FINANCIAL ASSISTANCE
FUNDING OPPORTUNITY ANNOUNCEMENT

U. S. Department of Energy

Office of Fossil Energy

National Energy Technology Laboratory

"Advanced Technology Solutions for Unconventional Oil & Gas Development"

Funding Opportunity Number: DE-FOA-0001722

Announcement Type: Initial

CFDA Number: 81.089 Fossil Energy Research and Development

Issue Date:	**06/21/2017**
Letter of Intent Due Date:	**Not Applicable**
Pre-Application Due Date:	**Not Applicable**
Application Due Date:	**08/15/2017 at 8:00:00 PM Eastern Time**

NOTE: REGISTRATION/SUBMISSION REQUIREMENTS

Registration Requirements

There are several one-time actions you must complete in order to submit an application in response to this Announcement (e.g., obtain a Dun and Bradstreet Data Universal Numbering System (DUNS) number, register with the System for Award Management (SAM), and register with Grants.gov). Applicants who are not registered with SAM and Grants.gov, should allow at least 44 days to complete these requirements. It is suggested that the process be started as soon as possible.

Applicants must obtain a DUNS number. DUNS website: http://fedgov.dnb.com/webform.

Applicants must register with the SAM. SAM website: http://www.sam.gov/. If you had an active registration in CCR, you should have an active registration in SAM. More information about SAM registration for Applicants is found at: https://www.sam.gov/sam/transcript/Quick_Guide_for_Grants_Registrations_v1.7.pdf.

Applicants must register with Grants.gov. There are 3 steps to this process.

1) **The Authorized Organizational Representative (AOR) must register at: https://apply07.grants.gov/apply/OrcRegister .**
2) **An email is sent to the E-Business (E-Biz) POC listed in SAM. The E-Biz POC must approve the AOR registration using their MPIN from their SAM registration.**
3) **AOR verifies that registration was completed at: http://grants.gov/applicants/applicant_profile.jsp.**

More information about the above steps is provided at: http://www.grants.gov/applicants/organization_registration.jsp.

Applicants must register with FedConnect to submit questions. FedConnect website: www.fedconnect.net.

Questions

Questions relating to the registration process, **system requirements, or how an application form works** must be directed to Grants.gov at 1-800-518-4726 or **support@grants.gov**.

Questions regarding the **content** of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. DOE/NNSA will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Application Preparation and Submission

Applicants must download the application package, application forms and instructions, from Grants.gov. Grants.gov website: http://www.grants.gov/
(Additional instructions are provided in Section IV A of this FOA.)

Where to Submit

Applications must be submitted through Grants.gov to be considered for award. You cannot submit an application through Grants.gov unless you are registered. Please read the registration requirements carefully and start the process immediately. Remember you have to update your SAM registration annually. If you have any questions about your registration, you should contact the Grants.gov Helpdesk at 1-800-518-4726 to verify that you are still registered in Grants.gov.

IMPORTANT NOTICE TO POTENTIAL APPLICANTS: When you have completed the process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step (i.e. Grants.gov registration).

Section I - FUNDING OPPORTUNITY DESCRIPTION

A. SUMMARY

The intent of this Department of Energy (DOE), National Energy Technology Laboratory (NETL) Funding Opportunity Announcement (FOA) is to select and award projects that focus on critical gaps in our understanding of reservoir behavior, and optimal completion and stimulation as well as waste water disposal in order to increase and enable more cost-efficient and environmentally-sound recovery from shale gas, tight oil, heavy oil, and tight gas resources. This can be achieved by developing technological solutions that enable effective resource recovery from fewer and less environmentally-impactful wells. This announcement is a critical component of the DOE portfolio to advance the environmentally-sound development of domestic unconventional oil and natural gas (UOG) resources. This FOA will support ongoing programmatic efforts in both UOG onshore and offshore to (1) improve our understanding of the processes (e.g. geophysical, geomechanical and geochemical) involved in resource development, (2) develop improved technologies and engineering practices to ensure these resources are developed efficiently with minimal environmental impact and risk, and (3) increase the supply of U.S. oil and natural gas resources in order to enhance national energy security and further reduce energy imports.

B. BACKGROUND

The Energy Information Administration (EIA) estimates that crude oil and condensate production from unconventional (tight oil) reservoirs currently accounts for 69% of U.S. Lower 48 onshore production. By 2040, unconventional tight oil reservoirs are expected to contribute more than 75%. Similarly, natural gas production from unconventional reservoirs (tight gas reservoirs, gas bearing shales, and coal seams) accounts for just under three quarters of U.S. Lower 48 onshore and offshore dry natural gas production (74%), according to the EIA's 2017 Annual Energy Outlook. Gas bearing shale reservoirs are responsible for more than half. By 2040, unconventional gas resources are expected to account for 85% of the nation's domestic gas supply with 68% of this originating from gas bearing shales. With these projections, clearly continued robust production from existing and emerging UOG plays will remain critical to domestic energy security.

The full potential of U.S. oil and gas resources has yet to be realized, and despite the significant growth in the production of UOG resources, very little is known, in detail, about recovery efficiency in these reservoirs. The limited information available suggests that recovery factors (the ratio of produced resource to total in-place resource) are typically quite low, perhaps 20% in gas-rich shale reservoirs and less than 10% in liquid-rich plays. Industry's knowledge and ability to produce these resources is limited primarily to a subset of the UOG resources—in particular, those that are relatively deep (and therefore higher-pressure), organic rich, and hydraulically fracturable (referring to a relatively brittle, clay-poor lithology). A large portion of many plays, especially those that are lower pressure, contain high clay content, and/or contain more ductile rocks are uneconomical to produce with current technologies despite having significant resource volumes.

Much has yet to be learned about the basic physical structure and behavior of UOG resources. For the past century, reservoir engineering has developed within the context of conventional reservoirs. However, in the nanoscale, organic-matter-rich context of shale reservoirs in particular, basic reservoir petrophysical properties (porosity, hydrocarbon saturation, and others) are determined by phenomena occurring across a broad spectrum of spatial scales. Further, unlike conventional reservoirs, production response is not primarily controlled by the nature of the reservoir, but instead is a complex interaction between the reservoir and the nature of the well stimulation. Therefore, in UOG settings, neither the in situ nature of hydrocarbon occurrence nor the resultant flow properties of the stimulated reservoir are well known, and neither lends itself to ready diagnosis from standard analyses of log, core, or production data.

The fundamental science required to inform a practical understanding of UOG reservoirs and their response to stimulation is lacking, and therefore, so is the potential for more efficient and less impactful resource recovery. The concept of "prudent development" describes the shared goal to optimally balance maximization of the national energy security and economic benefits of UOG development with minimization of any associated negative environmental impacts. The federal role and success in this effort, and in other allied R&D efforts, will strengthen America's energy independence, protect air and water quality, position the nation as a global leader in UOG resource development technologies, and ensure that the maximum value of the nation's resource endowment is realized.

Applicants should familiarize themselves with the DOE's Office of Fossil Energy's (FE) research portfolio; in particular, the ongoing Field Laboratory projects and the recently completed projects resulting from the Energy Policy Act of 2005 (EPAct), Ultra-Deepwater and Unconventional Natural Gas and Other Petroleum Resources Research and Development Program. Information can be found at:

https://www.netl.doe.gov/research/oil-and-gas/project-summaries/unconventional-resources
and
http://www.rpsea.org/media/files/files/8e3cfa6a/RPSEA_Final_Report_42677R-01.pdf.

NOTE: Those offshore projects (ones with 11 digit proposal numbers) listed in Appendix B of the second report link above are of primary interest for the offshore focus of this FOA (Topic Area 3).

Also, for more information on domestic unconventional resources and the technical challenges of developing them, see
https://www.netl.doe.gov/File%20Library/Research/Oil-Gas/2011-005539-unc-fe-report-congress-final-oct-2011.pdf

C. OBJECTIVES AND TECHNICAL TOPIC AREAS

Current UOG development can benefit significantly from advanced scientific understanding of the thermodynamic, petrophysical, chemical, and geomechanical processes controlling UOG reservoirs and the interaction between such reservoirs and stimulation practices. Given current estimates of UOG resources, the benefits of advanced science and technology that allow greater resource recovery from fewer wells could be substantial. For example, any increase in the recovery factor would considerably expand the nation's resource base, with significant economic benefits. At present resource estimates, every 1% increase in recovery efficiency adds 50 to 100 tcf to the nation's recoverable resource base.

Efficient UOG development that leads to minimal negative environmental impacts for the communities within which it is integrated can benefit from improved understanding of both intended and unintended subsurface effects of hydraulic fracturing. Improved hydraulic fracture diagnostics are needed to help producers understand how fracture treatment design affects well productivity and enables wells to efficiently recover the maximum amount of oil and gas with the minimum degree of surface disturbance. Improved subsurface diagnostics with respect to induced seismicity can help states and disposal well operators design reasonable safeguards related to fracture flowback water disposal and its potential to initiate low-level seismic activity.

Finally, while the U.S. offshore is not currently a focus area for the development of tight oil, shale gas or other resources within the categories typically considered as "unconventional," much like those unconventional plays the development of ultra-deepwater resources requires the development and application of new technologies to make their recovery technically and economically possible. In this area, offshore development can benefit from improved technologies to prevent oil spills. Such spills not only have the ability to create environmental damage, but also to create economic havoc for local communities and reduce the flexibility needed to tap all parts of the Nation's oil and gas endowment.

Accordingly, this FOA includes three primary topic areas:

1. Technology Validation Using Field Laboratories
2. Advancement in Subsurface Diagnostics
3. Offshore Spill and Leak Prevention

The primary objective of this FOA is to address critical gaps in our understanding of reservoir behavior and optimal well completion strategies as well as waste water disposal in order to enable more cost-efficient UOG resource recovery. This will be achieved through a strategy that includes funding, through this announcement, of at least two "cornerstone" Field Laboratory projects (Topic Area 1). A major emphasis of a Field Laboratory is to gather and disseminate comprehensive data sets to support the testing and validation of innovative technologies and engineering concepts being developed by industry and DOE.

TOPIC AREAS

NOTE: Applicants must identify the Topic Area they are applying against within the Narrative of the application. If DOE believes an application fits more appropriately in a different Topic Area than the one identified within the application, DOE may consider the application under the more appropriate Topic Area. Applicants may submit applications to one or more Topic Areas. However, the Applicant must submit separate applications for each Topic Area under which they are applying.

General Requirements – All Topic Areas:

Applicants are encouraged to propose projects comprised of joint industry partnerships (JIPs) in order to more rapidly disseminate research and project results among a broader industry and scientific audience and to facilitate wider commercialization of technologies and innovative approaches across regions/basins/plays. Projects not consisting of a JIP structure should consider within their organizational structure an advisory committee comprised of industry representatives and/or technical area experts so as to inform and guide project progress as well as review project results.

Applications selected for award as a result of this FOA will be required to submit to NETL a Data Management Plan (DMP) within 90 days of award. The DMP is a document that outlines the proposed plan for data sharing and preservation. Data generated from projects awarded as a result of this FOA shall be submitted to NETL for inclusion in the NETL Energy Data eXchange (EDX), https://edx.netl.doe.gov/. The Recipient should work with the DOE Project Officer to identify the proper file formats prior to submission. All final data generated by this project shall be submitted to EDX including, but not limited to: 1) datasets and files, 2) metadata, 3) software/tools, and 4) articles developed as part of this project.

Describe in detail all modeling efforts (e.g., reservoir modeling) to be included in the project and whether these efforts will be a continuation of existing models or a new model. If a continuation of an existing model, describe if the model is proprietary or available to industry, and how this research effort will fill any gaps in the model's applicability. **Note: If DOE is paying for new model development, then the model(s) will be required to be delivered to DOE at the close of the project, along with ALL acquired data inputs and relevant model outputs for subsequent use and distribution by DOE. In addition, applications that propose modeling ONLY but that DO NOT include lab-scale experiments or any other research effort will be considered non-responsive and will not be eligible for award.**

Applicants shall provide a discussion of any emerging technologies and/or innovative approaches to be developed or tested. The Applicant should clearly describe the current state of the proposed technology (i.e., its Technology Readiness Level [TRL]), the approach to advance the TRL through the proposed research effort, and the anticipated TRL of the technology at the end of the project performance period. The proposed technical approach should clearly link project tasks/subtasks to TRL-based activities as described in the table on page 12 of this announcment. Applications submitted in response to this FOA should propose emerging technologies that fall within the range of a minimum starting TRL of 3 through a TRL of 5.

Under this competitive Announcement, the following Topic Areas are being considered:

Topic Area 1: Technology Validation using Field Laboratories

Field experiments to acquire new scientific knowledge or validate newly-developed technology are vital for understanding the nature of oil and natural gas resource recovery as well as any environmental implications of UOG development. While industry partners often provide opportunities for researchers to gather data and test new concepts, timing, location, and other operational factors can preclude scientific data acquisition under ideal conditions.

DOE seeks to secure a "research well of opportunity" to enable an open, collaborative, and integrated program of scientific data acquisition and technology development/testing. A successful Applicant will provide access to a well or development site and propose initial plans for scientific testing (subject to review and approval by DOE) that will allow for the collection and dissemination of samples (e.g., core, water, gas) and data (e.g., log, seismic, production), the investigation of scientific and engineering concepts, and the testing and validation of advanced technologies and methods.

An alternative to a "research well of opportunity" is the concept of the "virtual field laboratory." In this case, existing and newly-acquired data are brought together from various complementary sources and made available for analysis. For example, envisioned is the potential for a number of operators to pool physical samples (e.g., core) and data from related sources from a specified field or region. While this concept may have limited applicability in the pursuit of the testing and evaluation of new and innovative technologies and techniques, the establishment of a virtual field laboratory is a reasonable substitute for some research questions such as those focused on improved characterization and quantification of the resource potential of the emerging play and of the regional impacts resulting from (expanded) development of the play.

Topic Area 1 is divided into two subtopic areas. The primary distinction between the two subtopics is that Subtopic Area 1A is focused on existing unconventional resource (heavy oil, shale gas, tight gas, or tight oil) plays under active development and production exceeding 50,000 barrels per day (equivalent). Subtopic 1B however, seeks to address the unique challenges within emergent unconventional resource plays where there is currently less than 50,000 barrels per day (equivalent) production. These

subtopics are described in greater detail below, following the General Requirements for all applications submitted under Topic Area 1.

General Requirements – Topic Area 1:

Applications received containing a proposed "well of opportunity" field laboratory must provide written commitment by an industry partner(s) for access to a commercial site and/or well.

Topic Area 1 Applicants should describe existing site data—digital and non-digital—and any physical samples such as core and cuttings that will be made available to support the proposed Field Laboratory project as well as the availability and accessibility of existing facilities, equipment, and infrastructure required to perform proposed project tasks and operations.

Applicants should discuss their strategy and technical approach for the collection, storing and dissemination of all existing or newly-acquired physical samples (e.g., core, cuttings, liquids, and gases) that support the technical objectives of the proposed effort. It is DOE's desire that samples are made available to the broadest possible scientific audience and that this discussion expand on what materials/samples will be made available and by what means. At a minimum, the strategy should include the development of a catalog of available geologic materials/samples collected under the project. This catalog should be maintained throughout the project by the Recipient, and provided to NETL annually. The recipient must ensure physical access to those materials/samples by NETL upon request.

Proposed Field Laboratory projects should capitalize on the ability to assess site baseline conditions (e.g., background seismicity, air quality, surface water or groundwater conditions, and land/ecosystem status) before field activities begin (e.g., drilling, completion, stimulation, or deep well disposal) and should consider sampling and/or monitoring continuously throughout the life cycle of the project.

Subtopic 1A: Established Unconventional Oil and Gas Plays

The focus of this subtopic area is to conduct scientific data acquisition and to develop/test technologies and techniques to drive improved resource recovery from unconventional plays with production greater than 50,000 BOPD, in which active development and production is underway. DOE's preference is that applications submitted under this subtopic area will further DOE's commitment to research in liquid-rich unconventional hydrocarbon plays. Some of the plays that fall into this category are the liquid-rich windows of the Permian Basin-Wolfcamp, Bakken, Utica, Niobrara, and Eagle Ford. DOE will consider applications in these as well as other proposed—liquid-rich or dry gas—plays.

Applicants shall describe the unique challenges and benefits of the proposed Field Laboratory project. While DOE will not exclude from review those applications under Subtopic Area 1A proposing a Field Laboratory project in plays already addressed by ongoing field lab projects (Permian Basin-Wolfcamp, Utica and Marcellus shales), said applications shall recognize and differentiate the benefits of the proposed project relative to those ongoing projects. Research areas of specific interest include, but are not limited to:

- Innovative and breakthrough technologies for improved subsurface characterization, visualization, and diagnostics. This may include approaches and/or technologies to inform hydraulic fracture stimulation treatment effectiveness, including characterization of fracture development and propagation, fluid and proppant emplacement, reservoir response, and stimulated rock volume.
- Improved understanding of the petrophysical, geological, and geochemical conditions of reservoir rock and seals before, during, and after reservoir stimulation that provides scientific insights into the relationship between stimulated treatment design/application and the resulting stimulated rock volume.
- New technologies and/or approaches that can enable or accelerate dramatic improvements in drainage volume, per well resource recovery efficiency, and ultimate field resource recovery.
- Measurements of seismic events, from micro to macro, and/or changes in subsurface stress associated with reservoir stimulation, and/or injection and production activities within the formations, to provide scientific insights into the relationships between operational activities and induced seismic activity, if induced seismicity is a factor.
- Real-time, "ahead of the bit," remote sensing technology that can help drillers locate horizontal laterals with more precision and optimize well performance and ultimate recovery.
- "Smart" technologies (e.g. "smart" drilling mud and cement with enhanced sensing properties) to better characterize the downhole environment and assess hazards.
- Development and validation testing of emerging tools and techniques to assess and/or assure long-term wellbore integrity, including the isolation of production zones from overlying sources of water.

- Research designed to advance the knowledge base of the potential of alternatives to conventional "slickwater" hydraulic fracturing fluids and for enhanced gas or oil recovery (EGR/EOR) from unconventional resources, including advancements in our understanding of the complex interaction of injected agents with the existing rock matrix and reservoir fluids. Research proposed may consider these interactions and the changes over time utilizing various EGR/EOR agents such as CO_2 or natural gas. Research should address the challenges of flow conformance and sweep efficiency, and the geophysical and geochemical mechanisms governing EGR/EOR.

Subtopic 1B: Emerging Unconventional Plays

Field Laboratories proposed under Subtopic Area 1B must address emerging unconventional oil or natural gas plays where there is currently less than 50,000 barrels per day (equivalent) production. Funding under this subtopic area shall be awarded to either a not-for-profit or university-based consortium comprised of industry, academia, and stakeholder groups which may include non-governmental organizations. A major focus of this subtopic area is to characterize and quantify the resource potential of the emerging unconventional oil and gas plays and to conduct investigations that elucidate the benefits, impacts, and technical challenges of expanded and prudent development of these plays. In addition to the research areas of interest discussed above for Subtopic 1A, projects proposed under this subtopic area may also include, the following research studies:

- Environmental impacts including potential water consumption and water quality impacts.
- Socio-economic impacts of oil and gas development, including local and regional impacts.
- Investigation of regional infrastructure availability, needs and challenges.
- Development of best practices and techniques for prudent resource development including the design of advanced completion and stimulation techniques.

Topic Area 2: Advancement in Subsurface Diagnostics

Over the past decade, a marked increase in earthquakes with a moment magnitude (M) equal to or greater than 3.0 (earthquakes with potential to be felt at the surface) has been observed throughout the continental United States, including in Arkansas, Colorado, Ohio, Oklahoma, and Texas. Although any injection or withdrawal of fluids from the subsurface can alter local stress conditions, resulting in the increased potential to induce seismic events, wastewater disposal is considered more likely to generate seismicity due to the nature, volumes, and duration of injection. These factors, when combined with the high permeability of the reservoirs, allow increased fluid pressure to be felt over a much larger volume of the subsurface. This pressure perturbation can cause effective stress changes in near-by faults, inducing slip events. In contrast to wastewater injection, hydraulic fracture stimulation is much less likely to significantly alter the subsurface pore pressure away from the stimulated well because of the low permeability of UOG reservoirs and the short duration and relatively low volumes of injected fluid. Nonetheless, induced seismicity linked to hydraulic fracturing is rare, the cause and effect relationship is not well understood, and the likelihood of such events occurring increases as UOG development intensifies. For this topic area, DOE seeks to address this concern through research that provides science-based, useful information to stakeholders, regulators, and operators, including well stimulation and wastewater disposal operators. Key areas of research interest include:

- Collection and new analysis of digitized datasets including subsurface geology, permeability, faults, regional/local stress, and seismic history (i.e., seismic event catalogues).
- Techniques that measure changes in subsurface stress magnitudes and/or directions during water injection activities.
- Tools and approaches to characterize the conditions in the subsurface that make induced seismicity likely.
- Models to understand and forecast the subsurface mechanisms that lead to induced seismic events.
- Tools, technologies, and methods to manage the risk of induced seismicity.

Another subsurface diagnostics issue involves our ability to accurately characterize the dimensions and orientation of created hydraulic fractures. Current technologies (e.g., microseismic fracture mapping), while valuable, are expensive and in some cases inaccurate. It may be that a larger suite of diagnostic tools and modeling options can lead to more accurate characterization and a much better understanding of how to optimize fracture treatment design.

Research topics considered suitable under this topic area include but are not limited to:

- Next generation, physics-based geomechanical models (e.g., peridynamic models).
- New ways to process, analyze, and utilize existing geophysical data (e.g. integration of S and P wave response).

- Next generation distributed temperature sensing (DTS) and distributed acoustic sensing (DAS) fiber optics.
- Transient poroelastic diagnostic techniques (using pressure and flow rate measurements to infer fracture volume).
- Electromagnetic techniques, including the use of electromagnetically active proppants.
- Techniques that incorporate devices into proppant mixtures that communicate their location.

General Requirements – Topic Area 2:

Applications that propose DOE funding to support installation of a seismic monitoring network must demonstrate that either no seismic network currently exists in the proposed geographical area of interest or, in circumstances where seismic networks do already exist, how the proposed monitoring network improves upon or enhances the existing network capabilities.

Applicants should clearly identify how predictive models will be validated, the data that will be used to validate the model, and what the established criteria will be to show that the predictive capabilities of the model are statistically relevant.

Topic Area 3: Offshore Spill and Leak Prevention

The deepwater offshore environment is complex and technically challenging. Additional research is needed to characterize and mitigate risks, including oil spills. Of interest are innovative solutions from topside through the reservoir that predict geologic hazards and prepare for and prevent offshore incidents and loss of life through risk reduction and mitigation technologies. Specific research areas of interest include but are not limited to the following:

- Develop technologies to reduce and mitigate the risk of oil spills and leaks due to geological uncertainty through research to better characterize geologic hazards in deepwater and ultra-deepwater in real-time and communicate those data while drilling in order to reduce the risk of loss of well control. This area includes technologies that improve our ability to map and model sub-salt sediments to assist in determining whether some areas are more prone than others to overpressure, especially those focused directly on reducing the risk of blow-outs in an active exploration area in the deepwater Gulf of Mexico.
- Develop technologies to improve the ability to reliably and quickly inspect and control subsea completion infrastructure in order to mitigate equipment failure. This includes technologies for remote sensing data acquisition and analysis in addition to materials research focused on improved understanding of failure mechanisms, subsea acoustic leak detection, and the real-time detection of reservoir souring.
- Develop technologies to improve well control while drilling, that leads to real-time corrective actions, and increased long-term well reliability focusing on reducing the risk that leads to oil spills. This includes technologies such as next generation geochemical sensors with the potential for accurate, detailed geologic characterization of both formation and in-situ fluids downhole in real-time.
- Develop technologies to improve the efficiency and accuracy of autonomous subsurface and subsea monitoring during drilling and production operations for early detection and advance warning of potential failures and the avoidance of leaks and costly unplanned repairs.
- Develop new process-focused technologies and chemicals to prevent and mitigate disruption to hydrocarbon flow from hydrate formation and asphaltene and paraffin deposits during operations under extreme conditions of high pressure and high temperature.
- Develop technologies and structure design practices for prevention of excessive facility congestion in order to reduce deflagration-to-detonation risk.
- Develop next-generation deepwater well integrity technologies. This includes technologies that provide improved understanding of cement properties under extreme temperature and pressure conditions and in the presence of contaminants in wellbore fluids during drilling and completion operations. It also includes new cement formulations utilizing additives such as polymers, resins, or nanoparticles to improve cement properties and long-term reliability. It further includes advanced sensors capable of detecting and transmitting pressure, corrosion, or other data from behind pipe or within the reservoir for predicting well integrity issues before they occur.

General Requirements – Topic Area 3:

DOE recently completed an offshore portfolio of research projects during the period 2008-2016 that should be considered by potential Applicants as a launching point for new research. Applications of special interest to DOE are those low TRL, pre-commercial projects that are continuing or that can gain industry support to continue from this offshore portfolio. For more information on this portfolio of

projects see the file link in Section I.B or http://www.rpsea.org/ Ultra-Deepwater Program.

Also of interest is early stage research related to the precursors associated with the challenges being addressed by other Federal spill prevention research of high TRL or commercial technology such as that conducted by the Department of the Interior, Bureau of Safety and Environmental Enforcement (https://www.bsee.gov/what-we-do/research/tap).

TECHNOLOGY READINESS LEVELS

TRL	Definition	Description
1	Basic principles observed and reported	Core Technology Identified. Scientific research and/or principles exist and have been assessed. Translation into a new idea, concept, and/or application has begun.
2	Technology concept and/or application formulated	Invention Initiated. Analysis has been conducted on the core technology for practical use. Detailed analysis to support the assumptions has been initiated. Initial performance attributes have been established.
3	Analytical and experimental critical function and/or characteristic proof-of-concept validated	Proof-of-Concept Validated. Performance requirements that can be tested in the laboratory environment have been analytically and physically validated. The core technology should not fundamentally change beyond this point. Performance attributes have been updated and initial performance requirements have been established.
4	Basic technology components integrated and validated in a laboratory environment	Technology Validated in a Laboratory Environment. The basic technology components have been integrated to the extent practical (a relatively low-fidelity integration) to establish that the pieces will work together, and validated in a laboratory environment. Performance attributes and requirements have been updated.
5	Basic technology components integrated and validated in a relevant environment	Technology Validated in a Relevant Environment. Basic technology component configurations have been integrated and validated in a relevant environment. Integration is similar to the final application in most respects. Data sufficient to support planning and design of the next TRL test phase have been obtained. Performance attributes and requirements have been updated.
6	Prototype validated in a relevant environment	Prototype Validated in Relevant Environment. A high-fidelity prototype, integrated to the extent practical, has been validated in a relevant environment. Data sufficient to support planning and design of the next TRL test phase have been obtained. Performance attributes and requirements have been updated.
7	Fully integrated prototype validated in an operational system	Fully Integrated Prototype Validated in Operational Environment. A high-fidelity unit, which addresses all scaling issues, has been built and tested in an operational environment. Data sufficient to support planning and design of the next TRL test phase have been obtained. Performance attributes and requirements have been updated.
8	Actual technology successfully commissioned in an operational system	Actual Technology Commissioned. The actual technology has been successfully commissioned for its target commercial application. In almost all cases, this TRL represents the end of true system development.
9	Actual technology operated over the full range of expected operational conditions	Commercially Operated. The actual technology has been successfully operated long-term and has been demonstrated in an operational system, including (as applicable) shutdowns, startups, system upsets, weather ranges, and turndown conditions. Technology risk has been reduced so that it is similar to the risk of a commercial technology if used in another identical plant.

Section II - AWARD INFORMATION

A. TYPE OF AWARD INSTRUMENT

Cooperative Agreements

- DOE anticipates awarding cooperative agreements under this funding opportunity announcement (See Section VI.B.2 Statement of Substantial Involvement).

B. ESTIMATED FUNDING

Amount Multiple Year Awards

- Approximately $10,000,000 is expected to be available for new awards in FY 2017 and an additional $10,000,000 is expected to be available for awards under this announcement in years FY 2018 through FY 2019. Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

C. MAXIMUM AND MINIMUM AWARD SIZE

Ceiling (i.e., the maximum amount for an individual award made under this announcement):
Topic Area 1: $8,000,000 (DOE)
Topic Area 2: $1,500,000 (DOE)
Topic Area 3: $1,500,000 (DOE)

D. EXPECTED NUMBER OF AWARDS

Number of Awards per Program Area

- Under this announcement, DOE expects to make the following number of awards for each Program /Topic Area. However, DOE reserves the right to select from any or all Topic Areas.

Topic Area	Number of Awards
1	2 to 3
2	up to 5
3	up to 3

E. ANTICIPATED AWARD SIZE

The anticipated award size for projects under each Program/Topic Area in this Announcement is as shown in the following table.

Topic Area	Award Size (DOE Share)
1	$5,000,000 -- $8,000,000
2	$500,000 -- $1,500,000
3	$500,000 -- $1,500,000

F. PERIOD OF PERFORMANCE

Period of Performance Per Program Area

- The anticipated period of performance for projects under each Program/Topic Area in this announcement is:

Topic Area	Number of Months
1	36-60
2	24-48
3	24-48

G. TYPE OF APPLICATION

New Applications Only

- DOE will accept only new applications under this announcement.

Section III - ELIGIBILITY INFORMATION

A. ELIGIBLE APPLICANTS

1. Individuals

U.S. citizens and lawful permanent residents are eligible to apply for funding as a prime recipient or subrecipient.

2. Domestic Entities

For-profit entities, educational institutions, and nonprofits that are incorporated (or otherwise formed) under the laws of a particular State or territory of the United States are eligible to apply for funding as a prime recipient or subrecipient.

State, local, and tribal government entities are eligible to apply for funding as a prime recipient or subrecipient.

DOE/NNSA Federally Funded Research and Development Centers (FFRDCs) and DOE Government-Operated Government-Owned laboratories (GOGOs) are not eligible to apply for funding as a prime recipient, but may be proposed as a subrecipient. See Section III.C.

Non-DOE/NNSA FFRDCs and non-DOE GOGOs are eligible to apply for funding as a subrecipient, but are not eligible to apply as a prime recipient.

Federal agencies and instrumentalities (other than DOE) are eligible to apply for funding as a subrecipient, but are not eligible to apply as a prime recipient.

NOTE: NETL is not considered eligible for award under this announcement and may not be proposed as a team member on another entity's application.

3. Foreign Entities

Foreign entities, whether for-profit or otherwise, are not eligible to apply for funding under this FOA as a prime recipient. However, a foreign entity may receive funding as a subrecipient.

4. Incorporated Consortia

Incorporated consortia, which may include domestic and/or foreign entities, are eligible to apply for funding as a prime recipient or subrecipient. For consortia incorporated (or otherwise formed) under the laws of a State or territory of the United States, please refer to "Domestic Entities" above. For consortia incorporated in foreign countries, please refer to the requirements in "Foreign Entities" above.

Each incorporated consortium must have an internal governance structure and a written set of internal rules. Upon request, the consortium must provide a written description of its internal governance structure and its internal rules to the DOE Contracting Officer.

5. Unincorporated Consortia

Unincorporated consortia, which may include domestic and foreign entities, must designate one member of the consortium to serve as the prime recipient/consortium representative. The prime recipient/consortium representative must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. The eligibility of the consortium will be determined by the eligibility of the prime recipient/consortium representative under Section III.A of the FOA.

Upon request, unincorporated consortia must provide the DOE Contracting Officer with a collaboration agreement, commonly referred to as the articles of collaboration, which sets out the rights and responsibilities of each consortium member. This agreement binds the individual consortium members together and should discuss, among other things, the consortium's:

* Management structure;

* Method of making payments to consortium members;

* Means of ensuring and overseeing members' efforts on the project;

* Provisions for members' cost sharing contributions; and

* Provisions for ownership and rights in intellectual property developed previously or under the agreement.

B. COST SHARING

The non-federal cost share must be at least 20% of the total allowable costs for research and development projects (i.e., the sum of the Government share, including FFRDC contractor costs if applicable, and the recipient share of allowable costs equals the total allowable cost of the project) and must come from non-Federal sources unless otherwise allowed by law. (See 2 CFR part 200 and 2 CFR part 910 [DOE Financial Assistance Regulation] for the applicable cost sharing requirements.)

Total Project Costs = DOE Share + Applicant Cost Share

If FFRDC participates: Total Project Costs = DOE Share + FFRDC Costs + Applicant Cost Share

If the award is terminated or discontinued, the Recipient must refund sufficient funds to the Government in order to achieve the Recipient's cost share percentage based on total allowable project cost.

C. OTHER ELIGIBILITY REQUIREMENTS

FFRDC/National Laboratories

Federally Funded Research and Development Center (FFRDC) Contractors. FFRDC contractors may be proposed as a team member on another entity's application subject to the following guidelines:

Authorization for non-DOE/NNSA FFRDCs. The Federal agency sponsoring the FFRDC contractor must authorize in writing the use of the FFRDC contractor on the proposed project and this authorization must be submitted with the application. The use of a FFRDC contractor must be consistent with the contractor's authority under its award and must not place the FFRDC contractor in direct competition with the private sector.

Authorization for DOE/NNSA FFRDCs. The cognizant contracting officer for the FFRDC must authorize in writing the use of a DOE/NNSA FFRDC contractor on the proposed project and this authorization must be submitted with the application. The following wording is acceptable for this authorization.

"Authorization is granted for the [*Name*] Laboratory to participate in the proposed project. The work proposed for the laboratory is consistent with or complementary to the missions of the laboratory, will not adversely impact execution of the DOE/NNSA assigned programs at the laboratory, and will not place the laboratory in direct competition with the domestic private sector."

Value/Funding. The value of, and funding for, the FFRDC contractor portion of the work will not normally be included in the award to a successful Applicant. Usually, DOE/NNSA will fund a DOE/NNSA FFRDC contractor through the DOE field work proposal system and other FFRDC contractors through an interagency agreement with the sponsoring agency.

Cost Share. The Applicant's cost share requirement will be based on the total cost of the project, including the Applicant's and the FFRDC contractor's portions of the effort.

FFRDC Contractor Effort:

1) The scope of work to be performed by the FFRDC contractor may not be more significant than the scope of work to be

performed by the Applicant.
2) The FFRDC contractor effort, in aggregate, shall not exceed 25% of the total estimated cost of the project, including the Applicant's and the FFRDC contractor's portions of the effort.

Responsibility. The Applicant, if successful, will be the responsible authority regarding the settlement and satisfaction of all contractual and administrative issues, including but not limited to, disputes and claims arising out of any agreement between the Applicant and the FFRDC contractor.

NETL is not eligible for award under this announcement and may not be proposed as a team member on another entity's application. An application that includes NETL as a team member will be considered non-responsive.

D. PERFORMANCE OF WORK IN THE UNITED STATES

The Recipient agrees that at least 75% percent of the direct labor cost for the project (including subrecipient labor) shall be incurred in the United States, unless the Recipient can demonstrate to the satisfaction of the Department of Energy that the United States economic interest will be better served through a greater percentage of the work being performed outside of the United States.

Applicants and prime recipients may request a waiver of this requirement. Applicants must include a written waiver request in the Full Application. Prime recipients must submit any waiver requests in writing to the DOE Contracting Officer for this FOA. The DOE Contracting Officer has discretion to waive this requirement if he/she determines that it will further the purposes of this FOA and is otherwise in the best interest of the Government. If you would like to request a waiver see Section VIII.

E. LABORATORY OR FIELD COMPONENT

Applications are sought with a laboratory or field test component to complement the research, modeling, or experimentation effort addressing the associated Topic Area. Applications that propose research and/or modeling efforts WITHOUT a laboratory or field test/field-based data collection component will be considered non-responsive and will not be eligible for award.

Section IV - APPLICATION AND SUBMISSION INFORMATION

A. ADDRESS TO REQUEST APPLICATION PACKAGE

Apply at Grants.gov

- Application forms and instructions are available at Grants.gov. To access these materials, go to http://www.grants.gov, select "APPLICANT", then Click "Apply for Grants," and then select "Download a Grant Application Package." Enter the CFDA and/or the funding opportunity number located on the cover of this announcement and then follow the prompts to download the application package.

NOTE: (In accordance with Section I. Funding Opportunity Description) Applicants must identify the Topic Area they are applying against within the Narrative of the application. If DOE believes an application fits more appropriately in a Topic Area other than the one identified within the application, DOE may consider the application under the more appropriate Topic Area. Applicants may submit applications to one or more Topic Areas. However, the Applicant must submit separate applications for each Topic Area under which they are applying. Therefore, the required format for the project title will be "Topic Area 1 or Topic Area 2" and the "Project Title"

B. LETTER OF INTENT AND PRE-APPLICATION

1. Letter of Intent.

Letters of Intent Not Required

- Letters of Intent are not required.

2. Pre-application

Pre-applications Not Required

- Pre-applications are not required.

C. CONTENT AND APPLICATION FORMS

You must complete the mandatory forms and any applicable optional forms (e.g., Disclosure of Lobbying Activities (SF-LLL)) in accordance with the instructions on the forms and the additional instructions below. Files that are attached to the forms must be in Adobe Portable Document Format (PDF) unless otherwise specified in this announcement.

1. SF 424 (R&R)

Complete this form first to populate data in other forms. Complete all the required fields in accordance with the pop-up instructions on the form. The list of certifications and assurances referenced in Field 17 can be found on the DOE Financial Assistance Forms Page at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Certifications and Assurances.

2. RESEARCH AND RELATED Other Project Information

Complete questions 1 through 6 and attach files. The files must comply with the following instructions:

Project Summary/Abstract (Field 7 on the Form)

The project summary/abstract must contain a summary of the proposed activity suitable for dissemination to the public. It should be a self-contained document that identifies the name of the Applicant, the project director/principal investigator(s), the project title, the objectives of the project, and a description of the project, including methods to be employed, the potential impact of the project (i.e.,

benefits, outcomes), and major participants (for collaborative projects). This document must not include any proprietary or sensitive business information as the Department may make it available to the public after awards are made. The project summary must not exceed 2 pages when printed using standard 8.5" by 11" paper with 1" margins (top, bottom, left and right) {single spaced} with font not smaller than 11 point. To attach a Project Summary/Abstract, click "Add Attachment."

Project Narrative (Field 8 on the Form)

The project narrative must not exceed **35 pages for Topic Area 1 and 25 pages for Topic Areas 2 and 3** when printed using standard 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) {single spaced} with font not smaller than 11 point. EVALUATORS WILL ONLY REVIEW THE NUMBER OF PAGES SPECIFIED IN THE PRECEDING SENTENCE. Do not include any Internet addresses (URLs) that provide information necessary to review the application, because the information contained in these sites will not be reviewed. See Part VIII.D for instructions on how to mark proprietary application information. To attach a Project Narrative, click "Add Attachment."

The Project Narrative is intended to provide the bulk of the technical content related to the project being proposed. A specific structure for the Project Narrative document, along with descriptions / instructions for each section, is outlined below. Evaluation of the content of the Project Narrative will be a critical component of the evaluation of the application. The criteria and process by which reviewers will be asked to review the application (including content of the Project Narrative) are defined within this FOA under Section V (Application Review Information).

The project narrative consists of the following:

- Scientific and Technical Merit section as defined below under Section 1
- Technical Approach section as defined below under Section 2
- Management Approach and Capabilities section as defined below under Section 3

The Project Narrative should provide sufficient information so that reviewers will be able to evaluate the application in accordance with the merit review criteria listed under Section V.

The project narrative should be formatted as follows with content as described following the layout.

*******BEGINNING OF DRAFT FORMAT FOR PROJECT NARRATIVE*******

Cover Page [Excluded from the Project Narrative page limitation of 35 single-spaced pages for Topic Area 1 and 25 pages for Topic Areas 2 and 3].

The cover page shall indicate the FOA number (**DE-FOA-0001722**), **Topic Area and Subtopic Area if applicable for which the application is submitted**, title of proposed project (maximum of 140 characters due to system limitations), name and address of the Applicant, technical and business points of contact, telephone/fax number, e-mail address, and date of application.

Table of Contents [Including list of tables, figures, and acronyms; **excluded from the "Project Narrative" page limitation of 35 single-spaced pages for Topic Area 1 and 25 pages for Topic Areas 2 and 3**]

TABLE OF CONTENTS

Project Narrative – Description of Specific Content

This section shall contain the major portion of the technical application prepared in the format of the preceding table of contents while not exceeding the prescribed page limits. It shall be presented in as much detail as practical and include the following technical information. This section should follow the template included below and should be structured to allow reviewers to evaluate that content in accordance with the Merit Review Criteria described in Section V of this FOA.

1. Scientific and Technical Merit

In this section, the Applicant shall provide detailed information, formatted as per the preceding table of contents that will allow DOE reviewers to score the application based on Criterion 1 identified in Section V. Content here is intended to fully describe the technical and scientific aspects of the project proposed.

1.1 Statement of the Problem

The Applicant should discuss the nature and significance (scientific, engineering, economic, environmental, etc.) of the problem being addressed. This section should include a discussion of the current state of technology, knowledge or capabilities, as well as ongoing research being conducted by industry, academia, and other institutions to overcome the problem being addressed in the application. The Applicant should include a discussion of any limitations (technical, costs, others) with regard to the current technology/information and/or research as it relates to the problem being addressed.

1.2 Proposed Advances in Knowledge / Technology

The Applicant should provide a clear, concise statement of the specific objective(s) of the proposed research and show that the proposed research is based on sound scientific and engineering principles designed to overcome the limitations discussed in Section 1.1. The Applicant should identify and discuss the specific advances that will be made over the course of the project and the significance of these advances in terms of the Technology Readiness Level continuum.

NOTE for TOPIC AREA 1 APPLICANTS: Applications submitted in response to Topic Area 1 should include in this section a detailed discussion of the proposed field laboratory site (e.g., well of opportunity or virtual field lab), and the specific engineering principles and advanced technologies / techniques that will be investigated to overcome limitations discussed in Section 1.1. The Applicant should clearly convey the merits of the proposed field laboratory site to achieve the DOE goals and objectives for Topic Area 1 as defined in this FOA.

1.3 Technical Merit of the Proposed Research

This section should discuss and quantify, to the extent appropriate, the potential merits (i.e., impacts/benefits) of the proposed research in comparison to current state of knowledge or technology or current commercial and emerging technologies in terms of additional recovery, reduced costs or improved economics, resolving environmental barriers, or other benefits and the extensiveness of those

benefits to other unconventional oil and gas resources.

1.4 Non-Duplicative Research

The Applicant should provide clear evidence that the proposed research is not duplicative of any ongoing research being performed by industry, academia, or other entities. To the degree possible, the Applicant should substantiate their statements.

1.5 Existing Data (**Topic Area 1 Applications ONLY**)

The Applicant should describe all existing site data (e.g., physical samples, digital data, etc.) that will be made available to support the Field Laboratory project. This discussion should include the quality of the data, its vintage, method used to collect it, its current status/availability to the project team, and any limitations on its use.

2. Technical Approach

In this section, the Applicant shall provide detailed information, as outlined in the preceding table of contents that will allow DOE reviewers to score the application based on Criterion 2 identified in Section V. Content here is intended to describe the specific approach / steps / activities necessary to conduct the research described in Section 1 above and to define the physical resources necessary to implement that approach. The Applicant should include / address the following:

2.1 Statement of Project Objectives (SOPO) and Technical Approach

A detailed SOPO should address how research under the project will be conducted and how the project objectives will be met. The SOPO must contain a clear, concise description of the tasks / subtasks to be completed during project performance. The SOPO should provide a logical progression of tasks and clearly demonstrate the interconnectedness or relationship between tasks such that the results of one task support or feed into another task or other tasks.

The SOPO should follow the specific format outlined below. The content should be limited to definition of the specific activities and should not include extraneous explanation or description of why the research is being done; that should be addressed within Section 1.1 Scientific and Technical Merit. The SOPO may be released to the public by DOE in whole or in part after award. It is therefore required that it shall not contain proprietary or confidential business information.

The SOPO is generally less than 8-10 pages of the total project narrative and is included in the overall page count limit for the project narrative (35 pages for Topic Area 1 and 25 pages for Topic areas 2 and 3).

Note: Specific language listed for Task 1.0, and under "Briefings/Technical Presentations" is mandatory and should be reflected in the SOPO included by the Applicant.

Applicants shall prepare the SOPO in the following format:

*******BEGINNING OF DRAFT FORMAT FOR SOPO*******

*(**Note:** Items following "Note:" are intended to provide guidance regarding the contents to be provided. Please delete all notes before submission.)*

TITLE OF RESEARCH TO BE PERFORMED (Required)
Insert the title of research to be performed. Be concise and descriptive (maximum of 140 characters due to system limitations).

A. OBJECTIVES (Required)
Include the overall objective(s) of the research and an objective(s) for each phase of the research, if applicable.

B. SCOPE OF WORK (Required)

This section should not exceed one-half page and should summarize the effort and approach to achieve the objective(s) of the research for each phase.

C. TASKS TO BE PERFORMED (Required)

Tasks, concisely written, should be provided in a logical sequence and should be divided into the phases of the project, as appropriate. This section provides a concise listing of the specific steps necessary to conduct the proposed project. Projects proposed with multiple phases should be broken along logical technical lines.

PHASE 1

Task 1.0 - Project Management and Planning (Required Task as Written)
(MANDATORY - APPLICANT INSERT THE LANGUAGE PROVIDED BELOW IN QUOTES)

"The recipient shall work together with the DOE project officer upon award to develop a project management plan (PMP). The PMP shall be submitted within 30 days of the award. The DOE project officer shall have 20 calendar days from receipt of the PMP to review and provide comments to the recipient. Within 15 calendar days after receipt of the DOE's comments, the recipient shall submit a final PMP to the DOE project officer for review and approval.

The recipient shall review, update, and amend the PMP (as requested by the DOE project officer) at key points in the project, notably at each go/no-go decision point and upon schedule variances of more than 3 months and cost variances of more than 10%, which require amendments to the agreement and constitutes a re-baselining of the project.

The PMP shall define the approach to management of the project and include information relative to project risk, timelines, milestones, funding and cost plans, and decision-point success criteria.

The recipient shall execute the project in accordance with the approved PMP covering the entire project period. The recipient shall manage and control project activities in accordance with their established processes and procedures to ensure subtasks and tasks are completed within schedule and budget constraints defined by the PMP. This includes tracking and reporting progress and project risks to DOE and other stakeholders."

Task 2.0 - (Title)
Task Description
    Subtask 2.1 (Title and/or Task Description)
    Subsequent Subtasks (Subtask Number, Title and/or Task Description)

Task 3.0 - (Title)
Task Description
    Subtask 3.1 (Title and/or Task Description)
    Subsequent Subtasks (Subtask Number, Title and/or Task Description)

Additional Task/Subtasks titles and descriptions, as necessary

PHASE 2 (Optional)

Task # - (Title), as required
Task Description
    Subtask #.1 (Title and/or Task Description)
    Subsequent Subtasks (Subtask Number, Title and/or Task Description)

List subsequent project phases and tasks/subtasks sequentially numbered through all relevant project phases.

*(**Note:** DOE acknowledges that a well-structured project should have Go/No Go decision points that coincide with project phases. DOE encourages the Applicant to insert decision points into the draft SOPO as appropriate; however, during negotiations DOE will make the final decision*

whether or not to include Go/No Go decision points in the final SOPO. If Go/No Go decision points are planned, the following language will be included in Section C of the SOPO for each Go/No Go decision point:

TECHNICAL GO/NO GO DECISION POINT 1
The Recipient shall meet the following success criteria:

*(**Note:** Define the criteria required to justify moving through the decision point and onto the next project phase or task.)*

The Recipient will provide DOE the data needed to justify proceeding based upon the success criteria outlined above. The Recipient is NOT authorized to proceed beyond this task without the written approval of DOE. If the Recipient unilaterally decides to continue into the subsequent tasks prior to DOE approval, all costs incurred are at the Recipient's risk and no DOE funds may be utilized for reimbursement of such costs.

D. DELIVERABLES (Required)

(MANDATORY - APPLICANT INSERT THE LANGUAGE PROVIDED BELOW IN QUOTES)

"The periodic and final reports shall be submitted in accordance with the Federal Assistance Reporting Checklist attached to the negotiated Financial Assistance Award 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 DOE Project Officer (identified in Block 15 of the Assistance Agreement as the Program Manager):

- "Project Management Plan (PMP).
- Data Management Plan (DMP). Draft DMP should be submitted to DOE within ninety (90) days after award and be updated as necessary throughout the project as requested by the Project Officer.
- Data Submitted to NETL-EDX. Data generated as a result of this project shall be submitted to NETL for inclusion in the NETL Energy Data eXchange (EDX), https://edx.netl.doe.gov/. The Recipient should work with the DOE Project Officer to identify the proper file formats prior to submission. All final data generated by this project shall be submitted to EDX including, but not limited to: 1) datasets and files, 2) metadata, 3) software/tools, and 4) articles developed as part of this project. EDX is designed for flexibility so if your file format is not listed please contact EDXsupport@netl.doe.gov to inquire if it is acceptable for submission. (Please note that EDX has both secure and non-secure servers for your data. If the application is selected then the applicant and the Federal Project Officer should discuss where the project information should be stored)."

Applicants may continue to list the deliverables other than those identified on the Federal Assistance Reporting Checklist that will be delivered. These reports shall also be identified within the text of the Statement of Project Objectives.

Deliverables such as highly-focused technical reports, hardware and software items, video or audio recordings, etc. shall also be listed in Section D. All Deliverables shall be linked to specific Tasks or subtasks identified within the Statement of Project Objectives. See the following examples:

- Task 1.0 – (Deliverable Description)
- Task 2.0 – (Deliverable Description)
- Task 3.0 – (Deliverable Description)

If the application is selected for award, DOE may require the Recipient to include additional Deliverables, provided that such Deliverables are consistent with the budget, schedule, and scope of the project.

Note: Do not include routine progress reports as Deliverables, because these reports will be already required via the Federal Assistance Reporting Checklist.

E. BRIEFINGS/TECHNICAL PRESENTATIONS (Required)

(MANDATORY - APPLICANT INSERT THE LANGUAGE PROVIDED BELOW IN QUOTES)

"The Recipient shall prepare detailed briefings for presentation to the Project Officer at the Project Officer's facility located in Pittsburgh, PA or Morgantown, WV. The Recipient shall make a presentation to the NETL Project Officer/Manager at a project kick-off meeting held within ninety (90) days of the project start date. At a minimum, 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 prior to the end of the period of performance of the project shall also be given."

At the Applicant's discretion, other briefings/presentations may be added to Section E of the SOPO. If the application is selected for award, DOE may require the Recipient to include additional briefings/presentations, provided that such briefings/presentations are consistent with the budget, schedule, and scope of the project.

*******END OF DRAFT FORMAT FOR SOPO*******

2.2 Verification/Validation Efforts

The Applicant should explain how the specific research efforts identified in the SOPO are sufficient to verify/validate (1) the advances desired under the project and (2) the benefits of those advances.

2.3 Quality and Suitability of Facilities, Equipment, and Materials

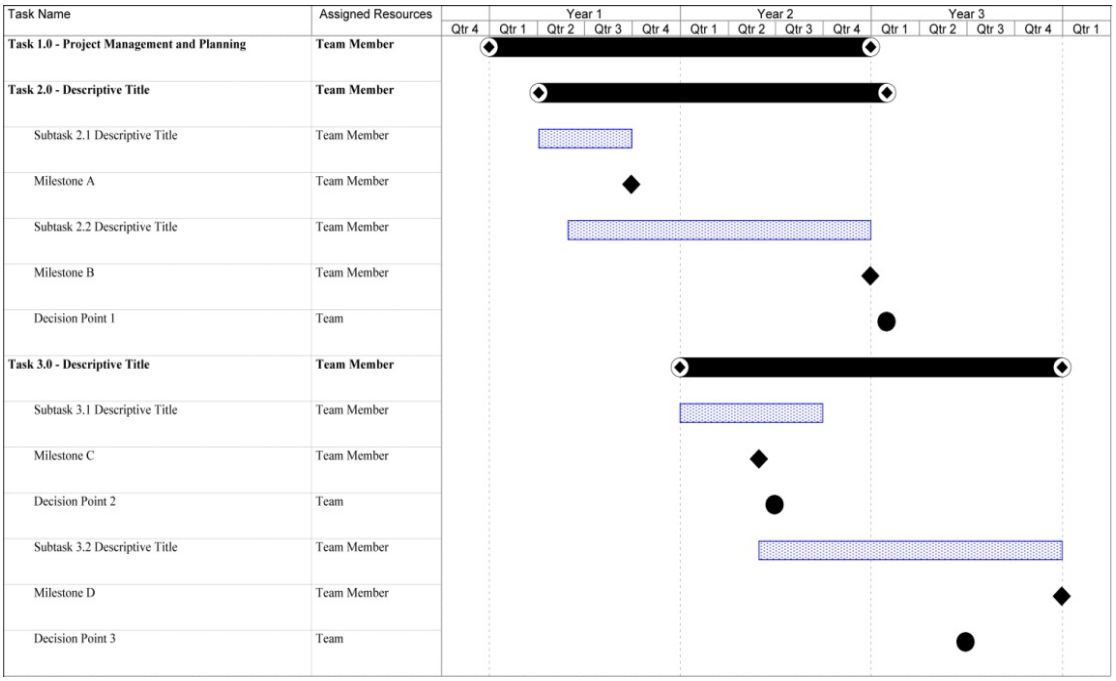
Content should address the specific facilities, equipment and other resources necessary to conduct the activities defined within the SOPO as well as the availability and accessibility of those resources to the Applicant for specific project purposes.

- Facilities and Other Resources: Identify the facilities (e.g., office, laboratory, computer, etc.) to be used at each performance site listed and, if appropriate, indicate their capacities, pertinent capabilities, relative proximity, and extent of availability to the project. Describe only those resources that are directly applicable to the proposed research. Provide any information describing the other resources available to the project such as machine and electronics shops.
- Equipment: List important items of equipment already available for this project and, if appropriate, note the location and pertinent capabilities of each. If proposing to acquire equipment, describe comparable equipment, if any, already at your organization and explain why it cannot be used.

2.4 Project Schedule/Timeline and Milestones

Provide a schedule of the project (similar to the example Gantt chart below) broken down by project phase and by task/subtask identified in the SOPO (Section 2.1 above). The schedule should include a start and end date for each project phase. Each task/subtask should also be identified with a start and end date. The schedule should show interdependencies between tasks and include the milestones that are identified below.

Example Project Schedule



Provide milestones for each phase of the project, and describe the relationship to specific tasks/subtasks identified in the SOPO (Section 2.1 above). Each milestone should include a title, planned completion date, and the method/measure used to verify completion of the milestone. Milestones should be quantitative, technically-based, and show progress toward intermediate project phase or overall project goals. The Applicant shall identify those milestones that represent critical path milestones (no less than 2 per calendar year) which must be met prior to the project proceeding to subsequent activities.

Format for the milestone log should be as follows:

Title:	{Milestone Title}
Planned Date:	{Planned Completion Date}
Verification Method:	{Milestone Verification Method}

2.5 Sample Collection, Preservation & Dissemination (**Topic Area 1 ONLY**)

Applicants should discuss their strategy and technical approach for the collection, storing and dissemination of all existing or newly-acquired physical samples (e.g., core, cuttings, liquids, and gases) that support the technical objectives of the proposed effort. It is DOE's desire that these samples are made available to the broadest possible scientific audience. At a minimum, the strategy should include the development of a catalog of available geologic materials/samples collected under the project. This catalog must be maintained throughout the project by the Recipient, and provided to NETL annually. The recipient must ensure physical access to those materials/samples by NETL upon request.

3. Management Approach and Capabilities

In this section, the Applicant shall provide detailed information, as outlined in the preceding table of contents that will allow DOE reviewers to score the application based on Criterion 3 identified in Section V. Content of this section is intended to address the approach to managing the proposed research, structure of the project organization and qualifications of Applicants and proposed key personnel.

3.1 Project Organizational Structure; Roles and Responsibilities

The Applicant should depict the overall structure planned for the project team including relationships among participating organizations.

Role of Participants: For multi-organizational or multi-investigator project structures, describe the roles and the research to be performed by each participant/investigator, the degree to which each partner provides value added towards achieving the overall objective(s), the business agreements between the Applicant and participants, and how the various efforts will be integrated and managed.

Roles and Responsibilities of Key Personnel: The Applicant should clearly delineate and describe the roles and responsibilities of key personnel assigned to the project team. The labor hours identified for personnel in Section 3.3 Knowledge, Capabilities, Experience, and Availability of Key Personnel (below), should be reflective of these roles and responsibilities.

3.2 Organizations' Corporate Experience in Managing Similar Projects

The Applicant should provide information relevant to the organization's (not individual personnel) capabilities and experience in managing technical projects of similar nature and complexity, including specific examples that demonstrate the ability to successfully meet research objectives within scope, budget and schedule. Depending on their role, relevant information for sub-recipients and consultants should also be provided.

3.3 Knowledge, Capabilities, Experience, and Availability of Key Personnel

The knowledge, capabilities, experience (technical and managerial), and availability of the key personnel to be assigned to the project shall be provided and the percentage of time each would devote to the project should be clearly identified. Resumes of key project personnel shall be included in the "RESEARCH AND RELATED SENIOR/KEY PERSON" file (See Section IV, paragraph C, sub-paragraph 3 of this FOA).

The Applicant shall provide a table and justification for the estimated labor hours and labor categories (e.g., project manager, principal investigator, engineer, technician, scientist, clerical, etc.) required for each task and subtask in the SOPO (section 2.1 above). The table and justification shall include labor hours and labor categories for any proposed subcontracting or consulting effort for each task and subtask. These categories should be easily cross-referenced with the key personnel, and should agree with labor hours identified in the separate "RESEARCH AND RELATED BUDGET" form submitted under SECTION IV, paragraph C, sub-paragraph 4 of this FOA.

3.4 Data Management and Technology Transfer

The Applicant will describe how results of the proposed research will be made available to DOE, the targeted industry segment, and to the greater scientific community. The Applicant will specifically identify and describe the method and frequency (e.g., meetings, conferences, journal articles, and websites) in which the product or information resulting from the research will be made available to the public, in general. **NOTE:** Applications selected for award as a result of this FOA will be required to submit to NETL a Data Management Plan (DMP) within 90 days of award. The DMP is a document that outlines the proposed plan for data sharing and preservation. Data generated from projects awarded as a result of this FOA shall be submitted to NETL for inclusion in the NETL Energy Data eXchange (EDX), https://edx.netl.doe.gov/. The Recipient should work with the DOE Project Officer to identify the proper file formats prior to submission. All final data generated by this project shall be submitted to EDX including, but not limited to: 1) datasets and files, 2) metadata, 3) software/tools, and 4) articles developed as part of this project.

*******END OF DRAFT FORMAT FOR PROJECT NARRATIVE*******

Other Attachments (Field 12 on the form)

If you need to elaborate on your responses to questions 1-6 on the "Other Project Information" document, attach a file in field 12.

Also, attach the following files:

Commitment Letters from Third Parties Contributing to Cost Sharing

If a third party, (i.e., a party other than the organization submitting the application) proposes to provide all or part of the required cost sharing, the Applicant must include a letter from the third party stating that it is committed to providing a specific minimum dollar

amount of cost sharing. The letter should also identify the proposed cost sharing (e.g., cash, services, and/or property) to be contributed. Letters must be signed by the person authorized to commit the expenditure of funds by the entity and be provided in a PDF format. Save this information in a single file named "CLTP.pdf" and click on "Add Attachments" in Field 12 to attach.

Industry Collaboration/Participation Letter

Eligible Applicants will provide an Industry Participation Letter ensuring collaboration between oil and gas operators, oil and gas vendor service companies, software vendor/developers, and other project team members pursuant to the mandatory requirements outlined in Part I of this FOA. Letters must be signed by the person authorized to commit the industry partner to participation in the project. Save this information in a single file named "IPL.pdf" and click on "Add Attachments" in Field 12 to attach.

Budget for DOE/NNSA Federally Funded Research and Development Center (FFRDC) Contractor, if applicable

If a DOE/NNSA FFRDC contractor is to perform a portion of the work, you must provide a DOE Field Work Proposal in accordance with the requirements in DOE Order 412.1 Work Authorization System. This order and the DOE Field Work Proposal form are available at https://www.directives.doe.gov/directives-documents/0412.1-BOrder-A-admchg1. Use the FFRDC name as the file name (up to 10 letters) and attach to the R&R Other Project Information form in Field 12 - Add Attachments.

Environmental Questionnaire

You must complete the environmental questionnaire at https://www.netl.doe.gov/File%20Library/Business/forms/451_1-1-3.pdf . Save the questionnaire in a single file named "Env.pdf" and click on "Add Attachments" in Field 12 to attach.

Notification of Activities that May Require an Environmental Assessment

This FOA will allow the use of DOE program funds and cost share project funds for activities such as active hydraulic fracturing or other fracture stimulation processes as part of the application. Applications that include that do not qualify for a categorical exclusion under the National Environmental Policy Act (NEPA) could require the completion of an Environmental Assessment (EA) prior to the undertaking of project activities covered by such an EA. The time required for the performance of that type of environmental review/analysis (typically 6-12 months for an EA) may delay field-based activities of an awarded project until such time that compliance with all NEPA requirements are completed and approved by DOE.

Data Management Plan- Award (Sept 2015)

An Applicant whose Full Application is selected for award will be required to submit a Data Management Plan within ninety (90) days of the award notification. The Data Management Plan is a document that outlines the proposed plan for data sharing or preservation. Instructions for submission of this plan will be identified in your award notification. Guidance for preparing a Data Management Plan is provided in the Appendix of the FOA. Failure to submit the Data Management Plan may result in the termination of the award.

3. RESEARCH AND RELATED SENIOR/KEY PERSON

Complete this form before the Budget form to populate data on the Budget form. Beginning with the Project Director/Principal Investigator (PD/PI), provide a profile for each senior/key person proposed. A senior/key person is any individual who contributes in a substantive, measurable way to the scientific/technical development or execution of the project, whether or not a salary is proposed for this individual. Subrecipients and consultants must be included if they meet this definition. For each senior/key person provide:

Biographical Sketch.

Complete a biographical sketch for each senior/key person and attach to the "Attach Biographical Sketch" field in each profile. The biographical information for each person must not exceed 2 pages when printed on 8.5" by 11" paper with 1 inch margins (top, bottom, left, and right) with font not smaller than 11 point and must include:

Education and Training. Undergraduate, graduate and postdoctoral training, provide institution, major/area, degree and year.

Research and Professional Experience. Beginning with the current position list, in chronological order, professional/academic

positions with a brief description.

Publications. Provide a list of up to 10 publications most closely related to the proposed project. For each publication, identify the names of all authors (in the same sequence in which they appear in the publication), the article title, book or journal title, volume number, page numbers, year of publication, and website address if available electronically.

Patents, copyrights, and software systems developed may be provided in addition to or substituted for publications.

Synergistic Activities. List no more than 5 professional and scholarly activities related to the effort proposed.

Current and Pending Support

- Provide a list of all current and pending support (both Federal and non-Federal) for the PD/PI and senior/key persons, including subrecipients, for ongoing projects and pending applications. For each organization providing support, show the total award amount for the entire award period (including indirect costs) and the number of person-months per year to be devoted to the project by the senior/key person. Concurrent submission of an application to other organizations for simultaneous consideration will not prejudice its review. Save the information in a separate file and attach to the "Attach Current and Pending Support" field in each profile.

4. RESEARCH AND RELATED BUDGET (TOTAL FED + NON-FED)

Complete the Research and Related Budget (Total Fed & Non-Fed) form in accordance with the instructions on the form and the following instructions. You must complete a separate budget for each year of support requested. The form will generate a cumulative budget for the total project period. You must complete all the mandatory information on the form before the NEXT PERIOD button is activated. You may request funds under any of the categories listed as long as the item and amount are necessary to perform the proposed work, meet all the criteria for allowability under the applicable Federal cost principles, and are not prohibited by the funding restrictions in this announcement (See Section IV.G).

Budget Justification (Field K on the form).
Provide the required supporting information for the following costs (See R&R instructions): equipment; domestic and foreign travel; participant/trainees; material and supplies; publication; consultant services; ADP/computer services; subaward/consortium/contractual; equipment or facility rental/user fees; alterations and renovations; and indirect cost type. Provide any other information you wish to submit to justify your budget request. If cost sharing is required, provide an explanation of the source, nature, amount, and availability of any proposed cost sharing. Attach a single budget justification file for the entire project period in Field K. The file automatically carries over to each budget year.

5. R&R SUBAWARD (TOTAL FED + NON-FED) FORM

Budgets for Subrecipients, other than DOE FFRDC Contractors. You must provide a separate cumulative R&R budget for each subrecipient that is expected to perform work estimated to be more than $100,000 or 50 percent of the total work effort (whichever is less). Download the R&R Budget Attachment from the R&R SUBAWARD BUDGET (Total Fed + Non-Fed) FORM and e-mail it to each subrecipient that is required to submit a separate budget. After the Subrecipient has e-mailed its completed budget back to you, attach it to one of the blocks provided on the form. Use up to 10 letters of the subrecipient's name as the file name.

6. PROJECT/PERFORMANCE SITE LOCATION(S)

Indicate the primary site where the work will be performed. If a portion of the project will be performed at any other site(s), identify the site location(s) in the blocks provided.

Note that the Project/Performance Site Congressional District is entered in the format of the 2 digit state code followed by a dash and a 3 digit Congressional district code, for example VA-001. Hover over this field for additional instructions.

Use the Next Site button to expand the form to add additional Project/Performance Site Locations.

7. DISCLOSURE OF LOBBYING ACTIVITIES (SF-LLL)

If applicable, complete SF- LLL. Applicability: If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the grant/cooperative agreement, you must complete and submit Standard Form - LLL, "Disclosure Form to Report Lobbying."

Summary of Required Forms and Files

Your application must include the following documents:

Item	Name of Document	Format	Attach to
1.	**SF 424 (R&R)**	Form	N/A
2.	**RESEARCH AND RELATED OTHER PROJECT INFORMATION**	Form	N/A
2a.	Project Summary/Abstract	PDF	Field 7
2b.	Project Narrative, including applicable appendices	PDF	Field 8
2c.	Other Attachments		
	Commitment Letters from Third Parties Contributing to Cost Sharing	*CLTP.pdf*	Field 12
	Industry Collaboration/Participation Letter	*IPL.pdf*	Field 12
	Budget for DOE/NNSA FFRDC, if applicable	*FFRDCname.pdf*	Field 12
	Environmental Questionnaire	*Env.pdf*	Field 12
	Foreign Entity Waiver Request (if applicable)	*ForeignEntityWaiver.pdf*	Field 12
	Performance of Work in US Waiver Request (if applicable)	*PerformanceofWork_Waiver .pdf*	Field 12
3.	**RESEARCH & RELATED SENIOR/KEY PERSON Profile**	Form	N/A
3a.	Biographical Sketch	PDF	Attach to appropriate block
3b.	Current and Pending Support	PDF	Attach to appropriate block
4.	**RESEARCH AND RELATED BUDGET (Total Fed + Non-Fed)**	Form	N/A
	Budget Justification	*RecipientBudgetJustification .xlsx*	Field K/Add Attachments
5.	**R&R SUBAWARD BUDGET (Total Fed + Non-Fed) ATTACHMENT(S) FORM,** if applicable	*SubrecipientNameSubaward Budget.pdf*	Attach to appropriate block
	Subaward Budget Justification, if applicable	*SubrecipientNameSubaward BudgetJustification.xlsx*	Attach to appropriate block
6.	**PROJECT/PERFORMANCE SITE**	Form	N/A

	LOCATION(S)		
7.	**SF-LLL Disclosure of Lobbying Activities,** if applicable	Form	N/A

D. SUBMISSIONS FROM SUCCESSFUL APPLICANTS

If selected for award, DOE/NNSA reserves the right to request additional or clarifying information for any reason deemed necessary, including, but not limited to:

- Indirect cost information
- Other budget information
- Name and phone number of the Designated Responsible Employee for complying with national policies prohibiting discrimination (See 10 CFR 1040.5)
- Representation of Limited Rights Data and Restricted Software, if applicable
- Commitment Letter from Third Parties Contributing to Cost Sharing, if applicable

E. SUBMISSION DATES AND TIMES

1. Pre-application Due Date

Pre-applications Are Not Required

- Pre-applications are not required.

2. Application Due Date

Applications Due Date 8:00 PM

- Applications should be received by August 15, 2017, not later than 8:00 PM Eastern Time. You are encouraged to transmit your application well before the deadline. APPLICATIONS RECEIVED AFTER THE DEADLINE WILL NOT BE REVIEWED OR CONSIDERED FOR AWARD.

F. INTERGOVERNMENTAL REVIEW

Program Not Subject to Executive Order 12372

- This program is not subject to Executive Order 12372 - Intergovernmental Review of Federal Programs.

G. FUNDING RESTRICTIONS (DECEMBER 2014)

Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

Cost Principles. Costs must be allowable, allocable and reasonable in accordance with the applicable Federal cost principles referenced in 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation]. The cost principles for commercial organization are in FAR Part 31.

Pre-award Costs. Recipients may charge to an award resulting from this announcement pre-award costs that were incurred within the ninety (90) calendar day period immediately preceding the effective date of the award, if the costs are allowable in accordance with the applicable Federal cost principles referenced in 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation]. Recipients must obtain the prior approval of the contracting officer for any pre-award costs that are for periods greater than this 90 day calendar period.

Pre-award costs are incurred at the Applicant's risk. DOE is under no obligation to reimburse such costs if for any reason the Applicant does not receive an award or if the award is made for a lesser amount than the applicant expected.

H. OTHER SUBMISSION AND REGISTRATION REQUIREMENTS

1. Where to Submit

- **APPLICATIONS MUST BE SUBMITTED THROUGH GRANTS.GOV TO BE CONSIDERED FOR AWARD.**

Submit electronic applications through the "Apply for Grants" function at www.Grants.gov. If you have problems completing the registration process or submitting your application, call Grants.gov at 1-800-518-4726 or send an email to support@grants.gov.

2. Registration Process

One Time Registration Process

You must COMPLETE the one-time registration process (all steps) before you can submit your first application through Grants.gov (See http://www.grants.gov/applicants/get_registered.jsp). We recommend that you start this process at least six weeks before the application due date. It may take 44 days or more to complete the entire process. See the Grants.gov web page for Registering as an Organization at http://www.grants.gov/web/grants/applicants/organization-registration.html to guide you through the process. [IMPORTANT: During the SAM registration process, you will be asked to designate an E-Business Point of Contact (EBIZ POC). The EBIZ POC must obtain a special password called "Marketing Partner Identification Number" (MPIN). The EBIZ POC will need the MPIN to complete the Grants.gov registration process.] When you have completed the Grants.gov registration process, you should call the Grants.gov Helpdesk at 1-800-518-4726 to verify that you have completed the final step.

3. Application Receipt Notices

After an application is submitted, the Authorized Organization Representative (AOR) will receive a series of four e-mails. It is extremely important that the AOR watch for and save each of the emails. It may take up to two (2) business days from application submission to receipt of email Number 2. The titles of the four e-mails are:

Number 1 - Grants.gov Submission Receipt Number
Number 2 - Grants.gov Submission Validation Receipt for Application Number
Number 3 - Grants.gov Grantor Agency Retrieval Receipt for Application Number
Number 4 - Grants.gov Agency Tracking Number Assignment for Application Number

Section V - APPLICATION REVIEW INFORMATION

A. CRITERIA

1. Initial Review Criteria

Application Award Eligibility

- Prior to a comprehensive merit evaluation, DOE will perform an initial review to determine that (1) the Applicant is eligible for an award; (2) the information required by the funding opportunity announcement has been submitted; and (3) the proposed project is responsive to the objectives of the funding opportunity announcement. Applications that fail to pass the initial review will not be forwarded for merit review and will be eliminated from further consideration.

2. Merit Review Criteria

All applications that pass the initial review process will receive a detailed and consistent technical evaluation utilizing the evaluation criteria described below.

Topic Area 1: Technology Validation using Field Laboratories

Criterion 1 - Scientific and Technical Merit (35%)

- The degree to which the Applicant understands and conveys the nature and significance (scientific, engineering, economic, environmental, etc.) of the problem being addressed in the application, and the limitations of the current state of knowledge or technology relative to addressing the problem.
- The degree to which the proposed research is based on sound scientific and engineering principles and is designed to overcome limitations or make advances to ongoing research and/or the current state of technology, knowledge or capabilities.
- The suitability of the proposed field laboratory site for supporting the proposed research and Program objectives as described in the FOA.
- The significant benefit of the advances of the proposed research in terms of additional resource recovery, reduced costs or improved economics, resolving environmental barriers, or other benefits and the extensiveness of those benefits to other unconventional oil and gas resources.
- The degree to which the Applicant demonstrates that the proposed research is not duplicative of current or past research conducted by industry, academia, DOE or others.
- Quality, quantity, and relevance of existing site data (e.g., physical samples and data) that will be made available to support the proposed Field Laboratory project.

Criterion 2 - Technical Approach (30%)

- Clarity, and completeness of the overall SOPO as well as the rationale and logic for each task and subtask of the Applicant’s technical approach for achieving the stated project objectives.
- The degree to which the technical approach includes specific efforts and the significance of those efforts (e.g., numerical analyses, laboratory experiments, field tests) to verify/validate (1) the advances in knowledge or technology made through the research and/or (2) the benefits/impacts of those advances.
- The adequacy and availability of the proposed facilities and equipment necessary to achieve the stated tasks/sub-tasks and the objectives of the project.
- The reasonableness of the project schedule to integrate all tasks/subtasks and achieve key project objectives as reflected by well-defined, quantifiable, and verifiable critical path milestones and key project decision points.
- The adequacy and robustness of the Applicant's strategy for the collection, preservation and dissemination of all physical samples (including samples e.g., cores, fluids gases, etc.) and demonstration that the physical samples are made available to DOE, other researchers and the wider scientific community in a timely manner.

Criterion 3 - Management Approach and Capabilities (35%)

- Degree to which the proposed organizational structure includes an industry operating partner and land-use (field site) commitment.
- The adequacy of the overall organizational structure of the project team and the degree to which additional industry participants besides the site operator are included in order to bring additional expertise to the project and expand the project results to a wider industrial audience.
- The roles of participating organizations, and responsibilities of key personnel to ensure that the stated project objectives are met.
- The adequacy and relevance of the Applicant's and any participating organization's corporate experience in managing projects of similar nature and complexity, within budget and on schedule and the Applicant's documentation of this capability within the application through citation of specific examples.
- Knowledge, capabilities, experience, and availability of key personnel for the successful completion of individual tasks and the overall project, and appropriateness of proposed labor hours for completing tasks/subtasks (including a listing of key project personnel and the percentage of their time committed to the proposed research, by task).
- The adequacy of the proposed data management and technology transfer strategy including the type(s) of data as well as the method and frequency by which the maximum amount of project data and information will be made available to DOE and the public in a timely manner.

Topic Areas 2 and 3: Advancement in Subsurface Diagnostics and Offshore Spill and Leak Prevention

Criterion 1 - Scientific and Technical Merit (50%)

- The degree to which the Applicant understands and conveys the nature and significance (scientific, engineering, economic, environmental, etc.) of the problem being addressed in the application, and the limitations of the current state of knowledge or technology relative to addressing the problem.
- The degree to which the proposed research is based on sound scientific and engineering principles and is designed to overcome limitations or make advances to ongoing research and/or the current state of technology, knowledge or capabilities in terms of the TRL continuum.
- The significant benefit of the advances of the proposed research in terms of additional resource recovery, reduced costs or improved economics, resolving environmental barriers, or other benefits and the extensiveness of those benefits to other unconventional oil and gas resources.
- The degree to which the Applicant demonstrates that the proposed research is not duplicative of current or past research conducted by industry, academia, DOE or others.

Criterion 2 - Technical Approach (30%)

- Clarity and completeness of the overall SOPO as well as the rationale and logic for each task and subtask of the Applicant’s technical approach for achieving the stated project objectives.
- The degree to which the technical approach includes specific efforts and the significance of those efforts (e.g., numerical analyses, laboratory experiments, field tests) to verify/validate (1) the advances in knowledge or technology made through the research and/or (2) the benefits/impacts of those advances.
- The adequacy and availability of the proposed facilities and equipment necessary to achieve the stated tasks/sub-tasks and the objectives of the project.
- The reasonableness of the project schedule to integrate all tasks/subtasks and achieve key project objectives as reflected by well-defined, quantifiable, and verifiable critical path milestones and key project decision points.

Criterion 3 - Management Approach and Capabilities (20%)

- The adequacy of the organizational structure of the project team, the roles of participating organizations, and responsibilities of key personnel to ensure that the stated project objectives are met.

- The adequacy and relevance of the Applicant's and any participating organization's corporate experience in managing projects of similar nature and complexity, within budget and on schedule and the Applicant's documentation of this capability within the application through citation of specific examples.

- Knowledge, capabilities, experience, and availability of key personnel for the successful completion of individual tasks and the overall project, and appropriateness of proposed labor hours for completing tasks/subtasks (including a listing of key project personnel and the percentage of their time committed to the proposed research, by task).

- The adequacy of the proposed data management and technology transfer strategy including the type(s) of data as well as the method and frequency by which the maximum amount of project data and information will be made available to DOE and the public in a timely manner.

Program Policy Factors

- The selection official will consider the following program policy factors in the selection process:

  - It may be desirable to select for award a group of projects which represents a diversity of technical approaches and methods;

  - It may be desirable to support complementary and/or similar efforts or projects, which, when taken together, will best achieve the Program's research goals and objectives;

  - It may be desirable to select for award different kinds and sizes of organizations in order to provide a balanced programmatic effort and a variety of different technical perspectives;

  - The nature (e.g., cash, data, in-kind services, etc.) and level of proposed cost share, as reviewed and allowed by DOE;

  - It may be desirable, because of the type of projects envisioned or limitations of past efforts to select for award a group of projects with a broad or specific geographic location;

  - It may be desirable to select project(s) of less technical merit than other project(s) if such a selection (1) will optimize the use of available funds by allowing more projects to be supported, (2) will allow more timely completion of program goals, and/or (3) will reduce program risks of accomplishing program goals, while not being detrimental to the overall objectives and goals of the program.

REPORTING OF MATTERS RELATED TO RECIPIENT INTEGRITY AND PERFORMANCE (DECEMBER 2015)

DOE, prior to making a Federal award with a total amount of Federal share greater than the simplified acquisition threshold, is required to review and consider any information about the applicant that is in the designated integrity and performance system accessible through SAM (currently FAPIIS) (see 41 U.S.C. 2313).

The applicant, at its option, may review information in the designated integrity and performance systems accessible through SAM and comment on any information about itself that a Federal awarding agency previously entered and is currently in the designated integrity and performance system accessible through SAM.

DOE will consider any written comments by the applicant, in addition to the other information in the designated integrity and performance system, in making a judgment about the applicant's integrity, business ethics, and record of performance under Federal awards when completing the review of risk posed by applicants as described in 2 CFR 200.205 - Federal awarding agency review of risk posed by applicants.

B. REVIEW AND SELECTION PROCESS

1. Merit Review

Applications Subject to Merit Review

Applications that pass the initial review will be subjected to a merit review in accordance with the guidance provided in the

"Department of Energy Merit Review Guide for Financial Assistance." This guide is available at http://energy.gov/management/office-management/operational-management/financial-assistance under Financial Assistance Policy and Guidance.

2. Selection

Selection Official Consideration

- The Selection Official will consider the merit review recommendation, program policy factors, and the amount of funds available.

3. Discussions and Award

Government Discussions with Applicant (DECEMBER 2014)

The Government may enter into discussions with a selected applicant for any reason deemed necessary, including but not limited to: (1) the budget is not appropriate or reasonable for the requirement; (2) only a portion of the application is selected for award; (3) the Government needs additional information to determine that the recipient is capable of complying with the requirements in 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation]; and/or (4) special terms and conditions are required. Failure to resolve satisfactorily the issues identified by the Government will preclude award to the applicant.

C. ANTICIPATED NOTICE OF SELECTION AND AWARD DATES

Selection and Award Date

- DOE anticipates notifying applicants selected for award in late November 2017 and making awards by late January 2018.

Section VI - AWARD ADMINISTRATION INFORMATION

A. AWARD NOTICES

1. Notice of Selection

Selected Applicants Notification

- DOE will notify applicants selected for award. This notice of selection is not an authorization to begin performance. (See Section IV.G with respect to the allowability of pre-award costs.)

Non-selected Notification

Organizations whose applications have not been selected will be advised as promptly as possible. This notice will explain why the application was not selected.

2. Notice of Award

Notice of Award (DECEMBER 2014)

An Assistance Agreement issued by the contracting officer is the authorizing award document. It normally includes either as an attachment or by reference: (1) Special Terms and Conditions; (2) Applicable program regulations, if any; (3) Application as approved by DOE; (4) 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation]; (5) National Policy Assurances To Be Incorporated As Award Terms; (6) Budget Summary; and (7) Federal Assistance Reporting Checklist, which identifies the reporting requirements.

For grants and cooperative agreements made to universities, non-profits and other entities subject to Title 2 CFR, awards made under this funding opportunity should include the government-wide Research Terms and Conditions. A new version of the Terms and Conditions based on the changes to 2 CFR 200 is not yet available. Once the Terms and Conditions become available, they will be located at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp. If an award is made under this funding opportunity before the Terms and Conditions are posted, alternative Terms and Conditions may be included in the award.

B. ADMINISTRATIVE AND NATIONAL POLICY REQUIREMENTS

1. Administrative Requirements (DECEMBER 2014)

The administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR part 200 as amended by 2 CFR part 910 [DOE Financial Assistance Regulation] (See: http://www.eCFR.gov). For grants and cooperative agreements made to universities, non-profits and other entities subject to Title 2 CFR, awards made under this funding opportunity will include the government-wide Research Terms and Conditions. A new version of these Terms and Conditions based on the changes to 2 CFR 200 is not yet available. Once they become available, they will be located at http://www.nsf.gov/bfa/dias/policy/rtc/index.jsp
If an award is made under this funding opportunity before the Terms and Conditions are posted, alternative Terms and Conditions may be included in the award.

DUNS AND SAM REQUIREMENTS

Additional administrative requirements for DOE grants and cooperative agreements are contained in 2 CFR, Part 25 (See: http://www.eCFR.gov). Prime awardees must keep their data at the System for Award Management (SAM) current at http://www.sam.gov current SAM is the government-wide system that replaced the CCR. If you had an active registration in the CCR, you have an active registration in SAM. Subawardees at all tiers must obtain DUNS numbers and provide the DUNS to the prime awardee before the subaward can be issued.

SUBAWARD AND EXECUTIVE REPORTING

Additional administrative requirements necessary for DOE grants and cooperative agreements to comply with the Federal Funding and

Transparency Act of 2006 (FFATA) are contained in 2 CFR, Part 170. (See: http://www.eCFR.gov). Prime awardees must register with the new FSRS database and report the required data on their first tier subawardees. Prime awardees must report the executive compensation for their own executives as part of their registration profile in the System for Award Management (SAM).

2. Special Terms and Conditions and National Policy Requirements (DECEMBER 2014)

The DOE Special Terms and Conditions for Use in Most Grants and Cooperative Agreements are located at http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Terms.

The National Policy Assurances To Be Incorporated As Award Terms are located at http://www.nsf.gov/bfa/dias/policy/rtc/appc.pdf

Intellectual Property Provisions. The standard DOE financial assistance intellectual property provisions applicable to the various types of recipients are located at:
http://energy.gov/gc/standard-intellectual-property-ip-provisions-financial-assistance-awards

Lobbying Restrictions. By accepting funds under this award, you agree that none of the funds obligated on the award shall be expended, directly or indirectly, to influence congressional action on any legislation or appropriation matters pending before Congress, other than to communicate to Members of Congress as described in 18 U.S.C. 1913. This restriction is in addition to those prescribed elsewhere in statute and regulation.

Corporate Felony Conviction and Federal Tax Liability Representations (MARCH 2014)

In submitting an application in response to this FOA the Applicant represents that:

(1) It is not a corporation that has been convicted of a felony criminal violation under any Federal law within the preceding 24 months; and

(2) It is not a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability.

For purposes of these representations the following definition applies:
A Corporation includes any entity that has filed articles of incorporation in any of the 50 states, the District of Columbia, or the various territories of the United States [but not foreign corporations]. It includes both for-profit and non-profit organizations.

NONDISCLOSURE AND CONFIDENTIALITY AGREEMENTS REPRESENTATIONS (JUNE 2015)

In submitting an application in response to this FOA the Applicant represents that:
(1) It does not and will not require its employees or contractors to sign internal nondisclosure or confidentiality agreements or statements prohibiting or otherwise restricting its employees or contactors from lawfully reporting waste, fraud, or abuse to a designated investigative or law enforcement representative of a Federal department or agency authorized to receive such information.
(2) It does not and will not use any Federal funds to implement or enforce any nondisclosure and/or confidentiality policy, form, or agreement it uses unless it contains the following provisions:
a. ‘‘These provisions are consistent with and do not supersede, conflict with, or otherwise alter the employee obligations, rights, or liabilities created by existing statute or Executive order relating to (1) classified information, (2) communications to Congress, (3) the reporting to an Inspector General of a violation of any law, rule, or regulation, or mismanagement, a gross waste of funds, an abuse of authority, or a substantial and specific danger to public health or safety, or (4) any other whistleblower protection. The definitions, requirements, obligations, rights, sanctions, and liabilities created by controlling Executive orders and statutory provisions are incorporated into this agreement and are controlling.’’
b. The limitation above shall not contravene requirements applicable to Standard Form 312, Form 4414, or any other form issued by a Federal department or agency governing the nondisclosure of classified information.

Notwithstanding provision listed in paragraph (a), a nondisclosure or confidentiality policy form or agreement that is to be executed by a person connected with the conduct of an intelligence or intelligence-related activity, other than an employee or officer of the United States Government, may contain provisions appropriate to the particular activity for which such document is to be used. Such

form or agreement shall, at a minimum, require that the person will not disclose any classified information received in the course of such activity unless specifically authorized to do so by the United States Government. Such nondisclosure or confidentiality forms shall also make it clear that they do not bar disclosures to Congress, or to an authorized official of an executive agency or the Department of Justice, that are essential to reporting a substantial violation of law.

FOREIGN NATIONAL ACCESS UNDER DOE ORDER 142.3A, "UNCLASSIFIED FOREIGN VISITS AND ASSIGNMENT PROGRAM"

All applicants, except institutions of higher education, selected for an award under this FOA may be required to provide information to the Department of Energy (DOE) in order to satisfy requirements for foreign nationals' access to DOE sites, information, technologies, equipment, programs, and personnel. A foreign national is any person who was born outside the jurisdiction of the United States, is a citizen of a foreign government, and has not been naturalized under U.S. law. If a selected applicant (including any of its subrecipients or subcontractors anticipates involving foreign nationals in the performance of its award, the selected applicant may be required to provide to DOE with specific information about each foreign national to ensure compliance with the requirements for access approval. Access approval for foreign nationals from countries identified on the U.S. Department of State's list of State Sponsors of Terrorism must receive final approval authority from the Secretary of Energy before they can commence any work under the award.

UNIFORM COMMERCIAL CODE (UCC) FINANCING STATEMENTS

Per 2 CFR 910.360 (Real Property and Equipment) when a piece of equipment is purchased by a for-profit recipient or subrecipient with Federal Funds (federal and/or non-federal), and when the Federal share of the financial assistance agreement is more than $1,000,000, the recipient or subrecipient must:

Properly record, and consent to the Department's ability to properly record if the recipient fails to do so, Uniform Commercial Code (UCC) financing statement(s) for all equipment in excess of $5,000 purchased with project funds. These financing statement(s) must be approved in writing by the contracting officer prior to the recording, and they shall provide notice that the Recipient's title to all equipment (not real property) purchased with Federal funds under the financial assistance agreement is conditional pursuant to the terms of this section, and that the Government retains an undivided reversionary interest in the equipment. The UCC financing statement(s) must be filed before the Contracting Officer may reimburse the recipient for the Federal share of the equipment unless otherwise provided for in the relevant financial assistance agreement. The recipient shall further make any amendments to the financing statements or additional recordings, including appropriate continuation statements, as necessary or as the contracting officer may direct.

Note: All costs associated with filing UCC financing statements, UCC financing statement amendments, and UCC financing statement terminations, are allowable and allocable costs to be charged to the Federal award.

Statement of Substantial Involvement

- There will be substantial involvement between the DOE and the Recipient during performance of the resultant cooperative agreement. The DOE Contract Specialist and DOE Project Officer will negotiate a Statement of Substantial Involvement prior to award in which the DOE and Recipient will agree on how to collaborate and share responsibility for the management of the project. The Statement of Substantial Involvement may include but not be limited to the following:

RECIPIENT'S RESPONSIBILITIES. The Recipient is responsible for:

- Performing the activities supported by this award in accordance with the Project Management Plan, including providing the required personnel, facilities, equipment, supplies and services.
- Managing and controlling project activities in accordance with established processes and procedures to ensure tasks and subtasks are completed within scope and within schedule and budget constraints defined by the current Project Management Plan.
- Coordinating related project activities with external suppliers, including contractors, to ensure effective integration of all work elements.
- Coordinating research and sharing data/results (to the extent possible) with other research entities that are conducting similar research to maximize the outcome of all research projects.

- Implementing an approach to identify, analyze, and respond to project risks that is commensurate with the complexity of the project.
- Defining and revising approaches and plans, submitting the plans to DOE for review, and incorporating DOE comments.
- Providing timely response and updates to the DOE Project Officer upon request.
- Providing all deliverables specified in the award and incorporating DOE review comments in technical reports upon review.
- Submitting via email to the Contracting Officer, at least ten (10) working days prior to the planned issue date, a draft copy of any planned press releases related to work performed under this Award.
- Participating in all briefings and presenting project results at appropriate technical conferences or meetings as specified by the Statement of Project Objectives (SOPO) or as directed by the DOE officer.

DOE RESPONSIBILITIES. DOE is responsible for:

- Reviewing in a timely manner project plans, including project management, testing, and technology transfer plans, and recommending alternate approaches, if the plans do not address critical programmatic issues.
- Participating in project management planning activities, including risk analysis, to ensure DOE's program requirements or limitations are considered in performance of the work/research elements.
- Conducting annual project review meetings to ensure adequate progress and that the work accomplishes the program and project objectives. Recommending alternate approaches or shifting work emphasis, if needed.
- Integrating and redirecting the work effort to ensure that project results address critical system and programmatic goals established by DOE/FE in coordination with the DOE Natural Gas and Oil Program.
- Reviewing, in a timely manner, technical reports, progress reports, and other deliverables and providing comments, if warranted, to the Recipient.
- Reviewing Continuation Application materials to ensure adequate progress and that the work accomplishes the program and project objectives, and concurring on project and task documentation prior to continuation into subsequent Budget Periods.
- Promoting and facilitating technology transfer activities, including disseminating program results to stakeholders, including other federal agencies, through presentations and publications.
- Serving as scientific/technical liaison between awardees and other program or industry staff.
- Coordinating all necessary reviews and clearances from the NETL Office of Public Affairs and cognizant Project Office and providing the Recipient with the results of such reviews at least 2 working days prior to the planned issue date.
- Reviewing and concurring with ongoing technical performance to ensure that adequate progress has been obtained within the current Budget Period authorized by DOE before work can commence on subsequent Budget Period as addressed within the "DECISION POINT" provision of the Cooperative Agreement.

C. REPORTING

Reporting requirements are identified on the Federal Assistance Reporting Checklist, DOE F 4600.2, attached to the award agreement. The checklist is available at: http://energy.gov/management/office-management/operational-management/financial-assistance/financial-assistance-forms under Award Forms.

Section VII - QUESTIONS/AGENCY CONTACTS

A. QUESTIONS

Questions regarding the content of the announcement must be submitted through the FedConnect portal. You must register with FedConnect to respond as an interested party to submit questions, and to view responses to questions. It is recommended that you register as soon after release of the FOA as possible to have the benefit of all responses. DOE/NNSA will try to respond to a question within 3 business days, unless a similar question and answer have already been posted on the website.

Questions and comments concerning this FOA shall be submitted not later than 45 calendar days prior to the application due date. Questions submitted after that date may not allow the Government sufficient time to respond.

Questions relating to the registration process, system requirements, how an application form works, or the submittal process must be directed to Grants.gov at 1-800-518-4726 or support@grants.gov. DOE/NNSA cannot answer these questions.

B. AGENCY CONTACT

Name: Jodi Collins
E-mail: jodi.collins@netl.doe.gov

Section VIII - OTHER INFORMATION

A. MODIFICATIONS

Notices of any modifications to this announcement will be posted on Grants.gov and the FedConnect portal. You can receive an email when a modification or an announcement message is posted by registering with FedConnect as an interested party for this FOA. It is recommended that you register as soon after release of the FOA as possible to ensure you receive timely notice of any modifications or other announcements.

B. GOVERNMENT RIGHT TO REJECT OR NEGOTIATE

DOE reserves the right, without qualification, to reject any or all applications received in response to this announcement and to select any application, in whole or in part, as a basis for negotiation and/or award.

C. COMMITMENT OF PUBLIC FUNDS

The Contracting Officer is the only individual who can make awards or commit the Government to the expenditure of public funds. A commitment by other than the Contracting Officer, either explicit or implied, is invalid.

Funding for all awards and future budget periods are contingent upon the availability of funds appropriated by Congress for the purpose of this program and the availability of future-year budget authority.

D. PROPRIETARY APPLICATION INFORMATION

Patentable ideas, trade secrets, proprietary or confidential commercial or financial information, disclosure of which may harm the applicant, should be included in an application only when such information is necessary to convey an understanding of the proposed project. The use and disclosure of such data may be restricted, provided the applicant includes the following legend on the first page of the project narrative and specifies the pages of the application which are to be restricted:

"The data contained in pages [*Insert pages*] of this application have been submitted in confidence and contain trade secrets or proprietary information, and such data shall be used or disclosed only for evaluation purposes, provided that if this applicant receives an award as a result of or in connection with the submission of this application, DOE shall have the right to use or disclose the data herein to the extent provided in the award. This restriction does not limit the government's right to use or disclose data obtained without restriction from any source, including the applicant."

To protect such data, each line or paragraph on the pages containing such data must be specifically identified and marked with a legend similar to the following:

"The following contains proprietary information that (name of applicant) requests not be released to persons outside the Government, except for purposes of review and evaluation."

E. EVALUATION AND ADMINISTRATION BY NON-FEDERAL PERSONNEL

In conducting the merit review evaluation, the Government may seek the advice of qualified non Federal personnel as reviewers. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The applicant, by submitting its application, consents to the use of non-Federal reviewers/administrators. Non-Federal reviewers must sign conflict of interest and non-disclosure agreements prior to reviewing an application. Non-Federal personnel conducting administrative activities must sign a non-disclosure agreement.

F. INTELLECTUAL PROPERTY DEVELOPED UNDER THIS PROGRAM

Patent Rights. The government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for nonprofit organizations or small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions.

Rights in Technical Data. Normally, the government has unlimited rights in technical data created under a DOE agreement. Delivery or third party licensing of proprietary software or data developed solely at private expense will not normally be required except as specifically negotiated in a particular agreement to satisfy DOE's own needs or to insure the commercialization of technology developed under a DOE agreement.

Program Covered Under Special Protected Data (DECEMBER 2014)

Special Protected Data Statutes. ***The resultant awards made under this announcement are covered by a special protected data statute.*** The provisions of the statute provide for the protection from public disclosure, for a period of up ***2 years*** from the development of the information, of data that would be trade secret, or commercial or financial information that is privileged or confidential, if the information had been obtained from a non-Federal party. Generally, the provision entitled, Rights in Data--Programs Covered Under Special Protected Data Statutes (Item 4 under 2 CFR 910 Appendix A to Subpart D), would apply to an award made under this announcement. This provision will identify data or categories of data first produced in the performance of the award that will be made available to the public, notwithstanding the statutory authority to withhold data from public dissemination, and will also identify data that will be recognized by the parties as protected data.

G. PATENT WAIVER

Class Patent Waiver: The Government will have certain statutory rights in an invention that is conceived or first actually reduced to practice under a DOE award. 42 U.S.C. 5908 provides that title to such inventions vests in the United States, except where 35 U.S.C. 202 provides otherwise for domestic nonprofit organizations or domestic small business firms. However, the Secretary of Energy may waive all or any part of the rights of the United States subject to certain conditions. Pursuant to 10 CFR Part 784, FE has issued a class patent waiver that applies to this FOA. Under this class waiver, any entity other than a domestic small business firm or domestic nonprofit organization may elect title to their subject inventions similar to the right provided to domestic small business firms and domestic nonprofit organization by law. In order to avail itself of the class waiver, such an entity must agree that any products embodying or produced through the use of a subject invention (first created or reduced to practice under this program) will be substantially manufactured in the United States, unless DOE agrees otherwise.

H. NOTICE REGARDING ELIGIBLE/INELIGIBLE ACTIVITIES

Eligible activities under this program include those which describe and promote the understanding of scientific and technical aspects of specific energy technologies, but not those which encourage or support political activities such as the collection and dissemination of information related to potential, planned or pending legislation.

I. CONFERENCE SPENDING (FEBRUARY 2015)

The recipient shall not expend any funds on a conference not directly and programmatically related to the purpose for which the grant or cooperative agreement was awarded that would defray the cost to the United States Government of a conference held by any Executive branch department, agency, board, commission, or office for which the cost to the United States Government would otherwise exceed $20,000, thereby circumventing the required notification by the head of any such Executive Branch department, agency, board, commission, or office to the Inspector General (or senior ethics official for any entity without an Inspector General), of the date, location, and number of employees attending such conference.

J. FOREIGN ENTITY WAIVER REQUEST

As set forth in Section III.A.3, all prime recipients receiving funding under this FOA must be incorporated (or otherwise formed) under the laws of a State or territory of the United States. If a foreign entity applies for funding as a prime recipient, it must designate a subsidiary or affiliate incorporated (or otherwise formed) under the laws of a State or territory of the United States to be the prime recipient.

To request a waiver for this requirement, the Applicant must submit a waiver request in the Full Application, which includes the following information: entity name, country (or state) of incorporation, description of the work to be performed by that entity, and the location where the work will be performed. If the applicant is seeking a waiver to have a foreign entity serve as the prime recipient, the applicant must explain why it is necessary to have a foreign entity serve as the prime recipient. Waiver requests should explain

how the waiver would further the purposes of this FOA and otherwise serve the interests of the Department of Energy. The Contracting Officer may require additional information before considering the waiver request. Save the Waiver Request(s) in a single filed titled:
"ForeignEntityWaiver.pdf"

K. PERFORMANCE OF WORK IN THE UNITED STATES WAIVER REQUEST

As set forth in Section III.D., at least 75 percent of the direct labor cost for the project (including subrecipient labor) must be incurred in the United States, unless the Recipient can demonstrate to the satisfaction of the DOE that the United States' economic interest will be better served through a greater percentage of the work being performed outside of the United States.

To request a waiver for this requirement, the Applicant must submit a waiver request in its Application, that includes the following information: entity name, description of work to be performed outside the United States and the location where the work will be performed. Waiver requests must explain how the waiver would further the purposes of this FOA and otherwise serve the interests of the United States and the DOE. The Contracting Officer may require additional information before considering the waiver request. Save the Waiver Request(s) in a single filed titled: "PerformanceofWork_Waiver.pdf"

L. REQUIREMENTS FOR SELECTED APPLICANT

Accounting System: If your application is selected for negotiation toward award, you should have an accounting system that meets government standards for recording and collecting costs. See 2 CFR 200.302 for the applicable standards. If you have not had prior government awards or a recent accounting system review, the DOE may request that the Defense Contract Audit Agency (DCAA) or an independent auditor verify that the accounting system is acceptable. A resulting cooperative agreement may contain a Term and Condition that prohibits DOE reimbursement until the system is deemed acceptable.

Indirect Costs & Indirect Rates: Indirect costs are an acceptable cost component of an approved budget if they are adequately supported and properly allocated. Potential Recipients and major sub-recipients proposing indirect costs will need to demonstrate that the proposed indirect (e.g., overhead, G&A) rates were developed using a methodology acceptable for Government contracting, and in accordance with applicable Federal cost principles. If a current provisional indirect rate agreement has been issued by a Federal agency, that agreement should be provided if the application is selected for award negotiations. The Recipient and major sub-recipients may be subject to an audit/review if an approved rate agreement is not available or an indirect rate audit has not been performed within the previous twelve months.

Compliance with the resultant Reporting Requirements Checklist requires the submission of an Annual Indirect Cost Proposal and Reconciliation. Potential Recipients and sub-recipients should be aware that this requirement mandates annual indirect cost reconciliations (i.e., Annual Indirect Cost Proposal) be prepared and submitted; this proposal is due within six (6) months of the Recipient and/or sub-recipient's fiscal year end and must be submitted in the format at http://www.dcaa.mil/ice.htm. This proposal is developed using the actual, allowable costs incurred by the Recipient during each fiscal year period. This is not a project-specific proposal; it must encompass the organization's entire business base (Government and commercial), and it must incorporate the total direct and indirect costs incurred to develop the actual indirect rates for each fiscal year. Because the proposal is not project-specific, the costs to prepare the proposal should be classified as indirect costs, part of the organization's indirect pool of expenses. If DOE is not the cognizant federal agency for negotiating and approving indirect rates, an informational copy of the proposal may be requested.

Applicants and sub-recipients (if applicable) should propose sufficient costs in the project budget to cover the costs associated with the incurred cost submission, as appropriate, as either a direct or indirect cost. DOE will share in the cost of the audit at its applicable cost share ratio.

Annual Compliance Audits:

If a for-profit entity is a Prime Recipient or Subrecipient and expends greater than $750K in project costs (Federal share only) in a respective fiscal year, an annual compliance audit performed by an independent auditor may be required. For additional information, please refer to 2 CFR 910 Subpart F.

If an institution of higher education, non-profit organization, or state/local government or Indian tribe is a Prime Recipient or Subrecipient and has expended greater than $750K of project costs in a respective fiscal year, then a single or program-specific audit must be conducted for that year in accordance with the provisions of 2 CFR 200 Subpart F.

Applicants and sub-recipients (if applicable) should propose sufficient costs in the project budget to cover the costs associated with the audit, as appropriate, as either a direct or indirect cost. DOE will share in the cost of the audit at its applicable cost share ratio.

Notice of Potential Disclosure Under Freedom of Information Act: Applicants are advised that identifying information regarding all applicants, including but not limited to applicant names and/or points of contact, may be subject to public disclosure under the Freedom of Information Act, whether or not such applicants are selected for negotiation of award.

Section IX - APPENDICES/REFERENCE MATERIAL

APPENDICES/REFERENCE MATERIAL

DATA MANAGEMENT PLAN GUIDANCE (SEPT 2015)

A Data Management Plan ("DMP") explains how data generated in the course of the research or work performed under an assistance award will be shared and preserved or, when justified, explains why data sharing or preservation is not possible or scientifically appropriate.

DMP Requirements

In order for a DMP to be considered acceptable, the DMP must address the following:

At a minimum, the DMP must describe how data sharing and preservation will enable validation of the results from the proposed work, or how results could be validated if data are not shared or preserved.

The DMP must provide a plan for making all research data displayed in publications resulting from the proposed work digitally accessible at the time of publication. This includes data that are displayed in charts, figures, images, etc. In addition, the underlying digital research data used to generate the displayed data should be made as accessible as possible in accordance with the principles stated above. This requirement could be met by including the data as supplementary information to the published article, or through other means. The published article should indicate how these data can be accessed.

The DMP should consult and reference available information about data management resources to be used in the course of the proposed research work. In particular, a DMP that explicitly or implicitly commits data management resources at a facility beyond what is conventionally made available to approved users should be accompanied by written approval from that facility. In determining the resources available for data management at DOE User Facilities, researchers should consult the published description of data management resources and practices at that facility and reference it in the DMP. Information about other DOE facilities can be found in the additional guidance from the sponsoring program.

The DMP must protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; avoid significant negative impact on innovation, and U.S. competitiveness; and otherwise be consistent with all laws (e.g., export control laws), and DOE regulations, orders, and policies.

Data Determination for a DMP

The Principal Investigator should determine which data should be the subject of the DMP and, in the DMP, propose which data should be shared and/or preserved in accordance with the DMP Requirements noted above.

For data that will be generated through the course of the proposed research/work, the Principal Investigator should indicate what types of data should be protected from immediate public disclosure by DOE (referred to as "protected data") and what types of data that DOE should be able to release immediately. Similarly, for data developed outside of the proposed research work at private expense that will be used in the course of the proposed research work, the Principal Investigator should indicate whether that type of data will be subject to public release or kept confidential (referred to as "limited rights data"). Any use of limited rights data or labeling of data as "protected data" must be consistent with the DMP Requirements noted above.

Suggested Elements for a DMP

The following list of elements for a DMP provides suggestions regarding the data management planning process and the structure of the DMP:

Data Types and Sources: A brief, high-level description of the data to be generated or used through the course of the proposed research work and which of these are considered digital research data necessary to validate the research findings or results.

Content and Format: A statement of plans for data and metadata content and format including, where applicable, a description of documentation plans, annotation of relevant software, and the rationale for the selection of appropriate standards. Existing, accepted community standards should be used where possible. Where community standards are missing or inadequate, the DMP could propose alternate strategies for facilitating sharing, and should advise the sponsoring program of any need to develop or generalize standards.

Sharing and Preservation: A description of the plans for data sharing and preservation. This should include, when appropriate: the anticipated means for sharing and the rationale for any restrictions on who may access the data and under what conditions; a timeline for sharing and preservation that addresses both the minimum length of time the data will be available and any anticipated delay to data access after research findings are published; any special requirements for data sharing, for example, proprietary software needed to access or interpret data, applicable policies, provisions, and licenses for re-use and re-distribution, and for the production of derivatives, including guidance for how data and data products should be cited; any resources and capabilities (equipment, connections, systems, software, expertise, etc.) requested in the research proposal that are needed to meet the stated goals for sharing and preservation (this could reference the relevant section of the associated research proposal and budget request); and whether/where the data will be preserved after direct project funding ends and any plans for the transfer of responsibilities for sharing and preservation.

Protection: A statement of plans, where appropriate and necessary, to protect confidentiality, personal privacy, Personally Identifiable Information, and U.S. national, homeland, and economic security; recognize proprietary interests, business confidential information, and intellectual property rights; and avoid significant negative impact on innovation, and U.S. competitiveness.

Rationale: A discussion of the rationale or justification for the proposed data management plan including, for example, the potential impact of the data within the immediate field and in other fields, and any broader societal impact.

Additional Guidance

In determining which data should be shared and preserved, researchers must consider the data needed to validate research findings as described in the DMP Requirements, and are encouraged to consider the potential benefits of their data to their own fields of research, fields other than their own, and society at large.

DMPs should reflect relevant standards and community best practices and make use of community accepted repositories whenever practicable.

Costs associated with the project description/scope of work and resources articulated in a DMP may be included in the proposed research budget as permitted by the applicable cost principles.

To improve the discoverability of and attribution for datasets created and used in the course of research, DOE encourages the citation of publicly available datasets within the reference section of publications, and the identification of datasets with persistent identifiers such as Digital Object Identifiers (DOIs). In most cases, DOE can provide DOIs free of charge for data resulting from DOE-funded research through its Office of Scientific and Technical Information (OSTI) DataID Service.

Definitions

Data Preservation: Data preservation means providing for the usability of data beyond the lifetime of the research activity that generated them.

Data Sharing: Data sharing means making data available to people other than those who have generated them. Examples of data sharing range from bilateral communications with colleagues, to providing free, unrestricted access to anyone through, for example, a web-based platform.

Digital Research Data: The term digital data encompasses a wide variety of information stored in digital form including: experimental, observational, and simulation data; codes, software and algorithms; text; numeric information; images; video; audio; and associated metadata. It also encompasses information in a variety of different forms including raw, processed, and analyzed data, published and archived data.

Research Data: The recorded factual material commonly accepted in the scientific community as necessary to validate research findings, but not any of the following: preliminary analyses, drafts of scientific papers, plans for future research, peer reviews, or

communications with colleagues. This 'recorded' material excludes physical objects (e.g., laboratory samples). Research data also do not include:

(A) Trade secrets, commercial information, materials necessary to be held confidential by a researcher until they are published, or similar information which is protected under law; and

(B) Personnel and medical information and similar information the disclosure of which would constitute a clearly unwarranted invasion of personal privacy, such as information that could be used to identify a particular person in a research study."

Validate: In the context of DMPs, validate means to support, corroborate, verify, or otherwise determine the legitimacy of the research findings. Validation of research findings could be accomplished by reproducing the original experiment or analyses; comparing and contrasting the results against those of a new experiment or analyses; or by some other means.

TRL - Glossary of Terms

Actual Technology: The final product of technology development that is of sufficient size, performance, and reliability—ready for use at the target commercial application. The technology is at Technology Readiness Levels (TRLs) 8–9.

Basic Technological Components Integrated: A test apparatus that ranges from (1) the largest, most integrated and/or most realistic technology model that can reasonably be tested in a laboratory environment, to (2) the lowest-cost technology model that can be used to obtain useful data in a relevant environment.

Commissioning/Commission: The actual system has become operational at target commercial conditions and is ready for commercial operations.

Concept and/or Application: The initial idea for a new technology or a new application for an existing technology. The technology is at TRLs 1–3.

Core Technology: The idea, new concept, and/or new application that started the research and development (R&D) effort. Examples include: (1) a new membrane material, sorbent, or solvent; (2) new software code; (3) a new turbine component; (4) the use of a commercial sensor technology in more durable housing; or (5) the use of a commercial enhanced oil recovery technology to store CO_2. Typically this is a project's intellectual property.

Fidelity: The extent to which a technology resembles its intended use in the target commercial application.

Integrated: The functional state of a system resulting from the process of bringing together one or more technologies or subsystems and ensuring that each function together as a system.

Laboratory Environment: An environment isolated from the commercial environment in which lower-cost testing is performed to obtain high-quality, fundamental data at earlier TRLs. For software development, this a small-scale, simplified domain for a software mockup.

Operational System: The environment in which the technology will be tested as part of the target commercial application.

Performance Attributes: All aspects of the technology (flux, life, durability, cost, etc.) that must be tested to ensure the technology will work at the target commercial application, including all needed support systems. It is likely that the performance attributes list will increase as the technology matures. Performance attributes must be updated as new information is received and formally reviewed at each TRL transition.

Performance Requirements: Criteria that must be met for each performance attribute before the actual system can be used at its target commercial application. These will be determined through consideration of technology test data, funding program goals, systems analysis, etc. Performance requirements may change over time, and it is unlikely that all of them will be known at a low TRL.

Program: The funding program. The program goals will be used to judge project value and, in concert with systems analysis, will support acceptable performance requirements for the project. The funding program will also determine whether the system will be tested under one or several sets of target commercial applications.

Project: The funding mechanism for technology development, which often spans only part of the technology development arc. Some projects may contain aspects that lack dependence; these may have different TRL scores, but this must be fully justified.

Proof-of-Concept: Reasonable conclusions drawn through the use of low-fidelity experimentation and analysis to validate that the new idea—and resulting new component and/or application—has the potential

to lead to the creation of an actual system.

Prototype: A test apparatus necessary to thoroughly test the technology, integrated and realistic as much as practical, in the applicable TRL test environment.

Relevant Environment: More realistic than a laboratory environment, but less costly to create and maintain than an operational environment. This is a relatively flexible term that must be consistently defined by each program (e.g., in software development, this would be “beta testing”).

Target Commercial Application: This refers to one specific use for the actual system, at full commercial scale, which supports the goals of the funding program. A project may include more than one set of target commercial applications. Examples are:

1. Technologies that reduce the cost of gasification may be useful for both liquid fuels and power production.
2. Technologies that may be useful to monitor CO_2 storage in more than one type of storage site.

Technology: This includes R&D work on all technology aspects, both within and external to any given project, that must be done for the project’s core technology to translate into an actual system. It is likely that what comprises the technology will increase as the TRL score increases. This includes concepts and/or applications (TRLs 1–3), components and/or systems (TRLs 4–5), prototype in a relevant environment (TRL 6), high-fidelity prototype in an operational environment (TRL 7), and the actual technology (TRLs 8–9).

Technology Aspects: Different R&D efforts, both within and external to any given project. Examples include material development, process development, process simulation, contaminant removal/control, and thermal management.

Validated: The proving of all known performance requirements that can reasonably be tested using the test apparatus of the applicable TRL.