

INDIAN POINT UNIT

2

Steam Generator Tube Failure

February 15, 2000

- **Sequence of Events**
- **Safety Significance**
- **Risk Significance**
- **Root Cause Areas**
- **Generic Implications**

EVENT DESCRIPTION

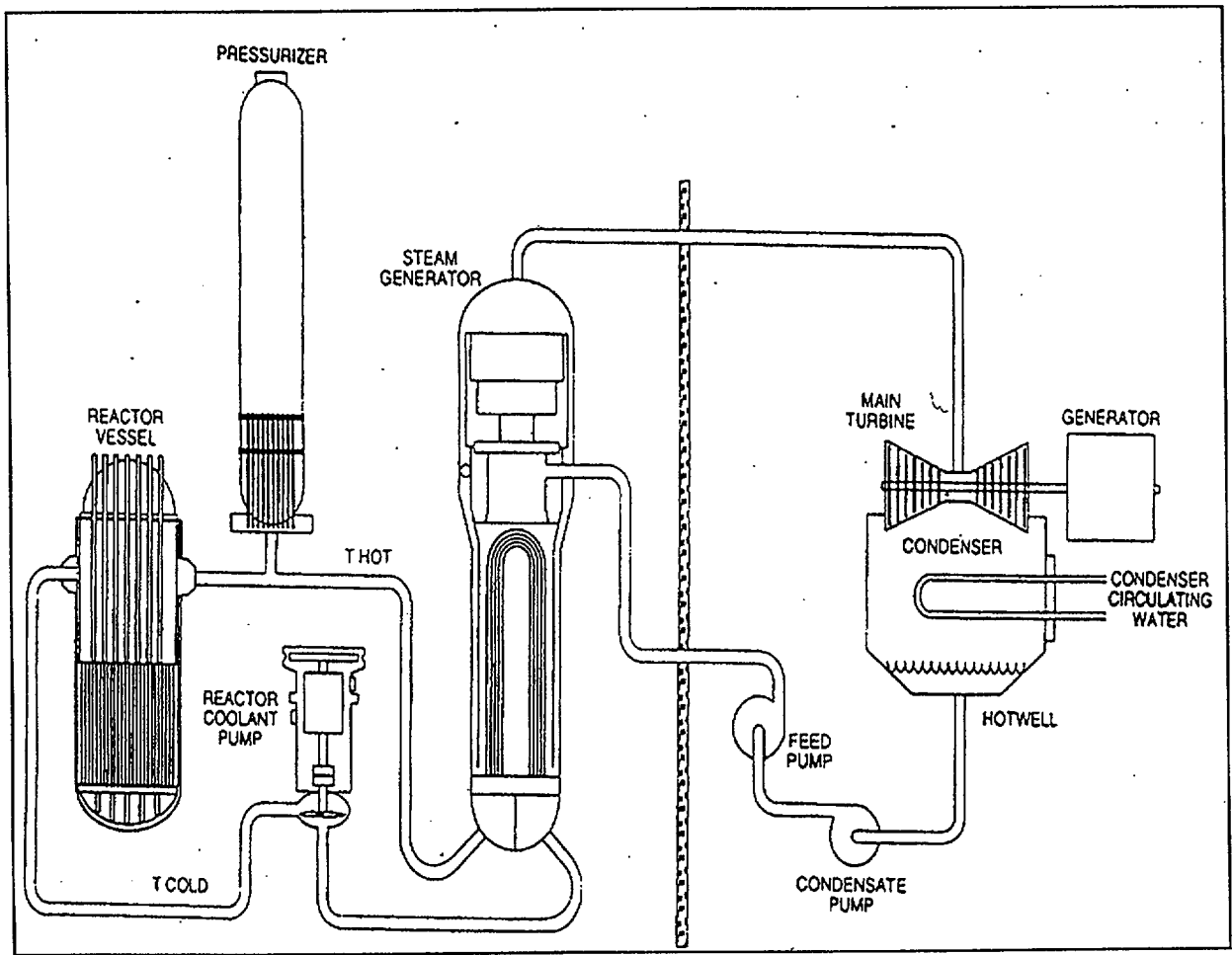
C/52

- **Initiator: Primary Water Stress**
Corrosion Cracking of the row 2, column 5 tube in the #24 steam generator resulted in a primary to secondary leak rate of approximately 150 gpm.

- **Complications: Several operator, procedural and equipment problems delayed establishing cold, shutdown conditions.**

- **Result: The plant remained in an “Alert” Status for about 24 hours, and resulted in minor off-site release.**

SYSTEM DIAGRAM



SEQUENCE OF EVENTS

February 15, 2000

- 7:17 p.m. -- Operators Identified Increased SG Leak
- 7:29 p.m. -- Declared Alert
- 7:30 p.m. -- Tripped Reactor
- 7:41 p.m. -- State/County Officials Notified
- 8:31 p.m. -- Isolated Affected SG
- 9:02 p.m. -- Operators Initiated Plant Cooldown
- 9:04 p.m. -- Manually Initiated Safety Injection
- 11:38 p.m. -- Tube Leak Stopped

February 16, 2000

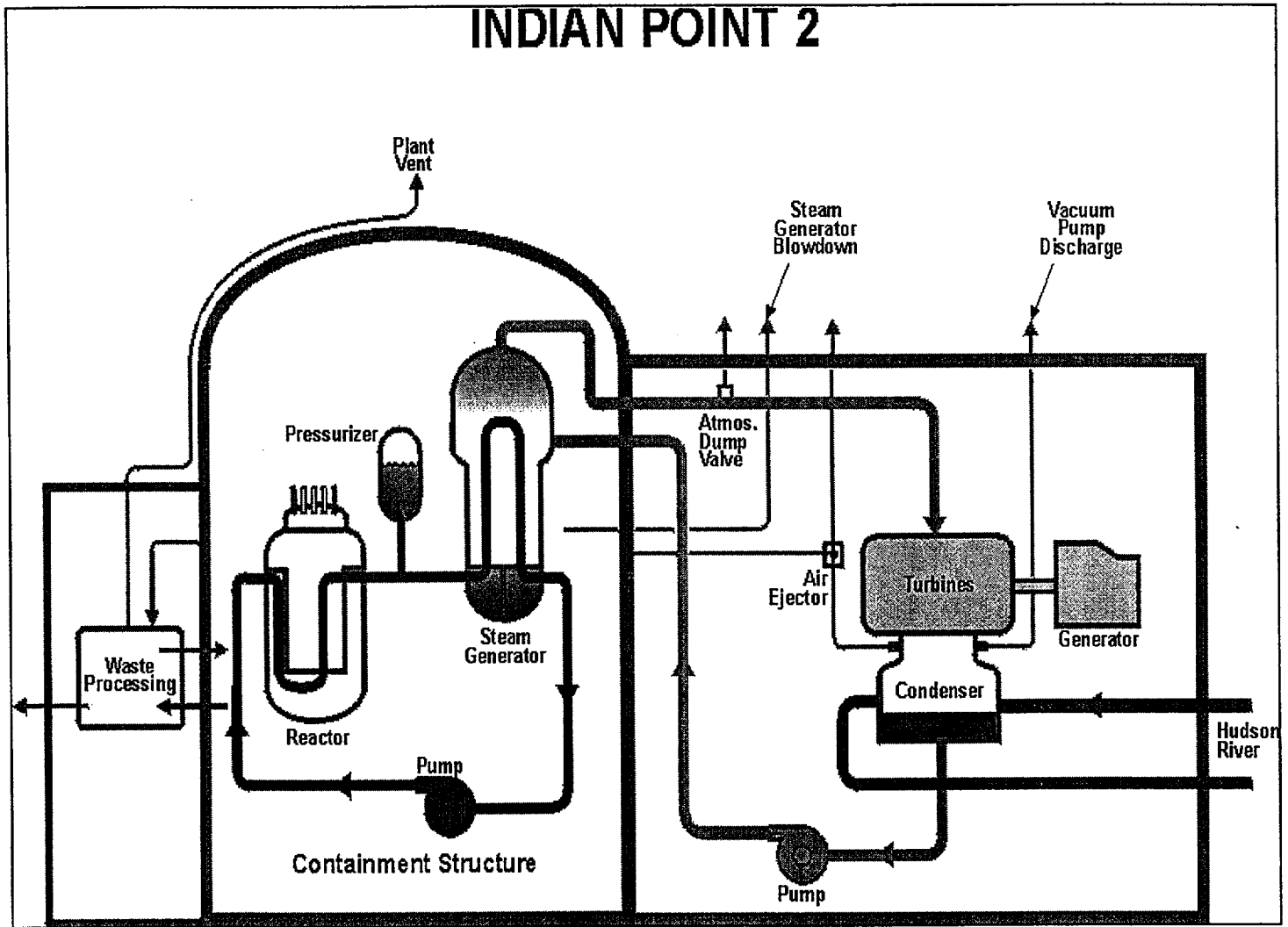
- 12:39 p.m. -- Shutdown Cooling System
- 4:57 p.m. -- Achieved Cold Shutdown
- 6:50 p.m. -- Terminated Alert

SAFETY SIGNIFICANCE

- Initial Operator Response Prompt/Appropriate
- Licensee Successful in Achieving Cold

Shutdown

- **Several Operator Performance/Procedural/Equipment Issues Identified Which Delayed Achieving Cold Shutdown Conditions**
- **Several Emergency Response Problems**
- **No Measurable Offsite Radiological Impact (consistent with calculated results)**
- **No Impact on Public Health and Safety**



RADIOLOGICAL RELEASE PATHS

RISK SIGNIFICANCE

- **Operator actions important to prevent core damage in a SG tube failure event.**
- **Conditional Core Damage probability for this event: (Trapp to Provide).**
- **The event had moderate risk significance.**

ROOT CAUSE AREAS

- **Operator Performance**

- **Procedural Adequacy**
- **Equipment Performance**
- **Emergency Response**

OPERATOR PERFORMANCE

- **Initial Response Prompt and
Appropriate; Procedure Adherence
Good Overall**
- **Some Deficiencies in the Plant
Cooldown Phase**

- **Initial Cooldown Excessive**
- **Operator Recognition of Plant Configuration**

PROCEDURE QUALITY

- **Procedures (AOPs/EOPs) to Guide Initial Response were Good**

- **Several Procedural Deficiencies Challenged Operators During the Plant Cooldown Phase**
 - **Delayed Placing Shutdown Cooling In-Service**
 - **System Configuration**
 - **Shutdown Conditions**

EQUIPMENT PERFORMANCE

- **Event Mitigation Systems Worked Properly**
 - **Reactor Protection System**
 - **Auxiliary Feedwater System**
 - **Safety Injection System**

- **Some Pre-existing Equipment Problems Challenged Operators**
 - **Automatic Condenser Vacuum Control Valve**
 - **Condenser Mechanical Vacuum Pump**
 - **Containment Valve Seal Water System Design Problem**
 - **Pressurizer Power Operated Relief Valve Design Problem**

EMERGENCY

RESPONSE

- **Emergency Response Protected Health and Safety of Public**
- **Event Classified Properly/Good Critique of Emergency Response**
- **Emergency Plan/Implementing Procedure Problems**
 - **Augmented Emergency Response Facility Staffing Not Timely**
 - **Accountability Problems**
 - **Emergency Response Data System (ERDS) not Operable for Several Hours (Pre-Existing Problem)**
 - **Problems in Implementation of the Media Response Plan**
 - **Emergency Response Facility Equipment Problems**
 - **Technical Support Timeliness and Quality Issues**

GENERIC IMPLICATIONS

- **NRC Information Notice 2000-09 issued.**
- **Cause/Analysis for the SG Tube Failure Under Separate NRC review.**
- **Potential Event Complications:**
 - **Operator Training to cold shutdown**
 - **Procedure Quality for Event Based Configurations**
 - **Non-safety equipment problems can complicate response**
 - **Support by the emergency response organization for operations.**