UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555-0001

June 28, 2000

NRC INFORMATION NOTICE 2000-09: STEAM GENERATOR TUBE FAILURE AT INDIAN POINT UNIT 2

Addressees

All holders of operating licenses for nuclear power reactors except those who have ceased operations and have certified that fuel has been permanently removed from the reactor vessel.

Purpose

The U.S. Nuclear Regulatory Commission (NRC) is issuing this information notice to inform addressees of a steam generator tube failure at Indian Point Unit 2. NRC investigations of the licensee's steam generator inspection program are ongoing and any potentially generic issues identified will be communicated in a separate generic communication. However, the investigations to date re-emphasize the importance of licensee involvement with ongoing industry efforts to understand and detect steam generator degradation. 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

On February 15, 2000, at 7:17 p.m., the Indian Point Unit 2 nuclear plant experienced a steam generator tube failure, which required the declaration of an Alert at 7:29 p.m., and a manual reactor trip at 7:30 p.m. The operators identified that the #24 steam generator was the source of the leak and completed isolation of the #24 steam generator by 8:31 p.m.

At 9:02 p.m., the operator opened the high-pressure steam dump valves and established an excessive primary plant cooldown rate that caused a rapid reduction in the pressurizer level and required the operators to manually initiate safety injection. The operators reset the safety injection at 9:21 p.m., reduced the reactor coolant system pressure to about 970 psig at 9:32 p.m., and re-commenced a plant cooldown at 11:35 p.m.

The residual heat removal (RHR) system was placed in service on February 16, 2000, at 12:38 p.m., and primary plant pressure was reduced below the #24 steam generator pressure to terminate the steam generator tube leakage at 2:20 p.m. The plant cooldown continued, and the plant entered cold shutdown at 4:57 p.m. The licensee exited the Alert at 6:50 p.m.

The NRC sent an Augmented Inspection Team (AIT) on February 18, 2000, to review the causes, safety implications, and licensee actions associated with the event. The AIT developed

a sequence of events, determined the risk significance of the event, and assessed the response by the plant staff and management. The cause of the tube failure was outside the scope of this inspection and is currently being reviewed separately by the NRC. The AIT's report is presented in Inspection Report 05000247/2000-02, dated April 28, 2000 (Accession Number ML003710036).

Discussion

The event was risk significant. It involved a steam generator tube failure that resulted in an initial primary-to-secondary leak of reactor coolant of approximately 146 gallons per minute and required an "Alert" declaration (the second level of emergency action in the NRC-required emergency response plan). The event resulted in a minor radiological release to the environment that was well within regulatory limits. No radioactivity was measured offsite above normal background levels, and the event did not adversely impact the public health and safety.

The licensee performed the necessary actions to protect the health and safety of the public. Specifically, the operators promptly and appropriately took those actions in the emergency operating procedures to trip the reactor, isolate the affected steam generator, and depressurize the reactor coolant system. Additionally, the necessary event mitigation systems worked properly. Notwithstanding the above actions, the AIT identified performance problems in several broad areas that challenged operators, complicated the event response, delayed achieving the cold shutdown condition, and affected the radiological release. The problems involved operator performance, procedure quality, equipment performance, technical support, and emergency response.

Operator Performance

Some operator performance problems were noted during the plant cooldown phase involving the following:

- While attempting to cool down the reactor coolant system (RCS), the reactor operator initiated an excessive cooldown rate that exceeded procedural and Technical Specification limits. The excessive cooldown led to several conditions that complicated the subsequent event response and delayed the RCS cooldown.

- Operators were slow to recognize configuration lineup problems that (1) prevented successful operation of the auxiliary spray system to lower RCS pressure and (2) delayed heatup of the RHR system.

Procedure Quality

The procedures adequately guided the initial operator response; however, several procedure problems were identified that delayed the cooldown and depressurizing of the RCS. Procedure deficiencies affected Standard Operating Procedures, Emergency Operating Procedures, and Emergency Plan Implementing Procedures. Specific activities included initiation of RHR cooling, initiation of component cooling water alignment, use of auxiliary pressurizer spray, use of methods to monitor RCS temperature to maintain cold shutdown conditions, and initiation of

emergency response organization (ERO) notifications. Station personnel were previously aware of the procedure issue involving initiation of RHR cooling but had not corrected the problem before this event.

Equipment Performance

The necessary event mitigation systems, including the reactor protection system, the auxiliary feedwater system, and the safety injection system, functioned properly. However, several longstanding equipment performance problems were identified that challenged operators during this event:

- Two losses of condenser vacuum resulted from problems with the operation of the automatic steam supply pressure control valve to the steam jet air ejectors, and the #22 condenser vacuum pump.

- The isolation valve seal water system became inoperable during the event and required operator action and an entry into a Technical Specification Limiting Condition for Operation Action Statement.

- A containment entry was required to install a temporary nitrogen supply to the pressurizer power-operated relief valve to compensate for a design deficiency. This action was required before placing the overpressure protection system in service.

- The steam generator leak rate monitoring equipment had been degraded for an extended period, and limited the amount of steam generator leak rate information available to the operators before the event.

The AIT determined that the number and duration of the equipment problems reflected weaknesses in engineering, corrective action processes, and operational support at the station. The licensee's response to a number of the equipment problems identified during the event reflected an acceptance of "working around" the problem rather than fixing it.

Emergency Response

The ERO took the necessary steps to ensure the protection of public health and safety. The operators properly classified the event, and the licensee implemented a thorough peer review of the emergency response to this event. The AIT identified several emergency plan and implementing procedure problems similar to those identified by the licensee's peer review team, including the following:

- The emergency response staff was slow to activate the emergency facilities.

- The licensee was slow to establish accountability (i.e., identify the location) of emergency response personnel.

- The emergency response data system (ERDS) was inoperable for the first several hours of the event as a result of a pre-existing equipment problem.

- Problems were noted in the implementation of the media response plan.

- Problems were identified involving the timeliness and quality of technical support provided to the operators.

The licensee developed and was in the process of implementing an emergency response improvement plan before the event.

This information notice requires no specific action or written response. However, recipients are reminded that they are required to consider industry-wide operating experience (including NRC information notices) when practical when setting goals and performing periodic evaluations under Section 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," of Part 50 of Title 10 of the Code of Federal Regulations. If you have any questions about the information in this notice, please contact the one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

/RA by John Tappert Acting For/
Ledyard B. Marsh, Chief
Events Assessment, Generic Communications
and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Technical contacts: Eric Benner, NRR
301-415-1171
E-mail: ejb1@nrc.gov

Lawrence Doerflein, Region I
610-337-5378
E-mail: ltd@nrc.gov

Peter Eselgroth, Region I
610-337-5234
E-mail: pwe@nrc.gov

Raymond Lorson, Region I
603-474-3589
E-mail: rkl@nrc.gov

Attachment: List of Recently Issued NRC Information Notices

emergency response data system (ERDS) was inoperable for the first several hours of the event as a result of a pre-existing equipment problem.

- Problems were noted in the implementation of the media response plan.

- Problems were identified involving the timeliness and quality of technical support provided to the operators.

The licensee developed and was in the process of implementing an emergency response improvement plan before the event.

This information notice requires no specific action or written response. However, recipients are reminded that they are required to consider industry-wide operating experience (including NRC information notices) when practical when setting goals and performing periodic evaluations under Section 50.65, "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," of Part 50 of Title 10 of the Code of Federal Regulations. If you have any questions about the information in this notice, please contact the one of the technical contacts listed below or the appropriate Office of Nuclear Reactor Regulation (NRR) project manager.

/RA by John Tappert Acting For/
Ledyard B. Marsh, Chief
Events Assessment, Generic Communications
and Non-Power Reactors Branch
Division of Regulatory Improvement Programs
Office of Nuclear Reactor Regulation

Technical contacts: Eric Benner, NRR
301-415-1171
E-mail: ejb1@nrc.gov

Lawrence Doerflein, Region I
610-337-5378
E-mail: ltd@nrc.gov

Peter Eselgroth, Region I
610-337-5234
E-mail: pwe@nrc.gov

Raymond Lorson, Region I
603-474-3589
E-mail: rkl@nrc.gov

DISTRIBUTION
REXB R/F
PUBLIC
Attachment: List of Recently Issued NRC Information Notices
*See previous concurrence Accession Number ML003726124 Template Number NRR - 052

To receive a copy of this document, indicate in the box C=Copy w/o attachment/enclosure E=Copy with attachment/enclosure N = No copy

OFFICE	REXB		TECH ED		RGN-I		DLPM		DLPM	
NAME	E Benner*		B Calure*		S Barber*		P Milano*		S Black*	
DATE	5/12/2000		5/9/2000		6/14/2000		6/15/2000		6/16/2000	

OFFICE	DSSA		REXB							
NAME	G Holahan*		LMarsh/JTappert							
DATE	6/23/2000		06/28/2000		/ /2000		/ /2000		/ /2000	

[OFFICIAL RECORD COPY]

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
2000-08	Inadequate Assessment of the Effect of Differential Temperatures on Safety-Related Pumps	5/15/2000	All holders of operating licensees for nuclear power reactors
2000-07	National Institute for Occupational Safety and Health Respirator User Notice: Special Precaustions for Using Certain Self-Contained Breathing Apparatus Air Cylinders	4/10/2000	All holders of operating licenses for nuclear power reactors,non-power reactors, and all fuel cycle and materiallicensees required to have an NRC-approved emergency plan
2000-06	Offsite Power Voltage Inadequacies	3/22/2000	All holders of operating licenses for nuclear power reactors, except those who have permanently ceased operations and have certified that fuel has been permanently removed from the reactor
2000-05	Recent Medical Misadministrations Resulting from Inattention to Detail	3/06/2000	All medical licensees
2000-04	1999 Enforcement Sanctions for Deliberate Violations of NRC Employee Protection Requirements	2/25/2000	All NRC licensees
2000-03	High-Efficiency Particulate Air Filter Exceeds Mass Limit Before Reaching Expected Differential Pressure	2/22/2000	All NRC licensed fuel-cycled conversion, enrichment, and fabrication facilities
2000-02	Failure of Criticality Safety Control to Prevent Uranium Dioxide (UO_2) Powder Accumulation	2/22/2000	All NRC licensed fuel-cycled conversion, enrichment, and fabrication facilities

OL = Operating License
CP = Construction Permit