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January 18, 1983

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Dresden Station Units 2 and 3
Quad Cities Station Units 1 and 2
Supplemental Response to Generic
Letter 81-04 on Implementation of
NUREG-0313, Revision 1
NRC Docket Nos. 50-237, 50-249,
50-254, and 50-265

References (a): T. J. Rausch letter to D. G. Eisenhut dated January 7, 1983.

(b): G. C. Lainas letter to L. O. DelGeorge dated October 28, 1982.

Dear Mr. Denton:

In Reference (a), Commonwealth Edison provided a further response to Generic Letter 81-04 (later referred to as 81-03) for Dresden Units 2 and 3 and Quad Cities Units 1 and 2 in response to the Reference (b) request. At that time we committed to provide a response to item 4 concerning the capability of installed leakage detection systems by January 17, 1983. This information is provided in the Attachment to this letter.

Please address any questions you may have concerning this matter to this office.

One (1) signed original and sixty (60) copies of this transmittal are provided for your use.

Very truly yours,

Thomas J. Rausch

Thomas J. Rausch
Nuclear Licensing Administrator

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Attachment

cc: Region III Inspector - Dresden
Region III Inspector - Quad Cities

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ATTACHMENT
DRESDEN Units 2 and 3, QUAD CITIES Units 1 and 2
LEAK DETECTION SYSTEMS

There are various leak detection systems at Dresden and Quad Cities used to detect unidentified leakage from the reactor coolant pressure boundary to the primary containment. After reviewing the leakage detection systems at these sites we believe that our sensitive and diverse leak detection systems meet the acceptance criteria of regulatory guide 1.45 and the requirements of NUREG 0313 Rev. 1.

We have grouped the leak detection capabilities into three parts: I. Drywell leakge monitoring Systems, II. High Radiation Sampling System Capabilities, and III. Process Radiation Monitoring Systems.

I. Drywell Leakage Monitoring Systems

Leak detection for the reactor coolant system is accomplished using several methods of continuous or periodic monitoring of the entire drywell space. They are:

A. Equipment Drain Sump:

If a pipe that contains reactor water develops a through wall crack, approximately 40% of this liquid leak will flash into steam. Steam in the drywell is condensed by the drywell air coolers and routed to the drywell equipment drain sump. The normal background leakage into this sump is 0 to 3 gpm and is essentially constant during any given period of operation. This flow is supplied by various valve leak off line.

An increase in leakage or a crack in a pipe would increase the discharge rate of the equipment drain sump and would be detected operationally.

There are detection systems designed to alert the operators of excessive flow through the drywell valve leak off lines. Therefore, the equipment Drain Sump can be used in combination with other leak detection equipment to determine the source of leakage.

Identified leakage into the equipment drain tank is composed of the normal seal and valve packing leakage and does not represent a safety consideration as long as the leakage is small compared to the reactor coolant makeup capacity available. If the total leakage of the floor drain sump exceeds 25 gpm the Tech. Spec 3.G.D limits would be exceeded and require an orderly shutdown to be initiated and the reactor is placed in a cold shutdown condition within 24 hours. This limit is only 0.5% of the capacity of the HPCI system, which is the emergency make-up system available with reactor pressure greater than 350 psig. In addition, thermocouples located on or near key equipment such as the recirculation pump seals may help in establishing the source of the leakage. The equipment and floor drain sumps have flow recorders, alarms, and integrators in the control room.

B. Floor Drain Sump:

If a pipe containing reactor water develops a through wall crack approximately 60% of the leakage will not flash to steam but will drain directly into the floor drain. The background leakage to this sump is 0 to 3 gpm and is essentially constant. Again, a significant increase in this flow will be detected operationally.

If the unidentified leakage to floor drain exceeds 5 gpm, the Tech. Spec. 3.G.D limits would be exceeded and require an orderly shutdown is to be initiated and the reactor placed in a cold shutdown condition within 24 hours. A drywell air sample is taken to determine the radiological content of the atmosphere then the drywell is deinerted for visual inspection of the primary system. This requirement is designed to insure that leaks from through wall pipe cracks will be identified before cracks can grow to a critical length.

The equipment and floor drain sumps in the drywell are pumped at the beginning of each shift. The amount is recorded and compared with previous shifts to determine changes or trends. The sumps are not automatically pumped. Since TMI, the operator, upon receiving a sump high level alarm, manually initiates the pumping process. Again, the amount is recorded and compared to determine changes or trends.

C. Temperature Rise of the Inlet Air to the Drywell Air Coolers:

The air inlet temperature of the drywell air coolers is monitored and has an alarm that will anunciate in the control room. This alarm will notify the operator of a failure of the Reactor Building Closed Cooling Water System or a steam leak.

Condensate flows from the air coolers are directed to the equipment drain sump. Changes in pumping frequency and rises in the drywell air inlet temperature may indicate leakage.

D. Air Sample System:

Each drywell is equipped with 24 air sampling points, and each suppression chamber (torus) with one sampling point. For leak detection mode of operation, one or two of the air sample points would be in service. Each half-inch tube will take an air sample from a selected point within the drywell. The air sample will be drawn through the tubing, out through a drywell penetration, auto-isolation valves, and then to a continuous air monitor. This air monitor will count gross beta activity which will be recorded and alarm on an increase. This provides an indication that a leak has occurred.

An actual example of the sensitivity of the air sampling system occurred during the week of March 22, 1982. Gross beta concentations in the containment (drywell) changed from 9.1E-12 uCi/cc to 1.47E-7 uCi/cc. This change was attributed to the Unit 9A recirc. header bypass valve packing leak which produced a leak rate of about 0.2 gal./hr. (4 gal./day) of reactor water (545^{o}F). Backseating the valve found the air sample results returning to 2.0E-10 uCi/cc. A pipe/weld crack of a similar leak rate would be detected in the same manner.

E. High Primary Containment System Pressure:

As part of the reactor protection system, an abnormal pressure could indicate a rupture of, or excessive leakage from, the reactor coolant system into the drywell structure.

F. Large Valve Thermocouple Leak Detection:

Large valves in the primary system are equipped with stuffing box leak-off lines. Leakage through the stuffing box packing at approximately its midpoint is vented off through a closed piping system. This hot leakage from each valve is routed past its own thermocouple and then to a water-filled reservoir and finally to the drywell equipment drain sump. An increase in temperature on any of the thermocouples will sound an alarm in the control room. A similar system is also provided for the safety and relief valves. This system permits leak location information to be obtained.

G. Flow or Pressure Switch Leak Detection:

Each of the reactor recirculating pump seals are equipped with flow switches which will actuate an alarm in the control room when leakage exceeds a prescribed limit. On the reactor vessel double gasketed seals a pressure switch will alarm if failure of the inner "O" ring takes place. Normal pressure between inner and outer "O" ring is drywell pressure.

H. Steam Leak Detection Thermocouples:

In the drywell and throughout the plant thermocouples have been installed to detect high energy line breaks. If a thermocouple detects high temperature in a room or an area it will cause an alarm to annunciate notifying the operator of a problem.

II. <u>The High Radiation Sampling System (HRSS)</u>

The HRSS has the capacity to draw rapid liquid and/or gas samples from a variety of sample points. The HRSS building is located outside the reactor building in order to reduce the exposure to the operator/analyst.

The following are the liquid and gaseous sample point locations.

LIQUID	GASEOUS
Shutdown Cooling	Standby Gas Treatment
Torus Water (LPCI)	Suppression Pool
Recirc. Loop B	Isolation Condenser Vent Return Line
Clean up filter Inlet	Drywell Cooler (E)
Reactor Building Equipment Drain Tank	Drywell Cooler (G)
Drywell Equipment Drain Sump	
Drywell Floor Drain Sump	
Drywell Floor Drain Sump	

The following tests can be run on these samples

LIQUID	GASEOUS
PH Dissolved Oxygen Concentration Dissolved Hydrogen Concentration Conductivity Radionuclide Analysis	Note: The Gas Chromatographic equipment can quantify all the gaseous components of the samples.

This rapid sampling capability can be used to identify components and/or trends that would indicate leakage.

III. Process Radiation Monitoring Systems

The process radiation monitoring system consists of several individual process subsystems:

A. Air Ejector Offgas Monitoring: Continuously monitors, indicates, and records the volumetric flow of the effluent gases removed from the main condenser by the air ejector offgas system.

B. Radioactive Stack Gas Monitoring: Continuously monitors, indicates, and records the radioactivity level of the effluent gases discharged from the stack to the atmosphere.

C. Main Steam Line Monitoring: Designed to continuously monitor the radiation from the main steam lines to permit the prompt indication of gross release of fission products from the fuel to the reactor primary system coolant and subsequently to the turbine-generator system.

D. Process Liquid Monitoring: Continuously measures, indicates, and records the radioactivity concentration levels of major process system streams which are:

1. Reactor building closed cooling water system
2. Service water discharge system
3. Radioactive waste disposal system

E. Reactor Building Air Monitoring: Designed to provide automatic initiation of the standby gas treatment system and closure of the normal reactor building ventilation when the concentration of raioactive materials in the ventilation exhaust exceeds prescribed levels.

F. Isolation Condenser Vent Monitor: Designed to detect and warn the operator of a tube leak in the isolation condenser.

All Process Radiation monitoring systems provide continuous indication in the control room, and are capable of initiating appropriate alarms and actuating control equipment to assure containment of radioactive materials.

The process monitoring subsystems which provide automatic signals, such as isolation valve closure or reactor shutdown, are designed so that a single component failure does not prevent the required action. All monitors are capable of self-supervision. As an example, an alarm annunciates when the instrument is downscale or de-energized. Alarms are also provided to give warning if the monitors are capable of operational verification by means of test signals or radioactive check sources. This self-supervision circuitry prevents these leak detection systems from being disarmed and results in a high degree of reliable leak detection information.

The normal operating heat load of the drywell air coolers is 3×10^6 BTU/HR. A 1 gpm steam leak or a 2.5 gpm liquid leak represents about a 16% increase in air coolant temperature. A 5 gpm steam leak will cause a 5 to 8^{o}F coolant temperature rise. The technical specifications limit the drywell floor drain leakage to 5 gpm and the overall drywell leakage to 25 gpm. These flows would require an orderly shutdown to occur within 24 hours. Leakage of this amount could be handled by the drywell air coolers.

The description of the various systems contained in this report would be used by the operator to determine that leakage exists within the drywell (containment). We believe that these systems, operating individually or together, provide enough information for the operator to make this determination and that our diverse leak detection systems meet the acceptance criteria of regulatory guide 1.45 and the requirements of NUREG of 0313 Rev. 1.