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SUBJECT: Forwards responses to questions from 900926 conference calls re radiation monitoring sys license amend request.

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SUBMITTAL OF ADDITIONAL INFORMATION - RADIATION MONITORS

Gentlemen:

Attached are responses to questions raised during a September 26, 1990 and subsequent conference calls between Carolina Power & Light Company and NRC staff regarding the Radiation Monitoring System license amendment request currently pending.

Questions regarding this matter may be referred to Mr. R. W. Prunty at (919) 546-7318.

Yours very truly,

L. I. Loflin
Manager
Nuclear Licensing Section

JSK/ch (838RNP)

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ATTACHMENT

Question 1. Provide a brief summary of the modifications being performed on the Plant Vent radiation monitors which addresses the upgrade of the monitors and the associated isokinetic sampling methodology.

Response: The plant vent is presently monitored by a variety of monitors which are manufactured by three different vendors. These monitors and associated ranges (in μCi/cc) are as follows:

R-14 Noble Gas (Low Range)	2.0×10^{-5} to 1.0×10^{-1}
R-34A Particulate	See note 1
R-34B Iodine	See note 1
R-34C Noble Gas	1.0×10^{-7} to 1.0×10^{-2}
R-35 Noble Gas (Intermediate Range)	1.0×10^{-3} to 1.0×10^{2}
R-36 Noble Gas (High Range) (note 2)	1.0×10^{1} to 1.0×10^{5}

Note 1: Low range particulate and iodine filters are analyzed for effluent accountability consistent with Technical Specification Table 4.10-2.

Note 2: High range particulate and iodine activity is sampled in the flow path and the particulate filter can be analyzed in the hot lab over the required range of 10^{-3} to 10^{2} μCi/cc as required by Reg. Guide 1.97.

The above channels will be replaced with a single, state-of-the-art, microprocessor controlled, user friendly, off-line, wide range stack monitor. The new monitor will perform all the functions of the existing equipment, i.e., satisfy both the normal and accident range monitoring and control requirements in a single integrated system. The new channels, functions and associated ranges (in μCi/cc) are as follows:

R-14A Particulate	6.7×10^{-12} to 6.7×10^{-7}
R-14B Iodine	3.5×10^{-11} to 3.5×10^{-5}
R-14C Noble Gas (Low Range)	2.4×10^{-7} to 2.4×10^{-2}
R-14D Noble Gas (Intermediate Range)	1.0×10^{-3} to $1.0 \times 10^{+2}$
R-14E Noble Gas (High Range)	1.0×10^{-1} to $1.0 \times 10^{+5}$

Note: High range particulate and iodine activity is sampled in the high range R-14 sampler and the particulate and iodine filters can be analyzed. The low range R-14 sampler also contains particulate and iodine filters which are analyzed for effluent accountability consistent with Technical Specification Table 4.10-2.

The existing system samples the plant vent via a constant volume sample probe. This sampling system does not include a flow control system to enhance isokinetic sampling conditions. The new system utilizes an isokinetic flow control system to modulate the sample flow in response to stack flow rate, thereby maintaining the particulate sample being analyzed as representative of the plant vent exhaust. The new system also utilizes density correction on the gas channels which increases the accuracy of the stack measurements.

The new equipment provides the following additional benefits:

1. Sample system utilizes redundant sample pumps thereby reducing down time.

2. Calibration methodology is made simpler by eliminating the need for hot gaseous releases.

3. The new system is more sensitive to krypton 85 due to use of Beta Scintillation detectors on the intermediate and high ranges.

Plant performance is improved since the new equipment is more reliable, maintenance and downtime are reduced, and more accurate calibration is attainable. The maintenance requirements of the new equipment is greatly reduced because the systems are microprocessor based and are inherently reliable. Serviceability is improved since the system replaceable parts are reduced, component parts are readily available (through one vendor), and the components are conveniently located for accessibility.

Question 2. Provide an assessment of the modification load change on the Station Batteries.

Response: Regulatory Guide 1.97 states that for Category 2 equipment power sources, "the instrumentation should be energized from a high reliability power source, not necessarily standby power, and should be backed up by batteries where momentary interruption is not tolerable." Per regulatory Guide 1.97 section D (Applicability) this is acceptable guidance to fulfill NUREG-0737 Table II.F.1-1 Power Supply requirements for the Noble Gas Effluent Monitor. Since the plant vent radiation monitor is not nuclear safety related and its operation is not required to support nuclear safety related equipment from mitigating the consequences of a postulated accident, momentary interruption is acceptable and battery back-up is not required. CP&L has determined that the balance

of plant power panels provide the high level of reliability required by the regulatory guide and the operating requirements of the radiation monitor. LP-27 (which is diesel backed) was chosen to supply the new system. A load study evaluation was performed and the panel was found to be acceptable.

QUESTION 3. What is the minimum detectable level of activity and minimum detectable flow (break size) that can be detected by the Main Steam Line radiation monitors given a Steam Generator tube rupture?

Also address the relative response time of the Condenser Vacuum Pump Vent monitor versus the Main Steam Line monitors to a Steam Generator tube rupture or leak.

RESPONSE: Primary to Secondary leak detection is presently provided by R-15 (Condenser Air Ejector Monitor), R-19 A,B and C (Steam Generator Blowdown Monitors), and R-31 A,B and C (Main Steam Monitors). The typical Lower Limit of Detection (LLD) for the monitors are as follows:

MONITOR	LLD
R-19 Monitors	2.43E-07 μCi/ml
R-15	3.99E-05 μCi/cc
R-31 Monitors	2.38E-01 μCi/cc

NOTE: The typical LLD's were determined from current calibrations and from typical operating backgrounds. The R-31 LLD was determined for the updated detectors to be installed in this upgrade.

The R-19 monitors and R-15 monitor provide indication in the range of 1.0E-06 to 1.0E-02 μCi/cc as required by Regulatory Guide 1.97; therefore, providing early detection in the event of primary to secondary leakage.

The Main Steam radiation monitoring system is designed to assess any radioactive release to atmosphere from the main steam line dump to atmosphere valves. These monitors were installed to meet the requirements of NUREG-0578 which requires that all points of potential radioactive material release be monitored. The range of these monitor channels is 1.0E-02 to 1.0E+03 μCi/cc.

This modification will not change the sensitivity of the normal range leak detection monitors (R-19 A,B,C and R-15). This upgrade will; however, remove the vent pathway of R-15 and route it permanently to the Plant Vent Stack. This will reduce the release concentration of this effluent pathway to the environment in the event of primary to secondary leakage, but will maintain current capabilities for leak detection.

The ability of the monitors to detect a primary to secondary leak rate at the sensitivities of the monitors depends greatly on the source term available; therefore, assumptions at nominal Reactor Coolant activities and one percent failed fuel were used for this calculation. The one percent failed fuel source terms were obtained from Table 11.1.1-2 of the Updated F.S.A.R. and nominal activities from typical operating analysis in 1988 when small fuel leaks were noted.

The primary to secondary leak rate detection at the monitors' Lower Limit of Detection level assuming a one percent failed fuel RCS activity are as follows:

MONITOR	LEAK RATE DETECTION
R-19 Monitors	4.57E-07 (GPM)
R-15	4.49E-03 (GPM)
R-31 Monitors	1.45E+03 (GPM)

The primary to secondary leak rate detection at the monitors' Lower Limit of Detection level for a typical operating analysis with a small fuel leak present are as follows:

MONITOR	LEAK RATE DETECTION
R-19 Monitors	7.24E-04 (GPM)
R-15	1.18E-01 (GPM)
R-31 Monitors	3.82E+04 (GPM)

As can be seen, the ability of these monitoring systems to detect primary to secondary leakage depends on the source term and the size of the primary to secondary leak rate. Small leaks should be identified first by the R-19 Monitors. The response time of these monitors is sufficient to prevent the discharge of liquid effluents to the environment above 10CFR20 limits in the event of primary to secondary leakage as previously identified by NED during implementation of MOD 898. R-15 response time to a primary to secondary leak rate above the Lower Limit of Detection is almost immediate since the Condenser Vacuum Pumps are continuously removing gas from the condenser. The R-31 Monitors response time would be immediate; however, due to it's low sensitivity the primary to secondary leak would have to be several orders of magnitude higher. This monitor meets the Reg. Guide 1.97 Main Steam high range monitoring requirements.