RAS 1753



UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION



BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

'00 MAY 26 P1:31

| | | |
|---|---|---|
| In the Matter of: | : | Docket No. 50-423-LA-3 |
| | : | |
| Northeast Nuclear Energy Company | : | |
| | : | |
| (Millstone Nuclear Power Station, Unit No. 3) | : | ASLBP No. 00-771-01-LA |

**CONNECTICUT COALITION AGAINST MILLSTONE AND LONG ISLAND COALITION AGAINST MILLSTONE'S FIRST SUPPLEMENT TO EXHIBIT A (ANNEXED TO INTERVENORS' MARCH 20, 2000 REPLY TO NORTHEAST NUCLEAR ENERGY COMPANY'S FIRST SET OF INTERROGATORIES)**

The Connecticut Coalition Against Millstone ("CCAM") and Long Island Coalition Against Millstone ("CAM")(collectively, "Intervenors") herewith supplement the exhibits identified in Exhibit A to Intervenors' March 20, 2000 Reply to Northeast Nuclear Energy Company's First Set of Interrogatories and Request for Production, as follows:

(1) Yankee Atomic Electric Company to the Nuclear Regulatory Commission, Licensee Event Report (LER) 2000-02, "Fuel Movement Exceeds Travel Height Restriction," April 13, 2000.

(2) Southern Nuclear Operating Company, Inc. to Nuclear Regulatory Commission, "Joseph M. Farley Nuclear Plant/Unit 1 Licensee Event Report 2000-04-00/Three Spent Fuel Assemblies in Spent Fuel Pool Locations Not Allowed by Technical Specification 3.7.15," April 20, 2000.

(3) Duke Energy Corporation to Nuclear Regulatory Commission, "McGuire Nuclear Station Unit 1 and 2/Licensee Event Report 369/00/03, Revision 0," March 30, 2000.

**CONNECTICUT COALITION AGAINST MILLSTONE**
**LONG ISLAND COALITION AGAINST MILLSTONE**

By: Nancy Burton

Nancy Burton, Esq.
147 Cross Highway
Redding Ridge CT 06876
Tel. 203-938-3952

Dated at Redding,
Connecticut this
22nd day of May 2000

Template = SECY-035

SECY-02

YANKEE ATOMIC ELECTRIC COMPANY

Telephone (508) 721-7736
Facsimile (508) 721-7743

Suite 200, 19 Midstate Drive, Auburn, Massachusetts 01501

April 13, 2000
BYR 2000-035

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

Reference: License No. DPR-3 (Docket No. 50-29)

Subject: Licensee Event Report (LER) 2000-02

This letter forwards Licensee Event Report 2000-02, titled "Fuel Movement Exceeds Travel Height Restriction".

We trust this information is satisfactory; however, if you have any questions, please contact us.

Very truly yours,

YANKEE ATOMIC ELECTRIC COMPANY

Merrill J. Atkins
Regulatory Affairs Manager

c: Mr. Phillip Ray, Project Manager
Decommissioning Section
Project Directorate IV and Decommissioning
Division of Licensing Project Management
Office of Nuclear Reactor Regulation

Mr. R. Bellamy, Chief
Decommissioning and Laboratory Branch
USNRC, Region I

IE22

ML003704231

NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Yankee Nuclear Power Station | 50-029 | 1 of 4 |

TITLE (4)

Fuel Movement Exceeds Travel Height Restriction

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 03 | 15 | 2000 | 2000 | 02 | | 04 | 15 | 2000 | FACILITY NAME | DOCKET NUMBER |

| OPERATING MODE (9) | NA | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11) | | | | | |
|---|---|---|---|---|---|---|---|
| POWER LEVEL (10) | 000 | 20.2201(b) | 20.2203(a)(2)(v) | 50.73(a)(2)(i) | 50.73(a)(2)(viii) | | |
| | | 20.2203(a)(1) | 20.2203(a)(3)(i) | X 50.73(a)(2)(ii) | 50.73(a)(2)(x) | | |
| | | 20.2203(a)(2)(i) | 20.2203(a)(3)(ii) | 50.73(a)(2)(iii) | 73.71 | | |
| | | 20.2203(a)(2)(ii) | 20.2203(a)(4) | 50.73(a)(2)(iv) | OTHER | | |
| | | 20.2203(a)(2)(iii) | 50.36(c)(1) | 50.73(a)(2)(v) | Specify in Abstract below or in NRC Form 366A | | |
| | | 20.2203(a)(2)(iv) | 50.36(c)(2) | 50.73(a)(2)(vii) | | | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (Include Area Code) |
|---|---|
| J. A. Kay, Principal Licensing Engineer | (413) 424-5261 |

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|
| YES (If yes, complete EXPECTED SUBMISSION DATE). | NO | | | | |

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

Yankee Nuclear Power Station was permanently shutdown in February 1992 and is currently being decommissioned. In the early 1980s, spent fuel storage capacity was increased by adding an upper tier of fuel storage racks. During preparation to conduct spent fuel inspections in the Spent Fuel Pool, it was discovered that past practice used in moving spent fuel from the lower tier racks to the upper tier racks was contrary to the design basis as described in the FSAR. The FSAR states that "the racks are designed to maintain proper spacing and structural integrity after being impacted by a fuel assembly dropped onto any location from a height of six inches above the top of the racks." The plant procedures for moving fuel assemblies had established a precaution to restrict travel height for moving fuel over lower tier racks. The maximum fuel assembly travel height over "ungrated" SFP racks is six (6) inches above the plane of the top of the rack. Past practice, however, permitted spent fuel movement over the lower tier racks to heights higher than 6 inches to enable movement up and over installed grating for storage in the upper tier racks. This resulted in lifting fuel approximately 13 inches above the racks, which is outside the design basis. As such, this LER is submitted in accordance with 10CFR50.73(a)(2)(ii)(B) as a condition outside the design basis of the plant. No fuel handling evolutions were in progress at the time of discovery of this issue.

## BACKGROUND INFORMATION

Yankee Nuclear Power Station was permanently shutdown in February 1992 and is currently being decommissioned. During the review and planning for the upcoming fuel inspection campaign, questions arose as to the technical and licensing basis for travel height restrictions for handling fuel assemblies within the Spent Fuel Pool. In particular, there was uncertainty as to the assumptions used in the analysis of the fuel assembly drop accidents when transferring fuel between lower and upper tier racks. No fuel handling evolutions were in progress at the time of discovery of this issue.

## EVENT DESCRIPTION

During preparation to conduct spent fuel inspections in the Spent Fuel Pool, it was discovered that past practice used in moving spent fuel to the upper tier racks was contrary to the design basis as described in the FSAR. The FSAR (Section 246.1) states that "the racks are designed to maintain proper spacing and structural integrity after being impacted by a fuel assembly dropped onto any location from a height of six inches above the top of the racks." Moving an assembly from lower tier to the upper tier racks required the installation of gratings over lower tier racks that preclude deformation of the racks in the event of an assembly drop. Installed gratings extend approximately twelve (12) inches above the top of the lower racks. The plant procedures (OP- 4226 & 7107) for moving both dummy and spent fuel assemblies had established a precaution to restrict travel height for moving fuel over lower tier racks. The maximum fuel assembly travel height over "ungrated" SFP racks is six (6) inches above the plane of the top of the rack. Past practice, however, permitted spent fuel movement over the lower tier racks to heights greater than 6 inches to clear the installed grating for storage in the upper tier racks. This resulted in lifting fuel approximately 13 inches above the racks, which is outside the design basis.

The design basis for fuel movement restrictions was first established during modifications to increase fuel storage capacity of the lower racks. These modifications replaced the existing spent fuel storage racks with anodized aluminum fixed-poison (Boral) curtain racks having a reduced center-to-center spacing. Design basis information was provided in Technical Specification Proposed Change # 131, submitted in September 25, 1975. From this submittal, the following was stated:

> "An additional design basis which will be met is the requirement that the spent fuel racks as installed be able to maintain proper spacing and structural integrity after being impacted by a spent fuel assembly dropped onto any location from a height of 6 inches above the top of the racks."

The NRC's SER associated with this change (License Amendment #33, dated December 29, 1976) did not restate this commitment explicitly. The SER does, however, state that "dropping a fuel assembly from above the top of the racks will not result in deformation of the racks and the fuel will be sufficiently above that stored in the racks so that the reactivity increase due to an assembly lying across the racks will be negligible."

NRC FORM 366A (4-95) U.S. NUCLEAR REGULATORY COMMISSION

**LICENSEE EVENT REPORT (LER)**
TEXT CONTINUATION

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) | | | | PAGE (3) |
|---|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | | REVISION NUMBER | |
| Yankee Nuclear Power Station | 05000029 | 2000 | -- | 02 | -- | 3 of 4 |

TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

Additional modifications and improvements were subsequently made to the spent fuel pool to further increase fuel storage capacity by adding an upper tier of racks. These modifications replaced and installed additional lower tier fuel racks, installed a new stainless steel pool liner, installed structural support modifications, and installed new upper tier racks (including grating installed between the lower and upper tier racks). This information was described in Technical Specification changes associated with Proposed Change # 158 (including supplements) submitted between 1978 and 1982. License Amendment # 75, which culminated these changes, established an additional height restriction when moving spent fuel over a "grated" lower tier spent fuel rack. The grating was a provision of the change in recognition that putting fuel on the upper tier would involve lifting fuel assemblies higher than presently allowed.[1]

> "The grating will be supported on the lower beams of the second tier support structure. The grating and support structure are designed to resist the impact of a fuel assembly dropped from 11 feet above the existing spent fuel racks. The analysis permits plastic deformation but limits distortion to prevent contact with the racks. This grating will be placed in the pool prior to placing any racks on the second tier."

The practice of moving spent fuel assemblies in accordance with OP-7107 required an implied movement of the assembly higher than 6 inches to move it up and over the lower tier grating. While a precaution in the procedure clearly stated the 6-inch height restriction, the procedure was silent on the steps and pathway necessary to move the assembly up the additional 7 inches and over the grating and preserve the 6-inch travel height restriction. Since it was literally impossible to move the assembly over a partially grated fuel rack without lifting the assembly higher than the 6-inch limitation, the practice was to move the assembly higher in a path directly over vacant fuel storage cells in order to move it up and over the grating. It is believed, however, the practice never moved the fuel assembly above the 6-inch restriction when directly over a location with stored fuel.

A Condition Report (CR) (CR 00-44) has been initiated. This condition is reportable as an LER in accordance with 10CFR50.73(a)(2)(ii)(B) – a condition that was outside the design basis of the plant.

The NRC regional site inspector was notified of this occurrence on 3/22/00.

## CAUSE OF EVENT

The cause of this event is the failure to adequately incorporate design basis information into plant procedures to specify the steps and pathway necessary to move the assembly up the additional 7 inches and over the grating and preserve the 6-inch travel height restriction.

[1] YAEC letter to USNRC, "Proposed Change #158, Rev. 1 to Supplement No. 3, dated August 18, 1980.

NRC FORM 366A (4-95) U.S. NUCLEAR REGULATORY COMMISSION

**LICENSEE EVENT REPORT (LER)**
TEXT CONTINUATION

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) | | | | | PAGE (3) |
|---|---|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | | REVISION NUMBER | | |
| Yankee Nuclear Power Station | 05000029 | 2000 | -- | 02 | -- | | 4 of 4 |

TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

SAFETY ASSESSMENT

No fuel handling evolutions were in progress at the time of discovery of this issue.

CORRECTIVE ACTION

In preparation for the spent fuel inspection campaign, the following corrective action plan was developed and implemented (including engineering evaluations and procedure changes to OP-4226 and OP-7107):

- Before moving any fuel to the upper tier racks, install the grating over the entire east bay lower tier racks to create a safe load path to the upper tier storage racks,
- Perform all spent fuel and component moves in compliance with the 6-inch travel height; requiring all fuel removed from the lower tier racks to be moved to a location where there are no racks with stored spent fuel (north end of pool) and then lifted to a height sufficient to move the spent fuel over grating to the upper tier,
- Establish a safe zone within the lower tier racks by emptying the center bay racks of fuel to permit fuel inspections (including installation of inspection equipment) and movement of assemblies between lower and upper tier racks.

ADDITIONAL INFORMATION

None.

PREVIOUS SIMILAR EVENTS

None.

**Dave Morey**
Vice President
Farley Project

**Southern Nuclear Operating Company, Inc.**
Post Office Box 1295
Birmingham, Alabama 35201

Tel 205.992.5131

SOUTHERN COMPANY
*Energy to Serve Your World℠*

April 20, 2000

Docket No.: 50-348

NEL-00-0112

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Joseph M. Farley Nuclear Plant
Unit 1 Licensee Event Report 2000-004-00
Three Spent Fuel Assemblies in Spent Fuel Pool
Locations Not Allowed By Technical Specification 3.7.15

Ladies and Gentlemen:

Joseph M. Farley Nuclear Plant Unit 1 Licensee Event Report (LER) No. 2000-004-00 is being submitted in accordance with 50.73(a)(2)(i). There are two NRC commitments in the LER. They are as follows:

1) The applicable procedure will be changed to provide sufficient detail to ensure correct configuration determinations and define independent review requirements prior to moving fuel.

2) Responsible personnel will be trained on lessons learned from this event, review requirements, and revisions to the procedure prior to moving fuel.

These will be completed prior to the next fuel assembly movement.

If you have any questions, please advise.

Respectfully submitted,

Dave Morey

EWC/maf ler200004-00.doc
Attachment

JE22

ML003707402

cc: Southern Nuclear Operating Company
Mr. L. M. Stinson, General Manager - Farley

U. S. Nuclear Regulatory Commission, Washington, D. C.
Mr. L. M. Padovan, Licensing Project Manager – Farley

U. S. Nuclear Regulatory Commission, Region II
Mr. L. A. Reyes, Regional Administrator
Mr. T. P. Johnson, Senior Resident Inspector – Farley

NRC FORM 366 (6-1998) U.S.NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104 EXPIRES: 06/30/2001
Estimated burden per response to comply with this mandatory information request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the Records Management Branch (T-6 F33), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, and to the Paperwork Reduction Project (3150-0104), Office of Management and Budget, Washington, DC 20503. If an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

# LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
|---|---|---|
| Joseph M. Farley Nuclear Plant - Unit 1 | 0 5 0 0 0 3 4 8 | 1 OF 4 |

TITLE (4)
Three Spent Fuel Assemblies in Spent Fuel Pool Locations Not Allowed by Technical Specification 3.7.15

| EVENT DATE (5) | | | LER NUMBER (6) | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER |
| 0 3 | 2 3 | 2 0 0 0 | 2 0 0 0 | 0 0 4 | 0 0 | 0 4 | 2 0 | 2 0 0 0 | | 0 5 0 0 0 |
| | | | | | | | | | FACILITY NAME | 0 5 0 0 0 |

| OPERATING MODE (9) | 6 | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11) | | | | | |
|---|---|---|---|---|---|---|---|
| POWER LEVEL (10) | 0 0 0 | 20.2201(b) | 20.2203(a)(2)(v) | X | 50.73(a)(2)(i) | | 50.73(a)(2)(viii) |
| | | 20.2203(a)(1) | 20.2203(a)(3)(i) | | 50.73(a)(2)(ii) | | 50.73(a)(2)(x) |
| | | 20.2203(a)(2)(i) | 20.2203(a)(3)(ii) | | 50.73(a)(2)(iii) | | 73.71 |
| | | 20.2203(a)(2)(ii) | 20.2203(a)(4) | | 50.73(a)(2)(iv) | | OTHER |
| | | 20.2203(a)(2)(iii) | 50.36(c)(1) | | 50.73(a)(2)(v) | | Specify in Abstract below or in NRC Form 366A |
| | | 20.2203(a)(2)(iv) | 50.36(c)(2) | | 50.73(a)(2)(vii) | | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER (Include area code) |
|---|---|
| L. M. Stinson, General Manager Nuclear Plant | 3 3 4 - 8 9 9 - 5 1 5 6 |

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO EPIX |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|---|
| YES (If yes, complete EXPECTED SUBMISSION DATE) | X | NO | | | | |

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-space typewritten lines) (16)

On March 23, 2000 at 0830, it was determined that Unit 1 had been operated in a condition contrary to Technical Specification (TS) 3.7.15, in that three spent fuel assemblies were loaded in the Spent Fuel Pool in configurations contrary to TS Figures 4.3-1 through 4.3-5. This condition first occurred during the core offload for the current refueling cycle on March 13, 2000 at 1449.

Manual verification of the acceptability of proposed offload configuration on March 11, 2000 failed to identify that three assemblies had insufficient burnup for their planned storage locations. On March 23, 2000, while Reactor Engineering personnel were loading the fuel location data into a Special Nuclear Materials tracking software package being developed for use, three fuel assemblies that did not meet the Technical Specification storage configuration requirements were identified. On March 23, 2000 at 0933, relocation of the three affected assemblies into acceptable locations was completed.

This event was caused by personnel error in that personnel responsible for developing, performing, and verifying the SFP configuration failed to assure that three fuel assemblies met the Technical Specification configuration requirements. Contributing causes were lack of detail in the procedure, experience level of personnel performing this evolution, and insufficient independent review in the verification process. The procedure will be changed to provide sufficient detail to ensure correct configuration determinations. Responsible personnel will be trained on revisions to this procedure and the independent review requirements prior to moving fuel.

NRC FORM 366A (6-1998) U.S.NUCLEAR REGULATORY COMMISSION

**LICENSEE EVENT REPORT (LER)**
**TEXT CONTINUATION**

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) | | | PAGE (3) |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Joseph M. Farley Nuclear Plant - Unit 1 | 0 5 0 0 0 3 4 8 | 2 0 0 0 | – 0 0 4 | – 0 0 | 2 OF 4 |

TEXT (If more space is required, use additional copies of NRC Form 366A)(17)

Westinghouse – Pressurized Water Reactor
Energy Industry Identification Codes are identified in the text as [XX].

Description of Event

On March 23, 2000 at 0830, it was determined that Unit 1 had been operated in a condition contrary to Technical Specification (TS) 3.7.15, in that three spent fuel assemblies were loaded in configurations contrary to TS Figures 4.3-1 through 4.3-5. This condition first occurred during the core offload for the current refueling cycle on March 13, 2000 at 1449.

On March 10 and 11, 2000, Reactor Engineering personnel reviewed the proposed configuration for the Spent Fuel Pool (SFP) for the Sixteenth Refueling Outage core offload against the TS.

The following combination of circumstances created an error likely situation for performance of this evolution: As the SFP approaches capacity with time, the complexity of the task of determining acceptable storage configurations has increased, however, the procedure had not been strengthened to address this additional complexity. The performance of this evolution was initially started using conservative fuel burnups. This resulted in excessive conservatisms being applied to the determination of acceptable configurations, and the evolution was restarted using actual end of cycle burnups. This reduced the time available for completion of the activity. As a result, personnel performing the verification and review chose to perform the activity together instead of sequentially, resulting in a reduction in quality of the review.

Manual verification of the acceptability of proposed offload configuration failed to identify that the proposed configuration would not meet the acceptable configurations defined in TS Figures 4.3-1 through 4.3-5, for three spent fuel assemblies. The review of this verification process also failed to identify this condition. The assemblies in question had burnups of up to 3300 Megawatt-days per Metric Ton Uranium (MWD/MTU) less than the minimum required for the proposed storage locations. The core offload was performed from March 11 through 14, 2000.

On March 23, 2000, while Reactor Engineering personnel were loading the fuel location data into a Special Nuclear Materials tracking software package being developed for use, these three fuel assemblies that did not meet the acceptable loading patterns were identified. On March 23, 2000 at 0933, relocation of these three affected assemblies into acceptable locations was completed.

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) | | | PAGE (3) |
|---|---|---|---|---|---|
| | | YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | |
| Joseph M. Farley Nuclear Plant - Unit 1 | 05000348 | 2000 | - 004 | - 00 | 3 OF 4 |

TEXT (If more space is required, use additional copies of NRC Form 366A)(17)

Cause of Event

This event was caused by personnel error in that personnel responsible for developing, performing, and verifying the SFP configuration failed to assure that three fuel assemblies met the Technical Specification configuration requirements. Contributing causes were lack of detail in the procedure, experience level of personnel to perform this evolution, and insufficient independent review in the verification process.

Safety Assessment

Analysis shows that a boron concentration of 700 ppm would have kept Keff below the limit of 0.95. Since the Technical Specifications require a minimum boron concentration in the SFP of 2000 ppm, and actual boron concentration was 2435 ppm, the Keff of the SFP remained less than 0.95 throughout this event. In addition, this analysis conservatively took no credit for the Boraflex neutron adsorber located in the SFP racks

Therefore the health and safety of the public were unaffected by this event.

This event does not represent a Safety System Functional Failure.

Corrective Action

On 3/23/2000 the three assemblies were relocated to acceptable configurations.

The Unit 2 SFP was checked for fuel in incorrect storage configurations. None was identified.

The applicable procedure will be changed to provide sufficient detail to ensure correct configuration determinations and define independent review requirements prior to moving fuel.

Responsible personnel will be trained on lessons learned from this event, review requirements, and revisions to the procedure prior to moving fuel.

NRC FORM 366A (6-1998) U.S.NUCLEAR REGULATORY COMMISSION

**LICENSEE EVENT REPORT (LER)**
**TEXT CONTINUATION**

| FACILITY NAME (1) | DOCKET NUMBER (2) | LER NUMBER (6) YEAR | SEQUENTIAL NUMBER | REVISION NUMBER | PAGE (3) |
|---|---|---|---|---|---|
| Joseph M. Farley Nuclear Plant - Unit 1 | 05000348 | 2000 | - 004 | - 00 | 4 OF 4 |

TEXT (If more space is required, use additional copies of NRC Form 366A)(17)

Additional Information

As an enhancement, a computerized SFP configuration verification system will be placed in service prior to September 30, 2000. The configuration verification procedure will be revised to reflect the computerized verification process, and optimize the manual verification process, by September 30, 2000. Reactor Engineering personnel and supervision will be trained on the software additions and related procedure changes by October 30, 2000.

A voluntary 4-hour nonemergency notification was made to the NRC at 1215 on March 23, 2000.

The following LER has been submitted in the past 2 years on a combination of personnel error and inadequate procedure:

LER 1998-003-00 Unit 1, Waste Gas Decay Tank Hydrogen and Oxygen Exceeded Concentration Limits

Duke Energy

H. B. Barron
*Vice President*

**Duke Energy Corporation**
McGuire Nuclear Station
12700 Hagers Ferry Road
Huntersville, NC 28078-9340
*(704) 875-4800 OFFICE*
*(704) 875-4809 FAX.*

DATE: March 30, 2000

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

Subject: McGuire Nuclear Station, Unit 1 and 2
Docket No. 50-369
Licensee Event Report 369/00-03, Revision 0
Problem Investigation Process No.: PIP M-00-0844

Gentlemen:

Attached is a Licensee Event Report describing a pre-existing design condition associated with criticality calculations. The condition affects calculations used to generate Limiting Conditions for Operation (LCO) for fuel storage requirements in the spent fuel pool. This event is being reported pursuant to 10 CFR 50.73 (a) (2) (ii) (B) "Operation Outside Design Basis of the Plant". This was previously reported under the parallel criteria of 10 CFR 50.72 in Event Number 36748 on March 2, 2000.

The design basis criteria at issue in this report is the required Keff associated with a spent fuel pool filled with water at zero boric acid concentration. The actual boron acid concentration of the spent fuel pools is maintained in excess of 2500 ppm and monitored on a routine basis as required by technical specifications. These factors mitigate this event to the extent that the condition did not adversely impact plant safety. These actual conditions allow for adequate time to detect and mitigate any dilution of the fuel pool before violating the Keff design basis acceptance criteria.

A Regulatory Commitment is listed as a planned corrective action.

Very truly yours,

H. B. Barron, Jr.
McGuire Nuclear Station, Vice President
Duke Energy Corporation

IE22

ML003701640

Attachment

cc: L. A. Reyes
U.S. Nuclear Regulatory Commission
Region II

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Atlanta, GA 30323

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Washington, D.C. 20555

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S. Shaeffer
NRC Resident Inspector
McGuire Nuclear Station

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Charles J. Thomas (EC050)
Luellen B. Jones (EC050)
Mike Rains (MG01SR)
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NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

# LICENSEE EVENT REPORT (LER)

| FACILITY NAME (1) | DOCKET NUMBER (2) | PAGE (3) |
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| McGuire Nuclear Station, Unit 1 | 05000 369 | 1 of 5 |

TITLE (4) Non Conservatism In Spent Fuel Pool Criticality Calculation

| EVENT DATE (5) | | | LER NUMBER (6) | | | | | REPORT DATE (7) | | | OTHER FACILITIES INVOLVED (8) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MONTH | DAY | YEAR | YEAR | | SEQUENTIAL NUMBER | | REVISION NUMBER | MONTH | DAY | YEAR | FACILITY NAME | DOCKET NUMBER(S) |
| 03 | 02 | 00 | 00 | - | 03 | - | 0 | 03 | 30 | 00 | McGuire Nuclear Station, Unit 2 | 05000 370 |

| OPERATING MODE (9) | THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more of the following) (11) | | | | |
|---|---|---|---|---|---|
| | 20.402(b) | 20.405(c) | 50.73(a)(2)(iv) | 73.71(b) | |
| POWER LEVEL (10) | 20.405(a)(1)(i) | 50.36(c)(1) | 50.73(a)(2)(v) | 73.71(c) | |
| | 20.405(a)(1)(ii) | 50.36(c)(2) | 50.73(a)(2)(vii) | OTHER (Specify in | |
| | 20.405(a)(1)(iii) | 50.73(a)(2)(i) | 50.73(a)(2)(viii)(A) | Abstract below and | |
| | 20.405(a)(1)(iv) | XX 50.73(a)(2)(ii) | 50.73(a)(2)(viii)(B) | In Text, NRC Form | |
| | 20.405(a)(1)(v) | 50.73(a)(2)(iii) | 50.73(a)(2)(x) | 366A) | |

LICENSEE CONTACT FOR THIS LER (12)

| NAME | TELEPHONE NUMBER | |
|---|---|---|
| | AREA CODE | |
| M. T. Cash | (704) | 875-4117 |

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

| CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS | CAUSE | SYSTEM | COMPONENT | MANUFACTURER | REPORTABLE TO NPRDS * |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | |
| | | | | | | | | | |

| SUPPLEMENTAL REPORT EXPECTED (14) | | EXPECTED SUBMISSION DATE (15) | MONTH | DAY | YEAR |
|---|---|---|---|---|---|
| YES (If yes, complete EXPECTED SUBMISSION DATE) | NO | | | | |

ABSTRACT (Limit to 1400 spaces, i.e. approximately fifteen single-space typewritten lines) (16)

**Unit Status:** Both Unit 1 and Unit 2 were in Mode 1 (Power Operation) at 100 percent power at the time of discovery.

**Event Description:** Modeling methods used to perform spent fuel pool criticality analysis have been determined to be non-conservative. Specifically, certain assumptions may result in Keff in excess of 0.95 for postulated off-normal conditions with 0 ppm boron concentration in the fuel pool. The design basis of the plant requires that fuel stored in the fuel pool remain ≤ 0.95 Keff when fully flooded with unborated water.

**Event Cause:** This event is the result of an original design condition.

**Corrective Action:** Technical Specifications will be revised to include additional conservatism to account for uncertainties associated with modeling assumptions.

NRC FORM 366A U.S. NUCLEAR REGULATORY COMMISSION(6-89)

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EXPIRES 04/30/92

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# LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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| McGuire Nuclear Station, | 05000 369 | 2000 | 03 | 0 | 2 OF 5 |

BACKGROUND:

Each unit has an independent fuel storage pool that contains fuel storage racks [EIIS: RK] in a 2 region design. Region 1 uses a high density flux trap design for storage of nuclear fuel. Region 2 uses a high density "egg-crate" design for storage of nuclear fuel. The spent fuel pool storage racks provide for safe storage of nuclear fuel assemblies. This includes maintaining a coolable geometry, preventing criticality, and protecting the fuel assemblies from excess mechanical or thermal loading. The rack design provides for fuel storage in a array such that the Neutron Multiplication Factor (Keff) will remain equal to or less than 0.95 assuming unborated water filled the pool. Keff values less than 1.0 indicates a sub-critical condition.

The water in the spent fuel pool contains boric acid dissolved in solution to act as a neutron absorber. The large neutron absorption characteristics of boron in combination with the rack design results in an actual Keff far below 0.95. Technical Specification (TS) 3.7.14, Spent Fuel Pool Boron Concentration, requires that the spent fuel pool boron concentration be within the limits specified in the Core Operating Limits Report (COLR). Current COLR limits require boron concentration > 2675 ppm. TS Surveillance 3.7.14.1, Spent Fuel Pool Boron Concentration Surveillance, requires fuel pool boron verification every 7 days.

TS 3.7.15, Spent Fuel Assembly Storage, also specify acceptable storage configurations for fuel assemblies in the fuel pool. These limits are indexed against the initial enrichment and burnup of individual fuel assemblies. Based on these parameters fuel assemblies are grouped into one of three classes, Filler Assemblies, Unrestricted Storage, and Restricted Storage. This same TS specifies patterns for locating the fuel assemblies based on class. The classification of fuel assemblies and the associated patterns have been determined using nuclear physics models. These models consist of sophisticated neutronic computer codes. The computer codes simulate the geometry, materials, and physical behavior of the nuclear fuel and surrounding materials in the fuel pool. These models have included an assumption that fuel assembly axial burnup distribution is uniform and that axial neutron leakage will be zero. These assumptions along with geometric models have approximated fuel pools as two dimensional systems. The underlying assumption has been that the conservative assumption of zero axial neutron leakage would result in conservative values of Keff. These models have not taken any credit for soluble boron in the spent fuel pools or for other poisons in the form of fuel assembly inserts. The models have taken credit for the boraflex panels [EIIS: PL] in the region 1 racks.

NRC FORM 366A U.S. NUCLEAR REGULATORY COMMISSION(6-98)

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| McGuire Nuclear Station, | 05000 369 | 2000 | 03 | 0 | 3 OF 5 |

EVALUATION:

Description of Event

On March 2, 2000, Nuclear Fuel Group engineers in Duke Energy's Corporate Office notified station personnel of a potential non-conservatism in the criticality calculations for the fuel pool storage configurations. Both Unit 1 and Unit 2 were in Mode 1 (Power Operation) at 100 percent power at the time of this notification. Fuel movement was not underway in either units fuel pools at the time of the discovery.

The Nuclear Fuels Group had been performing fuel pool criticality calculations using new models that used 3-dimensional geometry and non uniform fuel assembly axial burnup distributions. These calculations were being performed in support of a proposed TS amendment associated with Boraflex degradation in the spent fuel pools. Results from these analyses caused the Nuclear Fuels Group to suspect previous assumptions regarding the conservatism of 2-dimensional calculations. In the past, it was thought that the range of burnups and enrichments where 2-dimensional calculations were conservative easily bounded fuel assemblies in spent fuel pools. The 3-dimensional calculations estimated that 2-dimensional calculations might become non-conservative at lower burnups and enrichments.

The range at which these non-conservatisms could exist includes burnups and enrichments used to generate the TS limits discussed in the text above. Given the actual fuel assembly burnups and the existing limits, the potential existed that Keff would exceed 0.95 under the postulated unborated condition.

Conclusion

This event did not result in any uncontrolled releases of radioactive material, personnel injuries, or radiation overexposures. This event is not Equipment Performance Information Exchange (EPIX) reportable.

This event is the result of an original design condition.

NRC FORM 366A U.S. NUCLEAR REGULATORY COMMISSION(6-99)

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**LICENSEE EVENT REPORT (LER)**
**TEXT CONTINUATION**

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CORRECTIVE ACTION:

Immediate

Verified that the fuel pools were operable with credit for soluble boron concentration maintained at concentrations as required by TS.

Subsequent

An Operating Experience Release was issued for industry awareness of this issue.

Planned

1. Technical Specification limits will be revised to include additional conservatism to account for uncertainties in the 2-dimensional calculations when compared to the 3-dimensional calculations.

2. Upon NRC approval of the TS revision, the Updated Final Safety Analysis Report will be revised to specify storage requirements using Boron credit methodology.

SAFETY ANALYSIS:

Based on this analysis, this event is not considered to be significant. At no time were the safety or health of the public or plant personnel affected as a result of the event.

The design of the spent fuel storage racks assumes the use of unborated water, which maintains each region in a subcritical condition during normal operation with the spent fuel pool fully loaded. The double contingency principle discussed in ANSI N-16.1-1975 allows credit for soluble boron under other abnormal or accident conditions, since only a single accident need be considered at one time. For example, the most severe accident scenario is associated with the movement of fuel from Region 1 to Region 2, and accidental misloading of a fuel assembly in Region 1 or Region 2. This could potentially increase the reactivity of the spent fuel pool. To mitigate these postulated criticality related accidents, boron is dissolved in the pool water. Safe operation of the two region poison fuel storage rack with no movement of assemblies may therefore be achieved by controlling the location of each assembly in accordance with the accompanying LCO..

NRC FORM 366A (6-89) U.S. NUCLEAR REGULATORY COMMISSION

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Criticality analysis of the McGuire spent fuel pools demonstrate that approximately 460 ppm of boron for Region 1 and 550 ppm for Region 2 are required to off-set the axial burnup profile uncertainty. This uncertainty was identified as being non-conservative when the 2-dimensional calculation was compared to the 3-dimensional calculation. A boron dilution evaluation for McGuire has documented that for any credible dilution event the minimum soluble boron level in the spent fuel pools would be greater than 937 ppm. This dilution event is based on a minimum boron concentration of 2475 ppm as the initiating point for the event. The results also show that the dilution process requires many hours to significantly reduce pool boron concentration even under the most limiting conditions and provides sufficient time for operator actions to terminate the event. Because of level alarms [EIIS: LA] and operator rounds it is not credible for a dilution of the fuel pool to go undetected for a significant period of time.

Therefore, under conservative assumptions, the fuel pool would be diluted to a boron concentration approximately 400 ppm greater than that needed to maintain the fuel pool below 0.95 Keff. A condition of 0.95 Keff is approximately 5000 pcm subcritical. This is a substantial subcritical margin worth approximately 600 ppm boron concentration assuming a differential boron worth of 8.33 pcm per PPM. As such there is no credible scenario which could have resulted in an inadvertent criticality in the fuel pool under normal or off normal conditions. There are no safety consequences of this event beyond the potential for an inadvertent criticality.

In addition, there have not been any improper loadings of fuel assemblies in the fuel pool in recent operating history that would require consideration of a simultaneous misloading and boron dilution event. This condition had no adverse impact on public health and safety.

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

| | | |
|---|---|---|
| In the Matter of: | : | Docket No. 50-423-LA-3 |
| Northeast Nuclear Energy Company | : | |
| (Millstone Nuclear Power Station, Unit No. 3) | : | ASLBP No. 00-771-01-LA |

## CERTIFICATION

This is to certify that a copy of the foregoing "Connecticut Coalition Against Millstone and Long Island Coalition Against Millstone's First Supplement to Exhibit A (Annexed to Intervenors' March 20, 2000 Reply to Northeast Nuclear Energy Company's First Request for Interrogatories) and attachments thereto, was mailed by U.S. Mail, postage pre-paid, First Class, to the following on May 22, 2000:

David A. Repka, Esq.
Winston & Strawn
1400 L Street
Washington DC 20005

Office of the Secretary
U.S. Nuclear Regulatory Commission
Washington DC 20555
(Attn: Rulemakings and
Adjudications Staff)
(original + two copies)

Adjudicatory File
Atomic Safety and Licensing
Board Panel
U.S. Nuclear Regulatory Commission
Washington DC 20555

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LONG ISLAND COALITION AGAINST MILLSTONE

By: 

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**UNITED STATES OF AMERICA**
**NUCLEAR REGULATORY COMMISSION**

**BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

| | |
|---|---|
| **In the Matter of:** | **: Docket No. 50-423-LA-3** |
| | **:** |
| **Northeast Nuclear Energy Company** | **:** |
| | **:** |
| **(Millstone Nuclear Power Station, Unit No. 3)** | **: ASLBP No. 00-771-01-LA** |

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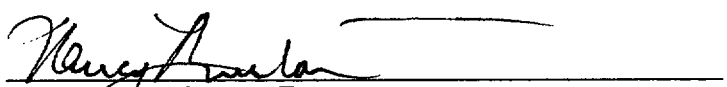
**CONNECITICUT COALITION AGAINST MILLSTONE**
**LONG ISLAND COALITION AGAINST MILLSTONE**

By: 

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