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Exelon Generation

10 CFR 2.790
Project No. 713

July 16, 2001

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

Subject: Application for Withholding Information from Public Disclosure

Dear Sir or Madam:

Exelon Generation Company (Exelon) hereby submits an application for withholding information from public disclosure pursuant to 10 CFR 2.790, (a) (4).

A meeting between Exelon and the US Nuclear Regulatory Commission staff is planned to take place on July 18, 2001 regarding attributes of the Pebble Bed Modular Reactor (PBMR) fuel design and fuel irradiation program. Exelon is requesting that a portion of the meeting discussions and materials be withheld from public disclosure on the grounds that certain information planned for discussion contains information in the nature of trade secrets and commercial or financial information which is confidential. It is believed, however, that pre-application discussion of this information with NRC Staff will be beneficial to the Staff's understanding of the PBMR fuel design, fabrication and qualification activities, and this type of discussion is consistent with the NRC's policy on Advanced Reactors, NUREG 1226. This will allow the Staff to provide important early input to Exelon regarding attributes of these activities which are considered important to the Staff, such that these insights can be considered for inclusion in the PBMR fuel design and qualification process.

Attachment 1 contains the discussion materials (i.e., irradiation program presentation, and answers to questions), which show the specific areas, which are considered by Exelon to be confidential. Attachment 2 contains a non-proprietary version (i.e. proprietary portion intentionally deleted) of the discussion materials.

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This information is being submitted under affirmation, and the required affidavit is enclosed.

If you have any questions concerning this matter, please do not hesitate to contact us.

Very truly yours,

James A. Muntz
Vice President, Nuclear Projects

Enclosures: Affidavit
Attachments

cc: Thomas King, RES
William Borchardt, Associated Director NRR
Amy Cubbage, NRR
Diane Jackson, NRR
Stuart Rubin, RES

Affidavit of James A. Muntz

Commonwealth of Pennsylvania:
: ss.
County of Chester :

James A. Muntz being duly sworn, deposes and states as follows:

1. I am Vice President, Nuclear Projects, Exelon Generation Company, L.L.C. (Exelon), and I am authorized to execute this affidavit in support of a request to withhold certain information, described in paragraph (2) below, from public disclosure and in accordance with Section 2.790(a)(4) of the Commission's regulations.

2. The information sought to be withheld is contained in the letter, J. A. Muntz (Exelon Generation Company, L.L.C.) to the U. S. Nuclear Regulatory Commission Document Control Desk, Project No. 713.

3. The information which is sought to be withheld from public disclosure is proprietary information of Pebble Bed Modular Reactor (Pty) Limited, a Republic of South Africa corporation ("PBMR Co"), and has been provided to Exelon subject to an agreement that it will be treated as confidential and proprietary information and not be disclosed publicly. Exelon has contributed substantial funds for the development of the information and holds a beneficial ownership interest in PBMR Co.

4. In making this application for withholding of proprietary information, Exelon relies upon the exemption from disclosure set forth in the Freedom of Information Act ("FOLA"), 5 USC Sec. 552(b)(4), and the Trade Secrets Act, 18 USC Sec. 1905, and NRC regulations 10 CFR Section 9.17(a)(4) and Section 2.790(a)(4) for "trade secrets and commercial or financial information obtained from a person and privileged or confidential." The material for which exemption from disclosure is here sought is all "confidential commercial information," and some portions also qualify under the narrower definition of "trade secret," within the meanings assigned to those terms for purposes of FOIA Exemption 4 in, respectively, Critical Mass Energy Project v. Nuclear Regulatory Commission, 975F2d871 (DC Cir. 1992), and Public Citizen Health Research Group v. FDA, 704F2d128O (DC Cir. 1983).

5. Some examples of categories of information which fit into the definition of proprietary information and which are applicable here are:

    a) Information that discloses a process, method, or apparatus, including supporting data and analyses, where prevention of its use by the Company's competitors without license from Exelon Generation Company, L.L.C. constitutes a competitive economic advantage over other companies;

b) Information which, if used by a competitor, would reduce his expenditure of resources or improve his competitive position in the performance of outages or the design, manufacture, shipment, installation, assurance of quality, or licensing of a similar product.

6. The information sought to be withheld is being submitted to the U. S. Nuclear Regulatory Commission ("NRC") in confidence. The information is of a sort customarily held in confidence by Exelon, and is in fact so held. Its initial designation as proprietary information, and the subsequent steps taken to prevent its unauthorized disclosure, are as set forth in (7) and (8) following. The information sought to be withheld has, to the best of my knowledge and belief, is not available in public sources. All disclosures to third parties including any required transmittals to NRC, have been made, or must be made, pursuant to regulatory provisions or proprietary agreements which provide for maintenance of the information in confidence.

7. Initial approval of proprietary treatment of a document is made by the Vice President, Nuclear Projects, the person most likely to be acquainted with the value and sensitivity of the information in relation to industry knowledge.

8. The procedure for approval of external release of such a document typically requires review by a Vice President, Exelon Generation, or his designee, for technical content, competitive effect, and determination of the accuracy of the proprietary designation. Disclosures outside Exelon Generation Company, L.L.C. are limited to regulatory bodies, customers, and potential customers, and their agents, suppliers, and licensees, and others with a legitimate need for the information, and then only in accordance with appropriate regulatory provisions or proprietary agreements.

9. The information identified in paragraph (2) is classified as proprietary because it contains fuel design and fuel irradiation program issues related to the Pebble Bed Modular Reactor (PBMR).

10. Public disclosure of the information sought to be withheld is likely to cause substantial harm to Exelon's and others contributing to the PBMR Project competitive position and foreclose or reduce the availability of profit-making opportunities. The fuel design and fuel qualification issues related to the PBMR provide commercial value to Exelon and its partners. The research, development, engineering, analytical, and NRC review costs comprise a substantial investment of time and money by Exelon and its partners.

    Exelon's and its partners' competitive advantage will be lost if its competitors are able to use the fuel design and fuel qualification information.

    The value of this information would be lost if the information were disclosed to the public. Making such information available to competitors without their having been required to undertake a similar expenditure of resources would unfairly provide competitors with a windfall, and deprive Exelon of the opportunity to exercise its competitive advantage to seek an adequate return on its large investment.

11. He has read the foregoing affidavit and the matters stated therein are true and correct to the best of his knowledge, information and belief.

James A. Muntz

Subscribed and sworn to
before me this day
of 2001.

Staci L. Cooper
Notary Public

Notarial Seal
Staci L. Cooper, Notary Public
Kennett Twp., Chester County
My Commission Expires Sept. 20, 2004
Member, Pennsylvania Association of Notaries

Attachment 2

Non-Proprietary

Version of

"PBMR Irradiation Program Presentation"

And

"Answers to Questions Regarding PBMR Fuel Design"

Exelon SM

PBMR
Fuel Irradiation Program

Robert R.Calabro
Consultant

July 18, 2001

PBMR Fuel Irradiation Program

- Purpose of presentation
  - Define the purpose of the PBMR fuel irradiation program
  - Describe the program plan and schedule
  - Describe the irradiation measurements to be taken
  - Describe the PBMR proposed joint international irradiation program

Purpose of PBMR Fuel Irradiation Program

- To confirm that the PBMR fuel, manufactured at the Pelindaba plant with modern processes and equipment to German specifications and quality control standards, will perform within the envelope of German measured irradiation data.

- To provide irradiation data for the steady state and transient operating conditions, as closely as possible, to those expected in the Demonstration Plant.

PBMR Irradiation Program

- Test Program in the RSA Safari Reactor
- Test Program in Russian IVV-2M Reactor

Fuel Baseline Program

Proprietary information not shown

Fuel Baseline Program

Proprietary information not shown

Proposed Test Program in the Safari Reactor

- Phase I

Proprietary information not shown

Proposed Test Program in the Safari Reactor, Cont'd

- Phase II

Proprietary information not shown

Proposed Test Program in Russian IVV-2M Reactor

- Test Process

Proprietary information not shown

- Coated Fuel Particle Tests

Proprietary information not shown

Proposed Test Program in Russian IVV-2M Reactor, Cont'd

- Fuel Element Tests

Proprietary information not shown

Proposed Test Program in Russian IVV-2M Reactor, Cont'd

Proprietary information not shown

Proposed Joint International Irradiation Program

Proposal

Irradiate PBMR fuel prior to completing the Pelindaba plant, using fuel from current manufacturing plants in different countries in the US. Advanced Test Reactor (ATR) in Idaho.

Advantages

USNRC will more easily participate in the Irradiation program.

Will establish further confidence in modern HTR fuel elements.

Develop in the US capability for HTR fuel irradiation testing.

Extend HTR database by irradiating fuel from different manufacturers Provide additional data for model development.

Provide opportunity for RSA and USA scientists collaboration.

Program

Three spherical and one cylindrical fuel element irradiated from each manufacturer. RSA would add 12 elements when Pelindaba was complete.

Target burnups of 80-90,000 MWD/Mtu. Tests will include pre and post characterizations, PIE examinations and heating tests for measurement of fission product release.

Conclusion

RSA Safari and Russian IVV-2M tests will confirm that fuel manufactured at Pelindaba will perform as successfully as previously tested German fuel under PBMR reactor conditions.

PBMR Response to NRC Questions
From June 13, 2001 Meeting

Note: Proprietary information has been deleted as indicated by blank or ellipsis.

1. How do the fuel packing fractions compare – German vs. RSA?
The PBMR packing is particles per sphere, the same as the German proof test of spheres manufactured and tested in 1988. The packing fraction is well within the envelope of all the fuel the Germans tested successfully, which ranged from particles per sphere to particles per sphere.

2. Do you look for damage to the kernels during the "packing" portion of the fuel manufacturing process?
Yes.
Each uranium dioxide kernel is coated with four layers:
(1) a porous carbon buffer
(2) a pyrolytic carbon layer
(3) a silicon carbide layer and
(4) a final pyrolytic carbon layer.
After coating, they are now referred to as coated particles.
The coated particles … lot.

3. Referencing the graph showing free uranium content in fuel, what drove the improvements for the HTR-10 fuel (Chinese experience)?
As far as we know the Chinese used a similar process to that used in Germany. The improvement after initial batches with higher free uranium fraction is due to a learning process of mainly the pressing step in the manufacturing process. The same is expected to happen with the PBMR process during the production of initial fuel batches.

4. What are the reasons for the differences in the maximum fuel temperatures between PBMR and the Germans Phase I and AVR fuel temperatures?
PBMR will inquire whether any reports on the matter of the unexpected high temperatures encountered in the AVR are available in Germany. (OPEN ITEM)

5. How many pebbles do you load before seeing coolant activity?
Coolant activity is not expected until operation at power is sustained.

6. Will radial variations in coolant temperature be able to be monitored?
PBMR is not planning to place any thermocouples inside the reactor core. PBMR is considering placing thermo-couples and neutron detectors in the demonstration plant's graphite reflectors. This will detect radial (azimuthal) imbalances in power distribution.

7. With regard to pebble flow experiments, how were temperature effects accounted for?
As far as we know no tests were performed with helium at operating temperature. The Germans did perform many flow experiments with spherical balls of different materials having different friction factors. PBMR will review the German records. (OPEN ITEM)

8. Did the Germans ever find higher burn-up levels than predicted by modeling?
During operation, the burnup of each sphere is measured as it is removed from the core, prior to re-insertion. Fuel spheres that would exceed the limit if re-inserted for an additional cycle were permanently discharged. PBMR will inquire whether there was any fuel that exceeded the burnup limit, including fuel that was in the reactor at the time the AVR was shut down. However, fuel has been irradiated to burnups higher than planned for PBMR. (OPEN ITEM)

9. What confidence do you have that pebbles don't actually get "hung up" in the core? Any insights from AVR?
The Germans had some fuel spheres restrained from movement by the graphite reflector. PBMR is reviewing this issue with the Germans although it has a different graphite reflector design based on this experience. (OPEN ITEM)

10. It was noted that the presentation had been focused on German experience. What are the plans for this (PBMR) fuel?
PBMR fuel plans will be presented to NRC on July 18, 2001. (OPEN ITEM)

11. NRC noted the need for Quality and Acceptance Testing details.
In the proprietary session following the public session PBMR presented the fuel product specifications, source of fuel materials and characteristics to be measured for QC checks.

12. Did AVR testing simulate load following (temperature/power transient issue)?
Not that we are currently aware of.

13. NRC questioned the appropriateness of using the Poisson distribution for modeling (failure fraction vs. temperature).
The heading of the slide on page 28 of the presentation on June 13, 2001 was in error. The slide in fact shows results using a binomial distribution and not a Poisson distribution.

14. Referencing page 32 of handout, if the test results are for various fuel batches (rather than for the reference AVR 21-2 fuel), what is the significance of the results?
This slide demonstrates that....

15. Will the burn-up measurement system be digital?

Yes.
The system will measure Cesium-137 activity. Major components of the system are its collimator, Germanium detector and amplifier/signal processor/computer assembly. The burn-up measurement system operates in an automated manner. Controls to the system and measurement results from the system are interfaced to the Fuel Handling and Storage System operational control system via input and output signals. A local operator interface display and keypad panel is provided at the system's electronic enclosure for calibration, troubleshooting and maintenance activities. Testing, validation and proving the equipment performance are planned.

16. What is the asterisk on the anisotropy values?
It refers to the fact that ....

17. How does the drop strength test height ( ) compare with actual drop height?
The actual drop....

18. How does the number of drops in test ( ) compare with expected number of drops in operation?
A fuel sphere is expected to be recycled in the core....

19. What is the source of the corrosion limit ?
It came from German material graphite standard.

20. On page 17 with regard to these QC checks, were these German tests or will they be the QC checks done for PBMR?
They were the tests done in Germany and will be the QC checks for PBMR.

21. On page 20, are the methods specified new, or the same as the Germans?
The same as the Germans.

22. On page 26, within the test designation numbers, what do K and P mean?
K refers to a sphere, P to a particle.

23. On Page 27, what was method of heat-up?
Heat-up was done via oven testing. Zero failures observed.

24. What is definition of failure fraction?
PBMR distinguishes fuel anomalies as:

1. Fuel manufacturing defects as measured by the free uranium fraction which includes tramp uranium (failed particle fraction – the fraction of coated particles that have been damaged in manufacture).
2. Fuel mechanical failures as measured by broken or cracked spheres as a result of drops, handling damage etc.
3. Fuel failures in the reactor is measured by Krypton-85 level in the coolant above the level than can be expected from manufacturing defects.

25. On Page 32, how is a fast neutron defined?
Neutrons with energies greater than 0.1 Mev.

26. NRC noted that it would need to help establish acceptance criteria – Safety Limits, Operating limits, etc.
Another meeting will be planned with the NRC discussing Safety analysis, Design basis accidents, operating limits, etc., at the appropriate time.

27. What are PBMR's nuclear material control and accountability plans?
PBMR has developed a conceptual plan that has been endorsed by IAEA. The issue of material accountability will be addressed at a future meeting. (OPEN ITEM)

28. NRC requested more detail about source term projections, analysis, testing plans, etc. Expected release in terms of time and temperature and the uncertainty related to the release projection.
A separate presentation to the NRC will be made on the radiological effects during steady state, transient and accident conditions at the appropriate time.
(OPEN ITEM)

Attachment 1

-- Proprietary Information –

"PBMR Irradiation Program Presentation"
(13 Pages)

and

"Answers to Questions Regarding PBMR Fuel Design"
(4 Pages)