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February 12, 1981

Mr. B. J. Youngblood, Chief
Licensing Branch 1
Division of Licensing
U.S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: LaSalle County Station
Units 1 and 2 Resolution
of Effluent Treatment
Systems Branch Questions
NRC Docket Nos. 50-373/374
LOD 81-40-18

Dear Mr. Youngblood:

Attached for your review are supplemental materials submitted in response to questions posed by the Effluent Treatment Systems Branch at a meeting of February 3, 1981. These questions relate to:

1. Post-Accident Sampling (NUREG-0737 Item II.B.3)
2. Accident Monitoring (NUREG-0737 Item II.F.1)
3. Primary Coolant Outside Containment (NUREG-0737 Item III.D.1.1)
4. Q321.20

In a follow-up discussion conducted on February 5, 1981 the questions posed by the Staff relative to items 1,2 and 4 above were resolved. The appropriate sections of the LaSalle County FSAR (Section L.20, L.29 and Q321.20) have been modified to reflect the changes agreed upon in that meeting. A copy of the proposed text revisions are attached.

Also discussed at this later meeting was the applicant's discussion presented in Section L.37 concerning Primary Coolant Leakage Outside Containment. This section has been revised to identify the LaSalle County Administrative Procedure (LAP-100-14) that is followed to perform the necessary leakage monitoring. In addition clarification of the systems to be monitored is provided in the revision to Section L.37. A copy of the proposed text revisions are attached. It should be noted that a copy of the referenced procedure has previously been provided to facilitate the Staff review.

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Related to the leakage monitoring program discussed in Section L.37, LaSalle County Station is committed to record all leakage as described in LAP-100-14. At the time Unit 1 reaches full power operation and before putting the unit into commercial service (approximately 6 months after fuel loading), Commonwealth Edison will submit to the NRC Staff a report of all recorded leakage and all preventative 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 instituting corrective action in the form of preventative maintenance. It is acknowledged that exceedance of these criteria will result in the issuance of work orders to take appropriate remedial action as soon as practicable; i.e. at the next scheduled or forced outage of sufficient duration to perform the work. Prior to the start of the second fuel cycle the applicant will revise the general criteria to the extent necessary 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 proposed revisions to the FSAR provided as attachments to this letter will be formally documented in a future amendment to the FSAR. If you have any questions on these matters, please direct them to this office.

Very truly yours,

L. O. DelGeorge

L. O. DelGeorge
Nuclear Licensing
Administrator

Attachment
cc: NRC Resident Inspector-LSCS

L.29 ADDITIONAL ACCIDENT MONITORING INSTRUMENTATION (II.F.1)

FUEL LOAD AND LOW POWER TEST REQUIREMENT:

Provide procedures for estimating noble gas, radioiodine, and particulate release rates if the existing effluent instrumentation goes off the scale.

This requirement shall be met before fuel loading. See NUREG 0737 Section II.F.1

DATED REQUIREMENT:

Install continuous indication in the control room of the following parameters;

a. Containment pressure from minus 5 psig to three times the design pressure of concrete containments and four times the design pressure of steel containments;

b. Containment water level in PWRs from (1) the bottom to the top of the containment sump, and (2) the bottom of the containment to a level equivalent to 600,000 gallons of water;

   Containment water level in BWRs from the bottom to 5 feet above the normal water level of the suppression pool;

c. Containment atmosphere hydrogen concentration from 0 to 10 volume percent;

d. Containment radiation up to 10^8 rad/hr;

e. Noble gas effluent from each potential release point from normal concentrations to 10^5 μci/cc (Xe-133).

Provide capability to continuously sample and perform onsite analysis of the radionuclide and particulate effluent samples.

This instrumentation shall meet the qualification, redundancy, testability and other design requirements of the proposed revision to Regulatory Guide 1.97.

This Dated requirement shall be met by ~~January 1, 1981.~~ JANUARY 1, 1982. See NUREG 0737 Section II.F.1

Rev of 4. Hi Range Containment Gross Gamma Rad Monitors

d. calibrations via in situ electronic signal which simulates 10^5 R/hr, and calibration capability for lower range radiation dose without disconnecting the detector from the readout module using a calibrated source;

e. energy response of detector is linear ±20% from 100 KeV to 3 MeV. Energy response of detector installation in thin steel sleeves is linear ± 20% from 500 KeV to 3 MeV, and logarithmic from 10 KeV to 500 KeV with maximum attenuation less than a factor of 4.

f. Detectors are easily retrievable for replacement, maintenance, and located so as to minimize personnel exposure. It is viewed as poor practice to install these detectors where they are not easily retrievable for calibration purpose, and where the rad protection concept of "as low as is reasonably achievable" (ALARA) is not applied in the design. It is important that these detectors be maintained in the calibrated condition, otherwise paragraph 4.20 of IEEE-279 will be violated.

The Commonwealth Edison design provides the best combination of detector placement for optimal viewing, ease of retrieval for on-line calibration, response to wide range of energy levels (60 KeV to 3 MeV) supplemented by sampling to determine what isotope is contributing what percentage of the measured dose. The attenuation contributed by the steel sleeves is less than a factor of four. In any installation arrangement, detector readings should be supplemented by sampling to determine which isotopes are contributing to the rad dose readings in order to better assess the interval for potential release to the environment(i.e., determining half-life of isotopes present).

~~The~~ These detectors ~~are~~ will be General Atomic, Model RD-23 equipment. The installation of the system will be completed prior to full power operation.

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LSCS-FSAR

5. Radiological-Noble Gas Effluent Monitoring Draft

(5) A. NEW RADIOLOGICAL NOBLE GAS EFFLUENT MONITORING Equipment

The Post-TMI effluent monitoring equipment was added to the existing effluent monitoring capability to extend the upper concentration limit to 10^5 µCi/cc. The new equipment is described first then the existing equipment. New and existing equipment cover [illegible] of the SGBT vent stack.

1. STATION VENT STACK MONITORING SYSTEM

A General Atomic Wide Range Noble Gas Monitoring System has been installed to sample the effluent stream which leaves the LSCS station vent stack. This monitoring system has a measurement range for radioactive noble gas concentrations of 1×10^{-7} µCi/cc to 1×10^{5} µCi/cc and is designed to meet Class 1E requirements. It is also in the process of being qualified to IEEE 323-1974. Arrangement details for this system are shown in Figure 11.5-1, sheets 1 and 2. This system has the following characteristics:

a) Off-line sampling is provided using existing isokinetic probe OD18-N001 (2 scfm)

b) The system has grab sample capability as required by ~~the TMI~~ NUREG-0737. The system is provided with a grab sample station which is the same one that will be used in the interim (if necessary), in conjunction with the existing stack monitoring system. The interim sampling process is described later in this subsection.

c) ~~Removable~~ On the particulate and iodine sample lines removable filters are employed ~~provided which will allow~~ to provide grab samples ~~collection~~ for ~~capability to be used in conjunction with~~ isotopic analysis ~~equipment~~ in the laboratory. Special multiple filters are employed during high-range radiation conditions. These special filter assemblies ~~assembly of special filters is~~ are self-contained and have ~~has~~ a large 4π lead shield to reduce personnel exposure. ~~In addition, all~~ The particulate and iodine filters are mounted on a skid which is separated from the skid with the detectors ~~in order~~ to minimize ~~contribution to back-ground~~ readings of the background detector and to more accurately ~~assess~~ represent the sample concentration.

d) i) The detector which is used for both low range and background subtraction is:
General Atomic Model RD-52 (~~Tag~~ PART Number OD18-N514)
Type: Plastic Phosphor
Range: 1×10^{-7} to 1×10^{-1} µCi/cc

ii) The detector which is used for both mid and high range is:
General Atomic Model RD-72 (Mid Range-~~Tag~~ PART Number OD18-N515, High Range-~~Tag~~ PART Number OD18-N516)
Type: Cadmium Telluride
Range: 1.2×10^{-3} to 1.2×1.3^{3} µCi/cc (Mid Range)
1×10^{-1} to 1×10^{5} µCi/cc (High Range)

e) The calibration of the detectors ~~will be~~ is conducted at least once per year.

f) The station vent stack monitoring, sampling and readouts are powered from Essential Bus Division 1 (135 Y-1).

2. STANDBY GAS TREATMENT VENT STACK MONITORING SYSTEM

A General Atomic Wide Range Noble Gas Monitoring System has been installed in the standby gas vent stack which is ~~wholly contained~~ vertically supported by and physically located inside the LCS station vent stack. This monitoring system has a measurement range for radioactive noble gas concentrations of $1x10^{-7}$ µCi/cc to $1x10^{5}$ µCi/cc and is designed to meet Class 1E requirements. It is also in the process of being qualified to IEEE 323-1974. Arrangements details for this system are shown in Figure 11.5-1, sheets 1 and 2. This system has the following characteristics:

a) Off-line sampling is provided using new isokinetic probes OD18-N518 (0.06 scfm for high range sampling) and OD18-N519 (2 scfm for low range sampling).

b) The system has grab sample capability as required by ~~the NRC~~ in NUREG-0737. The system is provided with a grab sample station which is identical to the one that will be used in the interim (if necessary), in conjunction with the existing station vent stack monitoring system. The interim sampling process is described later in this subsection.

c) ~~Removable~~ On the particulate and iodine line removable sample filters are ~~provided~~ employed to provide ~~which will allow~~ grab samples ~~collection capability to be used~~ for use ~~in conjunction with~~ isotopic analysis ~~equipment~~ in the laboratory. Special multiple filters are employed during high-range radiation conditions. ~~The assembly of special~~ These special filter assemblies ~~filters~~ are self contained and ~~has~~ use a large 4π lead shield to reduce personnel exposure. ~~In addition, and~~ The particulate and iodine filters are mounted on a skid which is separated from the skid with the detectors, ~~in order~~ to minimize ~~contributions to background~~ readings ~~by~~ of the background detector, and to more accurately ~~assess~~ represent the sample concentration.

d) i) The detector which is used for both low range and background substraction is: General Atomic Model RD-52 (~~Tag~~ Part Number OD18-N511)
Type: Plastic Phosphor
Range: $1x10^{-7}$ to $1x10^{-1}$ µCi/CC

ii) The detector which is used for both mid and high-range is: General Atomic Model RD-72 (Mid Range ~~Tag~~ Part Number OD18-N512) and High Range ~~Tag~~ Part Number OD18-N513)
Type: Cadmium Telluride
Range: $1.2x10^{-3}$ to $1.2x1.3^{3}$ µCi/cc (Mid Range)
$1x10^{-1}$ to $1x10^{5}$ µCi/cc (High Range)

e) The calibration of the detectors ~~will be~~ are conducted at least once per year.

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Continuous reading

(still part 5)

f) The SGTS vent stack monitoring, sampling and readouts are powered from Essential Bus Division 2 (136X-2).

B. EXISTING RADIOLOGICAL EFFLUENT MONITORING

The existing SGTS monitors shown in Figure 11.5-1, sheet 1, ~~will~~ are ~~be~~ retained ~~for monitoring~~ low range particulate, iodine and noble gas ~~monitoring, and covers a~~ concentrations range of 10^{-7} to 10^{-1} µCi/cc. This system uses existing probe OD18-N452 (2 SCFM) and the sampling process is described in subsystem 11.5.2 2.2. This sytem has ~~detectors~~ detectors which view the particulate and iodine filters, ~~as well as~~ ~~continuous~~ the noble gas concentration. These continuous readings are indicated in the control room (and the TSC when activated).

Per letter

The following table gives a brief ~~comparison of the two~~ capabilities summary for wide-range noble gas monitoring systems ~~(Station Vent Stack and Standby Gas Treatment Vent Stack)~~ for each vent at LaSalle Station:

Capabilities summary

ITEM DESCRIPTION	STATION VENT STACK ~~MONITORING SYSTEM~~	SGTS VENT STACK ~~MONITORING SYSTEM~~
a) On-Line or Off-Line *	Off-Line	Off-Line
b) Grab Sample Capability	Provided	Provided
c) Particulate & Iodine Filters Shielded (High Range)	Yes	Yes
d) Detector Type Low Range High Range	 Plastic Phosphor Cadmium Telluride	 Plastic Phosphor Cadmium Telluride
e) Calibration Frequency **	Once per Year	Once per Year
f) Power Supply	ESS 1 BUS 135 Y-1	ESS2 BUS 136X-2
g) Redundancy of Off-Line Low Range Continuous Particulate & Iodine Monitoring	No	Yes
h) Grab Sample Comes From Same Isokinetic Sample Probe	Yes	Yes
i) Automatically subtracts background radiation ~~using~~ *** ~~detector measurements and digital processing techniques~~	Yes	Yes

for inclusion in Capabilities Summary

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For each of the above systems, the energy dependence ~~will be~~ is determined during calibration. The monitoring systems, therefore, require only one level of radioactive gas for each detector. Kr-85 and XE-133 at concentrations of 10^{-4} μCi/cc and 1000 μCi/cc, will be injected into the monitor for calibration purposes. Then each decade response will be verified using a set of Cs-137 sources. At the time of pre-operational testing, an energy response curve will be run using at least five solid sources of different gamma energy levels.

Each of the above systems has a microprocessor which utilizes digital processing techniques to analyze the data from the wide range detectors and the digital processing performs background subtraction and filtering using readings from the low range gas channel.

All monitor readouts of gas concentration and accumulated dose release are provided for each system in the Technical Support Center and the Control Room, continuously during an accident.

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D. Interim Sampling (already addressed) Capability

Because it is expected that delivery of the GA wide-range monitors ~~will~~ can not be made until April 1981, ~~if necessary LSCS will~~ it may be necessary to implement an interim sampling procedure. Pending installation of the new wide-range General Atomics monitors, the following interim capability is to be used, if necessary. The ~~currently installed main~~ existing stack monitor with a range of 10^{-7} to 10^{-2} µC/cc will be used in conjunction with a new grab sample cart, which is capable of handling grab samples of up to 10^{+5} µC/cc concentration. Also, the ~~currently installed~~ existing SGTS vent monitor with a range of 10^{-4} to 10^{+2} µC/cc for high range noble gas will be used in conjunction with an identical grab sample cart.

The interim sampling process ~~will~~ involves capturing an aliquot unfiltered sample within a portable shielded cask. This portable cask ~~can be~~ is then moved to areas of low background radiation for sample analysis. Detector ports in the cask shield can be opened to allow for radioactivity analysis of the sample. The isotopic content of ~~this~~ the sample ~~will~~ is to be determined by isotopic analysis, ~~which is both~~ to provide a qualitative and ~~a~~ quantitative measurement of the radionuclides present in the mix. Decay corrections ~~will be~~ are made to account for decay from sampling time to counting time.

The grab sample cart is a 250-pound shielded device for capturing a volume of gas for analysis ~~at~~ another location. The cart has four wheels and is designed to be easily pulled along the floor by its handle. Manual valves allow ~~gas to circulate~~ the circulation of a carrier gas (argon) through the cart, ~~then capture~~ thus diluting a volume sample within the cart for analysis. Small ports can be opened in the side shielding to allow for sample analysis, thus minimizing personnel exposure.

E. Plant Release Calculation

Plant release rates are calculated from the isotopic analysis in accordance with the following expression:

$$\text{Curies/Sec} = \frac{\frac{\text{Curies}}{\text{cc of sample}} \times \text{Flow (cfm)} \times 2.83\times10^{4}\ \text{cc/ft}^3}{60\ \frac{\text{Sec}}{\text{min.}}}$$

where, curies (time-corrected)/cc of sample is determined from the isotopic analysis as being the sum of the concentrations of the measured radionuclides, and the flow is the stack effluent flow rate.

Subsequent plant release rates may be calculated from the effluent monitor readings in accordance with the following expression:

$$\text{Curies/Sec} = \text{monitor readings (CPM)} \times \frac{\text{Curie/Sec}}{\text{cpm}} \times F/Fi$$ where

$\frac{\text{curies/Sec}}{\text{cpm}}$ is the ratio of the release rate calculated from the isotopic analysis above to the monitor reading when the isotopic analysis sample was taken. The ratio of F/Fi is the ratio of the effluent flow to the effluent flow when the isotopic analysis was taken.

The isotopic analysis of the grab sample will establish the correlation between effluent monitor reading and plant release rate.

6. Radioiodine and Particulate Effluent Monitoring

The sampling media ~~will be~~ are analyzed in the counting room at LSCS. Charcoal cartridges will be reverse-blown with air to purge interferring noble gases. In addition, silver-zeolite cartridges are to be used to further reduce noble gas interference.

Analysis for iodine ~~will be~~ is performed using portable equipment such as an Eberline portable stable assay meter (SAM-2) or a gamma spectrometer multichannel analyzer system with a germanium detector.

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QUESTION 321.20

"Increased Range of Radiation Monitors - Noble Gas Effluent (2.1.8.b Section 1.A and 1.B; Action Plan 11.F.1.a & f).

"It is not clear from the description provided if the increased range monitors are on RE-OD18N001 (station vent) and on RE-OD18N452 (SGTS) as shown on Figure 11.5-1(1) of the FSAR or if they will be in addition to these noble gas station (Units Nos. 1 and 2) monitors. With two shared release points, two high range monitors are required, but only one monitor has been described. Provide additional information on:

1. the type of monitors (inline or offline);
2. method for background radiation correction;
3. capability to obtain radiation readings at least every 15 minutes during an accident; and
4. source of power for the noble gas detectors.

"What provisions have been included with the automatic grab samplers to minimize occupational exposures and to disseminate laboratory analyses results to the Technical Support Center and the control room?

"Provide a commitment to install and calibrate the high range monitors prior to the fuel loading date."

RESPONSE

The Standby Gas Treatment Effluent wide range noble-gas monitor draws samples from ~~two~~ isokinetic probe elements in ~~the~~ its effluent line: OD18-N518 and OD18-N519. The station-vent-stack wide-range noble-gas monitor draws samples from element OD18-N001 in the station vent stack. The above mentioned elements are shown diagramatically on Fig. 11.5-1 (1) of the FSAR.

1) Both of the standby-gas stack monitors and the vent stack monitors are considered off-line type monitors.

2) Background subtraction in both the separate standby-gas monitors and the vent stack monitors is provided by ~~a~~ detectors mounted on the same skid as ~~the~~ their associated mid- and high-range detectors. The subtraction takes place in the RM-80 microprocessor ~~as digital signal subtraction~~ of each unit.

3) Both the standby gas and vent stack monitors provide continuous indication of noble gas activity both locally and in the control room.

Galt

136X-2(ESSS Div II).

4) The standby gas monitor is powered from essential bus ~~[illegible] and~~ the station ~~main~~ vent stack monitor is powered from essential bus 135 Y-1(ESSS Div I).

In order to minimize occupational exposures associated with the automatic grab samplers, additional shielding is provided at each of the wide range monitoring skids.

The minimum implementation date ~~shall be prior to~~ is January 1, 1982. Additional information is included in Section L29 of Appendix L.

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d. the chemical analysis panel;

e. an independent HVAC system;

f. a waste system for the HRSS to prevent wholesale contamination of secondary systems outside the primary containment;

g. pumps to provide drywell sump samples to the liquid sampling panel;

h. valves and piping for the new system;

i. an independent communication system to the control room; and,

j. controls for the entire system.

The actual sampling panels, the HVAC system and controls are installed at elevation 687 feet 6 inches (upper basement level) and the waste equipment (e.g., waste pumps, waste tank, etc.) are installed at elevation 663 feet 0 inch (basement level). The upper basement sampling room has shielded access independent from the reactor building proper and will allow removal of post-accident samples without excessive exposure to personnel.

Liquid Sampling Subsystem

The HRSS liquid sampling panel is capable of sampling;

a. reactor coolant from the discharge side of the recirculation pump in the B recirculation loop;

b. reactor coolant from the discharge side of the residual heat removal heat exchangers (A and B);

c. reactor coolant from the discharge side of the cleanup nonregenarative heat exchangers before entering the reactor water cleanup demineralizers;

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d. reactor coolant from the discharge side of the reactor water cleanup demineralizers (A, B, and C);

e. water from the drywell equipment drain sump;

f. water from the drywell floor drain sump; and

g. water from the HRSS tank.

Disolved gases Analysis

In addition to taking the above liquid samples for either onsite or offsite analysis the HRSS liquid sample panel is capable of stripping disolved gases from a pressurized sample and routing the gases and the degassed and depressurized liquid sample to the adjacent chemical analysis panel. The chemical analysis panel has in-line ph, conductivity, and oxygen analyzers for ~~the~~ these liquid samples. Ion and gas choromatographs capture sample "bites" of liquid and gas respectively by means of automatic valves operated as part of the sampling/analysis cycle controlled by the instrument. The ion chromatograph determines chlorine concentration and the gas chromatograph determines hydrogen concentration. An analysis for boron concentration if

Sampling Program Frequency

Actual frequency of sampling shall be determined by station management, however, as a minimum the first sample can be taken within an hour from the time a decision is made to take a sample, at least one sample per day for the next 7 days, and at least one sample per week thereafter.

The time interval between taking a sample and receipt by plant management of the results of analysis is less than three hours.

QUESTION 321.22

"Post Accident Sampling (2.1.8.a; Action Plan II.B.3).

"Indicate that the new systems for reactor water sampling during an accident will be accessible to the laboratory and counting facilities. We require that the containment atmosphere be sampled and analyzed, in addition to the direct instrumentation subsystem. Provide the sample location.

"Provide a commitment to install and calibrate the post accident sampling equipment prior to the fuel loading date."

RESPONSE

The High Radiation Sampling Station is accessible by personnel of the laboratory and counting facilities by way of the auxiliary building stairs located near column 15 and row N. To transfer the radioactive samples from the upper basement floor to the ground floor, a portable, battery-powered gantry crane is used to lift the liquid and air sample carts, that contain the radioactive samples, through a hatch located in the ground floor at column 15 and row R.

The containment atmosphere can be sampled at the same point. The High Radiation Sampling System (HRSS) shares the same sample location with the post-LOCA Containment Monitoring System-B. Either drywell air or suppression pool air can be sampled by the HRSS by using the shut-off valves for the post-LOCA Containment Monitoring System-B. The controls for these valves are located in the control room.

Item II.B.3 of Appendix L describes the post-accident sample system and provides a commitment to install and have the system operational prior to full power operation.

L.37 PRIMARY COOLANT SOURCES OUTSIDE CONTAINMENT (III.D.1.1)

FULL POWER LICENSE REQUIREMENT:

Reduce leakage from systems outside containment that would or could contain highly radioactive fluids during a serious transient or accident to as-low-as-practical levels, measure actual leak rate and establish a program to maintain leakage at as-low-as-practical levels and monitor leak rates.

This requirement shall be met before issuance of a full-power license. See NUREG-0578, Section 2.1.6a (Ref. 4), and letters of September 27 (Ref. 23) and November 9, 1979 (Ref. 24).

POSITION:

A program has been developed to monitor leakage from systems outside the containment which could be used to transport highly radioactive fluids in a post-accident condition. This program includes the following features:

a. A combination of general inspections and detailed system walkdown of liquid systems. These inspections are done with the system operating at approximately expected pressure in a normal or test mode.

b. Systems containing gases are to be tested by use of tracer gases (DOP, freon, or helium), by pressure decay testing, or by metered makeup tests.

c. An aggressive maintenance program is used to assign high priorities to leakage related work requests. Essentially all leakage on concerned systems will be covered.

d. Systems lists have been provided to the NRC for review detailing specific methods used to test systems, the systems involved, and frequency of testing. Insert

e. Leakage-related work requests are to be reviewed to evaluate possible modifications to keep leakage "as low as practical."

This program is to be initiated prior to fuel load; however, some of the inspections cannot be completed until after start up, due to the plant conditions required.

Insert to L.37

This test is described in LaSalle Station Procedure LAP-100-14.

In addition to this testing program, system leakage tests will be performed on the LPCS, HPCS, RHR and RCIC as part of the 10CFR50, Appendix J leakage testing program. The systems will be pressurized with water to a hydrostatic pressure of 1.1 times the peak LOCA pressure in the containment, the leakages from the entire system measured and compared with the acceptance criteria established for post-LOCA leakage. The frequency of the test is established by the Appendix J requirements associated with Type C testing. The valves subject to this test that form the containment boundary are identified in Table 6.2-21 by reference to Notes 29 and 39.