From: Jerry Wilson
To: Black, Suzanne, Boger, Bruce, Collins, Samuel, ...
Date: Fri, Feb 2, 2001 11:43 AM
Subject: PBMR Meeting summary

NRR

I have prepared the following meeting summary for NRR:

Representatives of the NRC staff, including Travers and Thadani, met with representatives of Exelon Generation and Exelon Nuclear on January 31st to discuss their plans for developing and licensing the pebble-bed modular reactor (PBMR). There were ~ 80 people in attendance, not counting the people who could not get into the meeting because of lack of space in the meeting room and many people stood throughout the 3 hour meeting. In addition to a few staff from NRR and RES, attendees included ACRS, OIP, OGC, OPA, DOE, IAEA, Westinghouse, law firms, and several national labs, i.e. ANL, BNL, and ORNL. I have copies of Exelon's 43-page presentation and have also forwarded Mr. Bagchi's summary. Let me know if you would like a copy of the presentation materials.

Near Term Goals: Exelon requested that we begin a dialog on the PBMR licensing process, schedule, NRC budget/resource constraints, and competing priorities. Exelon asked that we prepare a pre-application review plan that would address fees, staffing, and schedule estimates and provide feedback on the licensing options by March 2001. Tom King has prepared a draft review plan for PBMR that he will soon submit for concurrence. Let me know if you would like a copy of the draft plan. Exelon also requested the NRC to form a working group to develop an HTGR regulatory framework (May 2001) and identify HTGR policy issues and regulatory "gaps" by September 2001.

Problems: Exelon Generation currently holds a 12.5% interest in Phase 1 of the PBMR project, which is to complete a feasibility study and the preliminary design by June 2001. Exelon's current plan is to submit application(s) for site approval and plant construction in early CY2002. However, Exelon will not decide on whether to participate in Phase 2, which includes construction of the prototype in South Africa, and proceed with application(s) until December 2001! Therefore, a significant problem for NRC will be our decision on if and when do we budget the necessary resources for licensing a PBMR plant. Other significant issues include the development and qualification of a fuel fabrication process, identification of a source term, identification of transients & accidents for the PBMR safety analysis, containment requirements, materials qualification, analysis code V&V, classification of SSCs, Regulatory Treatment of Non-Safety Systems, determination of the appropriate tests to be performed, and the timing of the tests relative to licensing and construction. Exelon is currently planning to start construction before the testing program is started!! There will also be issues associated with construction of a "merchant" plant, i.e. alternative sites, anti-trust, decommissioning funds, and Price-Anderson charges. Exelon did not request to address these issues during the pre-application review. Rather they plan to resolve the "merchant" plant issues, including development of new HTGR regulatory requirements, during the licensing process.

CC: Cullingford, Michael, Grimes, Chris, King, Tom, ...

6/18

From: Goutam Bagchi NRR
To: Jack Strosnider
Date: Thu, Feb 1, 2001 9:45 AM
Subject: PBMR Meeting High Lights

Jack,
I attended the subject meeting yesterday and my high lights are in the attached file. The room was filled with presidents and vice presidents of utility companies and resactor vendors (no one from GE), 15 people were standing outside. Dr. Travers was in attendance for the whole time.

High temperature issue seems to be dominating factor, also the licensing options and HTGR related design criteria will need some early activity.

Thank you,
Goutam
301-415-3305

CC: Bill Bateman, Cornelius Holden, Edmund (Ted) Sul...

PBMR Meeting High Lights

Project Ownership:

- Excelon (12.05%), BNFL (22.5%), ESCOM (40%) and IDC South African Government, 25%).
- Design feasibility study will be completed by June 2001.
- Decision to build prototype in late 2001.
- Needs simultaneous plant and fuel fabrication plant licensing - the fuel design and fabrication is a key item.
- Proposing to build new plants under merchant nuclear power.

Rough Time Table:

- Nominal 3 years construction (modular construction) and 1 year startup testing.

Plant design Overview:

- High temperature gas-cooled (900° C or 1562° F and 1000 psi),
- High negative reactivity coefficient at higher temperatures - shuts itself down on loss of coolant,
- Coated particle fuel (ceramic),
- Passive safety design - needs to rely on several tanks being functional,
- Direct gas cycle turbine,
- Rated power 110 - 115 MWe, plant outage 30 days every 6 years (turbine and generator maintenance,
- Spent fuel storage on-site for 40 years,
- Reactor vessel is 19.5 ft diameter and 65 ft high, it is housed in a citadel/reactor building (175 ft square (?) and 108 ft high) which is two thirds buried under ground, there will be multiple reactors on one site with shared control room, control rods or klaks are used not for safety but for load following (?),
- Uses containment, but could be vented for low leakage.

Licensing Process Issues:

- Presented various schemes using Part 50, Part 52 including early site permit,
- For Part 52 option, testing will not be completed before the COL approval,
- Looking for government/DOE funding for TH-Code verification.
- Wants an NRC PBMR Project Manager.

Near term Goal:

- By 3/01 conceptual; NRC Fees Staffing and schedule estimate Preliminary regulatory framework by 5/01
- Identification of HTGR policy/regulation change schedule by 9/01

Engineering Issues:

- High temperature metal creep
- Thermal fatigue

- Adequacy of design life (40 years) assumption for RCS components including the RPV
- Potential for relatively larger diameter graphite balls getting stuck in free gravity fall through vertical cylinders under vibratory motion. Resonant frequency of excitation etc.