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STEP 1 TECHNICAL EVALUATION REPORT

OF THE

NINE MILE POINT UNIT 2

INDIVIDUAL PLANT EXAMINATION

BACK-END SUBMITTAL

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1. INTRODUCTION

This technical evaluation report (TER) documents the results of the SCIENTECH Step 1 Review of the Nine Mile Point Nuclear Station, Unit 2 (NMP2), Individual Plant Examination (IPE) Back-End submittal[1]. This technical evaluation report complies with the requirements of the U.S. Nuclear Regulatory Commission contractor task order for Step 1 reviews, and adopts the NRC Step 1 Review objectives, which include the following:

- To determine if the IPE submittal provides the level of detail requested in the "Submittal Guidance Document," NUREG-1335
- To assess the strengths and the weaknesses of the IPE submittal
- To pose a preliminary list of questions about the IPE submittal, based on this limited Step 1 review
- To complete the IPE Evaluation Data Summary Sheet.

In Section 2 of the TER, we summarize our findings, and briefly describe the NMP2 IPE submittal as it pertains to the work requirements outlined in the contractor task order. Each portion of Subsection 2.1 corresponds to a specific work requirement. In Subsection 2.2, we set out our assessment of the NMP2 IPE submittal strengths and weaknesses, and, in Subsection 2.3, we submit to its authors our questions, comments, and requests for more information about the IPE submittal. In Section 3, we present our evaluation of the NMP2 IPE overall, as well as our conclusions, based on the Step 1 review.

2. CONTRACTOR REVIEW FINDINGS

2.1 Review and Identification of IPE Insights

This section is structured in accordance with Task Order Subtask 1.

2.1.1 General Review of IPE Back-End Analytical Process

2.1.1.1 Completeness

The Nine Mile Point Nuclear Station, Unit 2 (NMP2), Individual Plant Examination (IPE) Back-End submittal is essentially complete with respect to the level of detail requested in NUREG-1335. The only exception appears to be the failure to meet a generic-letter reporting requirement relative to radionuclide release categories. Generic Letter 88-20 states that the following should be reported:

> [A]ny functional sequence that has a core damage frequency greater than 1x10-6 per reactor year and that leads to containment failure which can result in a radioactive release magnitude greater than or equal to BWR-3 or PWR-4 release categories of WASH-1400.

The NMP2 IPE submittal describes many sequences (Table 4.6-7 of the submittal lists the top 100 Level 2 sequences, about 60 percent of the total CFD). However, there appears to be no way to determine which of the 100 sequences described, other than the 15 large release sequences, could result in a radioactive release magnitude greater than or equal to the BWR-3 or the PWR-4 release categories. No NMP2 release categories are addressed in the submittal (Releases were determined only in CsI categories).

2.1.1.2 Description, Justification, and Consistency

The IPE methodology used is clearly described and its selection is justified. The approach followed is consistent with Generic Letter GL 88-20, Appendix 1.

2.1.1.3 Process Used for IPE

As noted in Section 1.0, page 1-1, of the submittal:

> The NMP2 IPE is classified as an Internal Events Level II PRA including flood, through source term representing radionuclides released to environment.

As described in Subsection 1.3, page 1-4, of the submittal:

> [T]he study can be broken into three steps. The first step is to establish a set of possible initiating events that cause a plant challenge. . . . The second step is to establish a reasonable set of plant responses for each initiating event. . . . The third, and final, step is to determine the radionuclide releases of each of the sequences where core damage occurs.

PLG developed a special method for use during the NMP2 individual plant examination, which entailed following all of the sequences from the initiating events to the Level 2 end-states, using event trees. This method made it easy to track the support and inter-system dependencies. However, the PLG method is complex and does not allow for a transparent understanding of containment failure characteristics and the contribution of key phenomenology to containment failure. We elaborate on this later in the report.

2.1.1.4 Peer Review of IPE

As discussed in Section 5.0 of the submittal, peer review has resulted in better understanding of the IPE. As noted in Subsection 5.3, page 5-2:

> No major comments were received; where a major comment is loosely defined as one that would affect results substantially. The main result of the review was a better understanding of plant and design.

The names of the NMP2 IPE review team members are listed in Table 5-5, pages 5-8 and 5-9, of the submittal. Both the IPE team and the Peer Review team included members of the NMP2 staff, in addition to consultants and outside contractors.

2.1.2 Containment Analysis/Characterization

2.1.2.1 Front-end to Back-end Dependencies

With respect to the front-end to back-end dependencies, the NMP2 IPE submittal states on page 4.3-1:

> The Nine Mile Point assessment involves the direct coupling of each sequence from the Level 1 to the CET evaluation. Specifically, the Nine Mile Point 2 IPE directly links the front-end to back-end portions of severe accident sequences through directly linked event trees. These trees ensure that the support state conditions and the dependencies are properly accounted throughout the front-end and back-end trees.

Specific aspects of the Level 1 - Level 2 interface are summarized in Subsection 4.3.3, page 4.3-5, of the submittal. The methodology used adequately accounted for the front-end to back-end dependencies.

2.1.2.2 Sequence with Significant Probability

Table 4.6-7 of the submittal lists the top 100 Level 2 sequences. The sum of these sequence frequencies is 1.9E-5, which is about 61 percent of the total CDF (3.1E-5). This percentage is less than the required "95% of the total containment failure frequency" (NUREG-1335, page 27). However, NUREG-1335 also states that the number of significant sequences should not exceed 100, in any case. The top 100 Level 2 sequences provided in the submittal appear to be representative and adequate for the purposes of the IPE program.

Table 4.6-8, page 4.6-47, of the submittal lists the top 15 early-failure-with-high-release sequences, which are identified as "large releases." The first 10 of these sequences are discussed in Subsection 4.6.3.6.1 of the submittal, where it is noted that the "large releases" have been estimated conservatively.

2.1.2.3 Failure Modes and Timing

The containment failure characterization is described in Subsection 4.4 of the submittal. During the NMP2 IPE, 24 containment challenges were postulated (Table 4.4-3 of the submittal). Those that related to Level 2 are summarized in Table 4.4-4 of the submittal, in terms of time, size, and location of containment failure.

When ABB Impell performed a probabilistic evaluation of NMP2 containment performance, the following containment failure modes were identified (page 4.4-7 of the submittal):

- Wall/Basemat Junction Failure
- Wetwell Liner Tear
- Wall/Basemat Junction Radial Shear
- Hoop Membrane at a 324-foot Elevation
- Wetwell Hoop Membrane Tear
- Drywell Flexure/Tension at a 324-foot Elevation
- Radial Shear at a 324-foot Elevation
- Basemat Shear

The containment failure probability was calculated as a function of the above failure modes by parametrically varying the drywell and wetwell temperatures and the assumed containment pressures, ranging from 120 to 220 psig. The results appear in Tables 4.4-6 through 4.4-8 of the submittal.

Figure 4.4-8 of the submittal gives the pressure and temperature performance profiles for NMP2 containment: The respective, maximum limits are 141 psig for pressure and 900°F for temperature.

Table 4.1-1 of the submittal shows the principal design parameters and characteristics of the NMP2 primary containment system. However, the key plant features, such as volume of RCS water, mass of fuel, and mass of Zr, could not be located.

The descriptions of the potential containment failure modes and timing appear to be complete.

2.1.2.4 Containment Isolation Failure

The containment isolation failure is described in Subsection 4.6.2.4 of the submittal as follows:

> The modeling of containment isolation is based on a fault tree model. The fault tree for containment isolation incorporates modeling of containment hatches and large lines that penetrate the containment and are open to the containment atmosphere (e.g., purge and vent lines). The fault tree considers automatic isolation signal failure, pre-existing open pathways, manual isolation, and component failures.
>
> Failure of containment isolation is modeled as a failure in the drywell. Containment isolation failure is conservatively characterized as a high radionuclide release at the time of initial core damage (e.g., H/E release categorization) based upon a representative worst case MAAP calculation.

As an initial condition in the Level 2 analysis, containment isolation failure is stated to have been very low—as is to be expected. However, as noted below in Section 2.3, Question 7, the failure of operators to isolate the containment for certain sequences is significant.

2.1.2.5 System/Human Response

The integration within the IPE of system/human response with the phenomenological aspects of accident progression into CETs is discussed in Subsection 4.6.2.5 of the submittal. As noted on page 4.6-6:

> Human actions that can affect safety include: operator actions (e.g., control room manipulation, diagnosis of plant conditions, recovery actions, and system manipulation); maintenance actions (e.g., preventive maintenance, and corrective calibration and inspection); and management actions (e.g., problem solving and decision making).

As noted on pages 4.6-7 and 4.6-8, the following tasks were performed using human reliability analysis:

- Task 1 — Identify key PRA human error elements
- Task 2 — Review the plant-specific EOPs to identify areas of possible ambiguity or potential for confusion
- Task 3 — Develop a set of questions and postulated accident scenarios to determine if the PRA accurately reflects the EOPs and associated training
- Task 4 — Interview operators and staff

- Task 5 — Apply the information from the interviews to the available quantification models; ensure that dependencies are properly incorporated

- Task 6 — Document the process; provide qualitative insights and identify modeling of the operator actions.

Table 4.6-2, on pages 4.6-27 through 4.6-35 of the submittal, summarizes the human error probabilities used as best estimate values in the NMP2 IPE.

As noted in the submittal, the EOPs for NMP2 have a considerable impact on the progression of the severe accidents (e.g., flooding the containment). Accident management, as such, is beyond the scope of this review. However, in Subsection 2.3 of this TER, some concerns are raised about the impact that procedures could have on understanding the vulnerabilities of the NMP2 facility to human actions.

2.1.2.6 Radionuclide Release Characterization

Each containment event-tree sequence followed in the NMP2 IPE ended in one of 13 end-state/source-term categories. For purposes of comparison, 45 source-term categories were used in the McGuire IPE, 22 in the Palo Verde IPE, and 27 in the Turkey Point IPE. The end-states were defined by severity and time of release.

Severity of release was calculated according to the following:

- High (H) - Greater than 10% CsI release
- Moderate (M) - Between 1% and 10% CsI release
- Low (L) - Between 0.1% and 1% CsI release
- Low-low (LL) - Less than 0.1% CsI release
- No release/negligible - Much less than 0.1% CsI release.

Time of release was calculated according to the following:

- Early (E) - 0 to 6 hours after accident initiator
- Intermediate (I) - 6 to 24 hours after accident initiator
- Late (L) - More than 24 hours after accident initiator.

Each containment event-tree sequence ended with one of 13 designators such as H/E (for high release and early containment failure[1]). Over 50 MAAP runs were performed to provide sufficient deterministic bases by which to assign time of release and severity to

[1]Containment isolation failure is always considered a high release.

each sequence. These calculations appear in Tables 4.7-1, 4.7-2, and 4.7-3 of the submittal.

The outcomes of certain containment event-tree nodes, coupled with the Level 1 accident classes, were used to determine times of release. Table 4.7-4 of the submittal presents a matrix of accident classes and containment nodes, which were entered into RISKMAN as rules for assignment of one of the above three times of release. The containment nodes pertain to combustible gas venting, energetic containment failure, debris cooling, and containment heat removal. The representative MAAP runs in Table 4.7-4 of the submittal were used to make the assignments of time.

The outcomes of containment event-tree nodes, without regard to Level 1 accident class, were used in conjunction with representative MAAP runs to determine the severity of release for sequences in which the RPV was breached by molten debris. The nodes, which appear in the matrix in Table 4.7-5 of the submittal, pertain to containment failure mode, water availability to molten debris in the containment, and reactor building effectiveness. The combination of four containment failure modes (large drywell; small drywell; wetwell vent, or failure with suppression pool bypass; and wetwell vent, or failure with suppression pool effective), two options about water availability (yes or no), and two options about reactor building effectiveness (yes or no) led to 16 unique combinations. Each combination was assigned to one of four release severities (H, M, L, or LL). Specifically applicable MAAP runs were used to make these assignments for 14 of the combinations. The remaining two were estimated using similar MAAP runs. The information in Table 4.7-5 of the submittal was entered into RISKMAN to create rules by which RISKMAN automatically performed the sequence-by-sequence designations.

The designations for CET end-states were decoupled from the accident classes of Level 1 and the key Level 2 CET phenomena. This is unusual, and a great deal of effort was spent to justify the designation philosophy (see pages 4.6-12 through 4.6-16 and 4.7-5 through 4.7-13 of the submittal). The intent was to designate in a way that would provide insight into offsite effects on public health. The purpose of the IPE, however, is to provide insight into accident sequence progression within a plant. We believe that a clearer and more informative presentation of results would have been achieved using a binning procedure and designation that preserved information about the Level 1 accident class, containment failure mode, and other key CET events.

Table 4.6-5 of the submittal presents data on the frequency of each accident class (from the Level 1 study) and from the CET end-state combination. For example, one entry in that table is the frequency of an H/E release stemming from Class 1A (3.9E-07 per year). Summary results, which relate the fractional distribution of each Level 1 accident class to release categories, are provided as pie charts (Figures 4.6-19 through 4.6-32). A summary matrix of these results would be easier to read and provide the benefit of easier inter-comparisons of the contributions of each of the accident classes and release categories. In addition, Figure 4.6-16 is a pie chart that shows the fractional contribution of each containment failure mode to the total radionuclide release frequency.

As noted above, representative MAAP calculations were used to assign each CET sequence to a time/release category via rules input to RISKMAN. In general, decontamination factors internal to MAAP were used. Significant exceptions entailed the use of judgment to assign time/release categories in cases involving one or more of the following:

- Suppression pool bypass
- Wetwell failure below water line
- Standby gas treatment system
- Containment sprays
- Saturated suppression pool.

Except for the last in this list, the judgments made with regard to these items appear to be conservative, in that they erred on the side of high release. In cases involving release to a saturated suppression pool, the decontamination factor increased substantially over that provided in MAAP. No specific basis for the increase was provided, except that the MAAP was inconsistent with the data.

The actual source terms associated with each release category are not provided in the submittal. The only source-term information that is provided appears with the end-state category definitions, noted above.

Extensive sensitivity calculations were performed using MAAP. However, comparisons with other codes, such as the Source Term Code Package, were not included. Sensitivities were generally limited to varying parameter values within MAAP. No attempt was made to investigate the strict assumptions that underlie the MAAP models. Issues such as direct containment heating, steam explosions, and hydrogen detonation were treated "probabilistically." That is, they were not specifically included in deterministic accident progression calculations. Instead, they were conservatively assigned to the H/E end-state with an extremely small probability of occurrence. This is consistent with the treatment in the Limerick and Shoreham PRAs. Re-evolution of fission products from the suppression pool was not treated in MAAP, and a re-evolution term was not included in the calculations.

2.1.3 Quantitative Core Damage Estimate

2.1.3.1 Severe Accident Progression

In Subsection 4.2.1, page 4.2-1, of the NMP2 IPE submittal, it is stated that:

> Primary and secondary containment response to pressures, temperatures, flow rates, and timing of actions was evaluated using the BWR Mark II version of the MAAP thermal hydraulic code (version

3.0B, revision 7.01). This code, using Nine Mile Point 2 specific parameters as input, provided reactor and containment pressures, levels (water and radiation), and temperatures. Also calculated were the time windows between key events such as core damage and containment failure.

As noted on page 4.2-5 of the submittal, the phenomena not treated in MAAP were addressed as follows:

- Ex-vessel steam explosion was treated probabilistically.
- Direct impingement-induced failure was treated probabilistically.
- Direct containment failures were analyzed as separate effects and treated probabilistically.
- Reactivity insertions during core melt progression were analyzed as separate effects and treated probabilistically.

General assumptions used in the Level 2 PRA are listed in Subsection 4.2.4.1 of the submittal. In the same subsection, the treatment of phenomenological uncertainties is described as follows (page 4.2-7):

> The Nine Mile Point 2 IPE treats phenomenological uncertainties through sensitivity studies performed with MAAP as well as using other studies. Selection of the sensitivity runs are generally consistent with those given in the EPRI draft report "Recommended Sensitivity Analyses for an Individual Plant Examination using MAAP 3.0B."

It is not clear from the submittal, whether the NMP2 staff understood the role of the key phenomenology and the phenomenological uncertainties in the accident progression and the containment response.

2.1.3.2 Dominant Contributors Consistency with IPE Insights

The total core damage frequency was reported as 3.1E-05 per year and the total frequency of large release (defined as the H/E release category) was 8E-07 per year, which amounted to about 3 percent of the core damage frequency. The results may be broken down in various ways.

The following provides a breakdown of the core damage frequency in terms of severity of release.

- No or negligible release 25%
- Low-Low or Low release 16%
- Moderate release 6%
- High release 53%

The following provides a breakdown of the core damage frequency in terms of time of release.

- No or negligible release 25%
- Early release 7%
- Intermediate release 37%
- Late release 30%

The following provides a breakdown of the core damage frequency in terms of the release categories. (Note a slight inconsistency because of round-off).

NoRel	LL	L/E	L/I	L/L	M/E	M/I	M/L	H/E	H/I	H/L
27%	7%	1%	0.1%	7%	3%	<0.1 %	2%	3%	37%	13%

The total frequency of release is about 2E-05 per year.

The following provides a breakdown of the core damage frequency with respect to containment failure modes:

- Drywell head (no injection) 58%
- Energetic failure 9%
- Other Drywell failures 4%
- Wetwell below water line 9%
- Wetwell vapor space 15%
- Venting 5%

A direct comparison is difficult to make of the NMP2 IPE results with the results of IPEs performed at other units. This is because of the differences in defined containment failure modes, defined release categories, and maturity of the analysis technology employed. A great deal of analysis would be necessary to put the results on an equal footing. In general, however, the NMP2 IPE results appear consistent with (i.e., within the uncertainties) of other units with Mark 2 containments, such as Shoreham and Limerick.

2.1.3.3 Characterization of Containment Performance

As noted in Subsection 4.5.3, page 4.5-9, of the submittal:

> Whenever possible, NMP2 specific MAAP model is used to describe the boundary conditions of containment challenges. Engineering analyses regarding the capability of NMP-2 containment to withstand the various energetic accident phenomena were not performed. Rather, industry studies and staff positions on phenomenological uncertainties were taken into account to assign failure probabilities that are deemed representative of the NMP2 Mark II containment.

Containment performance is characterized above in Subsection 2.1.3.2 of this TER. The methodology used in the NMP2 IPE is not conducive to a clear understanding of the details of containment performance and how the phenomenology affects that performance. A description is given (starting on page 4.6-18) of the accident progression and containment response of the 10 most dominant sequences contributing to the "large" release category. However, these sequences represent only 35 percent of the large release contributors. The IPE submittal contains no similar discussion of other sequences that lead to early failures, or of any sequences that lead to late failures.

2.1.3.4 Impact on Equipment Behavior

A discussion of the impact of severe accidents on equipment is presented in Subsection 4.6.2.3 of the submittal. As noted in page 4.6-5, when taking credit for equipment in severe accidents, consideration is given to the fact that equipment is exposed to temperature, pressure, aerosol loading, radiation, and moisture. In the submittal, the degree of credit was based on a review of the literature cited and engineering judgment. Research studies and tests of equipment survivability were reviewed as to the following components: cables; electrical penetration assemblies; electrical connections; solenoid valves; motor-operated valves; motor-driven pumps; and motor control centers.

As noted on page 4.6-6 of the submittal:

> Injection systems, RHR system, the depressurization system, and the vent valves were modeled considering environmental effects.

2.1.4 Reducing Probability of Core Damage or Fission Product Release

2.1.4.1 Definition of Vulnerability

The NMP2 IPE identified core damage frequency and large release frequency as two figures of merit to consider in measuring plant vulnerability. The core damage frequency was within the range defined in other BWR PRAs; namely in PRAs of Shoreham, Peach Bottom Unit 2, Grand Gulf Unit 1, and Limerick. In the submittal, it is argued that, because the frequencies of these figures of merit were within proposed safety goal guidelines, cost-effective modifications are difficult to justify. Modifications might be difficult to justify in any event. However, the focus on the "large (early fatality) release" and on the safety goal detracted from consideration of other early or late release vulnerabilities. It is also stated (page 1-18) that no plant vulnerabilities were identified in the IPE process.

The top 10 core damage sequences showed a clear trend. Eight of the top 10 CDF sequences, comprising 38 percent of the total CDF, were initiated by partial loss of station power, full loss of station power, or loss of at least one division of emergency power. One sequence was initiated by a flood that caused loss of all divisional power. Another was initiated by loss of condenser. Significant contributing systems were RHR, containment vent, HPCS, service water, RCIC, and emergency DC power.

The top two large release sequences were initiated by flood. The remainder of the top 10 large release sequences were initiated by partial loss of AC power, loss of injection, and a turbine trip ATWS event. Significant contributors to large release sequences were the following:

- Failure of motor-operated, normally open containment isolation valves
- Containment flooding that filled the wetwell (no vapor suppression) at about the same time as reactor pressure vessel failure occurred
- Failure to depressurize the reactor pressure vessel.

2.1.4.2 Plant Improvements

The NMP2 IPE assumed several plant improvements in both the Level 1 and Level 2 studies (Subsection 6.3 and Table 6.1-1). That is, the models and quantification included plant and procedural modifications that have not yet been implemented. The assumed modifications relating to the Level 2 portion of the IPE were as follows:

- Installation of an improved, hardened wetwell vent, currently scheduled to take place during a 1994 refueling outage.

- Isolation of the standby gas treatment filters by valves. Currently, the filters must be isolated by locally removing expansion joints and installing blind flanges. This adds to the difficulty of aligning containment venting. The modification is scheduled to take place during a 1993 refueling outage.

- Improved procedure that adds guidance on opening the outside containment purge valve locally when instrument air or Division I AC is unavailable. The study also assumed an improved procedure to guide operators in the alignment of instrument air for the containment purge valve, if nitrogen is unavailable.

- Test and maintenance procedural precautions to make inadvertent opening of low-pressure injection paths unlikely during power operation.

- Station blackout procedural implementations and related operator training, currently under development. The procedures pertinent to the Level 2 IPE involve the following functions:

    - Remote operability of RHR injection MOVs without AC power. This is to allow diesel fire pump injection so that hookup of the fire pump can be achieved within 2 hours. (The study did not take credit for pump alignment within the first 2 hours.)

    - Local closure of the outside containment isolation valves that depend on AC power.

The submittal includes insights (Subsection 6.3) that may receive consideration as future plant and procedural modifications.

2.1.5 Responses to CPI Program Recommendations

Generic Letter No. 88-20, Supplement No. 3, notes the following recommendations of the Containment Performance Improvement Program (CPI) pertaining to the Mark-II containments:

> For events where inadequate containment heat removal could cause core degradation, additional containment heat removal capability using plant specific hardware procedures is expected to be considered as part of the IPE process. Potential methods of removing heat from containment include, but are not limited to, using a hardened vent or other means of improving reliability of suppression cooling. . . . In addition, the Mark I improvements contained in Supplement 1 to Generic Letter 88-20 dated August 29, 1989 are expected to be considered for applicability to Mark II containments.

Recommendations in Supplement 1 to Generic Letter 88-20 include the following:

- Alternate water supply for drywell spray/vessel injection
- Reactor pressure vessel depressurization system reliability enhancement
- Emergency procedures and training.

No section of the submittal can be found to address these CPI recommendations as such. However, some of these matters are addressed in the sensitivity analyses of Section 4.9.

2.2 IPE Strengths and Weaknesses

2.2.1 IPE Strengths

1. The back-end portion of the NMP2 IPE submittal contains a larger amount of information on severe accident progression and resulting containment response.

2. Table 4.9-2 provides an interesting comparison of sensitivity cases cited in GL 88-20 or NUREG-1335, which were useful in performing the NMP2 IPE.

3. Support and inter-system dependencies have been accounted for in a systematic way by following all of the sequences from the initiating events to the Level 2 end-states, using containment event trees.

4. It appears that the NMP2 management has educated the facility staff in the IPE process, results, and methods. Figure 2-1, for example, includes an IPE training course.

2.2.2 IPE Weaknesses

1. Although the subsection on Sensitivity Analysis (Subsection 4.9) is well written, it does not necessarily provide NMP2-specific insights. The information presented appears to be generic to MAAP results and FAI studies for BWRs. The sensitivity studies do not attempt to investigate the underlying modeling limitations of MAAP.

2. Information on source terms is lacking. The only information provided for release magnitude was based on approximate CsI fractions for each of the four release severity categories. Release timing was limited to three gross time intervals.

3. A direct comparison of the NMP2 IPE results with those of other units is difficult to make. This is because of the differences that exist in defined containment failure modes, defined release categories, and maturity of the analysis technology employed. A great deal of analysis would be necessary to put the results on an equal footing.

4. Important plant parameters, such as mass of water in the RCS and masses of fuel and zirconium in the core, were not given.

5. No section in the submittal appears to address the CPI recommendations.

6. The designations for CET end-states were decoupled from the accident classes of Level 1 and the key Level 2 CET phenomena. The intent was to designate in a way that would provide insight into offsite effects on public health. The purpose of the IPE, however, is to provide insight into accident sequence progression within a plant. A clearer and more informative presentation of results would have been achieved using a binning procedure and designation that preserved information about the Level 1 accident class, containment failure mode, and other key CET events. It would also have facilitated comparison with other studies.

3. OVERALL EVALUATION AND CONCLUSIONS

As discussed in Section 2 of this TER, the NMP2 IPE submittal contributes a great deal of back-end information toward the resolution of the severe accident vulnerability issues at NMP2. Much of this back-end information is well written and addresses Generic Letter 88-20 issues. At the same time, however, there do appear to be some weaknesses in the submittal.

In summing up the results of the SCIENTECH Step 1 Review overall, our chief concerns about the NMP2 IPE submittal are as follows:

- Except for CsI releases, no source term information was provided.
- Containment performance improvements were not addressed.
- The IPE methodology appears to have been geared to making consequence assessments and comparisons to safety goals, rather than to understanding the vulnerabilities of the containment and the effects that equipment, EOPs, and phenomenology may have on containment performance.
- The IPE analysis was predicated on the completion of certain planned modifications, yet there appears to have been no assessment of the as-built containment performance, nor of what the risk reduction may be when the modifications are in place.

4. REFERENCES

1. "Nine Mile Point Unit 2 Individual Plant Examination Report," prepared by Niagara Mohawk Power Corporation, April 1992.

ENCLOSURE 4

NINE MILE POINT NUCLEAR STATION, UNIT 2 INDIVIDUAL PLANT EXAMINATION

TECHNICAL EVALUATION REPORT

(HUMAN RELIABILITY ANALYSIS)