ROUTING SLIP — MAIL

DATE: 7/26/79

TMI TASK FORCE:

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RE: SAFETY RELATED EXAMINATIONS DURING TMI RECOVERY -- TMI ACTION #6

Please let me have your comments on the attached material by COB 8/10/79.

R. H. Vollmer

Richard H. Vollmer, Director
TMI-2 Support

By: Don

Safety Related Examinations During TMI Recovery

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 the obtaining of data which could otherwise be forever lost without adequate planning and control. An objective should be to determine and compare the values of alternative data needs and to establish their relative priorities at the various recovery operations step.

Both a general indication of desired information and preliminary listings of more explicit data needs, by category, are given as follows for early planning purposes (these lists are compilied 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 (at the Office Director - ETN level) 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 a library of 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 absorption on concrete, should be campled by swipes, trepanning or similar techniques. sa

2. Examination for damage associated with hydrogen burn.

3. All glass light bulbs and glass covers should be collected, identified for specific locat on 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 th amount of darkening (or change in optical density) may be pi portional 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. After decontamination, perform containment leak rate test to ascertain containment integrity subsequent to hydrogen explosion and intense radiation exposure.

C. Core and Reactor Vessel

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

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

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

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

5. Removal and inspection of fuel bundles during removal to determine if ruptured or melted.

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

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

8. 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,

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

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

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

   a. extent and location of sites of containmentation; characterization, of radioisotopes present,

   b. examination for signs of overheating, thermal distortions,

10. 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.

D. Survey Auxiliary Building and Contents

   1. Radionuclide deposition

   2. Flooding damage

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

E. Primary Coolant

   1. Sample coolant before and during decontamination to provide archival samples for analysis. (It may be desirable to interupt decontamination to dissolve lanthanides to abtain a sample of their abundance.)