32
Release

From: Amy Cubbage DRR PES
To: Bergman, Thomas; Caruso, Ralph; Fields, Leslie; Koenick, Stephen; Lu, Shanlai; Lyons, James; Orechwa, Yuri; Shoop, Undine
Date: Wed, May 1, 2002 2:05 PM
Subject: Fwd: Revised Annex to DOE-NRC MOU

FYI

I received the attached e-mail from DOE with a revised annex to the DOE-NRC MOU. The annex relates to the proposed DOE/NRC Advanced Gas Reactor Cooperative Fuel Testing Program.

Amy

S-4

TAB 044

RES

RES

From: "Caponiti, Alice" <Alice.Caponiti@hq.doe.gov>
To: "'Farouk Eltawila (E-mail)'" <fxe@nrc.gov>, "'Stuart D Rubin (E-mail)'" <sdr1@nrc.gov>, "'Amy Cubbage (E-mail)'" <AEC@nrc.gov>
Date: Wed, May 1, 2002 1:59 PM
Subject: Revised Annex to DOE-NRC MOU

All:

Attached is revised draft of the project-specific annex for the NRC/DOE MOU on cooperative nuclear safety research (MOU_AGR_Fuel.doc). Stu received a copy of this version at the Petten conference last week.

> Per the request of NRC, I modified the annex to be less specific to
> developing data for Exelon's licensing case. I took the opportunity to
> make the annex generic to gas reactor fuels by addressing GT-MHR and PBMR
> fuel. Please pay particular attention on the sections on financing and
> use of data.
>
> I have attached the original version as a reference for comparison
> (MOU_PBMR_Fuel.doc).
>
We could set up a meeting or telecon to discuss comments on the revised draft. Please let me know when NRC would be prepared for such a discussion.

> Alice Caponiti
301-903-6062

> <<MOU_AGR_Fuel.doc>> <<MOU_PBMR_Fuel.doc>>

CC: "Johnson, Shane" <SHANE.JOHNSON@hq.doe.gov>, "Miller, Tom" <TOM.MILLER@hq.doe.gov>, "Feltus, Madeline" <MADELINE.FELTUS@hq.doe.gov>

All:

Attached is revised draft of the project-specific annex for the NRC/DOE MOU on cooperative nuclear safety research (MOU_AGR_Fuel.doc). Stu received a copy of this version at the Petten conference last week.

Per the request of NRC, I modified the annex to be less specific to developing data for Exelon's licensing case. I took the opportunity to make the annex generic to gas reactor fuels by addressing GT-MHR and PBMR fuel. Please pay particular attention on the sections on financing and use of data.

I have attached the original version as a reference for comparison (MOU_PBMR_Fuel.doc).

We could set up a meeting or telecon to discuss comments on the revised draft. Please let me know when NRC would be prepared for such a discussion.

Alice Caponiti
301-903-6062

<<MOU_AGR_Fuel.doc>> <<MOU_PBMR_Fuel.doc>>

DRAFT – 10 APRIL 2002

MEMORANDUM OF UNDERSTANDING
between
U.S. NUCLEAR REGULATORY COMMISSION
and
U.S. DEPARTMENT OF ENERGY
on
COOPERATIVE NUCLEAR SAFETY RESEARCH

Addendum 1: DOE/NRC Advanced Gas Reactor Cooperative Fuel Testing Program

I. INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) and U.S. Department of Energy (DOE) Memorandum of Understanding (MOU) of August 16, 1999, establishes the guiding principles under which cooperative research programs between the NRC Office of Nuclear Regulatory Research and the DOE Office of Nuclear Energy, Science and Technology will be planned and conducted. This addendum provides a description of the first cooperative safety research program to be initiated under the umbrella of the above MOU, and guidance contained herein is in addition to that specified in the MOU.

II. PURPOSE

This addendum establishes the framework for cooperation and coordination of DOE and NRC safety research activities concerning advanced gas-reactor fuel.

III. PROGRAM DESCRIPTION

A. Background

High temperature gas-reactors are among the leading concepts being considered for near-term deployment of new nuclear power generation capacity in the United States. Industry has expressed interest in two gas reactor concepts based on coated particle fuels, namely prismatic compacts loaded in a fixed graphite core and spherical compacts that comprise a pebble bed core. The Pebble Bed Modular Gas-Cooled Reactor (PBMR) is an advanced reactor concept which has been demonstrated at a proof-of-concept stage through operation of experimental pebble bed reactors in Germany. In addition, General Atomics (GA) is working on a plutonium-burning modular gas reactor termed GT-MHR with the Russians under Department of Energy sponsorship, as well as a commercial version of the GT-MHR using a uranium-fueled core. An important technical issue that must be addressed to enable licensing of these concepts for use in the United States is the behavior of the coated particle fuel during normal, off-normal and accident conditions.

The U.S. Department of Energy has established an Advanced Gas Reactor Fuel

DRAFT – 10 APRIL 2002

Development and Qualification Program for both PBMR and GT-MHR fuels that will meet the following objectives:

to demonstrate adequate performance of the coated particle fuel (in compact and pebbles) during normal, off-normal, and accident conditions,
to identify the margin to failure for this fuel form under normal, off-normal, and accident conditions,
to provide the data necessary to qualify that the fuel manufacturing specification is adequate to produce fuel that can meet the in-reactor performance requirements, and
to develop a better understanding of the fuel and use that understanding to develop/improve mechanistic fuel performance models that describe the behavior of fuel under normal, off-normal, and accident conditions.

The U.S. Nuclear Regulatory Commission is in the process of developing an Advanced Reactor Research Plan, in response to the NRC staff's commitment to the Commission in the Future Licensing and Inspection Readiness Assessment (FLIRA) report, SECY-01-0188, dated October 12, 2001. The plan addresses four reactor types, including the PBMR and GT-MHR. The research plan seeks to determine the critical information that will be needed to establish safety standards for the new reactor designs, to explore issues involving great uncertainties, and to develop the staff's independent capabilities to review them. The fuel analysis portion of the plan includes PBMR and GT-MHR fuel testing that seeks to:

verify an applicant's claim of fuel performance and fission product release,
explore margins of fuel performance and fission product release,
provide the basis for judging the acceptability of an applicant's fuel irradiation test program (e.g., test methods, quality assurance program), and
provide data for use in developing and validating NRC analytical models and methods.

B. Goals and Objectives

The parties agree that an integrated and coordinated fuel test program should be conducted. The goals and objectives for DOE are directed toward supporting the development and qualification of gas reactor fuel for future U.S. licensing deployment. The goals and objectives for NRC are directed toward developing the infrastructure that will be needed for the staff to independently conduct a safety assessment and prepare a safety evaluation covering fuel performance and qualification. A coordinated test program requires the coordination of the pretest characterizations, the irradiation testing, and the post-irradiation examinations to meet the needs of DOE, NRC, and industry with a minimum of duplication and without constraining either party from achieving its respective goals and objectives.

Program scope, technical requirements, schedule and cost details will be described in the Fuel Development and Qualification Program Plan documents to be developed by DOE for both PBMR and GT-MHR fuels and in the supporting Fuel Irradiation Test Project Plan documents to be developed for each irradiation testing effort. Approval of these planning documents shall be by DOE-NE, but input and concurrence by the technical review group described in Section IV. B. shall be required prior to implementation.

C. QA Requirements

Quality assurance requirements shall be followed per DOE Order 414.1. The QA plan will be controlled and documented further in the PBMR Fuel Irradiation Test Project Plan.

IV. TERMS OF AGREEMENT

A. Exchange of Information

DOE will make available to NRC fuel qualification test plans, test data, and data analysis results.

NRC will provide input to DOE on the proposed plans for the fuel qualification program, including test conditions and data to be collected and data analyses and examinations to be performed. For the purposes of establishing specific test requirements and data needs to support NRC's objectives, input will be in the form of direct guidance on test conditions and data acquisition. Otherwise, input will be provided in the form of questions and issues raised by the NRC on the data, plans that are developed by DOE for performing independent measurements or analyses, and the results of such analyses and measurements.

NRC will make available to DOE test data and data analysis results.

All other terms and restrictions regarding information exchange described in Article 2 of the umbrella MOU also apply.

DRAFT – 10 APRIL 2002

B. Technical Oversight

Technical oversight of the activities undertaken as part of the DOE/NRC Advanced Gas Reactor Cooperative Fuel Testing Program shall be accomplished by a technical review group consisting of representatives from DOE and NRC. The representatives shall be assigned by the MOU management team consisting of the NRC Director of the Office of Nuclear Regulatory Research and the DOE Associate Director for Technology and International Cooperation, Office of Nuclear Energy, Science and Technology or their designees.

C. Conflict of Interest

NRC must retain its independence in reviewing and evaluating the qualification of an applicant's fuel for a U.S. license application, and therefore the focus of this program is on basic data needs. While a free exchange of information is essential to the success of the program, the establishment and maintenance of NRC's independence in the program is equally important. Thus, NRC shall maintain the right and responsibility to determine specific measurements, analyses, and inspections to be performed by NRC at their own expense. DOE may provide information for the NRC to consider in making decisions regarding the independent program, but the final decisions will be the sole responsibility of the NRC.

D. Funding

DOE and NRC shall agree on an appropriate level of cost sharing on common test expenses, including design and fabrication of the test apparatus and irradiation charges.

In general, DOE shall be responsible for funding those tests that are needed to support the technical basis for fuel development, reactor licensing, and fuel qualification.

In general, NRC shall be responsible for funding any NRC-specific fuel testing or independent data analyses or other related activities not specifically considered part of the licensing basis or the qualification of fuel for a reactor concept. Further, NRC shall be responsible for funding all NRC contractor and staff activities related to NRC's testing aspects of the program.

DOE shall be responsible for the disposal and costs of disposal of all fuel that is irradiated within the scope of the cooperative agreement and the proper storage and the cost of storage of any additional fuel which is obtained for the cooperative fuel testing program, specifically for archive purposes and, therefore, have not been irradiated, tested or examined within the scope of the cooperative agreement.

DRAFT – 10 APRIL 2002

E. Use of Data

All data developed in connection with the cooperative testing will be made available to the public upon completion of the project.

DRAFT – 10 APRIL 2002

V. AGREEMENT

Ashok C. Thadani, Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

R. Shane Johnson, Associate Director
Office of Technology and International Cooperation
Office of Nuclear Energy, Science, and Technology
U.S. Department of Energy

Date

DRAFT - 1/8/02

MEMORANDUM OF UNDERSTANDING
between
U.S. NUCLEAR REGULATORY COMMISSION
and
U.S. DEPARTMENT OF ENERGY
on
COOPERATIVE NUCLEAR SAFETY RESEARCH

Addendum 1: DOE/NRC Pebble Bed Modular Reactor Fuel Qualification Cooperative Program

I. INTRODUCTION

The U.S. Nuclear Regulatory Commission (NRC) and U.S. Department of Energy (DOE) Memorandum of Understanding (MOU) of August 16, 1999, establishes the guiding principles under which cooperative research programs between the NRC Office of Nuclear Regulatory Research and the DOE Office of Nuclear Energy, Science and Technology will be planned and conducted. This addendum provides a description of the first research program to be initiated under the umbrella of the above MOU, and guidance contained herein is in addition to that specified in the MOU.

II. PURPOSE

This addendum establishes the framework for cooperation and coordination of DOE and NRC activities concerning the pebble bed modular reactor (PBMR) fuel qualification program.

III. PROGRAM DESCRIPTION

A. Background

The U.S. Department of Energy has announced its intention to pursue development and implementation of a targeted fuel qualification program for PBMR fuel based on the German fuel fabrication process as part of the Advanced Gas Reactor Fuel Development and Qualification Program. Exelon, a U.S. utility, has expressed interest in the potential development of a PBMR reactor in the United States, with an international testing program proposed to jointly develop data necessary to license the use of this fuel with the U.S. Nuclear Regulatory Commission.

In the future, Exelon plans to submit PBMR fuel manufacturing and performance data to the NRC to support the NRC's licensing review for the PBMR. This body of data is expected to include results from the German fuel

development and testing program that was conducted from the 1960s through the early 1990s as well as test data on fuel produced in a new PBMR fuel manufacturing plant currently being designed for construction in South Africa. Since the German fuel production line has been disassembled for more than 10 years, the applicability of the German data to the PBMR fuel qualification effort needs to be assessed. The planned use of the German fuel data to support PBMR licensing and NRC expectations regarding these data are key elements in the PBMR fuel qualification effort.

B. Goals and Objectives

The parties agree that an integrated and coordinated test program should be conducted for the qualification of PBMR fuel for a U.S. PBMR license application. This test program requires the coordination of the pretest characterizations, the irradiation testing, and the post-irradiation examinations to meet the needs of DOE, NRC, and PBMR (Pty)/Exelon with a minimum of duplication. The irradiation tests are being planned for South Africa (SAFARI reactor), Russia (IVV-2M reactor), and the United States (Advanced Test Reactor). Further mention of the PBMR Fuel Qualification Program in this addendum refers to the U.S. portion of an integrated test program.

Program scope, technical requirements, schedule and cost details will be described in the Gas Reactor Fuel Qualification Progam Plan and the PBMR Fuel Irradiation Test Project Plan documents. Approval of these planning documents shall be by DOE-NE, but concurrence by the technical review group described in Section IV.B. shall be required prior to implementation.

C. QA Requirements

Quality assurance requirements shall be followed per DOE Order 414.1. The QA plan will be controlled and documented further in the PBMR Fuel Irradiation Test Project Plan.

IV. TERMS OF AGREEMENT

A. Exchange of Information

DOE will make available to NRC fuel qualification test plans and results.

NRC will make available to DOE expectations and licensing requirements of fuel qualification data, plans for performing independent measurements or analyses, and the results of such analyses and measurements.

All other terms and restrictions regarding information exchange described in Article 2 of the umbrella MOU also apply.

DRAFT - 1/8/02

B. Technical Oversight

Technical oversight of the PBMR Fuel Qualification Program shall be accomplished by a technical review group consisting of representatives from DOE and NRC. The representatives shall be assigned by the MOU management team consisting of the NRC Director of the Office of Nuclear Regulatory Research and the DOE Associate Director for Technology and International Cooperation, Office of Nuclear Energy, Science and Technology or their designees.

C. Conflict of Interest

NRC must retain its independence in reviewing and evaluating the qualification of PBMR fuel for a U.S. PBMR license application, and therefore the focus of this agreement is on basic data needs. While a free exchange of information is essential to the success of the program, the establishment and maintenance of NRC's independence in the program is equally important. Thus, NRC shall maintain the right and responsibility to determine specific measurements, analyses, and inspections to be performed by NRC at their own expense. DOE may provide information for the NRC to consider in making decisions regarding the independent program, but the final decisions will be the sole responsibility of the NRC.

D. Funding

DOE shall be responsible for the funding arrangements for the overall PBMR Fuel Qualification Program [...]

NRC shall be responsible for providing existing German fuel for testing and the packaging and shipping costs of such fuel to test sites. Further, NRC shall be responsible for funding all NRC contractor and staff activities related to [...]

Additionally, NRC shall be responsible for funding any NRC-specific independent analyses or other related activities not specifically addressed in the PBMR Fuel Qualification Program Plan.

DRAFT - 1/8/02

V. AGREEMENT

Ashok C. Thadani, Director
Office of Nuclear Regulatory Research
U.S. Nuclear Regulatory Commission

R. Shane Johnson, Associate Director
Office of Technology and International Cooperation
Office of Nuclear Energy, Science, and Technology
U.S. Department of Energy

Date