GA-A23811

GT-MHR COMMERCIALIZATION STUDY

Technical Progress and Cost Management Report for the Period
January 1 through January 31, 2003

by
GT-MHR Staff

Contact: A. S. Shenoy

Prepared under
Oakland Operations Office
Program DE-AC03-01SF22343
for the U.S. Department of Energy

General Atomics Project No. 30103
DATE PUBLISHED: February 2003

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**GT-MHR Commercialization Study
Monthly Technical Progress and Cost Management Report
for January 2003**

Contract No. DE-AC03-01SF22343
Submitted to: DOE - Oakland Operations Office
By: General Atomics

PART 1 – Technical Progress

Summary

- GA shipped 15 compacts plus 20 grams of un-bonded fuel particles from the same batch used in the compacts to the Petten High Flux Reactor (HFR) in The Netherlands. The package left GA on 1/7/03 and arrived at Petten on 1/24/03. Ten of the 15 compacts will be used in HFR-EU2 irradiation in the Petten HFR.
- A contract modification was received for preparation of a plan to develop coated particle fuel with higher temperature capability and work on preparation of the plan was started.
- Input was prepared for an INEEL report on materials for the VHTR. This input consisted of material property data needs, operating conditions, component configurations, and cost and schedule estimates. INEEL issued the report January 31, 2003 as INEEL/EXT-03-00141, entitled "Very High Temperature Reactor (VHTR), Survey of Materials Research and Development Needs to Support Early Deployment".

Task 1 – Fuel Irradiation

During January 2003 GA shipped 15 compacts (6 TRIGA activated + 9 non-activated) and 20 grams of Nuken fuel particles to the Petten High Flux Reactor (HFR) in The Netherlands. These un-bonded particles are from the same batch used in the compact formation. The package left GA on 1/7/03 and arrived on 1/24/03. Ten of the 15 compacts will be used in HFR-EU2 irradiation in the Petten HFR.

Work continues on the Pre-Irradiation Report for HFR-EU2. In this report complete details are provided on the HFR-EU2 capsule goals, irradiation conditions, capsule design, coated particles and compact quality control properties as measured at GA to be used in the test. As-measured properties of the H-451 graphite to be used in the HFR-EU2 test are also provided. Work on this report is

approximately 60% complete.

Task 2 – Fuel Manufacturing Process Improvement

This task has been completed.

Task 3 – NRC Interaction

This task is not currently funded.

Task 4 – Plant Cost Evaluation

This task has been completed.

Task 5 – Waste Disposal Assessment

This task has been completed.

Task 6 – Project Management and Project Development

This task covers all of the commercialization study project management and project development activities. During January, routine reviews of project activities were performed and the monthly report for December was prepared.

During January, two contract modifications were received, one in the amount of \$19,867 for performance of a materials survey for the VHTR and another one in the amount of \$280,133 to initiate work on preparation of a draft plan for development of advanced fuel particle coatings with higher temperature capability.

Task 7 – DOE Fuel Plan

GA continued to support the AGR Fuel Development and Qualification Program planning effort. GA support included the following activities:

- Participation in the weekly conference call
- Participation in QA conference calls
- Consultation with ORNL on fuel characterization technology
- Review/comment on ORNL near-term coating development plan
- Review/comment on draft of updated Appendix A of the Program Plan
- Interaction with INEEL, DOE-HQ, and DOE-OAK on contracting issues

As of the end of January, all of the funding allocated to this task has been expended.

Task 8 – MHR-2 Fuel Specification

Work on this task continued in January. The work included (1) a preliminary assessment of the applicability of the requirements in DOE-GT-MHR-100209A to demonstration test capsule fuel samples, and (2) initial efforts to define the process specifications and enhanced characterization methods for the reference fuel and fuel variants for the demonstration test capsule.

Task 9 – This task number not currently used

Task 10 – Advanced Fuel Studies

Work on the plan to develop coated particle fuel with higher temperature capability was started. The first task is to prepare a plan for development of coated particle fuels that are appropriate for applications with gas temperatures exceeding 850 °C. Options for high temperature coatings are being studied and an outline for the plan is being prepared.

Task 11 – VHTR Materials Survey

The objective of this task was to support the Idaho National Engineering and Environmental Laboratory (INEEL) in the development of a report identifying the materials technology development requirements for the Generation IV Very High Temperature Reactor (VHTR) using the GT-MHR material requirements as a starting point. The task work scope was divided into five subtasks and was performed over a one-month period during January 2003. The subtasks and the work performed is as follows:

Subtask 1. Perform a preliminary review of the schematic GT-MHR and VHTR plants to assign estimated temperatures, environmental conditions, and lifetime requirements to core support, gas loop, and structural materials.

Work performed: GA hosted a meeting of program participants on January 13 and 14, 2003, to determine the content of the report, assign who would write each section, and how the report would be edited. GA prepared and presented input to the meeting in the form of draft tables of VHTR engineering requirements, operating conditions, component materials choices, and GT-MHR configuration drawings.

Subtask 2: Review existing GA technologies materials design data needs to determine current materials choices for GT-MHR and VHTR materials components. Needs for improved materials, and needs for ASME code cases.

Subtask 3: Develop a survey that lists the major reactor materials components, their estimated operating environments and lifetimes, and current materials choices.

Subtask 4: Use the survey to identify and discuss the major gaps, needs for materials development, and needs for ASME code work required for the GT-MHR and VHTR reactors.

Subtask 5: Develop a preliminary scope and cost estimate for materials work required to eliminate the materials gaps and needs identified under subtask 4 including identification of the increment from GT-MHR to VHTR.

Work Performed for Subtasks 2, 3, 4 and 5: GA provided input to INEEL on materials data needs, operating conditions, components configurations, cost and schedule estimates and transmitted this to INEEL for editing into the report. In addition, GA commented on the report and provided comments to INEEL. A was produced by the participants and edited by INEEL. GA checked for incorporation of comments by GA and overall content.

The final report was issued January 31, 2003 by INEEL as INEEL report INEEL/EXT-03-00141, entitled "Very High Temperature Reactor (VHTR), Survey of Materials Research and Development Needs to Support Early Deployment".

Part 2 - Cost Management

Item	Total Expenditures, K\$	
	January 2002	Inception to Date ¹ , Totals
Task 1 – MHR-1 Fuel Irradiation	17.6	115.9
Task 2 – Fuel Manufacturing Process Improvement	0.0	204.0
Task 3 – NRC Interaction	0.0	143.8
Task 4 – Plant Cost Evaluation	0.0	87.3
Task 5 – Waste Disposal Assessment	0.0	103.2
Task 6 – Project Management and Development	2.7	136.9
Task 7 – DOE Fuel Plan	6.5	141.3
Task 8 – MHR-2 Fuel Specification	12.4	22.8
Task 10 – Advanced Fuel Plan	1.5	1.5
Task 11 – VHTR Materials Survey	25.3	25.3
Totals	66.0	982.0

Note:

1. Work started June 18, 2001.