

## STATEMENT OF WORK

### RESEARCH AND ENGINEERING SERVICES (RES) FOR THE DEPARTMENT OF ENERGY'S (DOE) NATIONAL ENERGY TECHNOLOGY LABORATORY (NETL)

**I. Purpose.** The purpose of this contract is to provide the necessary skilled personnel, facilities, equipment, materials, supplies, and services to support NETL in its implementation of assigned basic, applied, and technology development based energy research, and corresponding infrastructure responsibilities. Work will be performed at NETL's Office of Research and Development (ORD) sites located at: Pittsburgh, Pennsylvania; Morgantown, West Virginia; and Albany, Oregon; or at other field locations identified and approved by DOE's authorized Contracting Officer's Representative (COR).

**II. Objective.** The objective of this contract is to support NETL in its implementation of authorized on-site energy research in a manner that: 1) protects the safety and health of the public, the contractor and its subcontractor's employees, and DOE personnel; 2) respects and protects the environment; 3) instills public confidence; 4) fortifies and increases the Nation's engineering, scientific, and educational foundations; 5) effectively supports DOE's efforts to provide energy security; 6) effectively transfers NETL's technology to U.S. industry and firms. To achieve these objectives, the contractor shall utilize the best available management, engineering, scientific, and research practices from both the Government and commercial sources. A successful contract will enhance performance of NETL's current mission, provide for a robust technology transfer process, and extend NETL research capabilities to better serve future mission needs.

### III. NETL ORD Organization and Project Structure

**A. NETL Office of Research and Development (ORD).** NETL's Office of Research and Development (ORD) is responsible for planning and implementation of on-site research programs and stewardship of all associated project-specific and general laboratory infrastructure. NETL ORD research is technically organized into Focus Areas, and conducted within operating Divisions. The research and associated infrastructure is managed and conducted by Federal employees with support from Contractor staff. NETL is the lead research and development laboratory under the Office of Fossil Energy (FE) within DOE, and its activities are designed to accelerate development of energy related technologies to meet the nation's needs for reliable, clean, efficient energy systems with minimal environmental footprint. In addition, NETL engages in other research complementary to its mission, including reimbursable work and work for others.

The vast majority of DOE FE research done on site at NETL resides within one of four Focus Areas. These Focus Areas comprise related fields of experience, activity, or knowledge that generally align with one or more of the funding lines that are dictated by Congressional appropriation and make up the DOE FE research

program. They provide a technical, rather than administrative, rationale for organizing research, and assist in ensuring that projects are funded from appropriate budget lines. A description of the current Focus Areas can be found on the NETL web site at: [http://www.netl.doe.gov/onsite\\_research/index.html](http://www.netl.doe.gov/onsite_research/index.html).

Research projects are reviewed annually. The results of this review form the basis for the following year's research and infrastructure priorities. As part of this process, specific projects are identified for initiation, continuation, adjustment, or termination. Areas requiring Contractor support are also defined. Research project activities and associated project-specific infrastructure needs are developed with Contractor support and form the basis of the NETL ORD annual work plan.

Short term project-specific infrastructure needs are dealt with as part of the project work plan. Longer term infrastructure needs or those affecting one or more projects are tracked using a "R&D Facility Management Plan." This plan is fed by input from ORD Focus Area Leaders, Division Directors, and other Federal staff. Within this plan, appropriate Contractor roles for implementation are defined. Contractor support requires a high degree of coordination with ongoing and/or planned research activities so as not to adversely impact or delay project performance.

**B. Contract Line Item Numbers (CLIN's).** The Contractor shall perform work on a contract line item number (CLIN) basis. Contractor support for a given project and its project-specific infrastructure will be carried out within a CLIN aligned with that Focus Area, or the CLIN for New and Other Business. Contractor support for research infrastructure not associated with a specific project will be carried out within a CLIN for general infrastructure and logistics support. As NETL programmatic needs change, the CO may revise existing CLIN's in order to realign priorities and facilitate change control. A current title and a brief description of each of these six (6) CLIN's is as follows:

**1. NETL ORD General Infrastructure and Logistics Support.** This CLIN supports the management and implementation of general NETL ORD infrastructure and logistics activities not attributable to a specific research project effort. It includes the maintenance, operation and upkeep of ancillary facilities, including but not limited to machine shops, calibration /instrumentation shops, welding facilities, gas compression facilities, gas distribution networks, gas cylinder and bulk gas support, electrical, analytical services, control system, data collection infrastructure support, R&D personnel lab coat /uniform management, and those other facilities serving a wide cross section of NETL ORD projects. It includes design, construction and preventative maintenance support for those parts of high-performance and research computing infrastructure not directly attributable to specific computational chemistry and modeling projects. It includes general laboratory infrastructure design, construction, maintenance and demolition support, such as electrical, HVAC, piping, plumbing, carpentry, painting, flooring, and standard case work not

attributable to a specific research project. It includes policy compliance implementation and oversight for activities such as hazardous materials, chemical handling, waste disposal, chemical hygiene, NETL safety analysis and review system (SARS) permitting, federal/state/local permitting and compliance programs, safety training, quality assurance and quality control operations. It includes logistical and technical coordination support such as management of the Contractor research portfolio and workforce, management of Contractor work control processes and systems, support of NETL ORD Front Office activities, internship programs, business management and intellectual property issues, including patents, licensing, and technology transfer activities.

**2. Computational and Basic Sciences.** This CLIN supports research and project-specific infrastructure within the Computational and Basic Sciences Focus Area. Work within this area is intended to integrate physical and chemical experimental research with computational sciences as the preferred method for understanding and developing technologies, advanced materials, and multi-scale energy systems ranging from the molecular-scale to device-scale to plant-scale. The focus area has developed a strategy to assemble computational models from ab initio (atomic and molecular) through device-scale, and to integrate the device-scale models into virtual plant simulations. In concert with this modeling work, experimental R&D is conducted in selected program areas in close, often iterative, collaboration with the computational efforts. The focus area supports activities in coal power systems, natural gas and oil technologies, and also strives to meet national energy security goals. The long-term objective of the focus area is to develop science-based and validated computational tools to simulate and facilitate the development of clean, highly efficient energy systems of the future.

**3. Energy System Dynamics.** This CLIN supports research and project-specific infrastructure within the Energy System Dynamics Focus Area. Work in this area is intended to conceive, analyze, and develop pre-commercial energy technology that minimizes the environmental impact of fossil fuel use and that maximizes reliable use of domestic energy sources and infrastructure. The focus area primarily addresses devices that would be found “in plant,” such as turbines and fuel cell hybrids, fuel cells, fuel processors for fuel cells, gasification, carbon dioxide capture for pulverized coal and for integrated gasification combined cycle (IGCC) systems, reciprocating engines, and sensor/control methods for all these energy systems. This focus area is a recognized source of expertise and research leading to commercially viable technology that improves fossil-fuel-based energy systems. The focus area supports research and development in coal power systems, and supports the President’s Global Climate Change Initiative. Research is centered around investigation and testing of new energy system concept and technologies.

**4. Geological and Environmental Systems.** This CLIN supports research and project-specific infrastructure within the Geological and Environmental Systems Focus Area. Work in this area is intended to assess the capacity, suitability, and permanence of potential carbon sequestration reservoirs, to assess the ability of unconventional reservoirs to produce gas and oil and assist in that production, to improve environmental performance of existing power plants, and to be recognized for performing sound science, achieving excellence, and meeting goals. The scope of the focus area includes geological sequestration; ensure permanent carbon sequestering; resources assessment; production modeling; development of unconventional gas and oil resources; fate of air toxics such as mercury; and water issues related to existing coal-fueled electric power plants. Sequestration simulation and field work expertise provides a valuable internal capability for NETL in assessing external activities. The focus area is working closely with current sequestration field-testing activities and is involved in collaborative activities with the regional sequestration partnerships developed by DOE. The focus area directly supports the President's Global Climate Change Initiative, carbon sequestration technologies, natural gas and oil technologies, and clean power generation. The long-range objective of the focus area is to conduct research in carbon sequestration, natural gas and oil, and environmental research.

**5. Materials Science.** This CLIN supports research and project-specific infrastructure within the Materials Science Focus Area. Work in this area encompasses all aspects (formulating, processing, characterization, performance evaluation, prototyping, modeling, service life predictions and recycling) of advanced materials and process development. Advanced materials and processes are vital to higher performance and more economic fossil energy systems and other 21<sup>st</sup> century power and fuels production plants. This focus area addresses the need for new materials that can withstand higher temperatures and corrosive environments of advanced power generation technologies such as coal gasifiers, turbines, combustors, and fuel cells.

**6. New and Other Business.** This CLIN supports the management and execution of research activities not included in existing Focus Areas, such as new FE initiatives, Work for Others, and NETL ORD reimbursable work. It includes, but is not limited to Cooperative Research and Development Agreements (CRADA's), International Agreements, Memoranda of Understanding (MOU's), Contributed Funds Agreements (CFA's), and Military Interdepartmental Procurement Requests. It also includes work done in collaboration with or support of other (non-FE) DOE organizational and program elements (including other DOE National Labs), work related to other (non-DOE) Federal agencies, state agencies, and local government agencies, and/or work assigned to NETL as deemed to be in the National interest.

#### IV. Scope

**A. Research Services.** Research, and its ability to generate knowledge in the area of fossil energy and related technologies, is the core competency of NETL's Office of Research and Development. It must be carried out with the highest degree of technical excellence, quality, and integrity. It must be able to bridge traditional disciplines and integrate diverse skills as necessary to overcome the technical challenges of the future. In so doing, Contractor support for research services shall include, but not be limited to:

- The performance of research and development activities at all NETL ORD project locations, including both niche expertise to serve existing ORD project activities, as well as the planning, organization, and conduct of new and novel on-site research project activities assigned to the Contractor. In particular, the Contractor is expected to be assigned substantial responsibilities in the conduct of targeted fundamental research in fossil energy.
- The performance of Reimbursable Work and implementation of Work for Others. The locations for this type of work are often off site and will be specified on a case-by-case basis by the NETL COR.
- NETL ORD planning and analysis activities. NETL ORD planning and analysis is a subset of NETL strategic planning. It ensures that NETL on-site research remains responsive to DOE FE programmatic needs. Planning and analysis is a demanding activity that requires a combination of "big picture" thinking combined with an appreciation for lower level implementation. Contractor support includes the analysis of existing projects and infrastructure as well as the generation of ideas and concepts associated with developing, expanding, or pursuing new ORD research opportunities and capabilities.

**1. Context of Research Services.** The distinguishing characteristic of Contractor support in the area of research services is that it should provide a creative, intellectual contribution to the NETL on-site research program. As such, the Contractor shall possess demonstrated institutional expertise in the application of the scientific method, a thorough understanding of the process of technology development, and a history of creation and dissemination of knowledge products. Contractor support shall:

- provide information that will accelerate technology development elsewhere in the ORD or DOE research and development program,
- leverage the unique equipment, facilities, and Federal expertise already on hand at NETL, and
- broaden and develop NETL ORD on-site capabilities.

ORD research projects cover the range from fundamental investigations through applied science and engineering research to technology development, and may include CRADA work with industry and other external entities.

Techniques and methodologies employed include, but are not limited to, computational modeling, advanced instrumental measurements, laboratory investigations, process and device studies, and field work. Projects often crosscut a variety of academic disciplines, including but not necessarily limited to chemistry and chemical engineering, materials science, physics, geology, mechanical engineering, biology, environmental science and engineering, mathematics, electrical engineering, and computer science. The Contractor shall possess the breadth, capability, and flexibility to access resources across these varied areas when required.

Fact sheets describing current NETL ORD project activities can be found on the NETL web site at:

[http://www.netl.doe.gov/publications/factsheets/rd\\_toc.html](http://www.netl.doe.gov/publications/factsheets/rd_toc.html).

**2. Work Elements of Research Services.** In accomplishing the scope set forth, the Contractor shall employ the following work elements in any combination required to meet the needs defined by DOE. These support activities shall include, but are not necessarily limited to:

- a) Planning of projects, including the conduct of literature searches and other background investigations
- b) Development of work statements, including cost and schedule estimates
- c) Specification and acquisition of experimental equipment, services, and supplies
- d) preparation and handling of experimental samples
- e) Collection of data
- f) Analysis and interpretation of data
- g) Maintenance and archiving of research records and notebooks
- h) Drafting of papers, presentations, and reports
- i) Reporting of results at technical conferences and other meetings, including merit reviews
- j) Preparation and review of Safety Analysis and Review System (SARS) packages
- k) Adherence to all NETL Environmental Health and Safety (ES&H) and SARS requirements, including participation in required training
- l) Adherence to contract rights-in-data requirements, DOE Office of Scientific and Technical Information (OSTI) reporting requirements, and ORD publication tracking requirements
- m) Adherence to all NETL travel regulations including that done in conjunction with technical presentations
- n) Adherence to other applicable DOE policies and NETL directives
- o) Conceptual design and development of NETL ORD research infrastructure additions and modifications, from conception through “hand off” of responsibility to a specific project for detailed design and implementation

- p) Fostering and maintenance of state-of-the-art technical knowledge in areas of importance to NETL
- q) Formulating research-based options to advance DOE program goals
- r) Assessing the state of technologies developed both within and outside the DOE Fossil Energy Program for applications and/or use in solving problems which impede, limit or restrict the use of fossil energy resources and fuels
- s) Analysis and review of research data and reports
- t) Performing engineering analyses, cost estimates, economic evaluations, project technical risk analyses, and cost risk analyses on potential or existing projects

**3. Staffing and Skill Mix for Research Services.** Contractor skill mix for research services, including support of ORD Federal research, strategic planning, and Reimbursable Work / Work for Others shall primarily consist of full or part time professional scientists and engineers, including but not necessarily limited to research associates and postdoctoral researchers, and may also include part time and sabbatical appointments for science and engineering faculty with primary appointments elsewhere. Regardless of their appointment, Contractor support staff are expected to be located on site at one of the three NETL research campuses when working under the Contract, unless otherwise directed by DOE. Lead Contractor staff are expected to possess nationally or internationally recognized expertise in their technical areas as evidenced by a publication record. Support will require a high degree of innovation and creativity. Support is expected to require a minimum of a Bachelor's degree in science or engineering, with much support requiring an advanced degree. Project activities requiring a Contractor principle investigator shall necessitate a very high degree of specialized knowledge and expertise in that principle investigator, but may allow for a lower level of hands-on skills in project implementation, such as that provided by graduate students, postdoctoral positions, research assistants, or their equivalents.

**B. Research Infrastructure Support.** In order to sustain an outstanding research and development program, the Laboratory must possess a solid underlying research infrastructure. Research infrastructure is defined as those physical components (laboratories, instruments, test units, computational facilities, shops, etc.) and services that must be in place prior to commencing safe, high quality research operations. Such facilities and services must be available when needed and capable of carrying out their intended task. Contractor support for NETL research infrastructure shall include, but not be limited to:

- Project-specific and test unit equipment and instrumentation, including, but not limited to the design, fabrication, operation, and maintenance of state-of-the-art project facilities and test units to support NETL ORD research project activities

- High-performance computing infrastructure, requiring a broad spectrum of technical and engineering expertise, encompassing both hardware and software and including support of simulation and visualization activities
- Ancillary services, including analytical measurements and sample handling, compressed gases, calibration services, machining and fabrication, and work uniforms
- Fabrication, modification and upkeep of the laboratory and facility infrastructure that houses the project equipment and/or test units used to perform research, as well as maintenance of the utility headers that such research requires

**1. Context of Research Infrastructure Support.** Research infrastructure support shall consist of bringing R&D facilities into a state of readiness for use by researchers and maintaining them in that state as long as is required. Support services provided shall consist of the various disciplines required to cover the entire life cycle of a research project from conceptualization through decommissioning and dismantling. It includes engineering, detailed design, and drafting of NETL test units. It also may entail staffing support for instrumental, laboratory, and process unit facilities, including technicians for process units requiring operator support, and appropriately trained specialists for the maintenance of advanced scientific instrumentation. High performance and research computing requires support for both hardware and software infrastructure. It also includes assistance with the installation and set up of new computational hardware and software as required for research activities. Analytical and ancillary services comprise those laboratories and facilities not associated with a particular research project but that provide services for enough projects that an infrastructure (e.g., analytical facilities, service shops, compressed gases, etc.) or processes (service contracts) is maintained on site. Laboratory and facility infrastructure consists of those physical structures, systems, and components not associated with a specific research operation but that directly or indirectly impact the ability of NETL to conduct research. NETL ORD is responsible for those aspects of the laboratory or test unit area that can be loosely stated as being “inside the walls.” A more precise boundary between “R&D infrastructure” and “site operations infrastructure” can be found in the Site Support Contractor Solicitation Electronic Reading Room at: <http://www.netl.doe.gov/business/solicitations/ssc2008/>.

The primary location of research infrastructure operations will be on-site, but the Contractor shall also, on request, support project specific and test unit infrastructure at off-site locations, including field testing sites.

Descriptions of current NETL laboratory facilities and test units can be found on the NETL web site at:

[http://www.netl.doe.gov/onsite\\_research/capabilities.html](http://www.netl.doe.gov/onsite_research/capabilities.html).

Descriptions of current NETL computing capabilities can be found on the NETL web site at:

[http://www.netl.doe.gov/onsite\\_research/Facilities/cluster.html](http://www.netl.doe.gov/onsite_research/Facilities/cluster.html).

**2. Work Elements of Research Infrastructure Support.** In accomplishing the scope set forth, the Contractor shall employ the following work elements in any combination required to meet the needs defined by DOE. These support activities shall include, but are not necessarily limited to:

- a) Project-Specific and Test Unit Infrastructure Support
  - (1) Engineering and design of new and/or modified laboratory equipment and test units, including cost estimating, engineering analysis, and development of detailed process and instrumentation drawings (P&IDs)
  - (2) Specifying and obtaining devices, equipment, services, supplies, and materials associated with research and development operations, including the preparation of purchase requisitions
  - (3) Fabrication, installation, startup, shakedown, operations, maintenance, repair, modification, shut down, mothballing, decommissioning, dismantlement, and disposal/excess of test units, research apparatuses, sensors, instruments, vessels, reactors, infrastructure, or other necessary research and development equipment and facilities
  - (4) Operation of laboratory units, acquiring, recording, reporting, and archiving of data as instructed by research personnel
  - (5) Programming, setting-up, operating, maintaining and updating process control systems and data acquisition systems
- b) High Performance Computing Infrastructure Support
  - (1) Providing hardware and software support for setup and operation of R&D research computer and visualization systems, including scientific local area networks, NETL computer clusters, individual research workstations, RAID data storage systems, and visualization laboratory facilities
  - (2) Providing technical and administrative support for the specialized computer hardware, software, archival, and documentation systems used in the performance of computational and modeling based research project activities
  - (3) Developing requirements and specifications for purchases of research computer systems and software

- (4) Setting up and maintaining network security for NETL scientific and research computer systems, and providing engineering support to address cyber threats and the increasing number of regulations related to cyber security
  - (5) Providing hardware and software support for accessing external computing resources from all NETL R&D sites via high speed connections
- c) Ancillary Services Infrastructure Support
- (1) Performing analytical measurement of physical and chemical properties of materials utilized in and generated by NETL ORD operations.
  - (2) Performing calibrations, preventative maintenance and upgrading hardware and software required for on-site measurement and data analysis.
  - (3) Labeling, shipping, data compilation and data reporting of the samples analyzed by off-site laboratories
  - (4) Maintaining and upgrading hardware and software required for on-site measurement and data analysis
  - (5) Providing fabrication services such as machining, welding, instrumentation and electrical services for NETL ORD operations
  - (6) Operating and maintaining compressed gas cylinder storage areas and services, including the receiving, storing, distributing, inventorying, removing, and disposing of compressed and liquefied gases
  - (7) Operating on-site machine shops, welding shops, and instrumentation/electrical shops.
  - (8) Providing access to specialty services and supplies (e.g., glassblowing services, dry ice, etc.) not available on site.
  - (9) Providing and maintaining (cleaning) work uniforms and lab coats to NETL ORD personnel (both Federal and Contractor).
- d) Laboratory and Facilities Infrastructure Support
- (1) Development of implementation plans with engineering support (mechanical, HVAC, electrical, civil, instruments & controls, structural and drafting) for R&D facilities in accordance with applicable codes, standards, polices and best industry practices.
  - (2) Drafting support related to architectural, civil, electrical, instrumentation (P&ID), mechanical, piping and process flow diagrams (PFD), and structural for construction of and alterations to research facilities.
  - (3) Acquisition and installation of equipment, services, supplies, and materials associated with research and development facilities

(4) Fabrication, maintenance, and disassembly/ decommissioning of NETL facilities, including but not limited to:

- (a) Electrical
- (b) HVAC
- (c) Piping
- (d) Plumbing
- (e) Welding
- (f) Machining
- (g) Instrumentation
- (h) Carpentry
- (i) Painting
- (j) Flooring

(5) Performing independent assessments, validations, assessments of project cost estimates and schedules, uncertainty and project technical risk analyses, and cost risk analyses

(6) Operation and maintenance of site specific utility headers, including but not limited to compressed air delivery systems, nitrogen, hydrogen, argon, process cooling water supply and return, and high pressure steam.

### **3. Staffing and Skill Mix for Research Infrastructure Support.**

Infrastructure support staffing must be flexible enough to bring the right expertise to bear when needed. Engineering and design personnel shall have experience with the types of research infrastructure and operating units used at NETL ORD sites and must be able to effectively communicate with both Federal and Contractor researchers to provide viable solutions that address research needs within cost and schedule constraints. Design personnel shall possess a working knowledge of industry codes and standards. All code required design activities shall be performed, at a minimum, under the direct supervision of a Professional Engineer who is appropriately licensed in both the relevant design discipline and the State (PA, WV, OR) in which the design will be implemented. Although a core engineering and design workforce is anticipated, the Contractor shall also possess the ability to access engineering and design expertise on an as-needed basis. Personnel supporting advanced scientific instrumentation shall possess a thorough knowledge of the types of instruments and needs of the researchers being supported. Operators shall have the flexibility to move between different types of units as needed. High performance computing support personnel shall have intimate familiarity with the types of systems and needs of the researchers being supported. Appropriate training and/or certifications are required for those staffing laboratories, shops, and facilities. Ancillary workers, such as machinists, welders, electricians, etc., shall have the appropriate certifications to perform their work.

### **C. Environment, Safety, and Health (ES&H) and Quality Control (QC)**

**Support.** A successful research organization is not solely about results. It is also about going about business in the right way, adhering to best practices, establishing procedures and following them, and striving for continuous improvement.

Compliance-related activities are an essential component of NETL research and development operations in order to protect safety and health, respect and protect the environment, and instill confidence in the validity of results obtained. They involve providing sufficient oversight of NETL ORD research and R&D operations so as to maintain a safe working environment in compliance with applicable NETL policies and directives as well as ensuring the quality of products and research information. Contractor support for ES&H and QC shall include, but not be limited to:

- Implementation of the NETL Hazardous Waste Management Program, including operational and technical assistance associated with the NETL Chemical Handling Facility (Pittsburgh) and the hazardous waste facilities (Morgantown and Albany)
- Industrial hygiene support services for NETL R&D facilities and assistance in implementing the permitting, compliance, monitoring, surveillance, reporting, and emergency response requirements of NETL's industrial hygiene programs
- R&D related safety support services and ES&H compliance training and assist in implementing the permitting, compliance, monitoring, surveillance, and reporting of NETL's safety and ES&H training programs
- Property management and life cycle management activities for R&D facilities and projects
- Initiation, implementation, and maintenance of a Quality Assurance Program (QAP) meeting or exceeding the requirements of NETL Order 414.1, "Quality Assurance." The QAP program shall encompass and address all work performed by the contractor for NETL. It shall be uniformly implemented across all CLIN's and any associated subcontracts and shall be managed by the contractor Quality Assurance Manager.

**1. Context of ES&H and QC Support.** Much of the work in this area is geared toward providing assistance through consulting services and implementing requirements within existing DOE/NETL managed ES&H programs, processes, and directives, as well as the regulations, laws, and consensus standards upon which these are based. NETL adheres to the DOE principles of integrated safety management, which can be found at the DOE web site: <http://www.ocrwm.doe.gov/about/safety/ismprinciples.shtml>. A complete guide to DOE policies and procedures can be found at the DOE web site at: <http://www.hss.energy.gov/HealthSafety/ism/policy.html>. Both research and development activities and research facility support are closely

integrated with regulatory and policy compliance. In so doing, the Contractor shall adhere to all pertinent NETL ES&H Focused Standards list, derived from selected Standard References contained in NETL issued directives. Within NETL, work is conducted within a safety analysis and review system (SARS) permit process, which governs the safe operation of all on-site projects, including both research and facility work. Contractor support shall be required in the functional aspects of this SARS process as applied to NETL ORD work. NETL relies on maintaining a single culture across diverse sites and project areas in order to uphold safety standards and best operating practices. The contractor shall develop and implement a consistent approach across all NETL research sites to meet this objective.

NETL adheres to the DOE principles of quality management, which can be found at the DOE web site: <http://www.hss.energy.gov/CSA/CSP/qa/>. A complete guide to DOE policies and procedures can be found at the DOE web site at: <http://www.directives.doe.gov/>. NETL strives to produce quality products through the implementation of QA program that ensures R&D activities are designed, constructed and maintained in such a manner that published research results are reproducible and traceable. As such this program prescribes, via a graded approach, to the ten part criteria of DOE O414.1, "Quality Assurance". The contractor shall develop and implement a consistent approach across all NETL research sites to meet this objective.

**2. Work Elements of ES&H and QC Support.** In accomplishing the scope set forth, the Contractor shall employ the following work elements in any combination required to meet the needs defined by DOE. These support activities shall include, but are not necessarily limited to:

- a) Policy Implementation Support.
  - (1) Implementation of a contractor ES&H Program following approval by the NETL Contracting Officer's Representative
  - (2) Implementation of a contractor QA Program following approval by NETL Contracting Officer's Representative
  - (3) Implementation of NETL's Spill Prevention Control Strategy and Response Plans
- b) Chemical Handling and Hazardous Waste Management Support
  - (1) Operating and maintaining Chemical Storage and Waste Handling Facilities at all NETL sites
  - (2) Maintaining waste materials inventories (including accumulation date and material characterization and identification information).
  - (3) Permitting, compliance, monitoring, surveillance, reporting, and emergency response requirements of NETL's hazardous waste program
  - (4) Performing inspections of materials received

- (5) Preparing hazardous waste manifests and land disposal restriction documents
- (6) Archiving documentation according to DOE record management schedules
- (7) Obtaining chemical analyses where needed or requested to determine chemical identity for classification as a hazardous or regulated substance
- (8) Performing hazardous wastes packaging and labeling prior to shipping for disposal, as well as arranging (through subcontracts) shipments of hazardous and regulated substances to appropriate treatment, storage, and disposal facilities
- (9) Maintaining a computerized chemical inventory and related material safety data sheet (MSDS) database
- c) Permitting, compliance, monitoring, surveillance, and reporting requirements of NETL's industrial hygiene program. These support activities shall include, but are not necessarily limited to:
  - (1) personal protective equipment (PPE) use
  - (2) chemical inventory programs
  - (3) hazardous communication (HAZCOM) programs
  - (4) internal audits
  - (5) asbestos sampling, monitoring, and oversight for R&D facilities
- d) Safety Support Services and ES&H Compliance Training Support.
  - (1) Preparation and review of documents and packages dealing with ES&H requirements for NETL ORD projects, such as those requirements associated with SARS, environmental management system (EMS), and conduct of operations
  - (2) Permitting, compliance, monitoring, reporting, and emergency response requirements of NETL's safety and ES&H training programs
  - (3) Design, development, and deployment of computer-based training modules as well as tracking of ES&H training
- e) Property Management and Life Cycle Asset Management Support
  - (1) Performing all aspects of Life-Cycle Asset Management as practiced in NETL ORD
  - (2) Providing input to the NETL Site Development Plan, the Annual Maintenance Budget, the Deferred Maintenance Reporting Requirements, and the Maintenance Crosscut Budget.
  - (3) Updating the Condition Assessment Survey (CAS) program at NETL
  - (4) Performing inspection assessments and uploading CAS data into the facility information management system

(FIMS) and condition assessment information system (CAIS) databases, as appropriate.

- f) Quality Assurance / Quality Control Support
  - (1) Establishing an organizational structure, functional responsibilities, levels of authority, and interfaces for those managing, performing, and assessing work
  - (2) Establishing management processes, including planning, scheduling, and providing resources for work
  - (3) Developing and implementing processes for change control
  - (4) Training and qualifying personnel to be capable of performing assigned work
  - (5) Reviewing item characteristics, process implementation, and other quality-related information to identify items, services, and processes needing improvement
  - (6) Preparing, reviewing, approving, and maintaining records, including those documents that prescribe processes, specify requirements, or establish design
  - (7) Performing work consistent with technical standards, administrative controls, and hazard controls adopted to meet regulatory or contract requirements using approved instructions, procedures, etc
  - (8) Insuring proper calibration and maintenance of equipment used for process monitoring or data collection
  - (9) Identifying and controlling design interfaces
  - (10) Verifying/validating the adequacy of design products using individuals or groups other than those who performed the work
  - (11) Planning and conducting independent assessments to measure item and service quality and the adequacy of work performance and to promote improvement
  - (12) Ensuring that managers assess their management processes and identify and correct problems that hinder the organization from achieving its objectives

**3. Staffing and Skill Mix for ES&H and QC Support.** As with any activity conducted within a regulatory environment, properly training and possession of appropriate certifications is required. Record keeping abilities are essential. Interpersonal skills are also important as Contractor support personnel will have to interact with both federal and contractor researchers in the performance of their duties. A certified safety professional shall be part of the on-site support staff. A certified industrial hygienist shall be part of the on-site support staff at each NETL research location. Top level quality managers should possess quality assurance manager certifications. Auditors should possess certified quality auditor certifications. Varying levels of

certifications recognized through the American Society for Quality will be required.

**D. Logistical and Technical Coordination Support.** The technical breadth and logistical complexity of operations within NETL ORD will require a high degree of coordination, communication, and administration. Furthermore, progress must be tracked and made known and available to potential collaborators and partners (including the commercial sector) in order to realize its full benefit. To that end, Contractor support for Logistical and Technical Coordination shall include, but not be limited to:

- Coordination and integration of Contractor support activities, so that infrastructure support facilitates research services support, and all takes place within the parameters of NETL ES&H and quality programs.
- Providing administrative support for NETL graduate and undergraduate student internship, postdoctoral and senior research fellowship, faculty and senior research exchange, summer research participation, and other educational outreach programs, as requested by DOE, to facilitate NETL access to top-level researchers and students.
- Assistance in administration of NETL's technology transfer programs, including the tracking and management of intellectual property, and the identification of potential partnerships and collaborative opportunities for NETL, together with support for their implementation

**1. Context of Logistical and Technical Coordination Support.** The administration and coordination activities described in this section serve to:

- provide for a smoothly running research operation,
- ensure NETL ORD adherence to NETL safety and quality standards across all sites,
- identify new energy and related challenges to which NETL ORD expertise can be applied, and
- seek out opportunities to transfer the results of basic and applied research and technology development to the commercial sector.

Challenges inherent to this Contract include the collaborative, interdisciplinary nature of NETL on-site research projects, the breadth of subject matter addressed, the variety of facilities employed, and the multiple locations of NETL ORD research. Within this context, the Contractor shall be responsible for management of its research portfolio and workforce to ensure safety, security, fairness, quality, and productivity across all NETL research sites. At the interface with DOE, the Contractor should appear to be a single, seamless organization in its policies, procedures, management, and financial accounting. The desired outcome should integrate and target engineering, maintenance, and technical resources so as to provide a dynamic research-

oriented atmosphere for R&D personnel performing on site research and on/off site collaborative efforts.

**2. Work Elements of Logistical and Technical Coordination Support.** In accomplishing the scope set forth, the Contractor shall employ the following work elements in any combination required to meet the needs defined by DOE. These support activities shall include, but are not necessarily limited to:

- a) Maintaining NETL work control process and systems. The Contractor shall utilize this process and systems for accepting work, obtaining approvals, scheduling work, tracking work, and close out of work. All work performed by the contractor shall conform to NETL Quality Control and Standards
- b) Management of NETL ORD property by compiling, maintaining and making available on request information pertinent to the Property Administration and Management System (PAMS). Such information includes: DOE/NETL property tag number, custodial person, location of property, and property name & description
- c) Formulating, implementing, tracking and reporting progress against NETL ORD's authorized annual research work plan
- d) Logistically and technically supporting NETL ORD in conducting annual merit reviews of its research activities
- e) Development and implementation of business management systems such as those involving intellectual property (e.g., patents, licensing, etc.), technology transfer, research portfolio assessment, quality assurance, processing invitational travel, processing and controlling foreign visitors, badging of the support contractor's work force
- f) Reporting and tracking activities (e.g., publications to OSTI, tracking of metrics, completion of milestones, and other accomplishments and completion dates in automated tracking systems)
- g) Maintenance and monitoring of databases (technical publications, intellectual property, etc.)
- h) Identification and pursuit of business opportunities (e.g., non-FE DOE, other federal or government agencies, CRADA partners, private-sector organizations) that complement and/or leverage existing NETL on-site research
- i) Development of content for outreach materials (fact sheets, facilities, core competencies, technical capabilities, awards, etc.)
- j) Preparation of proposals (including statement of work and cost estimates) for submission to other Government or private sector funding sources and awards
- k) Hosting of domestic and foreign nationals working at NETL. This shall consist of the development and processing of the required paperwork to permit the foreign national to work on site at NETL and performing hosting activities per NETL security procedures while the FNs are on site

- l) Coordinating research projects with project SARS activities.
- m) Coordinating of research projects with related design, construction and installation activities
- n) Overseeing procurement activities for research equipment that will be used in conjunction with these research projects at NETL. This oversight shall also include any required coordination and planning for inspection activities
- o) Coordinating and planning of general training, including that related to technology transfer and intellectual property

### **3. Staffing and Skill Mix for Logistical and Technical Coordination**

**Support.** Support staff shall consist of core personnel possessing a working knowledge of NETL policies and goals to assist with ongoing efforts (operations, work control, administration of internship programs), together with the ability to access a flexible workforce on an as needed basis to address matters in business development, technology transfer, and intellectual property assistance.

**V. Relationship to DOE Strategic Plan.** NETL on-site research is conducted to accelerate the development of technology in order to address the goals of “Energy Diversity,” “Environmental Impacts of Energy,” “Energy Infrastructure,” and “Energy Productivity,” within the DOE Strategic Theme of “Energy Security.” NETL on-site research projects promote partnerships and collaborations between academic and industrial participants so as to better focus basic research toward helping to solve applied problems. These activities address the goals of “Scientific Breakthroughs,” “Foundations of Science,” and “Research Integration,” within the DOE Strategic Theme of “Scientific Discovery and Innovation.” NETL on-site research projects serve to generate fundamental scientific knowledge, and train future scientists and engineers, advancing the goal of “Human Capital,” within the DOE Strategic Theme of “Management Excellence.” Development of ORD research infrastructure advances the goal of “Infrastructure” within the DOE Strategic theme of “Management Excellence.” Although the DOE Strategic Plan is subject to revisions and updates, the concepts embodied therein are expected to remain fairly consistent throughout the term of this contract. A complete copy of the most recent DOE Strategic Plan can be found at the DOE web site: <http://www.doe.gov/about/strategicplan.htm>.