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July 3, 1984
5211-84-2165

Office of Nuclear Reactor Regulation
Attn: John F. Stolz, Chief
Operating Reactors Branch No. 4
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Stolz:

Three Mile Island Nuclear Station, Unit 1, (TMI-1)
Operating License No. DPR-50
Docket No. 50-289
Condenser Off-gas Monitoring and Sampling Program

In response to your letter of May 11, 1984, a summary of Technical requirements for continuous Iodine Sampling of Condenser off-gas during normal plant operation of TMI-1 is provided for your information (See Attachment 1).

GPUN is committed to install this modification during the Cycle 6 refueling outage. The technical specification change request for this addition will be submitted to the NRC, 30 days prior to the installation of the modification.

As indicated in an earlier GPUN communication (ltr No. 5211-84-2094 dated April 18, 1984), GPUN analysis concluded that a continuous release at the condenser off-gas monitor high set point will result in offsite doses less than 20 percent of the Annual Appendix I limits. As requested, in NRC letter of May 11, 1984, a summary of this analysis is provided in Attachment 2, for your information.

Sincerely,

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PDR ADOCK 05000289
P PDR

H. D. Hukill
Vice President - TMI-1

HDH/RAS/mle
Enclosure

cc: GPU Nuclear Corporation is a subsidiary of the General Public Utilities Corporation
J. VanVliet
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Attachment 1

Summary of Technical Requirements for Continuous Iodine Sampling of Condenser Off-Gas during Normal Plant Operations (TMI-1).

1. Background

GPUN Analysis and Evaluation of TMI-1 Plant radiation releases indicate releases to off-site, are well within the specified limits in 10 CFR 50 Appendix I.

Per NUREG 0017, GPUN analysis assumed 5 percent of the radioiodine entering the OTSG secondary side from the primary system interface is in organic form. These organic iodines were assumed to have a partition factor of 0.15 in the main condenser. A partition factor of zero was used for elemental iodines. Primary to secondary leak rates were varied from zero to 12000 lb/day.(1 gpm) for the purposes of parameteric study.

Currently TMI-1 condenser off-gas Iodine releases during normal plant operations is not continuously sampled. Installation of the Continuous Iodine sampling facility for off-gas during normal plant operations has been under review and discussion between NRC and GPUN. GPUN made a commitment to provide a capability to continuously sample condenser off-gas for Iodine during normal plant operations. (Following an accident or abnormal condition, MAP-5 takes over this function.)

2. Essential Features for Proposed Modification

- a) An additional take-off point from the vertical portion of the off-gas common discharge header of the main condenser vacuum pumps, up stream of Auxiliary Condenser tie in, will be provided. A representative sample will be assured by installing an isokinetic nozzle and consideration will be given to humidity, heat tracing, variable discharge, variable header flow, and sample volumetric adequacy as per ANSI N.13.1 1969 and NUREG 0472 Rev. 3.
- b) A double quick disconnection module housing combined in line filter and silver zeolite or equivalent cartridge capable of filtering effluent and capturing Iodines is provided.
- c) During normal power operations the expected fluid conditions in the discharge header are:

Flow 20-40 CFM
Humidity 100%

Temperature - 100°-120°F
Pressure - Near Atmospheric

- d) This modification shall provide:
 - i) A minimum of seven days purge and 95% Retention Efficiency for a sample line flow rate less than 1CFM.

- ii) Means for measuring flow rate and total flow associated with the sampling line. Isolation valves will be provided for easy and quick removal and replacement of the sample module housing Iodine filter. A modulating flow control valve will be installed in the sample line discharge, back to suction side of condenser vacuum pumps.
- iii) Module shielding or administrative controls to avoid additional radiation exposure to operators before and after an accident condition.
- e) The addition of this modification shall not degrade any existing features and functions of off-gas condenser and/or off-gas condenser Radiation Monitoring System.
- f) The piping, valving, and instrumentation for this modification shall be routed, oriented, and protected so that damage from pipe whip, jet impingement and missiles will not occur. Piping shall be designed to prevent the formation of traps or loss of excessive pressure drop.
- g) Equipment shall be located and protected, as necessary, to assure radiation exposure will not exceed the allowable limits of 10 CFR 20.

3) Quality Assurance

The Condenser Off-Gas Radiation Monitoring System is classified as "Important to Safety". Quality Assurance requirements shall be in accordance with "Operational Quality Assurance Plan for Three Mile Island Nuclear Station Unit #1.

The components of this modification will be commercial grade for an "ITS" application.

4) Safety, Health and Security Requirements

The design, material selection and equipment layout of this modification shall protect the health and safety of plant personnel during operation and maintenance. The maintenance requirements as regards to accessibility and radiation exposure shall be considered in the design phase. The design of this modification shall facilitate easy access to new and existing equipment.

5) Regulatory Requirements

This modification shall be designed in accordance with the requirements of the General Criteria 10 CFR 50 Appendix A, 10 CFR 50 Appendix 'R' and Reg. 1.21, Rev. 1 June 1974.

Attachment 2

TMI-1 Offsite Does Due to Continuous Release at the Condenser Off-gas Monitor High Set Point

(I) Key Assumptions (Ref. 1)

- Reactor Power = 2535 MWth
- Plant Capacity Factor = 80% (Ref. 2)
- Fuel Cladding defect = 0.03%
- OTSG Tube Leak Rate at Hi Set Point = 7 gph
- Fraction of Organic Iodine in the Primary Coolant = 5% (Ref. 2)
- Fraction of Organic Iodine Release from Off-Gas = 15% (Ref. 2)
- Fraction of Elemental Iodine release from the condenser = 0% (Ref. 2)
- Computer Code PWR-GALE (Ref. 2) was used
- Primary-to-secondary leak rate in the OTSG were varied from zero to about 1 gpm for the purpose of parametric study

(II) Result and Conclusion

- (A) Offsite dose results are plotted in Figure 1 as a function of OTSG tube leak rate.
- (B) The offsite doses (infant thyroid) resulting from continuous reactor operation at 100% power and 7 gph OTSG leak rate is approximately 2.45 mr/year, which is about 17% of 10 CFR 50, App. I limit (15 mr/year).

(III) References

1. GPU TDR No. 405, Rev. 0 "TMI-1; Evaluation of Plant Radiation Release and its 10 CFR 50 Appendix I Conformance for Different Operating Conditions", Dated 8/2/83
2. NUREG-0017, "PWR-GALE Code; Calculation of Releases of Radioactive Materials in Gaseous and Liquid Effluents from PWR," April 1976.

FIG. 1. OFFSITE DOSE FROM CONDENSER
OFF-GAS RELEASE VS. OTSG TUBE LEAKS FOR TMI-1

46 7400

K-E LOGARITHMIC 3 X 3 CYCLES
WEISSFEL & EGGEN CO. MADE IN U.S.A.

OFFSITE DOSE (mrem/yr)

10^1

10^0

10^1

10^0

2.45 mrem/yr
at 7 GPM

7 GPM

10^2

10^3

5×10^3

10^{-1}

OTSG TUBE LEAK RATE (LB/DAY)

1 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10 2 3 4 5 6 7 8 9 10