GE Energy

David H. Hinds
Manager, ESBWR

PO Box 780 M/C L60
Wilmington, NC 28402-0780
USA

T 910 675 6363
F 910 362 6363
david.hinds@ge.com

MFN 06-397

Docket No. 52-010

November 7, 2006

U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555-0001

Subject: **Response to Portion of NRC Request for Additional Information Letter No. 34 – Support Systems – RAI Number 9.3-26**

Enclosure 1 contains GE's response to the subject NRC RAIs transmitted via the Reference 1 letter.

If you have any questions about the information provided here, please let me know.

Sincerely,

Kathy Sedney for

David H. Hinds
Manager, ESBWR

D068

Reference:

1. MFN 06-198, Letter from U.S. Nuclear Regulatory Commission to David Hinds, *Request for Additional Information Letter No. 34 Related to ESBWR Design Certification Application*, June 22, 2006

Enclosure:

1. MFN 06-397 – Response to Portion of NRC Request for Additional Information Letter No. 34 – Support Systems – RAI Number 9.3-26

cc: AE Cubbage USNRC (with enclosures)
GB Stramback GE/San Jose (with enclosures)
eDRF 0058-2453

ENCLOSURE 1

MFN 06-397

Partial Response to RAI Letter No. 34 Related to ESBWR Design Certification Application.

RAI Number 9.3-26

NRC RAI No. 9.3-26

Provide the reactivity worth of the radial reflector (that is the bypass region surrounding the core, shroud, and annulus).

GE Response:

The Level 2 code PANACEA is used to evaluate the reactivity worth of the radial reflector by increasing artificially the leakage in the reflector region. This can be achieved in PANACEA by increasing the reflector diffusion coefficients in the three energy groups.

A steady-state case is initially run with "standard" reflector diffusion coefficients for the following conditions:

- EOC (End Of Cycle) : 16771 MWd/St
- Power : 4500 MWth (100% rated)
- Flow : 78.51 Mlb/hr (100% rated)
- Pressure : 1055 psia

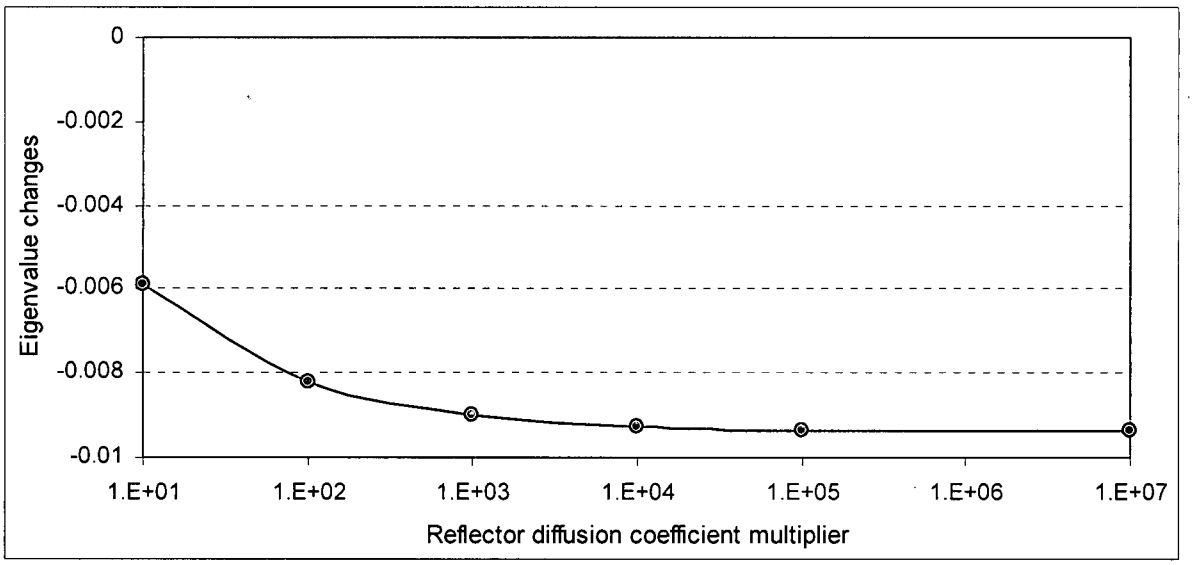
In addition, six cases were run for the same conditions as described above with reflector diffusion coefficients increased by different orders of magnitude. The following figure displays the changes in the eigenvalue k_{eff} as a function of the multiplication coefficient.

As seen in the figure, changes in reactivity are always negative, as expected and tend to reach an asymptotic value, which is less than 0.01.

Conclusion:

The reactivity worth of the radial reflector (that is the bypass region surrounding the core, shroud, and annulus) is approximately 1% Δk_{eff} (i.e. 1.75$ if the reactivity is calculated as $\Delta k_{eff} / k_{eff} \beta$ where β is the total delayed neutron fraction).

Eigenvalue changes = $k_{eff}^{modified\_reflector} - k_{eff}^{base}$



No DCD change will be made in response to this RAI.