UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

August 18, 1988

NRC INFORMATION NOTICE NO. 88-65: INADVERTENT DRAINAGES OF SPENT FUEL POOLS

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors and fuel storage facilities.

Purpose:

This information notice is being provided to alert addressees to potential problems resulting from unintentional draining of spent fuel pools (SFPs). 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 do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

Wolf Creek - On December 22, 1987 the licensee, Kansas Gas and Electric, unintentionally lowered the level of water in the SFP to an estimated minimum height of 22 feet above the stored fuel. The licensee determined that a valve in the return line to the refueling water storage tank (RWST) had been inadvertently left open two days earlier after operations to clean up the RWST inventory through the SFP clean up system. The licensee stopped the drainage by closing this valve.

The safety-related area radiation monitors near the SFP did not alarm. In the control room, the SFP level indicator and the low level alarm on the SFP cooling system pump suction were both inoperable. The control room operators were alerted to this event by the successive tripping of SFP cooling system pump A while they were operating the SFP clean up system.

River Bend - On September 20, 1987 the licensee, Gulf States Utilities, while preparing for refueling, intentionally lowered the level in the upper SFP to 2 feet below the normal level of 185 feet to allow for the expected water displacement when the steam dryer assembly would be transferred there. This caused the level indicator in the control room to go off scale as expected and the related low level alarm to activate as expected. Pool level indication is provided for a narrow range: 185 feet ± 12 1/2 inches. The alarm is set at 184 feet 7 1/2 inches when the level decreases.

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After placing the steam dryer in the pool, the plant operators opened two valves from the condensate storage tank (CST) with the intent of then closing two valves in the SFP purification suction line (see Figure 1). Within 20 minutes, while the four valves were opened, the level decreased an additional 5 feet, partially uncovering the dryer assembly. Safety-related area radiation monitors at both ends of the pool alarmed and indicated fields of about 80 mr/hr.

The drainage had been made possible by a procedural sequence establishing a free flow path in conjunction with a nonredundant antisiphon device (a vertical vent pipe under water) in the suction line of the SFP purification system. The antisiphon device had been plugged.

The operator in the control room was not aware of the pool draining because the level indicator was off scale. At the time of the SFP area radiation monitor alarms, however, an operator at an auxiliary equipment control panel noticed a water level increase in the CST. Realizing that this combination of signals meant the SFP was draining, operators closed the two manual valves in the SPF purification system suction line to stop the draining. They restored the level in about 2 hours using one SFP purification pump drawing suction from the CST.

Discussion:

In addition to the two events discussed above, another partial drainage of the spent fuel pool occurred at San Onofre 3 on June 22, 1988. Drainage of SFPs can cause potentially high radiation doses and damage to fuel elements resulting from the uncovery of spent fuel in storage or, in particular, in transit. Although the consequences of the events described in this information notice were not significant, they indicate deficiencies in control and management of refueling operations and SFP safety.

At San Onofre, the SFP cooling system design was apparently properly siphon-protected, but the SFP purification system design apparently was not. At River Bend, antisiphon devices in the SFP purification system were plugged to permit preoperational testing but were not unplugged at the beginning of refueling operations.

Operating procedures for the interconnected systems associated with SFPs either were not sufficiently detailed or were incorrect and failed to prevent alignments causing unintentional drainage. At River Bend, the range of SFP level indication was limited. Detailed operating procedures were available but were not correct. At Wolf Creek, detailed operating procedures did not exist.

Surveillance procedures were not implemented to ensure the operability of all instrumentation and control equipment. At Wolf Creek, there were no surveillance procedures for water level instrumentation that had been inoperable for a year. Also, the SFP cooling pump suction alarm was inoperable.

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Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: Vern Hodge, NRR
(301) 492-1169

J. Kudrick, NRR
(301) 492-0871

Attachments:
1. Figure 1. Simplified Flow Path Diagram of Upper Pool Purification System at River Bend
2. List of Recently Issued NRC Information Notices

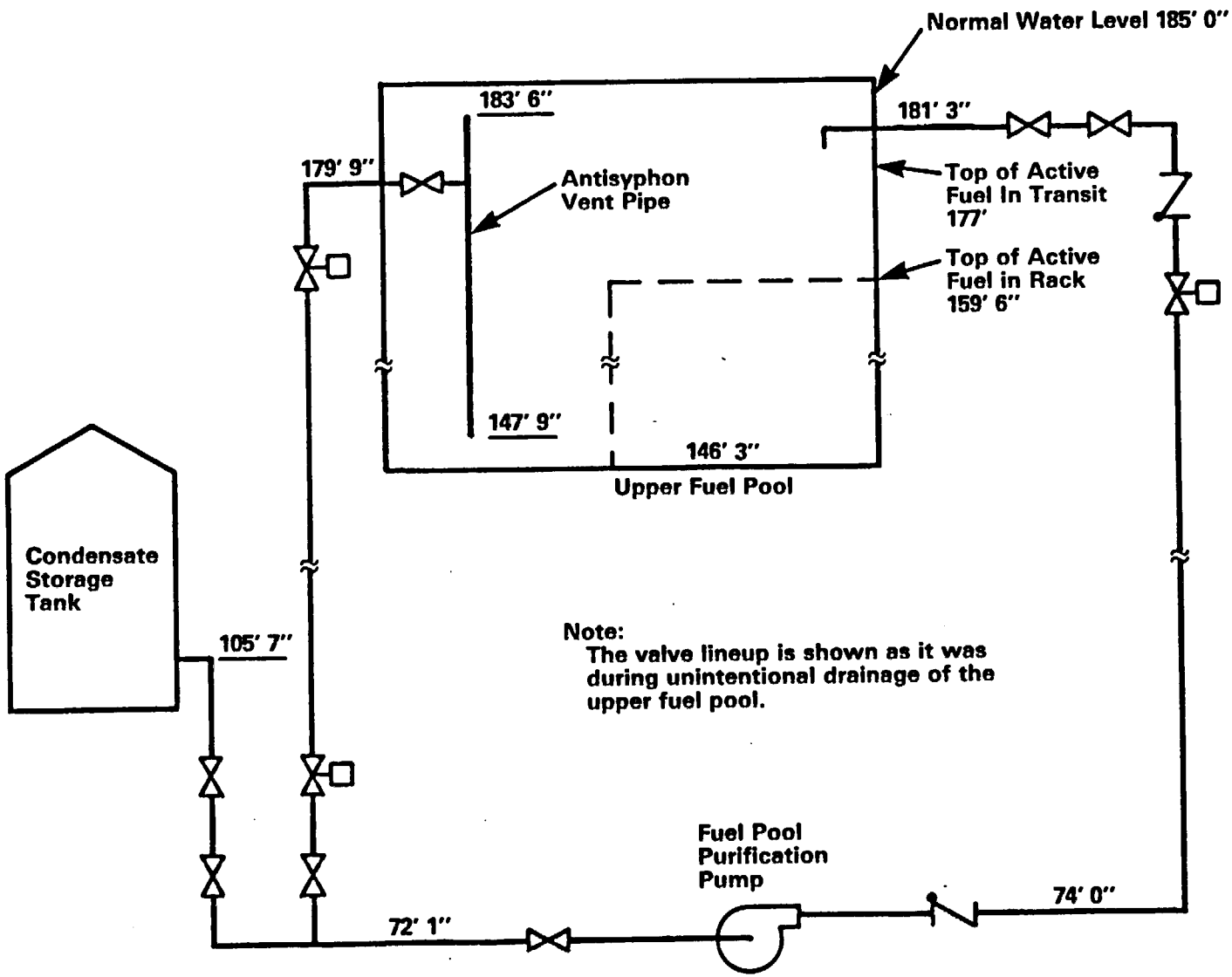

Figure 1. Simplfied Flow Path Diagram of Upper Pool Purification System at River Bend.

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
88-64	Reporting Fires in Nuclear Process Systems at Nuclear Power Plants	8/18/88	All holders of OLs or CPs for nuclear power reactors.
88-63	High Radiation Hazards from Irradiated Incore Detectors and Cables	8/15/88	All holders of OLs or CPs for nuclear power reactors, research reactors and test reactors.
88-62	Recent Findings Concerning Implementation of Quality Assurance Programs by Suppliers of Transport Packages	8/12/88	All holders of NRC quality assurance program approval for radioactive material packages.
88-61	Control Room Habitability - Recent Reviews of Operating Experience	8/11/88	All holders of OLs or CPs for nuclear power reactors.
88-60	Inadequate Design and Installation of Watertight Penetration Seals	8/11/88	All holders of OLs or CPs for nuclear power reactors.
88-04, Supplement 1	Inadequate Qualification and Documentation of Fire Barrier Penetration Seals	8/9/88	All holders of OLs or CPs for nuclear power reactors.
88-59	Main Steam Isolation Valve Guide Rail Failure at Waterford Unit 3	8/9/88	All holders of OLs or CPs for nuclear power reactors.
88-58	Potential Problems with ASEA Brown Boveri ITE-51L Time-Overcurrent Relays	8/8/88	All holders of OLs or CPs for nuclear power reactors.
88-57	Potential Loss of Safe Shutdown Equipment Due to Premature Silicon Controlled Rectifier Failure	8/8/88	All holders of OLs or CPs for nuclear power reactors.

OL = Operating License
CP = Construction Permit

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*SEE PREVIOUS CONCURRENCES

D/DOEA:NRR	*C/OGCB:DOEA:NRR	*RPB:ARM	*D/IMNS:NMSS	*PDSNP:DRST:NRR
CERossi	CHBerlinger	TechEd	RCunningham	CMiller
08/15/88	08/10/88	04/27/88	08/08/88	08/09/88
*OGCB:DOEA:NRR	*SPLB:DEST:NRR	*C/SPLB:DEST:NRR	*SAD/DEST:NRR	*D/DEST:NRR
VHodge	JKudrick	JCraig	AThadani	LCShao
07/15/88	07/18/88	07/20/88	07/26/88	07/28/88

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			vh by memo 080888	vh by discussion
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Surveillance procedures were not implemented to ensure the operability of all instrumentation and control equipment. At Wolf Creek, there were no surveillance procedures for water level instrumentation that had been inoperable for a year. Also, the SFP cooling pump suction alarm was inoperable.

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Antisiphon devices were either not included in the system design, not installed, or were initially placed in service but were not operable when required. At San Onofre, the SFP cooling system design was apparently properly siphon-protected, but the SFP purification system design apparently was not. At River Bend, anitsiphon devices in the SFP purification system were plugged to permit preoperational testing but were not unplugged at the beginning of refueling operations.

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