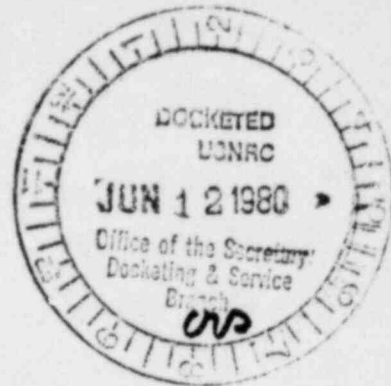


UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION



Commissioners:

John F. Ahearne, Chairman
Victor Gilinsky
Richard T. Kennedy
Joseph M. Hendrie
Peter A. Bradford

In the Matter of)
)
METROPOLITAN EDISON COMPANY, et al.)
)
(Three Mile Island Nuclear Station,)
Unit 2))

Docket No. 50-320

MEMORANDUM AND ORDER
(CLI-80-25)

The Commission has before it a staff recommendation that the licensee, Metropolitan Edison Company, et al., be authorized to commence a controlled purging of the TMI-2 reactor building atmosphere in order to remove the remaining radioactive Krypton-85.^{1/} To meet the requirements of the National Environmental Policy Act, the staff has submitted in support of this recommendation a "Final Environmental Assessment for Decontamination of the Three Mile

^{1/} Most of the radionuclides originally released into the containment atmosphere have decayed to insignificant levels. The dominant remaining radionuclide is the gas, Krypton-85 (Kr-85), which has a 10.7-year half-life. The Environmental Assessment states that approximately 57,000 curies of Kr-85 are mixed in the containment atmosphere, as determined by periodic sampling of Kr-85 concentrations.

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Island Unit 2 Reactor Building Atmosphere," NUREG-0662, May 1980. The draft version of this assessment and two subsequent addenda were issued for public comment, and by the close of the comment period on May 16, 1980 approximately 800 responses had been received. These are summarized in Section 9 of the final assessment and major comments are included in Volume II of NUREG-0662. The Commission received further information regarding the proposed purging at oral briefings by the staff on June 5, 1980 and June 10, 1980.

In a Statement of Policy dated November 21, 1979 the Commission announced its intent to prepare a programmatic environmental impact statement on decontamination and disposition of radioactive waste resulting from the March 28, 1979 accident at Three Mile Island, Unit 2. The policy statement noted that if the best interest of public health and safety required prompt decontamination action prior to completion of the programmatic statement, such action would not be precluded. The Commission stated among other things, however, that no action to purge the containment of radioactive gases would be taken without a prior environmental review and opportunity for public comment. Before we can approve the staff's recommendation for controlled purging of the TMI-2 containment, we must thus decide whether there is sufficient need for prompt decontamination of the containment atmosphere to justify going ahead prior to completion of the programmatic impact statement. We must also decide whether the decontamination method recommended by the staff can be carried out consistent with

the Commission's statutory mandate to ensure adequate protection of public health and safety and whether the environmental review has met the requirements of the National Environmental Policy Act.

The immediate goal of the proposal to purge the reactor building atmosphere is to remove radioactive particulates and gases released into the containment by the accident. There are several methods discussed in the Environmental Assessment by which the radioactive krypton can be removed. The method recommended by the staff involves controlled release to the outside atmosphere of the gases in the containment through the existing plant ventilation system, the hydrogen control subsystem, and the reactor building purge system. The release rates would be controlled so as to take place only during acceptable meteorological conditions, which would be continuously monitored, such that the dose limits established by 10 CFR Part 20, the design objectives of 10 CFR Part 50, Appendix I, and the provisions of 40 CFR Part 190.10, to the extent they may be applicable, will not be exceeded by the controlled purging.^{2/} In addition to monitoring of releases by the NRC, radiological monitoring during the proposed controlled purging would be conducted by the U.S. Environmental Protection Agency (EPA), the Commonwealth of Pennsylvania, the U.S. Department of Energy and Metropolitan Edison Company.

The Environmental Assessment contains ample evidence to show that risk to physical health from the proposed purge or from any of the alternative decontamination methods considered

^{2/} The most restrictive regulation is 10 CFR Part 50, Appendix I. Appendix I sets forth gaseous release annual off-site dose design objectives of 5 millirems to the total body and 15 millirems to the skin. The purging will be limited so that the maximally exposed individual could not receive a dose from purging that exceeds this objective. Gaseous releases from TMI-2 unrelated to purging are expected to be insignificant, so that the annual dose from gaseous effluents should not exceed the annual Appendix I design objective by any significant amount, if at all. Purging will likely result in doses that will exceed the reporting levels of IV.A of Appendix I, but this is of no concern in view of the assurance that the purging will be within the annual design objective.

by the staff would be negligible. See Table 1.1, NUREG-0662. The assessment also addresses the effects on the psychological well-being of persons living in the vicinity of TMI. The staff concluded that psychological stress resulting from the proposed venting of Kr-85 will be less than from any of the alternatives, including the alternative of taking no action. Testimony at the June 5, 1980 oral briefing by expert consultants on the question of psychological stress supported this conclusion and indicated that purging the containment should have the net effect of reducing the stress which otherwise would occur if positive steps are not taken promptly to proceed with decontamination and reduce uncertainty about the present and future condition of TMI-2.

Removing Kr-85 from the containment atmosphere would yield a number of important and immediate benefits. Radiation from Kr-85 at the concentration levels found inside the containment significantly limits worker access and precludes extensive operations needed to gather information, inspect and maintain equipment, and proceed toward the eventual removal of the highly radioactive damaged nuclear fuel from the reactor core. Decontaminating the atmosphere would relieve workers performing necessary maintenance and cleanup activities from hazards of working in awkward protective clothing and risk from penetrating gamma radiation associated with the

decay of Kr-85.^{3/} Moreover, there is no serious question that removal of the Kr-85 from the containment atmosphere is a necessary step toward core defueling. Until the fuel is removed, TMI-2 will continue to present a potential risk to public health and safety. Thus, decontaminating the containment atmosphere has an immediate and independent utility which justifies proceeding at this time,^{4/} provided that the proposed method is acceptable on health and environmental grounds.

Because of the importance to the public of having a clear understanding that purging the TMI-2 containment presents a minimal risk to physical health, we review here the basis for concluding that the physical health impacts of venting Kr-85 under proper controls will be negligible. This conclusion was supported by the U.S. Environmental Protection Agency, the U.S. Department of Health and Human Services, the National Council on Radiation Protection and Measurements, the Pennsylvania Department of Environmental Resources, and the Union of Concerned

^{3/} Only .4% of the Krypton-85 decays in a way that emits gamma rays. At the concentrations in the reactor building, this would be significant to workers. After mixing with the atmosphere, it does not threaten the public health and safety.

^{4/} The President's Council on Environmental Quality was consulted on the staff's proposal to vent Kr-85. In a letter dated May 19, 1980, and relying on the staff's technical analysis, the Council advised "that as a matter of procedure, staff's proposal does not violate 40 CFR Section 1506.1 (1979) (limitations on actions during NEPA process) of the Council's regulations implementing the National Environmental Policy Act."

Scientists. Governor Thornburgh of Pennsylvania has indicated in a letter to Chairman Ahearne, dated May 16, 1980, that he adopts the consensus that the dose rates associated with controlled purging are insignificant. Krypton-85 has no significant food pathway involvement and in 99.6 percent of its radioactive decays emits only low energy beta particles which primarily affect the skin, one of the tissues least susceptible to radiogenic concerns. The Environmental Assessment estimates that to the maximally exposed individual the risk of skin cancer "would be equivalent to spending 30 minutes in the sun. The average individual in the population would have an added risk of skin cancer equal to about a half-second of exposure to the sun's rays." NUREG-0662, p. 7-7. The total lifetime-individual cancer risk to the maximally exposed individual would be about one in sixteen million, compared to a normal lifetime expectancy of one chance in five from all types of cancer. NUREG-0662, p. 7-2.

Of course, most persons would receive a dose much smaller than the estimated maximum. The Environmental Assessment estimates that the collective offsite dose to the population within 50 miles of TMI-2 will be 0.76 and 63 person-rem for total-body and skin doses, respectively.^{5/} NUREG-0662, Table 1.1. Based on these figures and on a cancer mortality risk estimate of 135 deaths per

5/ At the oral briefing the staff reported that estimated total-body doses to the U.S. and world populations were about 15 person-rem and 60 person-rem respectively.

million person-rem,^{6/} the Environmental Assessment finds that "[t]he cancer mortality risk among the general population within 50 miles resulting from the purge option would be about 0.0001." In other words, the chance that the proposed purge would cause a cancer death among the general public living within 50 miles of TMI is about one in ten thousand. Although the impacts described above apply specifically to a slow purge as originally recommended by the staff, the Environmental Assessment notes that they also apply approximately to a fast purge alternative conducted under meteorological conditions favorable for atmospheric dispersion. The staff's current recommendation calls for use of a fast purge rate if weather conditions permit. The Commission agrees with the technical staff that the physical health impact of this recommended action may be termed insignificant.^{7/}

Alternative methods which could reduce offsite radiation exposure still further were considered in the Environmental Assessment, including several suggestions offered by commenters on the draft assessment. These included variations of the purging method whereby the Kr-85 would be injected into the

^{6/} This risk estimate is taken from the 1972 Report of the Committee on the Biological Effects of Ionizing Radiation, "The Effects on Populations of Exposure to Low Levels of Ionizing Radiation," National Academy of Sciences, November 1972.

^{7/} At the oral briefing the staff noted in answer to a question by the Commission about possible health hazards to animals that humans are generally more sensitive to radiation than other living things and that the proposed purging would clearly have no significant effect on animals.

atmosphere at a higher level, either by various means of elevating the release point higher than the existing 160-foot stack or by heating the gases prior to discharge to increase its buoyancy. The staff also considered methods whereby the krypton could be captured and stored indefinitely or until the radioactivity decayed to insignificant levels (about 100 years). These methods include (1) selective absorption of krypton by a scaled-up version of a system now in operation at Oak Ridge National Laboratory, (2) absorption of large quantities of charcoal, (3) gas compression and storage in pressurized containers, and (4) extracting the Kr-85 by liquefying it through cryogenic processing. The alternatives considered appear to have varying degrees of practicality, but the staff found that none of them could be implemented in the near future or, for that matter in a time period much short of a year at the best.^{8/} The controlled purging method of decontamination recommended by the staff can be implemented immediately. Since the physical health risks of the purging method are extremely small to begin with and since decontaminating the TMI-2 containment atmosphere should not be unnecessarily delayed, for reasons we have already discussed, the Commission agrees with the

^{8/} In particular, the staff investigated a suggestion that the selective absorption process could be placed into operation in six months by using equipment said to be available from the National Aeronautics and Space Administration and other sources. The suitability of this equipment turned out to be questionable, and the proposed schedule for design and procurement appeared unrealistic. The staff's minimum time estimate for making a selective absorption system operational was 16 months.

staff that the possibility of reducing very small physical health risks still further does not justify significant delay and uncertainty associated with implementing an alternative process.

Although the Commission has considered the question of psychological stress, firm conclusions on this subject are not possible. We believe that the alternative chosen will in fact minimize stress, but we have no special competence in this field. It is clear that different aspects of the TMI clean-up are sources of stress to different people. However, it is difficult for us to evaluate with precision whether choosing an alternative which would delay TMI cleanup would cause more or less stress than the controlled purging of Kr-85 which a broad consensus of scientific opinion considers safe. We are confident only that the stress will be lessened 1) by our having chosen a plan which rests on a very wide consensus that physical health is not threatened by the krypton release, 2) by having the krypton release occur over the shortest time consistent with the public health and safety, and 3) by a clear step toward cleaning up other potential sources of radiation at the damaged reactor. These three principles are part of this decision.

The Commission thus finds that decontamination of the TMI-2 containment atmosphere should be carried out promptly by the purging method recommended by the staff. Physical health impacts will be negligible, and a long-term reduction

in the sources of psychological stress is expected.^{9/}

Thus, there is adequate assurance that public health and safety will be protected as required by the Atomic Energy Act. We agree with the conclusion of the Environmental Assessment that the proposed action will have no significant adverse effect on the environment. Accordingly, no environmental impact statement need be prepared and a negative declaration to this effect may issue. In view of the scope and detail of the Environmental Assessment and the extensive solicitation of public comment, we believe in any case that the purposes of NEPA have been served and that preparation of a formal EIS, had one been required, could not add significantly to the level of environmental consideration and public disclosure already achieved.

TMI-2 is presently being maintained pursuant to restrictions in an order issued by the Director, Office of Nuclear Reactor Regulation on February 11, 1980 requiring the licensee, Metropolitan Edison Company, to maintain the facility in accordance with the requirements of revised technical specifications set forth as an attachment to that order. In implementation of the Commission's Policy Statement of November 21, 1979, these specifications

^{9/} The Commission has not yet determined whether psychological stress is a health concern cognizable under the Atomic Energy Act and/or an environmental impact cognizable under NEPA. We are presently considering these issues in connection with the TMI-1 restart proceeding. In the Matter of Metropolitan Edison Company (Three Mile Island Nuclear Station, Unit No. 1), Docket No. 50-289. In view of our finding that the proposed venting of Kr-85 is likely to have an overall beneficial effect on psychological stress, the present decision does not hinge on how the issues are finally resolved.

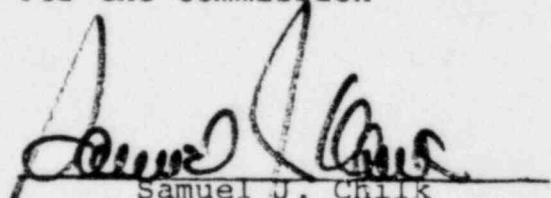
included the restriction that "purging or other treatment of the containment atmosphere is prohibited until approved by the NRC" In the present order we give the approval contemplated by that restriction insofar as necessary for the licensee to conduct a purging of the TMI-2 containment, commencing no sooner than 10 days from the date of this order, in accordance with the proposal recommended by the NRC staff as presented to the Commission in the record for this proceeding. The licensee shall conduct this purging in accordance with procedures approved by the NRC, pursuant to Section 6.8.2 of proposed Appendix A to the Technical Specifications, NUREG-0432, as made binding on the licensee by the February 11, 1980 order of the Director, Office of Nuclear Reactor Regulation.

Commissioner Gilinsky concurs in the result. Commissioner Bradford's separate views are attached.

Information regarding the carrying out of this decision will be available at 717-782-4014 or 944-0418.

It is so ORDERED.

For the Commission


Samuel J. Chirk
Secretary of the Commission

Dated at Washington, D.C.
this 12th day of June, 1980.

SEPARATE VIEWS OF COMMISSIONER BRADFORD

While I agree with the result and much of the reasoning in the foregoing Order, I feel compelled to note that it is misleading in three respects:

1. It states that the Union of Concerned Scientists "supported" the conclusion that the physical health impacts of venting Krypton-85 under proper controls will be negligible. The Union of Concerned Scientists did agree with that proposition, but it is disingenuous to imply that UCS agrees with the venting alternative chosen here. The UCS report to Governor Thornburgh is explicit in stating that the NRC's venting alternative should not be undertaken because other alternatives are available within what UCS views as a reasonable period of time and would reduce psychological stress. Thus, UCS should not be listed in the Commission's statement in a fashion designed to imply that they are in accord with the NRC's action.
2. The Order states that the staff also considered methods "whereby the krypton could be captured and stored indefinitely or until the radioactivity decayed to insignificant levels (about 100 years)." In fact, as was brought out at the June 10 meeting on this subject, there would probably be no need to store the krypton for any long period of time.

There is a commercial market for Krypton-85, and if an alternative to venting were chosen, the recovered krypton could probably be sold and would not need to be stored. The real argument against recovering the krypton is that the several recovery methods take too long and cost too much when weighed against the fact that venting will have no significant radiation-related public health impacts. The language suggesting that long-term storage is a serious problem should not have appeared in the staff's environmental assessment and should not appear in this Order.

3. The staff assessment of the cryogenic processing method of recovering the Krypton-85 did not deal adequately with the availability of a completed cryogenic processing system at the Hope Creek nuclear facility. This system is already completed and is on skids and could be moved easily to the site. It could certainly complete its task in less than the 20 months assigned as the minimum for a cryogenic processing alternative. However, I am persuaded that it too would be likely to take at least a year and is therefore not a reasonable alternative to the venting plan endorsed in this order.

I am astonished to have to make these points in a separate opinion, but the Commission has declined to include them in the body of the Order.