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DESCRIPTION:

Ltr furn info re abnormal occurrence #AO 50-289-74-5 of 5-31-74 inwhich a pinhole leak in the "B" makeup pump recirculation line orifice assembly was found.....

PLANT NAME: THREE MILE ISLAND UNIT #1

ENCLOSURES:

ACKNOWLEDGED
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FOR ACTION/INFORMATION 6-13-74 GMC

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June 10, 1974
GQL 0060

Director
Directorate of Licensing
U. S. Atomic Energy Commission
Washington, D.C. 20545

Dear Sir:

Operating License DPR-50
Docket #50-289

In accordance with Technical Specifications for the Three Mile Island Nuclear Station Unit 1, paragraph 6.7.2.a.2, we are reporting the following abnormal occurrence:

(1) Report Number: AO 50-289/74-5

(2a) Report Date: June 10, 1974

(2b) Occurrence Date: May 31, 1974

(3) Facility: Three Mile Island Nuclear Generating Station, Unit 1

(4) Identification of Occurrence:

Title: Pinhole leak in the "B" make-up pump recirculation line orifice assembly

Type: As defined by the Technical Specifications, paragraph 1.8e, in that the pinhole leak in the recirculation line orifice assembly of the "B" make-up pump resulted in an abnormal degradation of one of the several boundaries which are designed to contain radioactive materials.

(5) Conditions Prior to Occurrence: Reactor coolant system heatup in progress, with major plant parameters as follows:

Power: Core: 0
Elec: 0

RC Flow:	104×10^6 #/hr. (3 RC pumps)
RC Pressure:	2150 psig
RC Temp.:	430°F
PRZR Level:	100"
PRZR Temp.:	646°F

(6) Description of Occurrence: At 1345 on May 31, 1974, during heatup of the reactor coolant system, an operator on a routine tour discovered a pinhole leak to be coming from the recirculation line orifice assembly of the 1 "B" makeup pump. The 1 "A" makeup pump was immediately placed into service, the 1 "B" makeup pump secured and the leak isolated by valve closure.

Subsequent investigation revealed that the leak was located in the discharge end pipe portion of the pressure-reducing recirculation orifice, approximately one inch from where the orifice assembly is welded onto the recirculation line. Examination of the orifice assembly after its removal from the line revealed severe erosion of the pipe wall for approximately one and one-half inches downstream of the last orifice element and almost complete erosion of the last orifice element.

(7) Designation of Apparent Cause of Occurrence: Component Design, as indicated by subsequent discussions with the orifice vendor, in that erosion is a generic problem with orifices of this design and appears to be caused by excessively high exit velocities at the last stage of the orifice.

A related personnel problem, which could be considered to have contributed to the orifice assembly failure, was discovered during the post failure investigation. Due to a similar failure of the same type assembly at ANO-1, an untrasonic testing program was begun at TMI-1 to inspect the four suspect orifices on a bi-weekly basis. This testing program failed to identify the faulty orifice, however, because testing personnel were not performing their inspections at the correct location. They had been directed to inspect the downstream side of the suspect orifice assembly, while, in fact, they were inspecting the upstream side. Early identification of the erosion problem might have made it possible to implement corrective actions prior to the orifice assembly failure.

(8) Analysis of Occurrence: The loss of integrity in the 1"B" make-up pump recirculation line orifice assembly did not represent a threat to public health or safety for

a. there was no resultant release of radioactive materials, in that

1. there is a check valve installed in the discharge piping from each make-up pump discharge, and in each recirculation line, and

2. there were no radioactive materials in the primary coolant system due to the reactor not having yet achieved initial criticality, and

b. the plant's safeguards system was not adversely affected, in that during a LOCA

1. only one of the three injection lines is required to provide core protection,

2. two other make-up pumps (A & C) were available, and

3. the leaking orifice could have been quickly isolated during accident conditions.

(9) Corrective Action: Immediate actions were as previously described.

The Plant Operations Review Committee (PORC) met promptly after the incident and recommended to the Station Superintendent that

a. the failed orifice assembly be replaced,

b. the 1 "B" make-up pump then be returned to service,

c. radiograph inspections be conducted on the three similar orifices located elsewhere in the make-up and purification systems,

d. because of its relatively frequent usage, operational restrictions be placed on the 1 "A" make-up pump so that it will be used only on a limited basis.

e. the ultrasonic inspection personnel who failed to properly inspect the suspect orifices be appropriately instructed by supervisory quality assurance personnel, and

f. newly designed orifice assemblies (which are presently being manufactured and are on order) be installed in place of the faulty design assemblies.

The Station Superintendent has reviewed and concurred with PORC's findings, and all corrective actions have been implemented except for installing the newly designed orifices which are not yet available.

(10) Failure Data:

a. Previous failures of the subject orifice assembly have been noted at ANO - Unit 1. Also, the radiograph inspections of the other three assemblies installed elsewhere in the make-up

and purification systems indicated extensive erosion on 1 "A" make-up pump orifice, minor erosion on the letdown orifice, and no erosion on the 1 "C" make-up pump orifice.

b. The failed orifice assembly equipment identification is as follows:

Manufacturer:	Bingham Pump Co. Portland, Oregon
Part Number:	B-26555
Orifice Type:	Seven stage, multiple plate
Material:	304 SS
Service:	BYPASS
Manufacturer Drwg. #:	A-44047

Sincerely,

R. C. Arnold
Vice President - Generation

RCA:DNG:eg

cc: Directorate of Regulatory Operations, Region 1
U. S. Atomic Energy Commission
631 Park Avenue
King of Prussia, Pennsylvania 19406

File 20.1.1/7.7.3.5.1