



Department of Energy
Savannah River Operations Office
P.O. Box A
Aiken, South Carolina 29802

FEB 19 2019

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Mr. Tom Clements
Savannah River Site Watch
1112 Florence Street
Columbia, SC 29201

Dear Mr. Clements:

SUBJECT: Freedom of Information Act (FOIA) Request Savannah River Operations Office
SRO-2018-01475-F

This letter constitutes our final response to your August 10, 2018 FOIA request based on the Decision and Order from the United States Department of Energy Office of Hearings and Appeals following your appeal of the initial determination letter. In your request, you asked for copies of (1) Any "work for others" agreement or any other form of agreement(s), including any "memorandum of understanding" or contract between Germany [Jülicher Entsorgungsgesellschaft für Nuklearanlagen (JEN) - located at the Forschungszentrum Jülich (FZJ)] and the Savannah River Site, Savannah River Nuclear Solutions and/or the Savannah River National Laboratory concerning payment of approximately \$1.9 million (or any other amount) involving research and development at SRS of processing and disposal of German graphite spent fuel during Fiscal Year 2018; and (2) Any reports from any SRS entity provided to Germany under the requested work for other agreement.

WFO-13-021 Modification 3 and WFO-13-021 Modification 4 are responsive to your request and attached.

If you wish to challenge the adequacy of the search or the information withheld, you must submit a written appeal within 90 calendar days after receipt of this letter denying in part and granting in part the requested information. Written appeals should be submitted to the Director, Office of Hearings and Appeals, Department of Energy, 1000 Independence Avenue, SW, L'Enfant Plaza Building, Washington, DC 20585, under 10 CFR § 1004.8, which sets forth the required elements of such appeals. Thereafter, judicial review will be available within the district in which a requester resides, has a principal place of business, in the place in which the records are situated, or in the District of Columbia. You may also submit your appeal by e-mail to OHA.filings@hq.doe.gov, including the phrase "FOIA Appeal" in the subject line.

You may contact me, DOE Savannah River Operations Office's (SR's) FOIA Public Liaison, at (803) 952-7618 or by mail at PO Box A, Aiken, SC, 29802 for any further assistance or to discuss any aspect of your request. Additionally, you may contact the Office of Government Information Services (OGIS) at the National Archives and Records Administration to inquire about the FOIA mediation services they offer. The contact information for OGIS is as follows: Office of Government Information Services, National Archives and Records Administration, 8601 Adelphi Road-OGIS, College Park, Maryland 20740-6001, email at ogis@nara.gov; telephone at (202) 741-5770; toll free at 1-877-684-6448; or facsimile at (202) 741-5769.

Mr. Clements

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As Chief Counsel, DOE-SR, I am the authorizing and denying official for the documents responsive to your request. If you have any questions, please contact Ms. Jennifer Farmer at (803) 952-7813 or jennifer.farmer@srs.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Lucy M Knowles", with a long horizontal flourish extending to the right.

Lucy M. Knowles
Authorizing Official

OCC: LMK:anv

SRO-2018-01475-F
RESPONSIVE RECORDS INDEX

<u>Number</u>	<u>Subject</u>	<u>Pages</u>
1	WFO-13-021 Modification 3, dated 12-19-2017	2
2	WFO-13-021 Modification 4, dated 3-13-2018	8
		<u>Total Pages</u> 10

WORK FOR OTHERS AGREEMENT NO. WFO-13-021

BETWEEN

SAVANNAH RIVER NUCLEAR SOLUTIONS, LLC

OPERATING UNDER PRIME CONTRACT NO. DE-AC09-08SR22470
FOR THE
U.S. DEPARTMENT OF ENERGY

AND

Jülicher Entsorgungsgesellschaft für Nuklearanlagen mbH
(formerly AVR GmbH / FORSCHUNGSZENTRUM JÜLICH GmbH)

MODIFICATION NO. 3

THIS AGREEMENT MODIFICATION, entered into this the 19th day of December 2017, by and between SAVANNAH RIVER NUCLEAR SOLUTIONS, LLC, a company duly organized and existing under the laws of the State of South Carolina, and having a principal office in Aiken, South Carolina 29808 (hereinafter called "SRNS"), acting under Contract No. DE-AC09-08SR22470 with the UNITED STATES OF AMERICA (hereinafter called the "Government"), as represented by the DEPARTMENT OF ENERGY (hereinafter called "DOE"), and Jülicher Entsorgungsgesellschaft für Nuklearanlagen mbH (JEN) formerly AVR GmbH / Forschungszentrum Jülich GmbH, having a principal office in Jülich, Germany. JEN will hereinafter be called the "Sponsor":

BACKGROUND

SRNS and the Sponsor have agreed that the services provided under Work for Others Agreement WFO-13-021 have created a beneficial relationship for both parties. It has been determined that it will be necessary to extend the period of performance for this Agreement in order for SRNS to continue the WFO deliverables requested by the Sponsor.

This Modification No. 3 to Work for Others Agreement WFO-13-021 is entered into and by SRNS and the Sponsor for the purpose of extending the period of performance. Specifically, Modification 3 changes the following articles as noted below:

ARTICLE II. TERM OF THE AGREEMENT

The estimated period of performance for completion of the Statement of Work (hereinafter "SOW") is forty-six (46) months. This Agreement shall be effective as of the last date on which it is signed by all Parties hereto and shall remain in effect until 3/31/2018.

All other terms, conditions and provisions of WFO-13-021 shall remain in full force and effect.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement Modification as of the day, month, and year first above written.

FOR UNITED STATES DEPARTMENT OF ENERGY:

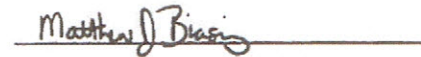
Signature: 

Name: Samuel Stewart

Title: Contracting Officer for DOE-Savannah River

Date: 12/21/17

FOR SAVANNAH RIVER NUCLEAR SOLUTIONS, LLC:

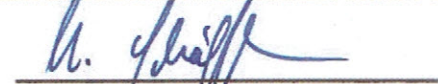
Signature: 

Name: Matthew J. Biasiny

Title: Manager, Contracts and Technology Partnerships

Date: _____

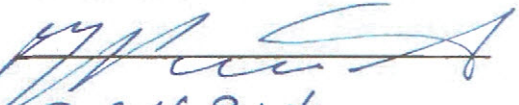
FOR JÜLICHER ENTSORGUNGSGESELLSCHAFT FÜR NUKLEARANLAGEN mbH :

Signature: 

Name: ULRICH SCHÄFFLER

Title: _____

Date: COMMERCIAL DIRECTOR

Signature: 

Name: Rudolf Prinz

Title: Technical Director

Date: Dec. 21, 2017

WORK FOR OTHERS AGREEMENT NO. WFO-13-021

BETWEEN

SAVANNAH RIVER NUCLEAR SOLUTIONS, LLC

OPERATING UNDER PRIME CONTRACT NO. DE-AC09-08SR22470
FOR THE
U.S. DEPARTMENT OF ENERGY

AND

JEN Jülicher Entsorgungsgesellschaft für Nuklearanlagen mbH
(formerly AVR GmbH / FORSCHUNGSZENTRUM JÜLICH GmbH)

MODIFICATION NO. 4

THIS AGREEMENT MODIFICATION, entered into this the 13th day of March 2018, by and between SAVANNAH RIVER NUCLEAR SOLUTIONS, LLC, a company duly organized and existing under the laws of the State of South Carolina, and having a principal office in Aiken, South Carolina 29808 (hereinafter called "SRNS"), acting under Contract No. DE-AC09-08SR22470 with the UNITED STATES OF AMERICA (hereinafter called the "Government"), as represented by the DEPARTMENT OF ENERGY (hereinafter called "DOE"), and JEN Jülicher Entsorgungsgesellschaft für Nuklearanlagen mbH (JEN) formerly AVR GmbH / Forschungszentrum Jülich GmbH, having a principal office in Jülich, Germany. JEN will hereinafter be called the "Sponsor":

BACKGROUND

SRNS and the Sponsor have agreed that the services provided under Work for Others Agreement WFO-13-021 have created a beneficial relationship for both parties. It has been determined that it will be necessary to extend the period of performance for this Agreement in order for SRNS to complete the WFO deliverables requested by the Sponsor.

This Modification No. 4 to Work for Others Agreement WFO-13-021 is entered into and by SRNS and the Sponsor for the purpose of extending the period of performance with additional cost to support receipt of irradiated kernels and unirradiated fuel pebbles for continued research, testing, and disposition of the sample kernels by SRNL. Specifically, Modification 4 changes the following articles as noted below:

ARTICLE II. TERM OF THE AGREEMENT

The estimated period of performance for completion of the Statement of Work (hereinafter "SOW") is fifty-seven (57) months. This Agreement shall be effective as of the last date on which it is signed by all Parties hereto and shall remain in effect until 2/28/2019. The additional scope of work being included with this modification #4 has a period of performance that shall remain in effect until 2/28/2019.

ARTICLE III. COSTS

- A. The total estimated cost for the work to be performed under this Agreement is increased to \$7,317,400 (original Step 1 and 2 estimate \$1,940,800) including 3% DOE administrative fee for the scope modification noted below.

(Addition of Section D to address funding from previous WFO Agreement)

- D. The DOE travel funding remaining from WFO-13-002 (\$40,847.47) will be added to this WFO for use by DOE in the travel fund scope supporting this work.
- E. Any remaining funding from previously executed tasks as part of WFO-13-021 will be available to cover costs associated with this scope modification.

ARTICLE XIV. PATENT RIGHTS

(new)

5. The Parties have agreed that the Sponsor may need access to the following SRNS/DOE owned technologies as well as any other prospective technology regarding German graphite fuel and materials being considered for patent protection during this or subsequent agreements to accomplish the objectives of the Sponsor in funding this Agreement: SRNS 13-007/017 – *Low Temperature Chemical Processing of Graphite-Clad Nuclear Fuels* and SRS 15-017 – *Low Temperature Vapor Phase Digestion of Graphite*. SRNS/DOE hereby grants the Sponsor an option to non-exclusively license European applications/patents stemming from SRNS 13-007/017 and SRNS 15-017 as necessary for processing German high temperature reactor graphite fuels and materials should it be determined by either Party that processing such fuels/materials in the US is not desired. Such option shall be in effect during the term of this Agreement, subsequent agreements regarding German graphite fuel and materials, and for six months thereafter (period shall not commence unless a final decision was made if processing of the materials takes place in the United States); any such license executed will be provided without payment of any associated license fees to SRNS/DOE but may require payment of annuities to the European Patent Office or other national patent offices (e.g., German Patent Office) and will require the Sponsor to provide appropriate liability protections and indemnifications for SRNS/DOE.

ARTICLE XV. RIGHTS IN TECHNICAL DATA – (UNLIMITED RIGHTS/NONPROPRIETARY) *(revised addition is underlined)*

3. The Sponsor, Contractor and the Government shall have Unlimited Rights in all Generated Information produced by the Parties or information provided under this Agreement, except for information which is disclosed in a Subject Invention disclosure being considered for patent protection, or which is marked as being Proprietary Information. All Generated Information produced under this Agreement will be shared with the Sponsor unless restricted by US Export Control laws.

APPENDIX A. STATEMENT OF WORK

1.0 SCOPE

4. The contractor/DOE will perform activities to receive, test and disposition irradiated kernels from the Sponsor to determine fission product distribution to confirm bench scale testing.
5. SRNS will provide key researchers from the contractor staff to support these activities as well as maintain the research documents in a current state through 2/28/2019.
6. SRNS will provide a staffing plan to ensure key staff are available to support continuation of the project provided agreement on additional work is reached no later than 2/28/2019.

7. The DOE travel funding remaining from WFO-13-002 (\$40,847.47) will be added to this WFO for use by DOE in the travel fund scope supporting this work with the period of performance extended to 2/28/2019.

WORK REQUIREMENTS

Section 3.0 Task Requirements is modified to include:

Continuation of Scope of Work for Graphite Project			
Task ID Number	Deliverable/Activity	Description of Deliverable	STEP 2
10	DOE Support of Travel	Covers DOE Staff travel for participation on progress meetings (envisioned to occur quarterly) regarding this Graphite project, public meetings, and status meetings to management.	\$102.4K*
13	Irradiated Kernel Testing. fission product distribution and Technology Maturation (SRNS managed)	Assign resources and perform activities for receipt, test equipment setup and testing of irradiated fuel kernels in SRNL Shielded Cells Facility. Testing will confirm performance of process on irradiated material and fission product distribution. Disposition of test equipment and materials is included in this task. Results will be documented and communicated. This task would also develop technology advancements to reduce the severity of process conditions to facilitate the acceleration of technology maturation and to reduce technology complexity. Testing on irradiated samples will be completed when necessary to confirm the reduced operating parameters.	\$1100K
14	Develop Schedule and Estimate for Technology Maturation	Establish core staffing needed to develop resource plans, estimates, and schedules needed for follow-on technology development to TRL-6 and project execution estimate and schedule	\$642.6K
	Total		\$1,845K
	DOE Administrative Fee (3%)* see footnote		\$55.35K
	Grand Total**		\$1,940.8K

*Footnote: The additional \$40,847.47 for DOE Travel is not included in the fee calculation since the fee was already taken in WFO-13-002.

** Funding for each task/step is approximate.

TASK DESCRIPTIONS

Supplemental Sub-System Definition

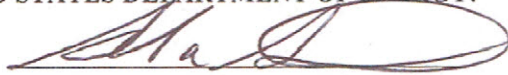
Testing to advance the maturation (and assumptions) for the proposed primary digestion, secondary digestion, off-gas treatment and handling, and alternate U/Th disposition will require laboratory testing. Based on previous SRNL process data and data in the literature, it is expected that the overall process can be operated at approximately 100 °C below the conditions previously employed during engineering-scale testing. If valid, the reduction in process temperature will accelerate overall process maturation through less aggressive process conditions, reduced materials of construction demands, more-efficient use of the primary oxidant, improved process safety, and reduced fission product volatility. The temperature of the primary digestion vessel and its subsequent impact on the behavior of Cs, Sr, I, and Tc fission products is a key step in determination of system parameters for further testing at higher maturity levels. The maturation will be completed using simulant materials; future demonstrations will employ the irradiated kernels and unirradiated pebbles received as part of this work scope. Successful completion of these tasks will have positive impacts on the overall cost and schedule for technology maturation being developed as part of this WFO extension.

All other terms, conditions and provisions of WFO-13-021 shall remain in full force and effect.

IN WITNESS WHEREOF, the parties hereto have executed this Agreement Modification as of the day, month, and year first above written.

FOR UNITED STATES DEPARTMENT OF ENERGY:

Signature:



Name:

Samuel Stewart

Title:

Contracting Officer for DOE-Savannah River

Date:

3-22-18

FOR SAVANNAH RIVER NUCLEAR SOLUTIONS, LLC:

Signature:



Name:

Matthew J. Biasiny

Title:

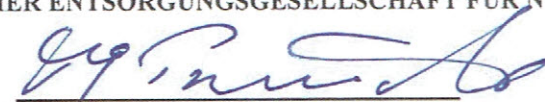
Manager, Contracts and Technology Partnerships

Date:

March 22, 2018

FOR JÜLICHER ENTSORGUNGSGESELLSCHAFT FÜR NUKLEARANLAGEN mbH:

Signature:



Name:

Dipl.-Ing. Rudolf Printz

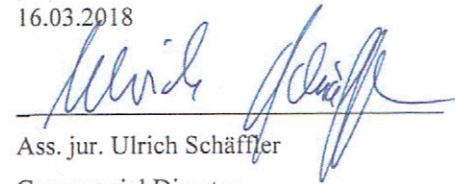
Title:

Technical Director

Date:

16.03.2018

Signature:



Name:

Ass. jur. Ulrich Schäffler

Title:

Commercial Director

Date:

16.03.2018

WORK FOR OTHERS – 13-021
DETAILED WORK DESCRIPTION, SCOPE OF WORK

ID 13:

Irradiated Kernel Testing, Fission Product Distribution, and Technology Maturation (SRNS managed)

Description of Deliverables:

Assign resources and perform activities for receipt, test equipment setup and testing of irradiated fuel kernels in SRNL Shielded Cells Facility. Testing will confirm performance of process on irradiated material and fission product distribution. Disposition of test equipment and materials is included in this task. Results will be documented and communicated. This task would also develop technology advancements to reduce the severity of process conditions to facilitate the acceleration of technology maturation and to reduce technology complexity.

Total estimated costs: \$1100K

Detailed description:

In 2015, the engineering-scale demonstration proved that the primary oxidant (nitric acid) could effectively digest graphite, and that the quantity of primary oxidant required could be greatly reduced through the use of a secondary oxidant (oxygen). These reactions can occur between 550 and 750 °C. Without the primary oxidant, oxygen requires 850 to 900 °C to react effectively with graphite. The significance of the reaction temperature is that multiple studies, including SRNL studies, show that fission product release to the offgas system (particularly cesium), begins to accelerate at 750 °C

Our process conditions tended toward 750 °C because higher temperatures made more effective use of the primary oxidant, plus there was significant heat removal required. Further study of the literature indicates that while the primary oxidant can be used in the manner previously demonstrated, the data indicate that the primary oxidant can be used more as a catalyst which enables oxygen to be the primary oxidant, but at significantly lower temperatures, perhaps as much as 100-150 °C lower.

The net result of lowering the temperature could have wide-ranging positive effects. These include:

- Reduced use of the primary oxidant (nitric acid) and increased use of the secondary oxidant (oxygen).
- Reduction of the amount of NO_x generated which must be either recovered or emitted to the atmosphere.
- Reduction of the quantity of fission products emitted during primary oxidation, which could result in significant simplification of the offgas system.
- Enable the use of less-expensive materials of construction.
- Decrease the physical and chemical hazards associated with operating at elevated temperatures.
- Increase process safety margins relative to reactivity and offgas generation.
- Decreased maturation cost and schedule due to process and equipment simplification.

There are several areas in which a small effort can produce results that could reduce the cost and schedule for scale-up. In this interim contract period, SRNL has explored the process and its chemistry which indicates that the process temperatures can be reduced by as much as 100 °C. Still the necessary processing throughput can be achieved.

One of the achievement of lower temperature demands could be a reduction of the off gas system demands, e.g. for the digestion of the irradiated coated particles and improve the process safety substantially. Reducing the process temperature would reduce risk across the board on the materials of construction, a vastly lower fission product volatility, and a lower use of primary oxidant and greater use of secondary oxidant, among others.

The work under the WFO would start with a series of optimization activities followed by several confirmatory tests with the existing engineering-scale equipment. This series of activities would enable us to explore the range and boundary conditions of our reaction, thereby enabling us to optimize the process and reduce risk in many aspects of the design and process. It will also enable us to define the bounds of safe operation relative to reactivity and flammable gas generation.

Included in the estimate is the receipt of the irradiated fuel kernels and the unirradiated fuel pebbles. The irradiated fuel kernels will be used for off gas testing to validate data as described above. Depending on the results of the above work, the radioactive materials will be used in a subsequent phase of maturation.

Activity Description	Cost (\$ k)
ID 13 Material Receipt and Technology Maturation	
1. Manage scope execution	115
2. Receipt and management of irradiated kernels and unirradiated pebbles	100
3. Laboratory set-ups and modifications – scoping study	75
4. Optimization of digestion parameters	325
5. Parameter safety evaluation	100
6. Fission product studies	100
7. Optimization of secondary digester parameters	125
8. Evaluation of alternate U-Th disposition	75
9. Document results	85
Technology Maturation (ID 13) Total	1100

Task 1. Manage scope execution:

Re-establish scoping testing equipment and instrumentation in existing laboratory. Obtain authorizations.

Task 2. Receipt and management of irradiated kernels and unirradiated pebbles

Task 3. Laboratory set-ups and modifications – scoping study

Evaluate process ranges and limits to define safe operation envelope relative to reactivity and flammable gas generation

Task 4. Optimization of digestion parameters

Evaluate the effects of varying temperature, oxidant ratios, feed rates, and multiple zones on reaction and equipment optimization for primary digester.

Task 5. Parameter safety evaluation

Evaluate process ranges and limits to define safe and effective operation envelope for secondary digester.

Task 6. Fission product studies

Evaluate fission product distribution behavior for base case, optimal conditions, and bounding conditions.

Task 7. Optimization of secondary digester parameters

Task 8. Evaluation of alternate U-Th disposition

Evaluate the feasibility of using of alloying techniques for disposition of radioactive elements as an alternative to dissolution.

Task 9. Document Results

The results for Tasks 1-8 will be presented to the client and a path forward will be gained. As well as documenting results in a technical report.

ID 14:

Develop Schedule and Estimate for Technology Maturation

Total estimated costs: \$642.6K

Detailed description:

Activity Description	Cost (\$ k)
ID 14 Develop Schedule and Estimate for Technology Maturation	
1. Development of resource plans, estimates, and schedules	
2. Follow-on technology development	
3. Project execution estimate and schedule	
Schedule and Estimate Total	642.6

Task 1. Development of resource plans, estimates, and schedules

Previous resource plans, estimates, and schedules will be revised to reflect the current situation of needing to re-establish the personnel to complete this work

Task 2. Follow-on technology development

Any additional technology development needed to achieve Technology Readiness Level 6 will be identified, estimated costs and schedules.

Task 3. Project execution estimate and schedule

All information from technology development and the revised plans, estimates and schedules will be factored into the project execution estimate and schedule. This work is essential to establishment of a two-phased contract.