1 October 1990

Dear Advisory Panel Member:

Enclosed is a copy of responses to E. Epstein's questions from the last meeting. I suspect he will address my responses at the upcoming meeting.

Just a reminder the next meeting is October 18, 1990 from 7:00 to 10:00 pm at the Holiday Inn on 2nd Street in Harrisburg, PA.

Michael T. Masnik
Panel Liaison

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Staff Responses to Questions Raised by E. Epstein on PDMS at the March 14, 1990 Meeting of the TMI-2 Advisory Panel

Each question raised by E. Epstein at the March 14, 1990 meeting of the TMI-2 Advisory Panel is reprinted below. The numbering follows the numbering established for the original staff response dated December 20, 1989. Following each reprinted question the individual subquestions are again printed preceeded by the word "Question" and identified by the question number and a letter corresponding to each subquestion. Following each reprinted subquestion the answer to that subquestion is provided.

Question 1: The staff never provided a definitive answer to my inquiry regarding the length of time TMI could be placed in a storage phase. The staff noted, "The period of time TMI-2 could be left in a 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." (p.1). What kind of time frame are we talking about? What if their license expires and they are not prepared to decommission either unit? Is it the opinion of the staff that this site can realistically be restored to its original status after decommissioning?

Question 1a: What kind of time frame are we talking about?

Answer 1a. The NRC regulations on decommissioning require that a licensee begin decommissioning when their license to operate expires or sooner if they permanently cease operations prior to the expiration of their license. Therefore, the licensee would be allowed to store the facility in PDMS until November 4, 2009, the expiration date of TMI-2 license. They could, however, choose to begin decommissioning prior to that date should the licensee declare permanent cessation of operation. As discussed in our previous response to this question the licensee has indicated that "monitored storage of TMI-2 would not extend beyond decommissioning of TMI-1" (letter from Clark GPUN, to NRC dated June 23, 1989). The present TMI-1 license will expire on 2014. The licensee, could submit a request to amend their license for TMI-2 or request an exemption to specific portions of the decommissioning rule to allow storage of TMI-2 until 2014 at which time both units would be decommissioned simultaneously.

Therefore assuming the beginning of storage in 1992 and an expiration date of the TMI-2 license of 2009, the length of storage would be 17 years or less assuming no amendment to the license or exemption to the regulations. If you assume that they will extend the time of storage until the end of the TMI-1 license and that the TMI-1 license will expire in 2014 then the period of storage would be 22 years.

Question 1b. What if their license expires and they are not prepared to decommission either unit?

Answer 1b. NRC regulations require all licensee's to plan for ultimate decommissioning throughout the life of the operating facility. NRC regulations required each licensee to submit by July 27, 1990 a decommissioning funding plan addressing the method by which the licensee will guarantee the availability of funds necessary to decontaminate structures or components during decommissioning that would ultimately allow for unrestricted site access. The licensee has submitted such a plan and it is currently under review. The licensee was required to submit separate plans for TMI-1 and TMI-2. Five years prior to expiration of the operating licenses for TMI-1 and TMI-2 the licensee must submit a preliminary decommissioning plan, and one year prior to expiration of the licensee the actual Decommissioning Plan. The staff therefore believes that the licensee will be prepared to decommission both units when TMI-1 ceases operation.

Question 1c. Is it the opinion of the staff that this site can realistically be restored to its original status after decommissioning?

Answer 1c. Yes. Decommissioning of TMI-2 to the point where it is suitable for unrestricted use is technically feasible.

Question 3: The NRC's reply to my question is quite confusing. For example, "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." (p.2) Please explain this answer.

Earlier in the passage the staff noted, "The remaining fuel would not be considered as HLW until it is removed from the cracks, crevices, piping and equipment for shipment." (p.2). Does this type of semantic juggling make the material any less hazardous? If this material poses a radiological hazard and has to be isolated, why does it have to be "removed" before it is called HLW? And if it is HLW once it is collected and/or removed, where will it be stored? If it is stored on site, is not TMI being used as a temporary waste repository?

Question 3a. Please explain this answer. [March 14, 1990 Transcript pg. 74 - "is there a difference between contaminated equipment and low-level waste"?]

Answer 3a. Your original question referred to the sentence on page 2.34 of the PEIS Final Supplement 3 that stated, "Because of waste volume limitations of the Low-Level Waste Policy Act and its amendments... many sites have made

provisions for storing LLW for periods beyond those normally required by operational considerations". The NRC has permitted this within carefully controlled limits, but has clarified its policy in Generic Letter 85-14, which states: "It is the policy of the NRC that licensees should continue to ship waste for disposal at existing sites to the maximum extent practicable.""

The referenced comment from 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 low-level waste (LLW) disposal site. As indicated in our previous answer, 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). Any wastes generated as a result of PDMS activities would be routinely processed and shipped to an offsite disposal site (page 3.12). The authors of the PEIS Supplement 3 did not consider contamination as waste until it is removed and packaged as waste.

Question 3b. Earlier in the passage the staff noted, "The remaining fuel would not be considered as HLW until it is removed from the cracks, crevices, piping and equipment for shipment." (p.2). Does this type of semantic juggling make the material any less hazardous?

Answer 3b. As explained in the response to question 2a above the authors of NUREG 0683 supplement 3 chose to define waste both High Level waste and Low Level waste as fuel, fission, or activation products that have been removed

from contaminated structures or components and packaged in an acceptable manner for disposal. Contamination was not considered waste until it is removed and packaged as waste. The staff does not assert that the material is any less hazardous whether classified as contamination or waste. The hazard associated with the material is based on the potential for release to the public. In either case, as a contaminate inside the facility or as a waste being shipped to a disposal site, sufficient measures have and will be taken to safeguard the public.

Question 3c. If this material poses a radiological hazard and has to be isolated, why does it have to be "removed" before it is called HLW?

Answer 3c. Again as explained in the response to question 2a. above the authors of NUREG 0683 Supplement 3 chose to define waste, both High-Level Waste and Low-Level Waste, as fuel, fission, or activation products that have been removed from the facility, and packaged in an acceptable manner for disposal.

Question 3d. [March 14, 1990 Transcript - pg. 74 "And if it is high-level waste once it is collected and/or removed, where will it be stored"?] If it is stored on site, is not TMI being used as a temporary waste repository?

Answer 3d. The licensee has no plans for removal of any additional material that may be defined as High-Level Waste. If during the readying of the facility for PDMS or during PDMS additional High-Level Wastes are collected

the licensee would either store the material on site in a safe stable configuration or negotiate with the U.S. Department of Energy to determine if the waste could be shipped to one of their facilities. Temporary storage of this material onsite, does not make TMI-2 a temporary waste repository any more than any nuclear power plant that stores spent fuel onsite.

Question 4: Is it possible Unit-1 could be put into PDMS if GPU is not prepared or able to decommission Unit-2? Also, once TMI and Oyster Creek cease to produce nuclear energy, what legal restraints has the NRC mandated to prevent GPU from liquidating GPU Nuclear as a corporate entity?

Question 4a. Is it possible Unit 1 could be put into PDMS if GPU is not prepared or able to decommission Unit 2.

Answer 4a. It is possible, however, PDMS has never been considered by either the licensee or the NRC for TMI-1. PDMS is a unique category designated prior to the Decommissioning Rule and applicable only to TMI-2.

Question 4b. Also, once TMI and Oyster Creek cease to produce nuclear energy, what legal restraints has the NRC mandated to prevent GPU from liquidating GPU Nuclear as a corporate entity.

Answer 4b. NRC cannot prevent GPU from liquidating GPU Nuclear as a corporate entity, however the NRC can require GPU to assume the responsibility for decommissioning the two facilities since GPU is the holding company for GPUN.

Question 5: If, "There is no specific time constraint for storage of radioactive waste onsite at a nuclear facility" (p.2) then it is quite possible the LLW or HLW could remain onsite at TMI for an indefinite period of time. If the federal government fails to construct a HLW waste repository by the end of PDMS, where does the waste go? Since federal legislation preempts state authority on this issue, could the utility continually postpone decommissioning without the state having any legal recourse?

Question 5a. If the federal government fails to construct a HLW waste repository by the end of PDMS, where does the waste go?

Answer 5a. Any material that was removed from structures or components of TMI-2 and determined to be HLW would be packaged and shipped to a HLW respository if one existed. If a repository is not available at the end of PDMS, then the fuel would likely be stored in a Monitored Retrievable Storage (MRS) until a repository is available. If an MRS facility is also not available, any HLW would be stored onsite until either an MRS facility or a repository was available.

Question 5b. Since legislation preempts state authority on this issue, could the utility continually postpone decommissioning without the state having any legal recourse?

Answer 5b. The decommissioning rule as cited in the response to question 1 precludes the possibility of continually postponing decommissioning. The state could, through the judicial system, force the NRC to require compliance with its regulations.

Question 12: Why did it take the NRC so long to mandate financing plans for decommissioning? Why does the utility submit a funding plan to the NRC, when it is the PUC who determines funding levels for segregated decommissioning accounts? Won't the PUC ultimately decide what the utility can recover for decommissioning through rate increases?

Question 12a. Why did it take the NRC so long to mandate financing plans for decommissioning?

Answer 12a. Decommissioning was a complicated issue in which the NRC involved the public, licensee and other federal and state agencies. Such efforts inherently require considerable time to complete.

As discussed in the Decommissioning Rule (53 FR 24018) prior to 1978, the Commission recognized that although decommissioning was not an imminent health and safety problem, the nuclear industry was maturing and that the number of facilities requiring decommissioning, was expected to increase. The Commission also recognized that inadequate or untimely consideration of decommissioning, specifically in the areas of planning and financial assurance, could result in significant adverse health, safety and environmental impacts. On March 13, 1978, the Commission published an Advance Notice of Proposed Rulemaking in the Federal Register (43 FR 10370) stating that the Commission was reevaluating its decommissioning policy and considering amendments to its regulations to provide more specific requirements relating to the decommissioning of nuclear facilities. The Commission's plan for reevaluating the decommissioning policy included development of an information base, the preparation of a generic environmental impact statement (GEIS) and the development of

amendments to the regulations. On February 10, 1981, the Commission announced the availability of the draft GEIS for public comment (46 FR 11666). On February 11, 1985, the Commission published a Notice of Proposed Rule Making On Decommissioning Criteria for Nuclear Facilities (50 FR 5600). The original comment period was due to expire May 13, 1985, but was entended to July 13, 1985, to accommodate requests from interested parties for an extended comment period. The decommissioning rule was published on June 27, 1988.

Question 12b. Why does the utility submit a funding plan to the NRC, when it is the PUC who determines funding levels for segregated decommissioning accounts?

Answer 12b. The NRC licenses utilization facilities (nuclear reactors other than those designed or used primarily for the formation of plutonium of uranium-233). The NRC by its regulatory role is responsible for ensuring that the facility is decommissioned and that following decommissioning the facility and site are suitable for release for unrestricted use. The Commission will terminate the license upon written request from the licensee, if it determines that decommissioning has been performed in accordance with the approved decommissioning plan and the order authorizing decommissioning, and the terminal radiation survey and associated documentation demonstrates that the facility and site are suitable for release for release for unrestricted use. Thus, the NRC requires submission of a decommissioning funding plan to ensure that the facility will be decontaminated, the license terminated no longer requiring regulation of the site.

Question 12c. Won't the PUC ultimately decide what the utility can recover for decommissioning through rate increases?

Answer 12c. Yes. That decision would be made by the PUC.

Question 13: Concerning radiation monitoring: How exactly does the review process work? Who has input? Will the DER be involved? If GPU does not need NRC approval to remove monitoring systems, how can the public be assured adequate monitoring is in place?

Question 13a. How exactly does the review process work?

Answer 13a. Final Supplement 3 of the PEIS states that "the environmental monitoring program at TMI... undergoes continuous review and modification in response to changing site and Unit-1 and Unit-2 facility conditions." This review is conducted by the licensee as a change is identified in another area of the plant, or as a need for a change is identified.

10 CFR 50.59 allows the licensee to make changes in the facility and the procedures that are described in the safety analysis report without prior Commission approval unless the proposed change involves a change in the technical specifications that are incorporated in the license or involves an unreviewed safety question.

If a licensee desires to make such a change in the technical specifications, the licensee must submit an application to the NRC for amendment of their

license. If a licensee desires to make a change that involves an unreviewed safety question the licensee would submit a safety analysis report describing the change.

Question 13b. Who has input?

Answer 13b. For those changes to facility procedures which do not involve an unreviewed safety question, the licensee is required to maintain a record of the changes in the facility and of changes in procedures. These records include a written safety evaluation which provides the bases for the determination that the change does not involve an unreviewed safety question. A report containing a brief description of such changes including a summary of the safety evaluation of each is submitted annually to the NRC. This report is made public.

The following procedures are used for those changes made in the technical specifications. Upon receipt of the licensee's application for amendment of the license, which describes the changes desired, the Commission will do one of the following; 1) make a proposed determination that there is no significant hazards to be considered and publish a notice of the proposed action in the Federal Register soliciting public comments, 2) inform the public about the final disposition of no significant hazard, and publish a notice in the Federal Register; a final determination will not be published unless the Commission receives a request for a hearing on the amendment request. If the Commission makes a final determination that no significant hazard is involved

the amendment will be issued with the amendment effective upon issuance and an opportunity for a hearing after issuance of the amendment. If the Commission determines that a significant hazard consideration is involved, an opportunity for a prior hearing will be provided. Exceptions to this process occur in situations where the failure to act in a timely manner would result in derating or shutdown of a nuclear power plant. Even in these instances however, a notice of issuance will be published providing the opportunity for a hearing and for public comment after issuance of the amendment.

For review of changes that involve an unreviewed safety question but do not involve the Technical Specifications the licensee submits a Safety Analysis Report for staff review. The staff conducts a review of the Safety Analysis Report and issues a Safety Evaluation Report.

Question 13c. Will the DER be involved?

Answer 13c. Prior to issuance of an amendment the NRC staff is required to contact the DER to discuss the propose change and receive comments from the state. The state may request a hearing for changes made in the technical specifications.

Question 13d. If GPU does not need NRC approval to remove monitoring systems, how can the public be assured adequate monitoring is in place?

Answer 13d. Although the licensee is allowed to make changes that are not part of the technical specifications, they are still required to demonstrate by actual measurements that radioactive material discharges are below the limits set forth in 10 CFR Part 20. The NRC staff will retain onsite inspectors as well as conduct special inspections utilizing Region I based personnel to assure an adequate monitoring program.

Question 16. When GPU's inspection and monitoring frequency decreases, can we expect similar decreases from the NRC and DER?

Answer 16. If the NRC's technical evaluation supports a decrease in the licensee's inspection and monitoring frequency, then yes, similar decreases in the NRC's inspection and monitoring frequency may also occur. The NRC staff is not able to speak for the DER's program.

Question 17. Is "negligible amounts" of radiation attached to a sliding scale: That is, if the "state of the art" monitoring devices change, will the value deemed a "negligible amount" also change?

Answer 17. The use of the term "negligible amounts" as used on page 3.18 of Final Supplement 3 could be better defined as "unmeasurable amounts" or "below the lower limit of detection of current (state of the art) measuring devices." There is no official definition of "negligible amounts" of radiation. If the lower limit of detection is reduced by an improvement in detection devices or

capabilities, than smaller amounts of radiation could be detected. However, the point of the statement in Final Supplement 3 is that during PDMS some of the isotopes in the facility may have decayed to the point where they can no longer be detected, and although they are theoretically still present, the amounts cannot be measured.

Question 20: The answer given by the staff relies totally on estimates and predictions which are hopeful and optimistic. Are they realistic? There appears to be little or no direct research in this area by the NRC, GPU or any other utility. How can the NRC be so sure that advances to another? How do we know if these advances will be cost effective?

Question 20a. Are they realistic?

Answer 20a. Yes, based on advances in robotic technology to date.

Question 20b. There appears to be little or no direct research in this area by the NRC, GPU or any other utility. How can the NRC be so sure that advances in robotic technology will be transferable from one industry to another?

Answer 20b. As discussed in our previous answer, advances in robotic technology are continually occurring in a variety of fields including the nuclear industry. As an example, the 1988 Winter meeting of the American

Nuclear Society (October 30 to November 4, 1988 in Washington, DC) listed 8 presentations on robotics and 6 presentations on remote handling technology. These presentations included reports on:

1) An all-terrain mobile robot (SURBOT-T) developed by REMOTEC to perform remote visual, sound and radiation surveillance within contaminated areas of nuclear power plants. This robot can be equipped with a two-armed, telerobotic manipulator system to perform remote maintenance work.

2) Various types of in-pipe traveling inspection robots developed by JGC Corporation in Japan,

3) A flexible robotic entry device (FRED) designed for deployment into confinement areas of operating reactors to assess unknown conditions. FRED is capable of gathering and evaluating data including transmitting information on tritium levels, gamma levels, audible and ultrasonic sound, infrared temperature sensing of objects and environment (temperature, humidity, etc) sensors (Savannah River Laboratory).

4) An electromagnetic acoustic transducer (EMAT) used for utrasonic testing in nuclear power plants. (Toshiba IEC-Japan).

In addition, seven papers were presented on remote technology used at TMI-2 during the cleanup to date.

The list of papers to be presented during the 1990 meeting of the American Nuclear Society in Nashville, Tennessee includes eight papers on Remote Handling and Roboti s research for Advanced Reactors.

Question 20c. How do we know if these advances will be cost effective?

Answer 20c. Robotics have been shown to be cost-effective and in fact cost-saving in a variety of industries. In the nuclear industry, an even more important issue than cost-effectiveness is the effectiveness of dose savings.

Question 21. This answer is especially disturbing since the data used is so marginal. The cost estimates are given in 1986 dollars and are for a reactor that has "not undergone a serious accident." (p.9) The figures project the minimum amount required to "reasonably assure" a plant will be decommissioned. This is obviously a formula for greatly underestimating the cost of decommissioning Unit 2 and Unit 1. The NRC prides itself on conservatively estimating exposure rates and radiation levels. Yet when it comes to decommissioning funding, the staff plans to set aside a minimal amount of resources based on generic estimates. Why not do a site-specific plan? Why not plan for maximum levels? Why not compute your figures based on 2020 dollars indexed to the current rate of inflation? Why not plan for the worst case scanario?

Question 21a. Why not do a site-specific plan? Why not plan for maximum levels?

Answer 21a. Similar comments were addressed in the Supplementary information to the Decommissioning Rule as published in the Federal Register (53 FR 25030).

Use of the certification approach for decommissioning funding is a first step in providing reasonable assurance of funds for decommissioning from the Commission's perspective. It represents the staff's best estimate at the time the rule was enacted as to the costs associated with the decontamination and disposal of structures and components that are radiologically contaminated. It does not include funds for storage, dismantlement or returning the site to a preconstruction configuration. The requirement for funds has an appropriate escalation factor since the amount available at the time of decommissioning would likely be substantially in excess of the $100 million. The second step is that the licensee, five years prior to the expected end of operations, must submit a cost estimate for decommissioning based on an up-to-date assessment of the activities necessary for decommissioning and plans for adjusting levels of funds assured for decommissioning. As noted in the supplementary information to the Decommissioning Rule, this estimate would be based on a then current assessment of major factors that could affect decommissioning costs and would include relevant, up-to-date information. These factors could include site specific factors as well as then current information on such issues as disposal of waste, residual radioactivity criteria, etc., and would present a realistic appraisal of the decommissioning of the specific reactor, taking into acount actual factors and details specific to the reactor and the time period.

The supplementary information to the Decommissioning Rule states that a "Combination of these steps, first establishing a general level of adequate financial responsibility for decommissioning early in life, followed by periodic adjustment, and then evaluation of specific provisions close to the time of decommissioning, will provide reasonable assurance that the Commission's objective is met, namely that at the time or permanent end of operations sufficient funds are available to decommission the facility in a manner which protects public health and safety. More detailed consideration by NRC early in life beyond the certification is not considered necessary because of the steps discussed above. In addition, because public utility commissions are to set a utility's rates such that all reasonable costs of serving the public may be recovered and because NRC requirements concerning termination of a license are part of the reasonable cost of having operated a reactor, it is reasonable to assume that added costs beyond those in the prescribed amount could be obtained if the latter were too low as suggested by the commenters."

Question 21b. Why not compute your figures based on 2020 dollars indexed to the current rate of inflation?

Answer 21b. According to the supplementary information in the Decommissioning Rule, "...in any comparison of costs it is necessary to place the costs in the same year's dollars in order to have a meaningful basis for comparison...(T)the decommissioning rule amendments, which will require maintenance of funds by methods which keep pace with inflation and periodic adjustment of funds to account for effects of inflation will provide assurance that funds are available to pay for decommissioning when needed."

Question 21c. Why not plan for the worst case scenario?

Answer 21c. See answer to A.