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Attention: Document Control Desk

Three Mile Island Nuclear Station, Unit 2 (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Post-Defueling Monitored Storage Safety Analysis Report,
Amendment 6

Dear Sirs:

Attached is Amendment 6 to the Post-Defueling Monitored Storage (PDMS) Safety Analysis Report (SAR) which provides the final response to Question 4 of your request for additional information dated August 22, 1989. Also provided are revisions to the main SAR text submitted as page changes.

Sincerely,

M. B. Roche
M. B. Roche
Director, TMI-2

EDS/emf

Attachment

cc: W. T. Russell - Regional Administrator, Region I
J. F. Stolz - Director, Plant Directorate I-4
L. H. Thonus - Project Manager, TMI Site
F. I. Young - Senior Resident Inspector, TMI

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Several Containment penetrations were modified during the cleanup period to provide capabilities necessary for cleanup operations. The piping penetration modifications installed during the cleanup period were designed to withstand 5 psig of pressure, except that penetration R-626 was designed for a maximum of 2 psig (see GPU Nuclear letter LL2-81-0191). All other piping penetrations have a retained capability at or near the original design pressure.

Although Table 7.2-2 provides a listing of specific means of Containment isolation, any equivalent means of isolation is acceptable and will not constitute a change to the Containment isolation capability. For example, a valve may be removed and replaced by a blind flange and result in no change in the Containment isolation capability.

7.2.1.2 Containment Atmospheric Breather

7.2.1.2.1 PDMS Function

The Containment Atmospheric Breather has been added to the Containment to provide passive pressure control of the Containment relative to ambient atmospheric pressure and to establish a "most probable pathway" through which the Containment will "breathe". The Containment Atmospheric Breather is designed to provide a specific pathway through which the Containment atmosphere can aspirate to maintain pressure equilibrium with the environment external to the Containment. The Breather is designed so that the Containment atmosphere will preferentially aspirate through it rather than through other potential Containment leak paths. In addition to assuring that the Containment structure will not experience significant pressure differential, positive or negative, to threaten the structural capability of the contamination boundaries provided by the Containment, the pathway assures that effluents from the Containment to the environment will pass through the filtered Breather pathway.

The Breather is a passive system which requires only periodic inspection of the HEPA filter. There are no active parts which can fail and cause the Breather to become inoperative. The Containment Atmospheric Breather model is shown on Figure 7.2-1.

The Breather is assured to be the "most probable" pathway because the size of the Breather is very large compared to other potential leak paths. The analysis which demonstrates that the Containment Atmospheric Breather is the most probable pathway is given in Section 7.2.1.2.3.

7.2.1.2.2 System Description

The breather is a passive system consisting of a 6 in. diameter duct with the HEPA filter and two (2) sample filter papers downstream of the HEPA. It has been installed in the 6 in. hydrogen control system line between the existing filter train and the exhaust fan (AH-E-34). Provisions have been made to allow semi-annual sample filter paper removal and assay and reinstallation or replacement of the DOP-tested HEPA. Interim surveillances between sample filter paper assays will be performed to ensure HEPA integrity. The PDMS configuration is shown on Figure 7.2-2.

This gives the ratio of mass flow rates as:

$$(\dot{m}_l / \dot{m}_v) = (0.00717 + 0.312) / 2675 = 0.00012$$

Therefore, the Containment Atmospheric Breather clearly is "the most probable pathway".

A sample filter paper installed downstream of the HEPA filter in the Containment Atmospheric Breather will be removed and assayed for radioactivity semi-annually. The total release can be evaluated for particulates, which represent the only significant radioactive content. Since the filter deposition is cumulative, this method provides determinative (but not real time) monitoring to verify that effluents through the breather are within the calculated values in Chapter 8. Due to the extremely low releases calculated for PDMS, the sample filter paper is adequate for determining the releases anticipated during PDMS.

7.2.1.3 Containment Ventilation and Purge

7.2.1.3.1 PDMS Function

During PDMS, the Containment vent and purge system ensures that uncontrolled atmospheric migration of radioactive contamination will not create a hazard to either the public or site personnel.

7.2.1.3.2 System Description

The Containment purge and purification subsystem will be maintained in an operational condition to support activities in the Containment (e.g., surveillance entries, maintenance) during PDMS. It consists of two Containment purge exhaust units and associated ductwork, dampers, and filters. The purge exhaust units (25,000 cfm each) draw air from the D-rings through HEPA filters, and discharge either to the station vent (purge mode) or back into the Containment (purification mode). The PDMS configuration is shown on Figure 7.2-2.

7.2.1.3.3 Evaluation

Operation of the Containment Vent and Purge System provides fresh air to the Containment while providing a filtered, monitored exhaust path. Atmospheric radiation monitoring, as described in Section 7.2.4, provides for monitoring of airborne releases from the system by using monitors located in the exhaust duct and in the station vent. This ensures that releases from the Containment to the environment are minimal.

early indication of any changing conditions which may require corrective action.

7.2.4.3 Effluent Monitoring

Airborne effluents will be monitored during active and passive ventilation of the Containment. Periodic operation of the Reactor Building Purge and AFHB exhaust will be necessary during personnel entries. During Reactor Building Ventilation System operation, the station ventilation stack monitor, HP-R-219 or HP-R-219A, will provide real time monitoring of releases. The Reactor Building effluent monitoring system is shown on Figure 7.2-13.

During periods when the Containment ventilation systems are not operating, airborne effluents from the Containment will continue to be monitored as discussed in Section 7.2.1.2.3. In the AFHB, no airborne effluent discharges are anticipated. Areas and systems within the AFHB containing contamination sufficient to pose a potential for a release will be sealed. Periodic surveys will be performed as described in Section 7.2.4.2 to monitor for contamination spread. Remedial action will be taken as appropriate to minimize contamination spread or releases to the environment.

The Containment is passively vented to the Auxiliary Building through a breather pathway which will be filtered using a HEPA filtration system. During periods of Reactor Building Purge operation the breather pathway will be isolated. During passive ventilation the purge exhaust will be isolated and the Containment will be vented through the breather HEPA filter. On a semi-annual basis, a sample filter paper installed downstream of the HEPA filter will be assayed for its radioactivity content to evaluate any release to the environment during periods of inactivity.

The Containment Atmospheric Breather System allows pressure equilization between the Containment and the environment. For this reason there is no motive force to cause contamination to leak out other than through the Containment Atmospheric Breather. Therefore, it is not anticipated that releases to the environment will occur through pathways other than the breather. Operating procedures for Containment isolation and inspection of airlock door seals, whenever the doors are opened, will be used during PDMS to ensure isolation is maintained.

A certain amount of inleakage into sumps is anticipated during PDMS and periodic discharges will be necessary. Initial and mid-batch samples will be taken and analyzed to quantify radioactive effluents. The pathway for all radioactive liquid discharges will be through the Industrial Waste Treatment System which provides dilution and monitoring capabilities.

7.2.4.4 General Radiological Monitoring

It is anticipated that the routine radiological surveys will only be performed in areas requiring access for visual inspection, preventive maintenance, or

3. Do all containment and auxiliary building vents discharge to the station vent? Will all vents be closed during those times that the ventilation system is not operating? If not, will they be monitored?

RESPONSE: All Containment and Auxiliary Building vents discharge to the station vent. The vents for the Auxiliary and Fuel Handling Buildings (AFHB) will not be closed during periods that the ventilation is not operating. This will allow pressure equalization with the environment through a filtered pathway. The Reactor Building (RB) will be vented through a filtered breather to the Auxiliary Building while the RB purge is secured.

The station vent will not be monitored by real time sampling during periods when the ventilation is not operating. First of all, sampling would not be representative during periods of very low flow and secondly the potential for a significant release to the environment is very small.

The RB has larger quantities of residual contamination available to release than the AFHB. A sample filter paper installed downstream of the RB breather HEPA will be removed and assayed at least semi-annually to evaluate any release to the environment during periods of inactivity. If the RB releases are very small, which they are expected to be, then the Auxiliary Building releases would be even smaller. In any event, the releases to the environment during periods of inactivity are expected to be insignificant because there is no motive force for forcing the radioactivity through the ventilation system to the environment.

Off-normal events which could provide a motive force, such as a fire, have previously been studied to determine the potential releases to the environment from the AFHB. These studies have shown that the off-site doses resulting from off-normal events would result in a dose of less than 1 millirem to the maximum exposed individual.

B.4. Provide additional detailed information on methodology for the determination of release rates and effluent concentrations for containment and AFHB gaseous effluents during passive mode conditions.

<u>RESPONSE</u>: As discussed in PDMS SAR Section 7.2.1.2, the Containment Atmospheric Breather will be added to the Containment to provide passive pressure control of the Containment relative to ambient atmospheric pressure and to establish a "most probable pathway" through which the Containment will "breathe." In order to determine the gaseous effluent releases for reporting purposes, two (2) sample filter papers will be placed downstream of the High Efficiency Particulate Air (HEPA) filter prior to exhaust into the Auxiliary Building. The two paper filters will be removed semi-annually and the first paper filter downstream of the HEPA filter will be analyzed for radionuclide content to evaluate and and report any release to the environment during periods of inactivity. DOP testing of the HEPA filter will be performed without the two paper filters in place. PDMS SAR Section 7.2.1 and 7.2.4 have been revised to reflect this detailed information.

In the Auxiliary and Fuel Handling Buildings (AFHB), no airborne effluent discharges are anticipated. Areas and systems within the AFHB containing contamination sufficient to pose a potential for a release will be sealed; however, to date, no area has been identified which will require sealing.

B.7. Provide flowpath, methodology for inplace DOP testing, and clarification of size and location of HEPA filter in atmospheric breather for containment.

<u>RESPONSE</u>: Refer to PDMS SAR Figure 7.2-2. The Hydrogen Control Exhaust Unit will be used as the Reactor Building passive breath . Filter position AH-F-33 will contain a 24" x 24" x 11 1/2" HEPA and two (2) sample filter papers downstream of the HEPA. All other filter positions will be empty.

The Reactor Building passive breather may be operated in the following modes:

- <u>Passive Breathing</u> - AH-V-3A, AH-V-52, and AH-V-225 will be open and AH-V-4A, AH-V-120A, and AH-V-36 will be closed. A filter housing door downstream of AH-F-33 will be opened. In this configuration, the Reactor Building will be allowed to naturally aspirate via a HEPA-filtered pathway to the Auxiliary Building which, in turn, naturally aspirates with the environment through yet another set of HEPA filters.

- <u>DOP Testing</u> - AH-V-32, AH-V-52, AH-V-25, and AH-V-36 will be open. AH-V-4A, AH-V-120A, and the filter housing door, which would be open during passive breathing, will be closed. As the Hydrogen Control Exhaust Fan, AH-E-34, is operated, DOP is injected upstream of AH-F-33 and sampled downstream using ports which will be installed later. DOP testing of the HEPA filter will be performed without the two paper filters in place.