NRC FORM 658
(9-1999)

U.S. NUCLEAR REGULATORY COMMISSION

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DATE OF MEETING
11/10/99

The attached document(s), which was/were handed out in this meeting, is/are to be placed in the public domain as soon as possible. The minutes of the meeting will be issued in the near future. Following are administrative details regarding this meeting:

Docket Number(s): **Project 691**

Plant/Facility Name: **General Electric**

TAC Number(s) (if available):

Reference Meeting Notice: Notice dated 11/1/99

Purpose of Meeting (copy from meeting notice): **To provide the staff a GE fuel experience and a nuclear methods qualification update, a discussion on GESTAR Am. 26 and Japanese joint venture.**

Non-Proprietary slides only

NAME OF PERSON WHO ISSUED MEETING NOTICE	TITLE
Robert M. Pulsifer	**Project Manager**

OFFICE
Office of Nuclear Reactor Regulation

DIVISION
Division of Licesning Project Management

BRANCH
Project Directorate III, Section 2

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DF03

A-F03

GE Nuclear Energy

GE/NRC Technology Update

10 November 1999

Agenda

- GE/Hitachi/Toshiba Fuel Joint Venture
- GE Fuel Experience Update
- Nuclear Methods Qualification Update
- GESTAR Amendment 26

JV Update

GENE - Wilmington

October, 1999

GE Fuel Experience Update

Nuclear Methods Qualification Update

GE Nuclear Energy

Application of TGBLA06/PANAC11 to Core Design and Monitoring

UPDATE

Items for Discussion

- ***Plant Tracking Statistical Update***
- ***Statistics Breakdown***
  - *TIPs*
  - *Thermal Limits*
  - *Eigenvalues*
- ***Application of SLMCPR methodology for TGBLA06/PANAC11***

One European plant designed and operating with TGBLA06/PANAC11 basis

Methods Introduction and Evaluation

- ***New physics exposure burn-in***
  - *Re-burn from cycle 1, or*
  - *2-3 cycles prior to cycle of interest*
- ***Trending analysis***
  - *Hot eigenvalue: $\sigma(k_{hot})$*
    last two complete cycles only
  - *Cold eigenvalue: $\sigma(k_{cold})$*
    all cycles after burn-in
  - *TIP comparisons: RMS_{rad}, RMS_{nod}*
    all cycles after burn-in

Plant Tracking Statistical Update

Plant Tracking Statistical Update, cont'd.

Plant Tracking Summary

- ***BWR/2-BWR/6, ABWR, and others***
- ***GE6-GE14, ABB fuel, Siemens fuel, STEP-2***
- ***HOT***
  - *31 Plants, 154 cycles*
- ***COLD***
  - *20 Plants, 81 cycles, 278 criticals*
- ***TIPs***
  - *5 Plants, 8 cycles (Neutron TIPs)*
  - *7 Plants, 30 cycles (Gamma TIPs)*

An additional 10 plants and 80+ cycles since Spring 1998.

Sample TIP Agreement

PANAC10	PANAC11
Radial RMS:	Radial RMS:
Nodal RMS:	Nodal RMS:

Small BWR/4 Case Study - TIP Comparison to Process Computer

Summary of plant tracking database (P11 only)

- ***Neutron TIP Plants***
  - *Radial (Bundle) :* %
  - *Total (Nodal) :* %
- ***Gamma TIP Plants***
  - *Radial (Bundle) :* %
  - *Total (Nodal) :* %
- ***All Plants***
  - *Radial (Bundle) :* %
  - *Total (Nodal) :* %
- ***Case Study***
  - *Radial (Bundle) :* %
  - *Total (Nodal) :* %

GE actively pursuing TIP comparisons across the fleet.

*Thermal Limits Predictive Capability**

** Compared with Process Computer evaluated thermal limit values. Population of data selected includes 10 plants for 14 cycles for a total of 690 points.*

No surprises in predictive capability.

Sample Cold Eigenvalue Statistics

PANAC10

Sample Definition

15 Plants, 55 Cycles

148 Cold Criticals

PANAC11

Standard Deviations

T4/P10: % Δk

T6/P11: % Δk

Sample Hot Eigenvalue Statistics

PANAC10 (CY.)	PANAC11 (CY.)
AVERAGE:	AVERAGE:
AVG. SLOPE:	AVG. SLOPE:
ST. DEV: pcm	ST. DEV: pcm

Operational Trends Driving New Capabilities

Plant C - Hot Eigenvalues for Cycles

Design:	Enrichment:	Gadolinium:

Extension of Power Uncertainty to PANAC11

Infinite Lattice Pin Power Uncertainty

Summary

- ***Implementation of TGBLA06/PANAC11 proceeding***
- ***Qualification and verification database is large and growing***
- ***Accuracy comparable to other advanced nuclear design systems***
- ***Full range of applications supported***
  - *Licensing*
  - *Stability*
  - *Fuel cycle design*
  - *Cold shutdown*
  - *Core monitoring*

Methods Accuracy Tracking is a Priority

Amendment 26

- General GESTAR revision (Amendment 26)
  - PANAC11
  - PRDF (BWR/6)
  - BWROG Stability Options
  - Updated references (LOCA)
  - Conversion to WORD/PDF format

Other Licensing Activities

- TRACG Application to Transients
  - LTR submittals in 4Q99
- Replace FABLE model with ODYSY
  - Stability analyses
  - Submit in 2Q00
- PANAC11 Rod Drop Accident version
  - Submit in 2Q00