

TO: ~~J. COLLINS~~  
~~TMI~~

*File  
EA on Containment  
Purge.*

March 11, 1980

For: The Commissioners  
From: Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
Thru: Executive Director for Operations *W. H. Denton*  
Subject: DECONTAMINATION OF THE THREE MILE ISLAND UNIT 2 REACTOR  
BUILDING ATMOSPHERE  
Purpose: Approval of the release of krypton-85 from TMI-2 reactor  
building atmosphere by controlled purging.

Discussion: As a result of the March 28, 1979 accident at TMI, Unit 2, significant quantities of radioactive fission gases and particulates were released into the reactor building atmosphere. At the present time the dominant radionuclide is krypton-85 (10.7 year half-life) due to decay of the shorter half life materials. Our present estimate of the krypton-85 concentration in the reactor building is 1.0 uCi/cc, which results in a total inventory of 57,000 Ci of krypton-85 within the building. This concentration of gases emits sufficient radiation (1.2 rem/hr total body, 150 rad/hr skin dose) so that personnel occupation of the reactor building is severely limited, even with protective clothing.

Greater personnel access to the reactor building is needed to better assure maintenance of instrumentation and equipment required to keep the reactor in a safe shutdown condition. In addition, greater access would facilitate the gathering of data needed for planning the building decontamination program. The disposal of krypton-85 will largely eliminate the large beta skin dose rate and reduce the total body dose rate at the operating deck level to about 300 mrem/hr. At these dose rate levels, entry to accomplish the above actions is reasonable. An additional consideration is that unduly prolonging the enclosure of the krypton-85 within the building increases the risk of accidental releases of the material to the environment as a result of material or equipment failures, or operational errors.

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The licensee evaluated four alternative methods for removing the contaminated atmosphere from the reactor building. These are: (1) controlled purging through the building hydrogen control system, (2) charcoal adsorption, (3) gas compression, and (4) cryogenic processing. The licensee evaluation is contained in its submittal of November 13, 1979.

Based on this evaluation, the licensee proposed that the reactor building atmosphere be decontaminated by controlled purging through the hydrogen control system. The licensee concluded that the purging can be done with no significant hazard to site personnel or the general population.

We evaluated the four alternative methods listed above and, in addition, the use of a selective absorption system in which krypton-85 is absorbed in freon and separated from the contaminated air. This system was developed by Oak Ridge and has been operated on a pilot plant scale only.

Based on our enclosed Environmental Assessment of the alternatives for disposal of the krypton gas, we have concluded that all of the alternatives studied could be implemented with little risk to the health and safety of the public from resulting effluents and in full compliance with the Commission's regulations and the applicable requirements of 40 CFR 190.10. The dose to the hypothetical maximum exposed individual at the site boundary from the proposed purging operation would be about 11 mrem beta skin dose and 0.2 mrem total body gamma dose, cumulative for the total purging period. The total public dose associated with purging would be less than 1 person-rem. Other alternatives have even lower doses, but this advantage is offset by higher occupational exposures and higher potential doses in the event of accidents (system malfunctions). The environmental impacts for each of the alternative methods would be less than those considered in the Final Supplement to the Final Environmental Statement Related to Operation of Three Mile Island Nuclear Station, Unit 2 (NUREG-0112).

In addition, the use of controlled purging offers the only method that could be implemented within a relatively short period of time. All other alternatives would require at least 1 1/2 years to implement even if off-the-shelf commercial grade components are used. It should also be noted that all alternatives evaluated for decontaminating the reactor building atmosphere will not completely eliminate the krypton-85 from the reactor building atmosphere. Rather, each alternative will reduce the concentration to the MPC of  $1 \times 10^{-5}$  uCi/cc. The remaining activity would subsequently be disposed of by purging to the environment through the building's normal purge system. Alternatives other than purging could also be expected to result in some releases of krypton-85 to the environment during their operation as a result of system leakage.

We have concluded that purging is the best method for removing the contaminated atmosphere from the reactor building. The staff is fully aware of the public sentiment against the planned or accidental release of any further radioactive materials from TMI-2, regardless of the dose consequences. Particular concern has been expressed about the purging of the krypton-85 contained in the reactor building. Thus, the authorization of controlled purging will entail some public concern and stress despite the absence of significant radiological health effects. On the other hand, if purging is not authorized and the krypton continues to be stored in the reactor building for 1 1/2 years or more, based on past experience there will continue to be planned and unplanned small gaseous releases incident to the activities involved in maintaining the facility in a safe status as well as continuous low level releases from offgassing in the auxiliary building and through the condenser vacuum exhaust. Thus, even if purging is authorized there will still be a source of continued public concern and stress over gaseous releases from the plant, but the major source of public concern will have been alleviated. In any event, the staff believes that the dominant consideration is the importance to public health and safety of being able to more positively assure the continued safe condition of the core by direct maintenance and restoration of important instrumentation.

Giving due consideration to all of these factors, the staff concludes that purging of the atmosphere should be authorized and will have no significant adverse impact on public health and safety and no significant environmental impact. In view of the determination that there will be no significant environmental impact, the staff does not propose to prepare a separate Environmental Impact Statement on this action. A negative declaration to this effect will be prepared. In addition, the staff intends to provide a 15-day period for public comment on the Environmental Assessment.

The Pennsylvania Commission on Three Mile Island in its report to Governor Thornburgh of Pennsylvania stated that "In light of our review of the alternative risks, this Commission urges the NRC to make a prompt decision concerning the proposed venting of the Unit 2 containment building atmosphere. Avoidance of this decision by the NRC is unacceptable. This Commission would not oppose an NRC decision to vent the krypton gas, provided that dose levels projected in the environmental impact assessment are acceptable. This position is based on a careful review of the best evidence available at this time." The Department of Energy has made a similar recommendation. Their recommendation was forwarded to the Commission on March 5, 1980.

We have reviewed all the reasonable potential alternatives to venting in the course of our assessment. We do not believe that additional reasonable alternatives will become available between now and the time that the Draft Programmatic Environmental Impact Statement (DEIS) is prepared. Thus there is no value from the standpoint of potential reduction in impacts from awaiting the completion of the DEIS. Similarly, we have considered whether the purging now precludes any potential alternative with respect to other aspects of the cleanup process to be considered in the DEIS, and concluded that authorization of purging will not preclude such alternatives.

The disposal alternative recommended by the licensee, namely, controlled purging through the hydrogen control system, would require approximately 60 days to complete. Because of the social impacts referred to above, the staff has considered whether the period of time needed to accomplish purging safely can be reduced. We believe that it is feasible to limit release to conditions of favorable meteorology, perhaps in combination with increasing the height of the release, such that the release could be accomplished in a few days with no more actual dose impact than currently proposed for the 60 days purge period. Such an alternative would lessen the period of time for release-induced public concern and stress.

If the disposal of krypton by purging is authorized, a very extensive program of monitoring would be conducted. DOE is currently formulating a program which would utilize air and ground measurements of krypton dispersion. DOE also proposes to train a cadre of local citizens to broaden the monitoring during release periods. EPA, the Commonwealth of Pennsylvania and the NRC would also be involved in the monitoring.

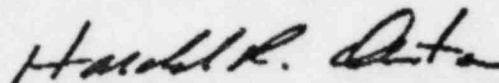
Based on the foregoing discussion, the staff believes that it is in the best interest of the public health and safety to purge the reactor building promptly prior to completion of the Programmatic Environmental Impact Statement.

With regard to contacting CEQ, the EDO Task Force reported its meeting with the CEQ staff in its Task Force Report, "Evaluation of Cleanup Activities at Three Mile Island" (Feb. 28, 1980). In the report they note that

CEQ staff views NRC's approval of total cleanup operations at TMI as a major federal action which legally obligates the Commission to prepare an Environmental Impact Statement. By total operations, CEQ staff means actions extending from the reactor cleanup through to ultimate disposal of the wastes resulting from that cleanup. Until that Statement is prepared, CEQ staff believes that NRC approval of certain actions, such as purging the radioactive gas from the containment, would be a segmentation of the entire clean-up program in a manner inconsistent with NEPA. However, CEQ staff recognizes that NEPA permits the NRC to approve certain actions which could result in limited radioactive effluents prior to completion of the Programmatic Statement. These actions include steps to obtain more information and data relevant to further clean-up activities, and actions necessary to maintain TMI in a safe and stable condition. Maintenance to ensure continued operation of the fan coolers inside the containment was specifically referred to as an example of permitted interim maintenance operations.

Recommendation: We recommend that controlled purging of the TMI-2 reactor building be authorized and that the licensee be directed to propose a method for purging over a shorter time period than the 60 days currently proposed, but within the constraints of Appendix I to 10 CFR 50 and 10 CFR 20.

Coordination: The Office of the Executive Legal Director has no legal objection.



Harold R. Denton, Director  
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Enclosure:  
Environmental Assessment - 2-  
NUREG-0662