FRAMATOME COGEMA FUELS

February 8, 2000
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U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D. C. 20555

Subject: NRC/BWOG Meeting to Discuss Recent Control Rod Performance Issues

Gentlemen:

Enclosed is a copy of the material to be presented to the NRC staff on February 9, 2000. In accordance with 10 CFR 2.790 FCF requests that the enclosed information be considered proprietary and withheld from public disclosure. Attachment 1 is the proprietary version of the material. Attachment 2 is an affidavit supporting the proprietary classification of the information. Attachment 3 is the non-proprietary version.

Very truly yours,

T A Coleman

T. A. Coleman, Vice President
Government Relations

cc: S. N. Bailey, NRC
M. S. Chatterton, NRC
M. A. Schoppman

Rec'd w/o Attachment 1+2. at DCD.

FRAMATOME TECHNOLOGIES

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TO10

Attachment 3

February 2000 NRC Meeting on Incomplete Rod Insertion

The B&W Owners Group and
Framatome-Cogema Fuels

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Agenda

- Review of October 1999 meeting
- Recent plant data
- What have we learned
- Corrective actions and future improvements taken by FCF and utilities

Review of October 1999 TMI IRI Meeting

- A significant amount of TMI data was collected and analyzed
- Improvements were made to the TMI Cycle 13 core
- TMI Startup data showed acceptable control rod drop times
- Based on the corrective actions, continuous operation was justified for TMI Cycle 13.
- No safety significance
- TMI will perform drop time testing for all shutdowns when testing has not been performed within four months
- TMI will submit a supplement LER within 18 months evaluating available new data and analyses and determining if additional monitoring is warranted.

TMI IRI Root Cause

Root Cause for the TMI IRI was identified as excessive Guide Tube Deformation

Guide Tube Deformation can be caused by:

- hold-down spring force
- lateral loads
- fuel assembly growth
- creep

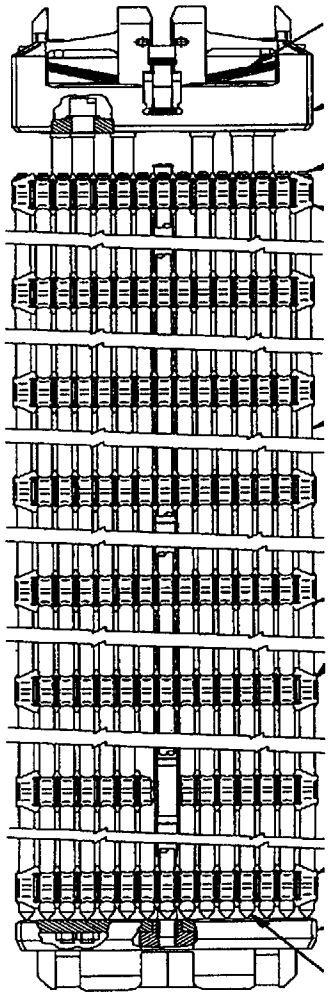
Background on IRI and Guide Tube Deformation

Hold down spring force must prevent FA lift

Spring is "plastically set" during cold shutdown due to differential thermal expansion

Fuel rod clad grows due to irradiation and material creep

Guide tubes grows due to irradiation and material creep



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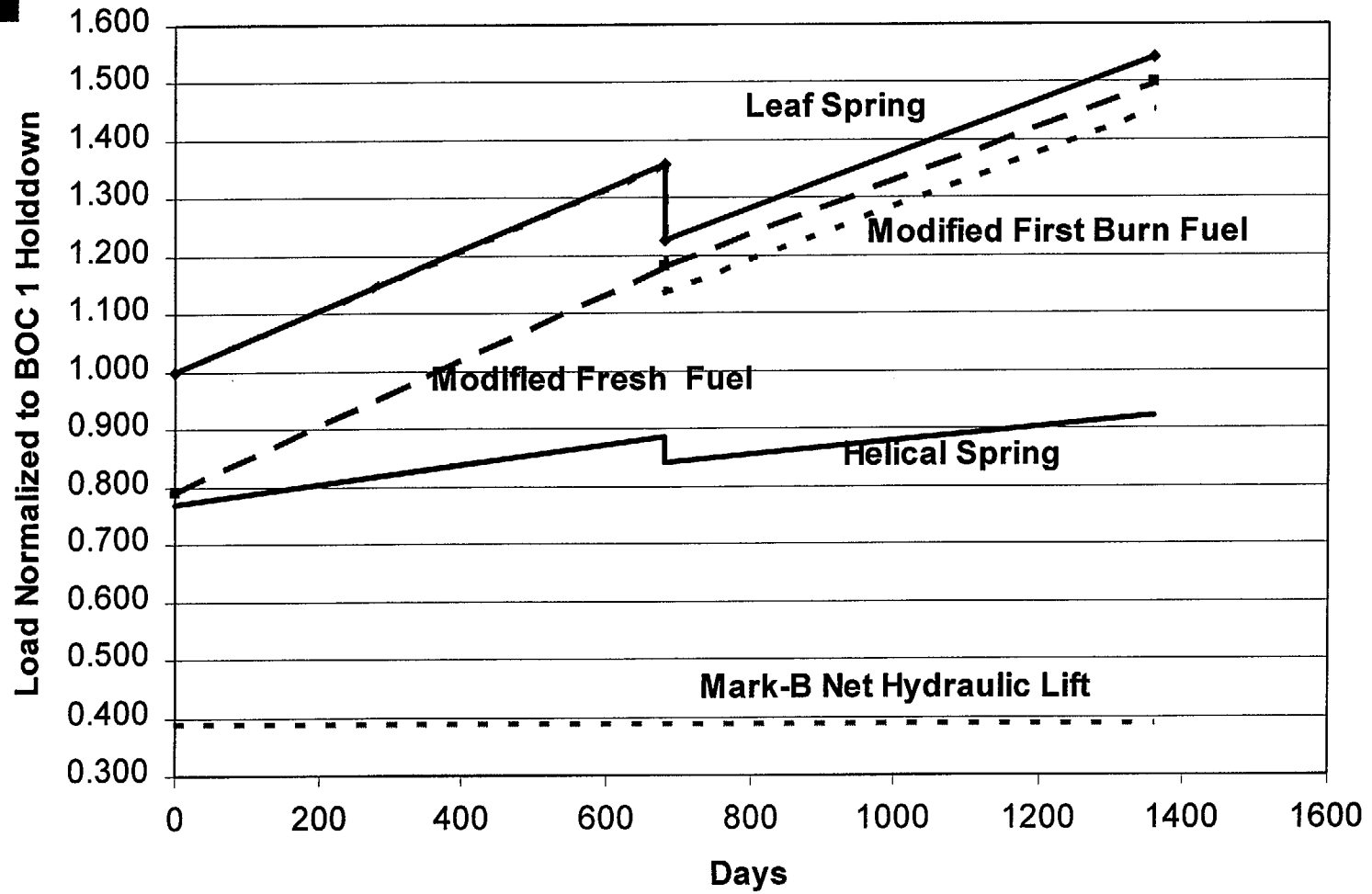
Immediate Corrective Actions Taken at TMI

Guide tube deformation:	Corrective Actions:
•Hold-down spring force	•Plastically set spring
•Lateral loads	•Minimized "same quadrant shuffle"

Possible Future Improvements

Guide tube deformation:	Future improvements:
•Hold-down spring force	•Redesign Mark-B10 leaf-spring
•Lateral loads	•Finalize shuffle guidelines
•Fuel assembly growth	•Low growth material (M5™)
•Creep	•Low growth material (M5™)

Mark-B Spring Hold-Down: Setting Springs



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Mark-B Data and Analysis

Gary Williams
FCF Team Leader
Mechanical Analysis and Development

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Agenda for Mark-B Data and Analysis

Latest Cycle Data for Mark-B Units

Mark-B Data Taken before TMI-1 IRI Observations

Mark-B Drop Time Variation with Burnup

Summary of TMI-1 Data

TMI-1 Drop Time Variation with Burnup

Summary of Crystal River-3 Data

Crystal River 3 Drop Time Variation with Burn-up, EOC 11

Summary of Oconee-2 Data

Oconee-2 Cycle 17 Drop Time Variation with Burnup

Oconee-2 Drop Time Variation with Burnup

Control Rod Assembly Drag Work

Control Rod Drag Work as a Function of Burn-up

Control Rod Drop Time Variation with Drag Work, TMI-1 Cycle 12

Control Rod Drop Time Variation with Drag Work, CR-3 Cycle 11

Control Rod Drop Time Variation with Drag Work Oconee-2 Cycle 17 (18-month cycles)

Mark-B Spring Hold Down: 24 Month and 18 Month Cycles

Mark-B Spring Hold Down: Effect of Cold Shutdowns at Davis-Besse

Oconee 2 PIE Data Collection

Conclusions From Mark-B Plant Observations

IRI Variables

Corrective Actions

Bernie Copsey

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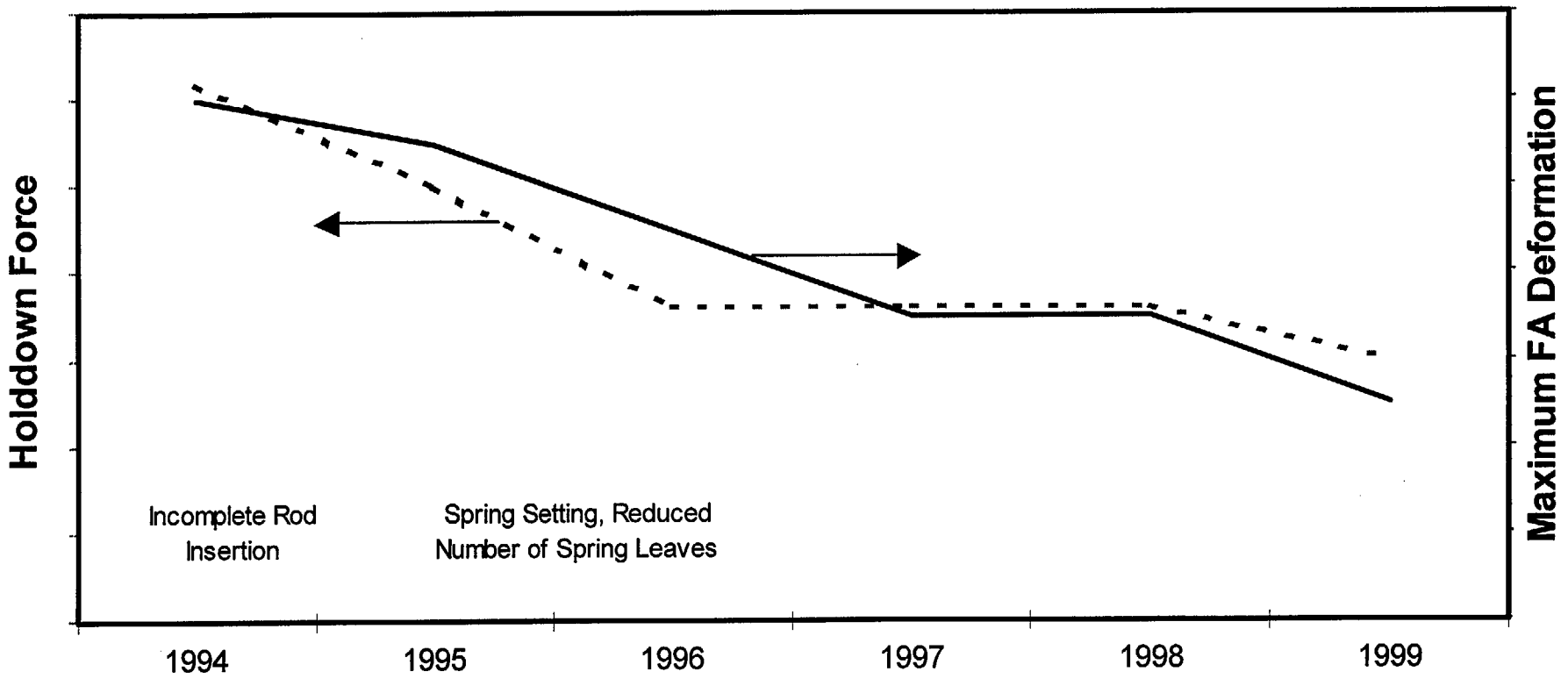
Corrective Actions Performed at Each Unit

	Set Fresh Fuel Leaf-Spring	Set Burned Fuel Leaf-Spring	Minimize Same Quadrant Shuffle
Recent:			
ANO	**N/A**	**N/A**	**N/A**
TMI	✓	✓	✓
Crystal River	✓	✓	✓
Oconee-2	✓	✓	✓
Future:			
Davis Besse	✓	✓	✓
Oconee-3	✓	**under evaluation**	✓
Oconee-1	**set spring or use redesigned spring**	**under evaluation**	✓

Improvements in FA Deformation at Ringhals



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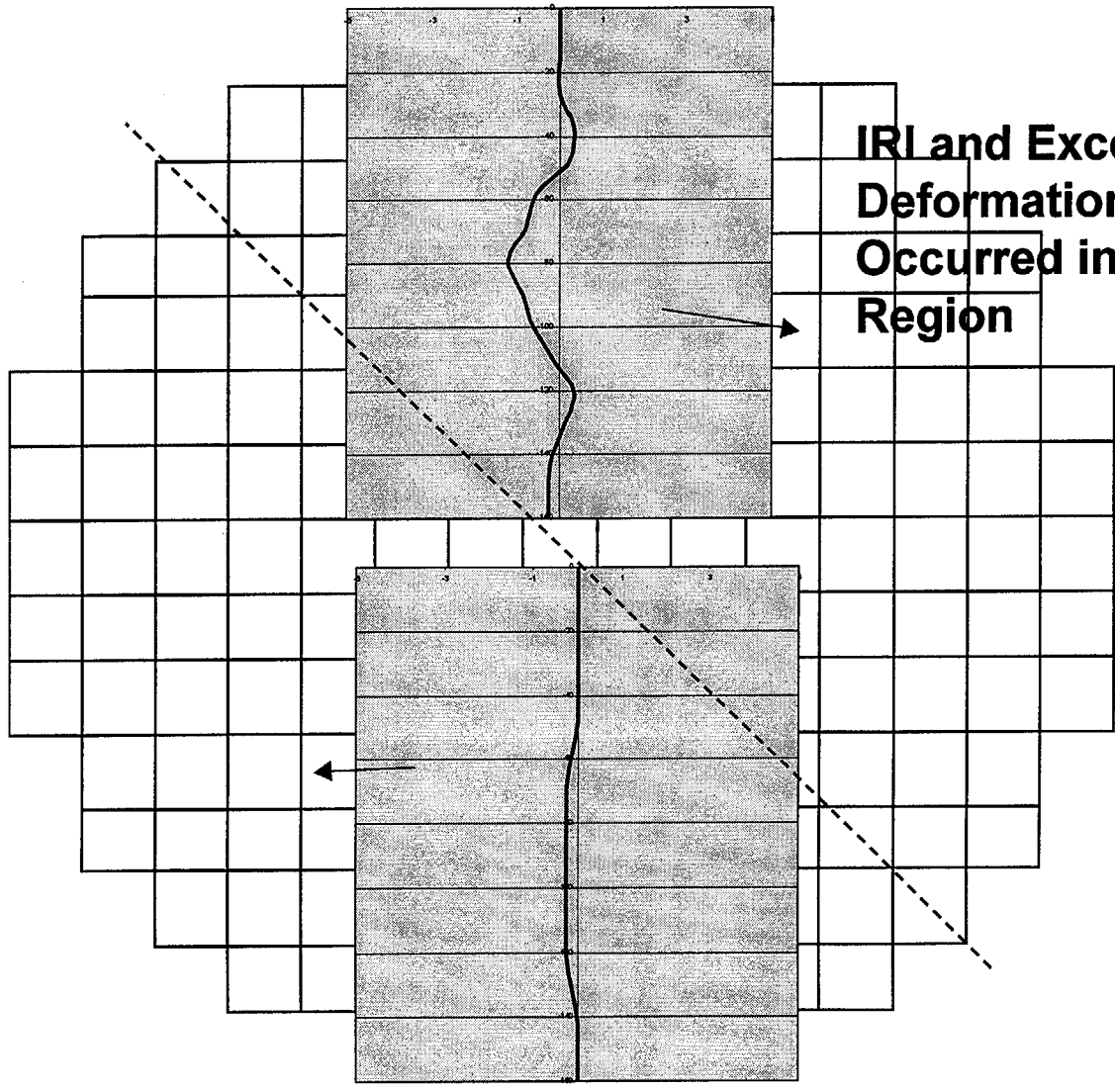
Guide Tube Deformation at TMI is Core Location Dependent



IRI and Excessive Deformation Occurred in this Region

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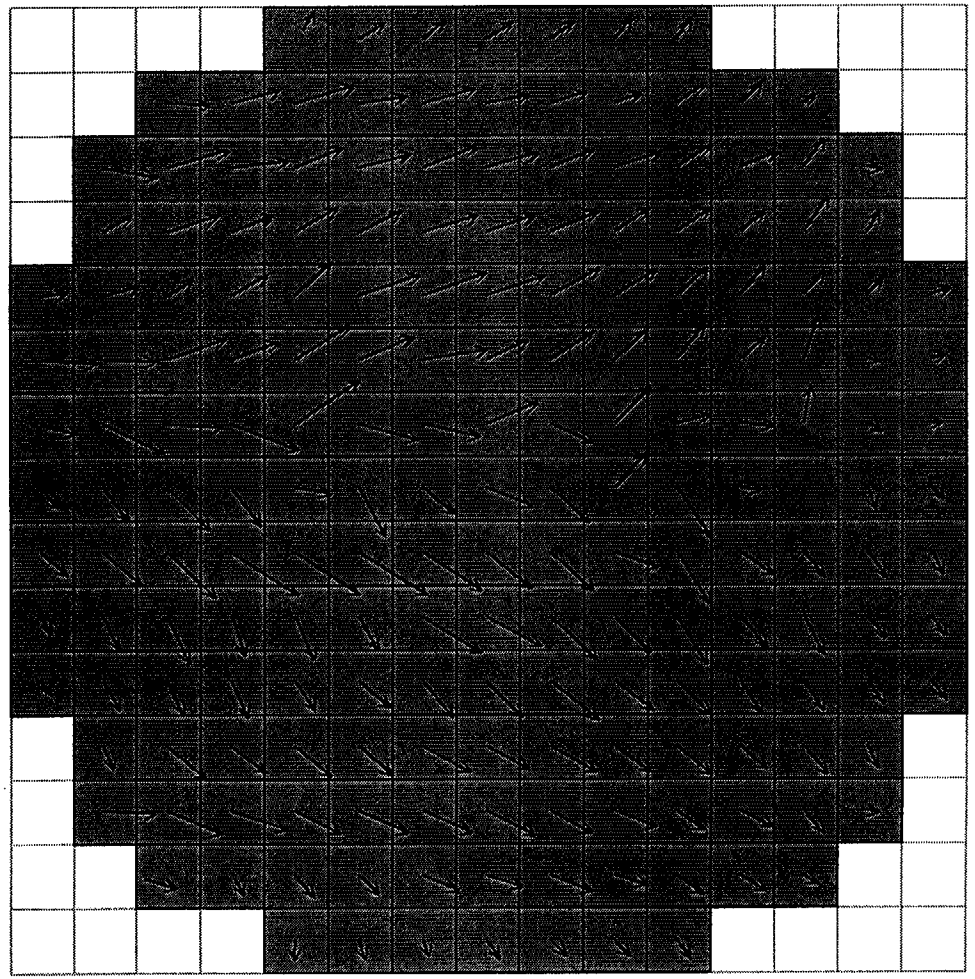
Framatome Also Observed that GT Deformation is Core Location Dependent

4-Loop Framatome PWR Units

Approximately 10 Units Measured

Guide tube deformation is observed to have the same trend for all plants of the same type



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Analytical Models Being Developed

- Single Fuel Assembly Model
  - evaluate guide tube deformation as a function of spring loads, material properties, temperature, etc.
- Core-Wide Fuel Assembly Model
  - evaluate core-wide deformation as a function of FA characteristics
- CRA Drop Model
  - evaluate CRA drop time as a function of CRA drag

Effect of Corrective Action

- Analytical models developed by Framatome show that the corrective actions have reduced susceptibility to IRI
- Framatome France data demonstrates that the corrective actions will reduce susceptibility to IRI

Davis-Besse Corrective Actions

- Planned Corrective Actions
  - Plastic setting of hold-down springs
  - Minimize "same quadrant shuffle"

- Other Beneficial Effects
  - Low growth fuel rod clad material (M5™)
    - Reduced growth-induced hold-down load

Davis-Besse Tentative Plans

- End-of-cycle drop time measurements
- Additional actions being evaluated
  - CRA drag measurements
    - In Vessel Drag, and/or
    - Spent Fuel Pool Drag

Planned Future Actions and Events

- Analysis
  - Finite element models
  - CRA drop time models
  - Continued data analysis
- Update TMI LER within 18-months
- Davis Besse will shutdown in April
  - Will provide data on the effect of mid-cycle cold shutdowns
- Mark-B10 leaf spring re-design
  - Improved hydraulic lift methodology
- Advanced material, M5™
  - Clad is currently available, if desired
  - M5™ guide tubes are in North Anna and are going into selected Davis Besse and Sequoyah locations
- Shuffle guidelines will be formalized

Conclusions

- Based on the observed data, there are no significant safety issues
- Corrective actions have been taken to further reduce susceptibility
- We are continuing to monitor data and develop analytical tools

Mark-B Plant Plans for Drop Time Data Acquisition

- Oconee
- ANO
- Crystal River
- TMI
- Davis Besse