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August 11, 1984

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

Subject: Byron Generating Station Units 1 and 2
Braidwood Generating Station Units 1 and 2
System Leakage Monitoring
NRC Docket Nos. 50-454/455 and 50-456/457

Reference (a): February 22, 1984 letter from T. R. Tramm to H. R. Denton

Dear Mr. Denton:

This is to provide additional information regarding the monitoring of leakage from systems outside of the containment which could be used to transport highly radioactive fluid and gases is a post-accident condition. NRC review of this information should close Confirmatory Issue 28(a) of the Byron SER.

Reference (a) provided a revised description of leakage monitoring programs to be implemented at Byron and Braidwood Stations to satisfy the concern identified in NUREG-0737, Item III.D.1.1. Attachment A to this letter is another revised description which addresses NRC comments regarding the fuel pool cooling and cleanup system, the high range sampling system, the secondary steam portion of the offgas system and the drain lines from the ECCS pumps. Attachment B to this letter contains a list of systems which have been excluded from this program. Changes are denoted by a bar in the righthand margin.

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

One signed original and fifteen copies of this letter and the attachments are provided for NRC review.

Very truly yours,

T. R. Tramm

T. R. Tramm
Nuclear Licensing Administrator

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Attachment

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ATTACHMENT A

FSAR Revisions

E.77 Primary Coolant Sources Outside Containment (III.D.1.1)

Integrated Leak Testing

Per Technical Specification 6.6.4, integrated leak test will be performed at refueling cycle intervals or less on each system or portions of systems, which could potentially contain highly radioactive fluids or gases. Station surveillances and procedures will be used to:

a) Monitor the leak testing of piping so that the appropriate lines are examined at the required intervals.

b) Direct leak test examinations such that systems are tested at approximate operating pressures or higher.

c) Align systems such that all piping tested is properly pressurized.

d) Identify lines which contain gases that require pressure decay, and/or metered make-up testing.

e) Quantify results of leakage examinations.

f) Initiate corrective action.

Leakage observed during the performance of inservice tests will be documented and a work request generated to repair leakage. Work requests of this type will be assigned a high priority and designated as an ALARA concern to initiate a review for possible modification to reduce leakage in the future.

Systems to be Tested

The following piping systems outside containment would or could contain highly radioactive fluids and gases during or following a serious transient or accident. Portions of systems which will not be included in the integrated leak tests are identified.

a) Chemical and Volume Control (CV)

The chemical mixing tank and associated piping are not included because this portion of the system is protected by check valves and normally closed valves.

The boric acid addition portion of the system is not included because it is protected by check valves and normally closed valves which prevent back leakage into this portion of the system.

The resin fill tank and associated piping is not included because this portion of the system is normally valved out and would not be required to operate during an accident.

b) Containment Spray (CS)

The spray additive tank and its associated piping are excluded because this portion of the system only supplies uncontaminated NaOH to the spray eductors. When all NaOH has been supplied to the eductors, check valves prevent leakage from the CS system into this portion of the system.

The 6 inch recirculation line which goes to the refueling water storage tank has not been included because it is normally isolated from the system and is only used to test the CS pumps in the recirculation mode.

c) Radioactive Waste Gas (GW)

The drain lines from the gas decay tanks have not been included because they are normally isolated from the system during plant operation. If any drain line were to be open, the inlet valve on that tank would also be closed, preventing any highly radioactive gases from entering this portion of the system.

The relief lines from the gas decay tanks have been excluded because these lines vent directly to the plant vent. The relief valves are set at 150 psi while the automatic system will divert gas to the standby tank at 110 psi. It is unlikely these lines would become highly radioactive.

The Unit 2 tie-ins will be excluded until such time as these lines come into service.

d) Offgas System (OG)

The calibration gas lines to the hydrogen analyzer are not included because these lines carry clean bottled gas to the analyzer for calibration purposes.

The portion of the offgas system associated with the steam system has been excluded. In the event of a high radiation signal, the atmospheric vent is valved through a vent filter system, including charcoal absorbers and HEPA filters, thereby isolating the radioactivity from the atmosphere. In addition, the secondary steam portion of the offgas system must not exceed low pressure (1 psig) and low flow (20 - 40 scfm) characteristics in order for the Steam Jet Air Ejectors to function properly. Such flow characteristics indicate the potential for major leakage is small.

The Unit 2 tie-ins will be excluded until such time as these lines come into service.

e) Residual Heat Removal (RH).

f) Safety Injection (SI)

The refueling water storage tank and its associated piping is not included because it provides relatively clean 2000 ppm borated water to the safety injection pumps, containment spray pumps, and residual heat removal pumps during an accident. When the level in the tank reaches its low level, suction is transferred to the recirculation sump and the RWST becomes isolated from the system which prevents highly contaminated water from entering it.

The accumulator fill lines are excluded because they are used to fill the accumulators and would not be in use during a serious accident and could not become contaminated with highly radioactive water.

The leakoff lines from the recirculation line isolation valve cans have not been included because there is little potential for these lines to become highly radioactive.

g) Fuel Pool Cooling (FC)

The Unit 2 tie-ins will be excluded until such time as these lines come into service.

h) Process Sampling (PS)

The pressurizer steam and liquid sample lines, reactor coolant sample lines, and residual heat exchanger sample lines are included. Also, the chemical and volume control system demineralizer outlet sample line and the letdown heat exchangers sample line are included. These sample lines will be tested up to the liquid sample panel.

The remainder of the PS system will be excluded. This system is normally isolated and sampling is intermittant. In addition, all piping is 1 inch or less with most piping in the 3/8" to 3/4" range. Piping lengths are minimized for sampling considerations. The sample panels, where the greatest probability of leakage exists, are kept at a negative pressure. Also, the system is frequently operated by the Radiation Chemistry Department during normal plant operation. Considering all the above system characteristics, it would be unlikely that a loss of flow would go undetected.

Integrated Test Leak Acceptance Criteria

After Unit 1 reaches full power operation, Edison will submit a report of all recorded leakage and all preventive maintenance performed as the direct result of the evaluation of this leakage. The report will also identify general leakage criteria to be applied during the first fuel cycle as the basis for instituiting corrective action in the form of preventive maintenance. Through this program's commitment to generate work requests for all pratically repairable leakage problems, levels of leakage will be kept as low as practicable. Because leakage problems presenting ALARA concerns will be reviewed, the leakage criteria can be refined over time as more information is accumulated through testing. Thus, the criteria can be revised to incorporate new modifications and techniques designed to keep leakage as low as practicable. In other words, the leakage criteria will be designed such that it excludes all practically preventable leakage, based upon current design, repair, and operating techniques.

Prior to the start of the second fuel cycle, the general criteria will be revised based on the experience gained during the first operating cycle on Unit 1. These revised criteria will be used as the basis for the long term leakage monitoring program on Units 1 and 2.

The initial system leak monitoring data will be taken after fuel load, during the startup testing. Leakage rates observed during this period provide a better baseline than those taken prior to fuel loading. Leak rates observed during preoperational testing are not necessarily representative of operating leak rates because of continuing adjustments to valve packing and seals, valve seat lapping, and the opening and closing of various mechanical joints. Implementation of the program described above will assure that initial leak monitoring will accurately indicate leak rates under actual operating conditions.

Other Leak Testing

In addition to this integrated leak test program, all Class 1, 2 and 3 systems will be leak tested at prescribed intervals, in accordance with the requirements of Section XI of the ASME Boiler and Pressure Vessel Code, "Rules for Inservice Inspection of Nuclear Power Plant Components," 1980 Edition, with addenda through the Winter of 1981 Addenda, as described in Byron Station's "Inservice Inspection and Testing Program Plan." Therefore, Class 1, 2 and 3 portions of systems excluded from this leakage program, will be leak tested through the ISI Program.

The piping and components which make up the containment penetrations are tested every outage as part of the 10CFR50, Appendix J leakage testing program for Type A and Type B testing, (Type C testing is in accordance with the Technical Specifications).

Prior to fuel load, all systems or portions of systems constructed in accordance with ASME Section III are hydrostatically tested to 125% of the system's design pressure. In the case of gaseous systems, a pneumatic type pressure decay test at 125% of system's design pressure is performed. All systems in this program are tested prior to initial plant startup via the Pre-Operational Test Program. During these testes, system walkdowns are conducted by the System Test Engineer and deficiencies are generated for leaking and defective components. In addition to the individual system tests, integrated type tests such as Integrated Hot Functional and Emergency Core Cooling Full Flow Tests are conducted. During these integrated tests, additional system walkdowns are conducted for vibrational testing and inspection of piping thermal expansion. Deficiencies are generated during these walkdowns also.

ATTACHMENT B

Systems Excluded From
Integrated Leak Test Program

There are other plant systems outside containment which are designed to contain radioactive process fluids and are excluded from the leakage testing program. These systems are listed below with a justification for exclusion:

Boric Acid Processing (AB) - The boric acid processing system is designed to collect borated effluent and separate it into primary grade water and 4 weight percent boric acid. Letdown from the RCS would be isolated during an accident and would reduce the potential for highly radioactive contamination of this system.

Boron Thermal Regeneration (BR) - This system is designed to change the boron concentration of the reactor coolant system during normal operations. The BR system has been excluded from this program because it is not required to mitigate the consequences of an accident and it is readily isolatable. In an accident boron concentration would be controlled by the CV system which is included in the leak test program.

Process Radiation Monitoring (PR) - The process radiation monitoring system is a "sampling" type system, not a process system, and as such utilizes very small flow rates. Liquid monitors are expected to receive a maximum flow rate of 5 gpm and a normal flow of approximately 3 gpm, while gaseous monitors are expected to be in the 3 to 5 cfm range. Since the flows are so small, major leakage could not occur without diverting a significant percentage of the total flow. In addition, some monitors are used only intermittantly and others are isolated, or their process streams are isolated, on an ESF or high radiation signal. All monitors can be manually isolated should the need arise. This system is designed to respond to abnormal conditions and as such, its features reduce the likelihood of highly radioactive leakage from the system. For example, the containment monitoring system for the equipment hatch is totally enclosed within the equipment hatch and is normally open but would isolate on an ESF signal. Therefore, uncontrolled leakage of highly radioactive effluent from the PR system is unlikely.

Reactor Building Equipment Drains (RE) - The reactor building equipment drain system, except for a line which extends from the reactor coolant drain tank to the waste gas compressor, was excluded because the discharge valve on the pumps is normally closed during plant operation and receives an ESF signal. Therefore, it would not become highly radioactive even during an accident.

Reactor Building Floor Dains (RF) - The reactor building floor drain system was not included because this system would become isolated from the auxiliary building during an accident through an ESF signal. In isolating, contaminated water would remain in containment and be recirculated by the RH, CS, CV, and/or SI systems, all of which will be monitored in this program.

Primary Containment Purge (VQ) - The primary containment purge system was excluded because its isolation valves are normally closed and their use is governed by the Technical Specifications.

Auxiliary Building Equipment Drains (WE) and Auxiliary Building Floor Drains (WF) - These systems, except for the casing drain lines from Containment Spray (CS) pumps, Safety Injection (SI) pumps, Residual Heat Removal (RH) pumps, and Chemical and Volume Control (CV) pumps, were not included because they would not contain highly radioactive fluids. The casing drain lines are included for protection in the event of a pump seal failure. By controlling the leakage from those systems which may contain highly radioactive fluids during a serious transient or accident, it is unlikely that the drain systems will experience uncontrolled, increases in radioactivity. In addition, most drain system piping is not pressurized and the majority of the piping connections are welded, as such, the likelihood for uncontrolled leakage is low.

Solid Radwaste Disposal (WX) and Chemical Radwaste Disposal (WZ) - The radwaste systems are designed to process radioactive waste produced by the plant. These systems do not connect directly to the primary systems and therefore it is unlikely they would experience an uncontrolled increase in radioactivity. Their use during an accident would require operator actions which would allow for the implementation of special precautions appropriate to the particular situation. In addition, the frequent visual inspection of radwaste systems would have a highly negative impact on the station's ALARA program.

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