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October 26, 1995

Mr. Alexander Adams, Jr.
Senior Project Manager
Non-power Reactors and Decommissioning
Project Directorate
U.S. Nuclear Regulatory Commission
M.S. 0-11-B-20
Rockville
MD
20852-2738

Subject: Second NRC Request for Additional Information (TAC No. M938090), relative to a proposed Amendment to the Safety Analysis Report (SAR), and also a proposed Amendment to the Technical Specifications (TS), both being requested for the University of Virginia Reactor (UVAR), Docket No. 50-62, License R-66.

Dear Mr. Adams:

In response to the NRC Request for Additional Information (RAI) of October 25, 1995, we agree with NRC observations in item 1 of the RAI that sewer release time averages are to be monthly, not yearly, concentration averages. We were aware of this fact, however, I did not catch the erroneous wording when editing our response. Accordingly, we are enclosing several replacement pages to our original submittal. We have amended the table headings and discussions in the text to reflect monthly averages for sewer releases. The conclusions reached in the SAR amendment have remained unchanged.

With regard to item 2 of the RAI, please find in attachment a new proposed UVAR Technical Specification (TS) 4.9 Surveillance of Activity in Secondary Coolant System. This surveillance specification has been approved by the U.Va. Reactor Safety Committee. The new TS will provide additional assurance that 10CFR20 effluents limits will not be exceeded, that credible heat exchanger leaks will be discovered within a reasonable time frame and that a change in the surveillance and analysis frequency of secondary system water will not occur without prior NRC review and approval. The proposed TS 4.9 wording is in attachment, together with a revised page 2 of the UVAR TS Table of Contents. The pages on which wording changes were made, or new pages, are listed in a "List of Enclosures," also in attachment.

We appreciate very much the expedited review NRC is giving to U.Va.'s SAR amendment request. Let me know if I can provide you with additional information.

Sincerely,

Robert U. Mulder, Director
U.Va. Reactor Facility &
Assoc. Prof. of Nuclear Eng.

cc: Mr. Craig Basset, NRC Region II, Atlanta, Ga.
Document Control Desk, NRC, Washington, DC

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City/County of Albemarle
Commonwealth of Virginia

I hereby certify that the attached document is a true and exact copy of a letter (type of document), presented before me this 26th day of Oct, 1995.

by Robert Mulder (name of person seeking acknowledgement).

Vickee D. Thomas
Notary Public

My commission expires 2/28, 1998.

LIST OF ENCLOSURES

Please find in attachment the following revised pages:

Page 9-85 Table 9.20.3 sewer-release column heading changed from "Yearly..." to "Monthly...".

Page 9-93 Table 9.20.5 sewer-release column heading changed from "Yearly..." to "Monthly...". Abbreviated "Regulatory" as "Reg." in table title.

Page 9-94 Paragraph 2:

Changed "calendar year" to "calendar month";
Changed "calendar-year-average" to "calendar-month-average".

Paragraph 3:

Changed "calendar-year-average" to "time-averaged".

Page 9-95 Changed "calendar-year-averaged basis" to "time-averaged bases".

Page 2 UVAR Tech. Specs. TABLE OF CONTENTS; added entry for TS 4.9

Page 37a TS 4.9; newly proposed TS wording, to become amendment No. 22

TABLE 9.20.3 Water Activity Conc's Compared with Regulatory Limits

Nuclide	Secondary Water Activity [$\mu Ci/ml_{water}$]	Yearly-Average Water Release App. B Table 2 Col. 2 Limits [$\mu Ci/ml_{water}$]	Ratio	Monthly-Average Sewer Release App. B Table 3 Limits [$\mu Ci/ml_{water}$]	Ratio
H-3	5 E-6	1 E-3	0.005	1 E-2	0.0005
Na-24	1.5 E-5	5 E-5	**0.300**	5 E-4	**0.03**
Mg-27	5 E-9	--	--	--	--
Cl-38	6 E-9	--	--	--	--
Mn-54	1 E-7	3 E-5	0.003	3 E-4	0.00033
Cr-51	6 E-7	5 E-4	0.001	5 E-3	0.00012
Sb-122	5 E-8	1 E-5	0.005	1 E-4	0.0005
W-187	4 E-7	3 E-5	0.013	3 E-4	0.0013
Sum of Temporary Ratios			**0.327**		**0.033**

Because sodium-24 is the dominant and most limiting radionuclide in the primary water, an additional calculation was done by assuming no loss of sodium-24 by blowdown to show that the concentration ratio (effectively infinite in this case) is not a critical parameter in these calculations. With no loss of sodium by blowdown, the equilibrium sodium concentration would increase from 1.5 E-5 [$\mu Ci/ml_{water}$] to 2.6 E-5 [$\mu Ci/ml_{water}$]. The temporary ratio for sodium effluent would increase from 0.300 to 0.530, making the corresponding sum of temporary effluent ratios increase from 0.327 to 0.557. The temporary ratio for sodium sewerage would increase from 0.03 to 0.052, making the corresponding sum of temporary sewerage ratios increase from 0.033 to 0.055. The result remains that the postulated water releases will not violate regulatory release limits.

however, and the resulting A_s^{∞} for the other listed radionuclides are presented here in TABLE 9.20.5. Results of sum-of-ratios calculations for the water- and sewer-release sub-cases are also shown in TABLE 9.20.5.

TABLE 9.20.5 Secondary Water Activity Conc's Compared with Reg. Limits

Nuclide	Secondary Water Activity [$\mu Ci/ml_{water}$]	Yearly-Average Effluent Release App. B Table 2 Col. 2 Limits [$\mu Ci/ml_{water}$]	Ratio	Monthly-Average Sewer Release App. B Table 3 Limits [$\mu Ci/ml_{water}$]	Ratio
H-3	2.0 E-4	1 E-3	0.20	1 E-2	0.02
Na-24	3.8 E-3	5 E-5	**76**	5 E-4	**7.6**
Mg-27	3.3 E-6	--	--	--	--
Cl-38	3.6 E-6	--	--	--	--
Mn-54	2.0 E-5	3 E-5	0.67	3 E-4	0.07
Cr-51	1.0 E-4	5 E-4	0.20	5 E-3	0.02
Sb-122	3.3 E-7	1 E-5	0.03	1 E-4	0.003
W-187	8.3 E-6	3 E-5	0.28	3 E-4	0.028
Sum of Temporary Ratios			**77**		**7.7**

The sum of temporary ratios, in the case of the water-only effluent release pathway is significantly larger than 1. However, there is no water effluent released to the environment because it is mostly retained in the secondary coolant [Note: Secondary make-up shuts down automatically due to the fast leak rate which tends to improve (lower) the conductivity of water in the cooling tower.].

At worst, some cooling tower water could overflow to the on-site reactor pond, also used for liquid waste dilution. The pond dilution factor is about 750,000 gallons / 2000 gallons, or 375-to-1. Only a fraction of the entire 2000 gallons of secondary water could overflow to the pond. Natural radionuclide concentration in the pond is negligible.

With pond-water dilution, the sum of temporary ratios for water effluent is reduced to 77 / 375 = 0.21, well below the allowed calendar-year-average limit of 1. It is concluded that with a DEGTB and a water-only effluent pathway, the calendar-year-average water effluent limit would not be exceeded. Pond water is only released periodically, subsequent to radioanalysis. In the case of this event it would most likely be possible to delay a pond release long enough to achieve significant decay of the 15-hour sodium-24.

The sum of temporary ratios for the sanitary sewer release is marginally greater than 1 during a short period of time (about 1 hour). A great volume of cooling tower water with no measurable radionuclide content is released to the sewer by blowdown during any calendar month. This will ensure that the calendar-month-average sum of ratios will be less than 1. Thus, it is concluded for this case that sewer release regulations will not be exceeded.

9.20.8.8 Conclusions

The primary-to-secondary heat exchanger leak scenario involving the DEGTB analyzed above is extremely conservative. The posited 600 gph leak rate and staff discovery time of 1.2 hours or less represents a hypothetical situation postulated for examination of the potential maximum consequences to the public. Calculated radionuclide concentrations for limiting air-only and water-only release cases are sufficiently low and dilution sufficiently high that time-averaged release limits are not challenged. Therefore, it is concluded that even an extremely severe (hypothetical) heat exchanger tube rupture poses no significant threat to public health and safety.

The analysis just performed reveals that the leak rate, per se, is not a critical parameter. While radionuclide concentrations in a release depend strongly upon the primary-to-secondary leak rate, this is a temporary situation. On time-averaged-bases, it is the total activity of each isotope released, i.e., the volume of primary water lost to the environment, that is significant.