

TESTIMONY OF HAROLD R. DENTON
DIRECTOR - OFFICE OF NUCLEAR REACTOR REGULATION, NRC
STATUS OF THE THREE MILE ISLAND UNIT 2 CLEANUP
U.S. SENATE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
May 20, 1982

Mr. Chairman, my colleagues and I are pleased to be invited to testify today on the status of the cleanup of Three Mile Island Unit 2 and the implications that a prolonged cleanup might have on the health and safety of the general public and the TMI-2 work force. Before I introduce Dr. Bernard Snyder who will present the more detailed portions of our testimony today, I would like to make a few preliminary remarks.

Although it hardly seems possible, more than three years have passed since I was sent to Three Mile Island during the accident in March 1979. One of my most vivid recollections of the period during the accident and the weeks shortly thereafter is of the cooperative -- almost infectious spirit -- of the many organizations, individuals and governments who worked together to bring the situation under control. It was a monumental effort carried out effectively and efficiently with one ultimate goal - to eliminate the danger to the public and the environment.

In the midst of all this national attention and selfless cooperation, I could hardly have guessed that three years later I would be sitting here before a Senate subcommittee testifying about the continuing threat posed by conditions at TMI-2. While the cleanup is progressing, its pace is painfully slow. I find the sharp contrast between the active progress early-on and the current situation very disconcerting. Accordingly I have been emphasizing to all

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who can play some role in the cleanup that the potential for harm to both the public and TMI workers still exists. Although we believe that the likelihood of an accident involving a release of significant amounts of the radioactive materials currently contained at TMI-2 is small at present, the possibility will certainly increase as the cleanup is further delayed. I am committed, as I know the Commission is, to seeing that the entire cleanup is expedited in order to eliminate all potential for mishaps.

In order to move ahead as swiftly as safety will permit, the fundamental issue of financial assurance will need to be resolved. I agree with the assessment expressed in Chairman Palladino's recent letter to the Congress that a "greater Federal participation in assuring financial viability is a prerequisite to an acceptably rapid (cleanup) program." Our purpose in requesting Federal support for some form of cleanup funding is to do all we can to bring about the safe and expeditious completion of all TMI-2 cleanup activities. TMI is not yet behind us.

I would now like to have Dr. Snyder, Director of the Three Mile Island Program Office, present the more detailed NRC testimony.

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TESTIMONY OF
DR. BERNARD J. SNYDER, DIRECTOR
TMI PROGRAM OFFICE, NRC

STATUS OF THE
THREE MILE ISLAND UNIT 2 CLEANUP

U.S. SENATE
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

May 20, 1982

Mr. Chairman, I am pleased to be here today to present the Nuclear Regulatory Commission staff testimony on the status of the cleanup of Three Mile Island Unit 2 and the implications that a prolonged cleanup might have on the health and safety of the TMI-2 work force, as well as the general public. As NRC Chairman Palladino testified last October, our principal responsibility is the protection of the health and safety of the public, including the work force at the site, as well as protection of the environment. We are concerned that if the pace of the cleanup is not accelerated, the capability for continued maintenance of the health and safety will become more uncertain. These concerns were also conveyed to you in a letter from the Commission on March 22, 1982. Before I elaborate on our concerns regarding the future status of the plant, I want to briefly give you NRC's views on the legislation you are considering today. I will then provide you with a summary of the cleanup progress to date.

The Energy Committee substitute amendment to S.1606 provides for an assessment by the Department of the Treasury on nuclear utilities in order to provide funds toward the cleanup of TMI-2 over a six-year period. As Chairman Palladino testified last fall in connection with the original proposal for S.1606, while the Commission takes no position on the specific methods of obtaining funds for TMI-2 cleanup proposed in this or other legislation, we welcome the approach encompassed in the proposed legislation as a reasonable mechanism for solving this continuing problem.

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More than three years have passed since the accident and progress in the cleanup has been limited. The accident left large bodies of very contaminated water in the basement of the reactor building and in tanks in the auxiliary building. Virtually every exposed surface of the floors, walls and equipment in the reactor, auxiliary and fuel handling buildings was contaminated to varying degrees. The reactor building atmosphere was contaminated with a large inventory of radioactive gases and the water in the reactor coolant system was extensively contaminated with fission products. Lastly, we know that the reactor core suffered significant damage. It is probable that small particles of fuel and cladding, along with control rod and core structural material were distributed throughout the reactor coolant system, with some materials ending up in the lower level of the reactor building. No one knows the actual conditions within the reactor vessel, but realistic estimates suggest that the upper half of the core contains a rubble bed of damaged fuel and other materials. Additionally, some of this material and individual fuel assemblies are suspected to be fused together. This is the condition we believe has existed since the accident in March 1979. It is important to note that the plant has been in a condition for which it was not designed. This situation causes us increasing concern.

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The Nuclear Regulatory Commission's program for carrying out its regulatory responsibilities during the TMI-2 cleanup is centered in the TMI Program Office (TMIPO) within the Office of Nuclear Reactor Regulation. Established formally in March 1980, the TMIPO evolved from NRC's early regulatory efforts involved in mitigating the accident and initiating the cleanup. The TMIPO is dedicated solely to the cleanup and consists of technical and management staff located both at NRC headquarters and TMI site. Currently the TMIPO is staffed with approximately 30 technical management and administrative staff. The responsibilities of the TMIPO include the following; 1) overall planning and

management of all NRC TMI-2 cleanup activities, 2) approval of licensee cleanup procedures and proposals, 3) coordination with DOE, EPA and other Federal and State agencies, 4) preparation of safety and environmental reviews, and 5) advising the Commission on major cleanup actions. The TMIPD efforts have been given the highest priority category within the agency.

Within several weeks of the accident, the decontamination of the floors, walls, and equipment in the auxiliary and fuel handling buildings was initiated. At present, approximately 70 percent of the contaminated area in these buildings has been cleaned up, but this represents removal of only 10% of the radioactivity since some of the most contaminated and difficult areas were bypassed and remain to be cleaned up.

In addition to the decontamination efforts to date in the auxiliary and fuel handling buildings, other significant cleanup accomplishments include: purging of the contaminated atmosphere from the reactor building, processing of accident generated water which collected in auxiliary building tanks and the reactor building basement, and shipment and disposal of some of the radioactive solid waste generated as a result of cleanup activities. Approximately 750,000 gallons of moderately contaminated water from auxiliary building tanks and 600,000 gallons of highly contaminated water from the reactor building basement have been processed; however, none of this water has been permitted to be disposed of and it is currently stored in on-site tanks. The reactor building atmosphere was purged of the 45,000 curie inventory of krypton-85 which collected during the accident. Finally, 22 lower level radioactive waste resin containers generated as a result of accident water processing and large quantities of other low-level waste, such as compacted trash, have been shipped to a commercial burial site for disposal.

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The activities completed to date represents only limited progress toward total plant cleanup. A great deal of difficult work remains to be done. About 5% of the highly contaminated water (approximately 30,000 gallons) and an unknown quantity of contaminated sludge remain in the reactor building basement, and still need to be removed and processed. Another 90,000 gallons of highly contaminated water remains in the reactor coolant system and will require processing. Containers of highly radioactive resin (49) and zeolites (6) remain on-site until steps are taken to make these safe for shipment, considering the hydrogen being generated. The balance of the most contaminated floors and surfaces in the auxiliary building remain to be cleaned up. Although a large-scale experimental program for gross decontamination was conducted over large portions of the reactor building, preliminary results indicate that general area radiation levels have not been reduced sufficiently to support large scale cleanup activities in the building. The entire building will have to undergo further detailed decontamination. Decisions on the degree of further decontamination required await the final results from this experiment. Reduced radiation levels in the reactor building is a pre-requisite for the most difficult task ahead -- the defueling of the damaged core. The defueling will be a long, carefully controlled effort, which is not anticipated to be completed for at least several years. Following defueling, the reactor coolant system surfaces will require decontamination. The processed accident generated water will require ultimate disposition. The higher level radioactive solid waste resulting from water processing and other decontamination activities will require offsite shipment to a commercial or federal facility for disposal or research, as appropriate. Finally, all fuel assemblies and packaged core debris and internals will require shipment offsite for research and/or disposal. As you are aware, the schedule for the completion of these vital

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cleanup activities is essentially indeterminate because of uncertainties regarding the availability of funds to support the work. With only limited progress, and no end in sight, we are extremely concerned about the future status of the plant and the licensee's capability for maintaining the plant in a stable condition to adequately protect the on-site work force and offsite public over the long term. Further delays in completing the cleanup can no longer be tolerated.

The risks associated with indefinite delays of the cleanup are real, especially for workers at TMI and, to a lesser extent, for the public offsite. Currently the plant is safe but no one can give assurances that the present situation will remain stable for an indefinite period. Over time, as equipment deteriorates the probability of incidents involving radiation leakage and subsequent exposure to workers and the public will increase.

Several incidents of this type have already occurred. In 1979, leakage of highly contaminated water in the auxiliary building resulted in overexposure to several workers during subsequent maintenance efforts to contain the leakage. In 1980, another leak of highly contaminated reactor coolant caused high airborne levels and contaminated several workers. This past year, an inaccessible valve in the reactor building in a line connected to the reactor coolant system started leaking during testing, increasing the normal system leakage by about a factor of ten until the source could be identified and the valve reseated. During each of the first four months of 1982, separate incidents have occurred. In January, workers inserted an air hose in a contaminated floor drain and spread radioactive material into the auxiliary building atmosphere. This caused alarms on local radiation monitors within the building, as well alarms on the effluent release monitor in the plant exhaust stack. In February some portable instruments used to sample the containment building atmosphere indicated the presence of combustible gases, possibly hydrogen. These readings were subsequently shown to be

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erroneous, but not before the licensee declared an "unusual event" (the lowest level in their emergency response plan) and made the required offsite notification to local officials. In March, another "unusual event" was declared when increased makeup water was noted to be going into the reactor coolant system, indicating a possible leak. It was determined that a valve was leaking which resulted in spillage of about 150 gallons of water onto the floor when contaminated filters from the reactor coolant purification system were removed. Although each of these events did not cause any harm, they did cause considerable concern among area citizens. Just two weeks ago, a health physics technician was unable to exit from the containment building because the airlock doors were jammed shut. It took nearly an hour before the doors could be opened. Although this individual was never in any danger and received only minimal radiation exposure, this incident does clearly show one of the potential risks that exist for the TMI cleanup workers.

Inevitably, as the result of restricted access to areas of the facility in which high radiation levels persist, maintenance will continue to be limited and equipment will continue to deteriorate. Similar problems can be anticipated to occur in the future. The frequency and risks from these events, although small now, are likely to increase as the cleanup is prolonged. There is also an exceedingly small, but not zero, probability for a criticality accident in the reactor vessel. The present core configuration will remain unknown until at least a camera is inserted to obtain information. There is even some small potential for a criticality event outside of the core because of the unknown quantity of fuel materials which were transported out of the reactor pressure vessel. To the best of our ability, all cleanup activities have been planned, approved and conducted to preclude, with a large margin of safety, criticality

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anywhere within the plant.

While the incidents to date have been of a controllable nature, it is not inconceivable that a future leakage incident could result in an unisolable leakage from the reactor coolant system. Considering the plant condition, such leakage cannot be ruled out, and this possibility is of serious concern to us. Reactor system valves and other components have the greatest likelihood of failure. However, we are also concerned about the condition of the 52 instrument tubes which penetrate the bottom of the reactor pressure vessel and constitute a part of the reactor coolant system boundary. These tubes were submerged in the highly contaminated and possibly corrosive water in the reactor building basement for approximately three years. Corrosion and subsequent leakage through any of those tubes would be unisolable. If the leakage rate from failures in the reactor coolant system boundary were high enough, use of the safety systems and equipment would be required. Much of this equipment has not been used since before the accident or previously subjected to contaminated water. If an incident of this type occurs prior to completing defueling of the core, the cleanup would be setback and become even more difficult than presently anticipated.

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Experience has shown that delays in cleanup cause radioactive contamination to be more difficult to remove from surfaces and equipment. Radioactivity tends to "soak into" concrete surfaces, and rusting of metallic surfaces compounds the problem. For this reason, the cleanup will be more costly in terms of worker radiation exposure as further delays result.

The mechanical deterioration of components and systems over time may reduce the plant's ability to respond to natural phenomena (e.g., tornados), and other adverse events (e.g., fire) thereby posing potential threat to continued successful containment of TMI-2 contamination and stored waste. Although the likelihood of severe natural phenomena or a fire resulting in a radiation release to the environment is small, the possibility does exist, and the probability for such events occurring increases with time. Only the timely completion of all cleanup and radioactive waste disposal activities at the TMI-2 site will eliminate the associated risks to the workers and all possibility of inadvertent offsite radioactive releases.

The damaged fuel and other materials at the TMI site will remain radioactive for many hundreds of years. The threat remains until the facilities are decontaminated, the fuel is removed from the site and all radioactive wastes are disposed of safely.

In addition to the increased possibility of radioactive releases as the cleanup is further delayed, we are equally concerned about unnecessary radiation exposures to plant workers. The NRC will continue to assure that the licensee takes all steps necessary to ensure that radiation exposures to the workers are kept as low as reasonably achievable. However, as the cleanup is stretched over an unnecessarily long time due to lack of adequate finances, workers inevitably will be exposed to radiation and will accumulate increased exposures while performing maintenance activities. These activities by workers in radiation zones will be required to maintain the status quo, even though little or no progress is made toward cleanup.

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It is simply imperative that the pace of the cleanup be conducted in an expeditious manner and that the financial problems which are hindering this pace be resolved as quickly as possible. In the interests of protecting the health and safety of the site workers and general public we would support any initiatives to expedite the cleanup.

The concern is more than a local one. The issue of expediting the cleanup and belatedly bringing the TMI-2 accident to a conclusion is of national importance and demands the attention of, and resolution by, the industry, the Administration, the Congress and government agencies. Anything less will perpetuate an intolerable situation at TMI, having significant impacts on the local population, the government, the industry and, most importantly, the nation.

This concludes my prepared testimony and I would be glad to answer any questions the Committee might have.

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