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February 2, 1983
JPN-83-10

Director of Nuclear Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Attention: Mr. Domenic B. Vassallo, Chief
Operating Reactors Branch No. 2
Division of Licensing

Subject: James A. FitzPatrick Nuclear Power Plant
Docket No. 50-333
Performance Evaluations of the Reactor Coolant and Main Steam Line Tunnel Leakage Detection System

Dear Sir:

The Power Authority has committed to evaluate the performance of the Reactor Coolant and the Main Steam Line Tunnel Leakage Detection Systems after 5 years of plant operation and to report the results of this evaluation to the NRC. The Authority has evaluated both systems, as described in the enclosure, and has determined that both systems have an excellent performance history, as indicated by frequent system functional tests, instrument calibrations and, in three cases, actual system operation which led to prompt discovery and mitigation of leakage.

If you have any questions regarding the enclosed evaluations please contact Mr. J. A. Gray, Jr. of my staff.

Very truly yours,

G.M. Wilverding

for J. P. Bayne
Executive Vice President
Nuclear Generation

cc: Mr. J. Linville
Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 136
Lycoming, New York 13093

A001

ENCLOSURE TO JPN-83-10 , FEBRUARY 2 , 1983
POWER AUTHORITY OF THE STATE OF NEW YORK
JAMES A. FTIZPATRICK NUCLEAR POWER PLANT

PERFORMANCE EVALUATIONS OF THE REACTOR COOLANT AND MAIN STEAM LINE TUNNEL LEAKAGE DETECTION SYSTEMS

Reactor Coolant Leakage Detection System (RCLDS)

The RCLDS is designed to detect abnormal leakage from the Reactor Coolant Pressure Boundary. Limits are established on identifiable and unidentifiable liquid leakage. Both identified and unidentified leakage in excess of limits is annunciated in the control room. Sources of leakage in the drywell are generally classified by the drain sump to which leakage is directed.

Identified liquid leakage is defined as the sum of leakage from the recirculation pumps, the reactor vessel head seal and all major valve seals. This leakage is piped to the equipment drain sump. The identified leakage rate at the equipment drain sump, limited to 20 gpm, is measured daily and averages 2 to 5 gpm during normal operation. A monthly functional test is performed for the flow rate instrumentation to verify its operability and to ensure the accuracy of its control room annunciator trip point. The instrument is calibrated every quarter.

Unidentified liquid leakage is defined as all Reactor Coolant Pressure Boundary leakage not originating from the identified sources above. Unidentified leakage, limited to 5 gpm, flows to the drywell floor drain and is surveyed daily. This leakage generally averages 1-2 gpm during normal operation. A monthly functional test is performed for the instrumentation to verify its operability and to guarantee the accuracy of its control room annunciator trip point. The instrumentation is calibrated every quarter.

Lastly, a Continuous Drywell Atmosphere Sampling System (which counts gross particulate, iodine and noble gas activities) and a continuous drywell pressure detection system further ensure that leakage from the Reactor Coolant Pressure Boundary will not go undetected.

Main Steam Line Tunnel Leak Detection System

The Main Steam Line Tunnel Leak Detection System consists of 16 temperature sensors, each set to initiate a Main Steam Isolation Valve closure and annunciate in the control room at a temperature of 40° above the maximum steam tunnel ambient temperature (160°F). As set, the sensors can detect a steam leak on the order of 3500 lb/hr. The temperature measurements of each sensor are recorded daily.

Functional tests for the leak detectors are performed monthly, and each sensor is calibrated once per operating cycle. For conservatism, trip points are set at 190°F for the detectors, 10°F below the maximum allowed temperature of 200°F.

Forced Shutdowns Due to Leakage

Since the initial startup of the FitzPatrick plant, there have been three instances in which Reactor Coolant Pressure Boundary Leakage beyond the established leakage rates occurred. In all cases the Reactor Coolant Leakage Detection System performed as expected, prompting operators to shut down the plant to investigate the cause of the leakage and make appropriate repairs. The first two events occurred in April 1978 and are described in the FitzPatrick Operating Status Report for that month, submitted to the NRC on May 3, 1978 (JAFP-78-216).

On April 18, 1978, operators commenced a normal shutdown to investigate unidentified drywell floor drain leakage annunciated by the RCLDS. The peak reading taken from flow rate instrumentation was 4.51 gpm on April 17, which is below the maximum allowed rate of 5 gpm. After corrective actions were taken, the reactor was restarted and the unidentified leakage rate declined to less than 1.5 gpm in subsequent daily readings.

On April 26, 1978, operators manually scrammed the reactor to investigate leakage into the drywell equipment drain sump. Reactor Coolant System leaks to the containment were identified and corrective maintenance was performed. In addition, a leak in the drywell equipment sump cooler was identified as a source of water to the sump and maintenance was performed. The highest reading taken from the flow rate instrumentation, following annunciation in the control room, was 25.86 gpm, which exceeded the allowable 20 gpm, demanding corrective action.

In the third incident, on April 1, 1981, operators shut down the reactor when the RCLDS indicated a leakage rate limit was being exceeded by about 5 gpm. The source of leakage was determined to be a failure of the "A" recirculation pump seal. Within 20 minutes after shutdown, the defective pump was isclated and leakage was brought to within the limits. The seal was subsequently replaced. This incident is described in the FitzPatrick Operating Status Report for April 1981, submitted to the NRC on May 7, 1981 (JAFP-81-0464).

These incidents, coupled with monthly functional tests of the Drywell Equipment Drain Sump flow instrumentation and the Drywell Floor Drain Sump flow instrumentation, demonstrate the operability and effectiveness of both the identified and the unidentified leakage detection systems for the Reactor Coolant Pressure Boundary.

Main Steam Line Tunnel leakage exceeding allowed limits has never occurred at the FitzPatrick plant. Hence, the steam tunnel leakage detectors have never initiated a reactor shutdown. However, the monthly functional tests, in which instrument trip points are surpassed by heating the local environment around each sensor, ensure that the detectors can indeed function as intended.