PSNH

SEABROOK STATION
Engineering Office

Public Service of New Hampshire

New Hampshire Yankee Division

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United States Nuclear Regulatory Commission
Washington, DC 20555

Attention: Mr. Vincent S. Noonan, Project Director
PWR Project Directorate No. 5

Reference: (a) Construction Permits CPPR-135 and CPPR-136, Docket Nos. 50-443 and 50-444

Subject: Primary Auxiliary Building (PAB) Radiation Monitor

Dear Sir:

The Seabrook Station FSAR Section 12.3.4.2.2(c), "Primary Auxiliary Building Monitor - Channel 6532," states that the sample withdrawal point for this monitor is upstream of Filter Train F-16. In fact, the actual plant configuration has the sample withdrawal point downstream of the filter train.

We were requested by your Mr. R. Serbu to provide a discussion on the existing design and a justification for the present configuration. Attachment 2 provides that justification and concludes that the isokinetic nozzles for RM-6532-1 and RM-6532-2 can remain downstream of the PAB ventilation filters. Attachment 1 provides the necessary FSAR changes which will be incorporated in the FSAR via a future amendment.

Should you or your staff have any questions, please do not hesitate to contact us. We do request that the acceptability of this subject be reflected in a future supplement to Seabrook Station's SER.

Very truly yours,

John DeVincentis
Director of Engineering

Attachments

cc: Atomic Safety and Licensing Board Service List

B001
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Diane Curran, Esquire
Harmon & Weiss
2001 S. Street, N.W.
Suite 430
Washington, D.C. 20009

Sherwin E. Turk, Esq.
Office of the Executive Legal Director
U.S. Nuclear Regulatory Commission
Tenth Floor
Washington, DC 20555

Robert A. Backus, Esquire
116 Lowell Street
P.O. Box 516
Manchester, NH 03105

Philip Ahrens, Esquire
Assistant Attorney General
Department of The Attorney General
Statehouse Station #6
Augusta, ME 04333

Mrs. Sandra Gavutis
Chairman, Board of Selectmen
RFD 1 - Box 1154
Kennsington, NH 03827

Carol S. Sneider, Esquire
Assistant Attorney General
Department of the Attorney General
One Ashburton Place, 19th Floor
Boston, MA 02108

Senator Gordon J. Humphrey
U.S. Senate
Washington, DC 20510
(ATTN: Tom Burack)

Richard A. Hampe, Esq.
Hampe and McNicholas
35 Pleasant Street
Concord, NH 03301

Donald E. Chick
Town Manager
Town of Exeter
10 Front Street
Exeter, NH 03833

Brentwood Board of Selectmen
RFD Dalton Road
Brentwood, NH 03833

Peter J. Mathews, Mayor
City Hall
Newburyport, MA 01950

Calvin A. Canney
City Manager
City Hall
126 Daniel Street
Portsmouth, NH 03801

Stephen E. Merrill, Esquire
Attorney General
George Dana Bisbee, Esquire
Assistant Attorney General
Office of the Attorney General
25 Capitol Street
Concord, NH 03301-6397

Mr. J. P. Nadeau
Selectmen's Office
10 Central Road
Rye, NH 03870

Mr. Angie Machiros
Chairman of the Board of Selectmen
Town of Newbury
Newbury, MA 01950

Mr. William S. Lord
Board of Selectmen
Town Hall - Friend Street
Amesbury, MA 01913

Senator Gordon J. Humphrey
1 Pillsbury Street
Concord, NH 1
(ATTN: Herb Boynton)

H. Joseph Flynn, Esquire
Office of General Counsel
Federal Emergency Management Agency
500 C Street, SW
Washington, DC 20472

Paul McEachern, Esquire
Matthew T. Brock, Esquire
Shaines & McEachern
25 Maplewood Avenue
P.O. Box 360
Portsmouth, NH 03801

Gary W. Holmes, Esq.
Holmes & Ells
47 Winnacunnet Road
Hampton, NH 03841

Mr. Ed Thomas
FEMA Region I
442 John W. McCormack PO & Courthouse
Boston, MA 02109

Stanley W. Knowles, Chairman
Board of Selectmen
P.O. Box 710
North Hampton, NH 03862

Indication and alarm is available locally and in the main control room for both units.

See Subsections 5.2.5.3.b.2, 5.2.5.5.b and 5.2.5.5.c for a further discussion of monitoring requirements.

(b) Waste Process Building Monitor - Channel 6531

The major potential release of airborne radioactivity in the waste processing building is that associated with the gaseous waste processing system. The gas dryers, carbon delay beds and the two gas compressors are situated in their individual compartments, and these compartments are ventilated in such a way that they are at a negative pressure with respect to surrounding areas. The ducted ventilation exhaust is continuously sampled and monitored. The sample is returned to the ducted ventilation exhaust line which is directed to the Unit 1 vent. Both the sampling point and the return are downstream of the filters in the ventilation exhaust line outside the building. Information from this channel is displayed and alarmed on the radiation monitoring system panel in the main control room of Unit 1 and locally.

(c) Primary Auxiliary Building Monitor - Channel 6532

Three minimum ventilation areas have been defined for the primary auxiliary building:

(1) Heat exchanger, thermal regeneration demineralizer, and mixed bed demineralizer area,

(2) Volume control tank area, and

(3) Charging pump area.

These areas, which are potential sources of airborne activity, are maintained at a negative pressure with respect to surrounding areas. The PAB ventilation system collects potentially contaminated air through a duct system and discharges it to the plant vent via filter train F-16. The sample withdrawal point for this monitor (RM-6532) is downstream ~~upstream~~ of filter train F-16. The location of this sample withdrawal point provides an early warning to the operating personnel in the event that radioactive material becomes airborne in the PAB.

Indication and alarm is available locally and in the main control room. An alarm indication on these monitors would trigger a radiological evaluation within the areas 49 48

ATTACHMENT 2

DISCUSSION ON PRESENT CONFIGURATION OF PAB RADIATION MONITOR

BACKGROUND

FSAR Section 12.3.4.2 states that monitored points within the station ventilation system are in areas where potential personnel exposure to radiation is most likely and in several ventilation exhaust ducts.

The Primary Auxiliary Building (PAB) ventilation system is monitored as follows:

RM No.	Description	Type	Range
6532-1	Air Particulate	Skid-Mounted	10^{-11} - 10^{-7} uCi/cm^3
6532-2	Radiogas	Skid-Mounted	10^{-7} - 10^{-3} uCi/cm^3
6567	Miscellaneous Ventilation	Duct-Mounted	10^1 - 10^6 cpm
6568	Containment Enclosure	Duct-Mounted	10^1 - 10^6 cpm

Monitor 6567 is located at the inlet to the PAB cleanup filter. The following areas are monitored by this detector: valve aisle, volume control tank area, sample heat exchanger room, sample room fume hood, degassifier area, PAB lower level Elevation -6 ft., and PAB filter and heat exchanger area.

Monitor 6568 is located in the exhaust duct from the containment enclosure at the inlet to the cleanup filter. The following areas are monitored by this detector: charging pump cubicles, safety injection pump cubicles, residual heat removal equipment areas, containment spray pump and heat exchanger equipment areas, mechanical penetration area, and the containment enclosure ventilation equipment area.

Monitors 6567 and 6568 are gross activity monitors located in the ducts upstream of the PAB ventilation filters. Monitors 6532-1 and -2 on the other hand are skid-mounted. They utilize isokinetic nozzles and sample lines to draw a sample from the downstream side of the PAB filters. The total exhaust

flow from the PAB ventilation system is 41,500 cfm. Attachment 3 is a detailed list of the areas and rooms that discharge via the PAB ventilation filters to the plant vent stack.

The PAB ventilation filter housing is a box approximately 18 ft. x 15 ft. x 15 ft. The PAB ventilation ducts enter this housing approximately 2-1/2 ft. away from the prefilters.

FSAR Section 12.2.2.2 (Leakage Sources - Auxiliary Building) notes that there are several areas in the PAB which have a concentration of piping and valves with a potential for significant contributions to airborne contamination. None of these areas require continuous occupancy. The design basis maximum leakage rate to the PAB, per NUREG-0017, is 20 gpd. The source for these areas is reactor coolant with 0.25% fuel clad defects, as presented in Table 11.1-1. Airborne concentrations are presented in Table 12.2-35 (Attachment 4 to this letter) for the average contaminated area.

Attachment 4 shows the expected airborne noble gas and iodine concentrations with 0.25% fuel clad defects. Note that particulates are not expected. Iodines are expected to be accompanied by noble gases.

Section 12.3.4.2, Page 12-7, of the Seabrook Safety Evaluation Report (SER) states: "The applicant will also provide <u>upstream</u> monitoring for the PAB" (emphasis added).

Furthermore, FSAR Section 12.3.4.2.a (Airborne Radioactivity Monitoring Instrumentation) states: "The sensitivity of the airborne radioactivity monitors is such that they should be capable of detecting ten (10) MPC hours of particulate, iodine, and gaseous radioactivity in those plant areas which have contained sources of airborne radioactivity and which may be occupied by personnel ...."

DISCUSSION

As noted in our telephone conversation with your Mr. Serbu on April 15, 1986, we have determined that the isokinetic nozzles for the PAB ventilation monitor (RM-6532-1, RM-6532-2) have been installed downstream of the PAB ventilation filters rather than upstream as previously required in the SER.

We would like to state our reasons for proposing that the nozzles remain in their installed (downstream) location.

During operation with defective fuel, it is expected that noble gases and iodine predominantly will be present in the PAB ventilation. Iodine is not likely to be present without noble gases. With respect to monitoring for noble gases, RM-6532-2 will function whether the sample line inlet is upstream or downstream of the PAB filters. Noble gases will penetrate the prefilters, HEPA filters, and charcoal adsorbers. Noble gases are usually the first indication of a breach or leak in a Reactor Coolant System in the PAB.

In addition, Monitor RM-6567 and 6568 would also provide indication of a gross increase in activity in their respective ducts. Radiation protection personnel would be alerted to the need for sampling of the PAB to identify the source of contamination.

Sampling is accomplished using approved procedures for noble gases, particulates, and iodines. Samples are analyzed in the counting laboratory. In addition, the station utilizes portable Continuous Air Monitors (CAMs) which aid in pinpointing the affected plant area. Normally one CAM is dedicated for use in the PAB.

Note that RM-6532 does not have radioiodine monitoring capability. This limitation is imposed by the state-of-the-art in radiation monitors. A sample is collected for laboratory analysis. There is no monitor alarm. Detection of in-plant iodine is, therefore, dependent upon an effective plant air sampling program.

With respect to monitoring for noble gases and iodines, the location of the sample nozzles upstream or downstream of the PAB filters is irrelevant.

The HEPA filters remove 99.97% of 0.3 micron particles. Therefore, the downstream location of the nozzles will render the particulate channel useful for only gross releases of particulates from the PAB. An indication of 10^{-11} uCi/cm^3, the minimum sensitivity of the monitor, would mean the upstream concentration is on the order of 3×10^{-8} uCi/cm^3 or that the filters have been breached.

As stated earlier, particulates are not expected in the PAB ventilation system. Furthermore, a concentration of 3×10^{-8} uCi/cm^3 in a ventilation line carrying 41,500 cfm would be indicative of a gross failure and is not credible during routine operations.

Particulates are sampled routinely during operation as are noble gases and iodines. Mobile CAMs are also used to monitor particulate concentrations.

Activities which have a high potential for generating particulates (e.g., grinding, welding on contaminated systems) will be controlled by a radiation work permit system. Procedures require air sampling, use of respirators, and portable ventilation units during such work as warranted by the degree of hazard.

SUMMARY

We believe the isokinetic nozzles for RM-6532-1 and RM-6532-2 can remain downstream of the PAB ventilation filters for the following reasons:

1. Monitors RM-6567 and RM-6568, located upstream of the filters, provide indication of gross activity in the ventilation system.

2. Monitor RM-6532-2 (PAB radiogas) will continue to provide indication of a release of noble gas to the ventilation system in the present downstream location.

3. There are a minimum of 25 cubicles or other vent lines that are inputs to the PAB ventilation system.

4. Item 3, in conjunction with the 41,500 cfm PAB ventilation flow rate, makes it unlikely that a single monitor located upstream or downstream of the PAB filters will detect 10 MPC-hours. This is due to dilution of the room or cubicle ventilation flow in the larger flow of the PAB ventilation system.

5. Monitoring upstream of the PAB filters in accordance with ANSI Standards is not practical since the other ventilation lines enter the housing only about 2-1/2 ft. away from the prefilters. An adequate mixing zone prior to the sample nozzles cannot be provided.

6. A detailed, proceduralized program for monitoring, sampling, and analyzing air samples exists. Portable CAMs and air samplers are used to monitor and sample the PAB atmosphere. Results are trended during normal operation and periods of shutdown to ensure adequate base line data is collected. This data will enable Radiation Protection personnel to take appropriate action when abnormal conditions are encountered.

ATTACHMENT 3

Areas and cubicles that discharge to the PAB filters:

Charging Pump Rooms (3)
Valve Aisle
Pipe Chase (Elevation 53'-0")
CVCT
Hot Sample Room (2)
Fume Hood
Seal Water Heat Exchanger
Moderating Heat Exchanger
Letdown Chiller
Letdown Heat Exchanger (2)
Degassifier Area
Seal Water Return Filter
Seal Water Injection Filter (2)
Reactor Coolant Filter
Prefilter
Fuel Pool Post-Filter
Fuel Pool Prefilter
Aerated Vent Header
Hydrogenated Vent Header
Condenser Mechanical Vacuum Pumps

TABLE 12.2-35

PRIMARY AUXILIARY BUILDING
AIRBORNE ISOTOPIC CONCENTRATIONS

Volume = 1.45×10^5 ft^3

Ventilation Rate = 41,500 cfm

Isotope	Specific Activity (μCi/cc)	MPC Fraction
Kr-85m	2.61 - 08*	4.35 - 03
Kr-85	2.03 - 09	2.03 - 04
Kr-87	1.92 - 08	1.92 - 02
Kr-88	5.12 - 08	5.12 - 02
Xe-131m	1.04 - 09	5.22 - 05
Xe-133m	8.60 - 09	8.59 - 04
Xe-133	3.87 - 07	3.87 - 02
Xe-135m	1.24 - 08	1.24 - 02
Xe-135	4.80 - 08	1.20 - 02
Xe-138	8.89 - 09	8.89 - 03
I-131	2.90 - 10	3.23 - 02
I-132	1.03 - 10	5.17 - 04
I-133	4.60 - 11	1.53 - 03
I-134	6.48 - 11	1.30 - 04
I-135	2.51 - 10	2.51 - 03
TOTAL	5.65 - 07	1.85 - 01

*2.61 - 08 = 2.61×10^{-8}