T/C

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February 1, 1980
TLL 042

TMI Support
Attn: J. T. Collins, 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 II (TMI-2)
Operating License No. DPR-73
Docket No. 50-320
Processed Water Disposal

As addressed in our letter of December 21, 1979 (GQL 1509), the following information is supplied in response to item 2.

STATEMENT OF PROBLEM

There are about one million gallons of water at TMI-II containing approximately 2800 curies of tritium at concentrations ranging from 0.02 Ci/ml to 1.0 Ci/ml. Tritium will not be removed by processing because the processes to be used for decontamination of the water cannot distinguish between tritiated water (HTO) and normal water (H_2O).

The near term ultimate disposal of this water has been complicated by current administrative limitations which prohibit discharge until approved by the NRC. This delay in discharge is intended to permit sufficient time for environmental review and to demonstrate that plans for ultimate disposition will result in acceptable impacts.

APPROACH TO PROBLEM, NEAR TERM

Until approved by the NRC, tritiated water will be retained at Unit II in existing tanks, sumps and fuel pools and in tanks to be constructed. During the recovery, tritiated water will be segregated as necessary and its recycle applications will be optimized to minimize the additions of new water. Plans for processing and placement of processed water during 1980 were submitted to the NRC on January 30, 1980.[1]

With respect to recycle application efforts have been initiated, and are continuing, to demonstrate the acceptability of the use of this water for flushing, decontamination, and for spent fuel pool shielding. Specifically, the occupational dose and chemistry requirements for recycle applications are being evaluated. A prime example of such use is the placement of approximately 200,000 gallons of processed water in

1 TLL 036

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Spent Fuel Pool B for shielding the Submerged Demineralizer System.

As a minimum, two 500,000 gallon storage tanks will be completed this year which, with existing tanks and the fuel pool, will provide sufficient storage capacity for the processed accident water. Additional tankage may be contructed to facilitate water management during cleanup and decontamination.

LONG TERM OPTIONS

A study completed in September[2] qualitatively evaluated nine options for long term disposition of tritiated water. Evaluation factors included technical feasibility, radiological health and safety, licensing and cost. On the basis of this study, consideration of three of the nine options was discontinued, as follows:

- Local release to the ground by deep well injection or subterranean grouting was rejected because the geological uncertainty was unacceptable (without extensive investigation), there is no regulatory precedent, and the cost would be high.

- Shipping as a liquid for processing and disposal elsewhere was deferred from further consideration primarily because the judgement was made that obtaining regulatory approval would be extremely difficult.

- Local release to the air by forced evaporation was deferred because there is no regulatory precedent and is conceptually and environmentally similar to natural evaporation from a pond.

Of the remaining six options, four were defined for further investigation, two of these four being combinations. These were as follows:

- Casting into concrete blocks (suitable for shipment should such be required).

- Placement in a natural evaporation pond.

- Long term retention as liquid in tanks at TMI.

- Local release to the river in compliance with NRC and EPA regulations (including the possibility of imposing drinking water maximum concentrations at the outfall).

Several ongoing tasks have addressed these four options and results to date are as follows.

2 9/28/79 WMA-TR-2, Rev. 0, Draft 3; Management Options for TMI-II Contaminated Water, C. Negin, et al.

1. Casting Into Concrete Blocks

This option was studied for the TMI Recovery Engineering Department by the Bechtel Corp. Bechtel's evaluation concludes that a concrete batch plant with an hourly capacity of 100 cubic yards would occupy about one acre in the southern portion of the owner controlled area, at least 200 ft from the property line. The cost of the plant, including operation, would be about four million dollars. If a requirement to ship to a burial site were imposed, an additional three to four million dollar cost would be incurred for transportation and burial. Additionally, the concreting process would directly result in evaporation of some water. Because of this loss of tritium via evaporation (which would be contrary to the purpose of solidification) and also because of the relatively high cost of this option, it will not be considered further.

2. Evaporation Pond

A conceptual design for an evaporation pond was developed by the Bechtel Corp., and evaluated by GPU Recovery Engineering, with support from Bechtel, International Energy Associates, and Pickard, Lowe & Garrick, Inc.

The location of this pond would be in the southern portion of the owner controlled area and at least 200 feet from the facility property line. The pond was sized at about one acre. It would be approximately 3 feet deep and have a dike an additional 3 feet high. The construction cost is estimated at about $500,000.

The environmental impact of an evaporation pond would be within regulatory requirements of 10CFR20 and 10CFR 50 (Appendix I). However, special design and operating features in addition to the simple pond concept might be required to demonstrate such acceptability.

A major question regarding this concept, which remains unresolved, is whether there would be a net increase or decrease of water inventory in the pond over an extended time period, taking into account the compensating effects of precipitation and evaporation. (Clearly the specific activity of this water would decrease with time due to evaporation and radioactive decay.) This is an important consideration because, if studies were to show that there is a net increase in water inventory with time, additional complicating design features would be required (such as those to control or collect overflow) and the ultimate disposition problem at end of plant life, may well be aggravated. If, on the other hand, the water volume will decrease with time, this option would remain attractive.

At this point, technical analysis has suggested that there will be a net increase in pond inventory, although more involved investigation would be required to develop adequate confidence on this point. In any event, because there are more desirable near term options available for disposition of processed water, consideration of the evaporation pond is suspended for the forseeable future.

3. Storage In Tanks

The processed water storage tanks have been designed as permanent plant components. Thus, they are suitable for longer term storage beyond the period of administrative limitation of discharge. Storage of tritiated water in these tanks for an extended period, if necessary, would allow deferral of the decision on tritiated water disposal until some later time. The tritium levels in the processed water storage tanks will continue to decrease by radioactive decay at a 12½ year half life.

4. Local Discharge

During the period in which discharge is prohibited, the environmental and radiological suitability of processed water will be addressed by GPUSC, NRC and others and will be subject to extensive scrutiny. Furthermore, as water is processed, its quantity and radiochemical characteristics will be established as actual fact rather than analytical projection, thus removing some of the uncertainty associated with earlier evaluations.

If the extended information base developed during this period provides further support of the discharge concept, we may choose to make later application to NRC for approval to discharge processed water. As part of this application, hardware and procedures would be developed to control and monitor such discharge to satisfy regulatory and environmental requirements.

CONCLUSION

In summary, it is concluded that sufficient holding capacity and recycle applications will exist to accommodate the near term operational impact of discharge restriction. Based on continuing evaluations by GPU and others, the discharge option may be pursued in the future as the means of disposing of processed water after the period of administrative limitation of discharge. Alternately, the on site storage option, utilizing processed water storage tanks now under construction, is available as are other options discussed above which are still viable ultimate disposal techniques. We do not intend to further pursue any of the ultimate disposal options until a future date.

Sincerely,

J J Barton for
R. F. Wilson
Director, TMI-II

RFW:CN:hah

cc: R. Vollmer