EGG-M-09681

CONF-811085--6

MASTER

LESSONS LEARNED FROM TMI-2

H. J. Zeile

EGG-M--09681

~~DE82 005647~~

Presented at

DOE NUCLEAR FACILITY SAFETY CONFERENCE

October 26-30, 1981

Augusta, Georgia

Idaho National Engineering Laboratory

Idaho Falls, Idaho 83415

EG&G Idaho

Idaho Falls, Idaho 83415

MGW

DISCLAIMER

LESSONS LEARNED FROM TMI-2

H. J. Zeile

EG&G Idaho, Inc.

The lessons learned by the commercial nuclear power community as a result of the TMI-2 accident have been extensive. Even though the accident proved to be a nonevent from the standpoint of its effect on public health and safety, the financial losses, to the utility owner, have proven to be enormous. In addition, the accident has been devastating to the image of the nuclear power industry. As a result of the accident, the commercial nuclear power industry now recognizes a fact that has been continually emphasized with the contractors who operate the Department of Energy (DOE) owned reactors: to ensure safe operation of a nuclear reactor facility, a management structure must exist that will not only be concerned about but will be effective in identifying and correcting reactor safety deficiencies on a continuing basis.

The major deficiencies which the industry set out to correct immediately occur in the following areas:

(1) Operator training and qualification
(2) Improved plant status and control capability
(3) Independent evaluation of operations
(4) Emergency response
(5) Management structure support to safe reactor operation
(6) Adequate and timely technical support
(7) Timely and accurate public information

The Institute for Nuclear Power Operations (INPO) was organized, and its achievements to date have been significant. Together with the Electric Power Research Institute (EPRI) and the Nuclear Safety Analysis Center (NSAC), INPO has provided significant support to the commercial nuclear power industry in correcting the safety deficiencies identified by the TMI-2 accident and in bringing a balance to the overreaction represented by the many orders and directives issued by the NRC. The current evaluation of which would indicate that the compilation of the NRC actions may be detrimental to the overall plant safety as well as costly and unjustifiable from the cost/benefit standpoint.

To fully benefit from the TMI-2 experience, DOE has put in place an action plan to examine and evaluate the impact of the lessons learned by the TMI-2 accident on DOE-owned reactor facilities. This action plan is based on the actions taken by the contractors who operate the DOE facilities, actions initiated by the DOE Field Office and Assistant Secretaries who are responsible for the safety of these facilities, and the assessment and recommendations made by the Nuclear Facilities Personnel Qualification and Training (NFPQT) committee. The implementation of the DOE Action Plan started in June of 1981.

Immediately following the incident at TMI-2, DOE-ID and EG&G Idaho (contractor) personnel were requested by NRC to assist in the diagnosis of the plant status and to support the activities leading to the stabilization and ultimate cold shutdown of the plant. The INEL role during the TMI-2 incident provided the laboratory an early and unique understanding of the generic issues raised and the potential implications both to the facilities under EG&G Idaho cognizance and to the U.S. Nuclear Energy Program. Thus, even prior to issuance of formal documentation of the event, the contractor was in a position to initiate an evaluation of the INEL facilities (ETR, ATR, PBF, and LOFT) and compare their operation against the "lessons learned" which were ultimately documented by the various task forces investigating the accident.

Because of the diverse nature and missions of the various INEL facilities and the substantial differences between these facilities and commercial reactors, this initial assessment was based on the major generic issues identified. Contractor personnel then translated these issues into "facility unique" evaluations and corrective actions based on consideration of facility design, operating mode, mission, and siting. These activities constituted the initial contractor TMI-2 action plan and are thus identified and tracked in periodic facility status reports.

Within a year after the TMI-2 related actions were initiated, it became obvious that corrective actions were becoming strongly influenced by TMI-related corrective actions initiated by the NRC and activities initiated by DOE. The NRC corrective actions proved especially difficult to assimilate. DOE activities such as the NFPQT committee's audit of the ATR and the NE Reactor Review Team (NERRT) audit of TRA as well as independent audits of reactor operations initiated by the contractor tended to influence the response by the affected facility and therefore differentiate responses between facilities. In October 1980 the contractor started a major realignment of TMI response effort. This realignment was designed to a) demonstrate the coordination of the various actions taken in response to the generic issued raised by the accident, b) clarify the criteria upon which the activities are based in order to provide an acceptable basis for an assessment of the completeness of the response, c) enhance the visibility of the response activities at TRA, PBF, and LOFT, and d) provide the basis for agreement for the ultimate completion and closure of all TMI related work at these facilities.

The realigned TMI response plan comprises four major elements:

The first element is a bimonthly executive summary. This report provides to EG&G Idaho as well as DOE-ID management an executive overview of progress on outstanding items and the basis for subsequent actions.

The second element is a table (Table 1) providing a correlation between the DOE and NRC TMI action plan items and the generic issues with specific response activities for each the reactor facilities. This table also provides a tracking technique for completion of activities by reference to the individual facility TMI response status reports.

The third element is a table which is a compilation of the findings from the three major audits conducted at the TRA and PBF facilities, and relates the facility responses to the TMI issues in Table 1. The table provides a response, for each facility (whether or not it was audited), to each audit finding and, like Table 1, provides a reference to the individual facility status report for future tracking.

The final element consists of the individual facility status reports which were reworked to include a documented response to each of the audit findings and, as close as possible, relates them the NRC requirement and guidance from DOE. These are referenced to the DOE action plan item and the categorization used in the Kemeny Commission recommendations.

The individual elements of this plan were reviewed jointly by Technical Support Division and Facility Division personnel from each facility and the appropriate DOE-ID Program personnel.

In pursuing the TMI Action Plan, 661 separate activities have been initiated and more than 85 percent of these are now complete. Based on the work accomplished thus far by both the contractor and DOE. it can be concluded that the issues raised by the TMI-2 incident do not impact the DOE-owned reactors at the INEL to the same extent as commercial nuclear power reactors. Continued operation of the EG&G Idaho-operated reactors at INEL does not represent a tangible danger to public health and safety nor is the analyzed safety envelope for these facilities in any way compromised. However, a number of needed improvements have been initiated to ensure the continued safe operation of these facilities. These improvements can be classified in the following areas:

(1) Need to improve the training and qualification of operating and technical support personnel.

(2) Need to improve plant status and control capability for the operator.

(3) Need for enhanced, independent overview of operations.

(4) Need to improve emergency planning and response capability.

The following summarizes the key TMI-related activities at INEL facilities initiated or completed by EG&G Idaho.

Safety Overview

* Completed review of the adequacy and formal documentation of assignments of responsibility including establishment of new eligibility requirements for all Reactor Operations and Technical Support personnel.

* Formalized TMI considerations as a standard element of independent review functions requisite for facility and experiment operating authorization.

* Completed development of criteria and functional responsibilities for a new cross-company audit function to ensure the adequacy of independent assessments of all aspects of facility operations related to safety.

* Completed extensive revision of the facility emergency procedures to clarify specific functional responsibilities, better identify the functional emergency interfaces between EG&G, DOE, state and local government, and to provide more explicit direction for emergency notification of technical suppport personnel.

* Completed revision of the EG&G Resource Manual to update the management succession of authority, provide better definition of responsibilities of emergency response personnel, and update vital records protection criteria.

Programmatic Overview

* Completed evaluation of standards for plant status monitoring during accident conditions and recommendations for various plant upgrades.

* Completed evaluation of proposed standards for simulator usage and application to operator training with appropriate plans for new or upgraded simulator facilities.

* Completed evaluation of requirements for site facility accident source term monitoring.

* Completed reevaluation and implementation of recommendations to provide more formal documentation of requirements for UOR processing.

Training and Qualification

* Completed a major review and revision of the facility Training and Qualification Manuals.

* Modified written and oral examinations for facility operations personnel to place additional emphasis on recognition of and response to off-normal and emergency conditions in plant and experiment systems.

* Increased the frequency and scope of emergency action and response training to require a minimum of four on-shift drills and one management exercise on each shift per year.

* Developed listings of abnormal and emergency procedures and identified crew member responsibilities to ensure that emergency duties are effectively carried out.

* Initiated realignment of the training program to place additional emphasis on the thermal hydraulic characteristics of each EG&G Idaho facility and the potential for escalation of minor events into large scale accidents.

* Established formal requirements for inclusion of the facility UOR notebook in training certification.

* Initiated development of an enhanced Training and Qualification Program to comply with the revised requirements of DOE Directive 5480.1 (Draft and ANS 3.1.)

Technical Assessment

* Completed evaluation and developed recommendations for improvement of Primary Coolant System (PCS) relief valve reliability.

* Completed Human Factors Studies in conjunction with recommended upgrades of Reactor and Process Control Room Instrumentation.

* Completed study of accident compounding based on detailed review of facility DBR accidents list.

* Initiated reassessment of the adequacy of procedures and systems for facility shutdown, cooldown, and decay heat removal.

* Completed initial studies of adequacy of operational and control indication during normal and emergency conditions.

* Initiated studies to re-evaluate potential and consequences of small break LOCAs and misoperation of devices required for safety.

* Completed studies and submitted GPP funding requests for a spectrum of facility upgrades, including control room instrumentation, remote monitoring and control facilities simulator upgrades and replacements.

Worker and Public Safety

* Negotiated formal arrangements with Idaho Falls hospitals to handle radiologically contaminated patients.

* Evaluated all facilities for the adequacy of permanent and portable radiation detection equipment and recommendations made for upgrades where appropriate.

* Reviewed the DOE-ID Warning Communication Center and incorporated improvements to enhance communication capabilities under accident conditions.

* Studies are in progress to evaluate the adequacy of off-site monitoring and emergency notification requirements.

Emergency Planning and Response

* Revised the EG&G Resource Manual to:

  - Update the management succession of authority and emergency notification requirements.

  - Clarify and better define the responsibilities of emergency response personnel.

  - Update the vital records protection program.

* Reviewed and revised the individual facility emergency procedures to meet the criteria of NUREG-0654 where appropriate.

* Formal emergency training has been enhanced for facility management and technical support personnel.

* Increased the frequency and scope of emergency exercises; included coordination with other site facilities, DOE-ID, and state and local agencies and facilities. Two major site-wide drills and two emergency shift exercises per shift have been conducted in the past six months.

* Initiated development of pre-planned recovery procedures for severe facility accidents.

Public's Right to Information

* Completed evaluation and clarified roles for information dissemination interfaces under accident conditions.

* Completed evaluation of capabilities for accommodating media during major accident situation.

* Evaluated necessity for special identification for key individuals during emergencies.

Note: Work supported by the U.S. Department of Energy Assistant Secretary for Nuclear Energy, Office of Nuclear Reactor Programs, under DOE Contract No. DE-AC07-76ID01570.