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NINE MILE POINT 2
EMERGENCY OPERATING PROCEDURE INSPECTION

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Licensee:	Niagara Mohawk Power Corporation 301 Plainfield Road Syracuse, NY 13212
Facility Name:	Nine Mile Point, Unit 2
Inspection At:	Scriba, NY
Inspection Conducted:	January 28 - February 1, 1991
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Team Leader: Tracy E. Walker, Sr. Operations Engineer — Date: 3/21/91

Reviewed By: Richard J. Conte, Chief, BWR Section, Operations Branch, DRS — Date: 3/25/91

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EXECUTIVE SUMMARY

The purposes of the inspection were to verify that the NMP2 Emergency Operating Procedures (EOPs) are technically correct, that the NMP2 EOPs can be physically carried out in the plant, and that the NMP2 EOPs can be implemented by the plant staff. The inspection team concluded that the NMP2 EOPs are technically correct, can be physically carried out in the plant, and can be implemented by the plant staff.

The inspection team performed a technical review of the NMP2 Plant Specific Technical Guideline (PSTG) and EOPs and concluded that the various EOPs developed by the facility were sufficient to meet the intent of the BWR Owners Group (BWROG) Emergency Procedure Guidelines (EPGs). The NMP2 EOPs were, in general, technically adequate and, if implemented properly, could safely mitigate the accident conditions they are designed for. The licensee deviated very little from the BWROG EPG and the deviations taken were, with one noted exception, adequately justified. The inspection team questioned the technical adequacy of the justification for the omission of main steam tunnel temperatures as an entry condition for an EOP. A number of inconsistencies and deficiencies were identified in the EOP support procedures which indicated weaknesses in the verification and validation (V&V) process.

The inspection team performed a review to determine if the EOP flowcharts and N2-EOP-6, "NMP2 EOP Support Procedure," could be implemented by the operators and carried out in the plant. The operators' performance on the simulator and participation in the plant walkdowns indicated that the operators were properly trained, had a thorough understanding of the EOP bases, and could correctly implement the EOPs in emergency situations. Inconsistencies that could lead to confusion were identified in the EOP support procedures during the plant walkdowns. These inconsistencies were further indications of weaknesses in the V&V that was performed on the N2-EOP-6 attachments and other procedures that support the EOPs. The licensee's method for prestaging EOP tools could lead to confusion or delays in the implementation of the procedure. Additionally, the licensee's method of storing jumpers in packets located inside electrical panels could impact the qualification of those electrical panels.

The human factors review indicated the NMP2 EOPs were generally understandable and usable by operators to mitigate an emergency. In addition, it was noted that the EOP writer's guide reflected an effort to address some of the most significant industry issues on EOPs identified in previous inspections. The inspectors noted some weaknesses within the writer's guide that appear to have reduced the quality of the EOPs, especially N2-EOP-6.

The inspection team reviewed the licensee's program for ongoing evaluation of the EOPs. They concluded that the licensee had established a sound program for ongoing EOP evaluation and for implementing changes to the EOPs. The inspectors were concerned that the licensee's controls for issuing temporary changes to the EOPs and EOP support procedures are too flexible and do not assure that changes to these procedures will receive the proper level of review. The inspection team also reviewed the licensee's QA involvement in the EOP program and concluded that Niagara Mohawk QA Department is effective in identifying problems and assuring the quality of the EOPs.

The licensee's QA program appears to be effective since a number of NRC inspection team concerns identified in this report had already been independently identified by the most recent QA audit.

Overall, the inspection team also concluded that the licensee had devoted sufficient resources to the development of the EOPs. The result was procedures that can be effectively implemented. The operators' understanding of the EOP bases and ability to use the EOPs were considered a strength. There were some technical deficiencies and human factors issues identified, mostly within the EOP support procedures. The majority of the problems appear to be the result of weaknesses within the verification and validation process for the EOP support procedures. Additionally, the licensee was receptive to the inspection team's comments and committed to appropriately disposition the issues raised during this inspection.

DETAILS

1.0 Background

Following the Three Mile Island (TMI) accident the Office of Nuclear Reactor Regulation developed the "TMI Action Plan" (NUREG-0660 and NUREG-0737) which required licensees of operating reactors to reanalyze transients and accidents and to upgrade emergency operating procedures (EOPs) (Item I.C.1). The plan also required the NRC staff to develop a long-term plan that integrated and expanded efforts in the writing, reviewing, and monitoring of plant procedures (Item I.C.9). NUREG-0899, "Guidelines for the Preparation of Emergency Operating Procedures," represents the NRC staff's long-term program for upgrading EOPs, and describes the use of a "Procedure Generation Package" (PGP) to prepare EOPs. The licensees formed four vendor type owner groups corresponding to the four major reactor types in the United States. Working with General Electric and the NRC, the Boiling Water Reactor Owners Group (BWROG) developed the BWR Emergency Procedure Guidelines (EPGs) which are generic procedures that set forth the desired BWROG accident mitigation strategy. The EPGs were to be used by the licensees in developing their PGPs. Submittal of the PGP was made a requirement by Generic Letter 82-33, "Supplement 1 to NUREG-0737, Requirements for Emergency Response Capability." The generic letter requires each licensee to submit a PGP which includes:

(i) Plant-specific technical guidelines

(ii) A writers guide

(iii) A description of the program to be used for the validation of EOPs

(iv) A description of the training program for the upgraded EOPs

From this PGP, plant specific EOPs were to have been developed that would provide the operator with the directions to mitigate the consequences of a broad range of accidents and multiple equipment failures.

From January 28 - February 1, 1991, an NRC team of inspectors consisting of three NRC licensed operator examiners/inspectors, a reactor systems specialist, a human factors specialist, and the resident inspector conducted an inspection of the EOPs at the Nine Mile Point Nuclear Station Unit 2 (NMP2). NMP2 is a BWR 5 with a Mark II containment structure. The objectives of the inspection were to determine if: the NMP2 EOPs are technically correct; the NMP2 EOPs can be physically carried out in the plant; and that the NMP2 EOPs can be performed by the plant staff.

The objectives would be considered to be met if the results of the following reviews were found to be adequate: comparison of the NMP2 EOPs with the NMP2 plant specific technical guidelines (PSTG) and the BWROG EPGs; review of the technical adequacy of the deviations from the BWROG EPGs; control room and plant walkdowns of the NMP2 EOPs; real time evaluation of the NMP2 EOPs on the plant simulator; evaluation of the licensee program on continuing improvement of the NMP2 EOPs; and performance of a human factors analysis of the NMP2 EOPs. The inspection focused on the adequacy of the end product, the NMP2 EOPs. If any of the areas were not found to be acceptable, the inspection would assess other areas as necessary to understand the basis for the deficiencies.

The PGP for NMP2 was submitted to the NRC in a letter dated June 29, 1984. The Safety Evaluation for the NMP2 PGP was issued in February 1985. The NMP2 EOPs were implemented initially in October 1986. These EOPs implemented Rev. 3 of the BWROG EPGs. The facility utilized the NMP2 PSTG, writers guide, and verification and validation (V&V) program as described in the procedures generation package submitted to the NRC in June 1984. To determine the success of the implementation of licensee EOP programs, a series of NRC inspections of EOPs were conducted in 1988 which examined the final product of the program, the EOPs. The results of the NRC inspections conducted during 1988 were summarized in NUREG-1358, "Lessons Learned from the Special Inspection Program for Emergency Operating Procedures." This inspection was conducted following the implementation of a major revision to the EOPs that implemented Rev. 4 of the BWROG EPGs as part of the continuing effort of the NRC to evaluate EOPs at licensee facilities. The facility has modified their administrative program controls and EOP development process since the initial revision of the NMP2 EOPs following issuance of NUREG-1358.

2.0 Persons Contacted

Niagara Mohawk

* B. Sylvia, Executive Vice President - Nuclear Division
* J. Firlit, Vice President - Nuclear Generation
* R. Abbott, Unit 2 Plant Manager
* M. McCormick, Unit 2 Plant Manager designate
* S. Wilczek, Jr., Vice President - Nuclear Support
J. Perry, Vice President - Quality Assurance
* R. Smith, Training Manager
* M. Colomb, Operations Manager
* R. Seifried, General Supervisor - Operations Training
* R. Slade, Supervisor - Operations Training Unit 2
* G. Corbin, Supervisor - Simulator Tech.
P. Walsh, Licensed Operator Instructor
* J. Helker, Operations Supervisor

L. Naron, Generation Engineer
* J. Kronenbitter, Generation Engineer (NMP1)
K. Iandolo, Engineer
C. Kolod, System Engineer
* G. Lapinsky, Program Development
J. Burton, Supervisor - QA Audits
J. Burgess, QA Technician
P. Fodi, I&C Technician
* M. Goldych, Site Licensing
* J. Pavel, Licensing Engineer
* K. Korcz, Licensing Engineer
* N. Rademacher, Executive Assistant to Exec. Vice President
* A. Mattessich, Operations Assessment (MATS)
E. Dunn, Unit 2 Project Engineer

The inspectors also contacted other licensed and nonlicensed operators.

Other

* R. Brown, Requalification Instructor, General Physics
* B. Hennigan, Requalification Instructor, General Physics
* R. Klein, Human Factors, ARD
M. Yeminy, Engineer, SWEC

Nuclear Regulatory Commission

* L. Bettenhausen, Chief, Operations Branch, DRS
* W. Cook, Senior Resident Inspector

* Denotes those present at the exit interview on February 1, 1991.

3.0 Basic EOP/BWR Owners Group EPG Comparison

Scope

A comparison of the NMP2 EOPs and BWR Owners Group Emergency Procedure Guidelines (BWROG EPGs), Revision 4, was conducted to ensure that the licensee has developed the procedures indicated in the BWROG EPGs. The EOPs reviewed are listed in Attachment A of this report.

Findings

The facility developed EOPs that mimic the types of symptom based procedures recommended by the BWROG EPGs. The inspection team found no deviations between the types of procedures developed by the facility and the types of procedures recommended by the BWROG EPGs.

Conclusions

The inspection team concluded that the various types of EOPs developed by the facility were sufficient to meet the intent of the BWROG EPGs.

4.0 Independent Technical Adequacy Review of the Emergency Operating Procedures

Scope

The NMP2 EOPs listed in Attachment A were reviewed to assure that the procedures are technically adequate and accurately incorporate the BWROG EPGs. A comparison of the NMP2 PSTG to the BWROG EPGs and NMP2 EOPs was also performed. Differences between the BWROG EPGs and NMP2 PSTG were assessed for adequate technical justification. Selected specific values from the procedures were reviewed to determine that the values were correct.

Findings

4.1 Comparison of BWROG EPGs and NMP2 PSTG

In general, the differences between the BWROG EPGs and the NMP2 PSTG have adequate technical justification. The inspection team noted several instances in which the deviations between the BWROG EPG and the NMP2 PSTG were due to more conservative requirements established by the licensee.

The inspection team identified one deviation that did not appear to have adequate technical justification. The licensee did not include main steam tunnel temperature as an entry condition to N2-EOP-SC, "Secondary Containment Control." The licensee had deliberately omitted main steam tunnel temperature since the NMP2 main steam tunnel is not part of secondary containment. One of the purposes of Secondary Containment Control is to limit the reactivity release from secondary containment. A steam line break in the main steam tunnel would bypass secondary containment and could result in a radioactive release. Elevated main steam tunnel temperatures are indicative of a problem that should be addressed by an EOP. The licensee has agreed to review the need to add the main steam tunnel temperature to N2-EOP-SC or N2-EOP-RR, "Radioactivity Release Control."

4.2 Comparison of NMP2 PSTG and NMP2 EOPs

In general, the differences between the NMP2 PSTG and the NMP2 EOPs (variances) have adequate technical justification. The PSTG variances are properly utilized. However, the inspection team identified several variances that did not appear to be adequately justified or utilized properly.

The PSTG section for N2-EOP-PC, specifically the hydrogen control leg, states that El. 217 ft. suppression pool level is the transition point between purging the containment directly or purging through the suppression pool. The EOP states El. 201 ft. suppression pool level as the transition point. The licensee's justification for the variance may not be technically adequate. The licensee contends that the negative aspect of the additional containment pressurization at a higher suppression pool water level outweighs the added benefit from scrubbing hydrogen through the suppression pool water. The licensee has this item listed as an open item in accordance with N2-ODI-5.10, "EOP Ongoing Evaluation Program," and plans to address the issue with the BWROG in February 1991.

The inspection team identified several differences between the PSTG and the EOPs that did not have variances to justify them. For example, the NMP2 PSTG, step PC/H 4.2, directs venting the drywell if the suppression chamber cannot be vented. However, the EOP itself does not direct the drywell to be vented if the suppression chamber cannot be vented. The EOP, as written, does not accomplish the intent of the PSTG step, and the PSTG does not justify the variance between the PSTG and the EOP. The licensee agreed to review the unjustified variances and make appropriate changes.

Site specific procedure numbers are referenced in the NMP2 PSTG for tasks that are accomplished by the EOP support procedures. The PSTG is intended to describe the EOP strategy, not the specific procedures that accomplish the actions. Referencing specific procedure numbers in the PSTG can result in errors if the referenced procedures are modified. For example, the NMP2 PSTG incorrectly references N2-EOP-6, Attachment 18, for venting the RPV. N2-EOP-6, Attachment 12, provides direction for venting the RPV.

4.3 Technical Adequacy of EOPs

The inspection team identified several deficiencies with the technical adequacy of the EOP flowchart procedures, the EOP contingency procedures and the EOP support procedures. The deficiencies identified did not pose immediate safety concerns; however, they represented inconsistencies that a more thorough validation and verification (V&V) program should have prevented. Attachment B contains detailed technical adequacy comments.

The majority of deficiencies identified by the inspection team were found in procedure N2-EOP-6, "NMP2 EOP Support Procedure." The different attachments in N2-EOP-6 were not consistently written. Several attachments did not include restoration steps or give adequate guidance on the success criteria for individual steps. For example, Attachment 17, "Backfilling MSIVs," does not provide guidance for securing the backfill.

The inspection team identified the fact that several N2-EOP-6 attachments reference procedures that are inadequate for accomplishing the specified task. For example, N2-EOP-6, Attachment 18, "Depressurizing the RPV," directs the operator to use the RCIC system to depressurize the RPV in accordance with procedure N2-OP-35. However, N2-OP-35 does not contain procedural guidance for operating the RCIC system in the pressure control mode.

4.4 Technical Adequacy of Calculations

The inspection team reviewed the engineering worksheets for several setpoints and figures contained in the EOPs to evaluate the technical adequacy of the calculations. Additionally, the inspection team interviewed the individuals who performed the engineering calculations. The calculations that the inspection team reviewed were found to be technically adequate.

Conclusions

The inspection team concluded that the NMP2 EOPs were, in general, technically adequate and, if implemented properly, could safely mitigate the accident conditions for which they are designed. The licensee deviated very little from the BWROG EPG and the deviations taken were, in general, adequately justified. However, the inspection team noted several procedural inconsistencies and technical deficiencies, especially in the EOP support procedures. These problems were not identified by the V&V program indicating weaknesses in the program, especially with respect to the V&V performed on N2-EOP-6.

5.0 Control Room and Plant Walkdowns

Scope

The inspection team walked down the EOPs and procedures indicated in Attachment A to confirm that the procedures can be implemented by the staff and carried out in the plant. The purposes of the walkdowns were to verify that instruments and controls required to be used to implement the procedures are consistent with the installed plant equipment; ensure that the indicators, controls and annunciators referenced in the procedures are available to the operator; and ensure that the tasks can be accomplished. The EOP flowcharts were walked down in the plant control room (versus the simulator) and the N2-EOP-6 attachments were walked down both in the control room and in the plant.

Findings

During a walkdown of N2-EOP-6 Attachment 19, "RWCU Boron Injection," the inspection team noted that access to the RWCU precoat room is severely restricted by tanks, pipes and valves. About half of this equipment is required when using a two component mix (resin and filter media) in the RWCU

filter-demineralizers. The licensee now uses a single component mixture (e.g., ECODEX); this eliminates the need for half of the equipment in the room. This permanently installed equipment, which is no longer used, poses severe restrictions to the implementation of the alternate boron injection procedure. A modification has been developed by the licensee to remove the obsolete equipment. The licensee agreed to consider upgrading the priority of the modification for earlier implementation.

The inspection team noted several welding machines, lifting cages, gas bottles and other portable equipment either unrestrained or tied to safety related equipment (e.g., cabling). The problem was particularly noticeable on the 261 level of the reactor building. The inspector also noted flammable material (e.g., Poly Bags) stored in combustible material exclusion zones. These problems were identified to the licensee and appropriate corrective action was taken.

The inspection team noted that EOP support procedures (N2-EOP-6 attachments) which involved the installation of jumpers in 1E cabinets (e.g., to defeat interlocks) had the jumpers prestaged in the 1E cabinets. The required jumpers for each of the attachments were stored in open top plastic bags (e.g., zip-lock Bags) which were taped to the inside of the panel doors. In some cases, the tape (duct tape) had come partially loose from the door, resulting in the jumper bags being less secure than intended. The inspection team questioned licensee personnel as to the propriety of having the jumpers stored in this manner within the panels and the effect on panel equipment qualification. The licensee agreed to perform a technical evaluation of the jumper storage method.

In a related issue, the inspection team noted that the prestaged jumpers in relay room and control room panels are all numbered for the purpose of performing periodic inventories. The inspection team noted that neither the jumper tags nor the support procedure attachments specify which jumper is to be used for each of the terminal pairs being jumpered in the procedures. Since the jumpers are cut to length for each set of terminal pairs, the potential exists for an operator to use the longer jumpers first, and be left with only short jumpers for later sets of terminals which are more widely separated. Several of the panels in the control room and the relay room, which must be accessed for the installation of jumpers and the lifting of leads during performance of the N2-EOP-6 attachments, have no external labeling to indicate the individual bays within the panel. Additionally, there are no formally available general arrangement drawings of the panel layouts for the relay room (i.e., either as part of the procedures or posted as an operator aid in the relay room).

The inspection team noted that control room and relay room panels were not being consistently locked, as indicated either in procedures or by labels on the panel doors (e.g., P 861, Bay E in the relay room). Several panels, which either had a label requiring locking, or which the procedures indicated would require a key for entry, were found and left unlocked.

The inspection team noted that the format of the N2-EOP-6 attachments did not provide a concise and timely method for the operators to ascertain and assemble all of the tools and components necessary to perform each procedure in the field. The procedures required that the operator scan the entire procedure to look for tool and component requirements, which were indicated with a "Circle T" in the procedure margin. Either by memory or by writing down each of the requirements on a separate piece of paper, the operator would then obtain the necessary items from the EOP tool boxes in the control room. Although some EOP support procedure items were prestaged in the plant (e.g., hoses, large wrenches, and terminal jumpers), the necessity to determine the need for and obtain the other items (e.g., fuse pullers, flashlights, screwdrivers, speed wrenches, etc.) presented the potential for an operator to enter the plant without all of the necessary tools and introduce an unnecessary time delay.

During the walkdowns of N2-EOP-6 attachments, the inspection team noted inconsistencies in the identification of controls and components which had to be manipulated in performing the procedures. Some in-plant components and controls were identified by component number only, while others were indicated by combinations of number, noun name, and location. The licensee explained that the more limited descriptions were applied to components with which operators were most familiar, and that the more comprehensive descriptions were applied to less familiar components. The stated purpose for this methodology was to minimize the size and wordiness of the procedures. The inspection team found at least two cases where the operators initially thought that field components were operated from the control room, when in fact they required local operation (e.g., 2CNS-V261 in Attachment 6). In other instances, confusion was created by the triple component numbering scheme (e.g., 2WCS-F1C1016, 2G36- RO22, and G36-NO112 all referring to the same component in Attachment 19). In other procedures (e.g., step 18.1.4.b in Attachment 18), the procedure implied that valves, such as AOV-10B and D, had their own control switches, when in fact they do not. The inspection team noted that the existing process for determining the extent of component identification in the support procedures was not formalized in the Support Procedure Validation Checklist contained in N2-EOP-5. The walkdowns identified several examples of components whose labels did not match the noun name of the component in the N2-EOP-6 attachments.

Operator aids found throughout the plant included handwritten sections. The use of handwriting in operator aids can lead to illegibility and may cause the aid to be unusable. Currently, Procedure S-SUP-6 , "Control of Operator Aids," does not prohibit the use of handwriting in operator aids.

Attachment B contains additional specific comments on certain EOP procedure sections from the walkdowns.

Conclusions

The inspection team concluded that, in general, the EOP procedures could be implemented by the staff and carried out in the plant. However, the

procedures displayed inconsistencies that could lead to confusion. The licensee's method for prestaging required EOP tools could lead to confusion or delays in implementation of the procedure. Additionally, the licensee's method of prestaging certain EOP tools and equipment in packets located inside the electrical panel may impact the qualification of those electrical panels. The problems identified during the walk-down reflected weaknesses in the licensee's validation and verification program, especially with respect N2-EOP-6.

6.0 Simulator

Scope

Six scenarios were administered to two shift crews on the plant specific simulator. The simulator scenarios provided information on the operators' ability to implement the EOPs in a real time situation. The purposes of this exercise were to determine if the EOPs provide operators with sufficient guidance such that their responsibilities and required actions during emergencies both individually and as a team are clearly outlined; verify that the procedures do not cause operators to physically interfere with each other while performing the EOPs; verify that the procedures do not duplicate operator actions unless required (i.e., independent verification); and verify that transitions between procedures are clear and easily understood by the operators.

Findings

In general, both crews observed performed well during the three scenarios that each crew dealt with. Both crews displayed strong teamwork and communication skills. The operators understood the EOPs and were able to effectively implement the procedures.

The inspection team noted that the operators inconsistently used the attachments of N2-EOP-6, "NMP2 EOP Support Procedure." N2-EOP-6 contains support procedures which are written in a checklist format. The procedure clearly states that the operators are to place a "check" opposite each step as the steps are completed. The inspector observed that the operators did not in all cases refer to the attachments of N2-EOP-6 for operational guidance and that the operators, when they did refer to the procedure, did not place a "check" opposite each step as it was completed. Additionally, from direct questioning of the operators at the completion of the scenarios, the inspection team noted that the operators did not uniformly understand the expectations when using the N2-EOP-6 attachments. Some operators thought that placing a "check" opposite each step as a placekeeping method was optional.

The inspection team noted that one crew did not clearly understand the injection system alignment requirements for establishing RPV flooding as

delineated in N2-EOP-C4, "RPV Flooding." N2-EOP-C4 directs that injection into the RPV be controlled to maintain at least 4 SRVs open and at least 61 psid across the SRVs, the conditions required for RPV flooding. N2-EOP-C4 indicates that the differential pressure across the SRVs should be as low as practicable, which implies that injection sources can be (and should be) secured to establish the steady state conditions for RPV flooding. The crew misunderstood the flooding directions and believed that injection sources that are used to establish the conditions for flooding cannot be secured until the minimum core flooding interval time was satisfied.

The inspection team noted that several reactor operators were hesitant in reporting key parameter changes to the Station Shift Supervisor (SSS). There are certain parameter changes that require immediate notification of the SSS since these parameters influence the mitigation strategy of the EOPs. An example of a key parameter change that requires prompt SSS notification is the ability to determine reactor level. One crew failed to promptly report this parameter change to the SSS which resulted in a delay in entry into N2-EOP-C4, "RPV Flooding."

Conclusions

The inspection team concluded that the operators were properly trained in the use of the EOPs. The operating crews displayed minor knowledge and ability weaknesses, but performed well overall. The inspection team noted the operators' inconsistent usage of the attachments of N2-EOP-6 reflecting weaknesses in the training on EOP-6. Overall, the operators had a thorough understanding of the EOP bases and could correctly implement the EOPs in emergency situations.

7.0 Human Factors Review of the EOPs

Scope

A desk top review of the NMP2 EOPs was conducted prior to the on-site inspection. The review consisted of an assessment of the quality of N2-EOP-5, "Production and Control of NMP2 EOP Revisions" (EOP writer's guide and validation and verification program), and a comparison of the EOPs and EOP support procedures to ensure they were generated in accordance with N2-EOP-5. Observation of simulator exercises, interviews with NMP2 staff, plant walk downs, and control room tours were used to both corroborate those items noted during the desk top review and to identify additional concerns.

Findings

7.1 N2-EOP-6, NMP2 EOP Support Procedure

Considerable effort has been directed toward the development of guidance for procedure structure and content that supports operator

performance through the application of human factors principles. Lack of application of this guidance to procedure development can result in procedures that are difficult to use and may lead to errors. In some cases, procedures that do not complement human capabilities may inhibit performance, rather than enhance it.

The writer's guide for NMP2 EOPs included minimal guidance for structure and content for text procedures and the validation checklists reflected the writer's guide weaknesses. In addition, N2-EOP-5 did not contain a verification checklist for the EOP support procedures. The lack of a verification checklist indicated that there was no structural guidance against which to verify the procedures. As a result, N2-EOP-6 was found to have numerous inconsistencies in structure and level of detail. In some cases, steps were technically incorrect or could not be performed as written (Section 4.3). The attachments required numerous transitions to operating procedures. These transition steps failed to identify the necessary sections or steps to be performed. References to plant labeling throughout N2-EOP-6 were inconsistent with plant nomenclature (Section 5.0).

In addition, the sections of operating procedures referenced by N2-EOP-6 were not subject to the validation requirements of N2-EOP-6. These procedures were not cross referenced to the EOPs in any way that would ensure that structure, content, verification, and validation requirements for EOPs would be applied to the referenced procedures.

7.2 Communication Between Operations and Training

Natural human variation in performance is controlled by clear and consistent training on the structure, content, and expected execution of EOPs. Therefore, it is particularly important that clear two-way communications between operations departments and training departments exist regarding expectations related to implementation of the EOPs. Any discrepancy between these indicates a weakness in the EOP system and could lead to significant performance problems and possible error.

Several conflicts in definitions were identified between the NMP2 Operations Department EOP documents and Training Department documents. Operators provided conflicting definitions for important action verbs used in the EOPs which indicated a disconnect between operations and training department expectations. The writer's guide developed by operations personnel included some definitions that were missing from the related lesson plan developed by training.

7.3 N2-EOP-5, Production and Control of NMP2 EOP Revisions

In order to prepare clear, consistent EOPs that will support operator performance and minimize errors, a complete and restrictive writer's guide is necessary. A complete writer's guide addresses every aspect of the EOPs; a restrictive writer's guide defines clearly the precise methods and format to be used in the EOPs, applying human factors

principles. Writer's guides that are incomplete or nonrestrictive leave format decisions to the writer's judgment and preference. Because individual writer's judgments vary, this could result in increasingly inconsistent and complex procedures.

In addition, because the writer's guide controls the consistent presentation of information within the procedures, an incomplete or nonrestrictive writer's guide may lead to flawed verification. The resulting procedures may be inconsistent in structure and content and therefore more difficult for operators to use, resulting in a potential for error.

The NMP2 writer's guide includes a great deal of detail and reflects awareness of current issues and guidance on EOPs. For example, the structure of caution statements is consistent throughout the EOPs and the cautions do not contain actions. The writer's guide is not complete and restrictive with respect to some aspects of the EOPs. Some of the guidance within the writer's guide is unclear. In addition, the NMP2 writer's guide includes some guidance that fails to restrict procedure structure. Some important aspects of procedures are not addressed, such as the structure of N2-EOP-6 (text procedures). Additionally, some of the guidance included in the NMP2 writer's guide is in conflict with standard good practices for EOPs.

The verification and validation checklists are extremely detailed and clearly intended to serve as a tool to support thorough and consistent verification and validation of the EOPs. However, because the checklists are essentially reproductions of the guidance in the writer's guide, the writer's guide deficiencies are proliferated through the use of these checklists. Therefore, the V&V process has been unable to prevent inconsistencies in structure and content within the EOPs, especially in EOP-6.

7.4 Flowcharts

As mentioned above, N2-EOP-5 was weak in a number of important areas. As a result, a number of inconsistencies were found within the flowcharts. For example, action steps were found included within lists and action symbols were found to include information that did not require operator action. In addition, the level of detail of various step in the flowcharts varied and in some cases appeared to be insufficient.

Conclusions

The team concluded that the NMP2 EOPs were generally understandable and usable by operators to mitigate an emergency. In addition, it was noted that N2-EOP-5 reflected an effort to address some of the most significant industry issues on EOPs in the last few years. However, there were several weaknesses within N2-EOP-5 which resulted in inconsistent quality of the EOPs, especially N2-EOP-6.

8.0 Ongoing Evaluation of NMP2 EOPs

Scope

A review of the licensee's procedures and discussions with licensee personnel were conducted to determine the effectiveness of the licensee's ongoing EOP evaluation program. The ongoing evaluation program should ensure the technical adequacy and structural quality of the EOPs in light of operational experience, training experience, control room walkthroughs, and from changes in plant design; technical specifications; technical guidelines; or other plant procedures.

Findings

Procedure N2-ODI-5.10, "EOP Ongoing Evaluation Program," provides the guidance required to implement the ongoing evaluation program. It appears that the procedure is adequate and that the items currently listed in the Open Items Logbook, generated in accordance with N2-ODI-5.10, have been properly prioritized and are being properly dispositioned.

Procedure N2-EOP-5, "Production and Control of NMP2 EOP Revisions," provides the guidance required to perform revisions to the EOPs. Specifically, the procedure delineates the required verification and validation process for various types of revisions to the EOPs. The procedure is comprehensive and appears adequate with the exception of the weaknesses noted in the V&V process for the EOP support procedures.

An EOP Engineering Impact Checklist is completed for each modification or design change generated. The purpose of the checklist is to ensure that if there is a potential impact on any aspect of the EOPs or the PSTG, the appropriate personnel are informed so that the EOPs or PSTG can be revised if needed. The checklist itself has been developed, but training on use of the checklist will not be completed until March 31, 1991. The checklist is comprehensive and appears to be adequate to ensure that the EOPs are maintained current.

The inspector had concerns that AP-2.0, "Production and Control of Procedures," does not contain controls to ensure that the EOP coordinator performs a review whenever a temporary/publication change notice (TCN) is issued to an EOP or an EOP support procedure. It is imperative that the EOP coordinator performs a review of all EOP related procedural changes since the EOPs consist of a mix of EOP flowcharts, EOP support procedures, and specific operating procedures (OPs). Additionally, the inspector noted that AP-2.0 did not preclude a TCN from being issued to an EOP flowchart. The licensee committed to reviewing AP-2.0 and enhancing controls as needed.

Conclusions

The inspector concluded that the licensee had established a sound program for ongoing EOP evaluation and for implementing changes to the

EOPs. However, the licensee's controls for issuing TCNs to the EOPs and EOP support procedures are too flexible and do not assure that TCNs issued to these procedures will receive the proper level of review.

9.0 Quality Assurance Measures

Scope

The inspection team reviewed the Quality Assurance (QA) organization involvement in the programmatic approach of the EOP program. The inspection focused on those policies, procedures, and instructions necessary to provide a planned and periodic audit of the EOP development and implementation process. The inspection team reviewed the involvement of site Quality Assurance in the EOP program by interviewing Quality Assurance Department personnel and by reviewing a sample of past QA Audits and surveillances.

Findings

The most recent QA audit was conducted in December 1990 in conjunction with the final conversion of the Nine Mile Point Unit 2 EOPs from Revision 3 to Revision 4 of the BWROG EPGs. The QA inspectors used NRC Temporary Instruction 2515/92 as a guide in performing the audit. The audit was noteworthy in that it identified over 50% of the technical adequacy issues later identified by the NRC inspection team in their pre-audit review of the same EOP materials. Many of the concerns identified by both the Niagara Mohawk QA auditors and by the NRC pre-audit technical review had been corrected by the time the onsite portion of the NRC EOP audit commenced. A sampling of the audit concerns showed that they had been well documented using the methods specified in N2-ODI-5.10, "EOP Ongoing Evaluation Program." The licensee had initiated some corrective actions prior to this inspection.

The EOP surveillance conducted in June 1990 used procedure N2-EOP-5, "Production and Control of NMP2 EOP Revisions," and NUREG-1358, "Lessons Learned from the Special Inspection Program for EOPs," as guidance for conducting the surveillance. Concerns identified by the surveillance had either been corrected or are scheduled for correction.

Conclusions

The inspection team concluded that Niagara Mohawk QA Department involvement in the EOP program is satisfactory. The licensee's QA program appears to be effective since a number of NRC inspection team concerns identified in this report had already been independently identified by the most recent QA audit.

10.0 Initial Examinations

During the course of the inspection, the NRC administered a retake examination to one reactor operator (RO) license applicant. The applicant had

previously failed the simulator portion of the operating test, but passed the remaining portions of the examination. The retake examination consisted of only the simulator portion of the operating test. The retake examination was administered in accordance with NUREG 1021, Examiner Standards (ES) Rev. 6, dated June 1, 1990.

The applicant passed the retake examination; therefore, the applicant has now passed all portions of the RO licensing examination. Due to the limited scope of this retake examination, there were no generic strengths or weaknesses noted.

11.0 Licensee Action on Previous Inspection Findings

CLOSED (410/89-12-01): During an inspection of the implementation of NRC Bulletin 88-07 and Supplement 1, BWR Power Oscillations, conducted in 1989, the inspector had concerns that the licensee had not conducted a thorough review of all operating procedures to incorporate cautions that would preclude the operators from entering the unstable operating region of the power-to-flow map. The licensee committed to conducting an in-depth review of all operating procedures to make changes as needed. As a result of the licensee's review, 20 operating procedures were changed to preclude operation in the unstable region of the power-to-flow map. The inspector reviewed the licensee's corrective actions and found them acceptable. Based on the above, this item is considered closed.

CLOSED (410/89-12-02): During an inspection of the implementation of NRC Bulletin 88-07 and Supplement 1, BWR Power Oscillations conducted in 1989, the inspector had concerns that the licensee did not have an operating procedure that provided guidance for rapid power reductions. The licensee committed to developing a new procedure that would provide the guidance needed to perform rapid power reductions. The licensee developed procedure N2-OP-101D, Power Changes, which provides guidance for normal power changes between 45% and 100% power and an off-normal section which contains the guidance for rapid power reductions. The inspector reviewed the licensee's corrective actions and found them acceptable. Based on the above, this item is considered closed.

CLOSED (410/89-10-01): During a licensed operator examination conducted in 1989, the examiner had concerns over the technical basis of the methodology for actuating a reactor scram in procedure N2-OP-78, "Remote Shutdown System." The procedure directed the operator to initiate a scram by closing the MSIVs. The licensee committed to review the technical basis and make revisions if needed. The licensee revised procedure N2-OP-78 to direct the operator to scram the reactor by deenergizing RPS and then closing the MSIVs. This minimizes the transient placed on the reactor. The inspector reviewed the licensee's corrective actions and found them acceptable. Based on the above, this item is considered closed.

CLOSED (410/89-10-02): During a licensed operator examination conducted in 1989, the examiner had concerns that the EOP equipment box required to

accomplish alternate control rod insertion by venting exhaust header did not contain all the equipment necessary to accomplish that task. The licensee committed to verifying that all EOP equipment boxes contained the equipment necessary to accomplish the required task. The licensee developed procedure N2-PM-M4, "Monthly Audit of EOP Support Equipment," which ensures that each EOP equipment box contains the necessary equipment and procedures to accomplish the tasks required by the EOPs. The results of the in-plant walkdowns of the EOP support procedures indicated that the licensee's corrective actions were effective in assuring that equipment was available to perform EOP tasks. Based on the above, this item is considered closed.

CLOSED (410/90-16-01): During a licensed operator examination conducted in 1990, the examiner performed a review of the status of corrective actions performed by the licensee to correct deficiencies noted during the July 1989 Licensed Operator Requalification Program Evaluation. The examiner had concerns that three short-term corrective actions and one long-term corrective actions had not been completed. The licensee has since confirmed the completion of all the corrective actions planned via a letter dated August 20, 1990, and telephone conversation with the NRC staff on November 7, 1990. The inspector reviewed the licensee's corrective actions and found them acceptable. Based on the above, this item is considered closed.

12.0 Exit Interview

At the conclusion of the inspection on February 1, 1991, an exit meeting was conducted with those persons indicated in paragraph 2. The inspection scope and findings were summarized. The licensee did not identify as proprietary any of the materials provided to or reviewed by the inspectors during the inspection.

Licensee management was aware of the commitments made by the licensee's staff during this inspection and agreed that all deficiencies noted by the NRC inspection team would be addressed.

Attachments:
Attachment A - Documents Reviewed
Attachment B - Detailed Technical Adequacy and Walkdown Comments
Attachment C - Human Factors Examples
Attachment D - Simulation Facility Report

ATTACHMENT A

DOCUMENTS REVIEWED

Flowchart EOPs

* N2-EOP-RPV, RPV Control, Rev. 4
* N2-EOP-PC, Primary Containment Control, Rev. 4
* N2-EOP-SC, Secondary Containment Control, Rev. 4
* N2-EOP-RR, Radioactivity Release Control, Rev. 4
* N2-EOP-MSL, MSIV Leakage Control, Rev. 4
* N2-EOP-C1, Alternate Level Control, Rev. 4
* N2-EOP-C2, Emergency RPV Depressurization, Rev. 4
* N2-EOP-C3, Steam Cooling, Rev. 4
* N2-EOP-C4, RPV Flooding, Rev. 4
* N2-EOP-C5, Level/Power Control, Rev. 4
* N2-EOP-C6, Primary Containment Flooding, Rev. 4

Emergency Support and Related Procedures

N2-EOP-6, NMP2 EOP Support Procedure, Rev. 0

	Att. 1.0 -	RPV Water Level/High Drywell Pressure Associated ESF Actuations
*	Att. 2.0 -	Defeating Low RPV Press Isolation Interlocks
	Att. 3.0 -	Throttling ECCS Injection
	Att. 4.0 -	Throttling RCIC Injection
*	Att. 5.0 -	RHR Service Water Crosstie
*	Att. 6.0 -	RHR Firewater System Crosstie
*	Att. 7.0 -	ECCS Keepfull Pump Injection
*	Att. 8.0 -	Condensate Transfer Injection
*	Att. 9.0 -	SLS Test Tank Transfer Injection
*	Att. 10.0 -	Depressurizing the RPV Using the Condenser
*	Att. 11.0 -	Defeating RWCU Isolation Interlocks
*	Att. 12.0 -	Venting the RPV
	Att. 13.0 -	RRCS Manual Initiation
*	Att. 14.0 -	Alternate Control Rod Insertions
*	Att. 15.0 -	SLC Hydro Pump Injection
	Att. 16.0 -	Use of SJAE with Aux Boiler Steam
*	Att. 17.0 -	Backfilling MSIVs
*	Att. 18.0 -	Depressurizing the RPV
*	Att. 19.0 -	RWCU Boron Injection
*	Att. 20.0 -	Defeating L8 FWS Interlocks
*	Att. 21.0 -	Containment Venting
*	Att. 22.0 -	Containment Sprays
*	Att. 23.0 -	Containment Level Determination (above el 224 ft)
	Att. 24.0 -	DW Unit Cooler Oper. w/LOCA Signal
*	Att. 25.0 -	Containment Purging
*	Att. 26.0 -	Defeating HVR LOCA Isolation Signals
	Att. 27.0 -	Restoration of H2/O2 Analyzers

Att. 28.0 - Determining Reactor Building Temperatures
* Att. 29.0 - Determining Suppression Chamber Overpressure

N2-OP-13, Reactor Building Closed Loop Cooling, Rev. 2
* N2-OP-30, Control Rod Drive, Rev. 3
* N2-OP-31, Residual Heat Removal, Rev. 7
N2-OP-32, Low Pressure Core Spray, Rev. 3
* N2-OP-33, High Pressure Core Spray, Rev. 4
N2-OP-35, Reactor Core Isolation Cooling, Rev. 3
* N2-OP-36A, Standby Liquid Control, Rev. 2
* N2-OP-37, Reactor Water Cleanup System, Rev. 3
N2-OP-60, Drywell Cooling, Rev. 1
N2-OP-61A, Primary Containment Ventilation, Purge, and Nitrogen System, Rev. 3
N2-OP-61B, Standby Gas Treatment, Rev. 5
N2-OP-62, DBA Hydrogen Recombiner, Rev. 4
N2-OP-101C, Plant Shutdown, Rev. 6
N2-OP-101D, Power Changes, Rev. 0

Administrative Controls

AP-2.0, Production and Control of Procedures, Rev. 20
AI-1.0, Site Procedures Writer's Guide
N2-EOP-5, EOP Writer's Guide, Rev. 1
S-SUP-6, Control of Operator Aids, Rev. 1
N2-ODI-1.06, Verbal Communications, Rev. 1
N2-ODI-1.08, Operations Policy for Emergency Procedures, Rev. 4
N2-ODI-1.09, EOP Users Guide, Rev. 4 (cancelled)
N2-ODI-5.10, EOP Ongoing Evaluation Program, Rev. 0

Other

Plant Specific Technical Guidelines Input Parameters, Rev. 2
NMP2 EOP Basis Document

Calculations Reviewed

Figure PC-2 Drywell Spray Initiation Limit
Figure PC-4 Primary Containment Pressure Limit
Figure PC-8 Maximum Primary Containment Water Level Limit
Suppression Chamber Spray Initiation Pressure Limit (SCSIP)

* Denotes those procedures walked-down

ATTACHMENT B

DETAILED TECHNICAL ADEQUACY AND WALKDOWN COMMENTS

1. N2-EOP-C4, "RPV Flooding" does not provide clear guidance for determining that RPV water level indication has become available. Additionally, the EOPs do not provide guidance on when to backfill RPV water level indication reference legs to restore indication.

2. The definition in the EOP bases for "Gross Fuel Failure" is three times normal main steam line radiation or three times normal coolant activity. It appears the licensee has equated these two parameters when in actuality they may not indicate the same degree of fuel failure.

3. N2-EOP-PC, "Primary Containment Control" directs the operator to operate the hydrogen recombiner in accordance with N2-OP-62, "DBA Hydrogen Recombiner." However, N2-OP-62 contains hydrogen and oxygen limitations that are more restrictive than what N2-EOP-PC requires. The licensee has this item listed as an open item in accordance with N2-ODI-5.10.

4. The fire hoses which are required for the performance of N2-EOP-6, Attachment 6, "RHR Firewater System Crosstie," are staged in a locker in the reactor building stairwell which is 1 floor below where they are needed. This concern had already been documented by the licensee and will be evaluated to determine if the hoses can be moved to a location closer to the system interconnections.

5. N2-EOP-6, Attachment 7, "ECCS Keepfull Pump Injection," specifies the High Pressure Core Spray (HPCS) discharge pressure gage be used to determine that ECCS keepfull pressure is higher than RPV pressure. The HPCS pressure instrument line is upstream of the HPCS discharge piping check valve, but the ECCS keepfull flow enters the HPCS discharge piping downstream of the check valve. Therefore, the pressure gage listed in the procedure would be isolated from the ECCS keepfull pump and would not provide accurate indication ECCS keepfull pump discharge pressure.

6. N2-EOP-6, Attachment 7, "ECCS Keepfull Pump Injection," step 7.1.5, does not ensure that the system is properly aligned for injection. Both 2CSH*MOV107 and 2CSH*V54 could be closed resulting in no flowpath for the pump. The licensee agreed to add a step to open 2CSH*V54.

7. N2-EOP-6, Attachment 9, "SLS Test Tank Injection," does not contain restoration steps to replace the squib valves.

8. The purpose of N2-EOP-6, Attachment 12, "Venting the RPV," indicates that the procedure provides direction for venting the RPV with the RCIC system and the RHS HX (steam condensing) system, but the body of the procedure does not contain either of these methods. These methods are not used for venting the RPV, so the licensee agreed to correct the purpose to delete the references to RCIC and RHS HX.

9. N2-EOP-6, Attachment 17, "Backfilling MSIVs," does not contain restoration steps to restore the leads lifted and the jumpers installed to execute the procedure. Additionally, the procedure does not provide clear guidance for determining the status of the MSIV backfill and determining when the backfill should be secured. The procedure is written to rely on operator experience and judgement to determine the status of the backfill.

10. N2-EOP-6, Attachment 18, "Depressurizing the RPV," directs that RCIC be operated in accordance with N2-OP-35, "Reactor Core Isolation Cooling," to keep the RPV vented. The intent of the step is to operate RCIC in the full flow test mode; however, N2-OP-35 does not contain a section that directs operation of RCIC in the full flow test mode. Operators were generally aware of how to perform this routine task.

11. N2-EOP-6, Attachment 19, "RWCU Boron Injection," requires actions to be performed in the RWCU precoat room. Access to the RWCU precoat room is severely restricted by tanks, pipes and valves. About half of this equipment is required to use a two component mix (resin and filter media) in the RWCU filter-demineralizers. The licensee now uses a single component mixture (e.g., ECODEX), thus eliminating the need for half of the equipment in the room. A modification had been developed by the licensee to remove the obsolete equipment.

12. Steps 19.10 through 19.16 of N2-EOP-6, Attachment 19, "RWCU Boron Injection," do not provide clear direction to backwash the second demineralizer used for boron addition.

13. The substeps within step 19.9 of N2-EOP-6, Attachment 19, "RWCU Boron Injection," could lead to confusion as to when to commence the filter-demineralizer precoat cycle.

14. Auxiliary operators performing the walkdowns expressed a lack of familiarity with the RWCU Allen-Bradley computer terminal which is used to reprogram the timing sequence of the system when implementing N2-EOP-6, Attachment 19, "RWCU Boron Injection."

15. There are no new flex gaskets staged for installing the blank flanges on the SBGT system when implementing N2-EOP-6, Attachment 21, "Containment Venting."

16. N2-EOP-6, Attachment 21, "Containment Venting," contains no direction to shut the SBGT system fan discharge damper which is normally open prior to removing the spoolpiece.

17. The mechanical maintenance tool box in SBGT room B which contains items necessary for the performance of N2-EOP-6, Attachment 21, "Containment Venting," does not contain an inventory list and is apparently under the control of maintenance. As a result, there is no assurance that the equipment required to install the spool piece will be readily available when required.

18. N2-EOP-6, Attachment 23, "Containment Level Determination (above el. 224 ft.)," contains a "Note" which precludes determination of containment water level if containment pressure is greater than 40 psig. It appears that this note is not necessary and could mislead the operators during implementation of N2-EOP-C6, "Primary Containment Flooding," which directs actions based on containment water level up to containment pressures of at least 50.7 psig. The licensee agreed to evaluate the need for the note and make corrections as required.

ATTACHMENT C

HUMAN FACTORS EXAMPLES

The following examples are provided to clarify the types of problems identified in the areas of human factors concerns described in Section 7 of this report. These examples are not intended to be viewed as an inclusive list of all such problems found in the NMP2 EOPs, but rather as a set of limited examples of the types of inadequacies found through the human factors analysis.

1. N2-EOP-6, NMP2 EOP SUPPORT PROCEDURE

The writer's guide lacks sufficient guidance for structure and content of N2-EOP-6. For example, Section 10.2 of N2-EOP-5 indicates that each attachment should contain action steps, but provides no guidance for the structure of an action step. It also indicates that "cautions and notes may be contained throughout the action steps," but provides no guidance for structure or placement of cautions and notes.

The N2-EOP-5 Support Procedure Validation Questionnaire (used to validate N2-EOP-6 attachments) reflects the weaknesses in the writer's guide. The validation checklist asks the validator "was the terminology consistent with that used on the control panels or other procedures?" However, without clear guidance on the requirements for terminology used in the procedure, consistency could mean anything from an exact representation of control panel labeling to noun names for equipment that the verifier subjectively judges to hold the same meaning as the plant labeling. In addition, the checklist lacks any way to control such important aspects of EOPs as the consistency of step structure or level of detail, as does the writer's guide.

N2-EOP-6 contains numerous inconsistencies in structure and level of detail. For example, in Attachment 19, the format for the "purpose" section differs from that used in Attachment 15, although the content is similar. Also, Attachment 19, step 19.8 begins with the conditional phrase "if it is not already running." Several other steps in this attachment are applicable only under certain conditions; however, they do not include the relevant conditional phrase (e.g., 19.3 and 19.5). In addition, references to filter/demineralizers in this attachment are not consistent. The references include: "Filter Demineralizers (F/Ds)" (step 19.1); "Filter/Demineralizers" (step 19.3); and "F/D" (step 19.4). The sections of N2-OP-37 referenced from Attachment 19 also include the references "filter/demineralizers" (G.1.2), "Flt/Demin" (G.1.2.2), and "filter/demin" (G.1.2.3).

References to operating procedures often failed to indicate the section or specific steps to be performed. For example, Attachment 19, step 19.9.f, directs action to start the precoat cycle per N2-OP-37, section F.50, paragraph 5.4, then directs the operator to ignore the steps about resin addition and step 5.14. Failure to specifically reference the

appropriate steps requires the operator to read through irrelevant steps and decide which steps are necessary. Direct reference to the appropriate step numbers would ease the task and ensure performance of the correct steps.

Numerous steps include plant nomenclature references that do not match that found on the plant labels (e.g., Attachment 19, step 19.4, references for filter-demineralizers). This problem was even more prevalent throughout the referenced operating procedure sections (e.g., N2-OP-37, G.1.2.2).

2. Communication Between Operations and Training

Conflicts in important definitions were found between Operations Department documents and Training Department documents. For example, the writer's guide definition of the term "execute" states "perform the actions prescribed in the identified step" (N2-EOP-5, page 125). The definition of "execute" from Lesson Plan 02-REQ-006-344-2-20 is to "leave the step containing the executive instruction and take the action specified in the identified step, continuing on through the subsequent steps of that section" (p. 23). In addition, the definitions shown in the writer's guide and the lesson plan differ substantially for the terms "vent" and "prevent."

Operators had conflicting definitions for important action verbs. When asked to define the term "verify," some operators indicated that the word essentially meant "if it isn't so, make it so." Others indicated that the verb did not imply action even if the expected condition was not found. Others indicated that the necessary action was implied if an operator was licensed, but not for a non-licensed operator.

The writer's guide includes a number of important definitions for action verbs that are not included in the related EOP lesson plan. For example, the verbs "verify," "close," and "control" are not included in Lesson Plan 02-REQ-006-344-2-20.

3. N2-EOP-5, PRODUCTION AND CONTROL OF NMP2 EOP REVISIONS

The writer's guide contains some guidance that is unclear and not easily understandable. For example, page 43 contains the criteria for using a decision table for creating conditional steps rather than using questions and decision symbols. Neither the NRC team human factors specialist nor the NMP2 EOP coordinator could understand this criteria as written. Also on page 43, the writer's guide describes the criteria for including multiple conditional statements in one decision table. Again, neither of the two individuals could understand the guidance.

The writer's guide includes some directions that are not sufficiently restrictive to ensure consistency and fails to provide guidance for a number of aspects of the procedures. For example:

- The writer's guide briefly mentions notes on page 5; however, it does not provide a definition nor does it clearly describe the structure and placement for notes within the EOPs.

- The writer's guide indicates on page 57 that references to tables " ... may either be enclosed in parentheses or incorporated into step wordings."

- The writer's guide indicates the use of a requirement flag with symbolic cross-references (page 46), but fails to address the proper placement or structure of the symbolic cross-references.

- Although the writer's guide addresses the acceptable terms for indicating branches and cross references, no method of emphasis is provided for this important EOP component.

- Guidance is not provided for the use of the conjunctive "or," the requirements for use of plant nomenclature in the procedures, or the use of parentheses.

- The writer's guide does not address the need for consistent use of acronyms or terminology when referring to the same equipment or system.

- The writer's guide fails to provide usable criteria for the level of detail to be included in the procedure and does not address the need to structure steps with the same meaning identically.

The writer's guide includes some guidance that is in conflict with NRC guidance (e.g., NUREG-0899, NUREG-1358, and NUREG/CR-5228) and generally accepted good practices for EOPs. For example, the writer's guide allows the use of embedded logic statements (p. 44). In addition, it allows notes, actions, and lists to be formatted identically. The flowpath structure for concurrent steps allows one of the concurrent paths to terminate without a flowline connecting it to the next step to be performed. The writer's guide also fails to prohibit the use of qualifier phrases such as those beginning with the term "except."

Some differences were identified between the EOP writer's guide and the guidance included in procedure AI-1.0, "Site Procedures Writer's Guide." For example, the definition for the term "vent" differed in each. Also, acronyms used for the same system varied within the EOPs and operating procedures (e.g., WCS vs. RWCU).

4. Flowcharts

A number of inconsistencies were identified throughout the flowcharts. For example:

- Action steps are included within lists throughout the flowcharts (e.g., N2-EOP-RP, section RL, section RP, and section RQ; N2-EOP-C1; and N2-EOP-C5).

- Decision table contingent action sections ("THEN ...") also include information that does not require operator action (symbolic references) (e.g., N2-EOP-RPV, section RQ; N2-EOP-RR; N2-EOP-MSL; N2-EOP-C1; and N2-EOP-C5).

- Symbolic references (which require no direct action) are included with action steps in action symbols (e.g., N2-EOP-PC; section DWT).

- Action symbols are also used for symbolic references which require no direct action (e.g., N2-EOP-SC; N2-EOP-C1; and N2-EOP-C5).

- Specific terminology is used inconsistently. For example, N2-EOP-C5 and N2-EOP-C6 use the term "Maximum Primary Containment Water Level Limit" in the conditional section of the first step and use "the curve" in the contingent action section of the same step.

The level of detail of action steps varies throughout the flowcharts and in places appears insufficient, particularly with regard to the use of the term "if necessary" (e.g., N2-EOP-PC, section PCP; N2-EOP-C2; N2-EOP-C4; and N2-EOP-C6). For example:

- The action statement below step "L" in N2-EOP-C4 does not clearly state how many systems must be started and if systems once started can be secured to establish conditions before the minimum core flooding interval time starts. This caused confusion amongst the operators during the simulator scenarios (Section 6.0).

- Section SPL of N2-EOP-PC directs N2-OP-31 and N2-OP-33 to be used to control level. However, the EOP does not state which sections of these procedures to use.

- Phrases beginning with the phrase "irrespective of ..." are used throughout the procedures, though the subsequent information appeared unnecessary to the performance of the step and most likely was common operator knowledge.

Logic terms are sometimes used inappropriately (e.g., "if" in N2-EOP-RPV, section RP; "when" N2-EOP-C6 and N2-EOP-SC). Qualifiers following actions are used widely, leading to a potential for the action being completed prior to the qualifier being read (e.g., N2-EOP-PC, section SPL; N2-EOP-RPV, section RP; N2-EOP-SC; N2-EOP-C2; and N2-EOP-C5).

Elements not found in the writer's guide are included within the flowcharts (e.g., note in N2-EOP-C2; calculation tables in N2-EOP-C4).

The flowpaths in N2-EOP-PC are not logically placed with respect to the containment parameters that are monitored. The flowpaths, reading from left to right on the flowchart, are; drywell temperature, suppression pool water level, containment pressure, hydrogen and oxygen concentration, and suppression pool temperature. A more logical placement of flowpaths for

ease of monitoring parameters would be to group suppression pool water parameters together and drywell parameters together.

"Yes" and "No" exits from decision symbols are reversed from the normal format in two continuous decision symbols in section RQ of N2-EOP-RPV. During simulator scenarios operators incorrectly answered the second decision symbol, due to misreading the exit labeling. That is, the operator read "Yes" in the "No" location in the second symbol, as if the exit placement were identical to the preceding decision symbol.

ATTACHMENT D

SIMULATION FACILITY REPORT

Facility Licensee: Niagara Mohawk Power Corporation

Facility Name: Nine Mile Point Nuclear Station, Unit 2

Facility Docket Nos.: 50-410

EOP Scenarios Administered on: January 29, 1991

This form is to be used only to report observations. These observations do not constitute audit or inspection findings and are not, without further verification and review, indicative of non-compliance with 10 CFR 55.45(b). These observations do not affect NRC certification or approval of the simulation facility other than to provide information which may be used in future evaluations. No licensee action is required in response to these observations.

During the preparation and administration of the EOP inspection scenarios, the following items were observed:

ITEM	DESCRIPTION
1.)	The SLC manual out-of-service push button does not cause an inop annunciator.
2.)	The RCIC system isolates on high temperature when a loss of Division 1 or 2 power occurs.
3.)	The ECCS injection flow check valves open when the flow path (injection valve) is isolated.
4.)	The instructor station monitored parameter for suppression pool level deviates by one foot from the SPDS indicated suppression pool level.
5.)	The instructor station terminals occasionally lock-up.