

October 18, 2002

MEMORANDUM TO: Farouk Eltawila, Director  
Division of Systems Analysis and Regulatory Effectiveness  
Office of Nuclear Regulatory Research

FROM: John H. Flack, Chief */RA/*  
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Office of Nuclear Regulatory Research

SUBJECT: MEETING WITH GENERAL ATOMICS AND INTERESTED  
STAKEHOLDERS REGARDING HIGH-TEMPERATURE  
GAS-COOLED REACTOR TECHNOLOGY AND PREAPPLICATION  
ACTIVITIES FOR THE GAS TURBINE-MODULAR HELIUM REACTOR  
(PROJECT 716)

On September 24, 2002, the Nuclear Regulatory Commission (NRC) staff met with representatives from General Atomics Company (GA) and interested stakeholders to discuss plans and expectations for the preapplication review of the Gas Turbine-Modular Helium Reactor (GT-MHR). This was the second public meeting held with GA and included an update of information previously provided by GA at a meeting held on December 3, 2001 (ADAMS No. ML020430562). Attachment 1 is the meeting agenda. Attachment 2 is a list of the meeting attendees. Attachments 3 and 4 are copies of the GA presentation handouts concerning the "GT-MHR Design & Safety Approach," and "GT-MHR Project Update and Preapplication Objectives."

NRC Project Leader, Stuart Rubin, opened the meeting with an overview of the NRC's objectives for the GT-MHR preapplication review. The overview provided feedback to GA on technical, safety and policy issues that would need to be addressed to expedite an actual GT-MHR application. Mr. Rubin indicated that GA's proposed initial preapplication review scope, discussed in their August 16, 2002, letter to the NRC (ADAMS No. ML022390655), would need to be carefully delineated to ensure that available review resources would achieve the review objectives. Mr. Rubin noted that NRC Project No. 716 has been assigned for the docketing of all materials related to the GT-MHR preapplication review and that the "GT-MHR Conceptual Design Description Report," dated July 1996, which describes the major process parameters and design concept, is available (ADAMS # ML022470306).

A GA presentation followed that provided an overview of the GT-MHR preliminary design and safety approach, the design and development status of the GT-MHR project, and their objectives and areas of interest for the GT-MHR pre-application review. These areas were initially identified in their August 16, 2002, letter.

Detailed discussions between the staff and GA followed that focused on specific information that would be provided by GA for each technical topic. The review schedule and resources

required, and the nature of the feedback that the staff could provide was also discussed. It was agreed that the first technical review topical meeting would cover GT-MHR fuel and source term, and that the meeting should be held in early December 2002. Other topical meetings would be defined and scheduled during the course of the pre-application review.

The following summarizes the presentations:

#### GT-MHR Design and Safety Approach

Larry Parme, Reactor Safety and Licensing Manager (GA) presented the GT-MHR Design and Safety Approach (Attachment 3). Mr. Parme described the standard design as consisting of four modules co-located at one plant site with common control and support facilities. Each module consists of three major pressure boundary components, the reactor vessel, the power conversion unit (PCU) vessel, and the cross connecting vessel duct. All are located in a silo-shaped concrete confinement structure located below grade. The design and operation of the plant will generally be similar to that described in the "GT-MHR Conceptual Design Description Report," dated July 1996 (ADAMS # ML022470306), with some exceptions. For example, the control rods will be of high temperature carbon material rather than high temperature metal. The GT-MHR approach to safety emphasizes: (1) retaining radionuclides at the source during all accidents, and (2) minimizing reliance on active or complex engineered safety systems. Current plans are to store a lifetime quantity of spent fuel on-site.

Mr. Parme also noted that risk from water ingress is significantly reduced with the GT-MHR compared to the MHTGR because: (1) there are no steam generators, and (2) pre-cooler and inter-cooler secondary side pressures are below the reactor coolant (helium) pressure, which greatly reduces the potential for water ingress during normal operations.

NRC staff asked whether there were plans to filter reactor building releases. Mr. Parme indicated that there are currently no plans to filter releases, because of problems trying to design a filter that could withstand a rapid vessel blow down in the event of a large high energy line break. Mr. Parme noted that releases during accidents would be due to fission products that could result from: (1) particles with defective coatings, or that had experienced operational particle failure, (2) "tramp" uranium contamination, (3) activity in the primary coolant, or (4) activity that had "plated out" on coolant boundary surfaces during normal operations.

Mr. Parme stated that everything below grade would be considered within containment or confinement.

#### GT-MHR Project Update and Preapplication Objectives

Walt Simon, Power Reactor Division, Senior Vice President (GA) continued the presentation and discussed changes that GA has made or is considering. He noted they are in the process of developing a final design and are working with OKBM in the Russian Federation (RF) to develop magnetic bearings and the recuperator heat exchanger.

Key preapplication review topics identified by GA include:

- GT-MHR source term
  - Coated fuel particles
  - Use of a mechanistic release model
  - Containment
- Importing non-US technology, including use of test data
- Licensing approach
- Use of probabilistic risk assessment in selection of significant events and SSCs

Mr. Parme noted that GA is relying on DOE's fuel program to develop a qualified fuel design.

#### NRC Management Remarks on the GT-MHR Preapplication Review

Charles Ader, Deputy Director, DSARE noted that a public workshop will be held October 22-23, 2002, to address policy issues that emerged during the PBMR preapplication review. The issues include:

- How should the Commission's expectations for enhance safety be implemented for future non-LWRs?
- Should specific defense-in-depth attributes be defined for non-LWRs?
- How should NRC requirements for future non-LWR plants relate to international safety standards and requirements?
- To what extent should a probabilistic approach be used to establish the plant licensing basis?
- Under what conditions, if any, should scenario-specific accident source terms be used for licensing decisions regarding containment and site suitability?
- Under what conditions, if any, can a plant be licensed without a pressure-retaining containment building?
- Under what conditions, if any, can emergency planning zones be reduced, including a reduction to the site exclusion area boundary?

Mr. Ader stated the workshop will address issues important to the review of the GT-MHR, such as source term, defense-in-depth, and whether a confinement will be an acceptable substitute for a pressure retaining containment.

#### Proposed Preapplication Review Topics, Documents and Schedule; and Working Discussion: Preapplication Process, Schedule, Outputs and Resources; and Plans for the Next Meeting

Mr. Parme stated that GA would soon be forwarding a white paper on fuel fabrication, and information on graphite and high temperature metals. Mr. Rubin (NRC) stated that the NRC will review the information that GA submits, will meet to discuss the information, and will request additional information.

Mr. Parme stated that the topics for the next meeting (i.e., the first technical meeting), are expected to focus on fuel fabrication quality controls and perhaps source term. Mr. Rubin requested that GA provide a proposed date(s) for the next meeting and stated that NRC would work toward achieving the stated objectives for each identified technical topical area proposed by GA.

F. Eltawila

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Conclusion

There were no comments or questions from external stakeholders.

S. Rubin thanked the meeting participants and attendees. He noted that the next meeting on the GT-MHR will likely be held sometime between the end of November and early December 2002.

Attachments: As stated

cc w/o atts: See attached list

Conclusion

There were no comments or questions from external stakeholders.

S. Rubin thanked the meeting participants and attendees. He noted that the next meeting on the GT-MHR will likely be held sometime between the end of November and early December 2002.

Attachments: As stated

cc w/o atts: See attached list

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REACTOR TECHNOLOGY AND PREAPPLICATION ACTIVITIES FOR  
THE GAS TURBINE-MODULAR HELIUM REACTOR (PROJECT 716)

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AGENDA

NRC Meeting with General Atomics on GT-MHR Preapplication Activities  
September 24, 2002, 9:00 AM - 3:30 PM  
ASLBP Hearing Room T3B45

Time	Discussion Topic	Org
9:00 - 9:15AM	Opening Remarks and Participant Introductions (S. Rubin)	NRC
9:15 – 11:00 PM	GT-MHR Design and Safety Approach (L. Parme)	GA
11:00 – 11:15 AM	Stakeholder Comments	
11:15 - 12:30 PM	Lunch	
12:30 - 12:40 PM	NRC Management Remarks on the GT-MHR Preapplication Review (C.Ader)	NRC
12:40 - 1:40 PM	GT-MHR Project Update; GT-MHR Preapplication Objectives (W. Simon)	GA
1:40 - 2:00	Proposed Preapplication Review Topics, Documents and Schedule(L. Parme)	GA
2:00 - 2:15	GT-MHR User Remarks (tentative)	TBD
2:15 - 2:30	Break	
1:40 - 3:00	Working Discussion: Preapplication Process, Schedule, Outputs and Resources; Plans for the Next Meeting	NRC/GA
3:00 - 3:15	Stakeholder Comments	
3:15 - 3:30 PM	Closing Comments and Adjourn	NRC/GA

Attachment 1



NRC/General Atomics Meeting  
GT-MHR Preapplication Review  
September 24, 2002

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