RESEARCH & DEVELOPMENT (R&D) SUPPORT SERVICES

CLIN 2300.01.00

PERFORMANCE WORK STATEMENT

1.0 REQUEST INFORMATION

1.1 **Type of Activity:** Cost-Plus-Fixed-Fee

1.2 **Location:** Albany, OR (ALB); Morgantown, WV (MGN); and Pittsburgh, PA (PGH), Department of Energy (DOE), National Energy Technology Laboratory (NETL) sites.

1.3 **Travel:** Travel is anticipated
NOTE: The contractor shall discuss the rationale for their proposed travel regardless of the Government's anticipation of travel.

1.4 **Training:** Training is anticipated related to maintaining certifications required to perform requirements.
NOTE: The contractor shall discuss the rationale for their proposed training regardless of the Government's anticipation of training.

2.0 GENERAL REQUIREMENTS

2.1 The PWS does require on-call support.

2.2 This CLIN will require off-hours support (including weekends and holidays) for: site utility shutdowns/power outages; critical equipment failure; and support for research projects.

2.3 The annual average for expected callouts is 2 per site. Maximum response time to emergency call outs shall be 2 hours.

2.4 This PWS is covered by the Service Contract Act.

2.5 The contractor shall maintain/renew all drafting/design equipment and maintenance agreements.

2.6 All work is expected to be completed based upon the schedule accepted by DOE.

3.0 SPECIAL INSTRUCTIONS

3.1 The Offeror shall be required to employ personnel that possess the necessary technical, administrative, and management skills and certifications to perform works covered herein.

3.2 Cost estimating and tracking will be required at the task level. Costs shall be reported to the individual funding lines specified under each task, tracked by the project number. Funds will be allocated at the CLIN level.

3.3 All management costs shall be distributed accordingly among the tasks and applicable funding sources.

4.0 TASK 1 – RESEARCH INFRASTRUCTURE MAINTENANCE & SAFETY SUPPORT

4.1 Process Improvement Support

The Contractor will assist Facility Operations (FO) in the revision and improvement of Conduct of Research Operations (CROps), R&D Safety Analysis and Review System (SARS), Management of Change (MOC) and Research Engineering Design (RED) processes to reduce cycle time and improve the quality and efficiency of safe research operations. The contractor should make recommendations for improvements to the COR.

4.1.1 The Contractor will assist in the development of written guidance, standards, and templates to be approved by the COR.

4.1.2 Assist NETL in the development of Quality Assurance manuals and related processes to ensure NETL is meeting the requirements of DOE O 414.1, Quality Assurance.

4.1.3 Update documentation to reflect changes in NETL Policy, Procedure and/or Best Management Practices.

4.2 **Work Control**

The Contractor is responsible for administering a work control system that meets the requirements of NETL P430.4-01, Research and Development (R&D) Support Work Control Process.

4.2.1 The Contractor shall estimate and notify the Responsible Person and RIC Team Supervisor of the planned cost, start and completion date within ten business days of the approval of the work order.

4.2.2 A revised estimate shall be sent to the Responsible Person, RIC Team Supervisor, Engineering Representative, and ACOR for cost variances greater than the initial budget and schedule delays greater than one week. The revision shall contain:

4.2.2.1 The prior planned/actual start and completions dates

4.2.2.2 The revised planned/actual start and completions dates

4.2.2.3 The prior estimated labor and materials costs

4.2.2.4 The revised estimated labor and materials costs

4.2.2.5 The justification for the revised estimate

4.2.2.6 An update of the EDN log to record the revised estimate.

4.2.3 Work shall be scheduled on a first-in first-out basis unless otherwise specified by the COR.

4.2.4 All work shall be scheduled using a resource loaded schedule with the ability to perform what-if scenario analysis to provide DOE management information on the impacts of shifting priorities.

4.2.5 The Contractor shall ensure Facility Work Orders required for the completion of an R&D project are generated and completed in a timely manner to avoid delays that could impact start of research.

4.3 **Document Control**

4.3.1 The Contractor will maintain a document control system and provide experienced resources to preserve and retrieve critical design and safety documentation (NETL controlled documents, Laboratory Operations Center (LOC) and RIC guidance documents, R&D SARS documents, drawings, design files, etc.).

4.3.2 Assign and maintain a log of all Parent Activity Numbers.

4.3.3 Provide on-going daily administration, minor maintenance, and support for NETL's document management and workflow management system. This is a SharePoint based system and utilizes Microsoft Power Platform tools.

4.3.4 Provide hard copy prints or soft copies of existing drawings to NETL employees when requested. This effort is on-demand services and does not require an approved work order.

4.3.5 All documentation generated and recorded into the document control system is owned by DOE.

4.4 **Research Engineering Design Support Program** - The Contractor shall provide support for the Research Engineering Design Program:

4.4.1 Develop, implement, and maintain engineering directives consistent with DOE and NETL directives that meet relevant consensus design codes and standards as agreed to by the COR or designee.

4.4.2 Ensure that engineering workstations and software tools required to meet design and document control requirements under this CLIN are maintained.

4.4.3 Provide minor revisions to engineering drawings as provided by submitting redline revisions to facilitate operation and minor repairs due to operational issues. The various engineering deliverables that may require updates are outlined in the Research Engineering Design procedure, NETL P 431.1.02.

4.5 **R&D Safety Analysis and Review System Program** - The Contractor shall provide support for the R&D Safety Analysis and Review System Program:

4.5.1 Implement Environmental, Safety, and Health directives consistent with DOE and NETL directives that meet relevant consensus design codes and standards as agreed to by the COR or designee.

4.5.2 **Annual Assessments:**

4.5.2.1 Review R&D SARS files in advance of the ES&H Annual Assessment.

4.5.2.2 Facilitate and document Annual Assessments for RIC permitted research projects.

4.5.2.3 Address all identified nonconformances with environmental, safety and health policy and opportunities for improvement within 30 days of the assessment.

4.5.2.4 Upload the Annual Assessment documentation to the SARS file within five business days.

4.5.3 **General Safety Support Maintenance**:

4.5.3.1 Contractor shall use and provide support for NETL's System for Advanced Facilities for Experiment and Research (SAFER), which is an enterprise document management and business process workflow solution to support Conduct of Research Operations (CROps), R&D Safety Analysis and Review System (SARS), Management of Change (MOC), and Research Engineering Design (RED).

4.5.3.2 Contractor shall use and provide support for NETL's Safety Training Electronic Management System (STeMS), which is a system used to assist staff in managing end users training needs for working on various projects outlined and identified within SAFER. STeMS consists primarily of reports on training completion information.

4.5.3.3 Manage the Laboratory Coat Program.

4.5.3.4 The contractor shall distribute purchased PPE items to all trained laboratory personnel.

4.5.3.5 Routinely monitor research laboratory chemical storage areas to ensure that storage is consistent with safe laboratory practices. Correct or initiate a work request to address all nonconformances identified.

4.5.3.6 Maintain the electronic R&D SARS file.

4.5.3.7 Responsible for ensuring the SOPs conform to the requirements of the SOP Template. Revise and maintain the SOP Template as needed or requested by ACOR.

4.5.3.8 Update SARS package documents (SOP, Chemical Envelope, Training forms, etc.) to reflect changes documented in memos upon revision.

4.5.3.9 Maintain overall quality level of SARS package as minor changes occur.

4.5.3.10 Process administrative changes (e.g., Team Supervisor Risk Acceptance memos, Responsible Person Appointment Memos, RP Risk Acceptance Memos, and administrative change permits) within one month of the request, or whenever triggered by updates to the NETL organizational chart. The contractor is responsible for the generation of these documents.

4.5.3.11 Maintain all R&D SARS documents as controlled documents in accordance with NETL requirements.

4.5.3.12 Assist researchers in complying with Federal requirements for selecting and using equipment listed by a Nationally Recognized Testing Laboratory (NRTL) whenever possible. When NRTL equipment is not a viable option because functionally equivalent listed equipment is either not available or is cost-prohibitive, assist in providing all required documentation to obtain NETL AHJ acceptance prior to purchase.

4.5.3.13 Provide certified Industrial Hygiene support for the development of Safety Data Sheets for samples or NETL-created laboratory items.

4.5.3.14 ES&H/IH personnel will create and maintain the chemical envelope for each R&D project, assessing the hazard category and identifying proper hazard mitigations. Any proposed additions that are not properly mitigated under the current permit shall be reported to the RIC RP, the RIC RP's supervisor, and the COR or designee to communicate the need to initiate a permit modification to add that chemical.

4.5.3.15 Assist researchers in the identification and mitigations of hazards for all research samples, including those processed through the Laboratory Information Management (LIMS).

4.5.3.16 Assist with data entry in using LIMS.

4.5.3.17 Assisting RPs in adding new personnel, ensuring training requirements are identified and assigned. Responsible for documentation of completed training in SAFER and STeMS

4.5.3.18 Reviewing, and if necessary, updating notification signs for active projects (monthly)

4.5.3.19 Draft and sign Memoranda to File, route for approval, and upload approved memos in each project's SAFER file.

4.5.3.20 Participates as requested in root-cause analyses/lessons learned pertaining to incidents, near misses, or preemptive actions related to R&D undertaken to improve safety.

4.5.3.21 Participate in the implementation of recommendations made in the root-cause analysis/lessons learned reports.

4.5.3.22 Conduct and document the Field Work AHA for field work research activities. This includes shepherding the Field Work AHA for signatures and uploading the signed document to SAFER in advance of the field work.

4.5.3.23 Conduct walk-throughs of active projects as requested by the ACOR to identify potential areas of concern (e.g., general housekeeping, configuration changes, availability of equipment manuals and project [in-lab] R&D SARS file, chemical storage, container labeling, availability of spill materials, PPE availability and use, etc.). Documented as directed by the ACOR.

4.5.3.24 When requested, accompanying Team Supervisors on walk-throughs of their projects.

4.5.3.25 Provide technical/user support to RIC research personnel.

4.5.4 Training:

4.5.4.1 Provide project-specific, chemical-specific, training as needed. The Contractor will implement a program for contractor and federal employees working in RIC laboratories to ensure formal communication of safe laboratory practices for chemical handling (especially dealing with Particularly Hazardous Substances – HF, peroxide formers, cryogenics, etc.).

4.5.4.2 Provide support and training to enable researchers to safely ship research samples between NETL sites and field locations including creating and printing sample labels.

4.5.4.3 The Contractor shall preemptively review when training will be needed and ensure ES&H required training courses are scheduled prior to the need to prevent expiration of credentials.

4.5.4.4 Provide monthly status report to all RIC Team Supervisors informing them of any expired and training due within 30 and 60 days for the researchers in the laboratories under their supervision. Notification is to include instructions for satisfying training requirements.

4.6 **Compressed Gas Cylinder Program** – The Contractor shall provide support for the Compressed Gas Cylinder Program:

4.6.1 Implement Compressed Gas Cylinder directives consistent with DOE and NETL directives that meet relevant consensus design codes and standards as agreed to by the COR or designee.

4.6.2 Manage the compressed gas cylinder program for in-house research. This program includes dewars. The cylinder inventory and necessary tracking information is provided in Attachment 5, Comprehensive Cylinder Survey.

4.6.2.1 Perform administrative aspects of the cylinder request process.

4.6.2.2 Coordinate and execute shipping, receiving, delivery and return services with suppliers.

4.6.2.3 Coordinate specialty gas purchases to ensure:

4.6.2.3.1 the proper cylinder and hardware are specified and installed,

4.6.2.3.2 the gas certificate of analysis is received and controlled,

4.6.2.3.3 and that delivery dates are communicated to the requestor.

4.6.2.4 Ensure the stock gas inventory is maintained at a level that stock gas deliveries can be made within 2 business days. Stock gasses include:

4.6.2.4.1 Air, Dry
4.6.2.4.2 Air, Zero
4.6.2.4.3 Argon
4.6.2.4.4 Argon, UHP
4.6.2.4.5 Carbon Dioxide
4.6.2.4.6 Carbon Dioxide, Coleman 4.0
4.6.2.4.7 Research grade CO2, 99.999% Purity
4.6.2.4.8 Helium
4.6.2.4.9 Helium, UHP
4.6.2.4.10 Hydrogen
4.6.2.4.11 Hydrogen, UHP
4.6.2.4.12 Liquid Nitrogen
4.6.2.4.13 Nitrogen
4.6.2.4.14 Nitrogen, UHP
4.6.2.4.15 Oxygen
4.6.2.4.16 Liquid Oxygen
4.6.2.4.17 Methane
4.6.2.4.18 Methane UHP

4.6.3 Specialty gas purchases shall be charged to the respective projects' specified funding source.

4.6.4 Transport of gas cylinders and dewars to and from central cylinder storage facilities, to and from satellite distribution locations as well as project sites.

4.6.5 Gas cylinder and dewar installation, maintenance, purge, and in-service leak test(s) to satellite distribution locations as well as project sites. This includes resulting corrective actions of these systems.

4.6.6 Update cylinder cabinet/pad placards as required when gasses are added or removed. Placards must be updated at the time of the change.

4.6.7 Ensure all cylinder data in EMS – Chemical Inventory is up to date.

4.6.8 Gas system(s) installation, maintenance, purge, and in-service leak test(s) to satellite distribution locations and project sites. This includes resulting corrective actions of these systems.

4.6.9 Preventative Maintenance of cylinder regulators & flex hoses.

4.6.10 Withdraw government-owned cylinders from service for hydrostatic testing, replacement of valves, painting, or other maintenance to ensure they meet requirements and are safe for use.

4.6.11 Maintain cylinder pads and storage areas, including the proper labeling and disposal of all cylinders and dewars.

4.6.12 Routinely inspect cylinder storage areas to ensure that storage is consistent with safe laboratory practices. Correct or initiate a work request to address all nonconformances identified.

4.6.13 Report cylinder locations to the chemical inventory each time a cylinder is moved. Location must be reported within two business days of being moved.

4.7 **Quality Control Program-** The Contractor shall provide support for the Quality Assurance Program:

4.7.1 Implement Quality Assurance/Control directives consistent with DOE and NETL directives that meet relevant consensus design codes and standards as agreed to by the COR or designee.

4.7.2 Configuration Management Assessments:

4.7.2.1 Conduct and document the Configuration Management Assessments for permitted projects.

4.7.2.2 Communicate non-conformances of the Configuration Management Assessments to the Engineering Representative, Safety Representative, Responsible Person (RP) and Team Supervisor. These communications will be accompanied with recommended corrective actions.

4.7.2.3 Provide any electrical, mechanical, or M&TE-related unresolved findings to the Safety and Engineering Representatives prior to the Annual Assessment along with recommended corrective actions to resolve prior to the end of the Annual Assessment month.

4.7.2.4 Recommended corrective actions accepted by the RP/TS shall be submitted via work request by the contractor, to assist in resolving the finding.

4.7.2.5 Assist in resolving non-conformances by the end of the R&D SARS permitted project's Annual Assessment month. This includes making on-the-spot corrections when possible.

4.7.2.6 Document all non-conformances in the Configuration Management Assessment report, including those which were corrected on the spot.

4.7.2.7 Upload the inspection reports by the end of the Annual Assessment month.

4.7.2.8 Ensure that manuals (hard copies or electronic) for all equipment identified on the equipment list, are available and are the correct version (e.g., correct model number), as part of the Annual/Initial Assessment.

4.7.3 General Inspections:

4.7.3.1 Perform required inspections to facilitate the acceptance of non-NRTL laboratory equipment by the federal NETL Electrical Authority Having Jurisdiction (AHJ).

4.7.3.2 Review procurements related to work performed under this CLIN to ensure all quality assurance requirements are met (e.g., certified material test reports and certificate of compliance).

4.7.3.3 Conduct inspections to support Engineering and R&D Operations

4.7.3.3.1 Procurement Product Acceptance Actions (QC-2 & 3 Procurements)

4.7.3.3.2 Receipt Inspection (QC-1 Procurements)

4.7.3.3.3 Supplier Evaluation Reports

4.7.3.3.4 Non-NRTL Inspections

4.7.3.3.5 Quality Surveillance Reports

4.7.3.3.6 Mechanical Inspection Reports (MIR)

4.7.3.3.7 Pressure Test Reports (PTR)

4.7.3.3.8 Work Order Closeout Inspections (WCI)

4.7.3.3.9 Engineering Change Instructions Inspections

4.7.3.3.10 Weld Inspection Reports (CWI)

4.8 **General R&D Maintenance Support** – The Contractor shall provide general research support:

4.8.1 The Contractor will coordinate responses to lab maintenance issues to support operations, including troubleshooting, minor repairs, and minor reconfigurations.

4.8.2 Maintain all R&D support service facilities, including all preventative and corrective maintenance.

4.8.3 Support the maintenance and ongoing operation of NETL's onsite research capabilities.

4.8.4 Provide troubleshooting, including minor reconfiguration to facilitate operation and minor repairs due to issues running an experiment to support operational issues. Trouble shooting shall not override, bypass, or otherwise negatively affect safety measures.

4.8.5 Provide support for planned utility outages to minimize adverse impacts on research and address researchers' requested accommodations for each type of outage.

4.8.6 Conduct preventative maintenance for support R&D equipment, including ductless hoods.

4.8.7 Maintain project specific Reverse Osmosis and Deionized water systems at the ALB, MGN, and PGH sites. This excludes the PGH B83 and B84 facility systems.

4.8.8 Maintain the bag houses/dust collection systems.

4.8.9 Conduct machining work required for ongoing operations e.g., preparation of test samples.

4.8.10 Maintain and operate the machine-welding-sheet metal shops, at the ALB, MGN, and PGH sites. The equipment associated with these functions is provided in Attachment 2, Machine Shop Capabilities. Performance metrics for operations of service shops are based upon meeting service requestor's completion date.

4.8.11 Human Machine Interface (HMI) – installation of patches and upgrades to application as needed.

4.8.12 Maintain and operate the Calibration Laboratories at the ALB, MGN, and PGH sites. The equipment associated with these functions is provided in Attachment 3, Calibration Lab Capabilities.

4.8.13 Implement the calibration program to verify and document that key research and safety system components operate accurately, reliably, and meet applicable codes and standards.

4.8.14 Provide calibration services to the ALB, MGN, and PGH sites for Measurement and Test Equipment (M&TE). The tracking and calibration of all instrumentation shall be completed regardless of the labs' ability to calibrate the instrument on site. Calibrations shall be scheduled in accordance with the procedures for Preventative Maintenance.

4.8.14.1 Pressure Safety Valves (PSVs)

4.8.14.2 Flow Meters, Transmitters & Safety Switches

4.8.14.3 Temperature Safety Switches, verification of temperature sensing elements

4.8.14.4 Pressure Transmitters (atmospheric, gauge, a differential pressure) & Pressure Switches

4.8.14.5 Mass flow controllers (Critical data verification)

4.8.14.6 Handheld and desktop Analog & Digital Multimeters

4.8.14.7 Laboratory scales and balances

4.9 General R&D Infrastructure Materials

4.9.1 Machine and Weld Shops – maintaining all equipment, consumable items such as saw blades, drill bits and welding rods, some general stock fasteners, and new equipment.

4.9.2 Calibration Lab – maintaining all software, calibration of secondary standards, off site calibrations when the lab is not adequately equipped, and purchase of new equipment.

4.9.3 Laser safety interlocks and barriers.

4.9.4 Preventative maintenance items for water purification systems and ductless hoods.

4.9.5 PPE and safety items – All PPE prescribed in hazard charts and PPE Assessments.

4.9.6 Tooling and equipment of work performed via work request.

4.9.7 Uniforms.

4.9.8 NETL required training.

4.9.9 Contractor travel that is not related to direct R&D field work.

4.9.10 Engineering printers, paper, and software.

4.9.11 Maintenance agreements and technical support.

4.9.12 General laboratory equipment such as refrigerators and glassware washers.

4.10 Compressed and Liquid Gasses Materials

4.10.1 Procurement of stock compressed gas cylinders. Historical data show the refill of 1200 -1500 cylinders annually. This is inclusive of all required maintenance at the time the cylinder is refilled.

4.10.2 Rental and refill of a 185 Gallon / 700 Liter liquid argon dewar servicing the Analytical Lab on the Pittsburgh site. The dewar is equipped with a rented telemetry system for refill. (This cost is included in the dewar rental fee) The dewar is refilled approximately every 3-4 weeks depending on usage.

4.10.3 Rental and refill of a Taylor -Warton Model XL180, 100 psi liquid nitrogen dewar for analytical services on the Morgantown site. The dewar is refilled approximately weekly.

5.0 TASK 2 – NEW PROJECTS AND MODIFICATIONS

5.1 General Support

5.1.1 The work in this task is to support the efforts needed to enhance or expand current capabilities. Planning work requests will be submitted for estimation and executed when the project management plan is approved. This work is identified and shall be tracked and reported in the New Projects and Modifications report as specified in the Deliverables section. Labor hours shall be charged and tracked to the individual funding line level. Labor and Material cost shall also be tracked on each individual work order.

5.1.2 The contractor will facilitate monthly meetings with RIC team supervisors to give updates on all active and future work orders. They shall also communicate any material funding needs or explanations in delays of procurement or work progress, as well as actual vs. planned budget comparisons.

5.1.3 The Contractor will be responsible for providing work plans and direction to the R&D technicians and ensure that project installations are completed on schedule, within budget, and safely. Costs that exceed budget will be communicated and approved by the COR before incurring additional costs.

5.2 Project Management Support

The contractor shall provide project management support for all work requests. This support will facilitate the CROps process:

5.2.1 Develop the Project Management Plan (PMP) to identify the graded approach to the CROps process for an individual process.

5.2.2 Ensure work is performed on-schedule and within budget through working with responsible parties identified in the PMP.

5.2.3 Coordinate and execute procurements and ensure items are obtained in a timely manner to meet the schedule.

5.2.4 Arrange and facilitate meetings as required to keep the project on track, maintain status information on schedule and budget, facilitate key decisions, and obtain approvals.

5.2.5 Publish meeting minutes for all status meetings.

5.2.6 Compile and route all Preliminary, Detailed and Commissioning Stage Packages.

5.2.7 Track the status of all projects pursuing permitting actions through the CROps process. A historical tracking of all permitting actions shall be maintained for process improvement purposes.

5.3 Engineering Design

The Contractor shall provide engineering design services for new custom designs and modifications to RIC experimental processes and equipment. Designs should follow a graded approach based on a hazard review of the requested modifications. All design products produced shall be of similar presentation, appearance, and format.

Although each specific design project will vary from one to the next, design efforts are completed in the following disciplines:

5.3.1 Mechanical
- 5.3.1.1 Pressure Relief, Piping design in accordance with ASME B31.3,
- 5.3.1.2 Pressure Vessel Design in accordance with BPVC Section VIII, Div. 1, and Div. 2

5.3.2 Electrical
- 5.3.2.1 Single Line Diagram, Power Distribution and Electrical Schematics in accordance with National Electric Code

5.3.3 Instrumentation & Controls
- 5.3.3.1 P&IDs
- 5.3.3.2 I/O Drawings,

5.3.3.3 Instrumentation Specifications
5.3.3.4 Allen Bradley PLC Controls Programming
5.3.3.5 HMI Configuration
5.3.3.6 LabVIEW Programming

5.3.4 Process
5.3.4.1 Process Flow Diagrams
5.3.4.2 Heat and Mass Balance Calculations
5.3.4.3 Stream Summary Report

5.3.5 Other Engineering Deliverables
5.3.5.1 Project Plot Plans
5.3.5.2 Leak Test Procedures
5.3.5.3 Design Calculations
5.3.5.4 Project Cost (Labor and Material) Estimates
5.3.5.5 Weld Procedure Specifications
5.3.5.6 Preventative Maintenance Requirements
5.3.5.7 3D Models for CNC fabrication
5.3.5.8 Assistance to the RP in the Development of Standard Operating Procedures (SOP) consistent with the approved SOP Template.

5.3.6 Ensure drawings are numbered in accordance with the current established numbering scheme or as otherwise directed by the COR and shall bear an NETL title block. Each drawing shall also bear a revision designation, the date the drawing was revised, and respective signature approvals as required. Symbols, comments, font, general layout, etc., shall be standardized for all drawings produced or updated. Any changes to numbering or drawing procedures must be approved by the COR.

5.3.7 Development of procurement specifications associated with design efforts for both Federal and Contractor purchases.

5.3.8 Maintain secure storage of all design files in their native format. All completed design files and drawings are the property of DOE, NETL and the specific project requesting the work.

5.3.9 Provide commissioning and troubleshooting support for operational issues during installation and shakedown.

5.3.10 Ensure that design products include objective inspection and acceptance criteria for fabricated products. Inspection and acceptance criteria shall be based on safety and engineering code driven requirements, as well as research driven functional requirements. Inspection and acceptance criteria shall be included on engineering drawings and documents, as established by the COR.

5.3.11 Ensure that design products include maintenance requirements and intervals for fabricated products. Maintenance criteria shall be included on engineering drawings and documents, as established by the COR.

5.4 R&D Infrastructure, Installation and Operations

5.4.1 The Contractor shall provide experienced Engineering Technicians to support the development and modification, of NETL's onsite research capabilities.

5.4.2 The Contractor shall provide Machine Shop, Weld, & Mechanical Services at the ALB, MGN, and PGH sites including:
5.4.2.1 Machining; High complexity machining including test sample fabrication
5.4.2.2 Certified weld application
5.4.2.3 Custom sheet metal fabrication
5.4.2.4 Project steel erection (Beam & Tank)
5.4.2.5 High pressure process piping & tubing – All installations shall be performed by personnel that hold Swagelok installation and tube bending certifications.
5.4.2.6 Swagelok and Autoclave cone & thread

5.4.2.7 Pressure test services
5.4.2.8 Refractory installation and replacement
5.4.2.9 Configuration management
5.4.2.10 Tagging & labeling

5.4.3 The Contractor shall provide Electrical, Instrumentation & Control (EI&C) Services at the ALB, MGN, and PGH sites including:
5.4.3.1 Electrical equipment installation for AC/DC applications (high and low voltage)
5.4.3.2 Installation of programmable logic controller (PLC), Digital Control System (DCS) and Computer Control Systems
5.4.3.3 Installation of project sensors associated with project interlocks up to the monitor base
5.4.3.4 Process control panel fabrication and installation
5.4.3.5 Process control loop verification
5.4.3.6 UPS Systems < 30KV
5.4.3.7 Troubleshooting & Maintenance
5.4.3.8 Start-up & Commissioning

5.5 R&D Safety Analysis and Review System Program

Proactivity provide support in Laboratory Safety, Laboratory Industrial Hygiene, as well as General Safety Codes and Standards to perform the following activities to support new projects and modifications implemented through the application of NETL P 421.1.01, R&D Safety Analysis and Review System (SARS):

5.5.1 Create/update the chemical envelope for each R&D project, assessing the hazard category and identifying proper hazard mitigations. ES&H/IH staff will identify the hazards associated with the chemicals for the purposes of including the applicable "standardized" hazard charts and/or in the development of any project specific hazard charts.

5.5.2 Responsible for completing the Hazard Analysis (most commonly using the What-If checklist) and documenting in the Hazard Analyses Report including the identification of hazards and mitigation measures, for in-house research activities.

5.5.3 Responsible for uploading the Hazard Analysis Reports.

5.5.4 Identify required Personal Protective Equipment (PPE) (i.e., type of glove or eye protection) as part of the safety analysis and document the necessary PPE in the projects' SOPs.

5.5.5 Facilitate the completion of NETL F 451.1-1/3, Environmental Questionnaire and complete NETL F 451.1-1/1, Categorical Exclusion (CX) Designation and route for approval.

5.5.6 Complete and/or revise projects' Significant Impact Scoring Matrix (NETL F 450.1-2), Screening Analysis Questionnaire (NETL F 435.1-1), and Pollution Prevention and Waste/Resource Minimization Opportunity Assessment (NETL F 435.1-1) as needed for project revisions and new project additions.

5.5.7 Provide project-specific and hazard-specific training not included in the CLIN 4 PWS as needed prior to operations.

5.5.8 Responsible for ensuring the SOPs conform to the requirements of the SOP Template.

5.5.9 Completion of the project SOP except for Section 4, Operating Procedures. Support shall be provided to the research team to complete Section 4.

5.5.10 Review training completion records and provide administrative support to schedule personnel training that is required prior to operation.

5.5.11 Assisting RPs in adding new personnel, ensuring training requirements are identified and assigned as needed prior to operation. Provide support to ensure training requirements and completion records are appropriately documented.

5.5.12 Conduct personal and area industrial hygiene monitoring, not included in the scope of the CLIN 4 PWS, as required by the hazard analysis and documenting results to the R&D SARS file.

5.5.13 Assist researchers in complying with Federal requirements for selecting and using equipment listed by a Nationally Recognized Testing Laboratory (NRTL) whenever possible. When NRTL equipment is not a viable option because functionally equivalent listed equipment is either not available or is cost-prohibitive, assist in providing all required documentation to obtain AHJ acceptance prior to purchase.

5.5.14 Update SARS package documents (SOP, Chemical Envelope, Training forms, etc.) to reflect changes and route R&D SARS packages for approval.

5.5.15 Maintain all R&D SARS documents as controlled documents in accordance with NETL requirements.

5.5.16 Responsible for facilitating and documenting the R&D SARS Initial Assessment.

5.5.17 Responsible for addressing all identified opportunities for improvement to prevent nonconformances to safety policy.

5.5.18 Responsible for resolving outstanding SARS related issues within two weeks and notifying the Safety Rep. (SR) upon completion.

5.5.19 Responsible for uploading the Initial Assessment documentation to SAFER within five workdays.

5.5.20 Post the updated permit to SAFER within one week of issuance.

5.6 <u>Quality Control</u>

5.6.1 Quality Inspections

Provide Competent Quality Inspectors (QIs) with Expertise in Electrical, Mechanical, and Measuring Instruments and Test Equipment (M&TE**)** at the ALB, MGN, and PGH sites.

5.6.1.1 The QIs will lead and be responsible for conducting and documenting Initial Engineering Inspections. Initial Engineering Inspections will include the following inspections:

5.6.1.2 Electrical Inspection

5.6.1.3 Mechanical Inspection, including any required pressure and leak tests

5.6.1.4 Measuring Instruments and Test Equipment (M&TE) Inspection (includes Pressure Relief Devices)

5.6.2 The Initial Engineering Inspections will include a review of all project gas distribution systems and equipment installations for compliance with approved engineering design documents and QA/QC concerns. Initial Assessments for Modification to Operations permits place more emphasis on the new/modified component but are complete and full assessments of the entire project.

5.6.3 During Initial Engineering Inspections, the QIs are responsible for ensuring that manuals (hard copies or electronic) for all equipment identified on the equipment list in the project SOP, are available and are the correct version (e.g., correct model number).

5.6.4 Initial Engineering Inspections will include the communication of any non-conformances identified to the RP, Team Supervisor, and FO Engineering Representative as well as the path to correction, and the offer to help resolve the finding.

5.6.5 Ensure all inspections are completed in accordance with the quality requirements provided in the Detailed Design Package and compile the requirements and inspection results into a Quality Package.

5.6.6 Review procurements related to work performed under this CLIN to ensure all quality assurance requirements are met (e.g., certified material test reports and certificate of compliance).

5.6.7 Conduct inspections to support the new project or modification including:

5.6.7.1 Procurement Product Acceptance Actions (QC-2 & 3 Procurements)
5.6.7.2 Receipt Inspection (QC-1 Procurements)
5.6.7.3 Supplier Evaluation Reports
5.6.7.4 Non-NRTL Inspections
5.6.7.5 Quality Surveillance Reports
5.6.7.6 Mechanical Inspection Reports (MIR)
5.6.7.7 Pressure Test Reports (PTR)
5.6.7.8 Work Order Closeout Inspections (WCI)
5.6.7.9 Engineering Change Instructions Inspections
5.6.7.10 Weld Inspection Reports (CWI)

5.6.8 The Contractor Quality personnel will strive to resolve any findings or non-conformances identified. This includes making corrections on-the-spot when possible. Any on-the-spot corrections shall still be noted in the report.

5.6.9 The Contractor Quality personnel will provide the Quality Package to the FO Engineering Representative for review.

5.6.10 The Contractor Quality personnel are responsible for facilitating the acceptance of non-NRTL laboratory equipment by the Federal NETL Electrical Authority Having Jurisdiction (AHJ).

5.7 Direct Program Materials

5.7.1 Materials required to fulfill work requested by R&D personnel and direct operations support under this CLIN.

5.7.2 Procurement of specialty compressed gas cylinders. Historical data show approximately 180 specialty cylinders being refilled annually. This is inclusive of all required maintenance at the time the cylinder is refilled.

5.7.3 Purchase requests shall be approved by the project team supervisor and task COR, with a notification to the funding source project manager.

6.0 TASK 3 – PROJECT OPERATIONS

6.1 The Contractor shall provide Engineering Technician support to operate RIC R&D projects as specified in Attachment 4. R&D operations take priority over work requested via work control unless otherwise directed by the COR.

6.1.1 Operators are to follow the work schedule of the project that they are assigned to.

6.1.2 Operator hours shall be charged and tracked to the individual funding line level.

6.1.3 These operations will require off-hours support (including weekends and holidays)

7.0 DELIVERABLES

DELIVERABLE	FORMAT	FREQUENCY
R&D Dashboard	Summary of tracking information for all CLIN 1 tasks. To be used as the initial point of reference for R&D work inquires with links to specific projects and supporting trackers. To include but not limited to:	Living interface to be kept up to date as frequently as practical. Submitted for review Monthly

DELIVERABLE	FORMAT	FREQUENCY
	• Cost and duration statistics for all work orders. • General work order statistics (open, closed, on hold) and milestones met/missed broken down by site. • Up to date task 3 operator hours charges compared to total requested hours by project and funding source. • Links to New Project & Modifications Tracker, SARS Tracker, Schedule, and individual work order Trackers and Schedules. • Actual versus estimated statistics for all work order hours, materials, and schedules. • Record and summary for all Estimate Deviation Notices (EDNs) issued during the life of the contract. • Record of completed/closed work orders and associated statistics. • Summary of all task 1 project maintenance costs broken down by project (PAN) and funding source.	Submit to: COR and ACORs
SARS Tracker	Status summary for all work order related SARS activities. To include: • Charged actual hours versus planned hours per work order. • Overall status of each work order (on schedule, at-risk, over hours, over schedule, etc.). • Estimated completion date and status of each required deliverable per work order. • Summary of past due or at-risk tasks requiring Federal support. • Historical summary of tasks on-schedule versus over-schedule.	Monthly Submit to: COR and ACORs
Supply and Materials Tracking Report	This report shall include a detailed breakdown of all supplies and materials purchased in support of CLIN 1. The supplies and materials shall be tracked by funding source or designated as "general use"	Monthly Submit to: COR & ACORs
Compressed Gas Cylinder Report	This Excel based report shall: - Track cylinders by serial numbers snf NETL barcode to the individual site and building location, - Identify the contents of each cylinder, - Provide the Integrity Test date and relevant information, - Identify whether the cylinder is "Full", "In Service", or "Empty', - Be updated continuously in a spreadsheet or database format,	Quarterly Submit to: COR, ACOR, and Compressed Gas Safety SME, R&D Operations and Engineering Management

DELIVERABLE	FORMAT	FREQUENCY
	- Provide details on gas cylinders with their contents approaching their expiration date (90 days prior to expiration). Corrosives approaching three years of service, and/or unstable gases shall be highlighted, - Receipt Inspection Report summary from the vendor to include listings of newly inventoried corrosive and unstable gasses. - Provide details of any cylinders reported as not passing visual inspection by serial number, date reported, and final disposition. - Report all gas cylinders that have been in the cylinder storage area for longer than one year, including a visual inspection. - Recommendations regarding retiring cylinders, reducing, or increasing cylinder inventory and/or gasses, as well as process improvement suggestions for the Compressed Gas Cylinder Program. - Annual cost summary data updated quarterly to include (should include site level and total cost tracking): o Total count and cost for each type/quality of stock gas. o List of all specialty gasses purchased and the cost of the gas. o Inventory holding costs. o Gas delivery/removal costs.	
Monthly R&D Operations Summary Report	Summary of all ongoing R&D Support Operations activities by site. This is to include days to complete (where noted) using a consistent basis. Listing of all completed and in process Memos to file during the month. Provide a list of SSC provided training sessions. Configuration Management (mechanical, electrical, M&TE) Findings Tracking spreadsheet/log to include: Assessment month, Description of Issue, Risk Level, Requirement, Resolution Path Forward / Corrective Action log entries, Identification of who is responsible for the corrective action, Status (open, entered in to AIIS, or closed).	Monthly Submit to: COR, ACORs, CS

DELIVERABLE	FORMAT	FREQUENCY
	Number of work requests submitted, number of active requests, closed work requests (request, submission date, date work began, closure date, duration, and hours to complete), current lead time by resource classification. Calibrations Schedule, status, and statistics	
Training	Provide General Lab Safety Training for new hires. One session is to be synced with the arrival of the RIC summer students as directed by COR. Content to be specified by the ACOR. Provide General Lab Safety Refresher Training. Content to be specified by the ACOR. Actively work to ensure that any satisfied training requirements about to expire in the next three months will be able to be satisfied prior to expiration date. Provide project-specific/hazard-specific/ operation-specific training for field work and working with highly toxic chemicals, or other unusual activities as needed, and document completion of training.	At least annually Annually Quarterly Report to COR, and ACOR documenting upcoming deficiencies. As requested by RP, or ACOR.
Standard Operating Procedures, Support Operations SARS Package Updates & Engineering Procedures	As required per Attachment 1, Process and Procedures	As necessary Submit to RP and COR and ACORs
Project Maintenance Cost Report	Maintain the R&D Dashboard project maintenance costs for each project (PAN) and funding source. The cost shall be reported as the cumulative cost for the Execution Year to date.	Monthly Submit to: COR and ACORs
New Projects and Modifications Tracker	A summary status report for all projects undergoing a modification under task 2 during the Execution Year. To include • Updated status and projected completion date for each work order. • Labor and material estimates per work order and funding source, broken down by execution year where applicable. • Updated actual labor and material costs per work orders & funding sources, broken down by execution year where applicable. • Summary tabs totaling all estimated and actual labor and material costs per funding source for each execution year. The monthly submission should include all charges from the previous month. However, if all	Monthly, No Later than 7 calendar days after the end of the previous month Submit to COR and ACORs

DELIVERABLE	FORMAT	FREQUENCY
	charges cannot be compiled by the due date the missing information shall be listed on the submission and then included in the next month's update.	
Quarterly Funding Forecast	A forward-looking forecast for funding source needs based on the planned work schedule. Projected hours and labor costs shall be broken down into the 4 main labor categories per work order (Engineering, SARS/ES&H, QA, Technicians). Labor and material funding shall be totaled by funding source. A revised projection for the last month of the current quarter shall also be included with this submission to address any changes in scope and schedule from the previous projections.	Quarterly, End of the 2nd Month of each quarter, except for the Q3 forecast which should be submitted by August 20th Submit to COR and ACORs
Project Operator Cost Report	Maintain the operator support information on the R&D Dashboard. At a minimum, dashboard shall include the number of hours of support used and remaining by funding source and project (PAN).	Monthly Submit to: COR ACORs