

MAY 10 1979

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Docket No.: 50-320

NOTE TO: Dennis Crutchfield
 Program Support Staff, NRR

FROM: H. Schierling, Section A
 Accident Analysis Branch, DSE

SUBJECT: THREE MILE ISLAND 2 - HYDROGEN CONTROL CAPABILITY INSIDE
 CONTAINMENT

At about 9 a.m. on Saturday, March 30, 1979, the NRC staff at TMI-2 was advised that the hydrogen concentration inside the containment was 1.3% at that time. H. Denton requested that I determine the method and time required to reduce the concentration to 1.0% and less.

I made the following assumptions:

- (1) Hydrogen is removed from the containment by two recombiners with a 100% efficiency and with a combined flow rate of $F=114$ cubic feet per minute.
- (2) No additional hydrogen is generated or added to the containment. (a non-conservative and non-realistic assumption).
- (3) The hydrogen concentration is uniform throughout the containment.
- (4) The containment net free volume is $V = 2.1 \times 10^6$ cubic feet.

With these assumptions the hydrogen concentration is given by

$$C(t) = C_0 e^{-\lambda t}$$

where λ , the removal constant, is

$$\lambda = \frac{F}{V} = 0.0782 \text{ day}^{-1}$$

and the corresponding removal halftime is

$$tr/2 = \frac{\ln 2}{\lambda} = 8.85 \text{ days}$$

OFFICE: The time required to reduce the hydrogen concentration from $C_0 = 1.3\%$ to $C = 1.0\%$ is determined as

BURNANE: $t = \frac{\ln(C_0/C)}{\lambda} = 7.5 \text{ days}$

DATE: _____

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The method and status of the hydrogen removal was determined from an abbreviated FSAR available at the site and from contacts with the NRC staff and licensee personnel in the control room as follows:

- (1) Two hydrogen recombiners, thermal units, skid mounted are available on the site.
- (2) One unit was being installed at the time in the auxiliary building, the intake being connected to the containment purge line and the discharge to the containment air intake. The second unit, still in storage at the time, can be installed in parallel,
- (3) Because of the high radiation level of the containment atmosphere, to be circulated through the recombiner(s), a lead shield was being erected around the first unit. Provisions for purging the unit with nitrogen were also being considered.

I advised H. Denton within about one hour of the above status and made the following additional comments:

- (1) With only a single hydrogen recombiner operating the reduction time would double to 15 days,
- (2) Additional hydrogen was introduced to the containment by the continued, intermittent venting of the pressurizer, This also increases the reduction time. I recommended that the hydrogen concentration be monitored, as a minimum, on a daily basis.
- (3) I recommended that the licensee should inquire about and obtain additional hydrogen recombiner capacity for backup.

The first hydrogen recombination unit was finally placed into operation during the afternoon on Monday, April 2, 1979.

The hydrogen concentration was monitored at least once a day. It increased to 2.4% during April 1, 1979.

H. Schierling, Section A
Accident Analysis Branch, DSE

cc: R. Voller

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