METROPOLITAN EDISON COMPANY

JERSEY CENTRAL POWER & LIGHT COMPANY

AND

PENNSYLVANIA ELECTRIC COMPANY

THREE MILE ISLAND NUCLEAR STATION, UNIT 1

Operating License No. DPR-50
Docket No. 50-289
Technical Specification Change Request No. 135, Rev. 1

This Technical Specification Change Request is submitted in support of Licensee's request to change Appendix A to Operating License No. DPR-50 for Three Mile Island Nuclear Station, Unit 1. As a part of this request, proposed replacement pages for Appendix A are also included.

GPU NUCLEAR CORPORATION

BY _____
Director, TMI-1

Sworn and Subscribed
to before me this 11th
day of July, 1984.

_____
Notary Public

JULIA E. PARK, Notary Public
Middletown, Dauphin County, Pa.
My Commission Expires Nov. 3, 1986

TECHNICAL SPECIFICATION CHANGE REQUEST NO. 135 REV. 1.

The Licensee requests the attached pages replace the associated pages of the previous submittal Technical Specification Change Request No. 135 GPUN letter 5211-84-2053, June 1, 1984.

REASON FOR CHANGE REQUEST

This Tech Spec Change Request specifies appropriate limits of hydrogen and oxygen in the Waste Gas Holdup System (WGHS) for expected plant conditions and evolutions. During times of maintenance and inspection, high oxygen levels are expected due to opening the system to atmosphere, with insufficient hydrogen present for flame propagation. (See License Event Reports 82-08, 83-05, 83-08). During other evolutions, such as normal cooldown degassing, temporary hydrogen levels greater than 4% are expected with insufficient oxygen present for flame propagation.

SAFETY EVALUATION JUSTIFYING CHANGE

NRC IE Information Notice 81-27 states: "Flammable concentration of gas mixtures can be prevented by limiting either the hydrogen or the oxygen concentration to less than 3 percent". Experimental data* on the flammability of hydrogen in oxygen provides, under ideal conditions, a lower limit of 5% oxygen by volume. Therefore, if the concentration of oxygen in a nitrogen/hydrogen/oxygen gas mixture is kept below a concentration of 5% by volume whenever the hydrogen concentration is greater than or equal to 5% by volume, any gas mixture within these bounds will be below the flammability limit. With concentrations procedurally limited to less than or equal to 2% oxygen by volume more than sufficient margin exists to preclude flame propagation regardless of hydrogen concentration. This proposed specification provides that the oxygen concentrations in the waste gas system will be limited to less than or equal to 2% by volume whenever the hydrogen concentration is greater than 4% by volume.

If the oxygen concentration in the waste gas system ever exceeds 2% by volume when the hydrogen concentration is greater than or equal to 4% by volume, the oxygen concentration will be reduced without delay to below 2% by volume. In addition, if the oxygen concentration in the waste gas system ever exceeds 4% by volume when the hydrogen concentration is greater than or equal to 4% by volume, the addition of waste gas to the waste gas system will be immediately suspended and the oxygen concentration will be reduced without delay to below 2% by volume. These 2% oxygen and 4% hydrogen limits provide a conservative margin of safety in view of the 5% oxygen and 5% hydrogen ideal flammability limits.

As specified in Standard Review Plan (SRP) 11.3, Rev. 2 - July, 1981, (Page 11.3-5) of NUREG-0800, systems designed to operate below set limits for both hydrogen and oxygen may be analyzed for either hydrogen or oxygen. This Tech Spec change, by specifying monitoring of both oxygen and hydrogen, is providing a second conservative margin of safety.

*Bulletin 503, Bureau of Mines; Limits of Flammability of Gases and Vapors.

In order to evaluate the explosion resistant capability of the waste gas system a conservative, worst case analysis was performed based on the system's known component specifications, volumes and operational modes. The two types of hydrogen transfer to the waste gas system that occur are via degassing of reactor coolant water and via makeup tank venting. The largest feasible volumes of hydrogen were assumed to be introduced into the waste gas system for both types of transfer. Three key conservative assumptions were made: 100% air, instead of the operationally realistic nitrogen, is taken as the dilutent gas; no credit is taken for pressure relief via safety devices which is not realistic for the below detonation type conditions found for the worst cases in the analysis and no credit is given for corrective action which would normally occur as a result of the H_2/O_2 alarm set points.

Based on the conservative assumptions about the modes of operation, component specifications, quantities of H_2 transferred to the waste gas system and the waste gas system dilutent gas volumes, the major components in the waste gas system are capable of withstanding the pressure pulse from combustion of resultant H_2-air mixtures (which are below the 18.3% H_2 in air detonation limit**). The initial absolute pressure multiplication factor used for the waste gas system tanks was 5.0 which is based on experimentally determined lower detonation limit of 18.3% H_2 in air. Data *** for comparably shaped vessels (i.e., the same ratio of vessel length divided by vessel outside diameter) shows that the factor of 5.0 is conservative. The analysis showed that the tanks would withstand the resultant pressure pulse. The factor of 20 times the initial operating gauge pressure (from NUREG SRP 11.3, Part II.B.6.a,) was used for the piping, tubing, valves, fittings and flanges. The analysis showed that these components would withstand the resultant pressure pulse. The circumferential stress equation for thin walled vessels was used for the evaluations. This pressure surge capability of the waste gas system supports the proposed one (1) channel operation requirement for both the hydrogen and oxygen monitors.

** B. Lewis and G. von Elbe, Combustion, Flames and Explosions of Gases, Academic Press, 1961, Table 10, page 535.

*** L. W. Carlson, R. M. Knight and J. O. Henrie, Flame and Detonation Initiation and Propagation in Various Hydrogen-air Mixtures, with and without Water Spray, Atomics International Report AI-73-29, May 11, 1973, Table 2 on page 30.

EPRI Report: Hydrogen Combustion and Control Studies in Intermediate Scale, EPRI NP-2953, Final Report, June, 1983, Table D-1 on page D-6.

The waste gas system is operated with automatic maintenance of a nitrogen blanket by use of a pressure switch activated pressure regulation valve. This nitrogen blanket is kept at positive pressure in order to exclude air. Note that the system components can survive H_2/air combustion resulting from air in leakage.

The radioactivity leakage from the waste gas system due to system ruptures has been analyzed. In the event of a rupture, the release of radioactivity due to the nitrogen blanket over-pressure would be less than the Waste Gas Tank Rupture previously analyzed in the TMI-1 FSAR Update Section 14.2.2.6. Procedural controls insure that the radiological impact of the quantity of total activity released by a system rupture would be much less than that previously analyzed in the TMI-1 FSAR update section (14.2.2.6).

With the limits as stated in the specification, adequate protection is afforded against reaching hydrogen-oxygen combustion conditions. In addition analysis shows that the system will withstand conservatively estimated worst case combustion pressures and assurance is also provided that the release of radioactive materials will be suitably controlled in conformance with General Design Criteria 60 of Appendix A to 10 CFR Part 50.

SIGNIFICANT HAZARDS CONSIDERATION EVALUATION

The proposed specification is provided to ensure that the concentrations of potentially combustible gas mixture contained in the waste gas holdup system is maintained below flammability limits. This can be achieved by limiting concentrations of either hydrogen or oxygen below their lower limits of flammability. The conditions of specification 3.22.2.5 limits hydrogen and oxygen with sufficient margin to preclude flame propagation. Specification 3.22.2.5 provides a margin of 3% oxygen concentration outside the flammability limits. Therefore, operation of TMI-1 in accordance with this Tech. Spec. Chance Request does not:

a) increase the probability of occurrence or the consequences of accidents previously analyzed as the Waste Gas Tank Rupture (FSAR Update Section 14.2.2.6).

b) create the possibility for an accident or malfunction of a new or different kind of accident from any accident previously evaluated.

c) involve a signification reduction in the margin of safety since adopted limits of H_2 and O_2 concentration are conservative. Therefore, significant safety hazards are not associated with this change.

AMENDMENT CLASSIFICATION (10 CRF 170)

This change request involves the review of a single safety issue and is considered a Class III Amendment,subject to a $4,000.00 fee. A check for this amount was forwarded with our letter of June 1, 1984, (5211-84-2053).

IMPLEMENTATION

It is requested that this Amendment become effective upon issuance.