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Revision 2

A Microreactor Program Operations Plan for The Department of Energy

March 2021

Idaho National Laboratory

MRP Microreactor Program

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Originating Organization NS&T Microreactor Program
Idaho Falls, Idaho 83415

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TABLES

ACRONYMS

BCP	Baseline Change Proposal
FTMS	foreign travel management system
GAIN	Gateway for Accelerated Innovation in Nuclear
IPL	Integrated priority list
NTD	National Technical Director
OSTI	Office of Scientific and Technical Information
PMB	Performance Measurement Baseline
STI	Scientific and Technical Information
TA	Technical Areas
TAC	Technical Advisors and Coordination
TAL	Technical Area Leads
WP	Work Package
WPM	Work Package Manager

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A Microreactor Program Operations Plan for The Department of Energy

1. INTRODUCTION

In conjunction with the DOE Microreactor Program Plan, this Operations Plan provides the guidance and requirements necessary to ensure consistency, accuracy, and quality of the work performed under the Microreactor Program. This document shall be reviewed and updated yearly or as needed, at the discretion of the National Technical Director (NTD).

2. PROGRAM SCOPE AND STRUCTURE

The scope of the DOE Microreactor Program entails three major Technical Areas (TAs) and work packages as listed below. Scopes of work within each package are performed by DOE-NE National Laboratories, universities, and private-sector organizations both independently and collaboratively. Maintenance of consistency in both work products and processes forms the basis for the implementation of this Operations Plan. The details of each of the TAs and work packages are outlined in the DOE Microreactor Program Plan. The structure of the program and high-level scope is provided below:

- Program Management
- Systems Integration and Analysis Technical Area
  - Integrated Systems Analysis
  - Economic Performance and Market Analysis
  - Licensing/Regulatory
- Demonstration Support Capabilities Technical Area
  - Nonnuclear Testing and Demonstration
  - Nuclear Testing and Demonstration
  - Demonstration Reactor Transportation and Disposition
- Technology Maturation Technical Area
  - High Temperature Moderator Materials
  - Heat Exchange/Power Conversion
  - Structural Materials
  - Advanced Heat Removal
  - Instrumentation and Sensors.

3. ROLES AND RESPONSIBILITIES

The Microreactor program is managed by a National Technical Director (NTD), with programmatic, technical, and budget assistance from the Technical Area Leads (TAL). There is a TAL for each of the Technical Areas described in the scope section above. The specific work scopes are defined under work packages and are managed by respective Work Package Managers (WPM) to perform, track and report work progress. Oversight of the program is coordinated through NE-5 “Reactor Fleet and Advanced Reactor Deployment”. DOE-NE is the customer who monitors and directs the work.

Specific roles, responsibilities, authorities, and accountabilities (R2/A2s) are shown in Table 1.

MRP Microreactor Program

Table 1. Specific roles, responsibilities, authorities, and accountabilities.

Position	R2/A2s
National Technical Director (NTD)	Works with DOE-NE Federal Manager to develop program direction, priorities, and milestones. Communicates program direction and expectations to the Microreactor Program Team. Prepares integrated priority list (IPL) in response to multi-year budget call and integrates priorities within program. Ensures work performed is consistent with program objectives and provides expected benefits. Leads program review meetings. Identifies opportunities for collaboration/leverage across technical areas. Communicates performance status and issues to DOE-NE Federal Manager. Performs final review and approval of Level 2 milestones and associated deliverables. Leads DOE-NE Program monthly performance status teleconferences. Leads annual Microreactor program reviews. Authorizes baseline changes. Authorizes travel requests.
Program Manager (PM)	Works with NTD to develop and communicate program direction, priorities, and milestones. Prepares integrated priority list (IPL) in response to multi-year budget call and integrates priorities within program. Monitors all program review meetings. Communicates performance status and issues to NTD and program team. Communicates and tracks program milestones and funding to program team. Maintains PICS:NE data for the program.
Technical Area Leads (TAL)	Plans annual work scope, schedule, and budget. Communicates program direction to work package managers. Prioritizes work scope within technical area. Coordinates work scope with other technical areas. Identifies milestones and deliverables. Monitors work execution on schedule and within budget. Oversees all technical aspects within technical area. Provides Control Account Summary monthly performance reporting in PICS:NE. Participates in Microreactor Program monthly status teleconference. Participates in applicable annual program review meetings. Proposes baseline changes, as applicable.

Position	R2/A2s
Work Package Manager (WPM)	Develops and maintain baseline work scope, schedules, and budgets and oversee the execution of work. Provides monthly performance reporting in PICS:NE. Communicates status of milestones to NTD and TAL with anticipated late or missed milestones being communicated 30 days before due date. Participates in Microreactor Program monthly performance status teleconference. Performs and leads specific scope as defined in approved work packages. Prepare milestone completion notification documentation. Prepare baseline change proposals when needed.
Technical Advisors and Coordination (TAC)	Coordinates the INL research activities with an understanding of technical scope and connect with overall program objectives. Provides technical guidance and consultation to team. Develops and maintain program plan and other program-related activities. Engages with other DOE Programs (NRIC, GAIN, ARC, etc.). Engages with external stakeholders (industry, NRC, etc.).
Project Manager	Provide business and financial assistance as requested by the team. Develop and maintain Operations Plan. Complete special assignments when requested. Monitor financial and funding monthly as needed. Develop and maintain SharePoint and Box communication tools. Including granting and monitoring access as requested.

4. WORK PLANNING AND PERFORMANCE GUIDELINES

Work performed under the Microreactor Program is captured within the official Performance Measurement Baseline. This baseline preparation is directed by NE-5 oversight in a prioritization process that then leads to work package preparation, review, and approval. Any change to the baseline following approval goes through a Baseline Change Process to document revisions. Performance Reporting is collected monthly to track the progress of work performed and reported to NE-5.

4.1 Prioritization

Annually, NE-5 provides preliminary draft funding guidance for the upcoming fiscal year. Based on this guidance the NTD and Federal Manager prepare the initial Integrated Priority List (IPL). Proposed Level 2 milestones are also identified. The IPL is then communicated to TALs to gain their concurrence. The finalized IPL is used to assign scope and initial budget to the technical areas. The TALs then break down the IPL into specific work package scope, budget, and milestones.

4.2 Work Package Planning

The Performance Measurement Baseline (PMB) is developed based on the IPL details and entered in work packages. A specific WPM is assigned to each work package (WP) and recorded in the PICS:NE system. Each WP contains a narrative section that includes a description of scope, objectives, assumptions/prerequisites, a basis of estimate and any applicable notes for reference.

4.3 Work Package Preparation Guidance

Below is guidance on the preparation of work packages under the Microreactor Program to ensure consistency across the work packages and that they include sufficient detail for approval of the work.

Scope: The scope description shall provide sufficient detail to be understandable by people that are not directly engaged in the work. This include a high-level description of the work to be performed, the purpose for the work, key outcomes/accomplishments that are anticipated, and a list of tasks/activities to be performed. The format for this information is a paragraph or more description followed by a list of tasks and activities. Identify the people that will be performing the work in the scope description. The scope shall be written in full sentences and acronyms should be avoided or defined. Writing style should be similar to that used in technical reports. Connections with other work packages should be stated in the scope.

Objective: A one or two full sentence description of the primary objective of the work.

Assumptions and Prerequisites: State all assumptions on funding to be received and description of other work (perhaps in other work packages or external inputs) that needs to be provided to support this work. Risks associated with completing the work should be described.

Basis of Estimate: Provide the basis of cost and schedule estimates for the planned work. This is commonly based on experience with previous work. However, in the cases that a more formal cost and schedule estimate has been performed it should be noted in this field.

Activities and Milestones: Include activities and milestones with a clear connection to the scope. It is acceptable to include funding spread in milestones or to have funding spread with activities and milestones defined separately with no funding associated. Activity titles should be description of the work being performed. Milestones should note completion or achievement of an accomplishment and should start with a verb. Consideration should be made for milestones to be completed throughout the year to show progress and to mark significant achievement. Avoid having all milestones due in August and September.

4.4 Milestone Planning

The identification of milestones is also included and is key to tracking WP progress and used in performance reporting. Milestone levels (i.e., M2, M3, M4) are listed to highlight reporting interest and key deliverables for the work performed (see Table 2).

Table 2. Milestones.

Level	Description	Completion Criteria	Review/Approval Process
M2	Key tracking milestones defined by NE-5 and NTD that represent significant achievements by the program and assigned to specific WP's within a program Technical Area. M2 milestones are reportable to the Federal Project Manager. The completion criteria generally require a technical report published by the lead organization as an open publication and sent to Office of Scientific and Technical Information (OSTI).	Submission to Microreactor Program Federal Manager, via email by the NTD or program manager at the direction of the NTD.	All M2 milestones provided to NTD and TAL for review two weeks prior to submission date.
M3	Typically work packages have at least one M3 milestone defined for key work elements. The completion criteria generally require a technical report published by the lead organization as an open publication and sent to OSTI.	Submission to the NTD and TAL via email, with project controls copied.	Reviewed by TAL before submission to NTD.
M4	Represents status reports, updates, and intermediate accomplishments. The deliverable is a technical memorandum or email but can be a report. They do not necessarily need to be published openly, but they are encouraged to be and sent to OSTI	Submission to the TAL via email, with project controls copied.	Submitted to TAL for review before submission.
M5	Not utilized under the Microreactor Program.	N/A	N/A

4.5 Baseline Change Control

The finalization of work package planning establishes the program performance measurement baseline that is locked and under change control. A formal Baseline Change Proposal (BCP) is necessary to make any modifications to scope, budget, or milestones details including dates. This process is managed via PICS:NE and any requested baseline changes are initiated with a BCP and a WP revision. The changes are tracked, and modifications approved in the BCP by the WP approval chain. The changed WP once approved becomes a revision to the baseline.

5. PERFORMANCE REPORTING AND DELIVERABLE SUBMISSION

Each month the WPMs provide detail status on the individual performance measures outlined in their work package via the PICS:NE system. At the beginning of each month actual cost data is uploaded to PICS triggering an email notification that the status screen is ready for input.

The WPM will provide milestone status as on schedule, delayed or complete. Emphasis on milestone progress and completion is the focus of the performance reporting. Each milestone is evaluated to determine progress as anticipated in the WP baseline. If a milestone is expected to be missed, it is important to communicate at least one month of the original due date to the TAL and NTD. Lack of early indication of milestone issues is an indication of poorly managed work execution. This early notification is expected of the WPM.

Once milestones are statused, PICS then calculates the cost variance value and indicates if the variance is outside of threshold requiring and explanation. Monthly accomplishments, issues and concerns, and key look ahead information is also requested. The WPM should populate the status input recognizing NE-5 as the customer with content appropriate for the audience. Accomplishments should not be input at too technical detail level and issues should be kept to those that need NE assistance or notification.

When the work package status has been submitted the input is reviewed and summarized to the Control Account level by the TAL. This summarization gleans from the WPM input the elements of highest magnitude and importance to be reported to NE-5. The input entered at the Control Account level is collected into a set of draft Performance Review slides and provided to the TAL for edit. The slides are then compiled into a comprehensive Monthly Performance Review PowerPoint slide deck and provided to NE-5 and the NTD for their information. These slides are provided monthly as a summarization of the work performance of the Microreactor Program.

5.1 Technical Reports/Documents

The milestones in the baseline represent the focus of the work performed. Completion of these milestones on schedule with a quality deliverable is of upmost importance. Most milestones result in the preparation of a detailed technical report. These reports shall be standalone documents that clearly describe the purpose, objectives of the work, the context in which the work was completed, and most importantly, the results and outcomes. Milestone report length is left to the discretion of the author; however, the inclusion of a concise but comprehensive executive summary at the front of the report is strongly encouraged. Include an acknowledgement that the work was performed in support of the DOE-NE Microreactor Program, (e.g., *This research was supported by the U.S. Department of Energy Office of Nuclear Energy Microreactor Program under U.S. Department of Energy Contract.* The DOE and Microreactor Program logo should also be present on the front page of the document.

The report itself should not include references to milestone numbers and completion dates. Rather, that information shall be included in the transmittal of the deliverables. Reports shall satisfy the formatting of the author's home laboratory records management requirements and include the lab system generated report number All reports need to be cleared for release through the submitting lab records management process that addresses export control, classification review and controlled unclassified information-type prior to the milestone completion date. M2 and M3 milestone reports should typically be scientific and technical information (STI) that are distributed to OSTI by the lead author's home laboratory. M4 milestones are usually internal documents and can be satisfied by less formal communications, which may not be a formal report and can be satisfied with an email. Clarification of what is required for completion of milestones shall be as defined during the work package planning process in the Criteria for Completion narrative.

5.2 Submission of Deliverables

Upon completion of the milestones, the milestones shall be provided to the TALs, NTD, and Federal Manager per the guidance provided in the Milestone Planning section for each milestone level. This includes providing the deliverable before submission or review for M2 (two weeks before due date to NTD) and M3 (review by TAL before submission). The milestone deliverables shall be delivered to the Federal Manager by the NTD or delegate for M2 milestones, to the NTD by the TAL for M3 milestones and to the TAL by the WPM for M4 milestones. The microreactor program manager shall be cc'd on all milestone completion emails.

The milestone deliverables shall also be uploaded to the PICS:NE system by the close of the monthly status process. This is done during the monthly status reporting by selecting the "complete" option for milestone status. The PICS:NE Deliverable Form is then populated with the appropriate data and the

completed report is uploaded into the deliverable form and sent through the approval chain as defined for the specific milestone level.

6. COLLABORATION MEETINGS

6.1 Bi-Weekly Meetings

The bi-weekly microreactor status meeting is structured to allow DOE-NE and NTD to address current issues, program reminders, status updates, and address any concerns related to scope or milestones. This meeting is held via conference call with the various program participants that include the TAL's, WPM's and key technical contributors to the Microreactor Program.

6.2 Monthly Deep-Dive

Once a month the bi-weekly status meeting will be scheduled to include a deep-dive discussion that focuses on a single technical area on a rotating basis and presented by the TAL. General guidelines for preparing the "deep dive" discussions are as follows:

1. Focus on the progress of scope objectives
2. Invite WPM's/PI's to give update on specific scope as desired
3. Presentation format:
   - List WP's and give update on each
   - Focus on certain WP's as desired
   - Include pictures or charts to show highlights
   - Discuss current notable accomplishments
   - List all milestones and give status on upcoming due in next 3 months
   - Discus any issues or concerns including integration with other Technical Areas
   - Plan for 45 minutes and Leave enough time for question and answers.

6.3 Microreactor Program Review Meetings

These program review meetings are held twice a year to provide coordination within the program. An annual winter meeting is held with the core program leadership to focus on review and execution of current fiscal years work and includes addressing programmatic items, gauging progress on work packages, and making mid-year adjustments to scope, as necessary.

The second meeting will be held in the summer is a larger group to include a broad list of participants involved in the program to review programmatic accomplishments and progress for collaboration and networking purposes. The meeting will also serve as the start of the planning process for the following year by having TALs include proposed scope. Federal managers and NTDs from other DOE programs should be invited to this program review meeting to ensure that they are aware of work being performed by the program.

6.4 Industry Stake Holder Workshops, Meetings and Webinars

As needed, workshops, meetings, and webinars will be held for industry stakeholders to provide input on their needs and program research and development activities to support their reactor development, demonstration, and deployment. These workshops, meetings, and webinars should be coordinated with the Gateway for Accelerated Innovation in Nuclear (GAIN) and industry organizations as appropriate.

7. DATA SHARING

7.1 Microreactor Website

The Microreactor Program utilizes the GAIN website to communicate information and accomplishments that are general public approved content to ensure that key stakeholders are aware of the work and have a means to access the program's research products. Only publicly available information will be placed on this website. All other communications and document collaborations will be through the SharePoint and BOX account as explained below.

7.2 BOX Account

The Microreactor BOX account will be used to share documents between Technical Areas, facilities, or team members as a preferred method for program collaboration. Access to each area shall be controlled by the Project Manager. An annual review of access with be processed to ensure that team members that have left the program are removed from the account. Each Technical Areal Lead is responsible for structuring, organizing, and updating the folders under their areas of responsibility.

Non-publicly available information can be stored on the Microreactor SharePoint site. Individual users should be aware of the procedures and policy on how to handle classified and sensitive information as document by their own company.

8. TRAVEL

8.1 Domestic Travel

Domestic travel planned for meetings and visits should be communicated to the TAL. These trips should be included in the Monthly Performance "Look Ahead" slides to communicate within the program what meetings are attended.

8.2 Foreign Travel

All Foreign travel must to be coordinated and approved by program leadership. Only trips that provide direct benefit to the Microreactor Program will be considered for approval and, in general, supporting DOE international agreements or DOE-approved collaborations. Foreign travel for conference attendance at conferences for networking purposes or presenting technical work is generally not a sufficient justification for foreign travel. The purpose for each trip must be a clear and direct need of programmatic benefit and should be discussed with the TAL and NTD.

To request foreign travel, prepare and submit a "travel request" in PICS:NE to inform NE management of the upcoming travel and to gain their approval in advance of the foreign travel management system (FTMS) approval request. When approved this will be followed by the formal FTMS travel managed via the internal lab travel office. The foreign travel requests must be submitted well in advance of the proposed travel and late submissions will not be approved.

9. QUALITY ASSURANCE REQUIREMENTS

All Microreactor Program work shall be performed and documented in accordance with applicable laboratory Quality Assurance (QA) program requirements (for INL refer to the QA documents in footnoted below)[a]. QA implementing procedures will be identified for all activities to ensure work is documented and the results are capable of successfully completion.

The Microreactor responsible personnel (such as the PI or WPM) shall ensure:

- QA requirements and acceptance criteria are identified, flowed down, and implemented by all outside entities. QA requirements will be identified by the sponsoring organizations Quality Assurance Representatives in cooperation with the sponsoring organization's technical personnel. The integrity of research and development (R&D) products and their usability by Office of Nuclear Energy (NE) and/or sponsoring organizations is predicated on meeting the identified QA requirements for the specific scope of work and associated deliverables.
- Experimental work and findings, test methods and characteristics shall be planned, documented and the approaches and procedures recorded and evaluated. Documentation shall be developed to ensure replication of the experiment. The researcher/developer shall document work methods and results in a complete and accurate manner. The level of documentation shall be sufficient to withstand a successful peer review and lab notebook would need to be maintained and presented, if required or needed. These QA requirements do not cover activities for installing and operating experiments in applicable laboratory facilities or structures, nor does it cover facility modifications designed to meet testing needs (such as temperature, pressure, gas flow, and control systems). Those activities are controlled by the specific facilities and laboratory and should be part of the laboratory instruction document, respectively.
- Software systems used to collect data and operate the experiment requires verification that it meets functional requirements prior to collection of actual data. Data anomalies require investigation and a recovery plan initiated. When performing data analysis, define assumptions used; the results obtained, so that independent qualified experts can evaluate how data was interpreted; methods used to identify and minimize measurement uncertainty; the analytical models used; and whether the R&D results have been documented adequately and can be validated.
- Model and codes usage and development that have not received verification and validation (V&V), or the V&V documentation is not available, the researcher/principal investigator shall provide a description of the model or code, along with assumptions and detail methodology to ensure accuracy and proper review of the data generated can be carried out.

[a] PDD-13000 – Quality Assurance Program Description; LWP-13840 – Issues Management; LWP-13014 – Determining Quality Levels; LWP-13410 – Planning, Performing, and Documenting Inspection for Acceptance; LWP-13620 – Managing Information Technology Assets; PDD-13610 – Software Quality Assurance Program.

- A QA review of all quality affecting SOWs and other procurement documents to assist with specifying the QA requirements is obtained. For work performed by Universities and other organizations under contract or other agreements, applicable requirements will be flowed down through the contract or other agreements, but the organizations will be responsible to implement the flowed down requirements through their own specific implementing procedures.

10. KEY CONTACTS

Table 3. Key contacts.

FEDERAL MANAGER **Diana Li** DOE Federal Manager Office of Nuclear Energy, US Department of Energy Office: (301) 903-1503 Email:diana.Li@Nuclear.Energy.Gov	TECHNICAL AREA LEADS SYSTEM INTEGRATION & ANALYSES **M. Scott Greenwood** Nuclear Science and Engineering Directorate Oak Ridge National Laboratory Office: (303) 358-7627 Email: greenwoodms@ornl.gov
NATIONAL TECHNICAL DIRECTOR **John H. Jackson** Nuclear Science & Technology Directorate Idaho National Laboratory Office: (208) 526-0293 Email: john.jackson@inl.gov	TECHNOLOGY MATURATION **Holly Trellue** Nuclear Engineering and Nonproliferation Division Los Alamos National Laboratory Office: (505) 665-9539 Email: trellue@lanl.gov
TECHNICAL LEADS **V. Rao Dasari** Office of Civilian Nuclear Programs Los Alamos National Laboratory Office: (505) 667-5098 Email: dvrao@lanl.gov	DEMONSTRATION CAPABILITIES **Piyush Sabharwall** Nuclear Science & Technology Idaho National Laboratory Office: (208) 526-6494 Email: piyush.Sabharwall@inl.gov
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11. REVISION HISTORY

Revision No.	Details of Change	Date Change Reviewed/Approved
0	New release	June 30, 2020
1	Title, added new QA section (page 8 & 9), personnel changes on page 10.	Sept. 30, 2020
2	Changed to new INL branding format, Section 7 was updated to utilize Gains website, section 10 personnel changes, and addition of new MRP logo.	Mar. 3, 2021

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