UNITED STATES **NUCLEAR REGULATORY COMMISSION** OFFICE OF NUCLEAR REACTOR REGULATION AND OFFICE OF NUCLEAR MATERIALS SAFETY AND SAFEGUARDS WASHINGTON, D.C. 20555

Jim McKnight P1-37

May 27, 1994

NRC INFORMATION NOTICE 94-38: RESULTS OF A SPECIAL NRC INSPECTION AT DRESDEN NUCLEAR POWER STATION UNIT 1 FOLLOWING A RUPTURE OF SERVICE WATER INSIDE CONTAINMENT

<u>Addressees</u>

All holders of operating licenses or construction permits for nuclear power reactors and all fuel cycle and materials licensees authorized to possess spent fuel.

<u>Purpose</u>

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to inform addressees of the results of a special NRC inspection at Dresden Nuclear Power Station Unit 1 (Dresden 1) after a rupture of the service water system occurred inside the containment. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate to avoid similar problems. However, suggestions contained in this information notice are not NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances

Dresden 1, one of three boiling-water reactors at the Dresden site near Morris, Illinois, was licensed for operation on September 28, 1959, and was permanently shut down October 31, 1978. On January 25, 1994, the licensee for Dresden 1 discovered approximately 200 m³ [55,000 gallons] of service water in the basement of the unheated Unit 1 containment. The water originated from a rupture of the service water system piping inside the containment that had been caused by freeze damage to the system. The NRC dispatched a team of inspectors from the Offices of Nuclear Reactor Regulation (NRR), Nuclear Material Safety and Safeguards (NMSS), and Region III to conduct a special inspection of the circumstances surrounding the event. The results of this special inspection are contained in NRC Inspection Report No. 50-010/94001, issued on April 15, 1994.

The licensee investigated the circumstances further and found that there was a potential for a portion of the spent fuel pool (SFP) system inside the containment to fail and result in a partial draindown of the SFP containing 660 spent fuel assemblies. The licensee implemented several specific actions to quard against further damage from freezing and appointed an investigation team headed by a corporate official to investigate the status of Dresden 1.

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The NRC issued NRC Bulletin 94-01, "Potential Fuel Pool Draindown Caused by Inadequate Maintenance Practices at Dresden Unit 1," April 14, 1994, to request that action addressees specified in the bulletin take actions to ensure that the quality of the SFP coolant, and the cooling and shielding for fuel or equipment stored in the SFP is not compromised and that all necessary structures and support systems are maintained and are not degraded. The bulletin also indicated that the NRC staff is reviewing the need to request actions related to siphon or drainage paths at older operating power plants and certain fuel cycle facilities.

Discussion

The NRC inspection team evaluated the circumstances of the event and the findings of the licensee investigation. Based on these reviews, and as noted in NRC Bulletin 94-01, the following conditions existed at Dresden 1:

- Heating had not been provided to the Dresden 1 containment for the 1989/1990 and subsequent heating seasons. The lack of heating inside the containment under more severe weather conditions could potentially have resulted in the freezing and rupture of the fuel transfer tube. Failure of the fuel transfer tube could have drained the SFP to several feet below the top of the stored fuel assemblies. The loss of water shielding would have created onsite personnel hazards from the high radiation fields.
- The water quality in the SFP was poor. The original cleanup and cooling system was shut down in 1983; by 1987 the water quality had degraded to the point that an influx of microorganisms had developed. Concerned that the microorganisms might cause microbiologically induced corrosion, the licensee installed a temporary system to clean up the pool. The temporary system proved to be incapable of restoring the water quality to an acceptable level. Licensee records show that the conductivity in the pool exceeded the technical specification limit of 10 μ mho per centimeter by about a factor of two. Also, the licensee estimated that approximately 90 stored fuel bundles had leaking fuel pins resulting in elevated concentrations of cesium-137 of about 370 Becquerels/ml [1 x 10^{-2} μ Ci/ml].
- A number of obsolete piping lines from the original pool cleanup and cooling system remained in the SFP and were potential siphon paths that could reduce the pool level.
- Because the SFP gate was not installed it could not have prevented a
 draindown of the pool if the fuel transfer pool or tunnel had emptied.
 The NRC inspectors noted that the gaskets and steel mating surfaces for
 the spent fuel gate had been exposed to adverse biological, chemical,
 and radiological conditions that may have affected their ability to seal
 had the gate been installed.
- The licensee had no SFP leak detection or water inventory program. The observed cracks in the unlined concrete pool indicated a potential for pool leakage.

The following additional information was not included in NRC Bulletin 94-01:

- Service water to Unit 1 had been isolated on January 24, 1994 because of a rupture of service water piping in the off-gas filter building. Had the service water not been isolated, the leakage into the Unit 1 containment would have been greater and may have challenged containment integrity. A number of other pressurized water lines were isolated outside of the Unit 1 containment but the valves were not locked out or red tagged to provide positive control. These lines could have flooded the containment if opened and a rupture occurred inside the containment.
- An inspection of the SFP transfer tunnel by a remotely-controlled submersible camera found cracks in the concrete floor of the tunnel that could be pathways for SFP water leakage.
- A number of discrepancies in licensee actions with respect to docketed decommissioning plan submittals were found. These included (1) failure to appoint a project manager for the Unit 1 decommissioning activities, (2) failure to have systems operable that were stated to be operable including a system for containment heating, (3) failure to implement a commitment to install an Eberline Model SPING 3A air monitor in the fuel storage building, (4) failure to have service water and certain other systems drained or properly laid up so as not to be challenged by temperature extremes, and (5) failure to maintain ventilation exhaust flow rates in the containment sphere and the fuel storage building.

In addition to the above conditions the NRC inspectors also noted the following programmatic inadequacies:

- The site audit and quality verification program focused on the operating reactors at Units 2 and 3. Because of the emphasis on the operating reactors, audits and safety evaluations for the site were not rigorously implemented for Unit 1 or did not include the Dresden 1 systems and programs.
- The licensee could not provide any safety evaluation performed to support the decision to terminate heating of the Unit 1 containment.

The inspection team concluded that the layup of the plant and storage of spent fuel at Dresden 1 was not well managed or maintained for a period of years and that weaknesses existed in the site quality audit and inspection programs. Further, safety reviews of changes to Dresden 1 systems such as termination of heating and ventilation for the containment were apparently not performed or not adequately reviewed to determine the safety consequences of the changes. Interviews with personnel at the Dresden site (which includes two operating units in addition to Dresden 1) showed that, in part, the weaknesses identified above were based on an incorrect belief that Dresden 1 could not cause a serious safety problem because it was permanently shut down. This belief resulted in audits and safety evaluations that were not rigorously implemented or that did not include the Dresden 1 systems and programs. However, as noted above, significant safety considerations did exist.

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Attachments:

1. List of Recently Issued NRC Information Notices

2. List of Recently Issued NMSS Information Notices

LIST OF RECENTLY ISSUED NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
94-37	Misadministration Caused by a Bent Interstitial Needle during Brachy- therapy Procedure	05/27/94	All U.S. Nuclear Regulatory Commission Medical Licensees authorized to use brachytherapy sources in high-, medium-, and pulsed-doserate remote afterloaders.
94-36	Undetected Accumulation of Gas in Reactor Coolant System	05/24/94	All holders of OLs or CPs for nuclear power reactors.
91-81, Supp. 1	Switchyard Problems that Contribute to Loss of Offsite Power	05/19/94	All holders of OLs or CPs for nuclear power reactors.
94-35	NIOSH Respirator User Notices, "Inadvertent Separation of the Mask- Mounted Regulator (MMR) from the Facepiece on the Mine Safety Appliances (MSA) Company MMR Self-Contained Breathing Apparatus (SCBA) and Status Update"	05/16/94	All holders of OLs or CPs for nuclear power reactors, and all licensed fuel facilities.
94-34	Thermo-Lag 330-660 Flexi-Blanket Ampacity Derating Concerns	05/13/94	All holders of OLs or CPs for nuclear power reactors.
94-33	Capacitor Failures in Westinghouse Eagle 21 Plant Protection Systems	05/09/94	All holders of OLs or CPs for nuclear power reactors.
93-53, Supp. 1	Effect of Hurricane Andrew on Turkey Point Nuclear Generating Station and Lessons Learned	04/29/94	All holders of OLs or CPs for nuclear power reactors.
94-32	Revised Seismic Hazard Estimates	04/29/94	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License CP = Construction Permit

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94-23	Guidance to Hazardous, Radioactive and Mixed Waste Generators on the Elements of A Waste Minimization Program	03/25/94	All NRC licensees.
94-21	Regulatory Requirements when No Operations are being Performed	03/18/94	All fuel cycle and materials licensees.
94-17	Strontium-90 Eye Applicators: Submission of Quality Management Plan (QMP), Calibration, and Use	03/11/94	All U.S. Nuclear Regulatory Commission Medical Use Licensees.
94-16	Recent Incidents Resulting in Offsite Contamination	03/03/94	All U.S. Nuclear Regulatory Commission material and fuel cycle licensees.

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OFFICE	REG	ION III	RE	REGION III ONDD:		:DORS:NRR	C/0	ONDD:DORS	
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OFFICIAL DOCUMENT NAME: 94-38.IN

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OFFICE	REG	GION III	REGION III			ONDD:DORS:NRR		C/	ONDD:DORS
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OFFICE	REGIO	N III	RE	GION III	ONDD	:DORS:NRR	C/0	NDD:DORS	
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OFFICE	REGION III QLA	REGION III	ONDD:DORS:NRR	C/ONDD:DORS
NAME	JMcCormick-Barger	JAGrobe	RDud1ey	SWeiss
DATE	04/23/94	04/22/94	04/ /94	04/ /94
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SJones	GHubbard	CMcCracken	MVirgilio
04/ /94	04/ /94	04/ /94	04/ /94
Tech Editor	OGCB:DORS:NRR	AC/OGCB:DORS:NRR	D/DORS:NRR
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