December 20, 1989

Mr. Eric Epstein
R.D. #1, Box 435A
Liverpool, Pennsylvania 17045

Dear Mr. Epstein:

Enclosed are responses to the questions you raised at the September 21, 1989, TMI-2 Advisory Panel Meeting in Harrisburg, Pennsylvania.

I am making copies of this correspondence available to the TMI-2 service list as well as members of the TMI-2 Advisory Panel.

Please do not hesitate to call if you need clarification on any of the responses. My phone number is (301) 492-1373.

Sincerely,

/s/

Michael T. Masnik, Project Manager
Project Directorate I-4
Division of Reactor Projects - I/II
Office of Nuclear Reactor Regulation

Enclosure:
As stated

cc: w/enclosure
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NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

December 20, 1989

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R.D. #1, Box 435A
Liverpool, Pennsylvania 17045

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Michael T. Masnik

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Enclosure:
As stated

cc: w/enclosure
See next page

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Three Mile Island Nuclear Station
Unit No. 2

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QUESTIONS FROM ERIC EPSTEIN, TMI ALERT - SEPTEMBER 21, 1989
ADVISORY PANEL MEETING

1. The NRC accepts the idea of leaving "the TMI facility in storage for an unspecified period of time, quite likely until TMI-1 is ready for decommissioning" (1.2). I'm very uncomfortable with the terms "unspecified" and "quite likely." Does quite likely have a percentage value attached to it?

   Response:

   The licensee has proposed to place the TMI-2 facility in post-defueling monitored storage (PDMS) for a period of time following current efforts to remove the damaged fuel. The licensee has not explicitly proposed a duration for the storage period, however, the licensee has indicated in a letter dated June 23, 1989, from Clark to the NRC, that "monitored storage of TMI-2 would not extend beyond decommissioning of TMI-1." The period of time TMI-2 could be left in post-defueling monitored storage is limited by either the expiration date of the TMI-2 license or a decision to begin decommissioning simultaneously with the decommissioning of TMI-1.

   The present Unit 1 operating license expires on May 18, 2008 and the TMI-2 operating license expires on November 4, 2009. Based on the Decommissioning Rule, the licensee would be required to submit a preliminary decommissioning plan 5 years before the expiration date, and a decommissioning plan 1 year before the expiration date of the license. A license extension for TMI-1 could be considered based on the 40-year life beginning at the operating license date. If this extension was requested and granted, the Unit 1 operating license would expire on April 19, 2014.

   The NRC staff, in their analysis of the environmental impacts of PDMS, did not attach a percentage value (we assume this to mean a probability) to the likelihood that PDMS would last until TMI-1 was ready for decommissioning. The NRC staff did, however, evaluate various durations of PDMS, ranging from 5 to 33 years.

2. What is the maximum amount of time GPU could legally keep this plant in the PDMS phase?

   Response:

   As stated in the response to Question 1, PDMS is limited by the expiration date of the TMI-2 license unless GPUN decides to begin decommissioning before that date.

3. How long would the NRC be willing to make "provisions" (2.34) for the storage of low-level waste (LLW) and high-level waste (HLW) at TMI?

Response:

The comment on page 2.34 of Final Supplement 3 refers to facilities where the contamination has been removed from its original location, and is in a form that could be readily shipped to a LLW disposal site. Contamination in the TMI-2 facility that has been removed and packaged as waste will be shipped offsite either before initiation of PDMS or at the start of PDMS (page 3.8).

The NRC has no plans to make provisions for the storage of low-level waste (LLW) and high-level waste (HLW) at TMI. Before the start of PDMS, the licensee plans to have removed greater than 99 percent of the fuel from the facility. The remaining fuel will be in the form of fuel fines in inaccessible cracks and crevices, as surface coatings (including corrosion films) on piping and equipment, or as molten and resolidified material fused to metal surfaces in the reactor vessel. The remaining fuel would not be considered as HLW until it is removed from the cracks, crevices, piping and equipment for shipment. No other sources of HLW will be present in the facility. Although a considerable amount of contamination will remain in the TMI-2 facility at the initiation of PDMS, this contamination will not be in the form of low-level waste, but will be in the form of contaminated equipment etc.

Routine building and equipment decontamination are not expected during PDMS. Any additional decontamination during PDMS would occur if the periodic radiation surveys indicated that contamination had spread, or in support of maintenance or inspection activities. Any wastes generated as a result of PDMS activities would be routinely processed and shipped to an offsite disposal site (page 3.12).

4. What happens if TMI-1 has to be placed into PDMS or some other indefinite storage period?

Response:

Neither NRC or the licensee contemplates placing TMI-1 into PDMS or indefinite storage. At the end of its useful life, the licensee will be required to decommission TMI-1 in accordance with NRC regulations.

5. Is there a time constraint on how long a utility can store radioactive waste onsite at a nuclear facility.

Response:

There is no specific time constraint for storage of radioactive waste onsite at a nuclear facility. However, Generic Letter 85-14 does indicate that "It is the policy of the NRC that licensees should continue to ship waste for disposal at existing sites to the maximum extent practicable." (page 2.34)

6. Is the Department of Energy (DOE) likely to grant GPU any additional "emergency allocations" (2.37-2.38) for low level radioactive waste?

   Response:

   The Secretary of Energy has already granted the licensee an emergency allocation for waste disposal associated with the evaporation of the accident-generated water. The likelihood of a second such emergency allocation would depend largely on the necessity for additional disposal space.

7. Does the "unique agreement" (3.31) with the DOE have an expiration date or volume ceiling?

   Response:

   The Memorandum of Understanding between the U.S. Nuclear Regulatory Commission and the U.S. Department of Energy Concerning the Removal and Disposition of Solid Nuclear Wastes from Cleanup of TMI-Unit 2, does not have an expiration date or volume ceiling.

8. How much "Class C" (3.54) waste would be generated during PDMS?

   Response:

   It is unlikely that any Class C waste would be generated during PDMS. The estimates in Table 3.20 (page 3.54) bound the environmental impact resulting from waste volume estimates for cleanup following PDMS for the delayed cleanup alternative. Table 3.19 (page 3.53) provides the waste volume estimates used to bound the environmental impact resulting from waste disposal during PDMS.

9. I'm confused about the role of the SDS and EPICOR II systems (2.9, 3.12 etc.). It is my understanding that both systems would be maintained in proper worker condition until PDMS. Is that a correct interpretation?

   Response:

   The submerged demineralizer system (SDS) is currently not operational, however, it has not yet been deactivated. Comment letter No. 10, on pages A.27 and A.28 of Final Supplement 3, indicates that GPU Nuclear plans to deactivate the SDS upon completion of accident-generated water disposal. The EPICOR II system would be available for processing of contaminated liquids throughout PDMS.

10. Would the law of diminishing returns, or the fact that these systems [SDS and EPICOR II] have been subjugated to harsh environments, influence their performance?

Response:

As indicated in the above response, GPU Nuclear plans to deactivate the SDS upon completion of accident-generated water disposal. The EPICOR II system was designed and constructed following the March 28, 1979 accident. It was housed in the already existing chemical cleaning building. The EPICOR II system has not been subjected to any harsher of an environment than that for which it was originally designed. EPICOR II was designed such that, with normal maintenance, it should be able to continue operation through the PDMS period without diminished performance.

11. The staff noted, "exposure rates throughout the fuel-handling section are generally less than 15 mR/h." Also, "Dose levels in the AFHB at the end of defueling are expected to be similar to those found in an undamaged reactor facility nearing the end of its life, except for a [few of the] cubicle areas (2.19). It is my understanding that 10 mR/h is the accepted rate in "undamaged reactors" at the end of their lifetime. Does the rate vary from reactor to reactor? Are some areas of the reactor exempt from this standard? Is 15 mR/h the licensee's goal?

Response:

The dose rates in an undamaged reactor at the end of its operating life vary from reactor to reactor and especially between areas within a specific reactor. A dose rate of 10 mR/h is not a standard. The statement made in the PEIS and discussed on page 2.1 of Final Supplement 3, was that "general area radiation dose rates at the completion of cleanup would approach 10 mrem/h in most areas of the reactor building and AFHB...is typical of commonly occupied areas in an undamaged reactor facility (one that has not undergone a severe accident) nearing the end of its operating life." Commonly occupied areas include hallways, corridors and other portions of the plant that are easily accessible. Other areas such as some of the cubicles in the AFHB or specific areas in the reactor building could have dose rates considerably in excess of 10 mrem/h.

The licensee's radiological goals for the TMI-2 Facility at the end of defueling are given in Table 3.2 (page 3.5) of Final Supplement 3. The licensee's radiological goal for the corridors of the AFHB is less than 2.5 mR/h. For the remaining areas in the AFHB the licensee's goal is less than 50 mR/h.

12. Doesn't it seem a bid odd and incongruent that a reactor planned in the 1960s is not required to submit a decommissioning plan "...on or before July 26, 1990, to ensure that funds will be available to decommission the facility" (2.36)?

Response:

All NRC-licensed nuclear power reactor facilities are required to submit a decommissioning funding plan by July 27, 1990. A decommissioning plan is not required by this date. The decommissioning plan is required 2 years after permanent cessation of operations or 1 year before the expiration date of the license. The July 27, 1990 date for submitting a decommissioning funding plan provides the licensees with a 2 year period to finalize their funding plans following the July 27, 1988 effective date of the Decommissioning Rule.

The licensee will be required to submit a decommissioning funding plan by July 27, 1990 and has agreed to consider in this funding plan all activities involved in the decommissioning of the plant starting from post-defueling monitored storage conditions (Letter from E. E. Kintner to USNRC dated August 5, 1989 shown as Comment Letter 28, Final Supplement 3).

13. I'm confused as to the status of radiation monitoring during PDMS. The staff noted that the environmental monitoring program at TMI is "expected to continue during PDMS" (3.7). What does "expected" mean? What system or systems, is likely to be removed? Is the NRC or any other governmental body willing to stipulate that environmental monitoring continue at TMI during PDMS? If a system or systems is to be removed, does GPU need the NRC's approval?

Response:

Final Supplement 3 of the PEIS states on page 3.7 that during PDMS, "The environmental monitoring program, including wells and monitoring stations, *would be* maintained." The footnote at the bottom of the page, however, indicates that "the environmental monitoring program at TMI...undergoes continues review and modification in response to changing site and Unit-1 and Unit-2 facility conditions. This process [of continuously reviewing and modifying the environmental program in response to site and facility conditions] *is expected* to continue during PDMS."

The term "expected" was used to indicate that the NRC looks for this process of continuous review and modification of the environmental monitoring program as a process that is "due, proper, or necessary". The review and modification of the environmental monitoring program is necessary to provide a quality program. One example of a modification is the deletion of the requirement to monitor isotopes that are no longer present as a result of radioactive decay, for instance iodine-131 (with an 8-day half-life).

At this point, the NRC is unaware of any system or systems GPU has definitely decided to remove. As long as GPU Nuclear holds a license for the TMI-2 facility they are required to monitor effluents from the facility to ensure that radioactive material discharged in the effluent would not result in the exposure of an individual to concentrations of radioactive material in air or water exceeding the limits specified in 10 CFR 20, Appendix B, Table II. Thus the licensee is required to conduct a monitoring program during PDMS. The licensee is allowed to make modifications to their monitoring program and thus to remove or replace equipment without direct approval by the NRC, however, they must still be able to show that radioactive material discharges are below the limits set forth in 10 CFR 20.

14. When the AFHB is "actively ventilated through HEPA filters," (3.10), what forms of environmental monitoring will be in place?

Response:

The auxiliary building ventilation system exhausts through dual HEPA filters into the station vent. The station vent is continuously monitored during ventilation system operation using an effluent monitor in the vent stack (HP-R-219 or HP-R-219A). In addition, the environmental monitoring program discussed in the response to question 13 will be in place.

15. What happens if the HEPA breaks down or fails during continuous "ventilation"? (3.27)

Response:

There are two HEPA filters in series in the AFHB vent stack. Each has an in-place tested efficiency of at least 99.95 percent for removal of particulates of 0.3-micron (0.0003 millimeter) diameter. Therefore, if one HEPA filter failed, the fraction of particulates in the building atmosphere that would be released into the atmosphere would be 0.0005 rather than 0.00000025 for the two filters in series. It is highly unlikely that both HEPA filters would fail simultaneously. The effects of an accidental double HEPA-filter failure in the reactor building station vent during ventilation are discussed in Sections 3.1.2.3, 3.2.2.3, 3.3.2.3, 3.4.2.3 and 3.5.2.3 of Final Supplement 3 for the decommissioning preparations or cleanup proceeding or following PDMS. The effects of a double HEPA-filter failure in the AFHB station vent would be much lower than those discussed for the reactor building station vent.

16. Why are so many of the monitoring activities conducted on a monthly basis (3.11)?

Response:

The licensee's anticipated schedule for inspection and monitoring activities within the reactor building and AFHB, as shown in Table

3.3 of Final Supplement 3, gives expected monitoring frequencies as either "continuous" or "monthly". Monitoring activities with monthly frequencies are those that require worker entry into the facility. The frequency of the entries was based on the likely rate of change in the plant parameters (which in turn is based on the current rate of change in that parameter) and the lack of activity in the buildings during PDMS. More frequent building entries are not warranted from an ALARA standpoint.

The licensee has, however, taken into account that the initial years of monitoring may indicate that there are no unexpected or adverse changes in building conditions over periods of time much longer than one month. If this occurs, the inspection and monitoring frequency would likely decrease.

17. During the staff's discussion on decommissioning, the term "negligible amounts" (3.18) was mentioned. Does "negligible amounts" have an official value?

Response:

"Negligible amounts" as used on page 3.18 of Supplement 3 could better be defined as "unmeasurable amounts" or below the lower limit of detection of current (state of the art) measuring devices. These levels would not be expected to pose a threat to the public.

18. Does the NRC seriously believe that Unit-2 can be "refurbished?" (3.37)

Response:

From a technical standpoint it is possible to refurbish Unit-2, although it may not be economically or politically practical. The possibility of refurbishment following the completion of cleanup was mentioned in Final Supplement 3 in an effort to provide a complete analysis of cleanup options.

19. How did the NRC ascertain that it would take "...four years to assemble and train a work force..." (3.37) following PDMS?

Response:

The NRC staff does not expect, and did not state in Final Supplement 3, that a four year period would be required to assemble and train a work force. The statement in question reads, "...a full 4 years would be necessary for cleanup and *would include the time required* to assemble a work force and train them regarding facility conditions..." The NRC staff expects that a 6 to 12 month period would be needed to assemble and train the work force. Thus while a 3- to 4-year period was assumed for the cleanup during the immediate cleanup alternative (Section 3.3.1.2), a full 4 years (including time required to assemble and train a work force) was assumed for the cleanup following PDMS in Section 3.2.1.2.

20. The staff maintains that "the possibility of advanced robotic technology, decommissioning technology, and waste technology appears very promising on the basis of advances made in these areas in the last decade" (7.17). Many of the advances in robotic technology were supposedly made by GPU during the cleanup. Yet the central point of PDMS is to postpone the cleanup. So while the staff terms robotics a "rapidly emerging technology" (7.19), the[y] advance delaying one of the prime contributors to the technology.

When are these much heralded advances in robotic technology going to occur? They are not going to be available after a two-year engineering study (3.61) and "possibly would not be available during the 7- to 10-year period for immediate cleanup/reduced effort," (3.78) but this technology would be available following PDMS (3.78). The staff predicts that between "10 to 20 years may be required before robotic cleanup would be possible" (7.19). What formula(s) did the NRC utilize to predict the availability of robotic technology? Who is going to make and fund these advances?

Response:

Advances in robotic technology are continually occurring. Robotic technology is used in a variety of industries in addition to the nuclear industry, such as the automotive industry, computer industry, chemical manufacturing and disposal, etc. Frequently advances made in one industry are utilized by a totally different industry with little additional development.

The NRC staff in their evaluation of the alternatives presented in Final Supplement 3, did not use a formula to predict the availability of robotic technology. The statements that were made in Final Supplement 3 regarding availability of robotic technology are as follows:

Page 3.61 - "The cleanup processes are assumed to be similar to those projected by the staff for evaluating cleanup during the delayed cleanup alternative in Section 3.2.1.1. The differences are as follows...advances in robotic technology that would have occurred during an intervening PDMS period would probably not be available following the engineering study...". This statement was not meant to be interpreted as a prediction of the availability of robotic technology, rather, as a comparison with the tasks associated with the delayed cleanup alternative and the immediate cleanup alternative. A list of five differences between the alternative includes the statement that all of the advances in robotic technology that would occur during a 17- to 33-year period, would not have occurred after a period of 2-years.

Page 3.78 - "...advances in robotic technology that would have occurred during an intervening PDMS period possibly would not be available during the 7- to 10-year period for immediate cleanup/reduced effort...". This statement was meant as a comparison of the tasks associated with the delayed cleanup alternative and the immediate cleanup/reduced effort alternative. Again, one of the differences is that all of the advances in robotic technology that would have occurred during a 17- to 33-year period, would not have occurred after a period of 7- to 10-years.

Page 7.19 - The statement on page 7.19 that "...10 to 20 years may be required before robotic cleanup would be possible..." was a quote from Draft Supplement 1, written in 1984. Further explanation on page 7.19 follows this quote to indicate that these projections now appear conservative especially in light of the extensive use of robots in the basement. It continues to state that "Although adaptations of the currently used robots would do much to further cleanup at this time, advances projected during the next 23 years will further improve robotics and thus further simplify the cleanup task".

21. Question from transcript, page 112 - The NRC said today, well, 110 million per reactor. Dr. Travers said last year, 200 million. And it's in this document which they submitted. So I would like to know, is it 110, 200 or what the deal is?

Response:

Cost estimates for decommissioning a nuclear reactor vary among reactors and decommissioning alternatives. The decommissioning rule published June 27, 1988 (53 FR 24018) specifies the minimum amounts (January 1986 dollars) required to demonstrate reasonable assurance of funds for the decommissioning of reactor facilities that have not undergone a serious accident. For an undamaged reactor facility that would supply 890 MW (2772 MW thermal), the same size as TMI-2, the minimum amount would be 99.4 million dollars. This is the minimum amount required to demonstrate reasonable assurance of funds for an undamaged reactor at the end of its useful life. The actual cost of decommissioning will be greater for the TMI-2 facility. Although the costs have been generically estimated by a number of sources, they are not currently known.