NON-PUBLIC?: N
ACCESSION #: 8807180137
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Indian Point, Unit 3 PAGE: 1 of 6

DOCKET NUMBER: 05000286

TITLE: Reactor Trip Turbine Trip Caused by Control Oil Smoothing Orifice Relief Failure
EVENT DATE: 06/12/88 LER #: 88-005-00 REPORT DATE: 07/12/88

OPERATING MODE: N POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:
NAME: Vincent R. Coulehan TELEPHONE #: 914-736-8047

COMPONENT FAILURE DESCRIPTION:
CAUSE: B SYSTEM: SJ COMPONENT: V MANUFACTURER: C635
REPORTABLE TO NPRDS: Y
CAUSE: B SYSTEM: JI COMPONENT: V MANUFACTURER: H035
REPORTABLE TO NPRDS: Y
CAUSE: B SYSTEM: TG COMPONENT: OR MANUFACTURER: W120
REPORTABLE TO NPRDS: N

SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On June 12, 1988 with the reactor at 100% power, a unit trip occurred. The trip was generated on a low-low steam generator level received from 32 steam generator. All plant systems functioned properly following the unit trip with the exception of three high pressure steam dump valves which did not fully close and the main boiler feed pump recirculation valves which did not open. It was determined subsequent to the trip that the main turbine control valves had closed due to the failure of the smoothing orifice relief device in the main turbine control oil system. The valve trim on both main boiler feed pump recirculation valves was replaced and operating pressure on the valve operators was adjusted. The high pressure steam dumps were isolated and Technical Services evaluated continued operation with these valves isolated. The smoothing orifice relief device was repaired and long term corrective action

includes periodic inspection to prevent recurrence of this event. The plant was brought critical and synchronized to the bus on June 15, 1988.

(End of Abstract)

DESCRIPTION OF EVENT:

At 0850 hours on June 12, 1988, with the plant operating at 100% reactor power, a unit trip occurred due to low-low level in 32 steam generator (AB). All plant systems functioned properly following the unit trip with the exception of the following:

1. Operators carrying out post trip supplementary actions noted that both main boiler feed pump (SJ) recirculation valves (C635) (V) (Model #D-100-400) had failed to open automatically. Placing the control switches in the open position had no effect. Operators were then dispatched to locally open these valves.

2. Three steam dump valves (JI) (H035) (V) (Model #501SFC93FA) remained approximately one quarter open and were locally shut.

Subsequent investigation revealed that the low-low level trip on 32 steam generator was due to the shrink effect induced by closure of all main turbine control valves (TG) with the unit at full power. Closure of all control valves was the result of a smoothing orifice relief device (W120) (OR) (Westinghouse Instrumentation Literature 1250-3156) failure. This failure reduced control oil pressure to the control valves causing them to go closed.

INVESTIGATION OF EVENT:

Review of plant data obtained from charts, recorders and computer printouts indicated a power mismatch between the reactor and main turbine generator. Approximately two seconds before the trip, first stage turbine pressure dropped from a nominal 490 psi to 362 psi, control rod insertion commenced and

steam flow to the main turbine rapidly decreased, indicating closure of the main turbine control valves.

With the main steam isolation valves (SB) shut, Operations personnel reset the Westinghouse main turbine. The turbine reset normally, and all four turbine stop valves opened as auto stop oil reached a normal value of 125 psig. However, it was found that control oil pressure could not be increased above 15 psig, insufficient to open the main turbine control valves. Maintenance personnel then removed sections of the governor pedestal cover allowing personnel access to view inside the oil system. It was then observed that the smoothing orifice and relief valve assembly had become partially disassembled and damaged.

Upon inspection of the smoothing orifice and relief device, it was noted that the leaf spring had separated from the support lever and the nut on the dash pot piston which restrains the support lever on the dash pot piston had fallen off. A review of the control oil system has shown that the failure of this particular device would result in the closure of the control valves.

With the unit in hot shutdown, an investigation concerning the MBFP recirculation valves was initiated. There was concern that the valve trim was binding in the valve seat. After the valves were disassembled, the following was found:

1) Trim on both valves was visually inspected and yielded no obvious mechanical problems. The trim on both recirculation valves was replaced with warehouse stock components. Subsequently, the replaced sets of valve trim were sent to Copes-Vulcan for evaluation and refurbishment.

2) The valve trim vendor, Copes-Vulcan, suggested that the operating air pressure should be adjusted to a range of 20-30 psig. The original specification for air had been set to approximately 80 psig. This increased air signal may have led to the binding of the valve.

Operation of the high pressure steam dumps prior to this event indicated excessive valve seat leakage. To preclude adverse plant performance, it was elected to isolate a number of these

valves. Following the trip on June 12, 1988, three valves did not fully close when signaled to from the control room due to mechanical binding. Operations personnel secured these valves locally. The Technical Service Department then conducted a nuclear safety evaluation, and it was determined that isolating all the condenser steam dump valves would not impact plant safety. The condenser steam dump valves are not utilized in the Facility Safety Analysis Report. The Operations Department, utilizing this evaluation, elected to restore some valves to service prior to re-start.

CAUSE OF EVENT:

The root cause of this trip has been determined to be the failure of the smoothing orifice relief device in the Westinghouse main turbine. The precise component has been identified as the dash pot piston. Excessive clearance, a result of normal wear in the dash pot piston, reduced its damping function. This caused increased oscillation and vibration in the assembly. Increased vibration caused the locking nut to come loose and the dash pot piston to come free from the lever arm, thus eliminating its damping effect. The resulting excessive movement caused the leaf spring to fatigue and fail. The lever arm cocked and was unable to hold the

spring assembly and cup valve in place, thus the cup valve drifted off its seat allowing all control oil to be relieved. The result of reduction in control oil pressure caused all control valves to close. With the plant operating at 100% power, the control valve closure induced a shrink on all four steam generators levels. The shrink of 32 steam generator level was sufficient to actuate a low-low steam generator level reactor trip.

ANALYSIS OF EVENT:

This event is reportable under 10CFR50.73 (a) (2) (iv). An evaluation has determined that this event has been considered under the guidelines of plant FSAR and Technical Specifications, and no other safety concerns exist as a result of this event. No similar reportable event has previously

occurred at Indian Point Three.

CORRECTIVE ACTIONS:

The following actions were undertaken as a result of this incident:

1. The smoothing orifice and relief device was repaired as follows:

a) new leaf spring was fabricated from 0.031 inch stainless steel shim stock.

b) a new dash pot piston was fabricated from 1 3/4 inch carbon steel stock; installed with 0.009 inch clearance on the diameter to its housing.

c) a new cup valve was also installed to insure a clean knife edge seat.

2. The No. 31 and No. 32 MBFP recirculation valve trim was inspected and replaced. The air pressure to the valve operators was reduced to 24 psig. Both valves were tested satisfactorily.

3. Technical Service personnel have investigated and reviewed the operation of the high pressure steam dump system in response to concerns raised during this event. A nuclear safety evaluation was performed to justify continued operation of the system as it presently exists. High pressure steam dump operability and valve seat leakage is being addressed by plant staff with the long term goal of repairing these valves.

SECURING FROM THE EVENT:

The MBFP recirculation valves and the main turbine smoothing orifice assembly were repaired and tested satisfactorily. The reactor was brought critical and synchronized to the bus on June 15, 1988.

RELIEF VALVE AND ORIFICE I.L. 1250-3156

The relief valve and orifice shown in importance to give the Turbine
Figure 1 are assembled on a plate (2) and Serial Number, Instruction
mounted in a block which is integral with Leaflet 1250-3156, Item Number
the internal piping in the high pressure and Name of Part.
turbine governor end pedestal base. Item Name

The quantity of high pressure oil 1 Gasket
admitted to the chamber in the block is 2 Orifice Block Cover
determined by the setting of the orifice 3 Dashpot Piston
screw (19) and the pressure maintained in 4 Piston Support Lever
the chamber is established by the loading 5 Piston Retaining Nut
of the compression spring (13) acting 6 Adjusting Screw Support Bolt
downward on the cup valve (23). A 7 Adjusting Nut
dash-pot piston (31) is provided to 8 Adjusting Screw Retaining
insure relief valve stability. Bracket
9 Bracket Retaining Nut
Two high pressure oil outlets from the 10 Loading Spring Adjusting
chamber supply the governor impeller Screw
and the control devices. The oil supplied 11 Locknut
to the control devices passes through a 12 Loading Spring Seat (Upper)
high pressure filter (26) shown in Figure 13 Valve Loading Spring
1. 14 Loading Spring Seat (Lower)
15 Spring Assembly Retaining
The orifice screw (19) and the Bolts
adjusting screw (10) should be set to 16 Cover Retaining Screws
maintain an oil pressure of 100 psig. in 17 Spring Assembly
the chamber with the relief valve passing 18 Locknut
15 to 20 gpm. of oil to drain. 19 Orifice Screw
20 Cup Valve Screw
21 Screw Adjusting Nut
23 Cup Valve
LIST OF PARTS 24 Cup Valve Nut
25 Gasket
The following list has been compiled 26 Filter
to facilitate ordering Spare or Renewal 27 Filter Retaining Screws
Parts. In ordering parts, it is of utmost 28 Bushing

(1-1)

Figure 1

FIGURE OMITTED - NOT KEYABLE (DRAWING)

Indian Point 3
Nuclear Power Plant
P.O. Box 215
Buchanan, New York 10511

914 739.8200

New York Power
Authority

July 12, 1988
IP3-88-045
IP3-88-005R

Docket No. 50-286
License No. DPR-64

Document Control Desk
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Dear Sir:

The attached Licensee Event Report LER 88-005-00 is hereby submitted in accordance with the requirements of 10CFR50.73. This event is of the type defined in Paragraph 50.73 (a) (2) (iv).

Very truly yours,

/s/ W. A. JOSIGER
William A. Josiger
Resident Manager
Indian Point 3 Nuclear Power Plant

RL/rj
Attachment

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Regional Administrator
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