

Dominion Nuclear Connecticut, Inc.
Millstone Power Station
Rope Ferry Road
Waterford, CT 06385



DominionSM

NOV 2 2001

Docket No. 50-245
B18511

RE: 10 CFR 20.2201

U.S. Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Millstone Power Station, Unit No. 1
Licensee Event Report (LER) 2000-002-02
Fuel Rod Accountability

In a letter dated January 11, 2001,⁽¹⁾ Northeast Nuclear Energy Company (NNECO) forwarded Licensee Event Report (LER) 2000-002-00 to the Nuclear Regulatory Commission (NRC). This LER addressed fuel rod accountability at Millstone Unit No. 1 with respect to two full-length irradiated spent fuel rods. In a letter dated March 30, 2001,⁽²⁾ NNECO forwarded supplemental LER 2000-002-01 to the NRC. The supplemental LER provided an update of the progress made in the ongoing investigation into determining the location of the two rods.

The two spent fuel rods that are the subject of the investigation were determined to be unaccounted for by NNECO prior to the March 31, 2001, sale of Millstone Station to Dominion Nuclear Connecticut, Inc. The investigation into the disposition of the two rods was completed by Northeast Utilities Service Company. The results of the investigation are documented in a Final Report which was docketed in separate correspondence.⁽³⁾

(1) Northeast Nuclear Energy Company letter to the U.S. Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 1, Docket No. 50-245, Licensee Event Report (LER) 2000-02-00," dated January 11, 2001, (B18309).

(2) Northeast Nuclear Energy Company letter to the U.S. Nuclear Regulatory Commission, "Millstone Nuclear Power Station, Unit No. 1, Docket No. 50-245 Licensee Event Report (LER) 2000-02-01," dated March 30, 2001, (B18365).

(3) Dominion Nuclear Connecticut Inc., letter to U.S. Nuclear Regulatory Commission, "Millstone Power Station, Unit No. 1, Issuance of Final Report Pertaining to Unaccounted for Spent Fuel Rods," dated October 5, 2001, (B18496).

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The Root Cause evaluation prepared in connection with this investigation was also docketed in separate correspondence.⁽⁴⁾

This letter forwards supplemental LER 2000-002-02 (Attachment 1).

There are no regulatory commitments contained within this letter.

If you have any questions regarding this letter, please contact Mr. David A. Smith, at (860) 437-5840.

Very truly yours,

DOMINION NUCLEAR CONNECTICUT, INC.



C. J. Schwarz
Master Process Owner - Operate the Asset

cc: H. J. Miller, Region I Administrator
J. B. Hickman, NRC Project Manager, Millstone Unit No. 1
T. J. Jackson, NRC Inspector, Region I, Millstone Unit No. 1

Director
Bureau of Air Management
Monitoring and Radiation Division
Department of Environmental Protection
79 Elm Street
Hartford, CT 06106-5127

⁽⁴⁾ Dominion Nuclear Connecticut Inc., letter to U.S. Nuclear Regulatory Commission, "Millstone Power Station, Unit No. 1, Issuance of Root Cause Investigation Pertaining to Unaccounted for Spent Fuel Rods," dated October 29, 2001, (B18510).

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Attachment 1

Millstone Power Station, Unit No. 1

Licensee Event Report 2000-002-02

LICENSEE EVENT REPORT (LER)

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

Estimated burden per response to comply with this mandatory information collection 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.

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TITLE (4)
Fuel Rod Accountability

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
11	16	2000	2000	-- 002	-- 02	11	02	2001	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N/A	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
		<input checked="" type="checkbox"/>	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	0		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 Dave Dodson Team Lead-Compliance	TELEPHONE NUMBER (Include Area Code) (860) 447-1791 ext.2346
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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
<input checked="" type="checkbox"/> Yes (If yes, complete EXPECTED SUBMISSION DATE).	<input checked="" type="checkbox"/> X	<input type="checkbox"/> NO					

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

In September, 2000, during reconciliation and verification of the Millstone Unit No. 1 spent nuclear fuel records, Unit No. 1 personnel concluded that the location of two full-length irradiated spent fuel rods could not be determined, and that these spent fuel rods were not properly tracked in the Special Nuclear Material (SNM) records. In accordance with the requirements of 10 CFR 20.2201(a)(1)(ii) and 10 CFR 50.72(b)(2)(vi) Northeast Nuclear Energy Company (NNECO) notified the Nuclear Regulatory Commission (NRC) on December 14, 2000 that two spent fuel rods from the Millstone Unit No. 1 spent fuel pool were determined to be unaccounted for. The investigation of this condition determined that the spent fuel rods were either still in the Millstone Unit No. 1 spent fuel pool, or inadvertently transferred to one of three facilities licensed to store or dispose of radioactive material. The investigation also concluded that the health and safety of the public has not been adversely affected as a consequence of the potential inadvertent shipment of these spent fuel rods to any of the three licensed facilities.

The Root Cause of this event is attributed to an unrecognized over-reliance upon Millstone Unit No. 1 Reactor Engineers to compensate for organizational and process weaknesses in implementing the SNM inventory and control procedures.

Corrective actions will be implemented in accordance with the Millstone Corrective Action Program.

On October 5, 2001, Dominion Nuclear Connecticut (DNC) notified the NRC in accordance with 10 CFR 70.52(a), that the rods could be considered lost.

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

I. Event Description

On September 1, 1972, Millstone Unit 1, experienced condenser tube failures that resulted in an introduction of seawater into the condensate system. Chlorides in the seawater caused a breakdown of the condensate demineralizers and a subsequent chloride intrusion into the reactor coolant system. General Electric (GE), the nuclear fuel supply vendor, was contracted by Northeast Utilities (NU) management to assist with determining the effect of chlorides in the seawater upon nuclear fuel components. In October 1972, GE personnel under the direction of NU, disassembled spent fuel assembly MS-557 in the Unit 1 spent fuel pool (SFP) and stored all of the 49 spent fuel rods in seven specially designed eight-rod containers. The non-fuel irradiated hardware was shipped to GE's Vallecitos Nuclear Center in Pleasanton, CA (VNC) for examination. The placement of the spent fuel rods into the eight-rod storage containers was recorded. In addition it was documented that a tie rod received damage to its upper end plug during handling. In April 1974, GE personnel under the direction of NU, re-assembled spent fuel assembly MS-557. They did not return the damaged tie rod or the center spacer capture rod to the reconstituted spent fuel assembly. A dummy center spacer rod supplied by GE was utilized to support the spent fuel assembly because the original center spacer rod could not be re-installed. A vacancy remained where the damaged tie rod was originally located in spent fuel assembly MS-557. GE records indicate that after disassembly in 1972, workers stored both the damaged tie rod and the center spacer rod in the Millstone Unit No. 1 SFP in one eight-rod container with no other spent fuel rods.

Subsequently, an NU memorandum of May 15, 1979, indicated that the rods would be stored in the spent fuel storage rack in the northwest corner of the SFP until they could be incorporated into a scavenged spent fuel assembly. The Unit 1 Reactor Engineer documented the location of the spent fuel rods in the fuel history card file. Maps of the SFP drawn in February and April 1980, show the two spent fuel rods from MS-557 in the northwest corner of the pool. A third map, drawn in September 1980 omits the two MS-557 spent fuel rods. Document reviews and preliminary investigative efforts which were conducted in 2000, did not reveal records prepared after April 1980, that refer to these two spent fuel rods.

A description of the two spent fuel rods is presented in Table 1.

NNECO notified the NRC of its inability to determine the location of the two spent fuel rods on December 14, 2000, via the NRC's Emergency Notification System (ENS) pursuant to the requirements of 10 CFR 20.2201(a)(1)(ii) and 10 CFR 50.72(b)(2)(vi). Concurrently, NNECO notified the State of Connecticut of the two unaccounted for spent fuel rods. On January 11, 2001, NNECO submitted Licensee Event Report (LER) 2000-02-00 to the NRC pursuant to the requirements of 10 CFR 20.2201(b).

On March 30, 2001, NNECO submitted supplemental LER 2000-02-01 pursuant to the requirements of 10 CFR 20.2201(d) which provided an update of the progress made in the ongoing investigation pertaining to the two unaccounted for spent fuel rods. On March 31, 2001, ownership of Millstone Station, including Millstone Unit No. 1, was transferred by the NRC to DNC. The investigation into the disposition of the two rods was completed by Northeast Utilities Service Company (NUSCO) and documented in a Final Report.

On October 1, 2001, NUSCO submitted its Final Report to DNC for review. The Final Report indicates that the investigation was unable to conclusively establish the location of the two spent fuel rods, but determined the spent fuel rods to be in one of four locations, (i) Millstone Unit No.1 SFP, (ii) GE's Vallecitos Nuclear Center in Pleasanton, CA, (iii) Low-Level Radioactive Waste disposal facility located in Barnwell, South Carolina, (iv) Low-Level Radioactive Waste disposal facility located in Richland, Washington. The investigation into the disposition of the spent fuel rods found no evidence to indicate that the spent fuel rods were diverted, and concluded that the health and safety of the public has not been adversely impacted by this condition.

On October 5, 2001, DNC concluded that it was unlikely that the spent fuel rods remain in the Millstone Unit No. 1 SFP and in accordance with the requirements of 10 CFR 70.52(a) reported this event via the ENS as a loss of special nuclear

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material. DNC submitted a copy of the Final Report to the NRC (Reference 1) on October 5, 2001. This LER is issued as supplement to LER 2000-002-01 pursuant to the requirements of 10 CFR 20.2201(d).

II. Cause

A root cause investigation was also performed by NUSCO relative to the loss of accountability of two Millstone Unit No. 1 spent fuel rods. The results of the root cause investigation were submitted to the NRC (Reference 2). The "Root Cause" of this event was determined to be an unrecognized over-reliance upon Millstone Unit No. 1 Reactor Engineers to compensate for organizational and process weaknesses in implementing the SNM inventory and control procedures. That unrecognized over-reliance masked certain behaviors and conditions that led to this event, in particular:

- Process weaknesses associated with SNM inventory and control and radwaste characterization;
- Weaknesses in coordination of SFP activities and procedural adherence; and
- Inconsistent supervision and inconsistently applied oversight of SFP activities by knowledgeable individuals.

III. Assessment of Safety Consequences

The investigation was unable to conclusively establish the location of the two spent fuel rods, but determined the spent fuel rods to be safely stored in one of four locations: i) an undisclosed location in the Millstone Unit No. 1 spent fuel pool, ii) at the General Electric Vallecitos nuclear fuel facility, iii) at the Barnwell, South Carolina disposal facility, or iv) the Hanford, reservation disposal facility in Richland, Washington. The investigation further concluded that there was no evidence supporting the possibility that the fuel rods were unlawfully diverted. The basis for the conclusions regarding public health and safety are discussed in the Final report (Reference 1).

IV. Corrective Action

Corrective actions to prevent recurrence of this event include the following:

1. Strengthen SNM control and accountability program and implementing procedures as necessary to address weaknesses noted in Section 3.1.1 of the Root Cause Report.
2. Precisely define and maintain in a station procedure exactly what is the "SNM inventory of record" at each Millstone unit.
3. Define in a station procedure a requirement to periodically reconcile the SNM inventory with an "inventory of record" at intervals that satisfy business needs and regulatory requirements.
4. Either develop a Millstone Unit No. 2 procedure for "Spent Fuel Operations" or develop a site-wide standard procedure to ensure adequate control of SFP-related work (including expectations for supervision and oversight). Guidance to include clear management expectations for characterizing irradiated materials which are placed in the SFP.
5. Reconcile non-fuel SNM physical inventory with records at Millstone Unit No. 2 and Millstone Unit No. 3. This should be a detailed comparison of the SNM "inventory of record" with the actual physical SNM inventory at each unit.
6. Clearly define and communicate "ownership" of spent fuel pools and associated activities, including responsibility for activity coordination (and other current or future SNM storage areas) at Millstone.
7. Clearly define and communicate "ownership" of SNM control and accountability program and expected results.

Corrective actions required to address the cause of this event will be implemented via the Millstone Corrective Action Program.

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Previous Occurrences

None

Similar Events

No previous events similar to the loss of two spent fuel rods were identified.

EIIS

DB-Nuclear Fuel Services System

References

- 1) Letter B18496 from Dominion Nuclear Connecticut Inc. to United States Nuclear Regulatory Commission, "Millstone Power Station, Unit No. 1, Issuance of Final Report Pertaining to Unaccounted for Spent Fuel Rods," dated October 5, 2001.
- 2) Letter B18510 from Dominion Nuclear Connecticut Inc. to United States Nuclear Regulatory Commission, "Millstone Power Station, Unit No. 1, Issuance of Root Cause Investigation Pertaining to Unaccounted for Spent Fuel Rods," dated October 29, 2001.

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Table 1 – Spent Fuel Rods Description

Type of Special Nuclear Material:	One GE 7D Tie rod and One GE 7D Spacer Capture Rod
Material:	Uranium dioxide initially enriched to 2.44% in Zircaloy 2 cladding
Length of Spent Fuel Rods:	158 inches
Spent Fuel Rod Diameter:	0.570 inches
Total Uranium in the 2 Spent Fuel Rods:	7732.0 grams (year 2000)
Total Uranium₂₃₅ in the 2 Spent Fuel Rods:	101.4 grams (year 2000)
Total Plutonium in the 2 Spent Fuel Rods:	40.2 grams (year 2000)
Total Fissile Plutonium in the 2 Spent Fuel Rods:	32.8 grams (year 2000)
Activity Level for 2 Spent Fuel Rods:	5.182 X 10 ² Ci (year 2000)
Average Burnup of Assembly MS 557	9011 MWD/MTU
Effective Full Power Days (EFPD):	508 EFPD