FOA Overview and Changes October 25, 2017

Webinar Q&A

CINR FOA Overview and Update on Changes:

If industry is partner on a R&D application, is cost share required from industry?

Cost share from industry collaborators is required. You can gain that detail from the FOA under cost share as well. The FOA, Part 8 section H helps to define the cost share. The FOA does require a minimum 20% cost share from awardees except for apps led by US educational institutions. So if it's a university prime, that eliminates the need for a cost share. Please let us know if there is still confusion on this question, send questions to neup@inl.gov.

How many months of summer salary per year is the maximum allowed for university proposals?

There is no stipulation on that regard for summer salary.

What is the percent limit of funding that can go to a FFDRC for a project?

20% limit in aggregate; specifically if you have two national laboratories, they would be sharing that 20%, it would not be 20% each. That aggregate also includes all non-university partners.

If my project has a no cost extension till Dec 1, 2018, am I eligible to submit proposal this time?

Yes.

Can a Non-DOE research lab such as DoD research lab eligible as a Co-PI? If yes, will that affect the proposal review?

Yes they may and no, it will not affect the review.

If I understood correctly, the national lab participation for NEUP is not mandatory? Will it be any drawback if we don't include national lab for NEUP?

No it will not.

Can the proposal include a Co-PI in a Foreign institution? Can they receive funding through subcontract? Or only through their visiting to US?

Yes it can include a foreign institution, but no funding may be provide to the foreign institution from the funds that come from the federal government. They can receive no funds from the US government including travel.

Would the total number of new NEUP awards be approximately same as that of last year?

You could say that may be a reasonable estimate, but projects are always pending funding and DOE always holds the right to redirect funds.

Can we reveal NSUF facilities in NSUF with R&D support?

Yes you can.

If it makes sense for the workscope, can a private company be partner with a university, and receive funds as a subcontractor?

Yes as long as that private company is not a foreign entity.

For NSUF access request, does the narrative have to be semi-blind, i.e. can we include team member names?

While the narrative is semi-blind, the facility can be revealed.

For program supporting topics in Appendix B, if the University is leading the proposal, is there a limit on the percentage of funds that can go to non-University partners?

In Appendix B, No, there is not.

If an industrial partner is providing in-kind services to the project, do these services need to be reported as cost sharing in the proposal submission?

Yes, please include that on the proposal submission.

Can we send white paper to program managers to get feedback for relevancy?

No, though you are free to contact the program manager, but there is no pre-application process this year.

Is there a limit on the number of projects for which a person can be Co-PI?

No, there is not.

Are NEET-1, NEET-2 etc. considered individual workscopes for the 3 proposal limit per workscope per institution?

Yes, they are.

Are NSUF 1.1 and NSUF1.2 separate workscopes for the 3 proposal limit?

Yes, they are.

For NEUP proposals, is the participation of a National Lab a requirement?

No, it is not a requirement.

When will the final result of NEUP proposals be announced?

We anticipate in the early June timeframe in consistence with years past, with projects to start by Oct. 1st.

What is meant by active PI on 3 R&D projects. A NEUP project or any R&D project. Does being a Co-PI or a subcontractor for a national lab count?

That would mean being an active PI for a project funded through a prior year CINR project. No, being a Co-PI or a subcontractor for a national lab does not count.

How about number of application limits as a Co-PI?

There is no limit to the number of applications you can be on as a Co-PI. That limit is for the pre-application phase which has been eliminated this year.

If the workscope and FOA differ in project scope, i.e., new sensors R&D under NEET became an NSUF. How does that change the nature of the relevancy and the R&D portion?

The only Workscopes that are currently being offered are the ones in the currently and most recently posted one.

If I am now a PI on a current program, can I be a partner with another PI?

Yes, you can be a Co-PI on applications this year and there is no limit on the number you can be Co-PI on. Your restriction is on being a principal investigator role on applications submitted this year.

Can you comment on hold up on funding for this FY? I understand some projects are held up at HQ.

There are a couple of projects that are still being held, and they are working through the details of getting this resolved. But no further information is available at this time. All awards are pending availability of funds and from time to time these things do happen.

If I can get NSUF services at a university, do I still have to submit an application for access at the government NSUF?

No you do not, if you can get them at a university. But if you do need access to an NSUF facility, the only way to get that access is through an application.

Are students on student visas allowed on the projects at university?

Yes they are allowed.

For NSUF with R&D can you dedicate some of the money to support graduate students and summer salary for PI?

Yes, it would come out of the R&D support component and not the NSUF access budget.

All R&D applications do not require pre-applications and full applications are due on January 23, 2018, correct?

Yes, this is true.

Why was pre-application removed this year?

While the FOA was being approved for release, we quickly realized that to unfold the entire process there simply was not doable, so to get a call on the street that would result I projects beginning on Oct. 1st, we had to think a little outside the box, so pre-applications were rescinded.

Is there a way to obtain depleted UO2 pellets from DOE for funded projects?

We will need to do some research to get an answer to this question.

I'm new to this. What is the definition of NSUF-1 versus NSUF-2 applications?

NSUF -1 are requesting access to NSUF infrastructure and dollars for R&D support, while NSUF 2 are only requesting access to NSUF facilities. NSUF does not fund any investigator activities including travel.

You said that applications can only be submitted by invitation. What is the process for getting an invitation to submit a proposal?

That would be only for the NSUF applications, so as you submit your access requests they will be evaluated then we intend on issuing invitations on or about Dec. 19th. Those invitations would look like invitations that were issued from our pre-applications in past years, consistent with those year for NSUF only, if you are not invited to submit an application, you may not. The reason for that is the cost of the feasibility assessment that accompanies the full application.

Will the slides for today be made available on the NEUP site?

Yes, and the recording and Q/A will also be available there as well.

How many projects will be funded for each topic, say NEAMS 1.4? I assume this is a R&D project which requires only the full proposal submission?

It is an R&D project that requires a full proposal submission. At this time we don't have information on how many projects will be ultimately funded.

RC-1.3

What level of neutron flux is needed for adequate irradiation of TRISO particles?

Our particles have been irradiated up to 19% FIMA. You would need to have a soft flux in a gas cooled reactor, in a TRIGA reactor it may take 4 years, so may not work well. They can irradiate to get the fission products made active again in a TRIGA reactor. You would need a hot cell facility to handle these things. A small amount of radiation such as 3 months in a TRIGA reactor would give you not really more than 1% FIMA, so not much.

I plan to lead a two-universities combined team where we will be able to test irradiated items in the university facility. Do I need to submit some sort of pre-proposal or can I submit the final proposal by January 23?

Full proposals are due January 23rd and this workscope does not appear in any NSUF categories. You may collaborate with another university for this workscope. The experimental university should put in the application and have another university doing modeling and simulation be a Co-PI as a modeling. Parfoon and MOOSE-BISON codes are preferable from Idaho National Lab.

Will the TRISO specimens from national labs be free of charge?

We would only ship a very small amount and yes there is a cost involved if they are irradiated particles. Please contact Dr. Paul Demkowicz for pricing information. These would be a Fed Ex box of bead that would be shipped.

RC-1.3 Can one get surrogate materials without radioactive core for funded projects and from where?

We do have zirconium beads that have been coated at ORNL and depleted Uranium coated and matrix blanks and Dr. Paul Demkowicz can work with you to get those materials.

If one works with surrogate material without radioactive core for this study then can it be done on unirradiated samples?

Yes, in fact that is what they are intending with this workscope. If you use a zirconium coated bead and you put it in a matrix sleeve, you could measure the attack of the matrix under the water conditions and see how far it penetrates in terms of times and temperatures and how much damage has happened. We also have some highly irradiated material that is non-fueled so that you have the damage of coatings already there without having to have a radioactive source in terms of fuel.

Is it possible to propose working with only one material, either SiC or matrix?

PI should emphasize providing well-structured test plan that provides useful results, and not trying to do everything in a cursory manor.

What temperature ranges would be appropriate for steam ingress testing?

The temperature range of 800-1300C would be useful, but the exact temperature range is dependent on the specific transient being analyzed and the gas-cooled reactor design being used as a reference.

Should a proposal address oxidation behavior of BOTH graphitic material and SiC in order to be responsive to the FOA? Is the use of irradiated materials also essential to be responsive to the call?

Working on a single material is still responsive to the call. The PIs need to determine how effectively they can address all areas of the call within the prescribed budget, and be sure not to overcommit. So while addressing both materials is advantageous in certain respects, it is also important to present a thoughtful proposal, with well-designed experiments and reasonable prospects for providing useful data. These aspects of the proposal will be considered during the evaluation stage. If focusing on one area, it is suggested that that it be explicitly stated that this is the approach, with the goal of getting useful results without overstretching the budget.

While working with irradiated materials in order to determine the effect of irradiation on oxidation behavior is important (especially for graphitic matrix material) and may make for a more attractive proposal, it is not a requirement in order to be considered responsive to the call. It is understood by DOE that working with irradiated materials can be challenging or impossible at university facilities. A limited number of irradiated matrix specimens can be made available for this work (see details in the related question and response below), but these do have some radiological activity and attendant dose. Utilizing national laboratory facilities is a potential route to working on these specimens. Proposals that include generation of irradiated specimens (e.g., in university research reactors) are welcome.

The FOA and your webinar presentation clearly state the temperature range of interest is 1000 – 1600 °C for SiC. The graphitic steam oxidation temperature range is not clearly spelled out. Will it be 800 – 1000 °C or same as that of SiC?

Specific conditions are very dependent on the type of transient considered, the reactor design, and even the objective of the experiment. One strives to be in the range of relevant conditions (perhaps bounding). A suggested temperature range for steam oxidation is 800-1300°C when considering relatively high steam partial pressures. As an example, as core temperatures increase beyond this range during a steam generator leak in a steam-cycle modular high temperature reactor, pressure relief limits the steam concentration in the core considerably (e.g., MHTGR Preliminary Safety Information Document, DOE-HTGR-82-024).

Is it possible to give the range of partial pressures of oxygen and H2O that are of interest to the DOE? One ORNL presentation indicates the oxygen partial pressure to be in the range of 0-21 kPa, and H2O partial pressures in the range of 2-400 kPa. Should we go beyond these ranges?

In terms of reactor core conditions, for oxygen, ~0.2 to 20kPa is suggested as good range. For steam, the range you've provided is reasonable. Understand that these ranges are more about the

actual conditions in the core during the accident. The range of oxidant partial pressures the SiC (or even the matrix, in the case of a prismatic reactor) sees during an accident is another matter, since the large volume of graphite in the core is expected to getter the oxidants to a large degree. This will result in complex gradients of temperature and oxidant concentration throughout the core during an accident. This is the reason that the call mentions focusing on oxidation at lower O_2 and H_2O partial pressures for SiC (e.g., ranges that explore active-to-passive oxidation transition). There tends to be more published studies of oxidation of these materials at higher partial pressures (for example, Terrani et al. recently published a study of SiC oxidation in high-pressure steam up to 1700°C, J Am Ceram Soc 2014), so lower partial pressure conditions haven't been explored as much. For matrix material, the call focuses on oxidation in steam environments. Again, the reason for focusing on these conditions in the call is that these are the areas with the biggest gaps in the published literature, and it is more helpful to get additional data there, than to repeat existing studies (for example, high temperature oxidation of matrix in air).

Note that one of the recommendations in the call regarding matrix oxidation is that the work include a determination of reaction kinetics. This requires somewhat careful selection of experimental parameters (e.g., temperature, partial pressures, and even flow rates) in order to be in the kinetic oxidation regime. See, for example, the discussion by Contescu et al., J. Nucl. Mater., 453 (2014) 225-232. Hence a strict prescription here for enveloping experimental conditions is difficult.

Similarly for SiC, the call mentions exploring the active/passive oxidation regime, which will dictate experimental conditions. An example of calculated transition regions is given by Minato and Fukuda in IAEA-TECDOC-784 (1993). As mentioned in the call, recent studies on high-temperature oxidation of SiC with high oxidant partial pressures (e.g., in the passive oxidation regime) suggests that these conditions will not challenge the integrity of the SiC layer in TRISO fuel over the relatively short durations of HTGR transients (generally <100 h to reach peak temperatures and begin cooling). However, oxidant partial pressures at the SiC layer of the particles may be appreciably lower than that in the gas entering the core, and conditions may be in the active SiC oxidation regime. Data are sought in this regime to determine if active oxidation can threaten the integrity of the SiC layer.

What specimens can be made available from the DOE program for this effort? Could you please advise us how to budget the procurement of TRISO materials from the INL?

In general, the two types of materials that are relevant for this proposal call and are available from the DOE AGR program are (a) unirradiated and irradiated matrix specimens and (b) surrogate TRISO particles (i.e., TRISO particles with non-uranium kernels, but prototypical coatings, including the SiC layer, which is the subject of this study). Unirradiated specimens can be provided to winning applicants at no cost; irradiated specimens may be more involved due to the radioactivity in the specimens, and we will have to work out details, presuming such samples can be utilized (see below for more details). The matrix specimens would be pure matrix,

meaning that they have no particles in them. Surrogate particles come from several sources, and may have an exposed SiC layer (i.e., no OPyC layer was deposited), or have OPyC as the outermost layer. The AGR program is undertaking fabrication of a large quantity of particles with surrogate kernel materials (e.g., ZrO2) this fiscal year which can be made available for this work. Unirradiated matrix specimens are in the form of cylinders ~1 inch in diameter and 2.5 inches long. The point of contact for the unirradiated specimens is the TPOC for this proposal call.

Irradiated specimens are smaller (on the order of 0.5" in diameter), and they do have modest levels of radioactivity, which may limit usefulness in some laboratories. The contact for irradiated specimens is Will Windes (will.windes@inl.gov), who can provide information about the approximate dose levels.

There is nothing barring applicants from fabricating their own specimens for this study, but care would need to be taken to ensure that they are reasonably similar in properties to the materials currently being used in TRISO fuel manufacture.

Is there any link where I can access past research results on oxidation behavior of any related materials?

The attached list provides a few references in some relevant areas as examples. These lists are very incomplete. There is a large volume of literature in certain areas (e.g., graphite oxidation in air, etc.) that can be found through searches. Applicants are encouraged to search literature databases to better understand published work in these areas as well as the types of conditions relevant for high temperature reactor accidents involving air or moisture ingress into the core at elevated temperatures.

RC 2.1, 2.2 and 2.3

Under what kinds of conditions do we need to apply for NSUF - 1 or 2 for NEUP programs?

This scope does not apply to NSUF 1 or NSUF 2 workscopes.

Do proposals for RC-2.1 need an experimental component?

Yes, that would be great, the goal is to develop a model to guide the experimental activities. If you can combine those to validate your model, that would be ideal.

I assume we should take our queues from the presentation together with the text of RC 2.1 which does not cover all the topics in the text, is that correct?

Yes, the presentation provides more technical details and examples.

For RC-2.1 the details provided just now in the presentation are not reflected in the text for RC-2.1. In fact the text is unchanged from the draft provided some weeks ago.

The text has been revised in the new FOA draft posted on the NEUP website and it matches this presentations here. You can go to the workshop report in this presentation as well. We hope to get proposals that use a fundamental approach to enhance the database.

Can any 'computational only' proposal be submitted to the call?

Yes, but we will evaluate the most valuable proposals will be considered for funding because we will have limited resources.

For molten salt research, are you interested in multiscale modeling approaches (such as DFT, MD, ...)?

Yes, that is covered in the report as well.

Were any computational proposals funded for thermal radiation transport in the last NEUP call?

All information on the last calls are provided on NEUP.gov under R&D underneath the 2017 call under fuel cycle and reactor concepts. They information we are able to share is listed there.