DRAFT

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PROJECT NO. 2 - DESCRIPTION OF THE ACCIDENT

Parker

Major Objectives of Project	Purpose of the Objective
1. Provide description of events as they occurred (the facility, the operating crew on duty and their advisors, the man/machine interface) a. information directly known (data, etc.) b. indirect information, obtained after analysis of the direct information	1. a. Provide information for evaluation of adequacy of facility design, construction, and operation b. Provide information for evaluation of general adequacy of NRC regulatory approach (mostly NRR, IE) c. Provide information for evaluation of effectiveness of the research, standards dev., inspection and license review processes (in detail, as contrasted with (b), which is more general)
2. Provide description of information available to the operator, to NRC, to others at various times; and (where possible) of information that should have been available if plans or designed equipment had functioned properly. Failures could be hardware or administrative in nature.	2. a. Provide information for evaluating the response of the operating crew, utility management NRC staff, etc. b. Provide information for evaluating adequacy of the facility's information gathering capability and presentation of information to the operating crew. This includes evaluation of methods for recording and processing facility data during an accident.
3. Provide description of the operating crew's use of procedures during their response to the accident, and of the procedural response for those likely, alternate scenarios developed in number (5) below.	3. Provide information for evaluating the operating crew's utilization of their procedures, and the adequacy of the procedures.
4. Provide description of those facility components and systems that did not function as planned or designed.	4. Provide information for evaluating adequacy of design, regulatory requirements, inspection, testing, and maintenance.

Major Objectives of Project	Purpose of the Objective
5. Provide description and analysis of important scenarios, different from the one that actually occurred, if the scenarios fit one of the following criteria: a. the scenario might have occurred, with reasonable probability (in a stochastic sense), including equipment that operated beyond its nominal design specifi - cations. b. in retrospect, the scenario probably (or surely) could not have occurred, or was of very low probability, but was considered likely or significant during the course of the accident.	5. a. Provide information needed to evaluate operator and NRC decision-making and accident-response capabilities, and analytical capabilities. b. Provide information needed to evaluate the "remaining margin of safety" at TMI, which margin separated what actually occurred from other scenarios involving much greater consequences. c. Assist in understanding implications for other reactor designs.

This project is subdivided into seven tasks, as follows:

Task 1 Provide a Chronology of Plant Events

Task 2 Use of Procedures by Operators

Task 3 Key Equipment and Systems

Task 4 Impact on Radiological Releases

Task 5 Significant Alternative Courses of Events

Task 6 Impact of Communications on the Event

Task 7 Evaluation of Adequacy of Plant Design, Operation, and Emergency Response

Task 1 Provide a Chronology of Plant Events

Objective

Determine the chronology of events that occurred during the TMI-2 accident, beginning with the status of the facility just prior to the initial feedwater transient and continuing in depth until 3 to 5 days afterward; the later period, until the switchover to natural circulation cooling on April 13, will be covered in less detail.

Approach

The draft chronology of events generated by the IE staff will be used as a starting point, supplemented by chronologies put together by Metropolitan Edison and by EPRI. However, these will be considered as points-of-departure, and will be subjected to initial analysis as a key part of this task.

For each item within the chronology, the following will be determined if considered relevant:

1. The information available to the operating crew.
2. The reasons for a crew-initiated action.
3. For crew-initiated actions, the availability of procedures and their use.
4. The status of hardware and sensors.
5. The reason for a hardware failure, revival, actuation.
6. The occurrence of a radiologically significant release, or of an event leading directly to a later release.
7. The environmental conditions and performance of hardware, emphasizing hardware experiencing conditions beyond its design envelope.

Also, at certain key points in the sequence of events, a key branch point may have occurred where alternative scenarios might have branched from the events that did occur. These will be indicated.

This task will require some interviewing of persons involved, but no good estimate is available now as to the extent of interviews needed.

Resources

The manpower required to complete this task is at least 50 man-weeks, but could be substantially more. A better estimate will be made after a week or more of actual effort. NRC staff will be supplemented, as needed, with contractor support.

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Task 2

~~II.C.c~~ - Use of Procedures by Operators

Objective

Determine the extent to which operators utilized procedures during the accident. This information is necessary for assessing the adequacy of plant operational procedures, operator training, plant administrative controls, and NRC involvement in plant operations. This task will also treat the adequacy/or inadequacy of information available to the operator during the accident.

Approach and Resources

This task will require examination of the plant log, process computer output, I&E findings, plant operational procedures and the FSAR. Interviews with plant operating staff, NRC I&E operator licensing staff, and possibly B&W staff will be required.

The estimated manpower required to complete this task is 2-4 man-weeks.

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Task 3

Key Equipment and Systems

Objective

Provide information on key equipment and systems which failed at TMI or which operated beyond their design capabilities (including safety classification, environmental qualification; environmental and operational conditions encountered, pertinent design requirements, causes of failure, failure modes and times of failure - or if applicable, duration for which the systems or equipment worked successfully beyond their design envelopes).

Such information will be necessary for the assessment of the adequacy of plant design analyses (accidents and transients), as well as system and equipment design requirements.

Approach and Resources

Utilize FSAR, plant maintenance records, plant technical specifications, equipment specification documents, equipment qualification, testing data to determine the equipment and system design capabilities, and use the plant chronology, stripcharts, etc., to determine equipment and system operations and times of failure. This task will require some interviewing with GPU/B&W and Burns & Roe.

The estimated manpower required to complete this task is 4-6 man-weeks.

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~~II-2~~ Impact on Radiological Releases

Task 4 Objective: Provide information about those specific events and actions, that had an effect upon radiological releases.

This information is necessary to enable one to completely understand many of the actions taken to bring the plant to a safe shutdown, and to minimize the public's exposure.

Furthermore, this information is necessary for assessing the adequacy of the plant (design, construction, analysis, licensing, operating procedures, operators, emergency response, etc.).

Approach and Resources

Review the accident chronology, plant and offsite dosimetry data, plant operating data (logs, process computer output). Interviews with plant operating staff and emergency response personnel from NRC, and B&W, and others will be necessary.

Some analyses may be necessary to construct time-release and equipment histories. (Information from item II-3 (design parameters for key equipment and systems) will be required to accomplish this task.

The estimated manpower required to complete this task is 2-4 man-weeks, plus 2-4 contractor man-weeks.

Task 5 (A)

Significant alternative courses of action that the operators could have taken and their projected outcomes.

Objective

Provide delineation and provide analyses of the events that would have ensued if the operators had taken actions other than the ones they did.

Such analyses are necessary to make a determination of "how close TMI-2 was to a disaster," as well as "how much additional margin TMI 2 had." These determinations will be important in revealing weak and strong points in plant design and operation. This information is required for identifying deficiencies in plant design, or plant design requirements, and is also necessary to satisfy questions raised by Congress and the public on "how close were we?",as well as "how much margin did we have?"

Approach and Resources

This task will require careful examination of the chronology, plant logs, interviews with utility, B&W, Burns & Roe, NRC, and contractor personnel. Some computer analysis might be necessary (either by NRC or contractors). Present plans are for examining the most important alternate scenarios - e.g., to go on RHR, keep the primary system pumps on early in the accident, isolate containment, etc.). The number of such scenarios is presently estimated at about a dozen.

The estimated manpower to complete this task is 3-5 manweeks by the special inquiry staff and a comparable amount of contractor support.

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(B)

~~Task 4~~ - Alternative events

Task 5

Objective

Provide delineation and provide analyses of the events that would have ensued if key equipment or systems that were available were lost (e.g., loss of offsite power during thunderstorm, loss of control room habitability, inability to isolate containment, etc.)

Such analyses are necessary to reveal the weak and strong points in plant design and also are important in determining the adequacy of NRC's licensing requirements.

Approach and Resources

The task will require examination of the chronology and may require some computer analysis (either by NRC or contractors). The number of alternative events is presently estimated at about _____.

The estimated manpower to complete this task is 3 to 5 (?) man-weeks by the special inquiry staff and _____man-weeks of contractor support.

Task 6 Impact of Communications on the Event

Objective

Determine the impact on the chronology that occurred of communications between the operating crew and others (utility management, NRC staff, B&W, and others). This will involve determining what communications were received and sent by the operating crew, when, and with what result.

Approach and Resources

This task will require examination of the plant log, of interviews with the operating crew, and of other relevant material. The aim will be to discover major decision points that were reached by the crew, and the role of communications influencing those decisions. Only the most important decisions will be studied in depth (perhaps a dozen in number). It may be necessary to conduct interviews to accomplish this task's objective, but these interviews are probably only supplemental to interviews conducted for other purposes.

The estimated required manpower to complete this task is two to four man-weeks.

Task 7 Evaluation of Adequacy of Plant Design, Operation, and Emergency Response

Objective

Based upon the facts gathered in the earlier tasks, this task will provide an evaluation of a number of items closely linked to those facts. Among these are:

1. Design adequacy to respond to feedwater transients and related accidents.
2. Instrumentation requirements.
3. Operator training and procedures.
4. Adequacy of NRC licensing and operational review.
5. Communication adequacy.
6. Qualification requirements of equipment.
7. Degree of reliance on non-safety-grade or non-qualified equipment.

Approach and Resources

This evaluation will rely in part on work now underway by the NRC staff, by the utility, by EPRI, by B&W, and by the ACRS. This on-going work will be subjected to critical review and will be supplemented and compiled into a coherent set of adequacy evaluations.

It is estimated that the completion of this task will require at least 25 man-weeks of effort, mostly by the same staff that will have worked on the earlier tasks. The 25 man-week estimate might be an underestimate, but it is thought not by a factor of two.