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Metropolitan Edison Company
Post Office Box 480
Middletown, Pennsylvania 17057
717 944-4041

Writer's Direct Dial Number

January 24, 1980
TLL 029

TMI Support
Attn: J. T. Collins, Deputy Director
Nuclear Regulatory Commission
c/o Three Mile Island Nuclear Station
Middletown, Pa. 17057

Dear Sir:

Three Mile Island Nuclear Station, Unit II (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Processed Water Storage Tanks

Your letter of December 13, 1979, concerning the "Preliminary Design Criteria for Additional Processed Water Storage Tanks, Revision 1," specifies that dikes be provided as part of the foundation design for the Processed Water Storage Tanks (PWST), to control any liquid spillage from these tanks in the event of rupture. Our initial design criteria did not include such a requirement based on our analysis that rupture of these tanks would not represent a significant potential for radiological health and safety or environmental hazards, on-site or off.

Since receipt of your letter, we have reviewed this matter further, reexamining the possible need for dikes both from the licensing and radiological protection standpoints.

The technical specification cited in Section 4.3.3 is not the basis for the design of the tanks. The reason for referring to the Tech Specs was not to imply that these tanks are temporary but to cite the limit for the curie content in the processed water storage tanks.

The processed water storage tanks are <u>not</u> considered as part of the Radwaste Management System as defined by Regulatory Guide 1.143 for the following reasons:

a. As defined by the footnote on page 1 of the Regulatory Guide, "Radwaste, as used in this guide, means those liquids, gases or solids containing radioactive materials that by design or operating practice will be processed prior to final disposition."

b. As stated in the Regulatory Guide, "The radwaste system terminates at the point of controlled discharge to the environment... at the point of recycle to the primary or secondary water system storage tanks..."

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The water being stored in these tanks will have been processed through the radwaste system (EPICOR II/SDS or others) and require no further processing to remove radioactive materials prior to final disposition. These tanks are being installed to permit compliance with the NRC order preventing discharge of accident water from TMI-II, and not as part of Plant Radwaste Systems.

Our review has reaffirmed our initial analysis that the PWST's need not be provided with extraordinary leakage control features such as protective dikes because of the very low isotopic content of liquids to be stored therein. Such provisions would involve unnecessary design complications, delay and expense, and in addition, would further result in major site space problems possibly compromising total tankage capacity. Leakage, should it occur, would not pose a significant health hazard or environmental problem, on or off site. Moreover, the vessels being installed will be of high quality (fabricated to API-650 specifications) and rupture is highly unlikely. A Tank Rupture Analysis was performed using conservative assumptions to show the radiological consequences of such a highly unlikely event. This analysis is provided as Attachment 1 and shows that these consequences are well below the acceptance requirements of the applicable NRC Standard Review Plan.

Based on this response and the tank rupture analysis, we request your most expeditious reconsideration and approval in order that construction work may proceed. Should you have any questions, we will be more than happy to meet with you to discuss this issue.

The issue of filters and monitors for the vents as discussed in your letter, will be addressed in subsequent correspondence.

Sincerely,

R. F. Wilson

R. F. Wilson
Director
TMI-II Recovery

RFW:LWH:hah

Attachment

cc: R. Vollmer

ATTACHMENT 1

Tank Rupture Analysis

The subject of a tank rupture is addressed in Standard Review Plan (SRP) 15.7.3 (Rev. 1) (Attachment 5), "Postulated Radioactive Releases Due to Liquid - Containing Tank Failures." The SRP addresses itself to "...the consequences of single failures involving tanks and associated components containing radioactive liquids outside containment." The SRP's acceptance criteria is as follows:

> Tanks and associated components containing radioactive liquids outside containment are acceptable if failure does not result in radionuclide concentrations in excess of the limits in 10 CFR Part 20, Appendix B, Table II, Column 2, at the nearest potable water supply...

As used in the SRP, "supply" is defined as follows:

> ...a well or surface water intake that is used as a water source for direct human consumption or indirectly through animals, crops, or food processing.

Described below are the analyses performed and the results obtained for tank failures as addressed by SRP 15.7.3.

In assessing the consequences of a Processed Water Storage Tank (PWST) failure, the entire contents of one 500,000 gallon tank are assumed to flow via normal drainage into the east channel. The following two cases were studied:

Case 1: Water surface elevation behind the east channel dam is 279 feet MSL (crest elevation of the dam) at the time of tank rupture. The spillage overtops the dam without any dilution and mixes with Susquehanna River flow downstream.

Case 2: Water surface elevation behind the east channel dam is 277 feet MSL (normal pond elevation). The spillage is retained behind the dam and allowed to mix with ambient water. Overflow will occur when the water level in the east channel exceeds 279 feet MSL. This water then mixes with Susquehanna River flow downstream.

The analysis for both cases was carried out under simplifying assumptions that led to conservative results. It was assumed that there was no loss of water due to infiltration into the ground and all the water was discharged into the east channel. It was also assumed that full mixing of the processed water with the Susquehanna River water was accomplished before the mixed waters reach the nearest potable water intake. In view of the existence of a favorable environment for turbulent mixing, low quantity of processed water in one tank (500,000 gallons) as compared to river flows, availability of over two miles of river to accomplish full mixing, and the release of processed water on the east side of the river with the nearest potable water intake on the west side of the river, this assumption is justifiable. The initial tritium concentration was assumed as 1.05 uCi/cc (2000 Ci of tritium in 500,000 gallons of water).

For Case 1, the discharge of processed water over the east channel dam was calculated assuming that the entire content of the tank was stored above the crest between the dam and the culvert outlet. This yielded a head of approximately 0.03 ft. over the dam crest. Using this head in the weir formula, the processed water discharge was found to be 13 cfs. Assuming a steady discharge of processed water and the initial tritium concentration remaining undiluted, the final tritium concentration was calculated on the assumption that full mixing was accomplished with Susquehanna River flow downstream. The Susquehanna River flow was estimated from the rating curve at the Goldsboro gage at elevation 279 feet MSL and was taken as only 10,000 cfs.

The analysis shows that the tritium concentration in the river water at the potable water intake after full mixing will be less than 0.0014 µCi/cc.

For Case 2, with the water level at elevation 277 feet MSL corresponding to a water volume of 65 million gallons, a dilution with the water between the dam and the culvert reduces the tritium concentration to approximately 0.008 µCi/cc. This water is retained behind the dam until the water level exceeds the dam crest (279 feet MSL). At this level the concentration of tritium will be approximately 0.005 µCi/cc. Different values of flow head over the east dam were considered to compute overflow rates and initial tritium concentrations for the overflow. Final tritium concentrations were calculated for each different flow head assuming full mixing with the corresponding Susquehanna River flows.

Using this method, the highest tritium concentration after full mixing will be less than 0.0005 µCi/cc.

The limit specified in 10 CFR Part 20, Appendix B for tritium at the nearest potable water supply is 0.003 µCi/cc. Since the results of the analyses meet the limits set by the SRP's acceptance criteria, no additional design features are required.

We would point out two significant areas where the tank failure analyses are conservative. The first of these is that the anticipated tritium concentration is well below the 1.05 µCi/cc assumed. The second area deals with the volume of water assumed discharged to the river. The SRP states that the analysis is to be based on 80% of the liquid volume, whereas the analyses described above is based on 100% of the liquid volume.