Met-Ed GPU

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February 23, 1981
LL2-81-0033

TMI Program Office
Attn: Mr. Lake Barrett, Deputy Director
U. S. Nuclear Regulatory Commission
c/o Three Mile Island Nuclear Station
Middletown, PA 17057

Dear Sir:

Three Mile Island Nuclear Station, Unit 2 (TMI-2)
Operating License No DPR-73
Docket No. 50-320
Use of EPICOR II for RCS Water

The purpose of this letter is to request your approval of continued use of the EPICOR II System for its intended use, the processing of intermediate-level waste water. The licensee was ordered by the Commission on October 16, 1979 to "promptly begin the process of decontaminating the intermediate-level waste water" from TMI-2. However, as the water intended to be processed is the now intermediate-level water in the Reactor Cooling System (RCS), Technical Specification 3.9.14 requires your prior approval for such processing along with your approval of related procedures in accordance with Technical Specification 6.8.2.

The reasons for which we believe this request and your expeditious approval at this time are appropriate are set forth below.

In summary:

- EPICOR-II was designed to process "intermediate-level waste water." RCS water now meets the definition of "intermediate-level waste water."
- While the Memorandum which accompanied the October 16, 1979 Order excluded RCS water processing from the EPICOR-II charter, at that time RCS water was identified as "high-level". Time, with dilution and decay, has reduced the contained contamination to the intermediate-level concentration.
- The NRC has ascribed a high priority to clean-up of the RCS water as well as the containment sump water and to minimization of employee exposure to radiation.

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- It is desirable that EPICOR-II be used for RCS water processing as it is demonstrated, existing and available. No other system at TMI-2 meets any of these three parameters with the capability of handling intermediate-level waste water.

A review of the record is in order.

Soon after the March 28, 1979, accident at TMI-2, construction of a system to process radioactively contaminated water containing up to 100 μCi/ml* of radioactive material was started. This system was named EPICOR-II. The Commission directed its technical staff to prepare an environmental assessment of the use of EPICOR-II. The Staff published this Statement on August 14, 1979. After reviewing the Environmental Assessment as well as some 40 comments received from the public, the Commission issued a Memorandum and Order on October 16, 1979 which directed the licensee to "promptly begin the process of decontaminating the intermediate-level waste water from TMI-2 by operating EPICOR-II." The Order also stated, "In order to reduce the inherent risk from the contaminated water most expeditiously and prudently, the licensee should to the extent possible process all the water once through the EPICOR-II system" (Emphasis added in both quotations).

In Table 1 attached to Chairman Ahearne's January 12, 1981 letter to Mr. Dieckamp, two activities are identified as "Activities required for reducing the intermediate and long-term threats to public and worker health and safety". Item 17 of that table is "Develop the capability to decontaminate the radioactive water within the reactor building sump and the reactor coolant system." Item 23 is "Continue operation of the EPICOR-II System on an as needed basis." This further emphasized the NRC's desire that requested action carries a high priority.

A number of other quotations from the record that bear out the consideration that EPICOR-II was approved to process intermediate-level waste water without limitation as to its source are appended to this letter.

A study of these quotations or, indeed, of the full documents, seems to lead to the following considerations:

- EPICOR II was designed to process intermediate-level waste water (1-100 μCi/ml), not high-level waste water (>100 μCi/ml).

- The Commission excluded, in its Memorandum--not in its Order--the processing of then high-level waste waters in the reactor containment building and reactor coolant system, presumably because they had contamination levels well above that for which EPICOR-II was designed.

- The Commission's Order, as well as the Staff's Order for Modification of License, directed the expeditious processing of "intermediate-level waste water," without limitation as to its source.

*microcuries per milliliter

- Considerations of possible leakage, exposure of employees and protection of the public health and safety cited in the Commission's Memorandum are just as pertinent to the expeditious processing of RCS water as they were for the Auxiliary and Fuel Handling Building water.

Having reviewed the background of regulatory actions related to EPICOR-II, we now turn to the present. Since the dates of the EPICOR-II related Orders, there have been several very significant changes:

- The most compelling and significant change between October, 1979 and January, 1981 is that the gross beta-gamma level of the waste has been reduced due to dilution and decay to the 70-75 μCi/ml range. In October, 1979 this contamination was well over 100 μci/ml. The original definition of "intermediate level" waste was based on the cesium and iodine-131 content. The cesium is now down to about 30 uCi/ml, while water from the C/RCBT processed in the EPICOR-II system contained some 67 μCi/ml of cesium. Cesium is still the radionuclide of principal interest as related to personnel exposure as it is by far the predominant gamma emitter.

- The EPICOR-II system has proven to be reliable and to quite adequately meet ALARA and public safety requirements while processing over 500,000 gallons of intermediate-level waste water.

- Inorganic ion exchange media are now used in the EPICOR-II prefilter in lieu of organic resins.

- The original objective of a high decontamination efficiency of EPICOR-II has been met. The current requirement is that decontamination be adequate for the water's in-plant use such as for decontamination, shielding or return to the reactor coolant system.

- The integrity of the reactor coolant system certainly has not increased with time but, undoubtedly has been reduced to some extent, thereby increasing the likelihood of a leak.

- The primary charter for EPICOR-II, initial clean-up of post accident waste water in the auxiliary and fuel handling building is essentially complete so that EPICOR-II is now available for other necessary and similar work.

An inherent factor related to this request is that it is proposed that the EPICOR-II System be used with no basic change from the way it has been used (as ordered in October 1979), i.e., to decontaminate water with radioactive contaminants in the same range (1-100 μci/ml) as that for which it was designed and has been operated.

A comparison of the several aspects of the proposed operation to past operation is in order:

System configuration — No change. It is planned that water, as now, will be fed to EPICOR-II from an RCBT and returned to another RCBT.

Ion exchange media — As stated above, the prefilter would be loaded with only inorganic media. Material in the demineralizer vessels would be selected to perform the desired decontamination. The objective would be to reduce the radionuclide concentration to about 0.01 uci/ml, but to leave in the water boron and sodium necessary for the water to be returned to the RCS.

Prefilter radionuclide loading — This would be held (pending NRC approval for a higher limit) at the same 1300 Ci limit as has been past practice.

Gaseous effluents — No change

Liquid effluent to river — As at present, zero.

Employee exposure — No change on EPICOR-II operation. Exposure of those required to be near exposed parts of the RCS would be reduced.

Operating procedures — None of the EPICOR-II or solid waste handling procedures would require any change to handle RCS water other than minor changes, principally of an evolutionary nature. New or changed procedures would be required for the movement of water from and back to the reactor.

Accident liklihood and consequence — No change

While we have been unable to identify any aspect of EPICOR-II processing of RCS water more adverse than has been experienced in its prior operation, there are definite advantages to be realized by decontaminating RCS water at an early date by use of EPICOR-II. Some of these are:

- Use of EPICOR-II will significantly reduce radiation exposure of employees whose duties bring them near exposed parts of the primary cooling system. Indeed, some areas are considered to be inaccessible because of the radiation from the RCS. If EPICOR-II is not used promptly rather than the alternative of waiting until SDS processing of containment sump water is complete, current high radiation rates will persist

much longer. Should a major leak develop in one of these areas, repair would result in significant exposures. If it becomes necessary or desirable to use the Mini Decay Heat Removal System (MDHRS), lower activity RCS water would markedly reduce radiation exposure during maintenance of the MDHRS.

- o While major leakage of the RCS is not expected, it is possible. Obviously, the consequences of a leak would be greatly mitigated if the water were decontaminated.

The only non-benefit we have identified from use of EPICOR-II to decontaminate the RCS water is that the volume of solid waste would be greater from EPICOR-II than from the SDS. Trade-off of this negative factor vs. the several benefits is a matter of judgement. We have concluded that the benefits listed above considerably out weigh the one negative factor.

We therefore find:

- o Use of EPICOR-II to decontaminate RCS water is not contrary to, but rather fully in accord with, the literal words of related Orders, and is consistent with the sense of urgency expressed therein.

- o Changes in related factors since those Orders were issued in October 1979, make it now desirable that EPICOR-II be utilized to process RCS water.

- o Proposed EPICOR-II operation on RCS water does not differ from processing which has been performed, making unnecessary any further safety or environmental review.

- o To not utilize the available EPICOR-II System to clean up the RCS water in the most expeditious possible way would be inconsistant with the ALARA requirements of the NRC.

- o The expeditious clean-up of RCS water by using the EPICOR-II System will enhance the public health and safety by reducing the adverse consequences of an unlikely but possible leak in the RCS.

Accordingly we request that the NRC expeditiously consider the above request and arrive at an early and positive conclusion. On our receipt of approval of the action we will prepare the necessary revisions to and/or new procedures for your approval prior to operation of EPICOR-II on RCS water.

Sincerely,

/S/ G. K. HOVEY

G. K. Hovey
Vice-President and
Director, TMI-2

GKH:RN:lh

cc: [redacted]

INTENDED USE OF EPICOR-II
EXCERPTS FROM THE RECORD

NUREG-0591, "Environmental Assessment, Use of EPICOR-II at Three Mile Island, Unit 2," August 14, 1979.

Page 1. ". . ., treatment and disposition of water in the reactor containment building will also be covered in a separate assessment."

". . .letdown (. . .) from the reactor coolant system has resulted in a net increase to the inventory; . . " (of waste water in the Auxiliary Building)."

Page 2. ". . . the design basis of which [EPICOR-II] was to decontaminate water with an activity level up to 100 μci/ml of I-131 and Cs-137, the principal radionuclides present in the waste water for radiological dose considerations."

"**Intermediate-level waste is defined as waste having I-131 and Cs-137 concentrations greater than 1 μci/ml but less than 100 μci/ml."

The Commission's Memorandum and Order of October 16, 1979.

The Memorandum

Page 1. ". . .the Commission's technical staff has recommended that Metropolitan Edison, the licensee for Three Mile Island, be permitted to operate an EPICOR-II filtration and ion exchange decontamination system to decontaminate intermediate-level waste water now held in tanks in the TMI-2 Auxiliary and fuel handling building."

Page 2. "The radioactivity concentrations of waste water in the reactor building and in the primary coolant systems have been measured

(This directive also appears in the same wording in the October 18, 1979, Order for Modification of License.)

Page 15. "4. This Order ... does not authorize ... processing of any waste water other than intermediate-level waste water."

at greater than 100 μci/ml for some isotopes. This waste water is referred to as high-level waste water."

Page 3. ". . .the retention of contaminated water in the auxiliary building contributes to the occupational exposure of workers at the TMI Site."

"Successful operation of EPICOR-II will serve to transfer the significant radioactive contaminants from a mobile form (suspension in water) to a fixed form (held in filter and ion exchange resin materials.)"

Page 6. "The use of this system will immobilize most of the radioactivity presently dispersed in the intermediate-level water, which requires large storage volumes and involves at least some possibility of leakage, by transferring this radioactivity to the compact, more easily stored EPICOR-II resins thereby reducing the potential hazard to workers and the public of an excessive accumulation of intermediate-level waste water.

The Order

Page 14. "1. The licensee shall promptly begin the process of decontaminating the intermediate-level waste water from TMI-2 by operating EPICOR-II. Prior to operation, the licensee shall consult the Director of NRR for approval of the final operating procedures and design and construction details. In order to reduce the inherent risk from the contaminated water most expeditiously and prudently, the licensee should to the extent possible process all the water through the EPICOR-II System."