



Consumers
Power

**POWERING
MICHIGAN'S PROGRESS**

Big Rock Point Nuclear Plant, 10269 US-31 North, Charlevoix, MI 49720

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September 17, 1996

Nuclear Regulatory Commission
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Washington, DC 20555

**DOCKET 50-155 - LICENSE DPR-6 - BIG ROCK POINT PLANT - INITIAL PRESSURE
REGULATOR (IPR) BELLWS REPLACEMENT FOLLOWING SEPTEMBER 16, 1996, AUTOMATIC
REACTOR SCRAM.**

On September 16, 1996, @ 0251, Big Rock Point experienced an automatic reactor scram due to high reactor pressure. The initiator of the event has been attributed to the mechanical failure of the turbine Initial Pressure Regulator (IPR) bellows (the IPR maintains reactor pressure at its rated value by operating the turbine admission valves). The IPR bellows have failed in the past; and most recently was addressed in Licensee Event Report (LER) 92-010 dated July 2, 1992. Corrective action associated with LER 92-010 concluded that replacement of the bellows and implementing an "IPR bellows monitoring plan to detect leakage while the plant is operating as a means of precluding similar reactor scrams" was required for continued plant operation.

On November 17, 1993, Consumers Power Company forwarded a letter to the Commission to inform them that the IPR monitoring program installed during the previous operating cycle would be discontinued. Plans were made to replace the bellows every refueling outage with a new, certified, radiographed bellows. The bellows would also be tested in accordance with maintenance work instructions using a new test fixture, lending a greater degree of confidence that the bellows would perform their intended function without premature failure.

The purpose of this letter is to inform the Commission that an IPR bellows with one operating cycle (about 12 months) of satisfactory performance will be installed in lieu of a new bellows, which will not be available from the manufacturer for at least 10 weeks. A root cause evaluation will be performed by site engineering and additional corrective actions to improve bellows reliability will be identified and implemented. Vendor recommendations and laboratory analysis will be considered during the evaluation.

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The IPR bellows has failed five times over the last twenty-one (21) years. Prior to 1975, existing records show no evidence of failure. The two earliest failures of record occurred in 1975 and 1976, following service times of eleven (11) days and eleven (11) months, respectively. The root cause of these two failures was indeterminate.

A failure that occurred in 1989 was determined by lab analysis to be the result of intergranular stress corrosion cracking (IGSCC). This particular failure occurred after only two weeks of service. Root cause was attributed to the use of tap water during pressure testing by the manufacturer. The use of demineralized water during pressure testing was implemented as a corrective action to preclude recurrence.

In 1992, a failure occurred after a service life of thirty-four (34) months. Detailed metallurgical analysis determined the root cause to be cyclic fatigue which was exacerbated by the presence of a 65% lack of fusion weld defect stress concentrator. Corrective action was implemented at this time to change out the bellows each refueling outage. Additional actions included the use of radiography to qualitatively assess weld integrity.

The subject failure occurred after a service life of approximately 6 months. The failure occurred following the first full thermal cycle (cooldown from operating temperature to ambient and a subsequent heatup). Previous experience and analysis suggest that this early failure is the result of a stress concentrator (eg, weld defect that was not detectable via the radiographic examination that was performed prior to placing the bellows in service). The presence and initiating cause of this postulated stress riser is currently being confirmed through metallurgical analysis.

A replacement bellows that was utilized during the 1994 - 1995 plant operating cycle was installed. This bellows was evaluated to be a suitable replacement based on operating history that provides evidence that a gross discontinuity or other stress riser does not likely exist (ie, bellows did not suffer a premature failure of 12 months or less). This bellows assembly was subjected to several thermal cycles during this operating period. A review of past plant history shows three of the four previous failures to be early (ie, less than one year), premature failures. The bellows is subject to cyclic stresses and does have a finite lifetime. Previous bellows have operated in excess of five years. The only known failure that occurred after one year in service, occurred after 34 months of service and was due to a 65% lack of weld fusion on one of the bellows' leaves. The recently installed bellows will be used until the 1997 refueling outage, continued use beyond that will require additional review based on the root cause evaluation results. Cumulative bellows service time until the 1997 refueling outage will be approximately 22 months.

In addition to the replacement, the following compensatory monitoring will be performed:

- a) Changes in IPR control following established steady-state operation will be logged by the operation's staff.

NUCLEAR REGULATORY COMMISSION
BIG ROCK POINT PLANT
IPR BELLWS REPLACEMENT
September 17, 1996

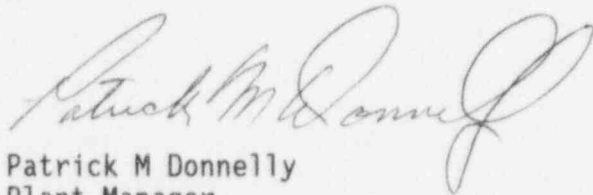
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NOTE: Historically, about one adjustment is required every 8 hours. Frequent adjustment will be cause for an immediate investigation.

- b) The IPR drain will be monitored each shift for the presence of water/steam leakage.

The plant response to an IPR bellows failure is closure of the turbine admission valves, leading to a rapid increase in reactor pressure and or flux, which in turn automatically scrams the reactor. The contribution to core damage frequency (CDF) from turbine trip is approximately 7% for Big Rock Point.

The Big Rock Point Plant Review Committee has reviewed this program change and finds it to be acceptable. The plant will be returned to service and should be operating at full released power within several days.



Patrick M Donnelly
Plant Manager

CC: Administrator, Region III, USNRC
NRC Resident Inspector - Big Rock Point