U.S. Department of Energy

Office of Fossil Energy and Carbon Management

**DE-FE0032051**

**Carbon Ore, Rare Earth, and Critical Minerals (CORE-CM) Assessment of San Juan River-Raton Coal Basin**

**STATEMENT OF PROJECT OBJECTIVES**

**CARBON ORE, RARE EARTH, AND CRITICAL MINERALS (CORE-CM) ASSESSMENT OF SAN JUAN RIVER-RATON COAL BASIN, NEW MEXICO**

Project Performance Period: 10/01/2021 – 12/31/2024

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**Submitted by:**

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**Attachment 2**

**DE-FE0032051**

**New Mexico Institute of Mining and Technology**

**Addendum**

**STATEMENT OF PROJECT OBJECTIVES**

**CARBON ORE, RARE EARTH, AND CRITICAL MINERALS (CORE-CM) ASSESSMENT OF SAN JUAN RIVER-RATON COAL BASIN, NEW MEXICO**

**A. OBJECTIVES**

1. The Recipient will achieve the Objectives stated in Section I.C. of DE-FOA-0002364 Amendment 0003. The purpose of this project is to (1) identify and quantify the distribution of critical minerals (CM), including rare earth elements (REE), in coal beds and related stratigraphic units in the San Juan and Raton Basins in New Mexico (including coal, coal refuse, ash, coal seam, interstitial clays/shales, volcanic ash beds, acid mine drainage, associated sludge samples, mine dumps, other nonfuel carbon-based products, humates, clinkers, sandstone uranium deposits, process waters, etc.), (2) identify possible sources of CM and REE in the basins, (3) identify the coal mine and nonfuel carbon-based waste products that could contain CM and REE, (4) characterize the CM and REE in these materials, (5) determine the economic viability of extracting CM and REE from these materials.

2. Continue with applicant-specific detail from the applicant’s SOPO, removing all reference to “Phase 1” or other project phases: Include one paragraph on the overall objective(s) of the work.

**B. SCOPE OF WORK**

Sample sites will be identified. Existing data will be collected, reviewed, and evaluated. Sampling plans, Health and Safety Plan (HASP), Data Management Plan (DMP) and databases will be developed. Sampling will be conducted in a phased approach, partly to address some of the research questions logically and allow for machine learning techniques to be applied. Existing drill core and cuttings will be sampled. Samples from the mines and outcrops will be collected throughout the project. Characterization of samples will be conducted. Chemical analyses will be used to select a subset of samples for thin section petrography. A subset of the samples will be submitted for electron microprobe study at New Mexico Tech, for detailed microscale examination of textures and mineral chemistry. SNL will conduct complementary micro-scale characterization to identify and map the potential sources that host CM and REE. Machine learning techniques will be conducted for basin-wide assessment by LANL. Waste streams will be identified, sampled, and characterized. A strategy will be developed to reuse waste streams. Technologies for assessing and developing CM and REE will be compiled. Field testing technologies will be developed. The Recipient will develop a framework to establish a center of excellence with San Juan College, Sonoash and New Mexico Tech. Stakeholder outreach and education will be conducted throughout the project. Presentations of research will be presented at national and international meetings and published in journals, and New Mexico Bureau of Geology and Mineral Resources (NMBGMR) reports. The Recipient will participate in DOE-led Working Groups with other CORE-CM recipients as required during the term of the project.

**C. TASKS TO BE PERFORMED**

**Task 1.0 - Project Management and Planning**

The Recipient shall manage and direct the project in accordance with a Project Management Plan to meet all technical, schedule, and budget objectives and requirements. The Recipient will coordinate activities in order to accomplish the work effectively. The Recipient will ensure that project plans, results, and decisions are appropriately documented, and project reporting and briefing requirements are satisfied.

The Recipient shall update the Project Management Plan 30 days after award and as necessary throughout the project to accurately reflect the project’s current status. Examples of when it may be appropriate to update the Project Management Plan include: (a) project management policy and procedural changes; (b) changes to the technical, cost, and/or schedule baseline for the project; (c) significant changes in scope, methods, or approaches; or (d) as otherwise required to ensure that the plan is the appropriate governing document for the work required to accomplish the project objectives. Management of project risks will occur in accordance with the risk management methodology delineated in the Project Management Plan to identify, assess, monitor and mitigate technical uncertainties as well as schedule, budgetary and environmental risks associated with all aspects of the project. The results and status of the risk management process will be presented during project reviews and in quarterly progress reports, with emphasis placed on the medium- and high-risk items.

The Recipient will participate in DOE-led Working Groups with other CORE-CM recipients as required during the term of the project.

Required attendance to, and active and meaningful contribution in DOE-coordinated and -led CORE-CM workshop(s) and other activities as organized by DOE.

Additionally, communication and collaboration is encouraged, whenever possible, when tasks or activities overlap basins.

Subtask 1.1 – Summary of Environmental Justice Considerations

The recipient will submit a summary of environmental justice considerations of the proposed technology, process, or system. The following issues will be addressed:

* How the technology relies on limited resources such as coal, biomass, freshwater, land, and/or low-carbon energy. Indicate the relationship between the number of resources used and the amount of product formed.
* If coal is used as a feedstock, where will it be mined and what are the associated near-term and legacy environmental impacts of the coal mining, including methane leakage.
* If coal wastes are being remediated, indicate the relationship between the amount of coal wastes used versus the amount of product formed.
* How the planned technology remediates legacy environmental impacts of the energy industry, including environmental impacts associated with the use of coal.
* The project’s waste management strategy and the anticipated impacts of residual waste on local residents.
* How the project incorporates a plan to ensure community and stakeholder input and engagement from underserved communities, which include persons of color; members of religious minorities; lesbian, gay, bisexual, transgender, and queer (LGBTQ+) persons; persons with disabilities; persons who live in rural areas; and persons otherwise adversely affected by persistent poverty or inequality.

Subtask 1.2 – Summary of Economic Revitalization and Job Creation Outcomes

The recipient will submit a summary of economic and workforce impacts associated with the proposed technology, process, or system. This includes discussion of:

* Whether application of the process will create new jobs, including clean energy jobs, at the prevailing wage.
* The extent to which those new jobs will be located in power plant and coal communities that are economically distressed and/or have been harmed by the adverse environmental impacts of the energy industry.
* The nature of the jobs, recruitment strategies for individuals who belong to groups that are historically underserved or underrepresented, anticipated recruitment of workers from the local community, and whether training will be required, or if the skills are associated with an existing labor force.
* How many new jobs will be created as a result of technology deployment (e.g., number of jobs per unit of product, # of jobs per unit of waste remediated, # of jobs per unit of emissions mitigated).

Subtask 1.3 - Environmental, Safety, and Health Analysis for Products Proposed to be Manufactured From CORE-CM Resources

As part of the Final Scientific/Technical Report, the Recipient will identify ES&H requirements for any products proposed to be manufactured from CORE-CM resources, based on anticipated effects on the environment, safety, and human health in the following situations:

* Processing (extraction/separation/recovery/waste stream management) of raw materials in an environmentally benign manner, leading to the production of REE-CM-containing intermediate and/or end products or other high-value products.
* Receiving, storage, handling, and use of raw materials to manufacture products
* Shipping to customer locations and handling of manufactured products at customer locations
* Field modification and installation (e.g., cutting, drilling, finishing, etc.) of manufactured products
* Long-term use of the manufactured product in residential, commercial, and industrial settings
* Demolition. removal, and recycling/disposal as applicable at the end of the manufactured product’s life

Subtask 1.4 – Working Group Participation

The Recipient will participate in DOE-led Working Groups with other CORE-CM Recipients as required during the term of the project, including attendance at related workshops. The Project Management and Planning task shall include communication, data sharing, and lessons learned with Recipients of other awards under DE-FOA-0002364 and NETL researchers/staff. This will be facilitated through CORE-CM specific closed working groups that include, but are not limited to Resource Characterization, Infrastructure, and Environmental Justice and Social Responsibility. The Recipient will participate and provide meaningful contributions to the objectives/deliverables of each of the three working groups, which can include:

* Best practices manual for resource characterization and assessment, including sampling collection strategies and methodologies, and assessment methodologies
* Developing a methodology (matrix) for assessing the “grade” of the resource (e.g., relative importance of concentration, ease of extraction, etc.)
* Site permitting guide
* Best practices guide for community engagement
* Coordination with NETL/FECM staff, including site support contractors, for the completion of working group objectives (i.e., participation in development of resource matrix, best practices manual, etc.).

**Task 2.0 – Basinal Assessment of CORE-CM Resources**

Basinal assessment of the potential for the occurrence of CM and REE will be conducted. Specifically, the Recipient will evaluate and interpret data generated during this project to address: (1) what is the distribution of CM and REE in the basins? (2) is it possible to predict the occurrence of CM and REE using machine learning and other techniques? An approach similar to the assessment of resource potential developed by the U.S. Geological Survey (USGS) (Goudarzi, 1984; McLemore, 1985) and used in McLemore (2018a, b) and McLemore and Hoffman (2017) for the U.S. Bureau of Land Management (USBLM) and New Mexico State Land Office will be used in the assessment. Geographic Information System (GIS) techniques will be employed, and a GIS specialist will assist the team. The mineral resources will be assessed by compilation and integration of all available published and unpublished geologic, geochemical, geophysical, and production data. Wherever possible the Recipient will incorporate known coal resource and reserve estimates as determined by the USGS, NMBGMR, and industry to determine quantitative estimates of REE and CM.

Resource assessments for REE-CM should include, but not be limited to:

* Coal sediments (sedimentary layers associated with coal beds such as clays, clinkers, beach placer sandstone and sandstone uranium deposits).
* Coal ash, such as ponded materials, combustion fly ash/bottom ash by-products, etc.
* Refuse (coal; other ores), such as tailings, prep plant wastes, slag, etc.
* Other basin-specific resources that could enhance basin-specific economics. This may include but not be limited to gasifier char materials and produced water (petroleum industry by-products and other produced waters).

*Subtask 2.1* – *Identification of sampling sites*: The first step in this Basinal Resource Assessment will identify (1) the stratigraphic units containing potential economic concentrations of CM and REE, (2) their location within the San Juan and Raton basins, and (3) estimate the quantity of each material contained within the San Juan and Raton basins. Data gaps will be identified.

*Subtask 2.2 –* *Collection and review of existing data:* The next step in the basinal resource assessment is to collect and review existing data. The NMBGMR has collected published and unpublished data on the districts, mines, deposits, occurrences, and mills (including coal) since it was created in 1927. The Recipient will provide existing data (McLemore et al., 2017).

*Subtask 2.3 -* *Develop a sampling plan*: A sampling plan describing how and where samples are collected, analyzed and archived, detection limits, analytical procedures, quality control, etc. using best practice methodologies such as those defined by the U.S. Department of Energy (DOE), USGS and State Geological Surveys, a health and safety plan (HASP, field safety protocols, when MSHA training is required, etc.) and well-designed databases of existing and proposed data to be collected during the project.

*Subtask 2.4 -* *Collect samples:* Samples will be collected to assess REE and other CM potential in 21 coal fields. Specifically, the Recipient will sample: (1) existing drill cores of coal and clay/shale beds above and below the coal seams (sedimentary layers associated with coal beds) and (2) field exposures of coal, clay/shale, and volcanic ash beds above and below the coal seams, humate deposits, as well as other potential stratigraphic units that could contain CM and REE, at both mine sites and specific exposures within the coalfields; Sample will be collected that will represent the entire distribution of the coalfields in the San Juan and Raton basins.

*Subtask 2.5 -* *Sample characterization*: The characterization task will include (1) bulk rock characterization (whole rock chemistry, thin section petrography, mineral identification), (2) microscale characterization, (3) 3D petrography, and (4) *in situ* laser-induced breakdown spectroscopy (LIBS) analyses.

*Subtask 2.5.1 Bulk rock characterization:* Bulk rock characterization includes whole rock major and trace element geochemistry, mineral compositions (X-ray Diffraction (XRD), thin section), alteration, texture, composition, and structure, identification of primary and secondary mineral phases (petrography, XRD, microprobe, Scanning Electron Microscope (SEM).

*Subtask 2.5.2 Micro-scale characterization:* Microscale characterization includes: mapping distribution of accessory minerals using infrared and RAMAN microscopes in conjunction with the electron microprobe; mapping the distribution of certain critical metals in accessory minerals using the electron microprobe; and Scanning Electron Microscopy-Energy Dispersive X-ray Spectroscopy (SEM-EDS) and cementation information via petrography, electron microprobe or SEM.

*Subtask 2.5.3 3D multiscale petrography:* X-ray computed tomography (XRCT) with an X-ray microscope will obtain nested three-dimensional (3D) datasets of 10s to single-digital micron resolution (depending on sample size). Focused ion beam–scanning electron microscopy (FIB-SEM), supplemented by energy dispersive spectroscopy or electron backscatter diffraction, will obtain 3D datasets with nanometer-scale resolution (plasma FIB-SEM options include rapid serial sectioning with cross-sections of up to 2 mm wide by 2 mm depths). Image analysis (e.g., with Avizo, ImageJ, Matlab®, and/or Diamorse) will quantify and fingerprint the 3D microstructure via geometric and topological metrics (e.g., particle size, shape, and persistent homology) of phases that host REE and CM. Results will be used in machine learning (ML) predictive modeling of REE-CM resources.

*Subtask 2.5.4 – in situ LIBS/RAMAN analyses:* A combination LIBS/RAMAN instrument will be employed to simultaneously collect geochemical and mineralogical data from core samples to identify targets for sample collection and more detailed characterization.

*Subtask 2.6 - Application of Machine Learning techniques for basin-wide resource assessment*: The Recipient will employ state-of-the-art Machine Learning (ML) techniques to estimate basin-wide resources. The ML application will be multi-fold: (1) to develop correlations between REE occurrence and REE concentrations and sample characteristics/mineralogy using characterization data collected through Subtask 2.5.1 - 2.5.4, (2) utilize the ML-based correlations to infer REE occurrence/concentrations from data where no direct observations are available and (3) integrate REE and CM characterization data along with other signatures associated with REE occurrence to develop a basin-wide assessment of REE and CM resource.

**Task 3.0 – Basinal Strategies for Reuse of Waste Streams**

*Subtask 3.1 – Waste streams sampling and characterization:* The Recipient will identify, sample, and characterize coal waste stream products, including but not limited to (1) coal ash (including ponded materials from 9 ash storage facilities at Fruitland and Prewitt, New Mexico and combustion fly ash, bottom ash, and any coal waste by-products); (2) coal refuse and waste piles, and other materials from existing AML sites; (3) acid mine drainage from both active and AML sites; (4) coal and other ore tailings, prep plant wastes, and produced waters (petroleum industry by-products and other produced waters), and (5) boiler slag. Sampling and characterization, described above, is required to understand the weathering processes at the surface and within the waste rock, tailings piles, and ash impoundments to determine chemical stability of the rock piles, tailings, and other mine features (McLemore et al., 2009).

*Subtask 3.2 - Coal Ash:* The Recipient’s focus for process development and the operability of the Center of Excellence (COE) at San Juan College in Farmington, New Mexico, is for establishing an unprecedented effort to fully recover waste coal ash and process to make a maximized number of commercial products. Some of these potential products include ultra-low carbon cement, catalysts, silica flour, artificial sand, zeolites, carbon nanotubes, and carbon fiber.

*Subtask 3.3 – Evaluation of Environmental Impact of Coal waste:* The Recipient will conduct bench tests using coal and coal-related waste streams to evaluate the environmental impacts such as those from coal and coal-based products containing high concentrations of toxic metals, such as, As, Cd and S.

**Task 4.0 – Basinal Strategies for Infrastructure, Industries, and Businesses**

*Subtask 4.1 - Infrastructure investigation:* The team will access the available infrastructure for coal mining and coal byproduct processing, as well as those raw materials’ transportation chains, to illustrate the current status of the feedstock supply for the basinal REE and CM industry and their potential development trend. A detailed investigation of the regional facilities of coal-to-REE and CM feedstock will be performed and reported to guide the potential basinal REE business commercialization plan and maximize the opportunity for spurring the local economy This will include the evaluation of a COE for San Juan College.

*Subtask 4.2 - Competitiveness and Challenge:* The team will analyze the existing or potential technologies to mine or access coal, coal byproducts, waste streams, or alternative source materials from current (or future) facilities that refine these raw resource materials into feedstock materials and seek to understand the basinal capital expenditures of REE-related industry and perceived obstacles to expanding REE-related business lines. The task will also identify the main challenges for the business development.

*Subtask 4.3 Life-Cycle Analysis:* Life-cycle analysis including energy and material analysis, environmental impact assessment, scalability assessment, and detailed economic analysis shall be conducted to the current REE and CM supply chain and investigate the potential upgrading of the REE and CM process industry in order to establish pathways toward net neutral carbon emission and the process engineering and design requirements to accomplish this. A cradle-to-grave concept would be adopted to set the boundary of energy and material flows for all the processes involved in the REE industry.

**Task 5.0 – Technology Assessment, Development, and Field Testing**

*Subtask 5.1 – Identify and assess existing and novel technologies specific to the resource:* The Recipient will evaluate technology gaps and perform a techno-economic evaluation of various existing techniques relevant to the extraction and purification of REE and CM from each feedstock identified in the basinal and waste stream assessment. Assess each technology in terms of efficiency and potential environmental impact. Identify gaps in knowledge or technology.

*Subtask 5.2 – Develop a plan for field testing:* Develop a plan for field and/or laboratory testing based on promising technologies and gaps identified in Subtask 5.1 specific to San Juan Basin feedstocks. The Recipient will optimize extraction techniques based on the unique characteristics of the San Juan and Raton basins and resources contained therein: hydrothermal-based extraction and chelating agent with supercritical CO2 extraction. The Recipient will conduct various bench-scale tests with input from industry partners on the team. Based on the identified promising technologies in Phase 1, a plan for larger scale testing will be developed. The testing plan may involve laboratory and further increase to field-scale studies. The testing plans will also consider the scalability and commercialization potential for newly developing technologies in comparison to traditional separation methods.

**Task 6.0 – Technology Innovation Centers**

*Subtask 6.1 -* The Recipient proposes a COE for coal ash beneficiation as well as other waste streams located in San Juan County and strategically aligned with the San Juan College School of Energy’s Sustainability Program and San Juan County itself. The Recipient will collaborate with team members to continue the planning and process of establishing the COE. The scope of the COE will be included as part of this project.

**Task 7.0 – Stakeholder Outreach and Education**

*Subtask 7.1 - New Mexico State and Regional Education:* The Recipient will create CM and REE research-based activities that can be shared with local communities in programs such as the NMBGMR/New Mexico Tech summer geology teacher workshop- “Rockin’ Around New Mexico.” Information will also be shared on the NMBGMR Education webpage.

*Subtask 7.2 – Lessons learned and narratives constructed:* Share lessons and activities created for the Rockin’ Around New Mexico workshop on our NMBGMR website will be made available for free public use and distribution.

*Subtask 7.3 – Publications:* The Recipient will create and assemble CM and REE research-related articles for a CM/REE-centered issue of Lite Geology, a biannual online publication written for teachers that includes geology-related topics.

*Subtask 7.4 -Training and Conferencing with San Juan College and COE:* The Recipient will engage regional stakeholders in Farmington, New Mexico, and statewide by partnering with San Juan College to present a CM and REE conference. The conference, held in Farmington, New Mexico, will focus on sharing research into CM and REE resource management, extraction processes from coal and coal fly ash, and the impacts of economic development of REE from coal and coal fly ash in New Mexico, especially in the Farmington region. Breakthroughs in REE research and development have the potential to produce marked impacts on the region. Input from stakeholders will be obtained to prepare, plan, and execute scalable REE extraction and pollution mitigation. This outreach deliverables and training shall be established and developed through San Juan College (SJC) and the COE to be established there.

**D. DELIVERABLES**

The periodic and final reports shall be submitted in accordance with the “Federal Assistance Reporting Checklist” and the instructions accompanying the checklist. In addition to the reports specified in the “Federal Assistance Reporting Checklist”, the Recipient must provide the following to the NETL Project Manager (identified in Block 15 of the Assistance Agreement as the Program Manager)**.”**

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| --- | --- | --- |
| Task | Deliverable Title | Due Date |
| 1.0 | Project Management Plan | Update due 30 days after award. Revisions to the PMP shall be submitted as requested by the NETL Project Manager. |
| 1.1 | Summary of Environmental Justice Considerations | To be included as an appendix to the Final Scientific/ Technical Report |
| 1.2 | Summary of Economic Revitalization and Job Creation Outcomes | To be included as an appendix to the Final Scientific/ Technical Report |
| 1.3 | Environmental, Safety, and Health Analysis | To be included as an appendix to the Final Scientific/ Technical Report |
| 2 | Overall CORE-CM Resource Sampling Plan providing sampling locations, sampling methods for each location, and site-specific access agreements | Due to NETL Project Manager before accessing the site. |
| 2 | Initial Basinal Resource Assessment | Due at the end of the Period of Performance. |
| 2 | Characterization and Data Acquisition Plan | Due at the end of the Period of Performance. |
| 3 | Initial Waste Stream Reuse Plan | Due at the end of the Period of Performance. |
| 4 | Results of the Basinal Strategies for Infrastructure, Industries and Business Assessment | Due at the end of the Period of Performance. |
| 5 | Initial Technology Assessment and Field Development Plan | Due at the end of the Period of Performance. |
| 6 | Initial Technology Innovation Center Plan | Due at the end of the Period of Performance. |
| 7 | Initial Stakeholder Outreach and Education Plan | Due at the end of the Period of Performance. |
| 1 | Phase 1 Interim Report | Due to NETL Project Manager 12 months and 24 months after award. At 12 months, this will include an outline of deliverable reports and preliminary findings to date. At 24 months this will include a summary of findings over the prior 12 months. |
| 2 | Energy Data Exchange (EDX) FOA-2364 REE  Researcher Database Template (per Appendix G of FOA 2364) | All available collected data shall be submitted by 12/31/2024 to the NETL Project Manager. A revised template including all data collected during project performance will be due at the end of the Period of Performance to the NETL Project Manager. Due 60 days after data is produced and a (final) update is due with Phase 2 down-select application. State-specific, county-specific, and site-specific resource characterization and geographic location data (i.e., elemental concentrations; proximate/ultimate analyses; ash content; phase identification/concentrations; morphology information; etc.), and characterization information will be supplied to NETL and made publicly available through inclusion on NETL’s EDX database platform. See Note below.\*  Note: Resource assessment may include data retrieved from literature review or obtained from unpublished sample repositories/historical samples, etc. Every effort should be made to provide the DOE this data, from where the data was obtained (i.e., tables/citations in final report), and any other pertinent info such as testing and characterization method. DOE asks the awardee to complete the REE Researcher Database Template as best as they can for this data. |
| 2 | Inputs for NETL REE-SED Sample Data Needs (per Appendices H and I of FOA 2364) | Due at the end of the period of performance. This information will be supplied in the format specified in Appendix H for uploading into NETL’s Geospatial EDX Database, for use in NETL RIC’s Geologic Models. See Note below.\* |
| 2 | Resource Samples for Mineral Characterization and Analysis | Due to NETL Technology Manager at the end of the Period of Performance, in coordination with assigned NETL Project Manager. Recipients will provide NETL with a single split REE and CM sample for each type of material or core sample assessed in Phase 1 (and if appropriate in continuing phases) that reflects the highest achieved REE or CM concentration identified during conduct of the project effort, and which reflects materials used by the award recipient for their economic assessment. The quantity of sample material should be adequate for laboratory analysis of the sample. Material Safety Data Sheets (MSDS) are required to accompany material supplied to NETL. See Note below.\* Recipients will provide NETL, when possible, splits/slabs of any core obtained during the conduct of the project effort. NETL will retain possession any submitted material. Safety Data Sheets (SDS) are required to accompany material supplied to NETL. |

\*Note: Geospatial Data Products should be compliant with requirements of the Federal Geospatial Data Act of 2018 and DOE’s Geospatial Data Strategy <https://www.energy.gov/cio/downloads/doe-geospatial-data-management-strategy-2021-2025>

**E. BRIEFINGS/TECHNICAL PRESENTATIONS**:

The Recipient shall prepare detailed briefings for presentation to the NETL Project Manager at the NETL Project manager’s facility (or virtually at DOE’s discretion), and to the Technology Manager(s) (TMs) located in Pittsburgh, PA or Morgantown, WV (or virtually at DOE’s discretion). The Recipient will make a presentation to the NETL Project Manager and TMs at a kick-off meeting to be held within ninety (90) days of the award. Project progress will be formally presented at an annual NETL Annual Project Review Meeting. Annual briefings shall also be given by the Recipient to explain the plans, progress, and results of the technical effort and a final project briefing at the close of the project shall also be given.

Informal monthly briefings to NETL Project manager (with optional TM/FECM personnel included) will be held. Informal quarterly update meetings, including shareable PowerPoint slides, will be given to the TM and FECM personnel by the Recipient to explain the plans, progress, and results of the technical effort. At the discretion of the Awardee and/or DOE, other briefings/presentations may be added to the SOPO, provided that such briefings/presentations are consistent with the budget, schedule, and scope of the project.