EDO Principal Correspondence Control

FROM: DUE: 05/15/08 EDO CONTROL: G20080172
DOC DT: 03/11/08
FINAL REPLY:

Finis H. Southworth, AREVA
Dan Keuter, Entergy
Arkal Shenoy, General Atomics
Edward G. Wallace, PBMR
Regis A. Matzie, Westinghouse

TO:

L. Reyes, EDO

FOR SIGNATURE OF : ** GRN ** CRC NO: 08-0140

DESC:

Licensing High Temperature Gas-Cooled Reactors and the Next Generation Nuclear Plant Project (EDATS: SECY-2008-0146)

ROUTING:

Reyes
Virgilio
Mallett
Ash
Ordaz
Cyr/Burns
Sheron, RES
Moorman, OEDO

DATE: 03/17/08

ASSIGNED TO: CONTACT:

NRO Borchardt

SPECIAL INSTRUCTIONS OR REMARKS:

Coordinate with RES. Before having meeting, wait for letter from Spurgeon, SRM from Commission Meeting and SRM from SECY on this topic.

Template: SECY-017 E-RIDS: SECY-01

EDATS

Electronic Document and Action Tracking System

EDATS Number: SECY-2008-0146 **Source:** SECY

General Information

Assigned To: NRO
OEDO Due Date: 5/15/2008 5:00 PM
Other Assignees:
SECY Due Date: NONE
Subject: Licensing High Temperature Gas-Cooled Reactors and the Next Generation Nuclear Plant Project
Description:

CC Routing: RES
ADAMS Accession Numbers - Incoming: NONE
Response/Package: NONE

Other Information

Cross Reference Number: G20080172, LTR-08-0140
Staff Initiated: NO
Related Task:
Recurring Item: NO
File Routing: EDATS
Agency Lesson Learned: NO
Roadmap Item: NO

Process Information

Action Type: Other
Priority: Medium
Sensitivity: None
Signature Level: No Signature Required
Urgency: NO
OEDO Concurrence: NO
OCM Concurrence: NO
OCA Concurrence: NO
Special Instructions: Coordinate with RES. Before having meeting, wait for letter from Spurgeon, SRM from Commission Meeting and SRM from SECY on this topic.

Document Information

Originator Name: Finis H. Southworth, et al.,
Date of Incoming: 3/11/2008
Originating Organization: Areva,Entergy,General Atomics,PBMR,Westinghouse
Document Received by SECY Date: 3/14/2008
Addressee: L. Reyes, EDO
Date Response Requested by Originator: NONE
Incoming Task Received: Letter

March 11, 2008

Mr. Luis A. Reyes
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Licensing High Temperature Gas-cooled Reactors and the Next Generation Nuclear Plant Project

Dear Mr. Reyes:

The undersigned companies wish to begin engagement with the U.S. Nuclear Regulatory Commission (NRC) for the purpose of establishing the earliest possible industry dialogue on the regulatory and technical infrastructure, policy, and practices necessary to license the Next Generation Nuclear Plant (NGNP) and initiate operations by 2018. The NGNP project supports the commercialization of the High Temperature Gas-cooled Reactor (HTGR) technology that can displace the use of premium hydrocarbon fuels, such as natural gas for producing process heat, thus providing enhanced energy sustainability and security, more stable energy prices and improved economics, improved use of finite hydrocarbon resources, and resulting in minimal greenhouse gas emissions.

In the February 20, 2008, NRC Commissioners' meeting, Fred Moore of The Dow Chemical Company, a potential end-user of nuclear produced high-temperature process heat, underlined the importance of developing the HTGR technology as an alternative in the energy mix necessary to enable Dow to achieve its aggressive non-carbon emitting global energy production commitments. Further, he sees nuclear generation of steam, power and hydrogen will provide an avenue to produce synthetic diesel, gasoline, and hydrocarbon feedstocks via gasification of coal without CO_2 emissions, thus enabling environmentally responsible use of our most abundant hydrocarbon resource and continued use of existing infrastructure. Dan Keuter of Entergy Nuclear noted that Entergy has a clear and vested interest in the future of nuclear energy and sees a potential business model wherein Entergy, as an owner/operator, would collocate HTGR modular units with an industrial facility, such as Dow's petrochemical processes, dedicated to providing the process heat, hydrogen, electricity, and other energy needs. Mr. Keuter emphasized the need to resolve the commercialization challenges at the earliest practical time – the greatest of which is licensing – hence, the 2018 target date for initial operations of the NGNP demonstration to support commercialization within the following decade.

Industrial users and technology suppliers are in process of forming a consortium (the "Alliance") to establish a public-private partnership with the U.S. Department of Energy (DOE) for the development and commercialization of HTGR technology through the design, licensing, construction, and operation of a commercial-scale demonstration project, the NGNP. The anticipated members of this Alliance include nuclear power plant owner/operators, industrial end-users, nuclear system suppliers, architect-engineers, equipment suppliers, and direct investors.

When the public-private partnership is formed, the Alliance will provide the structure, direction, management, and private sector cost-sharing for the activities required to commercialize the HTGR. One or more of the member utility owner/operator companies are anticipated to become the license applicant for the demonstration facility. The end-users will determine the overall

functional, operational, and performance requirements for the process heat applications of greatest utility to them.

The prospective Alliance members are interested in developing the commercial potential of the HTGR technology at the earliest practical time. A current target is to have the demonstration nuclear energy system operational by the end of 2018. This involves a development, design, licensing, and construction approach and schedule that are more aggressive than envisioned in the Energy Policy Act (EPAct) 2005 and a sequence for these activities that differs materially from the initial vision for the program. More specifically, it is anticipated that:

- Early site permits may be sought for locations in addition to the Idaho National Laboratory as directed in the EPAct 2005. These locations may include one or more end-user sites where the variations of the basic HTGR process heat technology may be employed as a "first-of-a-kind" demonstration.

- Combined construction permits and operating license(s) based on the early site permits may be sought for one or more locations, depending on the range of end-user applications for which a first-of-a-kind project is warranted.

- Design certifications may be sought by one or more nuclear system suppliers to provide pre-approved standardized offerings for follow-on commercial application(s).

We recognize that these accelerated commercial objectives will challenge the NRC resources in light of the large number of advanced light water reactor certification and licensing actions that are currently planned. We will support NRC's efforts to obtain the required Congressional appropriations for NRC to respond to the commercial industry needs described herein.

We consider that it is important to initiate, at the earliest practical time, formal interactions with the NRC to support development of the NRC infrastructure for HTGR technology and, specifically, the NGNP project. These interactions could typically be done through pre-application reviews as the first step toward preparing and submitting applications.

As an initial step in starting this engagement, we have prepared a list of potential policy issues and high-level technical topics that we believe should be addressed promptly to support necessary infrastructure development. Many of these issues are generic to HTGRs and are already the subject of discussion in the Pebble Bed Modular Reactor design certification pre-application project. Resolving these issues early and better defining the regulatory infrastructure provides an important and practical reduction in economic risk in the development of the HTGRs. The list of candidate issues is included in the Attachment.

We would request a meeting between NRC, DOE, and selected members of the Alliance in the near future to create the proper forum for this early engagement, review the attached list of issues and the associated outcome objectives, and establish the priorities for resolving these issues.

We look forward to working closely with the NRC, at this formative stage and later as design certification and license applicants, in developing and subsequently commercializing advanced HTGR technology for applications beyond electricity. You are requested to contact Mr. Phil Hildebrandt at (208) 351-8548, who will arrange our initial meeting with you.

Respectfully,

AREVA

Dr. Finis H. Southworth
Chief Technology Officer

Entergy

Dan Keuter
Vice President, Planning and Innovation

GENERAL ATOMICS

Dr. Arkal Shenoy
Director, MHR Programs

PBMR

Edward G. Wallace
Sr. General Manager – U.S. Programs

Westinghouse

Regis A. Matzie
Senior Vice President and Chief Technology Officer

Attachment

cc: NRC Chairman D. Klein
NRC Commissioner G. Jaczko
NRC Commissioner P. Lyons
Chairman, ACRS, W. Shack

Attachment

Summary of Potential Policy and Technical Issues to be Addressed During the Licensing of the NGNP

Possible Policy Issues

- Use of Risk Informed, Performance Based Licensing Framework
  - Use of Probabilistic Risk Assessment (PRA) for Advanced Reactor Licensing
  - Selection of Licensing Basis Events
  - Systems, structures, and components (SSC) Classification
  - Defense in-Depth – severe accident (beyond design basis) definitions

- Design Basis Threats from External Events
  - Reactor Building Requirements
  - Effects of reactor embedment
  - Aircraft crash requirements for passive non-light water reactors

- Applicability of requirements of Part 50 for HTGRs, (e.g., General Design Criteria; Appendix K)

- Containment performance requirements for HTGRs, including considerations for filtered, vented concept

- Establishment of Emergency Planning Zone of less than 10 miles for HTGRs

- Regulatory separation of collocated nuclear and industrial facilities under NRC and EPA jurisdiction

Technical Issues

- Identification of mechanistic source term for HTGR

- Significance of air ingress on large or small break design basis accidents and beyond design basis events

- Required Test Programs for qualification of fuel and materials for operating, abnormal, and accident conditions
  - Fuel Qualification and Manufacturing Assurance
  - Graphite
  - High temperature metallic materials in safety function services

- Classification of Systems, Structures, and Components for a HTGR design and establishment of special treatment requirements for passively safe reactors

- Methods for verification and validation of analysis methods and required test programs as part of the verification and validation program

- Reliability Integrity Management Program for HTGR components
- Applicable Industry Codes and Standards for HTGR design
- Human Factors design guidance for reactors with slowly evolving transients and accidents
- Establish application specification for HTGRs (analog to RG1.206 and NUREG-0800).