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November 8, 1983
NRC/TMI 83-067

Docket No. 50-320

GPU Nuclear Corporation
Mr. B. K. Kanga
Director, TMI-2
P. O. Box 480
Middletown, PA 17057

Dear Mr. Kanga:

Subject: Submerged Demineralizer System Technical Evaluation Report and System Description

This letter is in response to your letters 4410-83-L-0122, dated July 6, 1983; 4410-83-L-0154, dated August 19, 1983; and 4410-83-L-0223, dated September 26, 1983; in which you forwarded updated versions of the SDS Technical Evaluation Report and System Description. The reference documents take into account the planned removal of the feed tank farm in the framework of the "A" spent fuel pool refurbishment and the future use of the SDS for processing of Internals Indexing Fixtures (IIF) water after reactor vessel head lift.

The TMIPO staff has reviewed these documents and determined that some corrections and additions are necessary to make these documents complete. Our comments are included as an annex to this letter. Based on our review, we conclude that the SDS can be operated in a safe manner in the four described modes (i.e., RB sump water processing, RCS water processing, RCS water processing after depressurization and drai down, and IIF water processing between RV head lift and plenum removal) with the acceptance criteria, controls and sampling procedures described. The staff determined that the risk to the health and safety of the public and the occupational work force is minimal and consistent with accepted practices.

Additionally, the environmental effects from the SDS operations fall within the scope of conditions previously considered in the PEIS, and therefore are acceptable.

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Pursuant to Technical Specification 6.8.2, we require the submittal of system operating procedures for our approval before implementation. We also expect that an eventual revision or new issue of the SDS TER and SD should take the annexed comments into account.

Lake H. Barrett
Deputy Program Director
TMI Program Office

Enclosure: As Stated

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ANNEX

1. INFORMATION NOT FOUND

1.1 TER, Main Part

Chapter 6: p. 72 first paragraph: The words "ingestion of contaminated foods" should be added as has been done in the corresponding statements of the appendices.

Chapter 7:

a) some additional numerical data should be added:
   - -- §7.1, p.80 and §7.2, p.82: What % of the limits specified in 10 CFR 20 does the airborne contamination represent?
   - -- §7.5, p.87: what would be the collective dose to the personnel and to which level the airborne activity would be reduced?

b) §7.5, p.87: the mentioned studies about plant operability and integrity after the postulated incident should be given precise references.

1.2 TER, Appendix 1

Chapter 3: Figure 3.4 does not show the Sandpiper pump and associated piping referred to in §3.3, p.19.

Chapter 4: §4.2.1, p.32: the figure for the volume of RCS water processed has been left blank.

1.3 TER, Appendix 2

Chapter 3: §3.1.1, p.9: the description of the solid waste handling system omits liner inertization (LRVOS) which is referred to in the corresponding section of the main part (§5.5, p.59).

1.4 System Description

The staff did not formally receive appendices 5, 6, and 16.

2. UNDELETED REFERENCES TO THE TANK FARM

2.1 TER, Main Part

Chapter 4: §4.2, p.37. On the second line, the words "A fuel pool" should be deleted.

Chapter 6: §6.2.3.1, p.65. The words "Automatic level controlled" do not reflect the new situation. Vent and drain subsystem operating procedures now call for automatic 'high level indication' but manual startup of the bottom pump, which then stops automatically at low level. §5.1.6, p.55, gives better information.

2.2 TER, Appendix 1

Chapter 3: §3.4.2, p.22: reference to the feed tank standpipe should be deleted. The off-gas separator bottoms are routed directly to the RCS cleanup manifold from which they can be sent to the MWHT or RCBT's for storage, or to the SDS for processing.

2.3 System Description

In §1.6.2.5, p.26 lines 3 and 4: the words "either" and "or Feed Standpipe" should be deleted.

3. USE OF OUTDATED INFORMATION

Two sets of data about activity concentrations in SDS feed are found in the reports. The first one is based on February 1982 samples, the high values recorded then reflect the situation before any SDS operation. The second one is based on April 1983 RCS samples; the rather low values measured then are the results of one year decontamination efforts of the RCS water.

The main part of the TER uses the first set only. Chapter 1, giving a kind of historical review of SDS operation, should mention both sets and include some additional data about RB decon water; it is not clear why current sample data were not added to table 1.1 to reflect current expected operating conditions. In chapter 3, which discusses expected performance of SDS and EPICOR ion exchange systems, use of the old data (table 3.1) is questionable. Since the radionuclide concentrations of water to be processed now will be much lower than during the first runs, the OF's to be obtained will presumably be lower than those registered in early 1982. We do not doubt that radionuclide concentrations will be reduced; however, because of the variation in water sources, flow rates, and process system configuration additional discussions should be provided on predicted performance of the ion exchangers. The same comments apply for chapter 4, §4.3.3. In chapter 6 (table 6.1) use of the higher values is acceptable since it adds to the conservatism of the radiological safety study.

Appendix 1 uses both data sets and is therefore inconsistent (old data in table 1.1; and new data in table 4.1). Furthermore, the new data are used for the radiological safety analysis, the conservatism of which is so decreased.

Supplement 1 to Appendix 1 and Appendix 2 use the second set only and so are internally consistent.

Appendix 8 of the SD, which contained the first data set, has been deleted; however, it is still referred to in the document (p.10 §2). Our opinion is that Appendix 8 should not be deleted but completed with the second data set about RCS water and with recent values about RB decon water.

4. INCONSISTENCIES IN OFF-SITE DOSE ESTIMATIONS

The methodology for estimating the ^{129}I contribution to the population dose is not the same in the main part of the TER and in the appendices.

The main part reads (p.70): "However, no further effluent treatment is assumed for (...) ^{129}I. (...) For ^{129}I the DF is 1". This leads to a thyroid dose commitment of 20 mrem/Ci ^{129}I from SDS for the critical location (using figures in pp. 75 and 78).

Appendix 1 reads (p.35): "A decontamination factor of 100 is assumed for (...) iodine in the plant Waste Gas System (...). It is further assumed that (...) iodine pass(es) through HEPA filters in place at TMI-2 to give an additional DF of 100 (...). Therefore, the total DF for (...) iodine including both the plant Waste Gas System and treatment previously existing at TMI-2 is [illegible]. This leads to a thyroid dose commitment of 0.02 mrem/Ci ^{129}I fr[illegible] the critical location (using figures in pp. 36 and 38).

Supplement 1 to Appendix 1 and Appendix 2 copy the statements in Appendix 1 without modification.

In the main part, the contaminated gas stream is assumed to be the effluent of the SDS Vent and Drain Subsystem with a gas flow rate of 650 cfm. In the appendices this gas stream is not referred to and the contaminated gas stream is assumed to be the effluent of the RCBT's vents through the plant Waste Gas System, with a gas flow rate of 0.67 cfm. HEPA filters do not allow any credit for iodine decontamination; the presence and location of charcoal filters, if any, should be clearly mentioned in the various systems.

In Appendix 1, the total volume of RCS water to be treated is estimated to be 350,000 gallons (p.3), however, the off-site dose estimation is based on a volume roughly equal to that of the RCS (12 days of continuous operation at 5 gpm or 88,000 gallons, p.35). Your basis for these calculations appears marginal; indeed, for the nuclides which are trapped in the SDS liners (^{134}Cs, ^{137}Cs, ^{90}Sr) it neglects the recontamination of RCS water by such mechanisms as steady leaching of fuel debris in the reactor core, and for the nuclides which are not affected by the process, like ^{3}H, ^{85}Kr, ^{125}Sb, ^{129}I, it is obvious that a constant concentration is to be considered during the whole RCS feed and bleed process. Actually, it is known that the given RCS processing target (given as 1 µCi/ml ^{137}Cs in the report, but since then brought down to 0.1 µCi/ml) can be reached and hold only if the feed and bleed is continued regularly.

The same comments apply to Appendix 2 (p.30) where the Appendix 1 statements have been copied without further evaluation.

5. CONSIDERATIONS ABOUT PROCEDURES, TECHNICAL SPECIFICATIONS, AND THE LIKE

5.1 Procedures

In the main part of the TER, chapter 1 §1.4.2, provide references to procedures describing the ratios of various zeolites to be used in the ion exchanger mix (p.13) and the alternative processing modes (p.15).

In chapter 8, §§8.2 and 8.3 (p.91) the text should clearly state who is qualified to approve SDS testing.

5.2 Technical Specifications

At several points in Appendices 1 and 2 a chloride concentration of 5 ppm is given as an SDS operating target. Beyond the fact that SDS processing is without effect on chloride concentration, we should point that the value of 5 ppm is a technical specification limit and that therefore the operating target should be lower. (Appendix 1 §2.3, and Appendix 2 §2.3) We should like to have more detail about the Recovery Operations Change Request referred to at the end of Appendix 1 §2.3 (p.11).

5.3 TRU Detection

The criticality issue is discussed in Appendix 1 chapter 3, §3.4.5.3 (p.25). Identify whether any additional sampling is planned for specific TRU detection in addition to the spectroscopic equipment used at the RCBT's for monitoring of ^{144}Ce/Pr.

5.4 Pressure Vessel Code and Testing

There is some inconsistency between Appendix 1 chapter 5 §5.2 (p.40) and the main part of the TER, chapter 4 §4.3.7.10 (p.43). The test pressure is said to be 1.5 times the design pressure in the main part, and 1.1 times in the appendix, which does not clearly tell if the figure refers to pneumatic or hydrostatic testing. Code ANSI 831.1 asks for testing at 1.5 times the design pressure.

For piping systems and components added after 1980, the 1980 revision of ANSI 831.1 should be referred to (main part, chapter 4 §4.3.6.1).

5.5 FSAR

In Appendix 1, chapter 2 §2.2.2, the Standby Pressure Control System is erroneously said to be described in the FSAR.

6. CATION ZEOLITE VESSELS VS. "CATION" SAND FILTERS

We should like to have a clear statement about when and for what purpose sand filters will be used in the place of zeolite liners in the "cation" positions of the SDS. We understand, that the replacement occurred during RCS draindown, but the statements in the report are somewhat confusing (SD chapter 3 §3.4.1, pp.87-88; TER main part chapter 1 §1.4.2, p.14; chapter 4 §4.3.7.2b, p.42; chapter 5 §5.1.2, p.52; TER appendix 1, chapter 3 §3.4.2, p.22). If the SDS configuration has to be changed when switching from RCS or IIF water treatment to RB decon water treatment, will there be sufficient time for that operation? What will be the RB sump processing requirement during those periods?

7. ACCIDENT EVALUATION

In regard to the IIF level control system, Appendix 2 of the TER, chapter 6 §6.2.1 (p.38) and Appendix 17 of the SD, §4.2.1, describe switch failure analysis and contingencies, including any mitigation plans about RCS overflow in the reactor building.

In the main part of the TER, chapter 7 §7.5 (p.87), an assumed airborne release of 10^{-4}% (i.e., 10^{-6}) does not seem consistent with the 0.01% used in the SDS SER (NUREG-0796 §5.2). §7.5 should be reviewed with such a basis. In our evaluation, the final conclusion would not be affected.

Dr. Thomas E. Murley

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