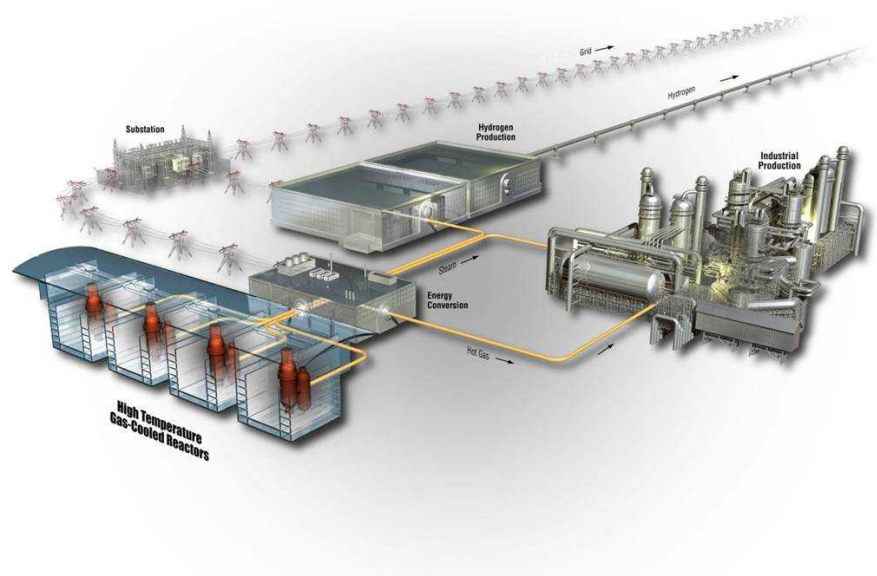


Statement of Work

Project No. 23841, 29412

Support for INL ART TDO Advanced Gas Reactor Fuel Fabrication and Characterization

The INL is a
U.S. Department of Energy
National Laboratory
operated by
Battelle Energy Alliance




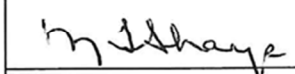


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Signatures			
Signature and Typed or Printed Name	Signature Code	Date (mm/dd/yyyy)	Organization/Discipline
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P For Preparer of the document.

A For Approval: This is for non-owner approvals that may be required as directed by a given program or project. This signature may not be applicable for all uses of this form.

C For documented review and concurrence.

Note: Quality Level 3 (QL3)

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REVISION LOG

Rev.	Date	Affected Pages	Revision Description
0	09/28/2012	All	New document.
1	05/21/2013	Pages 7, 9, and 10	Revised to include additional scope and applicable Quality Assurance program changes.
2	10/01/2013	All	Revised to incorporate additional work scope and remove completed work scope.
3	12/20/2013	All	Revised to incorporate additional FY-14 work scope.
4	04/16/2014	All	Revised to incorporate plus-up funding work scope.
5	10/01/2014	All	Revised to incorporate planned FY-15 work scope.
6	07/20/2015	All	Revised to add coating of materials work scope.
7	10/01/2015	All	Revised to incorporate planned FY-2016 work scope.
8	11/28/2016	All	Revised to incorporate planned FY-2017 work scope.
9	06/16/2017	6-7	Added characterization support for AGR-5/6/7 compacts.
10	12/04/2017	5-8	Revised to incorporate planned FY-2018 work scope.

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1. INTRODUCTION**1.1 Background**

Oak Ridge National Laboratory (ORNL) has participated in the Advanced Gas Reactor (AGR) program for the Next Generation Nuclear Plant (NGNP) and the transition to the Idaho National Laboratory (INL) Advanced Reactor Technologies (ART) Technology Development Office (TDO) since the inception of the program. In this effort, ORNL has fabricated tristructural isotropic (TRISO) fuel and fuel compacts for AGR-1, AGR-2, and AGR-3/4 experiments, provided matrix only components for AGC-2, AGC-4, and AGR-3/4 experiments and for university studies, and provided characterization, coating, and compaction support for INL and BWX Technologies Nuclear Operations Group (BWXT).

In fiscal year (FY) 2018, the activities for the INL ART TDO fuel development are focused on final characterization to support the AGR-5/6/7 experiments and technical support to the Generation-IV International Forum (GIF) pre-irradiation leach-burn-leach (LBL) round robin effort with China and South Korea.

1.2 Purpose/Objectives**1.2.1 ORNL Laboratory Operations and Support Services**

This task incorporates miscellaneous physical and administrative work activities needed to maintain the characterization laboratory in an operable state to support fuel characterization.

1.2.2 ORNL Project Management and Reporting

This task embodies work activities related to project planning, administration, and reporting status and outcomes of work performed.

1.2.3 ORNL Confirmatory Analyses and Characterization Support

ORNL will provide analytical and characterization support to INL and BWXT as requested to validate and/or verify the results obtained for AGR-5/6/7 fuel compact characterization.

1.2.4 ORNL Technical Support and Participation in Generation-IV International Forum Activities

ORNL shall provide technical support to the GIF LBL round robin being conducted with China and South Korea. The technical support will include collaboration meetings, analysis and shipment of simulated LBL defects made from archived U.S. TRISO particles, receipt of Chinese TRISO particles for leach-burn-leach analysis in the ORNL Uranium Lab, and preparation and issuance of reports of results and analysis.

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1.3 Anticipated Benefits

Activities related to compact deconsolidation leach burn leach (DLBL) are intended to provide corroboration of the results generated in the BWXT laboratory.

The analytical and characterization support provided by ORNL per this statement of work (SOW) allows for verification of results obtained from the BWXT lab analysis for the same or similar samples.

2. APPLICABLE CODES AND REFERENCES

American Society of Mechanical Engineers NQA-1 2008/1a 2009, Part I is applicable to the work scope performed.

Specification (SPC)-1352, "AGR-5/6/7 Fuel Specification", Revision 8, March 9, 2017.

3. SCOPE**3.1 Work to Be Performed****3.1.1 ORNL Laboratory Operations and Support Services**

ORNL shall maintain the data acquisition methods and equipment in the uranium fuel characterization laboratory in an operable state to support the planned work scope.

3.1.2 ORNL Project Management and Reporting

ORNL shall conduct necessary activities for project management and reporting activity status and progress.

3.1.3 ORNL Characterization and Analyses Support

ORNL will provide analytical and characterization support to validate and/or verify the results obtained for AGR-5/6/7 fuel compact characterization. This includes washing resinated graphite powder from TRISO particles, compact deconsolidation, leach-burn-leach of liberated TRISO, and impurities analyses.

3.1.4 ORNL Technical Support and Participation in Generation-IV International Forum Activities

ORNL shall provide technical support and participate in GIF activities, including an LBL round-robin. The U.S., China, and South Korea will be the primary participants in the LBL benchmarking round-robin. ORNL has shipped to Korea a series of samples prepared for this experiment that contain depleted-uranium-bearing coated particles with simulated LBL defects. A similar sample set has been prepared and shipped to China. Each primary participant will perform LBL analysis (ORNL analysis of these samples is already complete). China will ship large-coater depleted-uranium TRISO particles to primary participants for similar analysis. ORNL will perform analysis on the samples they receive from China, prepare a summary report on the ORNL LBL methods used and data acquired on both sets of round robin samples, and

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attend a GIF meeting where results from each participant will be presented and compared.

3.2 Work Excluded

Work not specifically identified to be performed in this SOW is excluded.

3.3 Requirements

ORNL internal environmental, safety and health, quality assurance program, and radiological control requirements apply to all work performed under this SOW.

3.4 Place of Performance

The primary place where this work will be executed is at ORNL.

3.5 Interfaces

BWXT, ORNL and INL investigators will interface with each other.

3.6 Miscellaneous

None

4. DELIVERABLES AND SCHEDULE

Principal investigator(s) shall report progress in bi-weekly INL ART TDO AGR teleconferences and written monthly progress reports.

Activity Description	Completion Date	Deliverable
GIF Round Robin	June 30, 2018	Report on ORNL analysis of Round Robin samples.
Characterization of samples	As completed	Reports, charts, graphs, photographs, micrographs, etc. detailing results of characterization.

5. COMPLETION CRITERIA AND FINAL ACCEPTANCE

Acceptance of task completion will be upon receipt and review by INL personnel of the applicable deliverable documentation.

6. APPENDICES

None

7. ATTACHMENTS

None