 3.2.3.2c: Inside of lab pack.

Hazardous waste management personnel at Pittsburgh are not authorized to transport hazardous waste. In 2023, Pittsburgh used Tradebe Environmental Services, LLC (Tradebe) to transport five shipments of hazardous waste. Tradebe transported the waste to its storage and treatment facilities where small packages of similar wastes were combined and then repackaged for more cost-effective shipment to a final disposal facility. In some cases, due to Tradebe's large operational size, most of Pittsburgh's final waste disposition is completed at Tradebe's own facilities. NETL monitors Tradebe facilities, along with other facilities that Tradebe might use for final treatment and disposal. The amount of hazardous materials and waste removed from the site in 2023 remained consistent with previous years. Pittsburgh generated 11,485 pounds of hazardous waste in 2023. (Pittsburgh also generated 1,673 pounds of universal waste.)



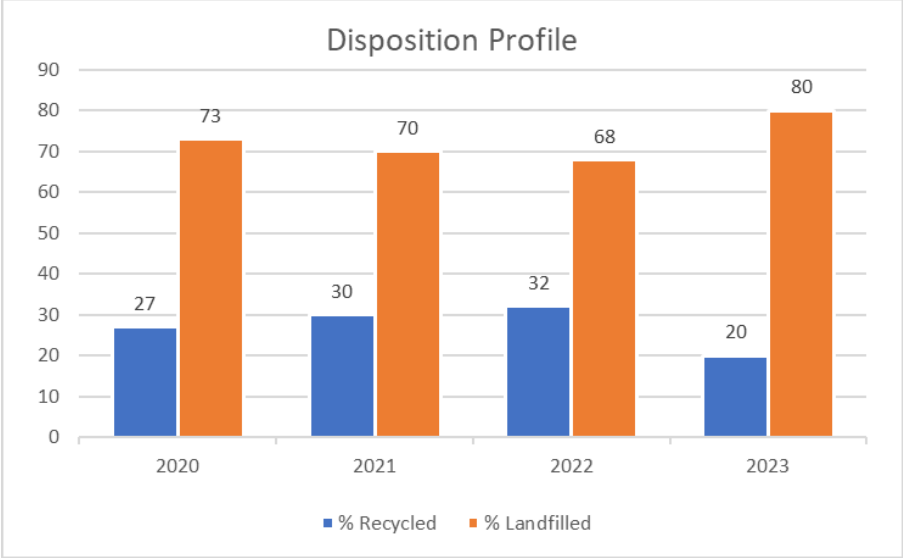


Diagram 3.2.3.2: Pittsburgh RCRA Hazardous Waste Disposition Profile

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 automatic data processing scrap contract

3.2.3.3 SARA TITLE III EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT (EPCRA)

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

NETL-Pittsburgh is not required to prepare a 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 2023, no toxic releases occurred that would have triggered emergency notification as required by either the EPCRA or CERCLA.

3.2.3.4 FFCA

There were no FFCA-related issues for NETL-Pittsburgh in 2023.

3.2.3.5 NEPA

See Section 2.1.5 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 related to manufacturing. No spills or releases of substances regulated by the of 1976 (with amendments, et. seq.) – including pesticides, PCBs, formaldehyde, methylene chloride, asbestos, etc. – were reported in 2023 at NETL-Pittsburgh. TSCA waste generated during 2023 included asbestos and lead-based paint, which was disposed of in accordance with federal, state and local requirements.

ASBESTOS

No unplanned releases of air pollutants covered by CERCLA or TRI regulations occurred during 2023. All known friable ACM has either been removed or encapsulated. Non-friable asbestos present at the NETL-Pittsburgh site is inventoried and maintained. No samples taken in 2023 indicated that the materials contained fiber concentrations exceeding EPA or the state of Pennsylvania clearance levels of (0.01 fibers/cc). Asbestos engineering drawings based on NETL-Pittsburgh inventory continue to be maintained and updated.

Evaluations, tests, and sample collection shall be conducted by an accredited Pennsylvania licensed ABI who received certification for Class III Asbestos Activities per 40 CFR 763.92(a)(2) or by a CIH. Analysis of bulk ACM or presumed ACM shall be performed by persons or laboratories with proficiency demonstrated by current successful participation in a nationally recognized testing program such as the NVLAP or NIST, or the Round Robin for bulk samples administered by the AIHA or an equivalent nationally recognized round robin testing program per OSHA 29 CFR 1910.1001(j)(8)(ii)(B) and OSHA 29 CFR 1926.1101(k)5)(ii)(B).

When asbestos is removed as part of any remodeling or reworking in a room, building, or facility, it is handled by a licensed AA/RC and adheres to OSHA 29 CFR 1910.1001 (Asbestos-General Industry), OSHA 29 CFR 1926.1101 (Asbestos-Construction), OSHA Instruction CPL 2-2.40, 40 CFR 61 (Subpart M, NESHAPs), and applicable state regulations (Allegheny County Health Department [ACHD] Article XXI, the Asbestos Occupational Accreditation and Certification Act of 1990 (P.L. 805, No. 194), the Worker and Community Right-to-Know Act of Pennsylvania (P.L. 734, No. 159, P.S. 7317), 25 PA Code § 124, 25 PA Code § 299.152, 25 PA Code § 299.232, and 25 PA Code § 299.302).

Five construction projects required a 10-day asbestos notification permit in 2023.

Project	Asbestos Removed	Removed by	Disposal
B-83 CAML Renovations	4 ft2	Bristol Environmental Inc. (License #: ACAL-23908)	Republic Waste (Imperial) Landfill (DEP Permit #: 100620)
B-83 CAML Renovations	4.25 ft2	Bristol Environmental Inc. (License #: ACAL-23908)	Republic Waste (Imperial) Landfill (DEP Permit #: 100620).
B-901 Roofing Renovations	21.25 ft2	KLA Roofing & Construction LLC (License #: ACAL-23925)	Cumberland County Landfill (DEP Permit #: 100945)
B-167 Roofing Renovations	2.5 ft2	KLA Roofing & Construction LLC (License #: ACAL-23925)	Cumberland County Landfill (DEP Permit #: 109945)
B-84 DAC Center Renovations	10.5 ft2	Bristol Environmental Inc. (License #: ACAL-23908)	Republic Waste (Imperial) Landfill (DEP Permit #: 100620)

One incident investigation and eleven asbestos sampling events were conducted in 2023 related to operation/maintenance and construction projects; seven of the sampling events were related to preventive operation/maintenance and four were related to construction projects. Samples were collected by an ABI (License #: 059101 & 059485).

Detailed sampling results for operation and maintenance, and construction projects are maintained at the sites and can be provided when necessary.

In September 2023, an incident occurred in B84-L-325 that involving the disturbance (drilling) of laboratory countertops.

- Non-detect samples were collected as part of the B-84 L-325 Multiple Gas Sensor Reactor System (MGSR) set-up (east side laboratory countertop).

Lead-Based Paint

One construction project required a lead notification permit in 2023.

- B-84 DACC Center Renovations (floor grind abrasive blasting) conducted by Bristol Environmental, Inc. (License #: C0004). Approximately 4,350 square feet (ft2) of surface to be blasted. Waste was disposed of on-site through the Chemical Handling Facility (CHF).

Additionally, NETL tests for lead paint before demolition, renovation, and maintenance projects or elimination of materials through excess property or recycling. Fifteen (15) lead-based paint sampling events were conducted in 2023 related to operation/ maintenance and construction projects; fourteen (14) were related to preventive operation/maintenance and one (1) was related to construction projects. The paint renovation work for the positive samples was conducted in accordance with OSHA 29 CFR 1910.1025, Lead (General Industry), and OSHA 29 CFR 1926.62, Lead (Construction). Detailed results are maintained at the sites and can be made available when necessary.

3.2.3.7 FIFRA

No restricted-use pesticides, herbicides, or defoliants, as regulated by FIFRA were kept on -site. Only general-use pesticides were kept and used for routine insect control. A professional pest control company, Leaf Pest Control, is subcontracted to spray inside certain offices, as needed, cafeteria drains, certain lunch areas, certain basement areas, and the daycare facility. Herbicides are used for controlling weeds for the fence lines, mulch beds and guard rails. No defoliants are used.

3.2.4 RADIATION PROTECTION PROGRAM

The cumulative annual dose for all personnel performing all operations at NETL-Pittsburgh during 2023 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. See Table 3.2.4a PGH 2023 Annual Exposure Rate.

Table 3.2.4a: PGH 2023 Annual Exposure Rate				
Exposure Range (mrem)			Count	TED
No measurable exposure			29	0
Measurable	<	100	0	0
100	-	250	0	0
250	-	500	0	0
500	-	750	0	0
750	-	1000	0	0
1000	-	2000	0	0
2000	-	3000	0	0
3000	-	4000	0	0
4000	-	5000	0	0
5000	-	6000	0	0
6000	-	7000	0	0
7000	-	8000	0	0
8000	-	9000	0	0
9000	-	10000	0	0
10000	-	11000	0	0
11000	-	12000	0	0
>=		12000	0	0
Number with Measurable TED:			0	N/A
Total Monitored: Total Collective TED (mrem):			29 0	N/A 0
Total CED:			N/A	0
Total CEqD: Num Individuals with Uptake:			0	118
Validation Status Errors:			0	N/A
Warnings:			0	N/A

Exposure Range (mrem)			Count	TED
No Measurable Exposure			29	0
Measurable	<	100	0	0
100	-	250	0	0
250	-	500	0	0
500	-	750	0	0
750	-	1000	0	0
1000	-	2000	0	0
2000	-	3000	0	0
3000	-	4000	0	0
4000	-	5000	0	0
5000	-	6000	0	0
6000	-	7000	0	0
7000	-	8000	0	0
8000	-	9000	0	0
9000	-	10000	0	0
10000	-	11000	0	0
11000	-	12000	0	0
>=		12000	0	0
Number with Measurable TED:			0	
Total Monitored: Total Collective TED (mrem):			29	0
Total CED:				0
Total CeqD: Num Individuals with Uptake:			0	118

* TED = Total Effective Dose
CED = Committed Effective Dose
CeqD = Committed Equivalent Dose

NETL maintains an inventory of on-site radiation sources and tracks each item, isotope(s), quantity, custodian, location, status and activity. Table 3.2.4b lists the 2023 source inventory at Pittsburgh, while Table 3.2.4c contains the 2023 X-ray radiation generating devices.

Table 3.2.4b: 2023 Radioactive Source Materials Inventory — Pittsburgh

Isotope	Activity/Date Determined	Source
Depleted Uranium	1427 µR/Hr (11.1 µCi) (08/19/21)	Geiger Counter: Model: 6A Serial #, 75788 Victoreen Industries
Depleted Uranium	1537 µR/Hr (11.9 µCi) (08/19/21)	Geiger Counter: Model: 6A Serial #, 7311 Victoreen Industries
Natural Uranium (U-238)	1558 µR/Hr (12.1 µCi) (08/19/21)	Geiger Counter: Model: 290 Serial # 681 Victoreen Industries
Natural Uranium (U-238)	1349 µR/Hr (10.5 µCi) (08/19/21)	Geiger Counter: Model: 290 Serial # 2429 Victoreen Industries
Cs137*	1177 µR/Hr (9.1 µCi) (08/19/21)	Check Source: CS137 Description: PL Yellow Spectrum Techniques for Ludlum Measurements (ID-223)
Cs137*	1272 µR/Hr (9.9 µCi) (08/19/21)	Check Source: CS137 Description: PL Yellow Spectrum Techniques for Ludlum Measurements (ID-470)

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

Table 3.2.4c: 2023 Pittsburgh X-Ray Radiation Generating Devices

Device	Quantity
Mail X-Ray Instrument	1
X-Ray Florescence Instrument	1
XRD- Aeris DY 1166	1
VersaProbe III XPS Microprobe	1
X-Ray Photoelectron Spectroscopy	3
FEI Quanta 600 ESEM	1
X-Ray Diffraction (Empyrean Series 3)	1
Gatan PIPS Model 695 (TEM)	1
FEI Quanta 450 Scanning Electron Microscope	1
X-Ray Diffractometer (Rigaku D/maX Rapid II)	1

3.2.4.1 DOE ORDER 435.1, RADIOACTIVE WASTE MANAGEMENT

NETL-Pittsburgh did not release any radiation source materials into the environment, as all source materials are sealed from escape or discharge. No LLRW disposal shipments were required in 2023.

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 implementing the requirements of the federal Clean Air Act, as well as Pennsylvania's Air Pollution Control Act. Additionally, the ACHD, is authorized to administer Title V operating permits under the Clean Air Act Amendments.

Pittsburgh's Title V, Operating Permit, issued on July 7, 2021, designates NETL-Pittsburgh as a synthetic minor source, and is effective for five years.

Current regulatory requirements include an annual emissions inventory, which is submitted to the ACHD by March 15 of each year, for the preceding calendar year. NETL uses an air emission inventory model (AES* Online) required by both the ACHD's Bureau of Environmental Quality and PADEP's Bureau of Air Quality to calculate the emissions. The model is based on fuel usage and provides a worst-case scenario for potential emissions. The model considers the type, quantity, and total burn time of each fuel to calculate the estimated emission levels. Modeling results are summarized in Table 3.2.5.1.

In addition to the annual emissions inventory, NETL-Pittsburgh also submits semi-annual reports to ACHD in accordance with the Title V Operating Permit, General Condition III.15.d. The semi-annual report includes data on comfort-heat boilers, space heaters, and emergency generators. NETL-Pittsburgh did not receive any notices of violation, nor were there any unplanned air emission occurrences in 2023.

NETL was required to submit an installation permit for the emergency generator and storage tank associated with the CAML Project. The Allegheny County Health Department issued the permit for public comment March 23, 2023. NETL received the Air Installation Permit for the NETL Energy Tech Laboratory in Pittsburgh, Pennsylvania (IP 0296-I001) on March 31, 2023.

In addition, NETL completed a Request for Determination for the Direct Air Capture Center project in May 2023. NETL received confirmation July 6, 2023, that the DACC would not require an additional air quality permit. However, all emission limitations, work practices and other applicable requirements will still apply.

Table 3.2.5.1: 2023 Air Emissions Inventory — Pittsburgh	
Pollutant	Calculated Emissions (lbs./yr.)
Ammonia	131.9
Benzene	0.09
Butane	8.7
Carbon Dioxide	4,839,600
Carbon Monoxide	3,462.1
Hexane	0.7
Naphthalene	0.03
Formaldehyde	3.1
Nitrogen Oxide	90.7
Lead	0.02
Pentane	10.7
Ethane	12.8
Methane	94.8
Particulate Matter, $PM_{2.5}$	1,100
Particulate Matter, PM_{10}	1,413.2
Sulfur Dioxide	24.7
Toluene	0.14
Arsenic	0.008
Barium	0.2
Cadmium	0.05
Chromium	0.06
Cooper	0.04
Manganese	0.02
Mercury	0.01
Molybdenum	0.05
Nickel	0.1
Vanadium	0.1
Zinc	1.2
VOC	226.7

3.2.5.2 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

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

3.2.5.3 HFC PHASEDOWN

Below is a table that shows a list of all HFCs on the phaseout list at NETL-Pittsburgh. Plans for addressing the phaseout are underway. There were no issues in 2023 regarding compliance with HFC phasedown at Pittsburgh.

2023 PGH HFC Phaseout Inventory Summary							
(All values in Pounds)							
Refrigerant	Amount in Equipment Dec. 31, 2022	Amount in Equipment Dec. 31, 2023	Amount in Storage Dec. 31, 2022	Amount in Storage Dec. 31, 2023	Amount Purchased in 2023	Amount Removed from Equipment in 2023	Leaks in 2023
R134A-HFC	1664.89	1664.89	432.6	432.6	0	0	0

3.2.5.4 METEOROLOGICAL TOWER DATA

NETL-Pittsburgh maintains two 30-foot meteorological towers (tower #1 is west of B-74 and tower #2 is west of B-901) that monitor temperature, relative humidity, precipitation, wind speed, wind direction, barometric pressure and solar radiation; they are not used for emissions monitoring. The data is collected every second, averaged over 15 minutes, and over 24 hours to provide critical meteorological information to the Emergency Response Organization (ERO) during emergency situations, to assist in employee heat stress data, and to provide meteorological information used in the models for the Air Emissions Program.

The meteorological towers were upgraded with new communications systems, software, and sensors in 2015 and were recalibrated in 2023.

Meteorological Tower #2 is shown in Photo 3.2.5.4.

Photo 3.2.5.4: Pittsburgh meteorological tower.

3.2.6 WATER QUALITY AND PROTECTION ACTIVITIES

NETL-Pittsburgh topography consists of rolling hills separated by the natural flow of water for the Bruceton Research Center site. As a result, surface water at NETL-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 DOE's portion of the site. The southern area is south of Wallace Road and houses administrative, project management and contractor maintenance operations. The northern area is referred to as the "R&D plateau," and the southern area is referred to as the "main plateau."

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

In addition to the sampling and analysis performed by NETL-Pittsburgh and CDC/NIOSH the PHA also conducts independent sampling and analysis of wastewater effluent the discharge of the wastewater treatment facility and the sub interceptor. This information is used to determine whether any discharges of the treated effluent exceed local limits. No industrial wastewater permit limits were exceeded in 2023.

NETL-Pittsburgh's main plateau (southern area) 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 on the main plateau.

3.2.6.1. DESCRIPTION OF PITTSBURGH WASTE WATER TREATMENT FACILITY

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 3.2.6.1). Prior to discharge to the Pleasant Hills sanitary sewer, the treated water is sent through an activated clay/activated carbon filtration system for additional removal of organics and metals. Once through the filtration system, if the effluent does not meet the necessary pH (6 to 9), it is recirculated through the system. If the pH is outside the allowable range, a diverter valve in the effluent monitoring tank opens automatically, allowing the off-specification effluent to be recirculated within the system for additional treatment. Final effluent pH adjustment occurs in a chamber inside the effluent monitoring tank prior to discharge. Once the WWTF effluent meets specification, it is routed to the PHA Sewage Treatment Plant for final treatment.

Photo 3.2.6.1: Pittsburgh plate separator.

Table 3.2.6.1: 2023 Industrial Sewer Use Permit Monitoring Analysis — Pittsburgh				
Constituent/Parameter	Total Cyanide	Mercury	Cadmium	pH
Permit Limit	6.4 mg/L	0.0062 mg/L	0.54 mg/L	6.0–9.0 s.u.
April 4, 2023, Sampling Date				
DOE Sub-interceptor Location				
Composite	0.0096 mg/l	ND	ND	N/A
Grab #1	N/A	N/A	N/A	7.30 s.u.
Grab #2	N/A	N/A	N/A	7.85 s.u.
Grab #3	N/A	N/A	N/A	8.45 s.u.
Grab #4	N/A	N/A	N/A	8.37 s.u.
B-74 Effluent				
Composite	ND	ND	ND	N/A
Grab #1	N/A	N/A	N/A	7.16 s.u.
Grab #2	N/A	N/A	N/A	7.06 s.u.
Grab #3	N/A	N/A	N/A	7.19 s.u.
Grab #4	N/A	N/A	N/A	7.26 s.u.
Oct. 11, 2023, Sampling Date				
DOE Sub-interceptor Location				
Composite	ND	ND	ND	N/A
Grab #1	N/A	N/A	N/A	NS
Grab #2	N/A	N/A	N/A	7.94 s.u.
Grab #3	N/A	N/A	N/A	8.31 s.u.
Grab #4	N/A	N/A	N/A	8.36 s.u.
B-74 Effluent				
Composite	0.012 mg/l	ND	ND	N/A
Grab #1	N/A	N/A	N/A	6.59 s.u.
Grab #2	N/A	N/A	N/A	6.89 s.u.
Grab #3	N/A	N/A	N/A	6.75 s.u.
Grab #4	N/A	N/A	N/A	6.79 s.u.

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

Table 3.3.6.2: B-74 2023 Monthly Monitoring Results (mg/L) — Pittsburgh													
Constituent	Permit Limit	Sampling Date											
		1/11/23	2/15/23	3/15/23	4/4/23	5/10/23	6/14/23	7/12/23	8/10/23	9/14/23	10/19/23	11/16/23	12/14/23
Aluminum	None	0.064	ND	0.130	0.430	0.120	0.091	NS	NS	NS	NS	NS	NS
Cadmium	0.061	ND	0.001	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	None	ND	ND	0.005	0.012	0.008	0.005	NS	NS	NS	NS	NS	NS
Copper	0.32	0.014	0.013	0.012	0.013	0.025	0.015	NS	NS	NS	NS	NS	NS
Cyanide Total	3.21	ND	ND	ND	ND	0.012	ND	ND	ND	ND	ND	ND	ND
TOX	None	0.047	0.110	0.040	0.140	0.130	0.076	NS	NS	NS	NS	NS	NS
Iron	None	3.600	1.300	1.600	1.300	8.400	5.900	NS	NS	NS	NS	NS	NS
Lead	None	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS
Mercury	0.0062	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nickel	None	0.004	ND	ND	0.006	0.034	0.008	NS	NS	NS	NS	NS	NS
Oil and Grease	None	ND	ND	7.2	ND	ND	ND	NS	NS	NS	NS	NS	NS
pH (s.u.)	6.0-9.0	7.09*	6.97*	7.12*	7.06*	6.84*	6.93*	6.60*	6.35*	6.91*	6.89*	6.78*	7.28*
Phenolics	None	ND	0.023	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS
TSS	None	9.8	0.90	27.0	1.5	8.0	23.0	NS	NS	NS	NS	NS	NS
Tin	None	ND	ND	ND	ND	ND	ND	NS	NS	NS	NS	NS	NS
Trichloro-methane	None	ND	0.0170	ND	ND	0.0030	0.0015	NS	NS	NS	NS	NS	NS
Zinc	None	0.044	0.120	0.031	0.049	0.038	0.030	NS	NS	NS	NS	NS	NS

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

3.2.6.2 SANITARY WASTEWATER

Separate from the treated laboratory/process wastewater discharge, sanitary sewage from the R&D plateau (northern area) is combined with sanitary sewage from CDC/NIOSH. The NETL/NIOSH sub-interceptor sanitary sewer line then discharges into the South Park (Pennsylvania) main sanitary line at a point close to the PHA wastewater treatment facility. CDC/NIOSH also has another sanitary sewer line that discharges directly in the South Park main sanitary line.

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

3.2.6.3 STORMWATER

NETL-Pittsburgh also discharges stormwater in conjunction with CDC/NIOSH, since CDC/NIOSH holds the NPDES storm water permit for the Bruceton Research Center. The NPDES permit lists four outfalls associated with NETL's portion of the site: the north outfall (001), the south outfall (002), the north outfall extension (101), and the south outfall extension (102). The NPDES permit regulates contaminants to the storm water effluent.

Potential stormwater discharges include: the salt-storage facility area, air-conditioning condensate (Photo 3.2.6.3), runoff from various impervious surfaces into the site storm sewer system and treated acid-mine drainage from a research coal mine operated by CDC/NIOSH. The NPDES permit requires CDC/NIOSH to monitor and report discharge results for north Outfall (001) and south outfall (002) on a quarterly basis but does not mandate any discharge limits. (The permit does require measurement of pH, flow, total suspended solids, manganese, iron, and aluminum.)

Photo 3.2.6.3: Pittsburgh air conditioner condensate.

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

Stormwater collected from the main plateau exits the site through a dedicated southern drainage system, which also enters Lick Run. This discharge occurs at NPDES-permitted south outfall (002). Stormwater discharged from the site's southern (main plateau) side is also regulated through the NPDES permit. The south outfall receives stormwater from both NETL-Pittsburgh and NIOSH.

No notices of violation were issued with respect to the Bruceton Research Center's NPDES permit in 2023.

3.2.6.4. SAFE DRINKING WATER ACT

There were no issues in 2023 regarding compliance with the Safe Drinking Water Act. NETL-Pittsburgh's potable water is supplied by the local water utility, which publishes Safe Drinking Water Act compliance reports detailing water quality testing. Drinking water fixtures on site are filtered, with filters and plumbing maintenance performed during periodic scheduled preventative maintenance.

3.2.6.4.1 PFAS AND ADDITIONAL EMERGING CONTAMINANTS

See Section 2.14 for information regarding PFAS at NETL.

3.2.7 OTHER ENVIRONMENTAL STATUTES

3.2.7.1 ENDANGERED SPECIES ACT

There were no issues at NETL-Pittsburgh regarding the Endangered Species Act in 2023.

3.2.7.2 E.O. 13751 SAFEGUARDING THE NATION FROM THE IMPACTS OF INVASIVE SPECIES

There were no issues at NETL-Pittsburgh regarding impacts of invasive species during 2023.

3.2.7.3 NATIONAL HISTORIC PRESERVATION ACT

There were no issues at NETL-Pittsburgh regarding the National Historic Preservation Act in 2023.

3.2.7.4 MIGRATORY BIRD TREATY ACT

There were no issues at NETL-Pittsburgh regarding the Migratory Bird Treaty Act in 2023.

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 (E.O.s)

NETL-Pittsburgh was in full compliance with all applicable environmental E.O.s in 2023. Throughout the year, numerous inspections and audits were performed and documented to ensure there were no instances of noncompliance. As noted above, E.O. 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, was implemented as part of NETL's ES&H Management System. This E.O. is described in more detail in Section 4.0.

In addition, other E.O.s that apply to NETL-Pittsburgh, but that required no specific actions in 2023, include: E.O. 11514, Protection and Enhancement of Environmental Quality; E.O. 11738, Providing For Administration of the Clean Air Act and the Federal Water Pollution Control Act with Respect to Federal Contracts, Grants, or Loans; E.O.13112 Invasive Species; E.O. 12088, Federal Compliance with Pollution Control Standards; E.O. 11988, Floodplain Management; and E.O. 11990, Protection of Wetlands; and E.O. 12898, Environmental Justice for Low Income & Minority Populations.

3.2.9.1 E.O. 11988, FLOODPLAIN MANAGEMENT

There were no issues at NETL-Pittsburgh regarding floodplain management in 2023.

3.2.9.2 E.O. 11990, PROTECTION OF WETLANDS

There were no issues at NETL-Pittsburgh regarding protection of wetlands in 2023.

3.2.10 OTHER MAJOR ENVIRONMENTAL ISSUES AND ACCOMPLISHMENTS

The department's 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.

NETL-Pittsburgh filed two ORPS reports in 2023.

- On July 9, the B-920 administrative area experienced an unscheduled loss of power associated with a software issue on the new electrical switch gear that was installed over a scheduled outage period. The electrical contractor performing the work did not have the new breaker setting software in hand after the install, which delayed power restoration. The subsequent outage affected electrical service to buildings 920, 921, 922 and 924. The referenced buildings were reopened for occupation 6 a.m. EDT on July 11 on portable generator power. Subsequent troubleshooting and programming to the electrical switchgear were completed on July 11 and electrical service to the buildings fully restored by 6 p.m. EDT.

- On July 26, NETL's hazardous waste disposal contractor provided notification that an NETL waste solvent drum (ID # 24178, profile 1000103516) received at their facility on July 10 had been rejected due to the unexpected detection of PCBs in the waste stream. The waste disposal contractor reported that the waste stream had been tested twice via gas chromatography on July 12 and PCBs were detected in both samples. This analysis resulted in the solvent drum being rejected for disposal. Upon initial investigation, NETL waste disposal personnel could not determine the cause for PCBs to be detected in this waste stream.

3.2.10.1 NATURAL RESOURCES CONSERVATION PROGRAMS AND PROJECTS

Natural resources conservation programs and projects help reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. In 2023 no issues in this area were uncovered at NETL-Pittsburgh.

3.2.10.2 SUSTAINABILITY RESILIENT REMEDIATION (SRR)

There were no hazardous waste sites suitable for SRR at NETL-Pittsburgh in 2023.

3.2.11 CONTINUOUS RELEASE REPORTING

No continuous release reporting was required at NETL-Pittsburgh in 2023.

3.2.12 UNPLANNED RELEASES

There were no unplanned environmental releases at NETL-Pittsburgh in 2023.

3.2.13 SUMMARY OF ENVIRONMENTAL PERMITS

A summary of environmental -related permits for NETL-Pittsburgh is provided in Table 3.2.13.

Table 3.2.13: 2023 Summary of Permits — Pittsburgh

Permit No. and Title	Issue Date/ Renewal	Regulatory Agency	Description
0296-OP21 Minor Source Operating Permit	07/07/2021 01/06/2026	Allegheny County Health Department, Air Quality Program	Establishes NETL-PGH as a minor source for particulate matter (PM), PM of 10 microns or less in diameter (PM10), sulfur dioxide (SO_2), volatile organic compounds (VOCs), nitrogen oxides (NO_x), carbon monoxide (CO) and hazardous air pollutants, as defined in section 2101.20 of Article XXI Air Pollution Control of the Allegheny County Health Department, Rules and Regulations.
IP 0296-I001 Installation Permit	03/31/23 09/30.2024	Allegheny County Health Department, Air Quality Program	Establishes the installation permit requirements for the CAML Project generator and fuel storage tank.
GF 47497.009 Industrial Sewer Use Permit	12/16/2020, 12/16/2025	Pleasant Hills Authority (PHA)	Establishes permission for the discharge of certain industrial wastewaters for the purposes of treatment by PHA. Includes permit requirements, general provisions, fees, reporting and local limits for certain discharge parameters. Permit was modified on May 26, 2022, to increase the amount of N,N-Dimethylacetamide waste stream that can be discharged to PHA.
ID: 02-81183 SEQ#: 008A Aboveground Storage Tank Registration Permit/ Certificate	1990s, 10/04/2023 Renewal 10/04/2024	PADEP Bureau of Environmental Cleanup and Brownfields	Permit for aboveground storage tank containing ferric chloride at Pittsburgh's WWTF (B-74).
ID: 02-81183 SEQ#: 009A Aboveground Storage Tank Registration Permit/ Certificate	1990s, 10/04/2023 Renewal 10/04/2024	PADEP Bureau of Environmental Cleanup and Brownfields	Permit for aboveground storage tank containing caustic soda at Pittsburgh's WWTF (B-74).
S-1018 Certificate of Fire and Explosion Safety	05/18/2004	Allegheny County Fire Marshal	Approval for the storage and handling of flammable and/or combustible liquids in aboveground storage tank; certificate covers ethanol tank and pump.
S-1102 Certificate of Fire and Explosion Safety	10/06/2006	Allegheny County Fire Marshal	Approval for the storage and handling of flammable and/or combustible liquids in aboveground storage tank; certificate covers one diesel tank and one gasoline tank.

3.2.14 RECREATIONAL HUNTING AND FISHING

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

3.2.15 FIRE PROTECTION MANAGEMENT AND PLANNING

At NETL-Pittsburgh, fire alarm control panels (FACPs) are installed in most buildings. All FACPs are equipped with digital alarm communication transmitters (DACTs) that enable the panels to send fire alarm and trouble signals to the B-920 security offices for monitoring and response. Each building with an FACP is equipped with alarm and notification devices to alert personnel of a fire. Fire suppression systems are installed in most buildings on-site to combat and/or extinguish a fire.

While NETL does not have a firefighting program, the site does have an ERO for on-site emergencies. The site maintains an emergency phone line reporting system (by dialing ext. 11), which connects the individual reporting a fire to the security office. NETL's response to any fire facility, project area, vehicle, wildfire, or other, would be to call the local fire department. Voluntary fire extinguisher usage is allowed, but not required. Annual fire drills are conducted to allow all employees to practice evacuation and accountability protocols. During any hot work or fire protection outages, a trained "fire watch" person(s) is designated to continuously monitor the area of concern and report any fires. A Memorandum of Understanding (signed July 2023) with the U.S. Department of Health and Human Services for Disease Control and Prevention National Institute for Occupational Safety and Health was issued for the purpose of planning, preparedness, and response for emergency situations at the shared Bruceton Research Center.

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

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

3.3 MORGANTOWN, WEST VIRGINIA

3.3.1 SITE DESCRIPTION

NETL-Morgantown (Photos 3.3.1a and 3.3.1b) 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, D.C. Geographically, NETL-Morgantown 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 NETL-Morgantown is a combination of residential, commercial, deciduous forest, and pasture.

Photo 3.3.1a: NETL B-39.

NETL-Morgantown focuses on technologies in scientific and engineering areas creating commercially viable solutions to national energy and environmental problems. The areas include energy conversion devices, simulation -based engineering, in-situ

Photo 3.3.1b: NETL- Morgantown Aerial.

materials characterization, supercomputer infrastructure, and diagnostics, sensors and controls. The work is accomplished both internally through in-house R&D and externally through funding awarded for specific research. As of Dec. 31, 2023, 475 employees were employed at NETL-Morgantown; 203 federal employees and 272 site-support contractor employees.

Morgantown's population, per the 2022 U.S. Census estimates, was 30,177 in 12,035 households within the city limits. The racial makeup of the city was 86.6 % White, 4.2% African American, 3.1 % Asian, 3.2% Hispanic or Latino of any race, and 4.8 % from two or more races.

The median household income for the Morgantown metro area was $41,103. About 34.4% of the population lives below the poverty line. Major employers within the Morgantown area according to the Morgantown Area Partnership were West Virginia University (WVU), WVU Medicine, Monongalia County Board of Education, Monongalia General Hospital, NETL, CDC-NIOSH, and TeleTech.

3.3.2 MAJOR SITE ACTIVITIES

1. **B-13 Exterior and Roof**
   Under this project, the exterior siding and roof of B-13 were replaced. The project replaced the original 1979 roof and siding to address multiple patched roof leaks and an unsightly rusted exterior, improve efficiency through an enhanced watertight building envelope and added insulation, and improved safety with the installation of roof fall protection.

Photo 3.3.2a: Before (left) and after (right) showing the new exterior and roof of B-13 featuring added horizontal lifeline fall protection

2. **Site-Wide Fire Alarm System Upgrade**
   In this project, staff completed a site-wide upgrade of fire alarm system panels. Half of NETL-Morgantown used older analog Silent Knight fire alarm panels while the remainder of the site is connected to the more modern Siemens fire alarm system. This project migrated the buildings still using the older Silent Knight panels to the Siemens system so that the site is now under one cohesive and fully integrated fire alarm system platform.

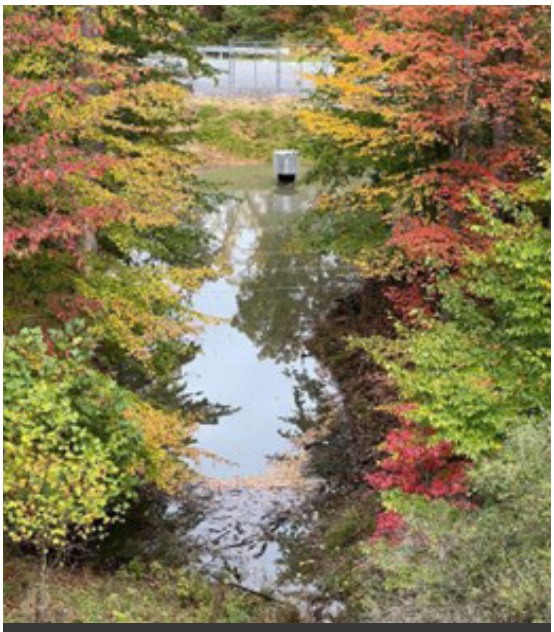


Photo 3.3.2b: Repaired retention pond with new standpipe visible.

3. **Retention Pond**
   Under this project, the retention pond north of the NETL-Morgantown parking garage was excavated, dredged, and repaired. The retention pond is required to prevent excessive runoff from developed areas during heavy rains. The project installed new standpipe and outflow piping and removed excess detritus buildup.

3.3.3 ENVIRONMENTAL RESTORATION AND WASTE MANAGEMENT

3.3.3.1 CERCLA

NETL-Morgantown had no NPL sites in 2023 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 2023.

3.3.3.2 SARA TITLE III/EMERGENCY PLANNING AND COMMUNITY RIGHT-TO-KNOW ACT

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

NETL-Morgantown does not prepare a TRI Form R because the site does not use, produce or process any listed toxic materials in quantities that exceed the threshold amounts. In 2023, no releases occurred that would have triggered emergency notification as required by either the EPCRA or CERCLA.

3.3.3.3 RCRA

NETL-Morgantown is designated as a large quantity generator (EPA ID #: WV7890031886) under the jurisdiction of the West Virginia Department of Environmental Protection (WVDEP).

NETL-Morgantown does not have an on-site program to treat hazardous waste or render it harmless; however, in 2023, it used Tradebe Environmental Services LLC (Tradebe) to transport five shipments of hazardous waste. Tradebe transported the waste to its storage and treatment facilities where small packages of similar wastes were combined and then repackaged for more cost-effective shipment to a final disposal facility.

Photo 3.3.3.3: Morgantown fluorescent light bulbs.

The amount of hazardous materials and waste removed from the site in 2023 remained consistent with previous years. NETL-Morgantown generated 1,812 pounds of hazardous waste in 2023, as well as 919 pounds of universal waste. See Figure 3.3.3.3a: 2023 Hazardous Waste Generation – Morgantown.

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

The WVDEP Office of Environmental Enforcement conducted its most recent inspection in 2021 and discovered no deficiencies or findings.

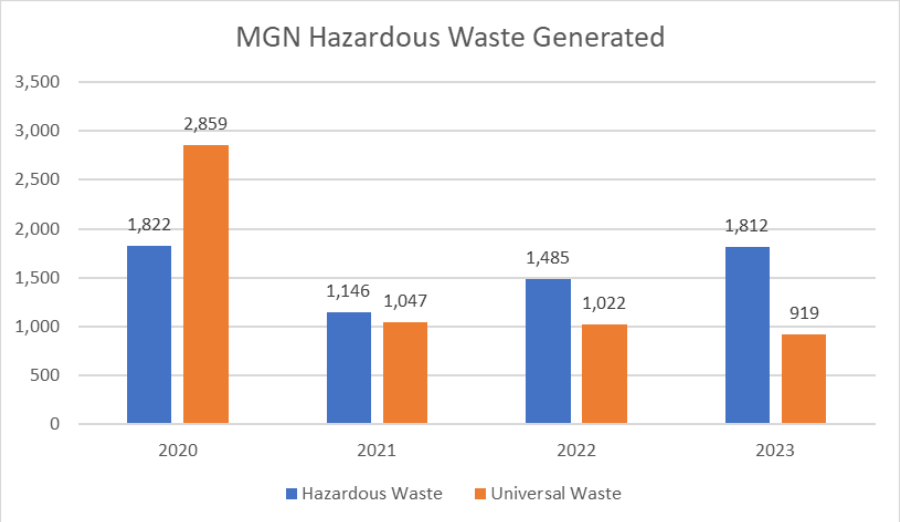


FIgure 3.3.3.3a: 2023 Hazardous Waste Generation – Morgantown.

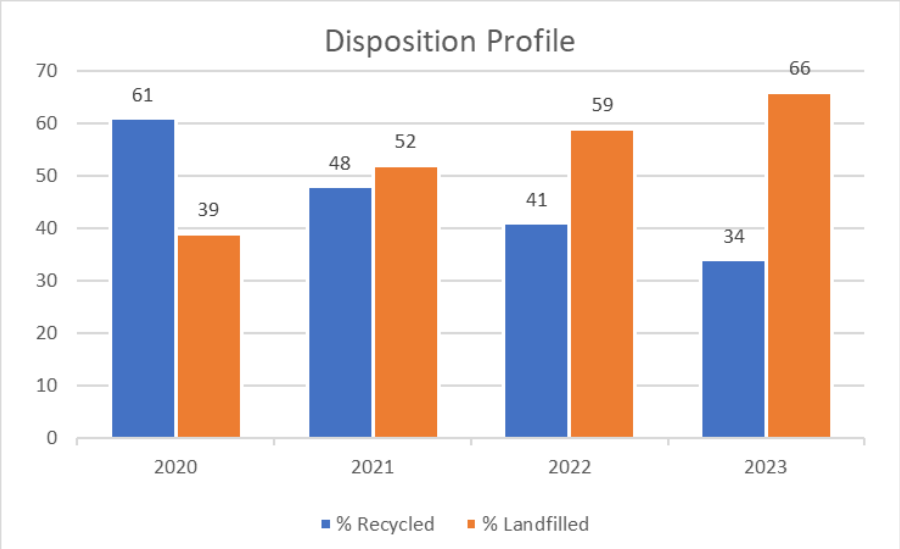


Figure 3.3.3.3b: 2023 Morgantown RCRA Hazardous Waste Disposition Profile.

3.3.3.4 FFCA

There were no issues related to the FFCA for NETL-Morgantown in 2023.

3.3.3.6 TSCA

NETL-Morgantown does not manufacture chemicals and is not subject to sections of the manufacturing-related TSCA. No spills or releases of substances regulated by the TSCA of 1976 (with amendments, et. seq.) – including pesticides, PCBs, formaldehyde, methylene chloride, asbestos, etc. – were reported in 2023. TSCA waste generated during 2023 included asbestos, lead-based paint, and assumed microbial growth, which was disposed of in accordance with federal, state and local requirements.

ASBESTOS

No unplanned releases of air pollutants covered by CERCLA or TRI regulations occurred during 2023. Asbestiform fiber concentration air monitoring is conducted annually in buildings 1, 2, 3, and 4 because asbestos-containing building materials were used in the construction of these facilities. All known friable ACM has either been removed or encapsulated. Non-friable asbestos present at the NETL-Morgantown site is inventoried and maintained. No samples taken in 2023 indicated that the materials contained fiber concentrations exceeding EPA or state of West Virginia clearance levels (0.01 fibers/cc). Asbestos engineering drawings based on the NETL-Morgantown inventory continue to be maintained and updated.

Evaluations, tests, and sample collection shall be conducted by an accredited WV licensed ABI who received certification for Class III Asbestos Activities per 40 CFR 763.92(a)(2) or by a CIH. Analysis of bulk ACM or presumed ACM shall be performed by persons or laboratories with proficiency demonstrated by current successful participation in a nationally recognized testing program such as the NVLAP or NIST, or the Round Robin for bulk samples administered by the AIHA or an equivalent nationally recognized round robin testing program per OSHA 29 CFR 1910.1001(j)(8)(ii)(B) and OSHA 29 CFR 1926.1101(k)5)(ii)(B).

When asbestos is removed as part of any remodeling or reworking in a room, building or facility, it is handled by a AA/RC and adheres to OSHA 29 CFR 1910.1001 (Asbestos-General Industry), OSHA 29 CFR 1926.1101 (Asbestos-Construction), OSHA Instruction CPL 2-2.40, 40 CFR 61 (Subpart M, NESHAPs), and applicable state regulations (WV Code § 16-32, WV 33 CSR 1, WV 64 CSR 51, and WV CSR 63).

One project required a 10-day asbestos notification permit in 2023.

- Renovation of B-13 conducted by Bristol Environmental Inc. (License #: C0002A). Approximately 840 linear feet of asbestos-containing seam sealant and roof cloth, as well as 100 linear feet of asbestos-containing caulking, were removed and disposed of at Cumberland County Landfill (DEP Permit #: 100945).

There were no asbestos work activities that were exempt from notification per WV Code § 16-32-11 Section (c) and 64 CSR 63 Section 10.3.

Nine asbestos sampling events and one incident investigation were conducted in 2023 related to operation/maintenance and construction projects; seven were related to preventive operation/maintenance and two were related to construction projects. Samples were collected by a licensed ABI (License #: AI010082 & AI010672). Detailed sampling results for operation and maintenance, and construction projects are maintained at the sites and can be provided when necessary.

In July 2023, an incident occurred involving the misunderstandings about how the central work control (CWC)/ work control system (WCS) funding sources apply. Process , and efficiency concerns of the process lead to an employee to avoid and bypass avoiding and bypassing the established WCS methods of the WCS in associated with laboratory space modifications, ; thus, resulting in unauthorized work that involved the following ES&H hazards:

- Disturbance of presumed asbestos containing material ACM (PACM) laboratory countertops and backsplash. Approximately, three (3) 36” x 48” sections and one (1) 26” x 33” section of laboratory countertop was disturbed and removed from metal cabinetry (~41.3 square feet (ft^2)).

- Disturbance of suspected asbestos containing flooring/mastic, laboratory countertop mastic, and abandoned HVAC duct caulking. The residual non-friable brown adhesive from the metal cabinetry on the laboratory countertops was found to be asbestos containing.

The laboratory countertops were individually double-wrapped, palletized, shrink wrapped and banded for shipment, and held in B-33 for proper disposal to an asbestos-accepting landfill. ABI WV License #: AI010082 decontaminated the surfaces of the handheld tools. Spent wipes were bagged and prepared for proper disposal to an asbestos-accepting landfill.

LEAD-BASED PAINT

Additionally, NETL tests for lead paint before demolition, renovation, and maintenance projects or through the elimination of materials by excess property or recycling. Fourteen lead-based paint sampling events were conducted in 2023 related to operation/maintenance and/or construction projects; all 13 were related to preventive operation/maintenance and one was related to construction projects. The paint renovation work for the positive samples was conducted in accordance with OSHA 29 CFR 1910.1025, Lead (General Industry) and OSHA 29 CFR 1926.62, Lead (Construction). Detailed sampling results are maintained at the sites and can be provided when necessary.

3.3.3.7 FIFRA

No restricted-use pesticides, herbicides or defoliants, as regulated by FIFRA were kept on site. Only general-use pesticides were kept and used for routine insect control. 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 used in limited instances for weed control. No defoliants are used.

3.3.4 RADIATION PROTECTION PROGRAM

The cumulative annual dose for all personnel performing all operations at NETL-Morgantown during 2023 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.

The radiation safety officer (RSO) maintains an inventory of on-site radiation sources, tracking each item, isotope(s), quantity, custodian, location, status and activity. Table 3.3.4a lists the MGN Annual Exposure Rates. Table 3.3.4b lists 2023 source inventory at Morgantown. Table 3.3.4c contains the 2023 radiation generating devices.

Table 3.3.4a: MGN 2023 Annual Exposure Rate				
Exposure Range (mrem)			**Count**	**TED**
No measurable exposure			23	0
Measurable	<	100	0	0
100	-	250	0	0
250	-	500	0	0
500	-	750	0	0
750	-	1000	0	0
1000	-	2000	0	0
2000	-	3000	0	0
3000	-	4000	0	0
4000	-	5000	0	0
5000	-	6000	0	0
6000	-	7000	0	0
7000	-	8000	0	0
8000	-	9000	0	0
9000	-	10000	0	0
10000	-	11000	0	0
11000	-	12000	0	0
>=		12000	0	0
Number with Measurable TED:			0	N/A
Total Monitored: Total Collective TED (mrem):			23 0	N/A 0
Total CED:			N/A	0
Total CEqD: Num Individuals with Uptake:			0	552
Validation Status Errors:			0	N/A
Warnings:			0	N/A

* TED = Total Effective Dose

CED = Committed Effective Dose

CeqD = Committed Equivalent Dose

This table is from the REMS data summary report that is provided by Oak Ridge Institute for Science and Education.

Table 3.3.4b: 2023 Radioactive Source Materials Inventory — Morgantown		
Isotope	Activity/Date Determined	Source
Cs-137	10 mCi (3/10)	Registration #0190/10, Geotek Ltd. (part of multi-sensor core logger in PAN 0569)
Cs-137*	1 µCi (1/14)	Serial #206, Spectrum Techniques
Cs-137*	1 µCi	Serial # 528, Spectrum Techniques

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

Table 3.3.4c: 2023 Morgantown Radiation Generating Devices	
Device	**Quantity**
X-ray photoelectron spectroscopy (Monchromator/Dual Anode X-ray Source)	2
X-Ray Diffractometer — PANalytical (X'Pert Pro)	2
Astrophysics (Mailroom X-Ray Instrument)	1
Toshiba Aquillion — CT Scanner. Model TSX-101A. SN: 1AA1312101. (Medical CT Scanner)	1
Micro CT Scanner, DynaTOM. Tescan.	1
Industrial CT Scanner (Comet X-Ray Tube) M5000 Industrial. North Star Imaging.	1
400 xCT Micro CT Scanner, Xradia	1
Olympus Innov-X-Delta XRF	1
Vanta XRF M Series Model VMR-CCC-G3U	1
PANalytical XRF. Axios.	1
Yxlon International MGC 441	1
Apreo 2 C LoVac Electron Microscope. Thermo-Fisher.	1

3.3.4.1 DOE ORDER 435.1, RADIOACTIVE WASTE MANAGEMENT

NETL-Morgantown did not generate or treat any radioactive material in 2023. Similarly, the site does it have any temporary or permanent facility for radioactive waste disposal on-site.

NETL-Morgantown did not release any radiation source materials into the environment, as all source materials are sealed from escape or discharge. No LLRW disposal shipments were required in 2023.

Photo 3.3.4.1: Area around the DynaTom CT scanner workstation.

In 2023, there was one report of radiation leakage from a CT scanner. During the semi-annual inspection of the DynaTom CT scanner, the area around the workstation was found to have a radiation level over 225 µR/hr. Working with the manufacturer, it was discovered that the panels around the right side of the CT scanner had become slightly warped. The manufacturer and the service technician built and installed a bracing system around the CT scanner cabinet, pushing the slightly warped panels back into proper alignment. The RSO reviewed the dosimetry records for all operators of this CT scanner over the last six months and determined the highest exposure had been 61 mrem, which is well below the DOE limit of 50 rem/year for extremities and five rem/year for the whole body.

3.3.5 AIR QUALITY AND PROTECTION ACTIVITIES

3.3.5.1 CLEAN AIR ACT

The West Virginia Division of Air Quality's (WVDAQ) permitting Section implements West Virginia's air 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 WVDAQ, NETL-MGN's operations (laboratory facilities associated with R&D activities) fall under 45CSR13. Specifically, 45CSR13B, The Permitting of Laboratories Under 45CSR13, provides guidance and clarification regarding any necessary permitting for construction and operation of stationary sources of air pollutants from laboratory facilities.

WVDAQ generally evaluates air quality on a county-by-county basis, although the regional data may be aggregated into Air Quality Control Region #6, for north central West Virginia. Monitoring is performed in Monongalia County daily at several sites, and the data is made available from the WVDEP website's air-quality index and from the EPA AirNOW webpage. Although, the Morgantown site is not a significant contributor to ambient air quality issues, air emissions are estimated in quarterly and annual air emission inventories to analyze the cumulative effect of all the projects and facilities. This analysis has shown that no regulatory or other environmental impact occurred during 2023. Table 3.3.5.1 displays the estimated 2023 Air Emissions Inventory.

Table 3.3.5.1: 2023 Air Emissions Inventory — Morgantown	
Pollutant	Estimated Emissions (lbs. /yr.)
Aldehydes	1.10E-05
Benzene	3.15E-05
Carbon Dioxide	1.66E+03
Carbon Monoxide	1.64E+00
Chlorine	3.00E-07
Ethylbenzene	1.56E-07
Formaldehyde	1.19E-03
Nitrogen Oxide	1.45E+00
Particulate Matter (PM), Condensable	6.04E-02
Particulate Matter, Filterable	5.16E-02
Particulate Matter, Total	1.15E-01
Particulate Matter, PM10, Filterable	1.18E-03
Particulate Matter, Total	3.21E-03
Sulfur Dioxide	8.46E-03
Sulfur Oxides	1.59E-02
Toluene	3.87E-05
TOC	8.19E-02
VOC	8.59E-02
Xylene, Mixed Isomers	8.60E-07

3.3.5.2 NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

There were no issues in 2023 regarding compliance with the National Emission Standards for Hazardous Air Pollutants at Morgantown.

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

3.3.5.3 HFC PHASEDOWN

Plans to address how deal with the phaseout are underway. There were no issues in 2023 regarding compliance with HFC phasedown at Morgantown.

Table 3.3.5.3: 2023 Morgantown HFC Phaseout Inventory Summary							
(All values in pounds)							
Refrigerant	Amount in Equipment Dec. 31, 2022	Amount in Equipment Dec. 31, 2023	Amount in Storage Dec. 31, 2022	Amount in Storage Dec. 31, 2023	Amount Purchased in 2023	Amount Removed from equipment in 2023	Leaks in 2023
R134A-HFC	985.28	985.28	193.75	193.75	0	0	0
R23	2	2	0	0	0	0	0
R125-HFS	39.44	39.44	0	0	0	0	0

3.3.5.4 METEOROLOGICAL TOWER DATA

The NETL-Morgantown maintains two small meteorological towers, one is located on the roof of B-39 (Photo 3.3.5.4a) and the other is on the roof of B-19 (Photo 3.3.5.4b). The B-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 ERO during emergency situations, to assist in employee heat stress data, and to provide meteorological information used in the models for the Air Emissions Program. The data collected at the B-19 location includes air temperature, wind speed and direction, relative humidity, and total rainfall.

Photo 3.3.5.4a: B-39 meteorological tower.

Photo 3.3.5.4b: B-19 rain gauge.

3.3.6 WATER QUALITY AND PROTECTION ACTIVITIES

NETL engages in water quality and protection activities to: (1) maintain full compliance with all applicable federal, state and local requirements; (2) prevent spills of potential pollutants into the environment; and (3) ensure the safety and protection of our employees, the public, and the environment. These activities include management of surface water, industrial process water and groundwater/soil. There were no water quality issues at the Morgantown site during 2023.

3.3.6.1. CLEAN WATER ACT/STORMWATER

NPDES PERMIT

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

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 NPDES permit. The WVDEP has primacy over its NPDES permitting program. NETL Morgantown (Registration No. WVG610042) is authorized to operate under WV/NPDES General Water Pollution Control Permit No. WV0111457 and subject to the provisions of Section W-1 of the general permit.

Under the existing permit, the site is required to test their effluent quarterly to verify permit compliance; the test results are submitted to the WVDEP. Additionally, the permit requires a Storm Water Pollution Prevention Plan (SWPPP) be developed and maintained to prevent or minimize potential storm water contamination.

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

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

Table 3.3.6.1a: 2023 NPDES Permit Storm Water Monitoring Requirements lists the parameters contained in the quarterly discharge monitoring report (DMR). The list requires monitoring results to be reported quarterly. The monitoring results are presented in Table 3.3.6.1b. Were 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; it utilizes benchmark monitoring concentrations, and only requires NETL to report the monitoring results. If the benchmark concentrations are exceeded, additional monitoring will be required and the SWPPP will be reviewed and updated. NETL satisfied the permit requirements. No permit issues were identified in 2023. (Note: WVDEP issued the latest Multi-Sector Stormwater General Permit (MSGP) for the Morgantown site on Feb. 25, 2021, expiring on Sept. 12, 2024.) The permit will be renewed in September of 2025, the process for renewal will be dicitated by the WVDEP.

Table 3.3.6.1a: 2023 NPDES Storm Water Analysis Results — Morgantown												
Constituents	Outfall 002				Outfall 005				Outfall 010			
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Total Nitrite plus Nitrate (Grab)	.37 mg/L	.31 mg/L	6.8 mg/L	.32 mg/L	<1.2 mg/L	.40 mg/L	.82 mg/L	.16 mg/L	<.62 mg/L	0.30 mg/L	.60 mg/L	<.55 mg/L
Total Ammonia Nitrogen (Grab)	< 0.3 mg/L	< 0.6 mg/L	< 10.0 mg/L	.36 mg/L	< 0.3 mg/L	< 0.6 mg/L	< 0.6 mg/L	< 10.0 mg/L	< 0.6 mg/L	< 0.6 mg/L	< 0.6 mg/L	< 0.3 mg/L
Fecal Coliform (Grab)	727.0 Cfu/ 100ml	1732.9 Cfu/ 100ml	248.1 Cfu/ 100ml	2419.6 Cfu/ 100ml	579.4 Cfu/ 100ml	228.2 Cfu/ 100ml	727.0 Cfu/ 100ml	435.2 Cfu/ 100ml	37.9 Cfu/ 100ml	1299.7 Cfu/ 100ml	387.3 Cfu/ 100ml	2419.6 Cfu/ 100ml
TSS (Grab)	11 mg/L	10 mg/L	<4 mg/L	7 mg/L	<4.0 mg/L	14 mg/L	<25.0 mg/L	11 mg/L	15 mg/L	70 mg/L	<25 mg/L	<4 mg/L
BOD	<2.0 mg/L	9.6 mg/L	<2.0 mg/L	<3.0 mg/L	EST 87.0 mg/L	<2.0 mg/L	<3.0 mg/L	<2.0 mg/L	31 mg/L	<2.0 mg/L	<3.0 mg/L	< 2.0mg/L
pH	8.17	7.8	9.18	7.85	8.15	8.20	9.38	7.98	7.93	8.02	8.03	7.33
COD	10.7 mg/L	<10 mg/L	< 20.0 mg/L	<20 mg/L	<4.0 mg/L	< 10.0 mg/L	< 20.0 mg/L	<20.0 mg/L	12.4 mg/L	< 10.0 mg/L	<20.0 mg/L	20.2 mg/L
Oil and Grease	<3.0 mg/L	< 3.0 mg/L	< 20.0 mg/L	< 3.0 mg/L	< 3.0 mg/L	< 3.0 mg/L	< 20.0 mg/L	< 20.0 mg/L	< 3.0 mg/L	< 3.0 mg/L	< 3.0 mg/L	< 3.0 mg/L

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

Table 3.3.6.1b: 2023 Wastewater Effluent Analysis (lbs./d); Pretreatment Permit, Outlet No. 01, One Sample/Qtr. — Morgantown					
Parameter	Limit	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Flow (MGD)					
Monthly					
Avg.	0.09	0.008	0.004	0.01	0.03
Daily Max.	0.15	0.02	0.25	0.037	0.06
BOD5					
Monthly					
Avg.	Monitor	<0.17	<0.17	<2.0	<2.0
Daily Max.	Monitor	<0.33	<4.2	<0.62	<1.00
TSS					
Monthly					
Avg.	Monitor	0.15	0.14	0.11	0.4
Daily Max.	Monitor	0.38	.90	0.40	0.8
Arsenic					
Monthly					
Avg.	0.005	0.00007	<0.00003	< 0.00008	0.00025
Daily Max.	0.008	0.0002	<0.0002	< 0.0003	0.0005
Cadmium					
Monthly					
Avg.	Monitor	<0.00007	<0.0003	<0.00008	<0.00025
Daily Max.	Monitor	<0.0002	<0.0002	<0.0003	<0.0005
Chromium					
Monthly					
Avg.	0.007	<0.0001	<0.00007	<0.00017	<0.0005
Daily Max.	0.011	<0.0003	<0.0004	<0.0006	<0.0005
Copper					
Monthly					
Avg.	0.04	.0007	0.0004	0.00004	0.0090
Daily Max.	0.06	.002	.003	0.002	0.0018
Cyanide					
Monthly					
Avg.	0.02	<0.0007	<0.0003	<0.0008	<0.0025
Daily Max.	0.03	<0.002	<0.002	<0.003	<0.005
Lead					
Monthly					
Avg.	0.025	< 0.00001	<0.000007	<0.000083	< 0.00025
Daily Max.	0.038	< 0.0002	< 0.0002	<0.0003	< 0.0005
Mercury					
Monthly					
Avg.	0.0006	<0.00001	<0.000007	<0.000017	<0.000050
Daily Max.	0.0009	<0.00003	< 0.0004	<0.00006	<0.00010
Nickel					
Monthly					
Avg.	Monitor	0.00007	0.00004	0.00008	0.00058
Daily Max.	Monitor	0.0002	0.0003	0.0003	0.0012
Silver					
Monthly					
Avg.	.011	<0.00007	<0.00003	<0.00008	<0.00025
Daily Max.	.017	<0.00002	<0.0002	<0.0003	<0.0005
Zinc					
Monthly					
Avg.	0.1	0.0005	0.0009	0.0013	0.0140
Daily Max.	0.15	0.001	0.006	0.005	0.028
Iron					
Monthly					
Avg.	Monitor	0.021	0.011	0.008	0.070
Daily Max.	Monitor	0.05	0.07	0.03	0.14
Manganese					
Monthly					
Avg.	Monitor	0.004	0.004	0.004	0.017
Daily Max.	Monitor	0.01	0.03	0.02	0.03

Table 3.3.6.1c: 2023 Wastewater Effluent Analysis (lbs./d); Pretreatment Permit, Outlet No. 01, One Sample/Qtr. — Morgantown					
Parameter	Limit	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.
Phenolics Monthly Avg. Daily Max.	Monitor	<0.0007 <0.002	< 0.0003 < 0.002	0.0009 0.003	0.0033 0.007
TOX Monthly Avg. Daily Max.	Monitor Monitor	<0.004 <0.01	<0.002 <0.013	0.0078 0.029	0.0208 0.042
Organics Alachlor-1254 All others	Report Report	0 0	0 0	0 0	0 0
pH (s.u.) Minimum Maximum	6.0 9.0	7.77 8.36	6.55 8.2	7.03 8.1	7.15 8.03
TDS Monthly Avg. Daily Max.	Monitor Monitor	30.7 76.8	10.3 64.7	20.9 77.2	80.1 160.2

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

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

An oil-water separator, Photo 3.3.6.1a, 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, since runoff can affect 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. Burroughs Run drains an area of significant urban and suburban development, which contributes typical urban/suburban pollution (e.g., oil, salt, pesticides, and herbicides). 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.

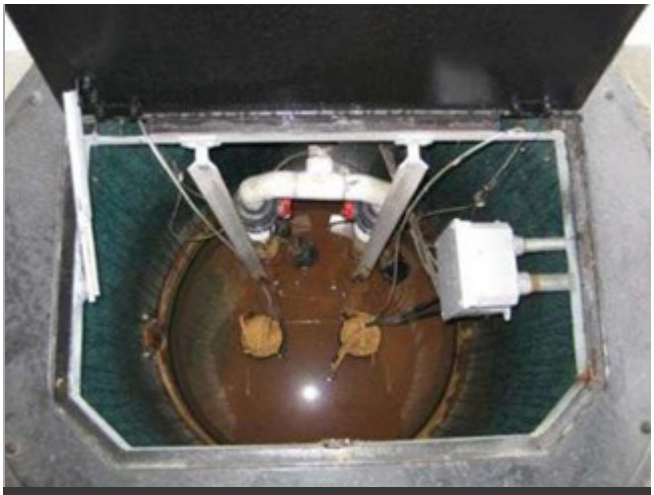


Photo 3.3.6.1a: Morgantown parking lot oil-water separator.

Protecting surface water and groundwater requires preventing leaks from storage tanks. Accordingly, NETL is compliant with the WVDEP's AST 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 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.

The ASTs are visually inspected weekly and their interstitial cavities are checked quarterly. Visible leaks are corrected immediately. Though no visible leaks have been observed, the interstitial space of the B-36 gasoline AST tested above the lower explosive limit in 2023. The area around the AST is currently diked and is inspected daily. The diked area around the AST is drained of rainwater only once it has been inspected to assure that there is no evidence (sheen, smell, discoloration, etc.) of petroleum products in the rainwater.

Oil-filled transformers are visually inspected daily. If leaked materials are observed, the materials are collected or absorbed with spill kits and disposed of per applicable regulations.

INDUSTRIAL WASTEWATER PROGRAM

Industrial wastewater quality is managed per NETL Manual 436.1-02.04, Industrial Wastewater System Management Program, Industrial wastewater is conveyed from Morgantown's facility floor drains, equipment condensate lines, and laboratory sinks to the clarifier (Photo 3.3.6.1b) and associated processes/equipment for sediment removal and pH adjustment. The site's industrial waste discharge permit (MUB 012), issued by the local utility, Morgantown Utility Board (MUB), allows for the operation and maintenance of a 16-foot diameter Lakeside Equipment Company Spirotlo clarifier, a batch pH treatment system with a 2,632-gallon equalization lank and two 2,500-gallon neutralization tanks, a 12 x 16-foot sludge drying bed, and one 12-inch tap to the MUB sanitary sewer collection system. The permit allows a wastewater discharge rate limit of 90,000 gallons per day. Monthly sampling is performed at a laboratory chosen from an EPA-certified list, and DMRs detailing this sampling and analysis are provided to the MUB. DMR results for 2023 are provided in Table 3.3.6.1c: 2023 Wastewater Effluent Analysis (lbs./d); Pretreatment Permit, Outlet No. 01, One Sample/Month – Morgantown. The sampling point is displayed in Photo 3.3.6.1c.

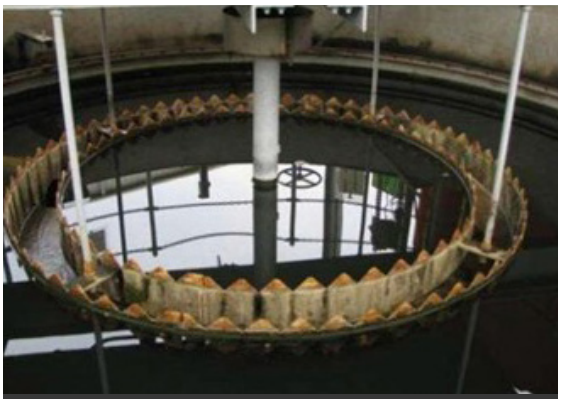


Photo 3.3.6.1b: Morgantown clarifier.

Photo 3.3.6.1c: Morgantown wastewater permit sampling point.

3.3.6.2. SAFE DRINKING WATER ACT

There were no issues in 2023 regarding compliance with the Safe Drinking Water Act. NETL-Morgantown potable water is supplied by the local water utility, which publishes Safe Drinking Water Act compliance reports detailing water quality testing. Drinking water fixtures on-site are filtered, with filters and plumbing maintenance performed during period scheduled preventative maintenance.

3.3.6.3 PFAS AND ADDITIONAL EMERGING CONTAMINANTS

See Section 2.14 for information regarding PFAS at NETL.

3.3.7 OTHER ENVIRONMENTAL STATUTES

3.3.7.1 ENDANGERED SPECIES ACT

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

3.3.7.2 E.O. 13751 SAFEGUARDING THE NATION FROM THE IMPACTS OF INVASIVE SPECIES

There were no issues at the Morgantown site regarding impacts of invasive species during 2023.

3.3.7.3 NATIONAL HISTORIC PRESERVATION ACT

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

3.3.7.4 MIGRATORY BIRD TREATY ACT

There were no issues at the Morgantown 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 E.O.S 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 (2017)

See Section 4.0 ES&H Management System.

3.3.9 EXECUTIVE ORDERS (E.O.s)

The Morgantown site was in full compliance with all applicable environmental E.O.s in 2023. Throughout the year, numerous inspections and audits were performed and documented to ensure there were no instances of noncompliance. E.O. 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability was implemented as part of NETL's ES&H management system. E.O. 13693, Planning for Federal Sustainability in the Next Decade, was revoked because of the new E.O., which is described in more detail in Section 4.0.

In addition, other E.O.s that apply to NETL, but for which no specific actions were required in 2023, 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 E.O. 11988, FLOODPLAIN MANAGEMENT

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

3.3.9.2 E.O. 11990, PROTECTION OF WETLANDS

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

3.3.10 OTHER MAJOR ENVIRONMENTAL ISSUES AND ACCOMPLISHMENTS

The Department's 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 zero reports with the department's ORPS in 2023.

3.3.10.1 SRR

There were no hazardous waste sites suitable for SRR at the Morgantown site in 2023.

3.3.10.2 ORGANIZATIONAL RESILIENCE

See section 2.13 for information regarding organizational resilience.

3.3.10.3 NATURAL RESOURCES CONSERVATION PROGRAMS AND PROJECTS

Natural resources conservation programs and projects help reduce soil erosion, enhance water supplies, improve water quality, increase wildlife habitat, and reduce damages caused by floods and other natural disasters. In FY 2023, a project was completed to repair a sink hole and increase the efficiency of the retention pond.

3.3.11 CONTINUOUS RELEASE REPORTING

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

3.3.12 UNPLANNED RELEASES

There were no unplanned releases at the Morgantown site.

3.3.13 SUMMARY OF ENVIRONMENTAL PERMITS

A summary of environmental permits for the Morgantown site is provided in Table 3.3.13, 2023 Summary of Permits.

Table 3.3.13: 2023 Summary of Permits — Morgantown

Permit No. and Name	Site	Issue Date, Exp. Date	Regulatory Agency	Description
MUB 012 Industrial Waste Discharge Permit	Morgantown	09/12/2019, Modified 02/25/2021 09/11/2025	Morgantown Utility Board (MUB)	Permit allows for the operation of wastewater pretreatment facilities and discharge into MUB's sanitary sewer system. It establishes discharge limits and monitoring requirements, compliance with the Morgantown Industrial Waste Ordinance, reporting requirements, including accidental discharge reporting and testing procedures.
WV0111457 WV/ NPDES General Water Pollution Control Permit	Morgantown	Old Permit: Issued 03/03/2014, Expired 03/30/2020. Permit Extended through 08/2020: Pending new permit at the state level. New Permit: Issued 09/12/2019, Expires 09/12/2024. New permit Modified 02/25/2021 Expires 09/12/2024	WV Department of Environmental Protection (WVDEP), Division of Water and Waste Management	MGN site (NPDES Stormwater Permit Registration Number: WVG610042) is authorized to operate under WV/ NPDES General Water Pollution Control Permit No. WV0111457 and subject to the provisions of Section W-1 of the General Permit. Semi-annual stormwater samples are collected and submitted as per Water Pollution Prevention Plan and Groundwater Protection Management Plan required by the permit.

3.3.14 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 Morgantown site comprises 132 acres, with 86 acres being considered forest and/or field. The site has a perimeter fence separating it from other industrial sites to the west and north); there is also a railroad to the north, and neighborhoods to the east and south of the site.

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

FACPs are installed in most buildings on-site. All FACPs are equipped with DACTs that enable the panels to send fire alarm and trouble signals to the B-39 security office for monitoring and response. Each building with a FACP is equipped with alarm and notification devices to alert personnel of a fire. Fire suppression systems are installed in most buildings on site to combat and/or extinguish a fire.

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

3.3.15 RECREATIONAL HUNTING AND FISHING

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

4.0 ES&H MANAGEMENT SYSTEM

The NETL's Environmental, Safety & Health management system (ES&H MS) is an enterprise-wide, organizational system, supported from top management down to the worker level, for ensuring environmental compliance and stewardship, as well as worker safety and health. The ES&H MS identifies, mitigates, and integrates NETL's ES&H issues into the planning and execution of all work to ensure protection of the public, employees, and the environment. The underlying framework of NETL's ES&H MS is DOE's Integrated Safety Management System.

To ensure environmental compliance and stewardship and worker health and safety is integrated into the planning and execution of all work processes, NETL conforms to and is certified to the International Organization for Standardization (ISO) 14001 (environmental) and ISO 45001 (health and safety) standards. NETL's current ISO 14001 and ISO 45001 certificates are valid from Oct. 27, 2022, through Oct. 26, 2025.

NETL's most recent surveillance audit was conducted in October/November 2023. This audit resulted in one major nonconformance, five minor nonconformances, and 15 observations. The major nonconformance was associated with management review, and the minor nonconformances were associated with operational controls, competency, incidents/non-conformity/corrective action, risks and opportunities, and documented information. Corrective action plans were developed, accepted by the external auditor, and are being implemented to ensure continual improvement of NETL's ES&H MS. The verification audit for the management review major non-conformance was completed on May 28, 2024. The external auditor verified the corrective actions as effective and recommended continued certification to ISO 14001 and ISO 45001.

4.1 HISTORICAL INFORMATION

In January 2001, as part of NETL's efforts to implement an effective environmental management system, a self-assessment was conducted to determine the degree to which NETL's Integrated Safety Management and Safety Analysis and Review System (SARS) processes conform to ISO 14001 (environmental). ISO 14001 certification was received in 2003. In June 2007, NETL pursued certification to OHSAS 18001 (health and safety). The OHSAS 18001 certification transitioned to ISO 45001 in 2019, as the next logical step in continual improvement of NETL's ES&H MS. Table 4.1 depicts NETL's ES&H MS certification history.

Table 4.1 ES&H Management System Certification Timeline				
Date	**Site(s)**	**Standard**	**Type**	**Auditor**
August 2003	MGN/PGH	ISO 14001:1996	Certified	NSF International Strategic Registrations, Inc.
June 2005	ALB	ISO 14001:2004	Certified	NSF International Strategic Registrations, Inc.
2006	MGN/PGH	ISO 14001:2004	Recertified as single entity	NSF International Strategic Registrations, Inc.
June 2007	MGN/PGH	ISO 14001:2004	Transferred to new registrar	Orion Registrar
		OHSAS 18001:2007	Certified	Orion Registrar
November 2009	ALB	ISO 14001:2004	Recertified	Orion Registrar
June 2010	MGN/PGH	ISO 14001:2004	Recertified	Orion Registrar
		OHSAS 18001:2007	Recertified	
August 2010	ALB	ISO 14001:2004	Recertified	Orion Registrar
		OHSAS 18001:2007	Certified	
September 2013	ALB/MGN/PGH	ISO 14001:2004	Recertified	Orion Registrar
		OHSAS 18001:2007	Recertified	
August 2016	MGN/PGH	ISO 14001:2004	Recertified	Orion Registrar
		OHSAS 18001:2007	Recertified	
September 2016	ALB	ISO 14001:2004	Recertified	Orion Registrar
		OHSAS 18001:2007	Recertified	
April 2018	MGN/PGH	ISO 14001:2015 (update)	Certified	Orion Registrar
		OHSAS 18001:2007	Certified	
July 2018	ALB	ISO 14001:2015 (update)	Certified	Orion Registrar
		OHSAS 18001:2007	Certified	
August 2019	ALB/MGN/PGH	ISO 14001:2015	Recertified	Orion Registrar
		ISO 45001:2018 (formerly OHSAS 18001)	Certified	Orion Registrar
September 2022	ALB/MGN/PGH	ISO 14001:2015	Recertified	Government & Military Certification Systems (GMCS)
		ISO 45001:2018	Recertified	

4.2 ES&H MS SCOPE

The scope of the NETL's ES&H MS (Environment, Safety, and Health Management System | netl.doe.gov) includes all on-site research and development activities, site maintenance and operations, site security and emergency response, construction management and verification activities, and the supporting administrative functions related to these activities and operations. In accordance with the International Accreditation Forum, the overall complexity and risk is medium for ISO 14001 and high for ISO 45001.

ES&H POLICY

NETL's ES&H policy is documented in NETL Order 440.1, Environment, Safety, and Health Management System and is implemented as follows:

- NETL will achieve environmental, safety, and health quality by proactively, systematically, and fully integrating ES&H considerations into the planning and execution of all work, so that the mission is successfully accomplished for the safety and health of the public without detriment to NETL or the environment.
- NETL is committed to reducing environmental, safety, and health impacts by:
  - Complying with all applicable ES&H laws, regulations, and standards through rigorous regulatory compliance programs.
  - Implementing pollution prevention programs to eliminate or reduce waste and emissions.
  - Implementing accident/incident reduction programs to eliminate or reduce accidents and incidents.
  - Conserving energy and materials through resource management and recycling/reuse.
  - Using SARS to identify, control, and reduce safety and health risks and environmental impacts through engineering and administrative controls.
- NETL will work continually to improve environmental, safety, and health systems with the goal of improved ES&H performance. Performance will be measured against stated objectives and targets.
- NETL will communicate information to employees and seek their involvement in reducing our environmental, safety, and health impacts and communicate NETL's policies to stakeholders and the public.

4.3 MANAGEMENT REVIEW

NETL's ES&H MS Management Review Board (MRB) includes top management from across the organization. The ES&H MS MRB meets on a quarterly basis to fulfill the management review requirements of the ISO standards to ensure continuing suitability, adequacy, and effectiveness of NETL's ES&H MS. NETL strives to continually improve integrated leadership engagement and effective, open lines of communication across the entire organization.

4.4 SIGNIFICANT ASPECTS/SAFETY AND HEALTH HAZARDS, OBJECTIVES, AND TARGETS

Because NETL has an integrated management system, significant environmental aspects and safety and health hazards are considered congruently and are identified as aspects/hazards that have or can have a significant impact on the environment or employee safety and health. Significant environmental aspects/safety and health hazards are determined based on executive orders (E.O.s), departmental directives, management concerns, ES&H policy, SARS processes, assessments, lessons learned, past ES&H performance, employee input, legal and regulatory requirements, resource availability, degree of practical control, stakeholder input/communications, and changing circumstances. NETL's significant aspects/safety and health hazards for fiscal year (FY) 2023 are listed in Table 4.4a.

Based on the identified significant environmental aspects/safety and health hazards, ES&H Management Plans (EMPs) are implemented to track NETL's objectives and targets and measure performance. Table 4.4b identifies NETL's FY 2023 EMP performance with respect to significant aspects/safety and health hazards.

EMS Compliance Report Summary

EMS Fiscal Year Reporting Score

NETL Score – 100%

NETL's 2023 Environmental Management System (EMS) compliance report was submitted via the Department of Energy's EMS site information database. NETL received a GREEN score based on the following responses to the EMS metrics questions:

Table 4.4d: NETL Responses to EMS Metrics Questions

METRIC QUESTION	RESPONSE
Environmental Performance	Using an established procedure, previously identified activities, products and services (and their associated environmental aspects) and all newly identified activities, products and services (and their associated environmental aspects) were evaluated for significance within the past fiscal year. The results of the analysis were documented, and any necessary changes were made or are scheduled to be made.
Environmental Objectives	Documented measurable environmental objectives are in place at relevant functions and levels. By the end of the fiscal year, at least 80% of them had either already been accomplished or were on schedule to be met.
Operational Controls	Within the past fiscal year, operational controls associated with identified significant environmental aspects are established, implemented, controlled, and maintained in accordance with operating criteria.
Compliance with Regulatory Requirements/ Corrective Actions	Within the past fiscal year, an environmental compliance audit program was in place, audits were completed according to schedule or were rescheduled as needed, audit findings were documented, and corrective and preventative actions were defined/documented. Corrective and preventative actions were not always on schedule for completion by an established date.
EMS/EO Goals Integration	• 80-100% of applicable E.O. 14057 Site Sustainability Plan goals are addressed in the EMS including: ○ Energy Management ○ Water Management ○ Waste Management ○ Fleet Management ○ Clean & Renewable Energy ○ Sustainable Buildings ○ Acquisition & Procurement ○ Investments: Improvement Measures, Workforce, & Community ○ Indirect Emissions ○ Fugitives & Refrigerants ○ Electronic Stewardship & Data Centers ○ Adaptation & Resilience

EMS Effectiveness

Benefit of EMS

NETL's ES&H MS enables the organization to address current E.O.s, with emphasis on waste management, improved energy efficiency and HPSB implementation. Since its inception, the ES&H MS has focused on reducing waste and increasing recycling. This is especially true for new demolition and construction project requirements. Other benefits of the EMS include:

- **Reducing risk to facility/organizational mission** by improving NETL's safety culture through monitoring and measuring leading indicators.
- **Improving fiscal efficiency and/or cost avoidance** using NETL's advanced metering program for tracking potable water consumption and energy usage with greater accuracy.
- **Improving understanding and recognition of environmental issues at all levels of the organization** through MRB and self-assessments.
- **Contributing to the continuous improvement of the organization's environmental footprint** by empowering individuals to participate in NETL's recycling program and SARS for projects, facilities, construction, and support operations.
- **Integrating the environment into organizational culture and operations** by procuring environmentally preferred products.
- **Integrating environmental considerations into real property asset management** by implementing HPSB requirements.
- **Improving community relations** through NETL's organizational resilience and emergency management planning requirements.
- **Improving effectiveness in NETL's overall mission** through monitoring energy use and implementing renewable energy and fleet management programs.
- **Strengthening cooperation** from groups within and outside the organization through NETL's Emergency Management Program.

Impact of EMS

The impact of implementing the EMS has been significant to NETL.

- In terms of **improved overall compliance management**, several EMPs address compliance with regulations and E.O.s. For example, NETL has an EMP that focuses on 10 CFR 835, Occupational Radiation Protection Program.
- **Personnel health and safety** is addressed through a leading indicator EMP. The objective is to improve the safety culture at NETL by establishing leading indicators in the suite of safety metrics.
- For **pollution prevention,** NETL has identified an EMP for refrigerant management. As an example, the goal of this EMP is to reduce the quantity of refrigerants on-site and more efficiently track those on-site as part of U.S. Environmental Protection Agency (EPA) hydrofluorocarbon phasedown.
- To **improve air and water quality**, NETL has an EMP for HPSB implementation.
- For **improved hazardous material, hazardous waste, and solid waste management**, NETL has a goal of reducing the quantity of toxic and hazardous chemicals and materials acquired, used, and disposed during FY 2023 using FY 2022 as a baseline.

- As an example of **improved conservation of water, natural resources, energy in facilities, fuel in vehicles**, NETL has EMPs that track potable water usage, energy usage, and fleet management.
- A **reduced number of permits needed to operate** is more efficient, environmentally friendly, and cost effective. Implementing NETL's EMP for HPSBs will help to reduce air emission discharges potentially reducing the number of permits required on-site.

EMS Best Practices/Lessons Learned

- As of the end of the FY 2023, 100% of NETL printers and 97.58% of NETL workstations have power management settings in place.
- NETL's HPSB implementation EMP ensured that all FY 2020-FY 2023 construction and renovation projects included conformance to HPSB guiding principles.
- As of the end of FY 2023, five out of 12 (41.6% of applicable buildings) were certified to the HPSB guiding principles.
- In FY 2023 (year-over-year comparison to FY 2022), energy usage in NETL facilities (Btu/square foot) was reduced by 5.5%.

EMS Challenges

NETL's EMS challenges include:

- Difficulty obtaining zero-emission vehicles (ZEVs) and non-petroleum-consuming vehicles from GSA for NETL's fleet. This makes achievement of ZEV acquisition and alternate fuel usage goals unattainable.
- Concerns with charging electric vehicle (EV) batteries to full capacity and the limited driving range may decrease EV usage for travel between NETL-Morgantown and NETL-Pittsburgh.
- NETL's goal of having dedicated smart meters installed in the data centers at all three NETL sites was not met due to delays in availability of project equipment and materials. The Morgantown and Albany smart metering projects are complete, but project completion for the Pittsburgh data center is not expected until August 2024.
- Addressing the significant number of corrective actions from increased audits and assessments by multiple oversight entities (e.g., ISO external audits, Office of Enterprise Assessment, and HQ Site Assistance Visit) limits ES&H personnel's time to perform their daily activities. NETL plans to reprioritize and sort like findings to implement effective corrective actions.

Major Environmental Programs and Initiatives

Environmental Justice (EJ) Integration into EMS: The DOE Sustainability Order requires that EJ is considered in the organization's ES&H MS. The order also requires that the site EMS representative work with EJ colleagues to ensure that outreach to EJ communities is reflected in the EMS. NETL organizations that address EJ as part of their work activities the include National Environmental Policy Act Division and Science & Technology Strategic Plans & Programs. Also, by searching EPA's EJ screening and mapping tool, the Office of Fossil Energy and Carbon Management's ESS&H (FECM-17) determined that no impacted communities surround NETL sites.

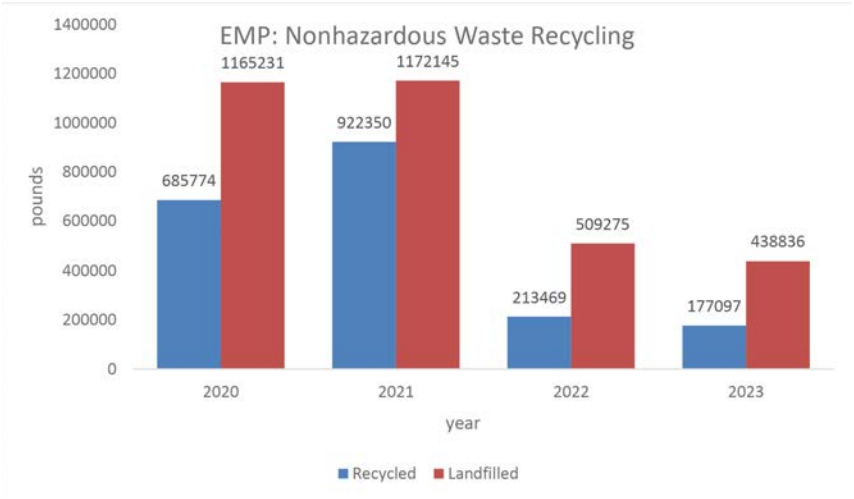
Special Environmental Studies/Activities/Training Programs

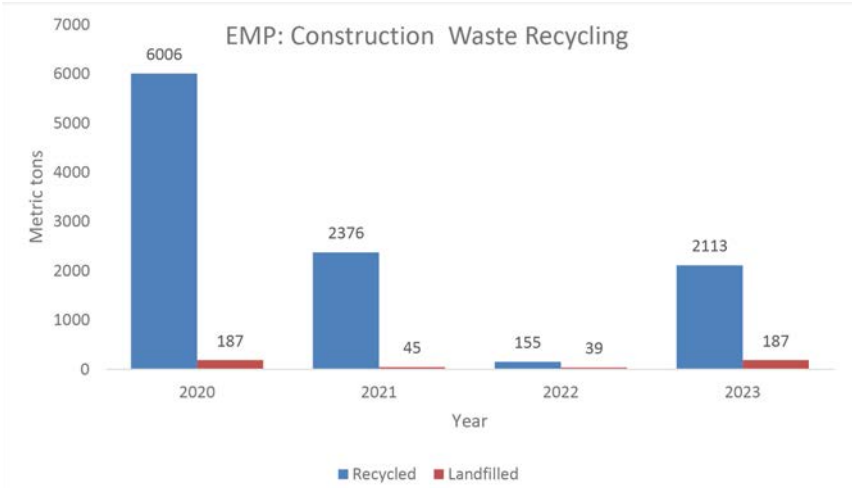
In calendar year 2023, NETL introduced the following new environmental training programs:

- Chemical Inventory and SDS Basics.
- Chemical Hygiene — Labeling Inside the Laboratory.
- Chemical Hygiene — Labeling Outside the Laboratory.
- Spill Kit Training.

4.4.1 WASTE MINIMIZATION, POLLUTION PREVENTION, AND RECYCLING

For FY 2023, EMPs addressing nonhazardous waste recycling and construction waste recycling included objectives and targets that address the requirements of E.O. 14057. As an example, the objective of the FY 2023 EMP for Nonhazardous Waste Recycling was to increase diversion of nonhazardous solid waste from disposal by 50% by the end of FY 2025 and 75% percent by FY 2030. NETL recycled 40% of the nonhazardous waste stream (177,097 lbs. out of 438,836 lbs). In addition, the objective for EMP for Recycling Construction Waste is to recycle the maximum extent feasible of construction/demolition waste and divert it from landfill disposal by the end of FY 2023. NETL diverted 2,113 metric tons of its construction/demolition waste.





4.4.2 HAZARDOUS MATERIALS PROCUREMENT, CONSUMPTION, AND STORAGE

For FY 2023, 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. 13834. NETL had a 0.56% increase in the number of containers (73 containers) compared to the baseline that was adjusted in FY 2022. The number of containers is within the no-net gain of (+/- 10%) target for FY 2023. As of the fourth quarter of 2023, the chemical inventory contained 13,200 containers. The chemical inventory verifications were completed as planned as part of this EMP.

4.4.3 SUSTAINABLE ACQUISITION

President Biden signed E.O. 14057, Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability, on Dec. 8, 2021. This E.O. reestablishes the federal government as a leader in sustainability. Section 604 of E.O. 14057 revokes E.O. 13834, Efficient Federal Operations, signed May 17, 2018. "Sustainable acquisition" refers to purchasing products with specific environmental or energy attributes and it involves not just the purchasing of goods and services, but the operation of buildings, owning or leasing fleet vehicles, and purchase/use of IT equipment.

Included in E.O. 14057, Sustainable Acquisition and Procurement Program Area, are links to, and highlights from, programs that enable agencies to meet goals including: environmentally preferable purchasing, comprehensive procurement guidelines, ENERGY STAR®, the green procurement program (GPP), and the Federal Energy Management Program. Under this E.O., agencies shall reduce emissions, promote environmental stewardship, support resilient supply chains, drive innovation, and incentivize markets for sustainable products and services by prioritizing products that can be reused, refurbished, or recycled; maximizing environmental benefits and cost savings through use of full life cycle cost methodologies; purchasing products that contain recycled content, are biobased, or are energy and water efficient, in accordance with relevant statutory requirements; and, to the maximum extent practicable, purchasing sustainable products and services identified or recommended by the EPA.

For FY 2023, the following NETL targets were identified based on meeting and/or exceeding NETL's FY 2022 achievements:

- Number of applicable contract actions w/ sustainable clauses: 87.
- Value of applicable contract actions w/ sustainable clauses: $ 122,597,070.96.

4.4.4 ELECTRONIC STEWARDSHIP

In FY 2023 the objective for the EMP for Operation and Maintenance of Electronic Products continued to enable power management, duplex printing and other energy-efficient or environmentally preferable features on all eligible DOE electronic products. In FY 2023, when exempt monitors and computers are accounted for, 100% of printers and 97.44% (1,601/1,657) of workstations have power management settings in place.

4.4.5 WATER USE

To address the goals of E.O. 13834, NETL's objective was to reduce water consumption intensity relative to the baseline of 27.3 million gallons (which equates to 23.3 gallons/gross square foot [gal/gsf]) through life-cycle cost-effective measures by 2% annually through FY 2021, or 36% by the end of FY 2025 using a baseline of FY 2007. NETL's FY 2023 potable water intensity was 8.5 gal/gsf. This equates to a 63.7% decrease from the 2007 baseline.

4.4.6 ENERGY AND FUEL USE

The latest energy intensity reduction goal requires a 25% reduction in energy intensity for subject facilities by FY 2025 relative to FY 2015 baseline. The FY 2023 interim target was a reduction of 24% from the FY 2015 baseline.

NETL's FY 2023 energy intensity was 138,995.7 BTU/GSF, only a 9.5% reduction from the FY 2015 baseline. The FY 2023 energy intensity was a 5% decrease from FY 2022. This decrease was mainly due to milder temperatures at NETL's Morgantown and Pittsburgh campuses. The Morgantown and Pittsburgh campuses consumed 84% of NETL's total energy in FY 2023. Year-to-year degree day comparisons show that in FY 2023 Morgantown and Pittsburgh had 10% fewer degree days than in FY 2022. The Albany campus consumed 16% of NETL's total energy in FY 2023 and had 10% more degree days in FY 2023 than in FY 2022. NETL will continue to strive to reduce energy intensity through continued energy conservation measures (ECMs) in new and existing buildings and systems.

One other factor impacting FY 2023 electricity and natural gas usage was that NETL continues to run building heating, ventilation, and air conditioning (HVAC) systems based on Centers for Disease Control and Prevention (CDC)/American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) recommendations, Guidance for Building Operations During the Covid-19 Pandemic. HVAC systems in NETL buildings were adjusted to improve ventilation by opening outdoor air dampers beyond minimum settings to reduce or eliminate HVAC recirculation, demand-controlled ventilation controls were turned off, filter efficiencies were increased as much as possible in each HVAC system, and HVAC systems ran longer hours (two hours before and after the building is occupied).

NETL's annual on-site renewable electrical energy generation equates to 0.5% of its total electric and thermal energy usage based on the Energy Policy Act (EPACT) 2005 double bonus for on-site renewable energy.

To meet the EPACT 2005 requirement that renewable electric account for 7.5% of total electric consumption, NETL purchased 3,500 MWh of renewable energy credits (RECs). With these RECs, NETL's renewable electric energy totaled 7.0% of NETL's FY 2023 total electric and thermal consumption.

Data Centers

NETL has a data center business case with Federal Information Technology Acquisition Reform Act approval that outlines NETL's full data center strategy. A summary of this strategy is below.

The NETL-Albany data center was relocated to the first floor of building 1 (B-1) in FY 2022. The new data center is fully metered and has an estimated power usage effectiveness (PUE) of 1.3. Data center infrastructure management (DCIM) software (Nlyte) provided by DOE HQ will be implemented in the Albany data center.

The Morgantown data center was remodeled and racks were consolidated 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 placed the construction contract for the Center for Artificial Intelligence/ Machine Learning (CAML) in B-83 in FY 2021 that will combine high-performance computing (HPC), research IT equipment, and commodity enterprise IT equipment. This consolidation will eliminate the need for multiple data centers on-site. It will also be fully metered and managed with DCIM software. CAML construction will be completed in Calender Year 2024.

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.

Fleet

NETL's FY 2023 fuel consumption and year-over-year metrics were greatly impacted by the lifting of the travel restrictions caused by the coronavirus pandemic. These travel restrictions were in place for all of FY 2021 and half of FY 2022.

The current petroleum fuel target is a reduction of fleet petroleum use by 20% by FY 2015 and thereafter relative to FY 2005 baseline. NETL's consumption of petroleum fuel in FY 2023 is 59.5% less than NETL's petroleum consumption in FY 2005, which meets the goal. FY 2023 total milage was 183,678 miles, which was 57,688 more miles than travelled in FY 2022.

NETL-Morgantown and NETL-Pittsburgh operate and maintain E85 refueling infrastructure to support the alternate fuel vehicles (AFVs) in the NETL fleet. Due to supplier issues related to the supply of E85 fuel regular fuel was used mid FY 2023, when E85 fuel delivery was resumed.

NETL installed EV charging stations in Pittsburgh and Morgantown in FY 2018 and currently has 54 EVs (Chevrolet Bolts), which are used for travel between NETL-Pittsburgh and NETL-Morgantown (130 miles round trip), and seven hybrid motor pool vehicles. Using the all-electric Chevy Bolts between sites can save NETL between $12 to $20 per round trip in fuel costs. Each round trip also saves four to six gallons of gas, reducing NETL's GHG emissions and helping to reduce fuel usage.

NETL installed the first charging stations in FY 2018, underground and electrical infrastructure were built out to support additional charging stations in the future. In FY 2022, NETL placed a construction contract to use this infrastructure and install EV charging stations in FY 2024 that will double (from six to 14) the number of EV charging stations for GSA-leased fleet EVs in Pittsburgh and Morgantown. These charging stations will also be made available to NETL employees during workplace hours.

Inter-site shuttle service between the NETL-Morgantown and NETL Pittsburgh sites continued in FY 2023. The inter-site shuttle reduces individual employee trips between sites, reducing vehicle miles and fuel consumption. The inter-site shuttle also delivers small packages reducing the cost of outside mail delivery services.

4.4.7 AIR EMISSIONS/GHG EMISSIONS

NETL scope 1 and 2 GHG emissions were 33.3% lower in FY 2023 than in the baseline year of FY 2008. In FY 2023, scope 3 GHG emissions were 52.7% lower than in the baseline year of FY 2008. These decreases occurred due to the implementation of numerous ECMs throughout NETL over the past 15 years, and the purchase of RECs.

Near-term emissions will be reduced by improving/replacing the efficiency of existing campus facilities (ventilation and air conditioning, lighting, insulation, compressors). Longer term solutions to reduce emissions are being evaluated and include decarbonizing/electrifying NETL campuses while increasing the usage of carbon-pollution free electricity (CFE) by replacing natural gas-fired boilers and heaters with electric-powered heat pumps and supplemental heat across NETL.

The DOE 2021 Climate Action & Resilience Plan identified NETL as a DOE site that will assess opportunities for climate technologies that could be deployed at its campuses and could hold on-site demonstrations for technology transfer. NETL envisions a staged approach with interim goals that reflect the increased power requirements anticipated due to new mission-critical facilities coming online within the next five years, specifically the CSE in Morgantown and the CAML in Pittsburgh.

4.4.8 HPSB IMPLEMENTATION

In FY 2023, 36.4% (four of 11) of NETL's applicable buildings over 25,000 GSF meet the HPSB GPs. Including the bonus credit for one building below 25,000 GSF, 41.7% (five of 12) of NETL's applicable buildings meet the HPSB GPs.

NETL will ensure the five current HPSB-compliant NETL buildings meet ongoing Energy Independence and Security Act requirements including the sixth guiding principle, "Assess and Consider Climate Change Risks," in future updates of the vulnerability assessment and resilience plan.

NETL will incorporate planned building modifications into the annual lab plan and five-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. Requirements to meet the Council on Environmental Quality's Guiding Principles for Sustainable Federal Buildings and Associated Instructions, latest version, will be written into all NETL renovation/construction specifications.

4.5 CORRECTIVE AND PREVENTIVE ACTION PROGRAM

Nonconformance with any appropriate regulations or standards identified during any self-assessment audits (or external assessments/audits) mentioned above would be documented using NETL's current corrective and preventive action tracking system (CATS) database and the assessment input information system (AIIS).

4.5.1 NETL Manual 450.1-01.04, Corrective and Preventive Action Management Program, 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 and preventive actions within their programs, organizations, or facilities, and disseminates lessons learned across appropriate organizational elements.

4.5.2 After completing 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 and preventive 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, closed findings undergo verification audits to determine if the corrective and preventive actions taken address the closed findings appropriately. Open findings are generated into a monthly report and sent to appropriate line management to further address and complete accordingly.

NETL completed a total of 492 internal inspections/audits at all three sites in 2023. As a result, NETL resolved 44 ES&H-related corrective/preventive actions.

Other processes used for reporting corrective actions include:

- ***Procedure 421.1-01J, Research and Development (R&D) Safety Analysis and Review System***, which describes the process requirements for activities supporting research and development to ensure risks are analyzed, understood, eliminated, or controlled to a degree acceptable by the Research & Innovation Center and Laboratory Operations Center. Any recognized deficiencies will be mitigated or entered into CATS.
- ***Manual 421.1-00.02, Support Operations Safety Analysis and Review System***, which describes the process requirements for on-site support operations to ensure risks are analyzed, understood, eliminated, or controlled to a degree acceptable by management. Any recognized deficiencies will be mitigated or entered into CATS.
- ***Manual 421.1-00.04C, Construction Safety Analysis and Review System***, which describes the process requirements for facility construction activities to ensure risks are analyzed, understood, eliminated, or controlled to a degree acceptable by management. Any recognized deficiencies will be mitigated or entered into CATS.
- ***Procedure 442.1-01A, Employee Concerns Program***, which discusses methods of investigation and mitigation responses for employee concerns as well as corrective actions for substantiated or partially substantiated employee concerns. Disclosures of corrective actions may happen only consistent with relevant policy.
- ***Manual 151.1-01.01, Emergency Preparedness Drills and Exercises***, which determines corrective actions to address deficiencies identified during drills, exercises and actual responses.
- ***Manual 151.1-01.02, Emergency Categorizations, Classifications, and Notifications***, which catalogs and investigates major nonconformities related to emergencies, as required by DOE.
- ***Manual 231.1-00.02, Injury/Illness Reporting***, which sets forth the minimum reporting requirements for injury or illness classification investigation for NETL.
- ***Manual 232.2-01, Occurrence Reporting, Processing, and Operating Experience***, which sets forth the minimum reporting requirements for occurrences (lessons learned, near misses).
- ***Manual 422.1-01, Incident Management***, which discusses incident investigations and causal analysis, as required by DOE.
- ***Manual 450.4-01.02, ES&H Assessment Process***, which describes the process for conducting ES&H assessments, collecting performance information, identifying deficiencies and improvement opportunities that may be implemented as corrective or preventive actions.

4.6 ENVIRONMENTAL OPERATING EXPERIENCE AND PERFORMANCE MEASUREMENT

If NETL develops a lessons-learned on environmental operating experiences, they will be shared with the EMS community of practice. Four lessons-learned were developed in 2023, none were environmentally related.

NETL is committed to maximizing the sustainable use of America's energy resources and reducing GHG emissions to meet DOE's sustainability goals. Sustainability goals and targets are addressed in NETL's site sustainability plan (SSP) as required by DOE Order 436.1, Departmental Sustainability.

The NETL SSP has been prepared per DOE Fiscal Year 2023 Site Sustainability Plan Instructions, dated September 2023. NETL is committed to maximizing the sustainable use of America's energy resources and reducing GHG emissions to meet DOE's sustainability goals.

As DOE's primary fossil energy national laboratory, NETL integrates these sustainability goals into the long-term and day-to-day management decisions required to meet NETL's mission to drive innovation and delivering solutions for an environmentally sustainable and prosperous energy future.

NETL FY 2023 water intensity decreased by 8% percent from FY 2022. This decrease was due in part to decreased water consumption in Pittsburgh B-94 laboratories. Per the 2021 DOE Sustainability Plan, NETL will complete a water balance assessment by March 29, 2024.

Including the bonus credit for one building below 25,000 GSF meeting the Sustainable Building Guiding Principles (GPs), NETL has 41.7% percent of applicable buildings (5 of 12) and 35.5 percent of applicable building GSF that meet the GPs.

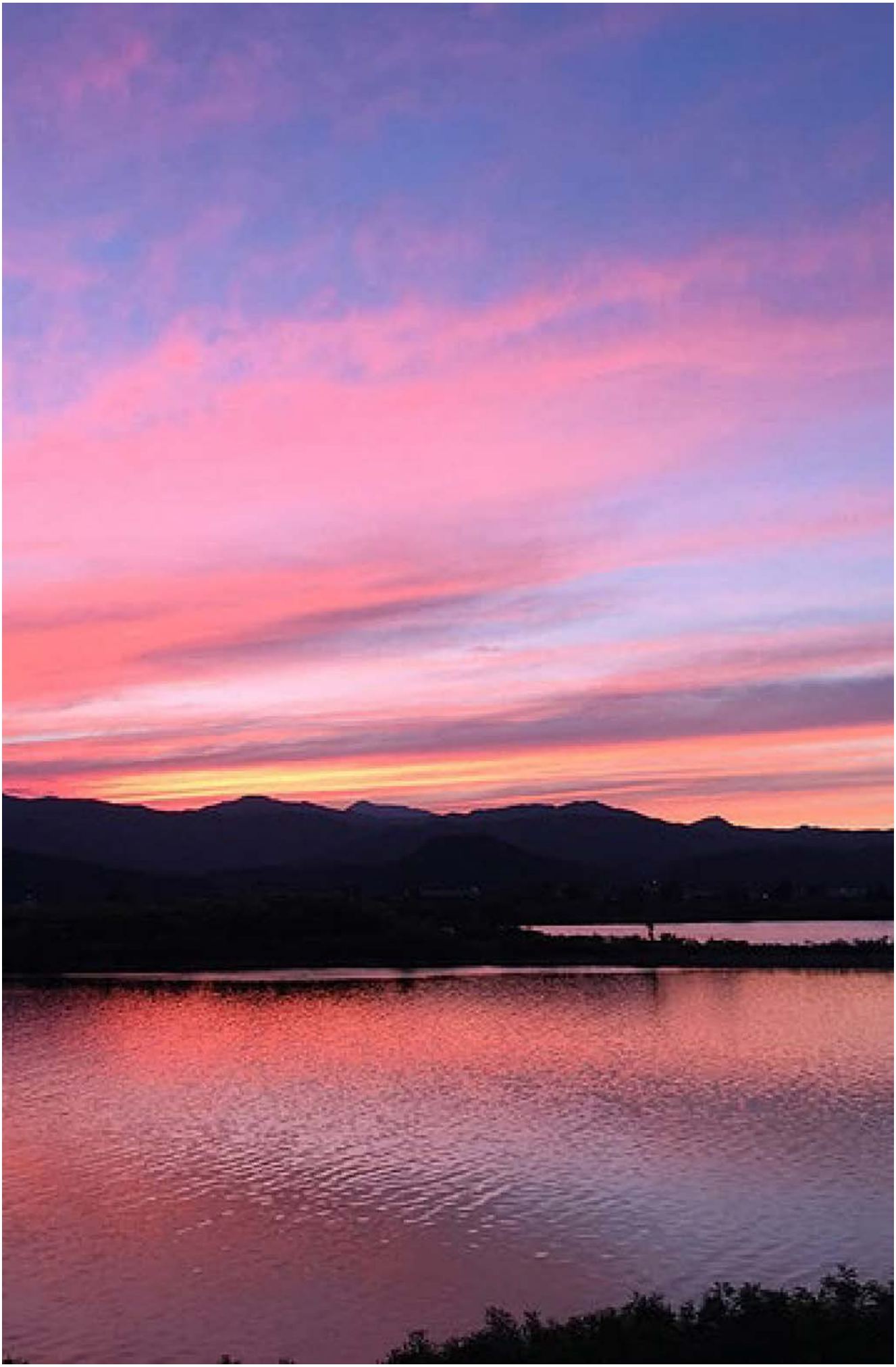
NETL's ES&H policy continues to incorporate the sustainability requirements and is implemented through various NETL directives, including NETL Order 440.1, Safety and Health Management System. NETL's ES&H policy states: "NETL will achieve environmental, safety, and health quality by proactively, systematically, and fully integrating ES&H considerations into the planning and execution of all work, so that the mission is successfully accomplished for the safety and health of the public without detriment to NETL or the environment."

NETL inputs energy and water consumption data into Energy Star Portfolio Manager and has used Portfolio Manager to benchmark metered buildings.

The Laboratory Operations Center has developed an aggressive carbon-pollution-free electricity (CFE) plan for NETL to comply with E.O. 14057 and the Energy Act of 2020. The plan sets forth goals related to decarbonization and sustainability and how NETL plans to meet these targets. Included in plan is the Assisting Federal Facilities with Energy Conservation Technologies (AFFECT) Grant program. NETL was selected to receive this grant to advance the Laboratory's commitment to net-zero carbon emissions goals and will involve incorporating energy efficiency upgrades to NETL-Pittsburgh B-901 that include a 260-kw solar array and battery energy storage element that will showcase a net-zero and electric vehicle charging model for future campus improvements. Similarly, NETL-Albany is planning a 250 KW solar array that will move the site towards the goal of 100% CFE by 2026. Additionally, NETL-Pittsburgh's Direct Air Capture Center's first lab-scale pilot prototype unit for novel solvent and sorbent material assessment was permitted for operation in June. The center is being developed to support technology development for atmospheric carbon dioxide capture. NETL and the U.S. Department of Energy's Office of Fossil Energy and Carbon Management (FECM) developed a unique power purchase agreement (PPA) to buy approximately 29,000 MWh of power annually from a newly completed utility-scale solar panel array from FirstEnergy subsidiary Mon Power by 2025. This CFE project was made possible in part by NETL's early first-of-its-kind commitment to purchase 100% of the power required to fulfill the electricity needs of the NETL-Morgantown campus.

The Annual Lab plan also identified two HPC centers that are to be established at NETL sites over the next four years: the CAML and the CSE. These centers will provide computer laboratories, state-of-the-art visualization capabilities and collaborative workspaces. These HPCs will be exempted from the energy intensity goal as high energy mission specific facilities. NETL will design these HPCs to have the most cost-effective PUE and minimize cooling water requirements.

NETL has carefully assembled the sustainability data in this report to ensure consistency between NETL's SSP, laboratory plan, facility information management system (FIMS), Federal Automotive Statistical Tool and DOE Sustainability Dashboard.



5.0 ENVIRONMENTAL NON-RADIOLOGICAL PROGRAM INFORMATION

NETL has three environmental programs that require monitoring non-radiological parameters. These include the Industrial Wastewater Management Program and Ambient Air Quality Management.

5.1 INDUSTRIAL WASTEWATER MANAGEMENT PROGRAM

NETL's industrial wastewater quality is managed per NETL Manual 436.1-02.04, Industrial Wastewater System Management Program, and is administered by the Industrial Wastewater Quality Program manager. NETL-Albany, NETL-Pittsburgh and NETL-Morgantown, each has its own industrial wastewater permit that specifies the criteria for discharges to meet the permit requirements. For specific information about the industrial wastewater program at each, see the following sections: 3.1.6 (Albany), 3.2.6 (Pittsburgh) and 3.3.6 (Morgantown).

5.2 AMBIENT AIR QUALITY MANAGEMENT

The requirements and responsibilities of the Ambient Air Quality program are discussed 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. Additionally, historical Environmental Safety and Health management plans (EMPs) have been used to track various emission categories or emissions sources where NETL can make the most improvement.

To maintain quality control, NETL subcontracts its analytical work only to certified laboratories. These laboratories must submit their quality assurance/quality control manuals to NETL for review prior to work. Upon submission of sampling material/s, NETL submits quality control samples (i.e., duplicates, blanks and spikes) to the laboratories to verify the quality of the analyses. Site air emissions data are calculated and maintained to ensure compliance with regulatory requirements.

5.3 STORMWATER MANAGEMENT PROGRAM

NETL's stormwater is managed per NETL Manual 436.1-03.03, Surface Water Quality. NETL-Albany, NETL-Pittsburgh and NETL-Morgantown, each manages storm differently, based on regulatory guidelines. For specific information about the industrial wastewater program at each, see the following sections: 3.1.6.4 (Albany), 3.2.6.3 (Pittsburgh) and 3.3.6.1 (Morgantown).

6.0 GROUNDWATER PROTECTION PROGRAM

Groundwater protection at NETL is administered through Procedure 436.1-03.02, Groundwater Quality Management. The program addresses regulatory requirements and best management practices to: prevent leaks and spills; monitor groundwater and soil; remove contaminated soil; and address regulatory-driven close-out actions. More detailed information is provided in NETL's Groundwater Protection Plan (GWPP) for each site, which documents site hydrogeology, potential pollution sources, potential contaminants to be monitored, well installation and sampling methods, a monitoring strategy and quality assurance/ quality control processes. Maps of the site aquifers and wells at each site are also included in the plan . Each site has specific reasons for monitoring its groundwater.

Photo 6.0: Morgantown Monitoring Wells.

The groundwater protection and monitoring program in Albany (initiated in 2001) is aligned with the Oregon Department of Environmental Quality (ODEQ) Voluntary Cleanup Program. This includes 33 wells (29 wells are in NETL-Albany property and 4 wells are on school district property) and two piezometers. The Albany groundwater monitoring wells were originally sampled for a broad range of contaminants, including volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, nitrates and polychlorinated biphenyls (PCBs). Over time the range of contaminants narrowed, but the program activities have continued to include the development of a conceptual site model (CSM) to document groundwater movement and contaminant trends. The CSM is a living document and is updated periodically. NETL continually assesses the results of periodic monitoring, updates the CSM and works with ODEQ to evaluate the need for remediation activities.

NETL-Pittsburgh has 23 groundwater monitoring wells, 19 of which are screened in shallow weathered bedrock. Seven are in the research and development (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 NETL-Pittsburgh 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

and foremost; hence, most wells are placed in this zone. The GMP also includes monitoring four wells screened in the deeper water-bearing zone to provide data on water quality and contaminant migration. An additional goal of the monitoring program is to identify and characterize groundwater flow and relate it to surface water flow conditions. This will help NETL to better evaluate potential environmental effects of any groundwater contamination.

Twenty active monitoring wells exist at NETL-Morgantown. These wells monitor two shallow aquifers within the unconsolidated Lake Monongahela sediments and one bedrock aquifer, the Morgantown Sandstone. None of NETL-Morgantown 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.

6.1 GROUNDWATER AND SOIL QUALITY PROTECTION ACTIVITIES - MORGANTOWN

Morgantown's Groundwater Protection Program is managed via NETL Procedure 436.1-03.02, Groundwater Quality Management. This procedure includes 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 GWPP is developed and implemented to obtain data for the purpose of determining baseline conditions of groundwater quality and quantity, demonstrating compliance, identifying existing and potential groundwater contamination sources and documents the site's hydrogeology.

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 Plan and the Storm Water Pollution Prevention Plan lay out the strategy for minimizing the risk of unintentional releases and quickly responding to minimize environmental contamination. In addition, R&D projects are only initiated or modified after a rigorous Environment, Health and Safety review is conducted in accordance with the Safety Analysis and Review System process.

Twenty active monitoring wells exist at NETL-Morgantown. The locations of the wells are displayed in Figure 6.3.1: Active Monitoring Wells at NETL-Morgantown. 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 6.3.2: Generalized Cross-Section of Aquifer Units at NETL-Morgantown 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 NETL-Morgantown has been focused primarily on past spills and leaks and the effectiveness of the cleanup actions undertaken. The section on Comprehensive Environmental Response, Compensation, and Liability Act of 1980, Section 3.5.3.1, lists the past events and the status of the spill sites.

POTENTIAL CONTAMINANTS

The only contaminants consistently found in significant amounts in the groundwater at NETL-Morgantown are related to the application of salts for deicing. 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 results of the ground water monitoring conducted during 2023 are presented as Table 6.1.1 through Table 6.36 in the appendix.

Morgantown is not a major user of per- and polyfluoroalkyl substances (PFAS) for three reasons: it only maintains limited quantities of R&D chemicals considered as PFAS, it has limited fixed aqueous film forming foam (AFFF) systems for fire suppression; and it does not operate its own fire department or firefighting training facilities. There is no history of any AFFF discharges at the site. 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 National Pollutant Discharge Elimination System permits. While there is an active GMP, PFAS-related substances have never been part of any historical sampling. Site groundwater or surface water is not used as a drinking water source; drinking water is provided by the local public drinking water system.

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. NETL will continue to review historical records associated with past activities, proactively manage risks associated with PFAS-related substances and manage chemical inventories to ensure proper management of any PFAS-related wastes. Equipment and facility upgrades considering environmentally friendly alternatives for R&D chemicals and AFFF systems for fire protection needs are being considered.

6.2 GROUNDWATER AND SOIL QUALITY PROTECTION ACTIVITIES - PITTSBURGH

NETL-Pittsburgh has two groundwater flow patterns. First, there is groundwater flowing in the shallow, weathered bedrock aquifer. 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 and can be seen in Photo 6.2.1. Some of this flow also discharges as springs on the hillsides or in the valleys.

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.

Most domestic water supplies for the area surrounding NETL-Pittsburgh 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 located to the north of NETL-Pittsburgh and it should not be affected by potential NETL groundwater impacts because groundwater is assumed to flow in a southern direction beneath the Lick Run Valley.

A second groundwater well is located on Piney Fork Road, approximately 1½ miles south of NETL-Pittsburgh. The Pennsylvania Department of Environmental Protection 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.

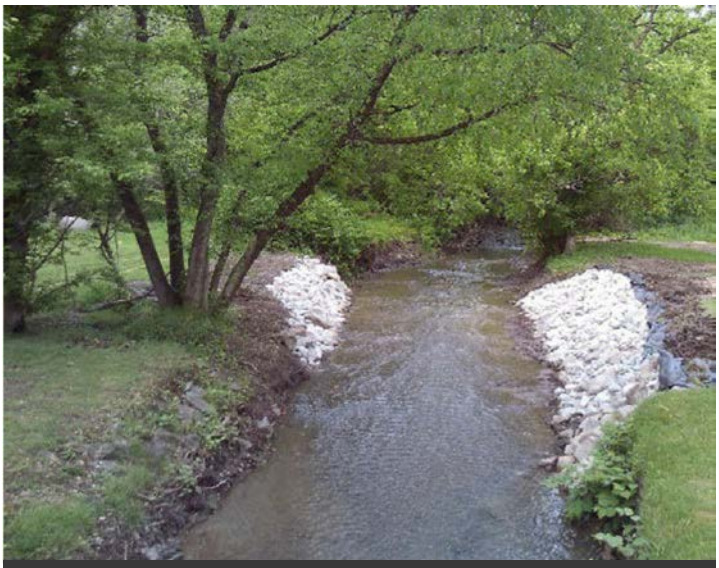


Photo 6.2.1: Lick Run.

POTENTIAL CONTAMINANTS

Groundwater monitoring in 2023 was performed per the NETL-Pittsburgh 2023 Groundwater Detection Monitoring Plan. The results of the NETL-Pittsburgh Groundwater Detection Monitoring Program are presented in Tables 6.2.1-6.2.4, and the results were compared against federal and state standards for drinking water and groundwater. This is done as a means to evaluate long-term groundwater quality. Statistical data comparisons on a semiannual basis is used to determine and identify potential groundwater contamination. Exceedances will be monitored and tracked to detect trends and any areas of significant contamination. If any areas of significant contamination are identified a formal investigation to define the nature, severity, and extent of contamination will be conducted. Detection of significant contamination will require PADEP notification and possible inclusion into mandatory groundwater monitoring programs. The following is a summary of the results:

- Manganese exceeded Environmental Protection Agency (EPA) Region III risk-based tables, and Act 2 Secondary maximum containment levels (MCL) standards for six wells.
- Nickel exceeded the Pennsylvania secondary drinking water MCL and Act 2 Secondary MCL for two wells.
- Strontium exceeded Pennsylvania secondary drinking water MCL and Act 2 Secondary MCL for seven wells.

- Chloride exceeded Pennsylvania secondary drinking water MCL and Act 2 Secondary MCL for 11 wells.
- Sulfate Exceeded Pennsylvania secondary drinking water MCL for four wells.
- Total dissolved solids exceeded Pennsylvania secondary drinking water MCL in all 12 wells.

Photo 6.2.2: Pittsburgh Groundwater Monitoring.

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

Pittsburgh is not a major user of per- and polyfluoroalkyl substances (PFAS) for three reasons: it only maintains limited quantities of R&D chemicals considered as PFAS; it has two fixed aqueous film forming foam (AFFF) systems for fire suppression; and it does not operate its own fire department or firefighting training facilities.

Pittsburgh 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 the stormwater National Pollutant Discharge Elimination System permit held by CDC/NIOSH. While there is an active GMP, PFAS-related substances have never been part of any historical sampling. Site groundwater or surface water is not used as a drinking water source; drinking water is provided by the local public drinking water system.

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. NETL will continue to review historical records associated with past activities, proactively manage risks associated with PFAS-related substances and manage chemical inventories to ensure proper management of any PFAS-related wastes. Equipment and facility upgrades considering environmentally friendly alternatives for R&D chemicals and AFFF systems for fire protection needs are being considered.

6.3 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 ODEQ Voluntary Cleanup Program, with regulatory input from ODEQ; however, there is no formal agreement between NETL and ODEQ. Albany installed 14 monitoring wells on site in July 2002 and sampled the wells for a broad range of contaminants, including VOCs, SVOCs, metals, nitrates and PCBs. A selected subset of the wells was also screened for pesticides, herbicides, dioxins and radiological constituents.

Initial periodic sampling showed potential concern over elevated levels of VOCs, metals and radiological constituents. This necessitated the continued periodic monitoring of the wells. 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 established for future collection of groundwater samples to be performed using 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 6.3: Albany Groundwater Sampling.

POTENTIAL CONTAMINANTS

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 ODEQ and the Greater Albany public school district personnel, investigations were made on-site and offsite during March-December 2005. Results of the site investigation showed no concern over surface soils, subsurface soils, soil gas or ambient air at offsite properties. The only issue identified was the elevated levels of COPCs in groundwater, including trichloroethene (TCE), carbon tetrachloride and chloroform.

ODEQ 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 the 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 ODEQ requirements between 2007-2009.

An independent health consultation was requested by ODEQ 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 Oct. 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 on the ATSDR website.

Additional monitoring wells have been installed over the years to enhance the groundwater investigation both on- and off-site at the Liberty Elementary School property, adjacent to the site (see Figure 6.1 for well locations). Periodic monitoring is performed twice per year during the wet season (March-April) and during the dry season (August-September), with sampling performed in accordance with the Albany Groundwater Monitoring Plan. Sampling is currently limited to VOCs and metals. The results of the 2023 monitoring program are presented in Tables 6.1.1-6.1.7.

NETL continues its site investigation activities and periodic monitoring at NETL-Albany in accordance with ODEQ requirements. Additionally, a groundwater conceptual site model continues to be periodically updated for NETL-Albany. ODEQ published updated, more conservative, Vapor Intrusion Risk-Based Concentrations in 2023, and NETL is planning a period of active well installation and sampling to verify compliance with the updated standard, and to assess human health risks posed by the COPC, in 2024 and 2025.

Finally, based on review of available current and historical information, another COPC DOE has issued guidance for is PFAS. NETL-Albany is not considered to be a user of PFAS, since the site has no significant quantities of R&D chemicals considered to be PFAS, has no fixed AFFF systems and does not operate its own fire department or maintain firefighting training facilities.

Albany 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. While there is an active GMP, PFAS-related substances have never been part of any historical sampling. Site groundwater or surface water is not used as a drinking water source; drinking water is provided by the local public drinking water system.

7.0 QUALITY ASSURANCE

QUALITY ASSURANCE INTRODUCTION

NETL's Quality Assurance (QA) Program is aligned with DOE Order 414.1, Quality Assurance and DOE's Integrated Safety Management (ISM) principles (Diagram 6.0).

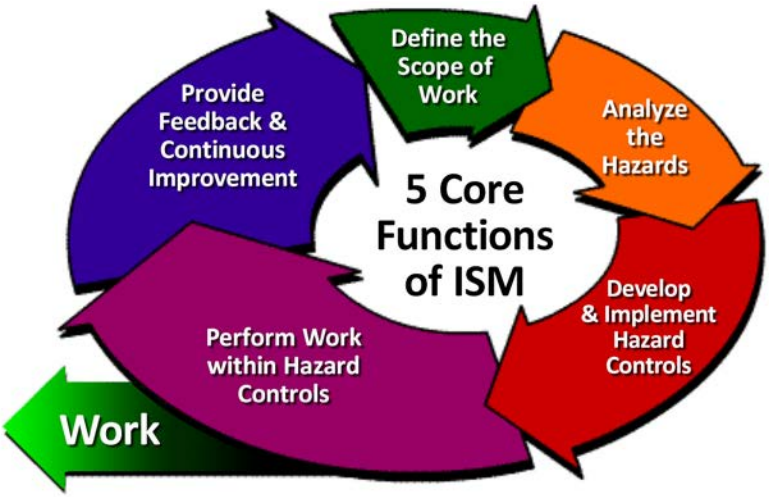


Diagram 6.0: NETL's ISM Principles.

NETL SAFETY ANALYSIS AND REVIEW SYSTEM DIRECTIVES

NETL's QA Program provides a structured directive program to ensure work processes are accomplished effectively and safely, minimizing potential hazards to the public, site workers, the environment and facilities prior to implementation. Directive responsibilities are included in employee performance goals, and assessments help ensure that assigned environmental safety and health (ES&H) related responsibilities are met.

NETL employs Safety Analysis Review System (SARS) directives that assist the QA Program in terms of assessing ES&H related requirements. SARS processes identify, analyze and control associated risks in accordance with adopted consensus codes and standards and to a degree acceptable by line management. SARS processes also establish assessment requirements to ensure mitigations are implemented correctly. Assessment findings are tracked to resolution using the Corrective Action Tracking System (CATS).

NETL has four distinct SARS processes:

1. **Research and Development SARS (Procedure 421.1-01)**

   The Research and Development (R&D) SARS Process primarily uses a "what-if/checklist" approach combined with hazard charts to identify, evaluate and mitigate risks. Following review and approval, R&D projects receive an operating permit that authorizes their operations.

   Permitted projects are initially assessed against mitigation requirements prior to operations and then annually afterwards.

2. **Construction (Manual 421.1-00_04)**

   After review and approval of proposed construction activities, a construction permit is issued prior to the start of construction. Selected contractors submit an ES&H plan, and any construction activities or environmental impacts not covered, receive an activity hazard analysis (AHA). AHAs are used to identify, evaluate and mitigate all potential ES&H risks.

   Facilities receive an initial inspection once construction is complete, prior to facility use. Annual Assessments are then conducted via the Facility Use Process.

3. **Facility Use (Manual 421.1-00_03)**

   Responsible ES&H operation, maintenance and modification of on-site facilities including buildings, trailers, utilities, services, structures, roads and walkways are addressed through the Facility Use Process, primarily focusing on code compliance. This process also provides a means of documenting, reviewing and approving necessary deviations to establish acceptable risk levels when compliance cannot be achieved without a General Plant Project.

   Facilities receive an initial assessment through the Construction SARS Process and receive an Annual Assessment via the Facility Use Process afterwards.

4. **Support Operations (Procedure 421.1-00_02)**

   On-site support operations conducted by site-support contractors are evaluated for risk with the Support Operations Process, including construction, operations, maintenance and renovation activities before initiation of the project or operation.

   Annual assessments are conducted on these operations, focusing on changes in site conditions, worker training, operating procedures, and the effectiveness of controls.

OTHER NETL DIRECTIVES AND MEASURES

Like the SARS processes, many NETL directives, manuals and handbooks governing ES&H programs contain monitoring requirements, ensuring programs remain compliant with code, line management and legal requirements. The NETL Fire Protection Program is such an example, requiring protection appraisals every three years to ensure risk reduction to an acceptable line management level, evaluation of the adequacy of the local fire protection and prevention programs, and written reports to responsible management. Again, all assessment findings (including directive-driven assessments) are tracked using the CATS to ensure proper response.

Along with SARS assessments, internal and external ISO 14001 & 45001 certification auditing and annual emergency response drills and exercises all validate the effectiveness of NETL's directives in ensuring responsible ES&H stewardship.

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
CO2e	Carbon Dioxide equivalent
CAA	Clean Air Act
CBOD5	Carbonaceous Biochemical Oxygen Demand 5-day Test
CBT	Computer-Based Training
CCPI	Clean Coal Power Initiative
CCUS	Carbon Capture, Utilization, and Storage
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CFC	Chlorofluorocarbon
CFO	Chief Financial Officer
CFR	U.S. Code of Federal Regulations

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

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

NFPA	National Fire Protection Association
NIMS	National Incident Command System
NIOSH	National Institute of Occupational Safety and Health
NNSA	National Nuclear Security Administration
NORM	Naturally occurring radioactive material
NOV	Notice of Violation
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPRA	National Petroleum Reserve
NRC	Nuclear Regulatory Commission
ODEQ	Oregon Department of Environmental Quality
ODS	Ozone-Depleting Substance
OHSAS	Occupational Health and Safety Assessment Series
OIO	Office of Institutional Operations
ORD	Office of Research and Development
ORPS	Occurrence Reporting and Processing System
OSHA	Occupational Safety and Health Administration
PADEP	Pennsylvania Department of Environmental Protection
PCB	Polychlorinated Biphenyl
PGH	Pittsburgh, Pennsylvania
PHA	Pleasant Hills Authority
QA	Quality Assurance
QC	Quality Control
R&D	Research and Development
RCRA	Resource Conservation and Recovery Act
REC	Renewable Energy Credit
SARA	Superfund Amendments and Reauthorization Act
SARS	Safety Analysis and Review System
SBEUC	Simulation-Based Engineering User Center
SCC	Strategic Center for Coal
SCNGO	Strategic Center for Natural Gas and Oil
SHPO	State Historic Preservation Officer

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

TABLES AND FIGURES

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

Table 4.4a: Environmental, Safety, and Health Significant Aspects for FY2023
Waste Minimization, Pollution Prevention, and Recycling
High-Performance Sustainable Building (HPSB) Implementation
Hazardous Materials Procurement, Consumption, and Storage
Electronic Stewardship
Greenhouse Gas (GHG) Air Emissions
Green Purchasing
Energy and Fuel Management
Water Usage
Workplace Health and Safety Issues
Safety Culture
Organizational Resilience – Climate Change Adaptation
Support Operations
Emergency Management
Refrigerant Management
Safety Culture

Table 4.4b NETL's FY 2023 EMP Performance

Significant Environmental Aspects/Safety & Health Hazards						
ES&H Management Plan Environmental Safety & Health Environmental, Safety & Health	**FY2023 Objective**	**FY2023 Target**	**Q1 Target Status**	**Q2 Target Status**	**Q3 Target Status**	**Q4 Target Status**
Waste Minimization, Pollution Prevention, and Recycling						
Environmental Impacts = Degradation of land quality, waste management, waste disposal, sustainable construction, and procurement of goods/services.						
Recycling	Divert non-hazardous solid waste from disposal annually. (E.O. 14057)	Divert/recycle solid non-hazardous waste produced in FY 2023.	Met	Met	Unmet	Unmet
	Pursue opportunities for net-zero waste or additional diversion opportunities. (E.O. 14057)	Identify opportunities to reduce non-hazardous waste in FY 2023.	Met	Met	Met	Met
Recycling Construction Waste	Achieve 50 percent diversion of non-hazardous construction and demolition (C&D) debris by FY 2025 and 75 percent diversion by FY 2030. (E.O. 14057)	Divert/recycle 50% of construction/demolition waste cost effectively in FY 2023.	Met	Met	Met	Unmet
High Performance Sustainable Building Implementation						
Environmental Impacts = Depletion of natural resources, procurement of goods/services, electricity/natural gas consumption, and water management.						
High Performance Sustainable Buildings	Ensure all new construction and major renovations comply with the 2020 Guiding Principles for Sustainable Federal Buildings. (EISA 2007 "Energy Independence and Security Act 2007"). Ensure at least 15% of existing facilities above 25,000 gross square feet (gsf) meet the Guiding Principles by FY 2023. (EISA 2007 "Energy Independence and Security Act 2007")	Track the design packages to ensure they contain High Performance Sustainable Building (HPSB) requirements.	Met	Met	Met	Met
		Develop a High-Performance Sustainable Building Plan as part of the Site Sustainability Plan.	Met	Met	Met	Met
		Submit Site Sustainability Plan (SSP) to DOE-HQ through the DOE Sustainability Dashboard.	Met	Met	Met	Met
Hazardous Materials Procurement, Consumption, and Storage						
Environmental Impacts = Depletion of natural resources, procurement of goods/services, sustainable procurement, waste management, management of ozone-depleting substances (ODSs), and degradation of air/land/water quality. OH&S Risk & Opportunities = Increased worker safety, protection of human health of workers and the public, and promotion of worker well-being.						
Chemical Inventory	Reduce the quantity of toxic and hazardous chemicals and materials acquired, used, and disposed during FY 2023 using FY 2022 as a baseline. (E.O. 14057)	No net gain (no more or less than 10% of baseline) of chemicals (by number of containers and/or weight in pounds) based on the baseline of 13,127 containers.	Met	Met	Met	Met
Refrigerant Management	Reduce the quantity of refrigerants on site at NETL and set up a tracking system for all refrigerants that are on site.	Reduce the quantity of refrigerants on site.	Met	Met	Met	Met
		Develop an equipment inventory for each site/include the refrigerant amount in each piece of equipment.	Met	Met	Met	Met
		Revise the Tracking Form to ensure all necessary inputs and losses (removals and leaks) are included.	Met	Met	Met	Met
Electronic Stewardship						
Environmental Impacts = Depletion of natural resources, waste management, procurement of goods/services, sustainable procurement, and degradation of land/water quality.						
Purchase of Electronic Products	To ensure processes are in place to evaluate Stripes requisitions for accurate identification of EPEAT levels of applicable certified electronic equipment and ensuring EPEAT is purchased when possible. (E.O. 14057	95% of the total number of electronic products purchased within EPEAT eligible product categories are registered as EPEAT Gold, Silver or Bronze.	Caution	Caution	Caution	Unmet

Significant Environmental Aspects/Safety & Health Hazards						
ES&H Management Plan Environmental Safety & Health Environmental, Safety & Health	**FY2023 Objective**	**FY2023 Target**	**Q1 Target Status**	**Q2 Target Status**	**Q3 Target Status**	**Q4 Target Status**
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. 14057)	Ensure that 90% of managed workstations and printers have power management settings in place.	Met	Met	Met	Met
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 Reuse through transfers, donations, and sales; Recycling through certified recyclers and manufacturer take-back programs using certified recyclers. (E.O. 14057)	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 FY 2022.	Met	Met	Met	Met
		Report ultimate disposition weights on a quarterly basis.	Unmet	Unmet	Met	Met
		Verify a process is in place to determine the appropriate hierarchy for all excess/surplus electronic products.	Met	Met	Met	Met
Greenhouse Gas Air Emissions						
Environmental Impacts = Depletion of natural resources, procurement of goods/services, sustainable procurement, and degradation of air quality.						
GHG Emission Reporting	Achieve 65 percent reduction in scope 1 and 2 GHG emissions by FY 2030 from FY 2008 levels. (E.O. 14057)	To achieve these government-wide goals, the E.O. requires agencies to set individual scope 1 and scope 2 reduction targets, as well as scope 3 reduction targets, and meet building, fleet, and operational goals aimed at reducing these emissions. DOE has not provided guidance on annual GHG reduction targets. NETL Target = 20,913,135.6 pounds CO_2e (9,486.14 MT) by FY 2030.	NA	NA	NA	Met
Green Purchasing						
Environmental Impacts = Depletion of natural resources, procurement of goods/services, and sustainable procurement.						
Environmentally Preferred Products	Increase internal awareness of Sustainable Acquisition policy and reporting changes; and monitor purchases of Sustainable and Environmentally Preferred Products (EPP) with environmental or energy designations, such as: recycled, Bio Preferred, Energy Star, FEMP, EPEAT, Water Sense or otherwise water efficient (E.O. 14057).	Report the number of applicable contract actions with sustainable clauses from the prior to the current fiscal year.	Met	Met	Met	Met
		Report the value of applicable contract actions with sustainable clauses from the prior to the current fiscal year.	Met	Met	Met	Met

Significant Environmental Aspects/Safety & Health Hazards						
ES&H Management Plan Environmental Safety & Health Environmental, Safety & Health	**FY2023 Objective**	**FY2023 Target**	**Q1 Target Status**	**Q2 Target Status**	**Q3 Target Status**	**Q4 Target Status**
Energy and Fuel Management						
Environmental Impacts = Depletion of natural resources, procurement of goods/services, sustainable procurement, waste management, and degradation of air quality.						
Energy Use	Reduce energy intensity by 0.7% in FY 2023, based on the FY 2021 baseline of 143,457 BTU/ft2. (E.O. 14057; DOE 2023 CFE Strategic Plan and Buildings Strategic Plan (Draft)). Reduce energy intensity by 50% by FY 2030 from an FY 2021 baseline. (E.O. 14057; DOE 2023 CFE Strategic Plan and Buildings Strategic Plan (Draft))	142,453 BTU/ft^2	Unmet	Caution	Met	Met
		(0.7%)	Unmet	Caution	Met	Met
Management of Servers and Data Centers	Maximize efficiency of data centers through virtualization and consolidation. 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.	Have dedicated smart meters installed in MGN, PGH, and ALB data centers in order to measure a monthly PUE.	Unmet	Unmet	Met	Met
		Identify remaining physical servers and establish a plan to virtualize into the NETL datacenter or a cloud instance.	Met	Met	Met	Met
		Identify a plan (consolidation, hot/cold row, reduced footprint) in order to optimize the PUE for the data centers.	Met	Met	Met	Met
Renewable Energy	Ensure that NETL's total electrical energy consumption includes the EPACT 2005 requirement of 7.5% renewable energy in FY 2023.	Procure Renewable Energy Credits to meet the 7.5% renewable electric energy and clean energy goals.	Met	Met	Met	Met
Fleet Management	DOE has not set interim ZEV acquisition targets. Ensure 100 percent of light-duty vehicle acquisitions are ZEVs by 2027. Ensure 100 percent medium- duty vehicle (MDV) and heavy-duty vehicle (HDV) acquisitions are ZEVs by 2035. (E.O. 14057 and EISA 2007).	Ensure 80 percent of light-duty vehicle acquisitions are ZEVs in FY 2023.	Met	Met	Met	Met
	Each year after FY 2015, achieve a 10% increase in annual alternative fuel consumption relative to an FY 2005 baseline, and achieve at least a 20% reduction in annual petroleum consumption relative to an FY 2005 baseline. (E.O. 14057 and EISA 2007).	Not later than October 1, 2015, and for each year thereafter, achieve at least a 20% reduction in annual petroleum consumption relative to an FY 2005 baseline. Target = 17,281.6 gallons	Met	Met	Met	Met
		Not later than October 1, 2015, and for each year thereafter, achieve a 10% increase in annual alternative fuel consumption relative to an FY 2005 baseline. Target = 11,531.3 gallons	Unmet	Met	Unmet	Unmet

Significant Environmental Aspects/Safety & Health						
ES&H Management Plan Environmental Safety & Health Environmental, Safety & Health	**FY2023 Objective**	**FY2023 Target**	**Q1 Target Status**	**Q2 Target Status**	**Q3 Target Status**	**Q4 Target Status**
Water Usage						
Environmental Impacts = Depletion of natural resources, procurement of goods/services, sustainable procurement. and degradation of water quality.						
Potable Water Consumption	Reduce potable water consumption by 0.5% from the final number for FY2021.	9.01 gal/gsf (0.5%)	Met	Met	Met	Met
Workplace Health and Safety Issues						
Environmental Impacts = Depletion of natural resources, procurement of goods/services, sustainable procurement, waste management, management of ozone-depleting substances (ODSs), and degradation of air/land/water quality. OH&S Risk & Opportunities = Increased worker safety, protection of human health of workers and the public, and promotion of worker well-being.						
Radiation Protection Program	To survey, manage, and control radiation 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. Also to incorporate proper controls, precautions, and warnings into procedures and R&D SARS packages to ensure appropriate controls are maintained to prevent possible exposure. (10 CFR 835 and DOE Orders).	Continue to track the number of surveys and items that were surveyed each quarter. Continue to populate the radiation database with the all the radiation materials, sealed sources, and RGD.	Met	Met	Met	Met
		Combine the two different radiation protection procedures into one; incorporate NORM/TE-NORM, radiation generating devices, and non-ionizing radiation into a flow chart for when dosimetry is required.	Met	Met	Met	Met
		Ensure that all personnel are properly trained.	Unmet	Unmet	Unmet	Unmet
		Ensure that dosimetry is worn when operating RGD.	Unmet	Unmet	Unmet	Unmet
		Ensure that all SARS projects that utilize RGD have the hazard properly documented in the SARS package.	Unmet	Unmet	Unmet	Unmet
Safety Culture						
OH&S Risk & Opportunities = Increased worker safety, protection of human health of workers, and promotion of worker well-being.						
Access and Clarity of R&D Project Safety Documentation	Improve consistency and accessibility of R&D SARS files. This will be met by replacing and expanding the existing eSARS system. The system will be expanded to include all aspects of the Conduct of Research Operations (CROps) Process.	Develop "as-is and "to-be" process maps.	Met	Met	Met	NA - Project completed Q3
		Develop business requirements.	Met	Met	Met	NA - Project completed Q3
		Identify a solution and prioritize development and implementation.	Met	Met	Met	NA - Project completed Q3
Leading Indicators	Improve the Safety Culture at NETL by establishing leading indicators in the suite of safety metrics. (E.O. 14057)	Create a dashboard allowing for the visualization of NETL's safety performance. Use approved leading indicators to measure and track the performance of NETL's safety culture.	Met	Met	Met	Met
Organizational Resilience						
Environmental Impacts = Depletion of natural resources, procurement of goods/services, sustainable procurement, waste management, management of ozone-depleting substances (ODSs) and degradation of						
Organizational Resilience Planning	Update Vulnerability Assessment and Resilience Plan (VARP) in FY 2023 in DOE Sustainability Dashboard. (2021 DOE Climate Adaptation and Resilience Plan).	Update Vulnerability Assessment and Resilience Plan (VARP) in FY 2023 in DOE Sustainability Dashboard.	NA	NA	NA	Met

Significant Environmental Aspects/Safety & Health Hazards						
ES&H Management Plan Environmental Safety & Health Environmental, Safety & Health	**FY2023 Objective**	**FY2023 Target**	**Q1 Target Status**	**Q2 Target Status**	**Q3 Target Status**	**Q4 Target Status**
Support Operations						
Environmental Impacts = Depletion of natural resources, procurement of goods/services, sustainable procurement, waste management, management of ozone-depleting substances (ODSs) and degradation of air/land/water quality. OH&S Risk & Opportunities = Increased worker safety, protection of human health of workers and the public, and promotion of worker well-being.						
Support Operations Safety Analysis and Review System	Complete all support operations SARS packages.	Assure that all assigned AIMS, CORS/ACORS, and ES&H reps understand their responsibility and role in the Support Operations SARS packages.	Met	Met	Met	Met
		Review all support operations SARS packages for completeness and approval. Make the complete packages available for others at NETL to easily review via ES&H page.	Met	Met	Unmet	Unmet
Emergency Management						
Environmental Impacts = Procurement of goods/services, sustainable procurement, waste management and degradation of air/land/water quality. OH&S Risk & Opportunities = Increased worker safety, protection of human health of workers and the public, and promotion of worker well-being.						
Emergency Management Planning	Adjust NETL's Emergency Response Organization (ERO) to a hybrid work environment based on input from DOE and other Federal agencies and updating applicable ERO procedures, manuals, and protocols.	Solicit information from DOE-HQ, other national laboratories, and other Federal agencies on how they have adjusted their emergency management program to adjust to a hybrid work environment.	Met	Met	Met	Met
		Review/update the Emergency Response Organization (ERO) procedures, manuals, and protocols to adjust to a hybrid work environment.	Met	Met	Met	Met
			31 Met 1 Caution 8 Unmet 2 NA	32 Met 3 Caution 5 Unmet 2 NA	33 Met 1 Caution 6 Unmet 2 NA	31 Met 0 Caution 8 Unmet 3 NA
			74% Met	76% Met	83% Met	80%Met

Table 6.1.1: NETL-Albany 2023 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	3/20	8/29	3/21	8/28	3/21	8/30	3/21	8/30	3/21	8/30	3/21	8/29
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-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-Chlorotoluene	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-Isopropyltoluene	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 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
Chlorodibromomethane	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	0.99	ND	ND	ND	ND	ND	ND	ND
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	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	NS	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Table 6.1.1: NETL-Albany 2023 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	3/20	8/29	3/21	8/28	3/21	8/30	3/21	8/30	3/21	8/30	3/21	8/29
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
Ethylene Dibromide	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
m,p-Xylene	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	1.9	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
o-Xylene	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

ND = Not detected NS = Not Sampled

Table 6.1.2: NETL-Albany 2023 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	
	3/22	8/29	3/22	8/29	3/22	NS	NS	NS	3/21	8/28	3/20	8/29	3/20	8/28	3/21	8/30
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-Chloropropane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodibromomethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	5.1	4.4	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND

Table 6.1.2: NETL-Albany 2023 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	
	3/22	8/29	3/22	8/29	3/22	NS	NS	NS	3/21	8/28	3/20	8/29	3/20	8/28	3/21	8/30
Dibromomethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Ethylene Dibromide	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
m,p-Xylene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert-butyl ether	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	18	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	NS	NS	NS	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not detected NS= Not Sampled

Table 6.1.3: NETL-Albany 2023 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	
	3/20	8/28	3/21	8/29	3/22	8/29	3/22	8/29	NS	NS	3/21	8/30	3/22	8/30	3/22	8/30
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-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-Chlorotoluene	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-Isopropyltoluene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Bromobenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	24	20	ND	ND	840	680	NS	NS	7	ND	1.1	ND	160	110
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Chlorodibromomethane	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	2.8	ND	ND	ND	140	ND	NS	NS	1.9	ND	3.1	ND	19	ND
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	0.54	ND	NS	NS	2.0	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND

Table 6.1.3: NETL-Albany 2023 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	
	3/20	8/28	3/21	8/29	3/22	8/29	3/22	8/29	NS	NS	3/21	8/30	3/22	8/30	3/22	8/30
Dibromomethane	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	ND	ND	ND	ND	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
Ethylene Dibromide	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	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
m,p-Xylene	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
o-Xylene	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	1.9	ND	ND	ND	9.3	ND	NS	NS	0.59	ND	ND	ND	0.47	ND
Toluene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	NS	NS	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	ND	36	47	74	ND	ND	170	ND	NS	NS	4.9	3.5	0.81	ND	63	38
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

ND = Not detected NS= Not Sampled

Table 6.1.4: NETL-Albany 2023 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	
	3/21	8/29	3/20	8/29	3/20	NS	3/21	8/29	3/21	8/28	3/21	8/30	3/21	8/30
1,1,1,2-Tetrachloroethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloropropene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichlorobenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-Trimethylbenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dibromo-3-Chloropropane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,3,5-Trimethylbenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,3-Dichloropropane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
2,2-Dichloropropane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
2-Chlorotoluene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Benzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromobenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromochloromethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Carbon tetrachloride	ND	ND	ND	ND	49	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodibromomethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	14	NS	ND	ND	ND	ND	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	6	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND

Table 6.1.4: NETL-Albany 2023 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	
	3/21	8/29	3/20	8/29	3/20	NS	3/21	8/29	3/21	8/28	3/21	8/30	3/21	8/30
Dibromomethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorobromomethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Ethylene Dibromide	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Hexachlorobutadiene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
m,p-Xylene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Methyl tert-butyl ether	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Methylene Chloride	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
n-Butylbenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
n-Propylbenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
o-Xylene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
sec-Butylbenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Styrene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Tetrachloroethene (PCE)	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,2-Dichloroethene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene (TCE)	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not detected NS= Not Sampled

Table 6.1.5: NETL-Albany 2023 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	
	3/22	8/29	3/22	8/29	3/22	8/29	3/22	8/29
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-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-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND
4-Chlorotoluene	ND	ND	ND	ND	ND	ND	ND	ND
4-Isopropyltoluene	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 tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND
Chlorodibromomethane	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
Chloromethane	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	0.41	ND	ND	ND	0.35	ND	ND	ND
cis-1,3-Dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND

Table 6.1.5: NETL-Albany 2023 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	
	3/22	8/29	3/22	8/29	3/22	8/29	3/22	8/29
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
Ethylene Dibromide	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
m,p-Xylene	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
o-Xylene	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)	4.6	12	2.7	ND	26	ND	ND	ND
Trichlorofluoromethane	ND	ND	ND	ND	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND

ND = Not detected

Table 6.1.6: NETL-Albany 2023 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	
	3/20	NS	3/21	NS	3/21	NS	3/21	NS
Aluminum	0.31	NS	ND	NS	0.40	NS	ND	NS
Antimony	0.00018	NS	ND	NS	ND	NS	ND	NS
Arsenic	0.00045	NS	0.0092	NS	0.00043	NS	0.0010	NS
Barium	0.0071	NS	0.079	NS	0.012	NS	0.017	NS
Beryllium	ND	NS	ND	NS	ND	NS	ND	NS
Cadmium	ND	NS	ND	NS	ND	NS	0.000046	NS
Calcium	23	NS	38	NS	7.2	NS	17	NS
Chromium	0.0011	NS	0.00081	NS	0.0022	NS	0.0015	NS
Cobalt	0.00056	NS	0.00065	NS	0.00024	NS	0.00010	NS
Copper	ND	NS	ND	NS	0.0018	NS	0.00061	NS
Iron	0.70	NS	2.5	NS	0.62	NS	0.079	NS
Lead	0.00022	NS	0.00010	NS	0.00028	NS	0.00016	NS
Magnesium	12	NS	19	NS	3.6	NS	8.2	NS
Manganese	0.017	NS	0.81	NS	0.025	NS	0.24	NS
Mercury	ND	NS	ND	NS	ND	NS	ND	NS
Nickel	0.00066	NS	0.0036	NS	0.00082	NS	0.0054	NS
Potassium	0.69	NS	1.1	NS	0.22	NS	0.80	NS
Selenium	ND	NS	ND	NS	ND	NS	ND	NS
Silver	ND	NS	ND	NS	ND	NS	ND	NS
Sodium	9.2	NS	17	NS	5.4	NS	6.5	NS
Thallium	0.000043	NS	0.000031	NS	ND	NS	ND	NS
Vanadium	0.0059	NS	0.0066	NS	0.0046	NS	0.0066	NS
Zinc	0.0013	NS	0.0011	NS	0.0030	NS	ND	NS

ND = Not detected

Table 6.1.6: NETL-Albany 2023 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–Metals (mg/L)								
Constituent	Well Number, Sample Date							
	MW-14		MW-15		MW-16		MW-17	
	3/20	NS	3/20	NS	3/21	NS	3/20	NS
Aluminum	0.10	NS	0.25	NS	0.88	NS	0.16	NS
Antimony	ND	NS	ND	NS	0.00015	NS	ND	NS
Arsenic	0.00036	NS	0.0010	NS	0.13	NS	0.0011	NS
Barium	0.0025	NS	0.0065	NS	0.12	NS	0.0046	NS
Beryllium	ND	NS	ND	NS	ND	NS	ND	NS
Cadmium	ND	NS	ND	NS	ND	NS	ND	NS
Calcium	11	NS	18	NS	38	NS	27	NS
Chromium	0.0017	NS	0.0012	NS	0.013	NS	0.00075	NS
Cobalt	0.00022	NS	0.00032	NS	0.0011	NS	0.00021	NS
Copper	ND	NS	0.0011	NS	0.0033	NS	0.0019	NS
Iron	0.17	NS	0.31	NS	71	NS	0.32	NS
Lead	0.00027	NS	0.00010	NS	0.00062	NS	0.00010	NS
Magnesium	3.8	NS	8.0	NS	15	NS	13	NS
Manganese	0.012	NS	0.028	NS	0.59	NS	0.12	NS
Mercury	ND	NS	ND	NS	ND	NS	ND	NS
Nickel	0.00031	NS	0.00073	NS	0.0083	NS	0.00046	NS
Potassium	0.35	NS	0.54	NS	1.3	NS	0.93	NS
Selenium	ND	NS	ND	NS	ND	NS	ND	NS
Silver	ND	NS	ND	NS	ND	NS	ND	NS
Sodium	8.2	NS	14	NS	13	NS	12	NS
Thallium	ND	NS	ND	NS	ND	NS	ND	NS
Vanadium	0.0048	NS	0.0073	NS	0.0050	NS	0.0063	NS
Zinc	0.0027	NS	0.0019	NS	0.0073	NS	0.0026	NS

ND = Not detected

Table 6.1.7: NETL-Albany 2023 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–Metals (mg/L)						
Constituent	Well Number, Sample Date					
	MW-18		MW-19		MW-20	
	3/21	NS	3/22	NS	3/22	NS
Aluminum	0.10	NS	ND	NS	0.26	NS
Antimony	ND	NS	ND	NS	ND	NS
Arsenic	0.00090	NS	0.00048	NS	0.0018	NS
Barium	0.0071	NS	0.011	NS	0.035	NS
Beryllium	ND	NS	ND	NS	ND	NS
Cadmium	ND	NS	ND	NS	0.000045	NS
Calcium	37	NS	16	NS	35	NS
Chromium	0.0015	NS	0.00018	NS	0.0010	NS
Cobalt	0.00024	NS	0.00045	NS	0.0017	NS
Copper	ND	NS	ND	NS	0.0013	NS
Iron	0.30	NS	ND	NS	0.39	NS
Lead	0.00011	NS	ND	NS	0.00013	NS
Magnesium	18	NS	7.8	NS	16	NS
Manganese	0.013	NS	0.66	NS	2.8	NS
Mercury	ND	NS	ND	NS	ND	NS
Nickel	0.00038	NS	0.00052	NS	0.0050	NS
Potassium	0.70	NS	0.43	NS	0.95	NS
Selenium	ND	NS	ND	NS	ND	NS
Silver	ND	NS	ND	NS	ND	NS
Sodium	17	NS	8.2	NS	23	NS
Thallium	ND	NS	ND	NS	ND	NS
Vanadium	0.010	NS	0.0014	NS	0.015	NS
Zinc	0.00099	NS	ND	NS	0.0029	NS

ND = Not detected

Table 6.1.7: NETL-Albany 2023 Groundwater Detection Monitoring Program: Results of Analysis—Groundwater Samples–Metals (mg/L)						
Constituent	Well Number, Sample Date					
	MW-22		MW-23		MW-24	
	3/21	NS	3/22	NS	3/22	NS
Aluminum	2.4	NS	0.34	NS	0.79	NS
Antimony	ND	NS	ND	NS	ND	NS
Arsenic	0.0049	NS	0.0013	NS	0.0016	NS
Barium	0.034	NS	0.0058	NS	0.0098	NS
Beryllium	ND	NS	ND	NS	ND	NS
Cadmium	ND	NS	ND	NS	ND	NS
Calcium	26	NS	24	NS	25	NS
Chromium	0.0029	NS	0.0014	NS	0.0018	NS
Cobalt	0.012	NS	0.0010	NS	0.0013	NS
Copper	0.0033	NS	0.00073	NS	0.0035	NS
Iron	6.4	NS	0.82	NS	2.2	NS
Lead	0.00077	NS	0.00022	NS	0.00035	NS
Magnesium	11	NS	13	NS	15	NS
Manganese	0.32	NS	0.019	NS	0.12	NS
Mercury	ND	NS	ND	NS	ND	NS
Nickel	0.0023	NS	0.00086	NS	0.0011	NS
Potassium	1.1	NS	1.0	NS	1.2	NS
Selenium	ND	NS	ND	NS	ND	NS
Silver	ND	NS	ND	NS	ND	NS
Sodium	25	NS	14	NS	18	NS
Thallium	ND	NS	ND	NS	ND	NS
Vanadium	0.019	NS	0.012	NS	0.016	NS
Zinc	0.0048	NS	0.0030	NS	0.0030	NS

ND = Not detected

Table 6.2.1 2023 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	
	05/22/23	10/25/23	05/22/23	10/25/23	05/24/23	10/25/23	05/23/23	10/25/23
TPH-DRO (mg/L)	ND	ND	ND	ND	ND	ND	ND	ND
pH (standard units)	7.03	7.14	6.79	6.77	6.86	6.76	6.72	7.13
Specific Conductance (uS/cm)	4.057	3.495	3.901	4.086	5.846	5.843	1.641	0.782
Temperature (^{0}C)	13.4	15.5	15.7	16.1	13.7	16.7	14.7	14.2
Constituent	Well Number, Sample Date							
	VFW-10		VFW-11		VFW-12		VFW-14	
	05/22/23	10/25/23	05/23/23	10/25/23	05/23/23	10/25/23	05/23/23	10/25/23
TPH-DRO	ND	ND	ND	ND	ND	ND	ND	ND
pH (standard units)	7.16	7.22	6.93	6.83	6.86	7.19	6.80	6.58
Specific Conductance (uS/cm)	5.472	5.764	4.718	4.249	2.633	2.548	3.510	6.595
Temperature (^{0}C)	12.4	15.0	14.9	14.3	15.8	14.9	15.5	16.6

ND = not detected

Table 6.2.2 2023 Groundwater Detection Monitoring Program Results of Analysis - Groundwater Samples, Valley Filled Area- VOC Constituents (ug/L) - Pittsburgh				
Constituent	Well Number, Sample Date			
	VFW-2	VFW-3	VFW-10	VFW-14
	05/22/23	05/22/23	05/22/23	05/23/23
Acetone	ND	ND	ND	ND
Benzene	ND	ND	ND	ND
Bromodichloromethane	ND	ND	ND	ND
Bromoform	ND	ND	ND	ND
Bromomethane	ND	ND	ND	ND
2-Butanone (MEK)	ND	ND	ND	ND
Carbon Disulfide	ND	ND	ND	ND
Carbon Tetrachloride	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND
Chloroethane	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND
Chloromethane	ND	ND	ND	ND
Cyclohexane	ND	ND	ND	ND
Dibromochloromethane	ND	ND	ND	ND
1,2-Dibromo-3-chloropropane	ND	ND	ND	ND
1,2-Dibromoethane (EDB)	ND	ND	ND	ND
1,3-Dichlorobenzene	ND	ND	ND	ND
1,4-Dichlorobenzene	ND	ND	ND	ND
1,2-Dichlorobenzene	ND	ND	ND	ND
Dichlorodifluoromethane	ND	ND	ND	ND
1,1-Dichloroethane	ND	ND	ND	ND
1,2-Dichloroethane	ND	ND	ND	ND
1,1-Dichloroethene	ND	ND	ND	ND
Cis-1,2-Dichloroethene	ND	ND	1.3	ND
Trans-1,2-Dichloroethene	ND	ND	ND	ND
1,2-Dichloropropane	ND	ND	ND	ND
Cis-1,3-Dichloropropene	ND	ND	ND	ND
Trans-1,3-Dichloropropene	ND	ND	ND	ND
Ethylbenzene	ND	ND	ND	ND
2-Hexanone	ND	ND	ND	ND
Isopropylbenzene	ND	ND	ND	ND
Methyl acetate	ND	ND	ND	ND
Methylene chloride	ND	ND	ND	ND
Methylcyclohexane	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	ND	ND	ND	ND
Methyl tert-butyl ether	ND	ND	ND	ND
Styrene	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	ND	ND	ND	ND
1,2,4-Trichlorobenzene	ND	ND	ND	ND
Tetrachloroethene (PCE)	ND	ND	4.3	ND
1,1,1-Trichloroethane	ND	ND	ND	ND
1,1,2-Trichloroethane	ND	ND	ND	ND

Table 6.2.2 2023 Groundwater Detection Monitoring Program Results of Analysis - Groundwater Samples, Valley Filled Area- VOC Constituents (ug/L) - Pittsburgh				
Constituent	Well Number, Sample Date			
	VFW-2	VFW-3	VFW-10	VFW-14
	05/22/23	05/22/23	05/22/23	05/23/23
Trichloroethene (TCE)	ND	ND	ND	ND
Trichlorofluromethane	ND	ND	ND	ND
1,1,2-Trichloro-1,2,2-trifluoroethane	ND	ND	ND	ND
Toulene	ND	ND	ND	ND
Vinyl chloride	ND	ND	ND	ND
Xylenes (total)	ND	ND	ND	ND

ND = not detected

Table 6.2.3 2023 Groundwater Detection Monitoring Program
Results of Analysis – Groundwater Samples, Valley Filled Area
Groundwater Characteristics Constituents - Pittsburgh

Constituent	Well Number, Sample Date											
	VFW-1	VFW-2	VFW-3	VFW-4	VFW-5	VFW-6	VFW-7	VFW-9	VFW-10	VFW-11	VFW-12	VFW-14
	05/24/23	05/22/23	05/22/23	05/22/23	05/23/23	05/23/23	05/24/23	05/23/23	05/22/23	05/23/23	05/23/23	05/23/23
Inorganics: Dissolved Metals (ug/l)												
Aluminum	ND	44	44	70	55	93	66	ND	ND	98	94	79
Boron	280	120	45	67	210	190	71	58	110	69	360	120
Calcium	8,700	250,000	210,000	430,000	250,000	350,000	410,000	92,000	220,000	520,000	260,000	340,000
Iron	ND	1,100	ND	310	120	1,300	4,800	140	ND	120	260	4,400
Magnesium	1,900	51,000	75,000	120,000	39,000	63,000	99,000	22,000	39,000	120,000	78,000	71,000
Manganese	9.6	970	220	340	7.8	480	890	33	2,200	450	150	5,900
Nickel	ND	12	120	210	56	14	ND	110	27	600	500	2.0
Potassium	1,100	6,100	5,600	5,700	4,000	11,000	4,700	1,700	14,000	1,900	1,800	2,500
Silica	5,400	7,500	4,000	5,600	8,600	4,300	5,900	3,500	5,500	3,800	4,400	6,000
Sodium	250,000	560,000	220,000	74,000	470,000	930,000	560,000	200,000	820,000	240,000	150,000	460,000
Strontium	790	2,700	890	3,700	850	1,600	6,200	230	650	1,300	3,500	1,400
Quality Parameters (mg/L)												
Chloride	32.1	817	583	1,050	1,140	1,960	1,690	389	1,360	1,370	449	1,020
Fluoride	1.38	0.570	0.185	0.148	0.680	0.634	0.0833	0.100	0.555	0.0798	0.218	0.208
Nitrate	0.0237	ND	0.999	0.151	0.975	0.696	0.0530	1.75	0.216	0.0455	0.639	ND
Sulfate	0.772	580	115	89.1	150	312	170	108	430	220	376	163
Total Dissolved Solids	600	2,400	1,300	2,000	2,300	3,700	3,200	890	3,000	2,500	1,400	2,300
Total Alkalinity	570	260	300	260	250	120	260	100	240	190	300	260

ND = not detected; NS= not sampled

	Exceeded Pennsylvania Secondary Drinking Water Maximum Contaminant Level and Act 2 Secondary Maximum Contaminant Level
	Exceeded EPA Region III Risk Based Table, Pennsylvania Secondary Drinking Water MCL and Act 2 Secondary Maximum Contaminant Level
	Exceeded Pennsylvania Secondary Drinking Water Maximum Contaminant Level

Table 6.2.4 2023 Groundwater Detection Monitoring Program Results of Analysis – Groundwater Samples, Valley Filled Area Groundwater Contamination Indicators Constituents - Pittsburgh												
Constituent	**VFW-1**	**VFW-2**	**VFW-3**	**VFW-4**	**VFW-5**	**VFW-6**	**VFW-7**	**VFW-9**	**VFW-10**	**VFW-11**	**VFW-12**	**VFW-14**
	05/24/23	**05/22/23**	**05/22/23**	**05/22/23**	**05/23/23**	**05/23/23**	**05/24/23**	**05/23/23**	**05/22/23**	**05/23/23**	**05/23/23**	**05/23/23**
pH (standard units)	7.98	7.03	6.89	6.79	7.00	7.10	6.86	6.72	7.16	6.93	6.86	6.80
Spec. Conductance (us/cm)	1.039	4.057	2.701	3.901	4.081	7.064	5.846	1.641	5.472	4.718	2.633	3.510
Temperature (^{0}C)	18.6	13.4	16.6	15.7	19.6	14.0	13.7	14.7	12.4	14.9	15.8	15.5
TOX (mg/L)	NS	NS	NS	NS	0.058	0.045	NS	0.031	NS	0.039	0.034	0.061
TOC (mg/L)	1.8	7.5	6.0	0.61	1.6	2.1	1.7	1.8	1.3	0.77	5.4	1.6

TOX = total organic halogens; TOC = total organic carbon; specific conductance unit = us/cm @ 25 C;

NS= not sampled

	Exceeded Pennsylvania Secondary Drinking Water MCL

Table 6.3.1: May 2023 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.	6.31	6.31	4.89	6.53	5.18	5.83	4.12	4.51	5.87	6.09
Specific Conductance (field)	µmhos	0.267	0.283	0.453	0.367	1.294	1.466	1.487	1.598	0.564	0.349
Temperature (field)	deg. C	17.43	16.37	14.98	16.11	15.23	14.82	14.12	15.73	14.90	15.86
Cadmium	ug/L	NT	NT	NT	ND	1.7	0.52	1.1	2.8	NT	NT

Table 6.3.2: May 2023 Data for "B-C" Aquifer—Morgantown						
Parameter	UNITS	Sample Location				
		11	31	32-A	GAS-5	SP2-BC
pH (field)	S.U.	6.11	5.60	5.46	6.14	6.23
Specific Conductance (field)	µmhos	0.144	1.148	3.661	2.005	0.408
Temperature (field)	deg. C	16.02	16.86	14.30	15.22	17.57

Table 6.3.3: May 2023 Data for Morgantown Aquifer				
Parameter	UNITS	Sample Location		
		D1-M	D2-M	D4-M
pH (field)	S.U.	6.44	8.56	7.34
Specific Conductance (field)	µmhos	0.458	0.527	0.571
Temperature (field)	deg. C	16.38	14.93	15.94

Table 6.3.4: Nov 2023 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.	6.33	6.03	5.23	6.38	5.02	5.70	3.86	4.28	5.89	5.68
Specific Conductance (field)	µmhos	0.922	0.937	0.998	0.917	1.362	1.517	1.290	1.488	0.979	0.951
Temperature (field)	deg. C	13.10	13.70	13.20	13.20	14.00	13.60	14.30	13.50	12.70	12.60
Cadmium	ug/L	NT	NT	NT	ND	1.9	0.93	0.77	2.3	NT	NT

Table 6.3.5: Nov 2023 Data for "B-C" Aquifer—Morgantown						
Parameter	UNITS	Sample Location				
		11	31	32-A	GAS-5	SP2-BC
pH (field)	S.U.	6.01	5.51	5.26	6.09	6.64
Specific Conductance (field)	µmhos	0.864	1.288	1.865	1.529	0.979
Temperature (field)	deg. C	13.60	16.50	14.70	15.70	13.60

Table 6.3.6: Nov 2023 Data for Morgantown Aquifer				
Parameter	UNITS	Sample Location		
		D1-M	D2-M	D4-M
pH (field)	S.U.	6.31	9.14	7.17
Specific Conductance (field)	µmhos	0.997	1.071	1.069
Temperature (field)	deg. C	13.60	14.30	12.50

ND = not detected NT = not tested

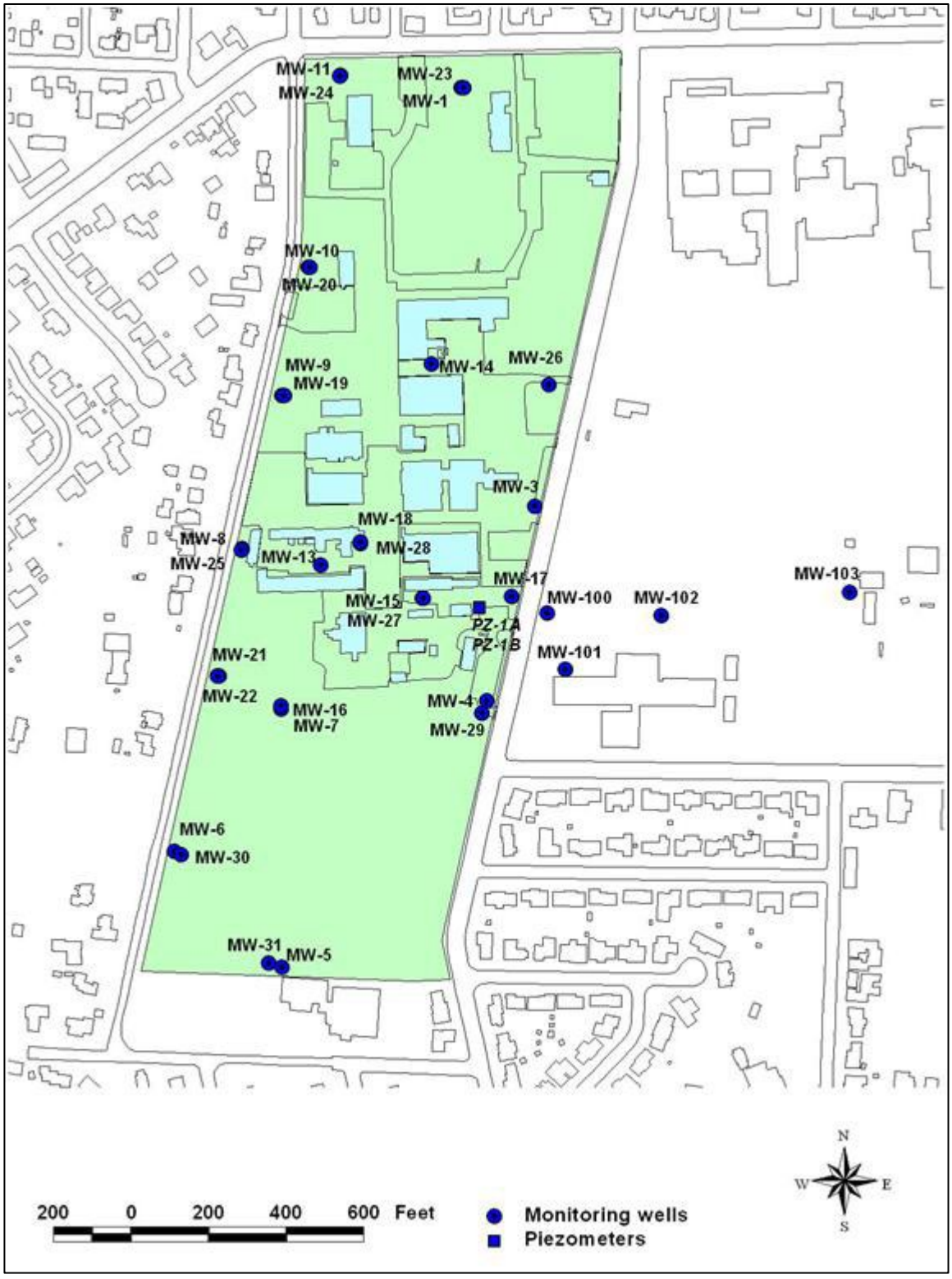
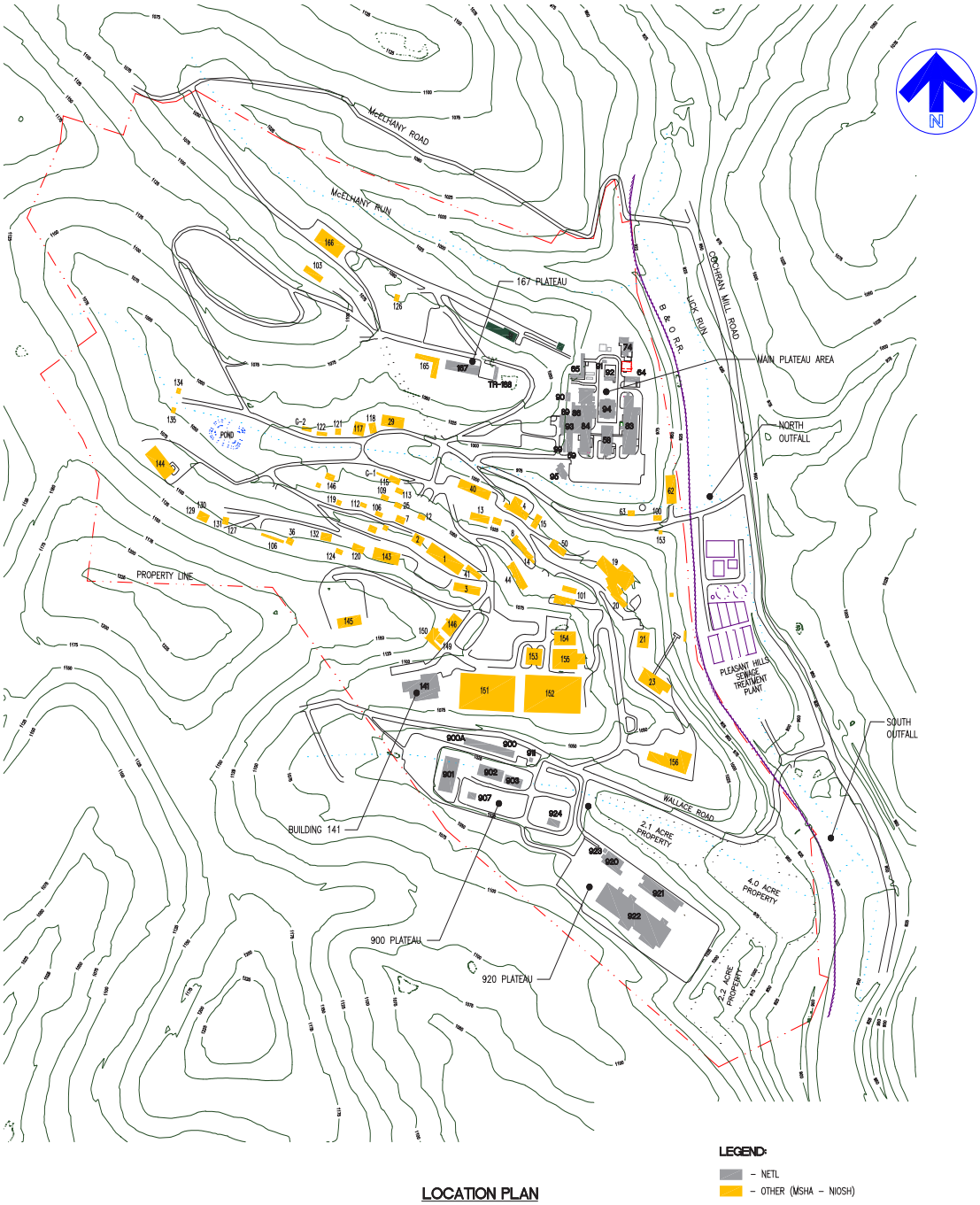


Figure 6.1: Monitoring Well Locations—Albany.



LOCATION PLAN

Figure 6.2: Topographic Site Map—Pittsburgh.

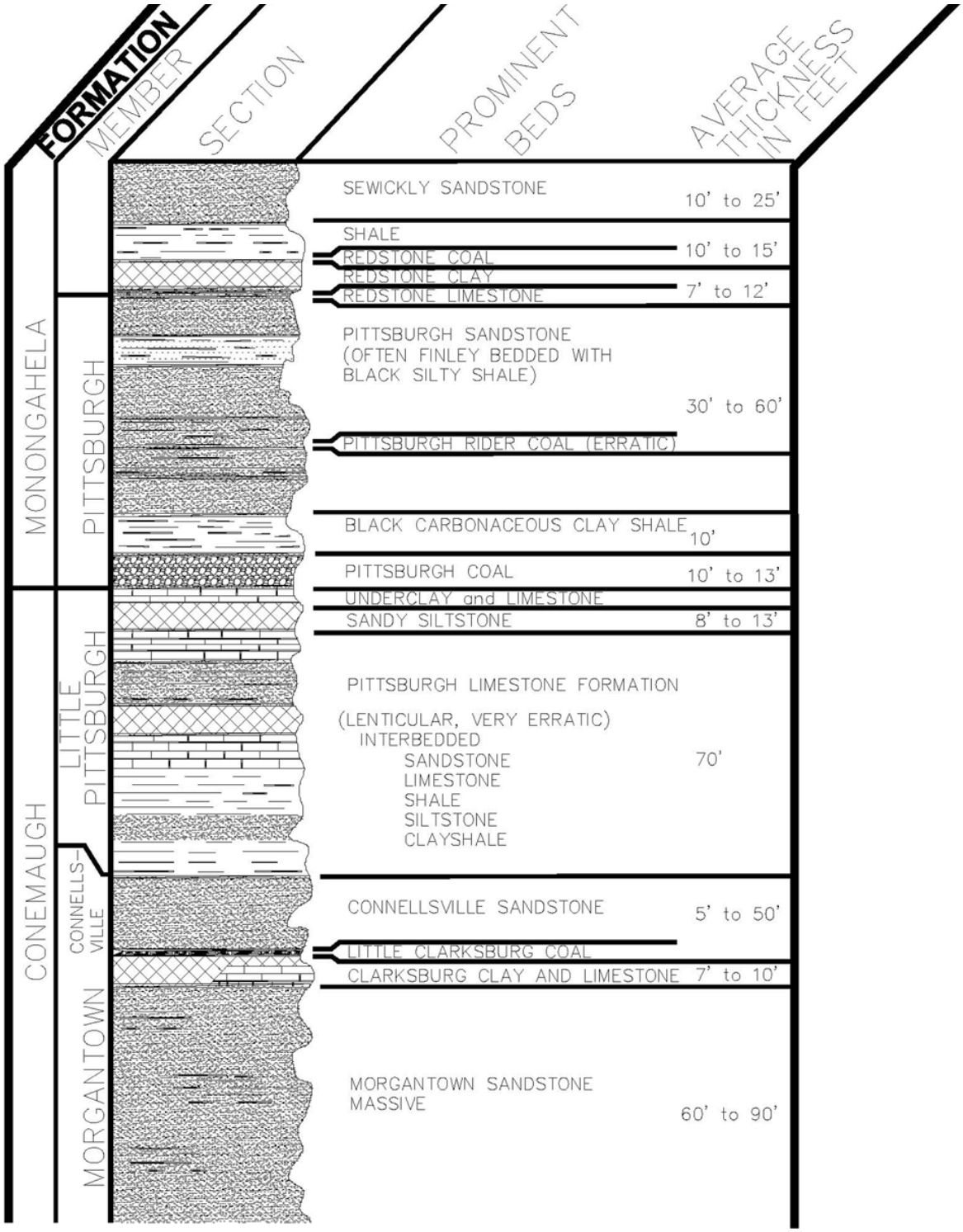


Figure 6.3: General Geologic Column—Pittsburgh.

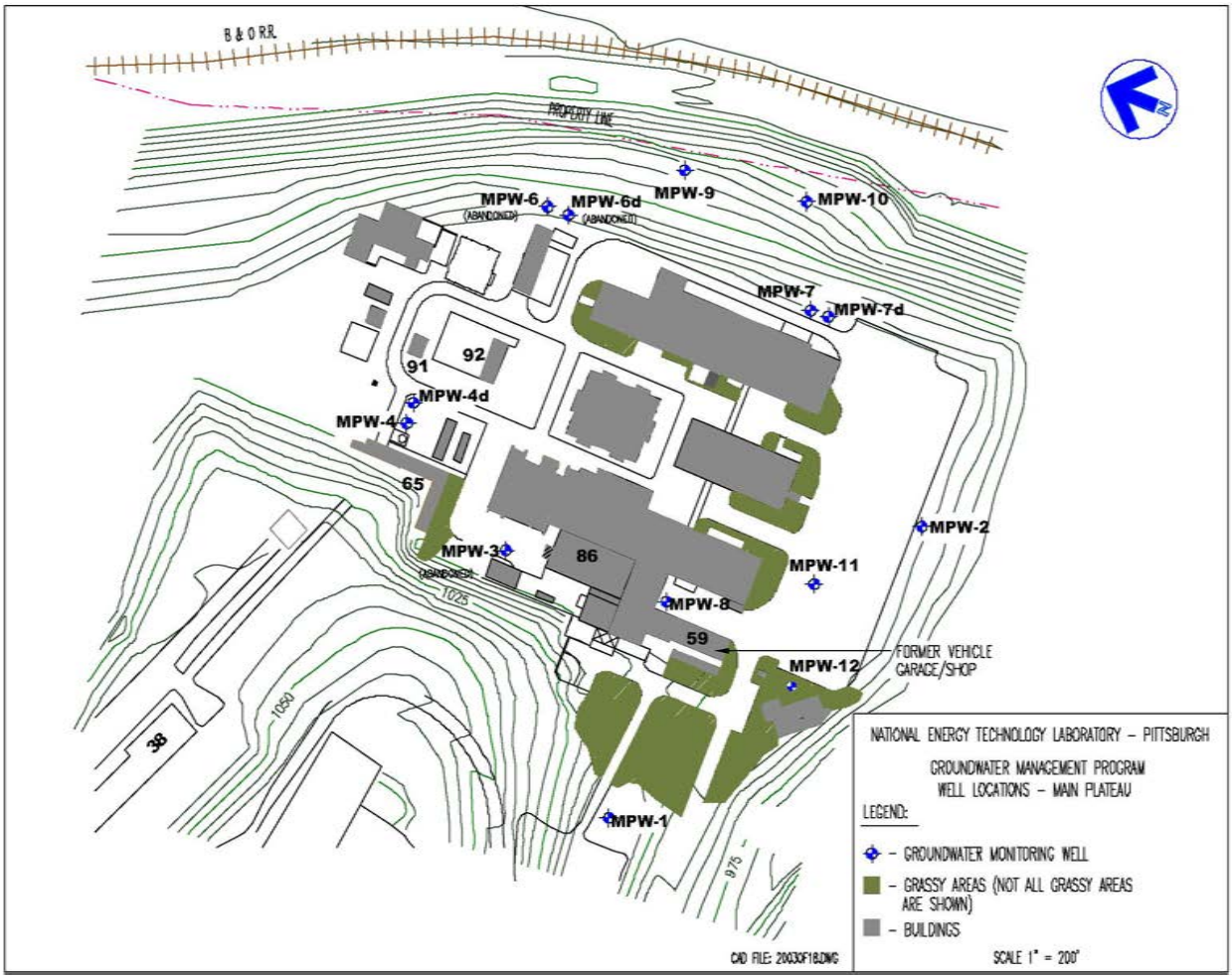


Figure 6.4: Groundwater Management Program R&D Plateau Well Locations—Pittsburgh.

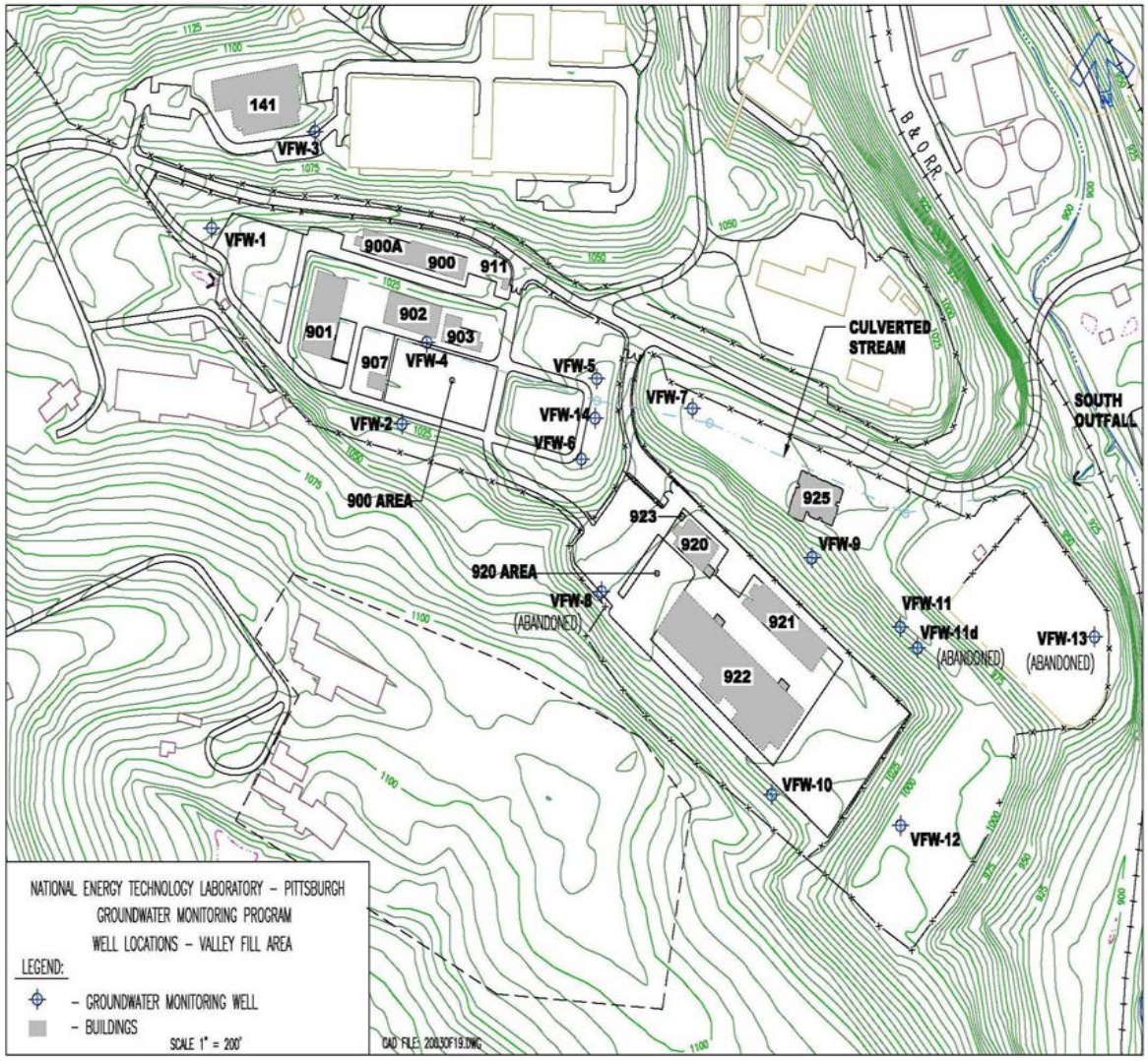
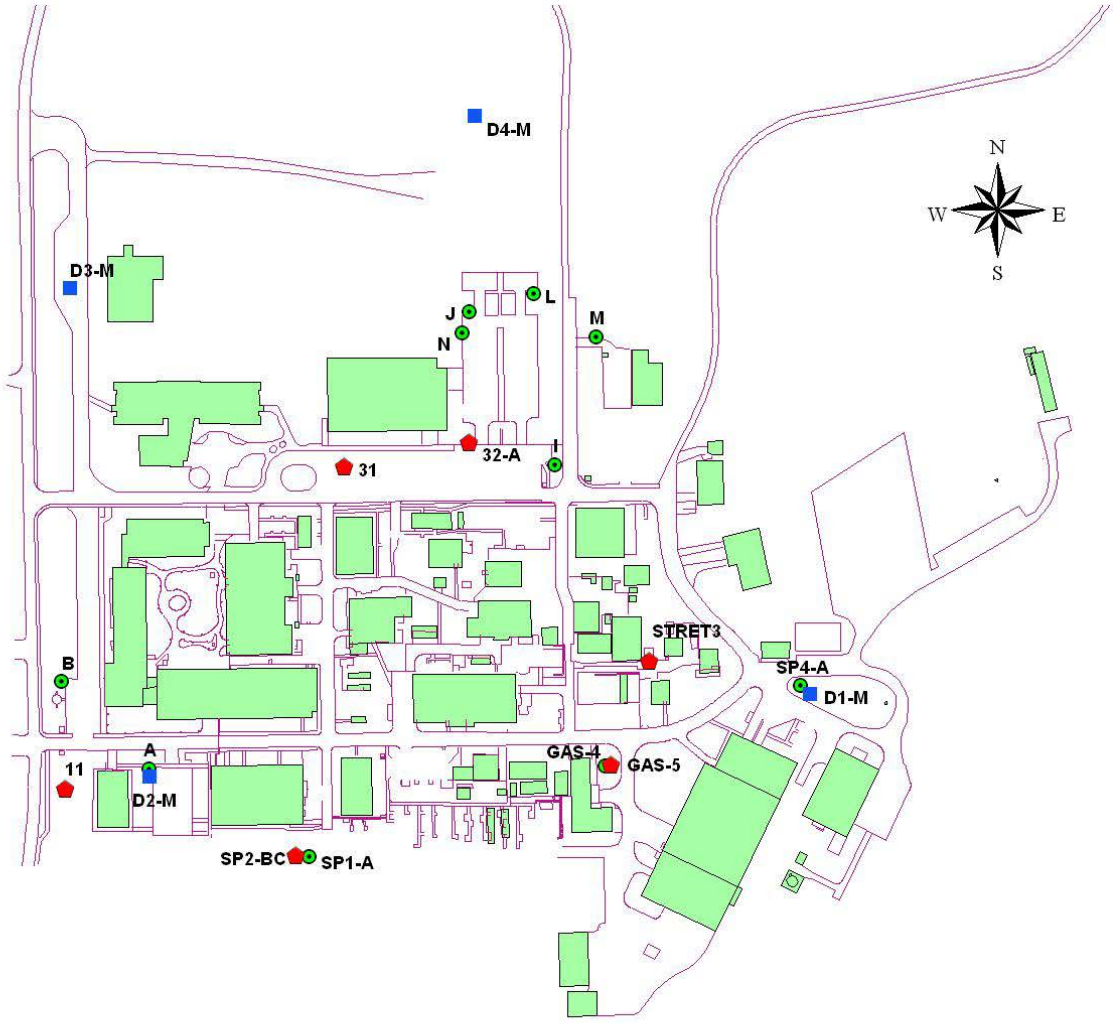


Figure 6.5: Groundwater Management Program Valley Fill Well Locations—Pittsburgh.



NETL Morgantown Site
Active Groundwater Monitoring Wells

Morgantown Sandstone well

B-C Aquifer well

A Aquifer well

100 0 100 200 300 400 500 Feet

Figure 6.6: Active Monitoring Wells at NETL-Morgantown.

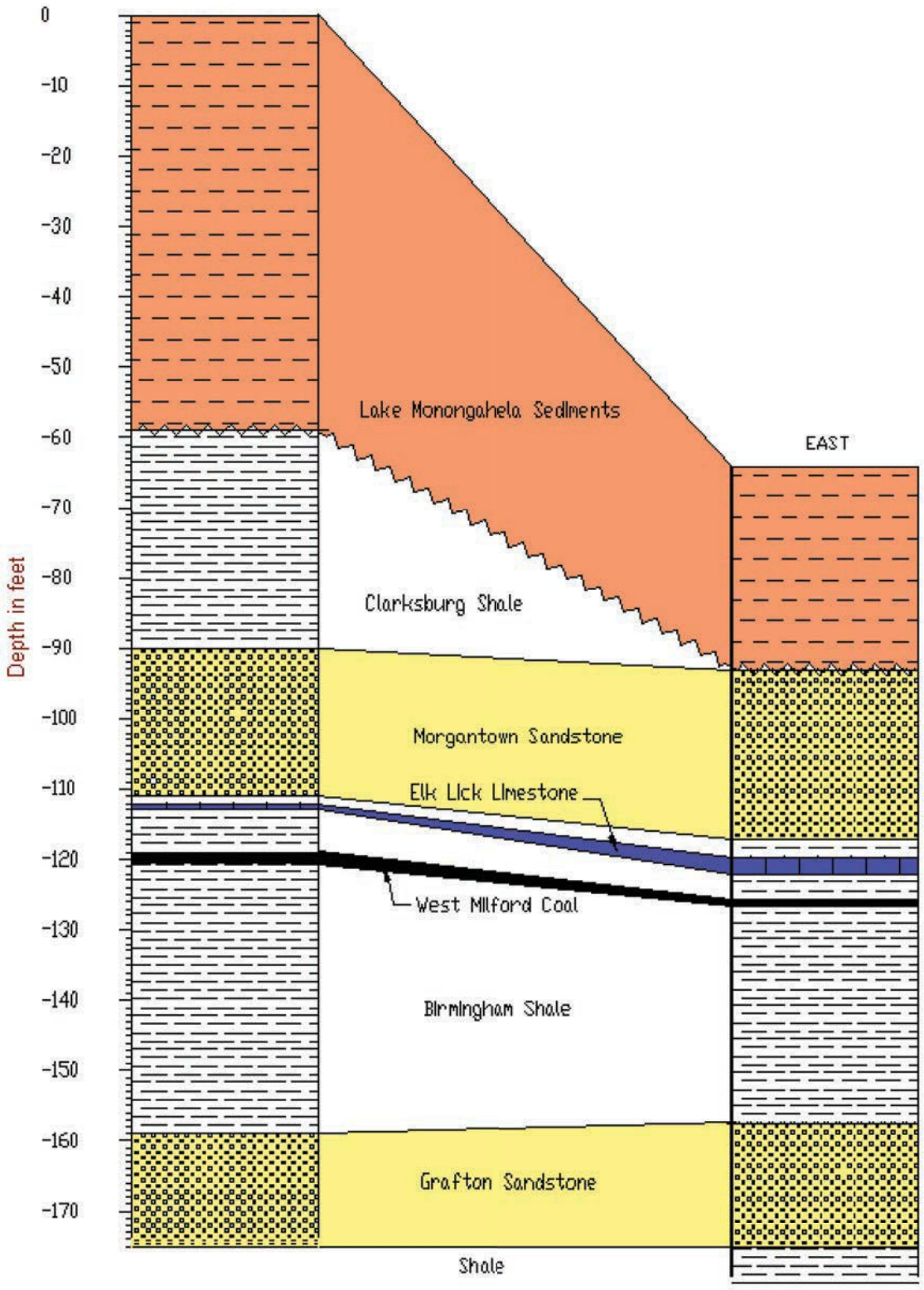


Figure 6.7: Generalized Cross-Section of Aquifer Units at NETL-Morgantown.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