October 14, 1994

LICENSEE: Pilgrim Nuclear Power Corporation

FACILITY: Pilgrim Nuclear Power Station

SUBJECT: MEETING SUMMARY - MEETING BETWEEN BOSTON EDISON COMPANY AND THE NRC ON THE REACTOR CORE SHROUD

At the request of the U.S. Nuclear Regulatory Commission (NRC), the Boston Edison Company, (BECo or licensee), made a presentation on their reactor core shroud in a meeting held in Rockville, Maryland on October 4, 1994. Enclosed is a copy of the meeting handouts and list of attendees.

The discussions followed the information in the slide presentation and included clarifying questions and points from the NRC staff. The staff commended the licensee on the quality of their submittal in response to Generic Letter 94-03, "Intergranular Stress Corrosion Cracking of Core Shrouds in Boiling Water Reactors." However, the staff wanted to review a sensitivity analysis on the margin to unacceptable core shroud performance during a postulated recirculation line break before they could concur with the licensee's justification for operation during the approximate 4 month period between the end of the current outage and the scheduled refueling outage (RFO 10) in April 1995.

The licensee stated that they will be installing a General Electric Company modification to the core shroud of a similar design to the one currently being installed at Hatch 1 nuclear plant during RFO 10. The licensee also stated that they will enter RFO 10 on the scheduled date. Finally, the licensee committed to providing a sensitivity analysis to demonstrate the margin to unacceptable performance of the core shroud during a postulated large break loss of coolant accident. The licensee is providing a schedule, within a week, for their submittal of the analysis.

Original signed by
Ronald B. Eaton, Senior Project Manager
Project Directorate I-3
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Docket No. 50-293

Enclosures: 1. Meeting Handouts
2. List of Attendees

cc w/encls: See next page

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001
October 14, 1994

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cc w/encls: See next page

Pilgrim Nuclear Power Station

cc:

Mr. Leon J. Olivier
Vice President of Nuclear
Operations & Station Director
Pilgrim Nuclear Power Station
RFD #1 Rocky Hill Road
Plymouth, MA 02360

Resident Inspector
U. S. Nuclear Regulatory Commission
Pilgrim Nuclear Power Station
Post Office Box 867
Plymouth, MA 02360

Chairman, Board of Selectmen
11 Lincoln Street
Plymouth, MA 02360

Office of the Commissioner
Massachusetts Department of
Environmental Protection
One Winter Street
Boston, MA 02108

Office of the Attorney General
One Ashburton Place
20th Floor
Boston, MA 02108

Mr. Robert M. Hallisey, Director
Radiation Control Program
Massachusetts Department of
Public Health
305 South Street
Boston, MA 02130

Regional Administrator, Region I
U. S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

Mr. Alan Shiever
Licensing Division Manager
Boston Edison Company
600 Rocky Hill Road
Plymouth, MA 02360-5599

Mr. E. Thomas Boulette, Ph.D
Senior Vice President - Nuclear
Boston Edison Company
Pilgrim Nuclear Power Station
RFD #1 Rocky Hill Road
Plymouth, MA 02360

Mr. Robert V. Fairbanks
Manager, Reg. Affairs Dept.
Pilgrim Nuclear Power Station
RFD #1 Rocky Hill Road
Plymouth, MA 02360

Mr. David F. Tarantino
Nuclear Information Manager
Pilgrim Nuclear Power Station
RFD #1, Rocky Hill Road
Plymouth, MA 02360

Mr. Thomas Rapone
Secretary of Public Safety
Executive Office of Public Safety
One Ashburton Place
Boston, MA 02108

Mr. David Rodham, Director
Massachusetts Emergency Management
Agency
400 Worcester Road
P.O. Box 1496
Framingham, MA 01701-0317
Attn: James Muckerheide

Chairmen, Citizens Urging
Responsible Energy
P. O. Box 2621
Duxbury, MA 02331

Citizens at Risk
P. O. Box 3803
Plymouth, MA 02361

W. S. Stowe, Esquire
Boston Edison Company
800 Boylston St., 36th Floor
Boston, MA 02199

Chairman
Nuclear Matters Committee
Town Hall
11 Lincoln Street
Plymouth, MA 02360

The Commonwealth of Massachusetts
Office of the Attorney General
One Ashburton Place
Boston, MA 02108-1698
ATTN: Leslie B. Greer

Pilgrim Nuclear Power Station

Commitment to Safety

Boston Edison

Core Shroud Presentation

- E.T. Boulette - Senior Vice President Nuclear
- H.V. Oheim - Nuclear Engineering Services Department Manager
- R.V. Fairbank - Regulatory Affairs and Emergency Preparedness Department Manager
- J. P. Gerety - Fluid Systems and Mechanical Components Division Manager

Meeting Objectives

- Assure the NRC Staff that Pilgrim places safety as the foremost consideration in resolving the core shroud cracking issue
- Update the NRC Staff on status of Pilgrim's efforts to resolve this issue
- Apprise the staff of the dynamic and complex nature of this issue
- Obtain feedback from the NRC Staff regarding Pilgrim's response to the Generic Letter
- Maintain open communications allowing for frequent status reports from Pilgrim and feedback from NRC Staff

Safety is Pilgrim's foremost consideration in responding to shroud cracking issue

- Our early recognition of significance and applicability dictated our sense of urgency
- Pilgrim plant-specific safety assessment provides interim safety assurance
- Industry experience continuously factored into planning
- Pilgrim is committed to permanent resolution as soon as practicable
- Pilgrim will provide frequent progress reports to the NRC Staff as our efforts continue

Our early recognition of significance and applicability dictated our sense of urgency

- Pilgrim took a leadership role in industry response
- Preemptive repair eliminates risk
- Optimum repair completion is RFO #10

Pilgrim took a leadership role in industry's response to shroud cracking

- BWRVIP Executive Oversight Committee Member
- Assessment Subcommittee Representative
- Inspection Subcommittee Representative
- Mitigation Subcommittee Chairman
- Mitigation Subcommittee Representative
- Repair Subcommittee Representative
- Repair design and hardware fabrication are in progress to support RFO #10

Preemptive repair eliminates risk

- Inspection uncertainties continue
- Repair restores structural margin
- Pilgrim likely to need eventual repair
- Do it right the first time

Optimum repair completion is RFO #10

- **Safest implementation during planned RFO**
  - High Confidence in Interim Safety
  - Provides necessary design and hardware lead times
- **Pilgrim is presently in an outage**
- **Implementation during current outage scope is uncertain and adds unnecessary risk**

Safest implementation during planned RFO

- Vessel open for refueling
- Fuel movement planned
- Operators trained and prepared
- Equipment tested and prepared

Pilgrim is presently in an outage

- Plant trip 8/29/94 due to generator failure
- MCO commenced 26 days early 9/4/94
- MCO to complete 10/7/94
- Generator repair dictates restart
- Restart target early December
- No plan to open vessel
- Generator repair progress
- 'B' Battery Cell replacement

Implementation during current outage is uncertain and adds unnecessary risk

- Repair design uncertainties
- Inspection plan uncertainties
- Battery cell replacement
- Refuel floor and operator readiness
- Open the vessel
- Move fuel
- RFO planning impacted
- Repair impacts vessel inspection

Core Shroud repair design uncertainties must be resolved prior to implementation

- Lead plant success
- Seismic loads
  - PNPS loads > lead plant loads
  - lead plant design may not be adequate for PNPS
- Pre-installation inspection uncertainties
  - Gusset welds
  - Vertical welds
  - Ring Segment
  - Others
- As-built configuration uncertainty
- Core support plate wedges
- LOCA Loads - RLB
- Code Classification

Core shroud repair implementation concerns must be resolved

- Availability of hardware and people
- Refuel floor readiness
- Operator readiness
- 125 vdc Battery cell replacement
- Potential regulatory support
  - 125 vdc battery crosstie tech spec waiver
  - approval of SGTS/CRHEAF tech spec submittal
  - agreement outage does not meet tech spec definition of "Refueling Outage"

Pilgrim's plant specific safety assessment provides interim safety assurance

- Structural margin exists assuming conservative crack size estimates
- Plant safety functions assured assuming hypothetical complete shroud failure
  - Normal Operation
  - Anticipated Operational Events
  - Design Basis Acccident
- Probabilistic risk assessment confirms acceptability of operation

Structural margin exists assuming conservative crack size estimates

- GE PLEDGE model based on conservative assumptions
  - highest fleet conductivity
  - initial flaw size and shroud material condition
  - potential IASCC contribution included
  - typical residual stress considered
- Analysis indicates high flaw tolerance
  - 64% of shroud circumference
  - 95% through wall
- Crack growth rate slowed
  - low conductivity
  - hydrogen water chemistry
  - crack growth to RFO #10 < 1%
- Estimated crack size is acceptable

Plant safety functions assured assuming hypothetical complete shroud failure

- **Normal Operation**
  - detectable
  - proper core geometry maintained
- **Anticipated Operational Events**
  - assume preexisting undetected 360° through wall crack
  - proper core geometry maintained
  - no additional reactor components affected
- **Design Basis Accident**
  - MSLB and RLB
  - Shroud lift less than top guide depth
  - Ability to SCRAM maintained
- **Confirms Safe Operation**

Probabilistic risk assessment confirms acceptability of operation

- Probability of undetected 360° through-wall crack
- Probability of MSLB or RLB
- Probability of shroud failure causing loss of mitigating systems and recovery actions:
  - Control Rods
  - SBLC
  - Core Spray
- Change in CDF < 10%

Industry experience is continuously factored into shroud project planning

- Inspection results enveloped by predictive model
- Inspection difficulties
- Repair difficulties
- Public interest

Safety is Pilgrim's foremost consideration in responding to shroud cracking issue

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LIST OF ATENDEES

NAME	ORGANIZATION
Ron Eaton	USNRC
Brian Sheron	USNRC/NRR/DE
Ashok Thadani	USNRC/NRR
Bill Russell	USNRC/NRR
R. V. Fairbank	BECo
E. T. Boulette	BECo
H. V. Oheim	BECo
John P. Garety	BECo
Gary M. Holahan	NRC/NRR/DSSA
George W. Davis	BECo
Walter Butler	NRC/DRPE/PDI-3
Bruce Baldwin	BWNT
Michael Breck	NUS
R. H. Wessman	NRC/NRR/DE
M. Schreim	Commonwealth Edison
J. Medoff	NRC/NRR/DE
S. Varga	NRC/NRR
G. Lainas	NRC/NRR
R. Pollard	UCS
K. Wichman	NRR/EMCB
Mark Rubin	NRR/SRXB
Pat Patnaik	DRS/Rgn I
Ed Hackett	NRR/EMCB
Matthew Mitchell	NRR/PD III-2
Amy Cubbage	NRR/DSSA/SRXB
Bill Dean	OEDO
Kerri Kavanagh	NRR/DSSA/SRXB
Robert Jones	NRR/DSSA/SRXB
Phillip Rush	NRR/EMCB
A. Randolph Blough	NRC/RI/DRS
R. Hermann	NRR/EMCB
Jack Strosnider	NRR/EMCB