May 30, 1980

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SECY-80-1320

INFORMATION REPORT

For: The Commissioners

From: Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Thru: Executive Director for Operations

Subject: TMI-2 CONTAINMENT BUILDING PURGE

Purpose: To provide additional information regarding questions on the staff's proposed purging of the TMI-2 Containment Building atmosphere. (See SECY-80-132C)

Discussion: The attached submits supplemental information on the slow purge alternative.

Coordination: The action was concurred in by the Office of the Executive Legal Director.

Harold R. Denton, Director
Office of Nuclear Reactor Regulation

Enclosure:
Supplemental Slow Purge Information
(SECY-80-132C)

cc:
Commissioners
Commission Staff Offices
ACRS
SECY

SECY NOTE: The subject of this paper and other related papers is scheduled for discussion at a Commission meeting on Thursday, June 5, 1980.

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Supplemental Slow Purge Information

The slow rate purge alternative recommended by the NRC staff would be carried out within several limiting conditions. Most importantly, purging would be controlled to limit the cumulative maximum individual offsite dose resulting from the purge to less than the annual Appendix I to 10 CFR 50 dose design objective (5 mrem whole body, 15 mrem skin). Dose would be tracked during actual purging by using real time meterological data to calculate hourly dose rate in affected sector/sectors surrounding the plant. (The region around TMI is divided into 16 directional sectors; wind directional changes during purging will result in differing dose rates for individual sectors.)

Cumulative dose, based on these calculated dose rates in each impacted sector, would be updated hourly throughout the purge process. No hypothetical person in any sector would be permitted to receive a dose in excess of the Appendix I dose design objective. For example, if the calculated cumulative dose to a hypothetical person, based on actual Kr-85 release rates and real time meteorology, reached the annual Appendix I whole body (5 mrem) or beta skin (15 mrem) dose objective in the North sector, purging would be discontinued whenever existing wind conditions could result in any incremental increase in dose to the North sector.

In addition to Appendix I constraints, the slow purge procedure would be limited by the existing Three Mile Island effluent release technical specifications for Kr-85. Although these specifications have dose limitations as their bases, they have been implemented as Kr-85 release rate limits. In contrast to the Appendix I limit, dose rates and cumulative dose are not monitored to show conformance with release rate technical specifications. Release rate (Kr-85) alone determines conformance or non-conformance with the technical specifications.

One Kr-85 release rate technical specification requires that instantaneous rates not exceed 45,000 μCi/sec. This instantaneous limit is derived from the annual average χ/Q (6.7×10^{-6} sec/m^3) for the TMI site and the maximum permissible concentration (MPC) for Kr-85 in unrestricted areas as listed in 10 CFR 20. This specification provides for short-term operational flexibility (in normal operating plants and the purge). Any extended release at this relatively high rate would quickly become limiting to operation because the cumulative Appendix I dose restriction also limits the conduct of the purge alternative.

A quarterly averaged release rate technical specification limit of 7200 μCi/sec, based on a more restrictive χ/Q value (4.2×10^{-5} sec/m^3), would also be applicable to a slow purge. This quarterly averaged release rate limit is based on not exceeding, in one quarter, four times the annual Appendix I dose design objective. Again this specification provides for relatively short periods of operational flexibility because relatively high release rates (and hence dose rates) can be averaged in a quarter with relatively low release rates. Cumulative Appendix I dose, however, cannot be exceeded.

Dose and dose rate during a Kr-85 purge are dependent on three variables; the Kr-85 release rate, meteorological dispersion and the Kr-85 dose conversion factor. Only the Kr-85 dose conversion factor is a fixed value, $\frac{\text{mrem-m}^3}{\text{Ci-sec}}$. While meteorology ($\chi$/Q sec/m^3) cannot be controlled during a purge, release rate (Ci/sec) can be adjusted to limit the resulting dose. During periods of less favorable meteorology, therefore, release rates can be selectively reduced to maintain desired dose rate levels. Licensee procedures for maintaining acceptable purge dose rates during varying meterological conditions, by varying release rates, have been reviewed and approved by the NRC staff.

It should be noted that the first paragraph (pp. 4-5) of the original discussion of the slow purge alternative in SECY-80-132C is somewhat misleading. In this paragraph the NRC staff was attempting to set out (for comparison to fast purging) the probability of having favorable meteorology under which the slow purge could be conducted. This discussion assumed a fixed release rate (which is not necessarily the case) in an attempt to provide correlation between the probabilities of having favorable meteorology for slow and fast purge alternatives during different times of the year. This discussion is misleading, however, because there is no meteorological threshold for slow purging. Release rates can be adjusted to near 0.0 Ci/sec to effect acceptable dose rates during poor meteorological conditions.