December 18, 1979

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SECY-79-669

INFORMATION REPORT

For: The Commissioners

From: Saul Levine, Director, Office of Nuclear Regulatory Research

Thru: Executive Director for Operations

Subject: MEMORANDUM OF UNDERSTANDING AMONG NRC, DOE, EPRI, GPU FOR POST-ACCIDENT EXAMINATIONS OF TMI-2

Purpose: To inform the Commission of the agreement among NRC, DOE, EPRI, and GPU on the methods of interaction and coordination of efforts to achieve common goals in TMI-2 data gathering as represented by a completed Memorandum of Understanding among the parties.

Discussion: Following the letter from Chairman Hendrie to DOE Under Secretary Deutch (copy enclosed) concerning the need to develop a coordinated program for the post-accident examination of TMI-2, a Memorandum of Understanding (MOU) was developed through several meetings of senior representatives of NRC and the other organizations. As described in the enclosed MOU, a Joint Coordination Group (JCC) has been formed which has appointed members to a Technical Working Group (TWG). The Technical Working Group has had several meetings during which planning has been developed toward meeting the common goals defined by the JCC and the TWG. Also, as set forth in the MOU a Technical Integration Office has been established at TMI headed by a DOE representative and staffed by personnel from EG&G (Idaho) to coordinate the implementation of the plans.

The first of the early examination efforts prescribed by the TWG has been accomplished. A 9-inch disk has been cut out of a containment penetration cover, allowing optical access to the containment and allowing for a detailed examination of the containment wall surface.

Contact:
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42-74323

12-18-79

The MOU will be signed by the Director of the Office of Nuclear Regulatory Research when DOE has the final draft prepared, by the end of December.

Coordination: This paper has been concurred in by NRR. ELD has no legal objection.

Saul Levine, Director
Office of Nuclear Regulatory Research

Enclosures:
1. TMI-2 Post-Accident Examination MOU
2. Chairman Hendrie Letter to Under Secretary Deutch

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ENCLOSURE 1

November 2, 1979

MEMORANDUM OF UNDERSTANDING

TMI UNIT 2 INFORMATION AND EXAMINATION PROGRAM

1. INTRODUCTION

The TMI Unit 2 accident of March 28, 1979 was and is of great concern to the electric power industry, its customers, regulatory and other government agencies and the country as a whole. While the accident resulted in only limited radiation exposure to the population surrounding the power plant, the plant itself suffered extensive damage with high radiation contamination within the nuclear and other supporting systems and facilities. TMI Unit 2 currently presents opportunities to provide information for the enhancement of nuclear power plant safety and reliability of generic benefit to nuclear power technology. Four organizations, the Department of Energy (DOE), the Electric Power Research Institute (EPRI), the General Public Utilities Company (GPU), and the Nuclear Regulatory Commission (NRC), have a common interest in assuring that this information is obtained during the course of recovery. This memorandum of understanding identifies the broad areas of common interests, and objectives to which the signatories subscribe, and lays out in broad terms methods by which the signatories have agreed to interact in an effort to achieve these objectives consistent with the other obligations of the signatories.

2. OBJECTIVES

The TMI Unit 2 accident represented one of the most severe integral tests of nuclear plant safety philosophy and safety systems ever

encountered in a commercial light water reactor. The extent of damage to the reactor core and the subsequent release of fission products to the primary system, containment, and elsewhere is the most extensive experienced in any known light water reactor power system.

The environmental conditions within containment and the reactor system pose one of the most technically challenging decontamination and radioactive waste management situations ever encountered. These circumstances represent opportunities for state of the art advancement not available through normal research, development, and test programs. Thus, it is our common objective that:

- significant applicable information stemming from the TMI Unit 2 accident be obtained and made available for the general improvement of light water reactor plant safety and reliability.
- unique data and experience at TMI Unit 2 that will be obtained during the plant decontamination and assessment of status be integrated into ongoing government and EPRI research and development programs as may be beneficial. This information will be made generally available to others engaged in the design, construction, operation and maintenance of nuclear power plants.
- information and experience of value to all parties be obtained during GPU's planned return to service program.

The signatories believe that the stated objectives above should be pursued to the benefit of the country and are in the best interest of the Nation. To this end, most effective use should be made of the available resources of government and industry.

3. COMMON INTERESTS

Major areas of common interests are, and work is expected to be undertaken in the following:

a) The development and reporting of information on the performance of instrumentation, electrical and mechanical equipment within the reactor containment and auxiliary buildings during and after the accident. This effort will encompass work on plant systems and components whose performance is of importance to general generic improvements in light water reactor safety and reliability. Information which could lead to improvements in component and system designs and standards and plant operability, especially under abnormal conditions will be included.

b) The development of information on fission product behavior, transport and deposition, particularly as this may contribute to a better understanding of nuclear plant accident scenarios.

c) The development of information and the development and testing of new technology of potential industry wide application in the fields of

- plant, system and equipment decontamination

- radioactive waste processing and disposal methods and systems
- post-accident pressure vessel and other primary coolant system pressure boundary testing and qualification technology
- removal, packaging, transportation, storage and disposal of damaged nuclear fuel.

d) The development and reporting of information on the nature and extent of physical damage to surfaces, structural components and equipment within the reactor containment and auxiliary buildings as a result of the accident.

e) The establishment and effective utilization of a common data bank for all information gathered under this agreement.

f) The development and reporting of information on the nature and extent of core damage, with the objective of understanding the chemical, metallurgical and physical behavior of fuel, clad, core components, and related reactor internals during and after the accident.

Recognizing that other areas of common interest may arise, that the possibility exists for discovering conditions not previously anticipated, or of new questions arising at some future time not presently being considered, the signatories agree that an archival system be established under which specimens of hardware or other samples may be stored off-site for possible future examination and testing.

4. JOINT COORDINATING GROUP

To provide a forum for effectively guiding and reconciling, where necessary, the various activities which may be undertaken in association with TMI recovery, a Joint Coordinating Group will be formed to which each signatory will appoint one senior representative. The group will act to provide an integrated overview of activities associated with TMI, to provide a means for priority assessment of the expected large numbers of peripheral data and technology tasks, and to provide a means for the review and integration of activities ancillary to the recovery of the Unit. The Joint Coordinating Group will function to permit the fullest necessary management interaction of the parties. It will serve as one means to identify facility, equipment, personnel and financial resources for the accomplishment of common goals.

The Joint Coordinating Group will meet periodically (initially about once every two months) to consider policy matters, with responsibility for chairing each meeting alternating between the EPRI and the DOE representatives.

The Coordinating Group will develop a charter to implement the general understandings contained in the memorandum, and to form such subgroups or interact with such other parties as to facilitate common interests herein identified.

5. TECHNICAL WORKING GROUP

To assist the Joint Coordinating Group, the signatories agree to establish a Technical Working Group (TWG) whose functions are:

(a) define the technical work to be done and prepare an integrated plan for such work.

(b) to provide detailed technical scope of work for specific tasks to be performed under the plan, and

(c) to provide technical oversight of such work, including recommendations for necessary changes and additions.

The TWG shall consist of technical experts appointed by each signatory. Three members shall initially be appointed by each signatory but the composition may be changed to meet specific needs or altered conditions. The TWG shall meet periodically as needed and the meetings shall be chaired by DOE and EPRI representatives. The results of these meetings shall be reported to the Joint Coordinating Group.

6. TECHNICAL INTEGRATION OFFICE

To assist the Joint Coordinating Group, the signatories further agree to establish a Technical Integration Office (TIO) with functions as noted below. Since some of these functions are expected to involve onsite work, the parties agree to the following understandings regarding such onsite activities:

(a) All work within the reactor and auxiliary buildings will be arranged for, controlled, and executed by GPU and its contractors.

(b) GPU will make office space available, on a reimbursable basis, within or proximate to the site boundary, for the Technical Integration Office.

The functions of the Technical Integration Office shall include:

(a) The TIO shall be the interface between GPU and its contractors on the one hand, and the Joint Coordinating Group and its representatives on the other, for all matters related to work carried on pursuant to this agreement. This shall in no way be interpreted to extend to the normal requirements for information required for licensing or inspection and enforcement activities of the NRC, where existing channels shall continue to be used as appropriate.

(b) In coordination with GPU, the TIO shall assist in identifying the schedule of specific activities to be conducted onsite pursuant to this agreement, arranging for the carrying out of these activities, the monitoring of these activities, and the reporting of data, selection and shipment of samples, etc.

(c) Review, in coordination with TWG and GPU, proposed procedures related to activities conducted pursuant to this agreement so as to assure high likelihood of success of task objectives.

(d) For all activities, whether onsite or offsite, actually carried out pursuant to this agreement, provide for the systematic collection and collation of information obtained so that such information may be freely accessible to any interested party. To this end, the TIO will maintain liaison with the TWG to define data to be collected, report format, and reporting schedule.

(e) Work performed pursuant to this agreement which is sponsored by the Government shall be contracted for by the TIO.

(f) Work performed pursuant to this agreement which is sponsored by EPRI shall be contracted for by appropriate means and the TIO shall be fully cognizant of the contractural arrangements so that it can perform its other integration, scheduling, interface, and information collection functions listed above.

(g) The TIO shall establish, and maintain, a system for controlling changes to the work scope that may arise from time to time. This system shall be approved by the TWG.

The TIO will be established, manned and funded by DOE. Representatives of organizations in the TWG may be attached to the TIO to assist in administering the functions of the TIO, including technical oversight of specific tasks conducted pursuant to this agreement.

7. STATEMENT OF LIMITATIONS

It is understood that the TMI Unit 2 owners and customers have a strong interest in the return to safe commercial service of TMI Unit 2. Each party of this Memorandum of Understanding will implement their own individual programs. Nothing contained in this document shall be construed to impose upon any party hereto liability for injury to persons or property arising in the course of the activities under this Memorandum of Understanding. Nothing is intended to affect, modify or to act to change the internal management, structure or responsibilities of each of the participating groups individually.

Signed:

_____
DOE

_____
EPRI

_____
GPU

_____
NRC

(This page has been re-typed per ELD comments; DOE has agreed to this version.)

ENCLOSURE 2

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

CHAIRMAN

October 19, 1979

The Honorable John M. Deutch
Under Secretary
U. S. Department of Energy
Washington, D. C. 20545

Dear Mr. Deutch:

I am writing you concerning the need for developing and implementing a plan for the post-accident examination of the Three Mile Island Unit-2 (TMI-2) power station. The accident was a highly regrettable occurrence, but the information that can be derived from a careful examination of the facility before and during cleanup can be invaluable in providing both understanding of the accident and reactor safety information.

Several discussions have been held on this subject. At a meeting of senior staff representatives of DOE, EPRI, GPU and NRC, it was concluded that it would be useful to develop a coordinated program under the aegis of a joint Coordinating Committee. I support this approach and recommend that DOE give strong consideration to the allocation of funds and other resources for this effort.

Some areas in which such information can be obtained are:

(a) fission product behavior, transport, and plateout;

(b) the extent and location of core damage from thermal and chemical degradation;

(c) other primary system structural damage, if any; and

(d) damage and deterioration of equipment in the containment.

Such information is not only valuable to the mission of the NRC and DOE, but will be equally valuable to the international community. The enclosure hereto contains a more detailed preliminary listing of data needs.

In essence, TMI-2 can provide a large amount of information which might not be available from limited scale experiments or simulations. It is important that these data not be lost in the recovery of the facility. Your attention to this matter is appreciated. If you have any questions in this regard, please do not hesitate to contact me or Dr. Charles N. Kelber of our Division of Reactor Safety Research,

Sincerely,

Joseph M. Hendrie

Enclosure:
As stated

Safety Related Examinations During TMI Recovery Operations

The TMI-2 plant, in its present accident aftermath state, contains a wealth of information of potentially great value to the NRC for understanding the nature of accident initiated effects on plant, equipment, and fluids. To guide future activities in preventing and mitigating the effects of accidents and to identify sources of potential decontamination and requalification difficulties it is of great importance that careful attention be given during recovery operations to obtaining data which could otherwise be forever lost without adequate planning and control. An early objective should be to determine and compare the values of alternative data needs and to establish their relative priorities prior to the various recovery operation steps during which they would take place.

A preliminary listing of desired information examples by category is given as follows for early planning purposes (taken from a more extensive list compiled from all sources within NRC staff):

Listing of Data Interests for TMI Recovery Examinations

General Guidelines

1. The recovery plan should be integrated with safety related examinations to minimize the loss of valuable information. A management mechanism has been suggested to assure proper coordination.

2. Provision should be made for careful recording and filing of photographs, TV tapes, voice records, etc., made during the recovery process.

3. Provision should be made for library samples for possible future tests.

Examples of Specific Examinations

A. Containment Building Interior Prior to Start of Decontamination

1. The disposition of radionuclides on walls and operating floors, and adsorption on concrete, should be sampled by swipes, trepanning or similar techniques.

2. Examination for damage associated with hydrogen burn.

3. All glass light bulbs and glass covers should be collected, identified for specific location and saved for eventual analysis. These items could provide an excellent indication of integrated dose to various parts of the containment since it is known that the amount of darkening (or change in optical density) is related to dose.

4. Check operating floor areas for any evidence that the containment spray was limited in lateral extent.

5. Assess debris in sump to determine type, size, and initial and final location if (and how) clogging took place.

B. Tests after Decontamination of Containment Building

1. Perform a detailed examination of safety grade electrical equipment including cables, instruments, and motors.

2. Check condition of thermal insulation.

3. Check condition of valves, blowdown lines, valve packing and gaskets.

4. Determine extent of external corrosion on reactor pressure vessel (including head), steam generators, pressurizer, piping and carbon steel valves inside containment.

5. Identify radionuclides and their location within the damaged steam generator.

6. Perform containment leak rate test to ascertain containment integrity subsequent to hydrogen explosion and intense radiation exposure.

C. Core and Reactor Vessel

1. Reactor Vessel, CRDM's, etc. (External)

   a. extent and location of sites of contamination; characterization of radionuclides present,

   b. examination for signs of overheating, thermal distortions.

2. Reactor Vessel, CRDM's, Instruments (Internal)

   a. melting, distortion, fission product entrapment, etc., effects on control systems, thermal shields, upper and lower core support structures,

   b. examination of vessel interior for damage and for signs of various accident conditions.

3. A visual examination of the core geometry with appropriate photographs; precise axial and radial locations of abnormalities.

4. Determination of extent of gross assembly-to-assembly core damage/distortion; estimation of flow blockages or other hydraulic phenomena, and distribution of thermal effects.

5. Determine distribution of (fuel and clad) debris and formation and composition of debris deposits and debris beds.

6. Assessment of the conditions of core instrumentation prior to removal.

7. Removal and inspection of fuel bundles to determine if ruptured or melted.

8. Poolside examination of any intact fuel bundles for degree of ballooning and flow restriction.

9. Removal and examinations of portions of guide tubes, control rods, instrumentation tubes, and upper and lower core structural components.

10. Removal of small samples from selected regions of the core.

11. Hot cell examination of samples for:

    a. an estimate of the maximum clad and fuel temperatures reached in different portions of the core;

    b. extent of oxidation of cladding in different temperature zones;

    c. extent of damage to grids spacers;

    d. evidence of UO_2 melting;

    e. evidence of Zr/UO_2 liquid phase formation;

    f. evidence of hydriding of zirconium cladding and the extent of hydride formation;

    g. structural integrity of fuel pins as a function of temperatures reached; and

    h. geometry of damaged fuel to assist estimates of coolability.

D. Survey Auxiliary Building and Contents

1. Radionuclide deposition

2. Flooding damage

3. Contamination of steam relief valves, lines and let-down heat exchangers.

E. Primary Coolant

1. Coolant before and during decontamination to provide archival samples for analysis. (It may be desirable to interrupt decontamination to dissolve lanthanides to obtain a sample of their abundance.)