May 3, 1989

MEMORANDUM FOR: John N. Hannon, Director
Project Directorate III-3
Division of Reactor Projects - III, IV, V and Special Projects

FROM: Thomas W. Alexion, Project Manager
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SUBJECT: SUMMARY OF NRR INSPECTION OF NOBLE GAS MONITORING AT CALLAWAY

On April 12, 1989, John Minns (PRPB) and I conducted an NRR inspection of the noble gas effluent monitors at Callaway. The purpose of the inspection was for NRR to obtain a better understanding of the monitors in order to respond to Region III concerns regarding their location and the lack of technical specifications (TS). Representatives from Union Electric Company (UE), the licensee, included Dave Shafer (Supervising Engineer Licensing), Neal Slaten (Supervising Engineer) and Brian Holderness (Health Physicist).

We observed the location of the 4 stationary secondary noble gas monitors. They are Geiger-Mueller tube detector assemblies (General Atomics Model Number RD-12). They are on the auxiliary building roof and they sit between the safety valve exhaust stacks at the base of those stacks. However, the licensee indicated that they are shielded and collimated to detect the plume from the secondary power operated relief valve (PORV) stacks, which are about 10 to 15 feet from the 4 monitors. There are 4 secondary PORV stacks (with silencers) and 40 safety valve exhaust stacks.

We also observed the portable monitor and identified the type (ionization chamber), manufacturer (Eberline Model Numbers RO-2 and RO-2A), and capabilities (0 to 5 R/hr and 0 to 50 R/hr). We also observed the location where the portable monitor reading would be taken (in the event the secondary PORV is blocked). The location is 1 foot from the containment building on the main steam line. The PORV tee-offs are downstream from the portable monitor locations, the safety valve tee-offs are downstream from the PORV's, and the MSIV's are downstream from the safety valves. The steam tunnel appears adequate for taking readings with the portable monitor with regard to lighting and room configuration. The licensee stated that physical environment of the room (temperature, radiation) would be evaluated by the appropriate emergency personnel for the specific accident involved and by the portable monitor operator as the steam tunnel is approached. The portable monitor has no hook up capability for a recorder.

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The licensee stated that in the event a reading with the portable monitor is needed, the TSC would call the OSC. The OSC would identify the monitor to be used and dispatch two HP technicians to the steam tunnel to take a reading (during backshift there are at least one HP foreman, two HP technicians, and two radiation technicians available). The HP technicians would then take the reading and relay the information back via portable radio or the nearest gaitronics device (about 50-100 feet away). The licensee estimated that the worst case time between a request for a reading and an actual reading being taken and communicated would be about 5 minutes.

The licensee provided us with sample calculations from a hypothetical portable monitor reading. A reading of 500 mrem/hour with one safety valve open (4,816 cfm) on the main steam line (with a conversion factor of 18.0 which also corrects for low energy gamma attenuation) results in a release rate of 4.34 E7 microcuries/second. This release rate is converted into a whole-body dose of 0.14 rem and a thyroid dose of 0.87 rem at the exclusion area boundary when consideration for stability class C meteorological conditions (factor of 3.2), wind speed (2.5 meters/second), and a steam-generator-tube-rupture accident conversion factor of 1.3E-9 are factored in. By a similar process, the licensee back-calculated that a whole-body dose of 1 rem (over 2 hours) at the exclusion area boundary would result in a portable monitor reading of 1,600 mrem/hour (assuming stability class D meteorological conditions).

We also observed the lab where the portable monitors are calibrated. They are calibrated every 6 months in a calibration chamber with a known radioactive source. The licensee also stated that the portable monitors are a very common and widely used monitor at the plant.

Additionally, the following questions were answered during the course of the inspection and during discussions with the licensee:

Q1 - Under what conditions would a portable monitor be used?

A1 If there was a SGTR event <u>and</u> the secondary PORV in the affected loop was blocked, then the portable monitor would be used. Also, the TS will limit the amount of time a secondary PORV can be blocked, thereby minimizing the likelihood of portable monitor use (application under review).

Q2 - Should the portable monitor be placed in a collimated, shielded assembly?

A2 - No. The reading is taken right on the main steam line at point-blank range. Any background or other radiation will only make the monitor reading more conservative.

Q3 - Does the portable monitor require a special calibration program?

A3 - No. The current calibration program calibrates up to the upper range of the monitor, and it is therefore acceptable.

Q4 - Can the portable instrument and its operator survive the environment?

A4 - The technician will monitor the radiation levels and observe other factors (heat, humidity) as the steam tunnel is approached. Also, the RO-2A monitor can read (and therefore operate) in a 50 rem/hour radiation field.

Q5 - If a PORV is blocked and the steam tunnel environment is unacceptable, what will be done?

A5 - A steam enclosure space contact reading can be taken (on the outside wall) and this contingency is provided for in the calculation worksheet. Also, field data will be available to support the necessary dose calculations.

Q6 - What correction factors are provided for the portable monitor as a function of time after shutdown?

A6 - None. The detector response is not energy dependent and the radionuclide spectrum does not change during the short (2 hour) accident duration assumed in the FSAR.

Q7 - Is adequate training provided for the portable monitor use?

A7 - Yes, this is included in emergency training. Also, this is a very common instrument.

Q8 - Why is the primary monitoring not done on the steam line?

A8 - The current arrangement more directly detects what is actually released to the environment and it does not have to account for low energy gamma attenuation.

Q9 - Are these monitors being properly controlled by plant administrative procedures?

A9 - Yes. The primary monitor is calibrated every 18 months and if it fails there is a loss-of-count alarm. The backup (portable) monitor is calibrated every 6 months and has a functional test at each use.

Q10 - What is the primary monitor calibration technique?

A10 - A calibrated source is taken up to the monitor.

Q11 - Are representative measurements assured with the primary monitor?

A11 - Yes. At most there is a 1% attenuation by air and negligible attenuation by steam.

Q12 - Does the primary monitor have the capability to obtain readings during and following an accident?

A12 - Yes. Also, the RM-11 and RM-23 display monitors display the data in the control room.

Q13 - Do release rates for the primary monitor consider radionuclide spectrum distribution as a function of time after shutdown?

A13 - No. The primary monitor (Geiger-Mueller tube) response is not energy dependent and the licensee does not assume that the spectrum changes in 2 hours (in accordance with FSAR Chapter 15 analyses). If the accident progressed beyond 2 hours, the licensee indicated they would consider spectrum changes if necessary.

At the end of the inspection, we thanked the licensee for their time and effort provided on our behalf, and told them that all of our questions (at this time) have been answered and that our understanding of their monitoring system was significantly improved. We also informed them that the NRC will be evaluating their noble gas monitoring system for adequacy.

/s/

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