SNUPPS

Standardized Nuclear Unit
Power Plant System

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Executive Director

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SLNRC 83-0048 FILE: 0278
SUBJ: Effluent Treatment Systems Branch Review

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

Docket Nos. STN 50-482 and STN 50-483

Dear Mr. Denton:

SNUPPS licensing confirmatory issues 28, II.F.1 for the Callaway Plant and B.28, II.F.1 for Wolf Creek Generating Station require that additional information be provided to address NRC staff positions 1, 2, and 3 regarding additional accident monitoring instrumentation. Information addressing position 3 has been provided in Revision 7 to the SNUPPS FSAR. Enclosed are additional technical data required to address positions 1 and 2 and marked-up FSAR pages to be incorporated in the next revision to the SNUPPS FSAR.

Positions 1 and 2 also require a post-implementation review of system drawings and procedures. Scheduling of this post-implementation review will be coordinated through the NRC Project Managers for the SNUPPS facilities.

Very truly yours,

N A Petrick

Nicholas A. Petrick

MHF/nld

Enclosures: A. Additional Information for the ETSB Review
B. Revised FSAR pages

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RESPONSE TO TMI-2 REQUIREMENT II.F.1, ATTACHMENT 1

Unit Vent and Radwaste Building Effluent Monitors

The plant unit vent and radwaste building wide range noble gas effluent monitors cover a range of 10^{-7} to 10^{5} microcuries/cc by utilizing three detectors with overlapping ranges and parameters as shown below:

Detector	Range (microcuries/cc-equiv. Xe-133)	Sensitivity CPM / (microcuries/cc) With Respect to Xe-133
RD52 Low Range	1.7×10^{-7} to 10^{-1}	2.94×10^{7}
RD72 Mid Range	10^{-4} to 10^{2}	1.42×10^{4}
RD72 High Range	10^{-1} to 10^{5}	49.4

The plant unit vent monitor and the radwaste building effluent monitor are GA Technologies Wide Range Gas Monitors, Models 0366-0000-14 and 0366-0000-11, respectively. The monitors measure the activity concentration of the unit vent and radwaste building effluent in units of microcuries/cc of dose equivalent Xe-133. A background correction is made by the microprocessor (RM-80) which automatically subtracts a previously entered background activity concentration value. The Radioactivity Release Information System (R^2IS) computes release rates (microcuries/sec) by multiplying the unit vent or radwaste building effluent concentration by the respective flow rate.

The plant operator may select a preprogrammed radionuclide spectrum distribution (i.e., normal reactor coolant, LOCA, waste gas decay tank rupture, or spent fuel handling accident) or later input actually measured distribution determined by analysis of grab samples.

Plume Monitors

The gamma detectors used to monitor the plume from each of the four main steam power-operated relief valves and the steam discharge from the turbine-driven auxiliary feedwater pump are GA Technologies Model 0360-5201-03. The plume monitors are mounted on the auxiliary building roof in a position to view their associated steam plume/turbine steam discharge. The monitors utilize a G-M tube detector which is collimated on the plume and shielded (4π) by 7½" of lead. The range of the GM tube is 1 to 10^{5} mR/hr. A background correction is made by the microprocessor (RM-80) which automatically subtracts a previously measured background radiation value. The Radioactive Release Information System (R^2IS) takes the dose rate (mR/hr) detector output and converts this reading to a plume

concentration (microcuries/cc) by multiplying by a dose rate-to-concentration $\frac{\text{microcuries/cc}}{\text{mR/hr}}$ conversion factor which accounts for the detector - source geometry and an energy response correction factor of 0.37 for Xe-133. This results in a measurement range of 1.3×10^{-2} microcuries/cc to 1.3×10^{3} microcuries/cc. The R^2IS computes a release rate (microcuries/sec) by multiplying the plume activity concentration (microcuries/cc) by the steam discharge rate and appropriate unit conversion factors which are dependent on steam pressure.

The plant operator may select a preprogrammed radionuclide spectrum distribution (i.e., normal reactor coolant or LOCA). This distribution remains constant for the time of release.

RESPONSE TO TMI-2 REQUIREMENT II.F.1, ATTACHMENT 2

The SNUPPS sampling equipment for the high-range radioiodine and particulate effluents from the plant and radwaste building vents are General Atomics systems associated with the wide range noble gas monitors. Each system has three high range particulate and iodine cartridges in heavily shielded casks that can be completely disconnected from the system and transported without removing the cartridges from their original casks. During an accident, the flow rate through the sample cartridges is much less than that through the cartridges used for normal operation. The flow rate is low to minimize the dose rate to personnel retrieving the cartridges. Therefore the shielding is adequate to protect personnel even with an air concentration of 10^2 microcuries/cc.

The sample filter cartridges have a collection efficiency for iodine and particulates of well above 90%.

The sampling system is designed in accordance with the provisions of ANSI N13.1-1969.

The sample lines are heat traced to ensure that moisture will not condense out and degrade the adsorber.

The sample collection is continuous with one of three separate filter cartridge assemblies collecting the sample at all times during an accident.

Each sampler has three separate filter cartridges. The filter cartridges are inside of heavily shielded casks that detach from the sampling line. The casks then serve as transport casks. The heavy shielding plus the low collection flow rate during accidents ensure that personnel exposures are within the 10 CFR20 limits. The sample analysis will be performed using extended distance geometries. The low sample collection flow rate plus the use of extended distance geometrics will ensure that the analysis equipment is not saturated.

Sampling of iodines and particulates during an accident will comply with the guidelines for approximate isokinetic conditions discussed in Section II.F.1, Attachment 2, Clarification (3) of NUREG-0737. The ventilation flow rate during the accident is much lower than during normal operation. In order to compensate and achieve approximately isokinetic conditions during an accident, the SNUPPS wide range effluent monitoring system provided by General Atomics has a special low flow isokinetic nozzle and a special low flow pumping system.

18.2.12.2 SNUPPS Response

Radiological Noble Gas Effluent Monitors

The SNUPPS design provides a high range noble gas radiation monitor for each of the release paths listed below. Each monitor will include detectors covering a range shown below:

MONITOR	RANGE
Plant unit vent (GT-RE-21B)	10^{-7} to 10^{+5} μCi/cc
Radwaste building effluent (GH-RE-10B)	10^{-7} to 10^{+5} μCi/cc

The locations of these monitors are given as the P&IDs for their respective system. Separate monitoring capability for the condenser air removal system is not provided because this system exhausts through the plant vent. The SNUPPS design includes gamma detectors to monitor the plume from the main steam power-operated relief valves and to monitor the steam discharge from the turbine-driven auxiliary feedwater pump. Additional information on this monitoring system will be provided at least 4 months prior to fuel load of the first SNUPPS unit.

Continuous indication will be provided in the control room for each monitor. Each monitor will be recorded in the control room.

The system/methods for monitoring and analysis will be incorporated into Section 11.5 of the FSAR upon completion of the design. The readouts from the high range monitors will be input to the plant computers. This information will then be accessible from the technical support center and the emergency operations facility.

The procedures used to calibrate the instruments and calculate release rates will be incorporated into the procedures for the respective facilities.

The following additional information was ~~will be~~ provided in Reference 10: ~~at least 4 months prior to fuel load of the first SNUPPS unit.~~

a. System description information, including energy dependence or response, range and sensitivity with respect to Xe-133, vendor model number, and methods used to assure representative measurements and background correction.

b. The calculational methods or procedures to be used for converting instrument readings to release rate per

unit time based on exhaust air flow and considering radionuclide spectrum distribution as a function of time after shutdown.

Provisions for Continuous Sampling of Plant Effluents for Post-Accident Releases of Radioiodines and Particulates

The SNUPPS design will provide continuous sampling for effluent radioiodines. The high range noble gas effluent monitors described above include the capability to obtain grab samples. The sampling will be accomplished with absorption charcoal filters or other media. The sampling system criteria for all airborne monitoring systems are provided in Section 11.5.2.3.1.3 of the FSAR. After collection, laboratory analyzers will be used to quantify iodine releases. A backup power source will be provided for sample collection and analysis equipment to ensure operation for a minimum of 7 consecutive days. The procedures for each facility will discuss the methods and counting equipment used to determine releases. The expected doses from obtaining and counting a sample will be presented in a revision to the FSAR. Additional information regarding how the SNUPPS design meets the recommendations of Table II.F.1-2 and the provisions for approximate isokinetic sampling ~~will be~~ was provided ~~at least 4 months prior to fuel load of the first SNUPPS unit~~. in Reference 10.

3. "Analysis of Delayed Reactor Coolant Pump Trip During Small Loss of Coolant Accidents for Westinghouse Nuclear Steam Supply Systems," WCAP-9584 (Proprietary) and WCAP-9585 (Non-Proprietary), August 1979.

4. Letter OG-49, dated March 3, 1981, Jurgensen, R. W. (Chairman, Westinghouse Owners Group) to Ross, D. F., Jr. (NRC).

5. Letter OG-50, dated March 23, 1981, Jurgensen, R. W. (Chairman, Westinghouse Owners Group) to Ross, D. F., Jr. (NRC).

6. Letter NS-TMA-2318, dated September 26, 1980, Anderson, T. M. (Westinghouse) to Eisenhut, D. G. (NRC).

7. Letter NS-TMA-2357, dated December 23, 1980, T. M. Anderson (Westinghouse) to D. G. Eisenhut (NRC).

8. Rockwell, T., Reactor Shielding Design Manual, D. Van Nostrand Co., New York, New York, 1956.

9. QAD-CG: A Combinatorial Geometry Version of QAD-P5A, Bechtel Power Corporation internal computer code.

10. Letter SLNRC 83-0048, dated September 1, 1983, N. A. Petrick (SNUPPS) to H. R. Denton (NRC).