

LIST OF ATTACHMENTS TO TSEP REPLY

Reply Attachment 1 Exelon Press Release (November 24, 2008)

Reply Attachment 2 Eileen O'Grady, "Exelon Seeks New Nuclear Design for Texas Project (November 24, 2008)

Reply Attachment 3 Letter from William J. Shack to R. W. Borchardt (October 29, 2008)



- Exelon Companies
- About Exelon
- Investor Relations
- Corporate Responsibility
- Careers



[Home Page](#) > [About Exelon](#) > [Newsroom](#) > [News Releases](#) > [Power Generation](#) > Exelon Nuclear Expects to Designate Alternate Technology for Texas Project

Management

News Releases

Search:

Newsroom

November 24, 2008 - Exelon Nuclear Expects to Designate Alternate Technology for Texas Project

go >
[Advanced Search](#)

- ▼ News Releases
 - Corporate
 - ▼ Power Generation
 - Recent
 - Archive
 - PECO
 - ComEd
 - Fact Sheet
 - Media Contact
 - Industry Links

Contact: Craig Nesbit Office: (630) 657-4207

[Contact Us](#)

[Links](#)

[Sitemap](#)

WARRENVILLE, Ill. (Nov. 24, 2008) – Exelon Nuclear officials are negotiating with manufacturers of alternate reactor technologies for its proposed nuclear energy development in Victoria County, Texas, the company announced today.

In November 2007, Exelon announced the selection of a General Electric-Hitachi reactor design as the preferred technology for the Victoria site, should Exelon decide to build the plant. That technology – the Economic Simplified Boiling Water Reactor, or ESBWR – is still in the early design phase.

Proposed NRG Transaction

Discussions with other reactor manufacturers began in August after an internal analysis conducted this summer showed that technologies other than the ESBWR provide the project greater commercial and schedule certainty. These improvements would enhance Exelon’s ability to obtain federal loan guarantees, which the company has said are essential for financing a new nuclear development project.

Security

Speakers Bureau

Suppliers

As a result, Exelon is considering reactor technologies that have more mature designs, more certain cost structures and better availability of information than the ESBWR.

Awards & Recognition

“We are seeking improved eligibility for federal loan guarantees, which is critical to the advancement of this project,” said Thomas S. O’Neill, Exelon Nuclear’s vice president for new plant development.

Environment

“We continue to believe the ESBWR and its technological advancements show great promise, but the ESBWR development schedule does not meet the needs of our Texas initiative,” O’Neill said.

Exelon filed an application with the Nuclear Regulatory Commission for a combined construction and operating license in September. Exelon expects to decide on an alternative technology in early 2009 and will revise the license application accordingly, O’Neill said.

A combined construction and operating license is required for construction of a new nuclear energy plant, but the application does not imply that Exelon has made a commitment to build a plant. That decision is expected in 2010.

sponsored by **EPSON**[Print](#) | [Close this window](#)

Exelon seeks new nuclear design for Texas project

Mon Nov 24, 2008 6:26pm EST

By Eileen O'Grady

HOUSTON (Reuters) - Exelon Corp, (EXC.N: [Quote](#), [Profile](#), [Research](#), [Stock Buzz](#)), the nation's largest operator of nuclear plants, said it may drop a promising General Electric nuclear technology for a better-known design that could improve chances that its proposed Texas nuclear project attracts federal financing, the company said on Monday.

Exelon's nuclear unit is talking to other reactor vendors for its proposed new plant near Victoria, Texas, because its initial design choice - the General Electric-Hitachi Economic Simplified Boiling Water Reactor (ESBWR) - is still in its early design phase, according to a release.

Exelon nuclear spokesman Craig Nesbit said the Victoria project came out in the bottom of two tiers in an initial ranking by the U.S. Department of Energy which is prioritizing 19 requests for federal loan guarantees for 14 nuclear projects, many more than the \$18.5 billion program can support.

"We believe the Victoria project fell into the lower tier largely because of the uncertainty of the ESBWR design," Nesbit said.

Exelon said the ESBWR design shows "great promise," but its development timing "does not meet the needs of our Texas initiative," said Thomas O'Neill, an Exelon nuclear vice president. A federal loan guarantee will be "critical to the advancement of this project," he said.

DOE spokeswoman Bethany Shively declined to say how Exelon and other nuclear developers ranked. "We did an initial ranking to help applicants decide if they want to proceed with the cost and effort of a part 2 application," Shively said. Part 2 of the loan application is due in mid-December.

NRG Energy (NRG.N: [Quote](#), [Profile](#), [Research](#), [Stock Buzz](#)) officials declined to say how the proposed two-unit expansion of the South Texas Project nuclear plant fared in DOE's ranking. The 20-year-old South Texas plant is about 70 miles from the site chosen by Exelon.

Exelon is trying to acquire NRG in a \$6 billion stock tender being made directly to shareholders after NRG directors rejected the offer, saying it undervalued the company.

Nesbit said Exelon plans to pursue the Victoria project and the South Texas expansion if its hostile bid for NRG is successful.

"Any decision to build (new) reactors will not be based on the acquisition, but on the availability of financing," Nesbit said. "A combined company will be in far better position to pursue one or both projects than either company alone."

Three other companies have selected the ESBWR design as U.S. utilities consider a revival of nuclear-plant construction: Entergy Corp (ETR.N: [Quote](#), [Profile](#), [Research](#), [Stock Buzz](#)); Dominion (D.N: [Quote](#), [Profile](#), [Research](#), [Stock Buzz](#)); and DTE Energy (DTE.N: [Quote](#), [Profile](#), [Research](#), [Stock Buzz](#)).

The GE-Hitachi ESBWR is one of four new designs under review by the U.S. Nuclear Regulatory Commission.

GE spokeswoman Elizabeth Kuronen said GE is talking to Exelon about the GE-Hitachi Advanced Boiling Water Reactor design, which already holds NRC certification.

Nesbit said a technology decision for Victoria will be made in early 2009. Exelon will then revise its application for a construction license with the NRC.

(Editing by John Picinich)

© Thomson Reuters 2008. All rights reserved. Users may download and print extracts of content from this website for their own personal and non-commercial use only. Reproduction or redistribution of Thomson Reuters content, including by framing or similar means, is expressly prohibited without the prior written consent of Thomson Reuters. Thomson Reuters and its logo are registered trademarks or trademarks of the Thomson Reuters group of companies around the world.

Thomson Reuters journalists are subject to an Editorial Handbook which requires fair presentation and disclosure of relevant interests.



UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
WASHINGTON, DC 20555 - 0001

October 29, 2008

Mr. R.W. Borchardt
Executive Director for Operations
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

SUBJECT: INTERIM LETTER 5: CHAPTERS 19 AND 22 OF THE NRC STAFF'S SAFETY EVALUATION REPORT WITH OPEN ITEMS RELATED TO THE CERTIFICATION OF THE ESBWR DESIGN

Dear Mr. Borchardt:

During the 556th meeting of the Advisory Committee on Reactor Safeguards, October 2-3, 2008, we discussed Chapters 19 and 22 of the NRC staff's Safety Evaluation Report (SER) with open items related to the Economic Simplified Boiling Water Reactor (ESBWR) design certification application. Our ESBWR Subcommittee held meetings on June 3 and August 21-22, 2008, to discuss technical aspects of the ESBWR design as well as the open items and the combined license (COL) action items identified in these Chapters. During these meetings, we had the benefit of discussions with representatives of the NRC staff and General Electric-Hitachi Nuclear Energy (GEH). We also had the benefit of the documents referenced. We previously commented on Chapters 2, 5, 8, 11, 12, and 17 in our November 20, 2007, letter, on Chapters 9, 10, 13, and 16 in our March 20, 2008, letter, on Chapters 4, 6, 15, 18, and 21 in our May 23, 2008, letter, and on Chapter 3 in our July 21, 2008, letter. Our reviews have not addressed security matters and their impact on ESBWR design.

CONCLUSIONS AND RECOMMENDATIONS

1. We await the staff's completion of the review of the ESBWR Probabilistic Risk Analysis (PRA) Revision 3 prior to evaluating the adequacy of the PRA for ESBWR Design Certification.
2. The bases for the assumption that passive ESBWR systems have a very low failure probability are currently incomplete. A better exposition of GEH analysis and a more systematic evaluation of the relevant uncertainties are required.
3. The technical basis for the failure probability estimates for the digital instrumentation and control (DI&C) systems should be provided.
4. Specific issues need to be clarified to ensure the functionality of the Basemat-internal Melt Arrest and Coolability device as a 'defense-in-depth' measure for severe accident conditions.
5. We will review the resolution of open items in SER Chapters 19 and 22 during future meetings.

BACKGROUND

The ESBWR is a direct-cycle power conversion system with natural circulation cooling in the reactor vessel under normal operation. It has a passive emergency core cooling system that operates without the need for emergency alternating current power systems or operator actions within the first 72 hours following a reactor transient or accident.

At the request of the staff, we have agreed to review the staff's SER on a chapter-by-chapter basis to identify technical issues that merit further consideration, thereby aiding effective resolution of any concerns, as well as assisting in the timely completion of the review of the ESBWR design certification application. Accordingly, the staff has provided at this time SER Chapters 19 and 22 with open items for our review.

DISCUSSION

The ESBWR design certification application was accepted formally by the staff in December 2005. Since that time, revisions to the Design Certification Document (DCD) have been issued, with the most recent being DCD Revision 5 and the PRA Revision 3. These revisions have included updates to the overall design and modifications that address the staff's requests for additional information originating from the staff's review of DCD Revision 4 as well as expanded analyses and correction of errors in the PRA.

Chapters 1-21 of PRA Revision 3 are identical to those of PRA Revision 2. The updates to the PRA are described in Chapter 22 but documentation of the updated logic diagrams was not provided. Our preliminary review of the PRA models in Revision 2 identified logic errors, inconsistencies, and lack of fidelity to the design descriptions in selected fault trees for the Gravity-Driven Cooling System (GDCS) and the Isolation Condenser System (ICS). Additional preliminary review of PRA models also identified errors and omissions in the modeling of physical and functional dependencies through the integrated event tree models (e.g., GDCS deluge valves success criteria and models, and anticipated transient without scram impacts from Standby Liquid Control System injection line breaks). Discussions with GEH indicate that many of the errors we identified in Revision 2 have been addressed. The GEH PRA analysts in their discussions of the PRA models demonstrated a thorough knowledge of the design and its details. However, the available Revision 3 PRA documentation provided to us does not contain sufficient detail for us to fully confirm the current status of the models. The staff is aware of these issues and will soon conduct an on-site audit of the PRA Revision 3 and supporting documentation. After the staff has completed its review, we will review the adequacy of the PRA for ESBWR design certification.

The analysts have made a number of simplifying assumptions about which components and causes for failure will be addressed. For example, possible causes for spurious closure of manual valves are systematically omitted from the models. The models include contributions from unplanned maintenance on active equipment in selected systems, but the models do not account consistently for equipment unavailability due to unplanned maintenance. The PRA also does not account for unavailability of safety system equipment due to the planned, coordinated work that may be performed during plant power operation, which is allowed by the current Technical Specifications. GEH explained that such simplifications are deliberate decisions by

PRA analysts. Limited sensitivity studies have been performed to examine the potential risk impacts from individual issues. However, the integrated impacts from these omissions remain unclear.

The ESBWR design is incomplete and includes new equipment for which there is no operational experience. Therefore, some of the PRA models and data are generic and cannot yet be design-specific. In the one case where substantial test data have been collected to develop an appropriate failure rate for a new component design, the wet-well vacuum breakers, the approach and assumptions have not been justified.

The comparisons between MAAP and TRACG analyses that were performed as part of sensitivity studies to establish PRA success criteria have demonstrated the adequacy of MAAP for the thermal-hydraulic calculations needed to support the ESBWR PRA. The sensitivity studies are helpful in addressing the robustness of passive safety systems. GEH has attempted to address uncertainty in thermal-hydraulic performance of the passive systems through building conservatism into the success criteria; i.e., a "minimum"+1 approach. However, it is not clear to us how the "minimum" numbers were obtained. If the "minimum" is not the true minimum, the "minimum"+1 may not represent conservatism that can be used to address uncertainty.

GEH has addressed thermal-hydraulic uncertainty through sensitivity studies. A better exposition of the failure modes and the effects of uncertainties on passive system reliability is needed to increase our confidence in their results. For example, it is not clear that the sensitivity studies have addressed the full range of uncertainty in the thermal-hydraulic variables.

During our reviews of the Office of Nuclear Regulatory Research program on DI&C systems, we have commented that it is premature to estimate failure probabilities (Ref. 8). Rather, we have urged the staff to focus on a systematic identification of the failure modes for these DI&C systems. The failure probability estimates for these DI&C systems are provided in Table 5.2-3 of the ESBWR PRA, Revision3.

- Failure probability (digital trip module fails to function) = 6.00E-04
- Common-cause failure probability of two trip modules = 1.11E-05
- Common-cause failure probability of three trip modules = 1.11E-06

The technical basis for these probabilities should be provided.

The Basemat-internal Melt Arrest and Coolability (BiMAC) device is a novel defense-in-depth core retention design to provide for long-term core debris coolability for severe accident management. GEH provided extensive documentation in regard to steady-state heat transfer test data and analysis (scaled as ½ scale and ¼ segment size) of the BiMAC device and its ability to remove core debris decay heat in the drywell cavity. The scaling laws for this steady-state experiment need further explanation to ensure that the tests are adequate to demonstrate the applicability of the behavior at full scale. In addition, the onset of flow instabilities (static and/or dynamic) may inhibit local coolant flow and convective cooling, thereby compromising burnout limits. GEH will provide additional information to help assess the likelihood of such instabilities.

The initial core melt transient deposition that initiates operation of the BiMAC device could pose problems for the long-term operability of the BiMAC device. It is not clear what the composition of the sacrificial material above the cooling tubes is to be and whether it will be able to handle the high transient heat flux that will occur when melt pours onto a localized region, (this deposition could be complicated by a metallic melt pour and/or a large pour rate). The GEH documentation does not seem to provide any review of past molten core-concrete interaction (MCCI) experiments for transient core melt pouring and melt spreading behavior in order to bound this initial transient heat load and its effects on the BiMAC device. GEH documentation does not provide an analysis of an initial asymmetric pour that would inhibit melt spreading and possibly cause an excessive heat flux damaging the BiMAC device near its corners. Finally, the GEH analysis does not seem to consider ex-vessel steam explosions as a mechanism to damage the BiMAC downcomer feed tubes along the vertical walls. Asymmetric melt pours into the water pool, after initial melt deposition and deluge valve actuation, could result in ex-vessel steam explosions that could 'crimp' the BiMAC downcomer tubes and thus affect long-term coolability. These specific issues need to be clarified to be able to assess the functionality of the BiMAC device as a 'defense-in-depth' measure for severe accident conditions.

We will review the resolution of open items in SER Chapters 19 and 22 during future meetings.

Sincerely,

/RA/

William J. Shack
Chairman

REFERENCES

1. Memorandum from David B. Matthews, Director, Division of New Reactor Licensing (DNRL), Office of New Reactors (NRO), to Frank P. Gillespie, Executive Director, Advisory Committee on Reactor Safeguards and Advisory Committee on Nuclear Waste, dated May 16, 2008, transmitting SER with Open Items for Chapter 19, "Probabilistic Risk Assessment and Severe Accident Evaluation" Regarding the Economic Simplified Boiling Water Reactor (ESBWR) Design Certification (ML080850462).
2. Memorandum from David B. Matthews, Director, Division of New Reactor Licensing (DNRL), Office of New Reactors (NRO), to Frank P. Gillespie, Executive Director, Advisory Committee on Reactor Safeguards and Advisory Committee on Nuclear Waste, dated May 8, 2008, transmitting SER with Open Items for Chapter 22, "Regulatory Treatment of Nonsafety Systems" Regarding the Economic Simplified Boiling Water Reactor (ESBWR) Design Certification (ML080940713).
3. Letter from James C. Kinsey, Project Manager, ESBWR Licensing, GEH, to NRC, dated February 22, 2007, transmitting ESBWR Design Control Document, Revision 3 (ML070660561).
4. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to Luis A. Reyes, Executive Director for Operations, dated November 20, 2007, "Interim Letter: Chapters 2, 5, 8, 11, 12, and 17 of the NRC Staff's Safety Evaluation Report With Open Items Related to the Certification of the ESBWR Design" (ML073070006).
5. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to Luis A. Reyes, Executive Director for Operations, dated March 20, 2008, "Interim Letter Chapters 9, 10, 13, and 16 of the NRC Staff's Safety Evaluation Report with Open Items Related to the Certification of the ESBWR Design" (ML080670596).
6. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to R. W. Borchardt, Executive Director for Operations, dated May 23, 2008, "Interim Letter 3: Chapters 4, 6, 15, 18, and 21 of the NRC Staff's Safety Evaluation Report with Open Items Related to the Certification of the ESBWR Design" (ML081330447).
7. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to R. W. Borchardt, Executive Director for Operations, dated July 21, 2008, "Interim Letter 4: Chapter 3 of the NRC Staff's Safety Evaluation Report with Open Items Related to the Certification of the ESBWR Design" (ML081930777).
8. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to Dale E. Klein, Chairman, U. S. Nuclear Regulatory Commission, dated April 29, 2008, "Digital Instrumentation and Control Systems Interim Staff Guidance" (ML081050636).

REFERENCES

1. Memorandum from David B. Matthews, Director, Division of New Reactor Licensing (DNRL), Office of New Reactors (NRO), to Frank P. Gillespie, Executive Director, Advisory Committee on Reactor Safeguards and Advisory Committee on Nuclear Waste, dated May 16, 2008, transmitting SER with Open Items for Chapter 19, "Probabilistic Risk Assessment and Severe Accident Evaluation" Regarding the Economic Simplified Boiling Water Reactor (ESBWR) Design Certification (ML080850462).
2. Memorandum from David B. Matthews, Director, Division of New Reactor Licensing (DNRL), Office of New Reactors (NRO), to Frank P. Gillespie, Executive Director, Advisory Committee on Reactor Safeguards and Advisory Committee on Nuclear Waste, dated May 8, 2008, transmitting SER with Open Items for Chapter 22, "Regulatory Treatment of Nonsafety Systems" Regarding the Economic Simplified Boiling Water Reactor (ESBWR) Design Certification (ML080940713).
3. Letter from James C. Kinsey, Project Manager, ESBWR Licensing, GEH, to NRC, dated February 22, 2007, transmitting ESBWR Design Control Document, Revision 3 (ML070660561).
4. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to Luis A. Reyes, Executive Director for Operations, dated November 20, 2007, "Interim Letter: Chapters 2, 5, 8, 11, 12, and 17 of the NRC Staff's Safety Evaluation Report With Open Items Related to the Certification of the ESBWR Design" (ML073070006).
5. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to Luis A. Reyes, Executive Director for Operations, dated March 20, 2008, "Interim Letter Chapters 9, 10, 13, and 16 of the NRC Staff's Safety Evaluation Report with Open Items Related to the Certification of the ESBWR Design" (ML080670596).
6. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to R. W. Borchardt, Executive Director for Operations, dated May 23, 2008, "Interim Letter 3: Chapters 4, 6, 15, 18, and 21 of the NRC Staff's Safety Evaluation Report with Open Items Related to the Certification of the ESBWR Design" (ML081330447).
7. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to R. W. Borchardt, Executive Director for Operations, dated July 21, 2008, "Interim Letter 4: Chapter 3 of the NRC Staff's Safety Evaluation Report with Open Items Related to the Certification of the ESBWR Design" (ML081930777).
8. Letter from William J. Shack, Chairman, Advisory Committee on Reactor Safeguards, to Dale E. Klein, Chairman, U. S. Nuclear Regulatory Commission, dated April 29, 2008, "Digital Instrumentation and Control Systems Interim Staff Guidance" (ML081050636).

Distribution

See Next Page

Accession No: ML082810703 **Publicly Available (Y/N):** Y **Sensitive (Y/N):** N
Viewing Rights: NRC Users or ACRS only or See restricted distribution

OFFICE	ACRS	SUNSI Review	ACRS	ACRS	ACRS
NAME	H. VanderMolen	H. VanderMolen	C. Santos/A. Dias	E. Hackett	EMH for WJS
DATE	10/28/08	10/28/08	10/28/08	10/29/08	10/29/08

OFFICIAL RECORD COPY

Letter to R. William Borchardt, EDO, NRC, from William J. Shack, Chairman, ACRS, dated October 29, 2008

SUBJECT: INTERIM LETTER 5: CHAPTERS 19 AND 22 OF THE NRC STAFF'S SAFETY EVALUATION REPORT WITH OPEN ITEMS RELATED TO THE CERTIFICATION OF THE ESBWR DESIGN

Distribution:

C. Santos
A. Dias
D. Bessette
H. Nourbakhsh
G. Shukla
M. Banerjee
P. Wen
S. Duraiswamy
Z. Abdullahi
H. Vandermolen
C. L. Brown
D. Widmeyer
M. Lee
J. Flack
V. Murphy
J. Delgado
N. Coleman
C. Jaegers
T. Bloomer
B. Champ
A. Bates
S. McKelvin
L. Mike
RidsSECYMailCenter
RidsEDOMailCenter
RidsNMSSOD
RidsNSIROD
RidsFSMEOD
RidsRESOD
RidsOIGMailCenter
RidsOGCMailCenter
RidsOCAAMailCenter
RidsOCAMailCenter
RidsNRROD
RidsNROOD
RidsOPAMail
RidsRGN1MailCenter
RidsRGN2MailCenter
RidsRGN3MailCenter
RidsRGN4MailCenter