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GENERATION
BUSINESS GROUP

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RICHARD B. ABBOTT
Vice President and
General Manager - Nuclear

May 12, 1997
NMP1L 1219

Director Office of Enforcement
U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

RE:	Nine Mile Point Unit 1	Nine Mile Point Unit 2
	Docket No. 50-220	Docket No. 50-410
	DPR-63	NPF-69

Subject: ***Notice of Violation and Proposed Imposition of Civil Penalties dated April 10, 1997 for NRC Inspection Reports 50-220/96-13 and 50-410/96-13; 50-220/96-15 and 50-410/96-15; and 50-220/96-16 and 50-410/96-16***

Gentlemen:

The subject Notice of Violation and Proposed Imposition of Civil Penalty were contained in Mr. H. J. Miller's letter of April 10, 1997. As discussed in Attachment A, Niagara Mohawk Power Corporation (NMPC) admits to the violations as cited. In addition, NMPC does not protest the proposed civil penalty. Accordingly, an electronic transfer in the amount of $200,000 has been submitted.

Niagara Mohawk has carefully reviewed the Notice of Violation and your accompanying letter and agrees that substantial actions are necessary to address the violations and the underlying causes in order to assure that Nine Mile Point Units 1 and 2 continue to be operated in a safe and efficient manner. The attached Reply to the Notice of Violation discusses both the specific violations and the underlying causes. Niagara Mohawk's Senior Management Team (SMT), which consists of the Executive Vice President, Vice Presidents and Plant Managers, has taken a lead role in analyzing the broader implications of these violations. It has critically evaluated the events described in the Notice of Violation and concluded that:

1) There are underlying causes of the Nine Mile Point Unit 1 reactor pressure vessel overfill event that require corrective action. The primary cause is insensitivity to reactor pressure vessel (RPV) overfill events which led to NMP1 Operations failure to adequately self evaluate shift performance, corrective actions, procedural compliance and crew responsibilities with regard to RPV high level events.

IE14

2) NMPC's corrective action program is fundamentally sound, but strengthening aspects of implementation of the program will enhance its effectiveness to address the underlying causes.

3) There have been weaknesses in the management oversight of the Generic Letter (GL) 89-10 program and other programs in engineering, and individual accountability.

Attachment A discusses the SMT review and the broad based corrective actions which have been or will be taken.

I wanted to address two of the issues raised in Mr. Miller's April 10, 1997 letter. We agree with the observation that there was a lack of sensitivity on the part of Niagara Mohawk to the significance of high water level in the reactor at NMP1. This was investigated as a case study by the SMT which resulted in corrective actions both with regard to those specific events and the broader aspects of operator performance issues. We have assured ourselves that the NMP1 operators and Operations management do not lack fundamental knowledge to safely operate the plants. However, as a result of this event we have evaluated and improved our training methods for responding to NMP1 high water level events and taken a number of actions to improve operator performance.

We also recognize that the number and extent of the deficiencies related to implementation of our corrective actions and design control programs is unacceptable. As detailed in Attachment A, the SMT has taken specific steps to assure that its expectations are met. In addition, we recognize that increased oversight over significant design issues should be improved and we intend to use panels of senior technical personnel to ensure improved focus on design issues and strengthen assessments of performance of the Engineering group. We have also initiated further training of engineering personnel on design and license basis issues.

Niagara Mohawk has carefully considered the issues covered by the subject inspection reports. We have taken action on a broad basis to evaluate and improve our performance. We have initiated measures to monitor these areas and the Senior Management Team will focus on them on an ongoing basis.

Very truly yours,

R B Abbott

R. B. Abbott
Vice President and General Manager - Nuclear

RBA/GJG/lmc
Attachment

xc: Regional Administrator, Region I
Mr. S. S. Bajwa, Acting Director, Project Directorate I-1, NRR
Mr. B. S. Norris, Senior Resident Inspector
Mr. D. S. Hood, Senior Project Manager, NRR
Records Management

UNITED STATES NUCLEAR REGULATORY COMMISSION

In the Matter of	)	
	)	
Niagara Mohawk Power Corporation	)	**Docket No. 50-220**
	)	**Docket No. 50-410**
Nine Mile Point Unit 1 and Unit 2	)	

Richard B. Abbott, being duly sworn, states that he is the Vice President and General Manager - Nuclear of Niagara Mohawk Power Corporation; that he is authorized on the part of said Corporation to sign and file with the Nuclear Regulatory Commission the documents attached hereto; and that the documents are true and correct to the best of his knowledge, information, and belief.

Richard B. Abbott

Richard B. Abbott
Vice President and General Manager - Nuclear

Subscribed and Sworn before me, a Notary Public in and for the State of New York and the County of Oswego, this 12th day of May 1997.

Beverly W. Ripka
Notary Public in and for

Oswego County, New York

My Commission Expires:

2/28/98

BEVERLY W. RIPKA
Notary Public State of New York
Qual. in Oswego Co. No. 4644879
My Commission Exp. ~~Mar 1997~~ 2/28/98

ATTACHMENT A

NIAGARA MOHAWK POWER CORPORATION
NINE MILE POINT UNIT 1 AND UNIT 2
DOCKET NO. 50-220/50-410
DPR-63/NPF-69

"REPLY TO NOTICE OF VIOLATION," AS CONTAINED IN INSPECTION REPORTS 50-220/96-13 AND 50-410/96-13; 50-220/96-15 AND 50-410/96-15; AND 50-220/96-16 AND 50-410/96-16

I. 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants," Criterion XVI, "Corrective Action," requires, in part, that measures be established to assure that conditions adverse to quality are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and that corrective actions are taken to preclude recurrence.

A. Contrary to the above, as of November 5, 1996, measures were not established to assure a condition adverse to quality, namely, potential overfill of the Unit 1 reactor pressure vessel (RPV), was promptly identified and corrected despite several opportunities to do so, as evidenced by the following examples. Specifically:

1. Following a reactor scram on November 5, 1996, the system for overfill protection failed to prevent FW injection on high water level due to leakage past the FW flow control valve. Additionally, the procedure for response to a reactor scram (N1-SOP-1, Revision 5) did not provide direction to verify that the overfill automatic protective actions occurred nor direction to take manual action if those actions did not occur, and training did not reinforce the actions necessary to prevent an overfill event.

2. Deviation/event report (DER) 1-92-3353 was initiated on August 27, 1992, to document that the wide range reactor water level indication read lower than expected during power operations. The condition was evaluated to be acceptable and it was determined that no equipment modifications were required. However, the corrective action was deficient because the operators in the control room were not made aware of the discrepancy to ensure correct interpretation of RPV level indication so as to prevent an overfill event.

3. On July 29, 1996, following a Unit 1 normal plant shutdown with a manual reactor scram, the operators allowed RPV water level to remain above the high level setpoint (95 inches) for approximately 15 minutes before taking action to lower level, a condition adverse to quality. Subsequent to the shutdown, the licensee's corrective actions were narrowly focused in that training was provided and procedure changes were made to address the assumed cause of the high level, but no action was taken to identify why the operators did not recognize the need to take prompt action to restore level to less than 95 inches, as specified by N1-SOP-1.

I. *THE REASON FOR THE VIOLATION*

NMPC admits to this violation. Niagara Mohawk's Senior Management Team (SMT) performed a case study of these events in order to determine the specific causes and generic implications. The SMTs review included interviews of the involved personnel, evaluation of the RPV wide range instrument design and its response at various plant operating conditions, and a comparison of the simulator response to the plant response for a scram similar to the July and November 1996 events. Members of the operating crews, Manager of Training, and a system engineer were interviewed to determine what their response to and knowledge of conditions were during and after these events. This information was then discussed with the Manager of Operations. The design of the Wide Range (WR) level instrumentation, including NMPC commitments in response to NUREG 0737, was thoroughly reviewed. In addition, the response of the WR indicator was compared to a separate computer point which senses the differential pressure from the same instrument reference leg to determine whether the WR indicator on November 5, 1996 accurately represented the water level. Certain SMT members also observed the simulator response to a scram with approximately the same feedwater leakage as the November 5, 1996 scram.

The results of the SMT case study established that the underlying cause of this event was failure to follow procedures due to NMPC's insensitivity to RPV overfill events. NMPC had focused on maintaining feedwater (HPCI) pumps running to avoid RPV low level, and did not adequately consider response to high water level conditions in the design of the high level trip system. Further, in developing procedures and associated training we did not adequately address high level transients.

The case study performed by the SMT further identified weaknesses in self evaluation of this event by Operations Management with respect to the following:

- Inadequate shift operations performance
- Inadequate cause and corrective/preventive action of technical issues after the events of July and November 1996

- Lack of procedure compliance

- Lack of clear understanding of shift operator crew responsibilities and how to act as a team. For example, the use of the Shift Technical Advisor (STA) was less than adequate during this event.

- Discrepancies between the simulator and plant which had not been identified.

In addition to addressing the underlying causes, the SMT also reviewed the specific examples cited in this violation and the reason for their occurrence.

Example 1

NMPC has determined that the cause of the specific overfill event was a failure to follow the applicable procedure. While the operators did confirm that the overfill protection control logic appeared to function as designed, i.e., the operating HPCI pump continued to run with its respective FCV indicating closed, they did not take appropriate manual action when the level continued to rise. The operators failed to take appropriate action to restore level to within the established level band due to an insensitivity to high water level being above 95 inches for an extended period of time. While actions were taken by the operating shift in an attempt to lower level, manual tripping of the operating feedwater pump was not performed. Based on interviews conducted with the involved persons, initial crew focus following the scram was on diagnosis of the cause of the trip of one of the HPCI pumps and on immediate scram recovery actions. Inappropriate emphasis was placed on maintaining the operating HPCI pump running. Consequently, control room personnel stated that they were focused on maintaining RPV level below the main steam lines (MSL), and did not realize that water was entering the MSLs.

NMPC agrees that the reactor scram procedure (N1-SOP-1, Rev. 5) was weak in that it failed to provide specific direction to verify that the overfill actuation protective actions had occurred, and specific direction to take manual action if those actions did not occur. The cause of the procedural weakness was NMPC's inadequate response to prior industry events. Nonetheless, if the existing procedural direction to restore and maintain level within the prescribed band had been more properly implemented, level would not have been allowed to increase to the main steam lines.

The overfill protection system failed to respond adequately to the RPV level increase. The cause of the failure of the overfill protection system to prevent feedwater injection was inadequate design in that it relied upon the flow control valve (FCV) limit switch to monitor full closure of the FCV. It has been determined that the precision of the switch was not adequate to reliably indicate full valve closure. Following a reactor scram, reactor operator intervention is required as a normal course of action at Boiling Water Reactors (BWR) (e.g., initiate let down via RWCU or another flow path). However, the design of the NMP1 overfill protection system placed undue reliance on operator intervention. The system response was to close the feedwater (HPCI) flow control valves (FCV) at a water level of 95 inches and to allow the feedwater pumps (HPCI) to continue to run if the FCVs indicated shut. Since the

valves are not designed to be leak tight following reactor scrams, normal design leakage was expected. In the event of valve degradation (i.e., degraded seat leakage or less than positive seating), flow past the valves with the pumps running would result in excessive flow to the RPV. Since the feedwater (HPCI) system is the only high volume and high pressure injection system at NMP1, the design objective was to maintain HPCI pumps running when possible. In the November 1996 event, significant flow past the operating pump's FCV was experienced, and since the subject valve's limit switch indicated shut, the overfill protection logic did not automatically trip the pump.

Example 2

The WR level indicator is calibrated at cold conditions; by design, the instrument is provided with density compensation to provide reasonably accurate indication during hot shutdown conditions (conditions during the overfill). The WR indication is not normally used during power operations. The operators were not properly trained on when to use the WR indicator and its expected accuracy. However, this factor was not a cause of the RPV overfill; rather, lack of sensitivity to the significance of high water level and consequent failure to follow procedures were the causes of this overfill event.

Example 3

The cause of NMPC failing to take adequate corrective actions was organizational insensitivity to exceeding the high level trip setpoint of 95 inches. Station management review of previous RPV high level events and related HPCI pump/valve design issues, revealed a long standing insensitivity to RPV high water level events. Concerns with HPCI pump tripping events consistently focused on optimizing FCV limit switch settings such that the pumps would not unnecessarily trip and would therefore remain running to perform the HPCI function for inventory makeup. As stated previously in Example 1 above, the feedwater (HPCI) pumps are the only high volume and high pressure make up systems at NMP1. Previous experience provided opportunities to identify the weakness in the system design which, in effect, placed an over-reliance on operator action to prevent overfill. This mind set led to a shallow evaluation of the July 1996 event, and a missed opportunity for proper corrective actions.

II. *CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED*

In response to this event, NMPC has taken corrective actions with regard to design/repair, procedures, training, and organization. These corrective actions are described below.

Design Changes and Repair to the FCVs

In November, 1996, subsequent to the event, comprehensive testing of the feedwater FCVs was performed using recently obtained air-operated valve (AOV) test equipment. Analysis of

the data identified that the FCVs were slightly open even though the limit switch indicated valve closure. The FCVs' air actuators were then adjusted to ensure proper valve closure.

During the 1997 refueling outage, a modification was installed to initiate HPCI/FW pump trips at sustained high water level, regardless of FCV position.

Procedures

Plant operating procedures have been changed to provide more explicit direction on actions to be taken for restoring and maintaining water level within the prescribed level control band. The procedures now requires manually tripping the feedwater pumps to restore post-scram reactor water level to less than 95 inches.

Station Operations management conducted stand downs on procedural adherence with cognizant department personnel, including shift operations. NMP1 Operations management reviewed and reinforced the requirements of NMP Nuclear Interfacing Procedure NIP-PRO-01, "Use of Procedures" during the standdowns. Personnel were required to reaffirm their understanding of procedural adherence requirements.

Training

Various aspects of simulator training have been enhanced. A simulator scenario has been developed to challenge operating crews with high water level conditions. The simulation accurately reflects plant system response, including that of feedwater level control and level indication, and incorporates feedwater control failures. In addition, Operations and Training personnel have been counseled regarding the identification of discrepancies between the simulator and the plant. Prior to this event, NMPC performed post trip reviews for unplanned plant trips, but not for planned shutdowns. NMPC now requires a post trip evaluation for planned and unplanned scrams. Training personnel review post trip data to verify that the plant and simulator responses are consistent. Since post trip evaluation had not been performed previously for planned shutdowns, this change will assure that differences between the plant and the simulator are identified.

Operators have received simulator and classroom training on (1) feedwater system response, (2) control of vessel level, (3) associated procedure changes, (4) the wide range level indicator limitations, and (5) the operator aide associated with the level instrument. Simulator training included responding to the high water level transients described above.

The following additional corrective actions in Operations training have been or will be completed as noted.

1) Unit 1 Operations training now uses a systematic methodology similar to Unit 2 Operations training in the selection of simulator training and evaluated scenarios. This was begun in July 1996. This process prevents repetition and

conditioning of operators to a set of simulated conditions by exposing operators to a greater variety of simulated conditions.

2) Thirty new simulator training scenarios are scheduled to be developed and implemented between now and August 1998. Three of these scenarios will be related to reactor vessel overfill of greater than 95 inches.

Organization

Operating personnel involved in the events have been counseled by the Plant Management and SMT members and are being remediated as necessary.

As noted in Section III below, improvement in crew resource management and teamwork are required. As an initial corrective action, Operations management reaffirmed with the operating crews expectations for the utilization of the STA. Specifically, the STA's function is to provide a broad overview of technical activities. In addition, STA training will be strengthened by incorporating enhanced diagnostic training, review of fundamentals and transient analysis.

As a result of the overfill event, organizational changes have been or will be taken:

- The Site Operations Review Committee (SORC) has reviewed, and NMPC will be submitting to the NRC, a request for amendment to the NMP1 Technical Specifications to reinstate the General Supervisor Operations position to improve the daily oversight of plant operation.

- Operating crew personnel alignments have been reviewed and have been changed to ensure appropriate level of crew knowledge and strengths on all shifts.

- Selected Operations management changes will be implemented to provide additional depth to enhance line management oversight of operations..

Results

Since the November 1996 event, the plant was shut down on January 17, 1997 and March 3, 1997; the shut down sequences involved planned scrams from low reactor power with conditions similar to the July event. As a result of improved operator and system performance, on both occasions, reactor water level was maintained properly within the specified control band. The subsequent additional corrective measures of modifying the pump trip logic and conducting a procedural adherence stand down have provided added assurance that the problems are corrected.

III. *ACTIONS TAKEN TO PREVENT RECURRENCE*

In addition to the corrective actions described in Section II above, the SMT has identified that broader preventative actions are required. These preventative actions are:

1) Qualified QA and Training personnel have been placed on shift to monitor operating crew performance. These personnel will monitor procedure compliance, attention to detail and the overall questioning attitude of Operations personnel. This monitoring will continue until the SMT is satisfied that augmented monitoring is no longer required. The SMT will perform an assessment of the effectiveness of corrective actions to ensure strict procedural compliance, appropriate crew utilization based upon defined roles and appropriate self assessment by operating crews by August 29, 1997.

2) The SMT believes that continued focus and dedication to the principles in the Nuclear Division Business Plan will assure continued safe operation of the Nine Mile Point plants. NMPCs mission to operate the Nine Mile Point plants safely and efficiently is clearly defined in the Nuclear Division Business Plan. Principles for Continued Improvement are included to implement the mission. These principles include nuclear and industrial safety, teamwork, problem identification and resolution, leadership, policies and procedures, quality, accountability/responsibility and self-assessment. These principles form the cornerstone for continued safe operation of NMP1 and 2. The SMT will re-enforce these principles throughout all levels of the organization. In addition, the SMT and Branch Managers will critically assess performance based upon these principles.

3) License/design basis training and expansion of the SRO/plant certification efforts will be provided in accordance with the NMPC Nuclear Division Business Plan.

The SMT evaluation assessed the broader implications to determine whether other issues existed that adversely impact the ability of the operators to safely operate NMP1. This evaluation consisted of a comprehensive review of operator knowledge and training. Based on this assessment, and the actions taken, the SMT has concluded that operator knowledge, training, and abilities are sufficient to ensure safe, continued plant operation.

The SMT case study on the overfill event assessed whether other generic issues exist and to independently determine the causes of the event. The results of the case study provided validation of the root cause and contributing factors. In addition, the SMT evaluation postulated other potential generic issues which since have been reviewed and determined to have not been event contributors. A brief summary of the more significant findings (in addition to those addressed in the corrective and preventive action section of this response) is provided below.

Willingness of Operations Personnel to Identify Concerns

The SMT questioned whether Operations personnel were reluctant to self-identify personnel performance or equipment problems. There are positive indications which support the conclusion that this concern is not valid. For example, the QA DER trend reports over the past two years show that the NMP1 Operations branch has initiated more DERs than any other NMP1 branch. These DERs included identification of issues which are classified as self-identified. For example, operations questioned the simulator response to Fuel Zone Level Instrument (FZLI) during training subsequent to FZLI modification in 1995. Based on operator identification of problems with this indication, the instrument's use and limitations have been clarified. Other water level indicator knowledge weaknesses beyond the corrected operator knowledge deficiencies with the wide range level indicator have since been identified and are discussed later in this response.

In addition, in 1996, Nine Mile Point employees participated in a comprehensive "safety culture" survey developed under the guidance of the SMT. The survey solicited anonymous responses from employees regarding their opinions on such topics as whether employees are comfortable in reporting safety concerns, supervisory and management effectiveness, management communications, and other related topics. The survey results show that Unit 1 Operations personnel rated performance high in these areas in both an absolute and relative sense, including operator willingness to self-identify problems and safety concerns. Survey follow-up briefings of operations personnel conducted by the Plant Manager indicated that operators understand that self-identification of problems is critical for continuous improvement of station operation. Based on the above, NMPC did not substantiate that Operations personnel are reluctant to identify concerns.

Operation Training and Knowledge

The SMT also asked that a review of training be performed to assure that operators have the basic knowledge to operate the plant safely. The training review focused on program content and control to ensure that operators have adequate knowledge of plant design fundamentals and adequate capability to implement procedures required to operate the plant safely within established licensing and design bases. Specific training attributes reviewed were Chapter XV transient and accident analysis, compliance with 10CFR55.59, key operator plant parameters and fundamental knowledge.

With regard to fundamental aspects of plant design and response, all Chapter XV transient and accidents are directly modeled or are otherwise addressed via simulator training by use of specifically designed malfunctions to accurately produce the desired plant responses. Of the thirty-one FSAR transients and accidents, twenty-four are specifically tested in accordance with ANSI 3.5 testing requirements. All remaining transients are tested through a combination of malfunctions and simulator overrides which simulate plant response; the one exception is the fuel bundle loading error, which is not really an operational transient but is analyzed for thermal limit considerations. The SMT therefore concluded that all aspects of Chapter XV

transients and accidents receive appropriate levels of training and challenges for operator personnel.

The review also indicated that the NMP1 operator training program is in full compliance with 10CFR55.59 requirements. Consistent with the Systematic Approach to Training (SAT), training on plant transients to meet 10CFR55.59 requirements are fulfilled by various training elements. As described in Section II of this response, the simulator response for an overfill event was not consistent with the actual event that occurred; rather, the simulated system response functioned as the plant was designed.

The operator requalification training program requires that crews or individuals who are unable to pass simulator and/or classroom training be relieved of shift duties until such time that remediation is performed to demonstrate acceptable performance as determined by Training and the Manager of Operations. In addition, in 1996, NMP implemented a Performance Training process at both units to trend weaknesses and strengths in operator training performance. This process is designed, in part, to identify commonalities among operating crews so that generic issues can be targeted for enhanced training leading to overall operating performance improvements; similarly, Training personnel can track individual performance to identify areas for personnel improvement. The Manager of Operations maintains a very high level of involvement in the operator training program and is routinely involved in the assessment of crew/trainee performance, evaluation of training provided, and training improvements. Independent assessment of the training program and operator training performance is performed by quality assurance personnel; identified training deficiencies are documented on Deviation/Event Reports (DER) for timely resolution and corrective/preventive action in accordance with Nuclear Interfacing Procedure NIP-ECA-01.

With regard to translation of training performance to actual plant operation, Operations Management, including shift supervision, perform periodic self-assessments of operator performance at the plant. These self-assessments include management review of planned evolutions, tests, and other work activities which are reviewed by the Manager of Operations and, as applicable, assigned appropriate priority for resolution. In addition, unsatisfactory operator performance at the plant, including that identified via self-assessment, which meets the established low DER generation threshold, is documented on DERs for resolution. On a semi-annual or more frequent basis, broad team-based self-assessments are also performed which may include review of DERs, trends, NRC inspection reports, QA audits and surveillances, and other applicable sources of performance information. Trends in operator performance are also identified through management review of the Operations Human Performance Index or through review of the quarterly DER trend report independently prepared by quality assurance.

With respect to control of key plant parameters, operators are required to demonstrate capability to execute the symptom-based Emergency Operating Procedures (EOPs) as part of the initial and requalification license training processes. The purpose of the EOPs is to provide specific procedural guidance to mitigate plant transients and accidents by taking action to control key plant parameters, i.e., by treating the resultant symptoms of the transient. The

majority of the key plant parameters constitute EOP conditions that initiate operator action to mitigate the event. As such, simulator scenarios designed to challenge operator ability to execute the EOPs contain pre-established critical tasks. These critical tasks evaluate the operator's ability to recognize off-normal key parameters for entry into the appropriate EOP and subsequent key parameter control. Failure to properly execute critical tasks causes individual and/or crew failure and results in remediation. For example, failure to emergency depressurize the RPV when exceeding the heat capacity of the suppression pool would be a critical task for the associated scenario; similarly, failure to maintain pressure within the control band such that technical specification requirements for cooldown rate are violated would also result in individual or crew failure.

With regard to operator theory and fundamental knowledge, operators receive requalification training on reactor theory, reactor physics, and heat transfer during the requalification cycle. Review of training since 1995 indicates that training has been provided in the above areas as well as in electricity fundamentals, fluid dynamics, print reading, and specific component fundamentals.

In addition, during the 1996 operator requalification cycle, a fundamentals diagnostic examination was administered to test operator knowledge and to identify areas where additional fundamental training might have been warranted in the areas of component theory and operation, thermodynamics, and reactor theory. Based on the results of this testing, five of eight areas of component theory tested were determined to warrant enhanced training; two of the component topics - sensors and detectors, and motor/generator theory - were identified as common weaknesses to all Unit 1 shifts. Enhanced training was completed on these topics during recent cycle training. The remaining areas which are not indicative of common crew weaknesses are scheduled for 1997 operator requalification training.

None of the above assessments with regard to operation knowledge and ability have identified generic operator weaknesses which would compromise safe plant operation. Typically, operator response to actual plant transients and operational challenges has been appropriate and an overall department strength.

NMPC concludes that based on the above, operators have adequate fundamental knowledge to safely operate the plant. However, as identified in the corrective actions to this violation, improvements in crew resource management and teamwork are required. Operators will attend Team Training workshops to improve teamwork, communications and crew resource management skills (i.e., STA diagnostics) by November 30, 1997.

IV. *DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED*

Full compliance was achieved prior to start up from the November 1996 forced outage.

I. 10 CFR Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants," Criterion XVI, "Corrective Action," requires, in part, that measures be established to assure that conditions adverse to quality are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and that corrective actions are taken to preclude recurrence.

B. Contrary to the above, prior to September 1996, measures were not established to assure that conditions adverse to quality were promptly identified and corrected. Specifically, the pressure control valve (2ICS*PCV115) for the Unit 2 reactor core isolation cooling (RCIC) turbine lube oil cooler was failed in the open position on January 26, 1991. However, this failure, constituted a condition adverse to quality because the downstream piping and lube oil cooler were routinely operated above their design pressure of 150 psig. This resulted in system degradation and could have adversely affected the RCIC operability.

C. Contrary to the above, prior to August 14, 1996, measures were not established to assure that conditions adverse to quality were promptly identified and corrected. Specifically, in 1992, NMPC reviewed the control room chiller condenser water flow trip setpoint following cancellation of Modification PN2Y87MX057 and concluded that the setpoint was conservative. In September 1995, the Unit 2 Division II control room chiller tripped twice due to low condenser flow concurrent with the start of the emergency diesel generator (EDG). The evaluation of these events and the 1992 review failed to recognize that, in response to a postulated design basis condition, the EDGs are expected to start, resulting in service water pressure and flow transients; and that sufficient margin was not provided for the control room chiller low flow trip setpoint to compensate for these transients. This constituted a condition adverse to quality because the CR chillers could trip following a postulated design basis accident. As a result of the narrowly focused evaluations, the licensee did not identify this condition adverse to quality until August 14, 1996.

D. Contrary to the above, prior to October 1996, measures were not established to assure that conditions adverse to quality were promptly identified and corrected. Specifically, while cleaning the Unit 2 suppression pool during a refueling outage (RFO4) in 1995, NMPC recognized and documented in a deviation/event report (DER) that most of the foreign material removed from the suppression pool must have entered through the downcomers. Despite this recognition, NMPC did not examine the downcomers. As a result of this failure to identify and correct a condition adverse to quality, a significant amount of debris was left in the downcomer from June 1995 until October 1996. The foreign material could have adversely affected the performance of the emergency core cooling system pumps by clogging the suction strainers.

I. THE REASON FOR THE VIOLATION

NMPC admits to these violations and has taken corrective actions for the specific violations. The SMT has evaluated the cited violations and has determined that our corrective action program is fundamentally sound, but that further enhancements are required to address the underlying causes. Following is a discussion of the cause of each of the specific cited violations.

Violation IB

The condition related to 2ICS*PCV115 should have been resolved in a more timely manner. The cause of this condition existing for an extended period of time was a lack of management sensitivity to the requirement to return the component to a fully qualified state in a timely manner. However, based upon the updated operability determinations, we conclude that, while degraded, the system remained operable.

Violation IC

NMPC's evaluation of the control room chiller condenser water flow trip setpoint was narrowly focused and failed to identify the full scope of the problem both in 1992 and 1995. These failures were caused by inadequate depth of evaluation by the personnel who evaluated these issues. The complexity of the service water system, and the trip systems which interface with the control room chiller system made the technical evaluation and determination of cause for the trip more difficult. A contributor to the condition was the lack of a detailed analytical model of the service water system which made a precise determination of service water flows and pressures under transient conditions difficult.

Violation ID

The foreign material in the downcomers should have been discovered during refueling outage 4 (RFO4) in 1995. The cause of not inspecting the downcomers and correcting the problem in 1995 was a lack of questioning attitude, and lack of sensitivity to the issue. Review of DER 2-95-1639 identified that there were multiple missed opportunities to conclude that a downcomer inspection was appropriate. While the failure to inspect the downcomers is significant, NMPC's evaluation of the foreign material in the downcomers concluded that there was no adverse affect on the performance of the emergency core cooling system pumps.

II. CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

The specific deviations have been resolved. Pressure control valve 2ICS*PCV115 was permanently modified prior to startup from RFO5 on November 2, 1996. The foreign material in the suppression pool was removed during RFO5, in the Fall of 1996. The setpoint for the HVK control room chillers were set to appropriate values on August 14, 1996.

SMT Review of the DER Process

The SMT has reviewed the NMPC corrective action program and determined that while certain enhancements should be made, there are no major program changes required. NMPC's site wide corrective action process is the Deviation/Event Reporting System (DER), which requires personnel to report deficiencies. NMPC and contractors receive training on the DER process during General Employee Training (GET), which is required for site access. This system has served NMPC well since being incorporated into all levels of business at the site. In fact, the three cited examples were identified and corrected within our corrective action program prior to being identified by the NRC. The Plant Manager assigns the DER to a given department for disposition and corrective action. The DER process is defined in Nuclear Interface Procedure (NIP) NIP-ECA-01. Plant Managers establish the priority and level of follow up reviews required for individual DERs, including time for disposition completion, and on a selected basis, designation of augmented disposition review and approval which may include SMT, Site Operating Review Committee (SORC), etc.

Implementation of the corrective action program has been instrumental in achieving substantially improved performance in radiation exposure control, radiation worker work practices, contamination occurrence reports, safety system availability, events caused by poor human performance, 10CFR50.59 safety evaluation content, material condition as indicated by corrective maintenance backlogs, and overall plant reliability.

NMPC dispositions over 3000 DERs annually and objective monitoring indicates that the performance of the plant and personnel is being effectively monitored and improved via the DER system. DER trend reports are produced by the Quality Assurance Department (QA) each quarter and management reviews them to identify specific areas on which to focus attention in order to continually improve performance. The SMT recognizes that identifying problems is not an end in itself. The goal is to correct problems, including identifying underlying causes and implementing preventive actions to avoid reoccurrence. While further enhancement is necessary, the skill of the organization as a whole in satisfying that goal has been evolving over the years since 1991. The organization is far better at getting to root cause, and specifying the most effective corrective and preventive actions today than we have been in the past; however, the need for further improvement is recognized.

Beginning in early 1996, senior managers were assigned to review selected DER corrective/ preventive actions and root cause analyses. The primary focus of the 1996 effort was on human performance and programmatic deficiencies. Throughout the year, senior managers coached and provided feedback to personnel on the depth of root cause analyses and corrective/preventive actions. As a result, overall improvements in DER processing were evident. QA audit interviews indicated that in response to increased management emphasis, DER dispositioners and reviewers/approvers are applying more time and effort to processing DERs.

As a result of the reviews performed in 1996, NMPC has taken additional actions to improve the effectiveness of our DER program. In February 1997, procedure NIP-ECA-01, Deviation/Event Report, was revised and a DER dispositioning guideline (S-GUI-ECA-0101) was developed to enhance program implementation. Procedure enhancements included 1) provision to categorize DERs based upon significance of the deviation by the Plant Manager(s); 2) requirement that root causes (for Level 1 DERs) be performed by qualified personnel; 3) review of the USAR for non-conforming equipment impact resolution, or provide technical justification to operate until resolution can be completed, which is required within six months of the date of disposition and; 4) evaluation of the safety significance when DER extensions are required. Training on and implementation of the revised program began in February 1997. Results from these changes will be assessed in the future as part of the QA Branch semi-annual corrective action program audits and SMT oversight.

III. ACTIONS TAKEN TO PREVENT RECURRENCE

As stated in Section II above, NMPC believes that our corrective action program is fundamentally sound. However, we have identified further enhancements to improve the implementation of the program. The focus of this effort will be to enhance the quality review of cause determinations for selected technical issues. Potentially significant technical issues will be subjected to augmented review. In addition, as previously noted, the Plant Managers already route selected DERs to members of the Senior Management Team for review and concurrence with the proposed disposition before it can be approved. Previously, however, in the absence of a given branch manager, approvals were being delegated to an acting branch manager. This practice has been discontinued. Branch Manager or above approval is now administratively required to accept a disposition.

To improve the quality and rigor of cause and corrective action analysis on potentially significant equipment problems, the Plant Managers will exercise discretion to request a Review Board approval prior to accepting the disposition of DERs. This DER Review Board concept will be initiated on a trial basis by June 1, 1997 and, if deemed necessary, fully proceduralized by December 31, 1997.

In its response to Notice of Violation 96-05-I,A & B regarding the NMP1 blowout panels, dated July 16, 1996, NMPC described actions taken to prevent reoccurrence of that violation. Several of those actions have been completed and in fact were effective in identifying and resolving recent technical issues. For example, the training which was conducted on the impact of not performing 10CFR50.59 reviews for longstanding hardware deficiencies, resulted in design engineers identifying that the 2ICS*PCV115 was in a potentially degraded condition without a 10CFR50.59 safety evaluation having been written.

Additional actions to prevent reoccurrence of these types of events are:

1) The SMT believes that continued focus and dedication to these principles in the Nuclear Division Business Plan will further assure continued safe operation. As

stated in response to IA above, NMPCs mission to operate our plants safely and efficiently is already identified in the Nuclear Division Business Plan. Principles for Continued Improvement are included to implement this mission. These principles include nuclear and industrial safety, problem identification and resolution, leadership, quality, accountability/responsibility and self-assessment. These principles form the cornerstone for continued safe operation of NMP1 and 2. In accordance with the Business Plan, Back to Basics Training (Design and License Basis) was provided by the Manger of Licensing in 1996. Therefore, the SMT will continue to reinforce these principles throughout all levels of the organization. In addition, the SMT and Branch Managers will critically assess performance based upon these principles.

2) License/design basis training and expansion of the SRO/plant certification efforts will continue to be provided in accordance with the NMPC Nuclear Division Business Plan. Nuclear Engineering has already been providing this training to Managers, Supervisors and other selected personnel.

In summary, the SMT has concluded that the DER process is fundamentally sound and effective in assuring that conditions adverse to quality are promptly identified and corrected. However, we recognize that enhancements in the implementation of the process are required. The actions taken and planned will assure continual focus on conditions adverse to quality.

IV. DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Full compliance was achieved prior to start up from RFO5 when 2ICS*PCV115 was modified, the control room chiller condenser water low flow setpoint was revised and the foreign material was removed from the downcomers and suppression pool. As cited in Violation II.C, during RFO5, 2ICS*RO207 had been improperly sized. Therefore, an operability determination regarding the RCIC system was prepared on December 19, 1996 and the orifice was subsequently modified on April 22, 1997, to restore the system to full compliance.

II. 10 CFR Part 50, Appendix B, Criterion III, "Design Control," requires that measures be established to assure that applicable regulatory requirements and design basis for structures, systems, and components are correctly translated into specifications, drawings, and procedures. These measures shall include provisions to assure that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled. The design control measures shall provide for verifying or checking the adequacy of design, such as by the performance of design reviews. Design changes, including field changes, shall be subject to design control measures commensurate with those applied to the original design.

The NMPC Quality Assurance Topical Report (QATR), Section B.3, states that station modifications are accomplished in accordance with approved designs and procedures. The design controls apply to preparation, review and revision of design documents, including the correct translation of applicable regulatory requirements and design bases into those documents.

Nuclear Engineering Procedure NEP-DES-340, "Design Calculations," Step 2.1, requires the discipline supervisor to review calculation assumptions, and the validity of their application. Step 2.3 requires the calculation reviewer to check the calculation assumptions.

A. Contrary to the above, as of October 11, 1996, regulatory requirements and design basis were not correctly translated into specifications, and calculation assumptions were not reviewed at Unit 2. Specifically, NMPC did not adequately verify or check the adequacy of design for motor-operated valves 2CHS*MOV107, 2ICS*MOV126, 2RHS*MOV25A, and 2RHS*MOV25B in the high pressure core spray, RCIC, and containment spray systems. Motor-actuator run efficiency was utilized as a design input without verifying the validity of the application. Consequently, the functionality of the valves under design-basis pressure locking conditions was not adequately assured.

B. Contrary to the above, as of November 1, 1996, regulatory requirements and design basis were not correctly translated into specifications, and calculation assumptions were not reviewed at Unit 2. Specifically, the calculation entitled "RCIC pump cooler differential pressure evaluation," dated June 15, 1992, was incorrect in that it did not include the suction pressure of the RCIC pump when calculating the downstream pressure of 2ICS*PCV115, assuming the relief valve failed to open. Also, this calculation was not reviewed by the discipline supervisor. The calculation was used as the basis for two operability determinations for the RCIC system dated June 16, 1992, and August 24, 1993. As a result of the incorrect calculation, the operability determinations incorrectly concluded that the downstream pressure would not exceed the hydrostatic test pressure for the piping if the relief valve failed to open. Consequently, the RCIC system was operated with 2ICS*PCV115 failed open

which had the potential to exceed the design of the system if the relief valve failed to open.

C. Contrary to the above, as of November 1, 1996, regulatory requirements and design basis were not correctly translated into specifications, and calculation assumptions were not reviewed at Unit 2. Specifically, calculation A10.1-H-005 dated September 23, 1996, used an incorrect pressure input in determining the required size for the RCIC turbine lube oil cooler restricting orifice (2ICS*RO207). The independent review and the station operation review committee review failed to identify the incorrect design input. As a result, when 2ICS*RO207 was rebored in support of the design change to replace 2ICS*PCV115, the resulting orifice size was too small. With the incorrect orifice size, the RCIC turbine lube oil cooler and its associated piping could be operated at a pressure exceeding their design pressure and the relief valve could continuously lift during RCIC operation.

D. Contrary to the above, as of August 14, 1996, regulatory requirements and design basis were not correctly translated into specifications, and calculation assumptions were not reviewed at Unit 2. Specifically, a 1988 setpoint calculation for the low condenser flow trip of the control room chillers, had failed to consider the effects of the service water pressure and flow transients that would be expected to occur when the EDGs started following a postulated design basis accident. As a result, when the setpoint change was implemented in 1989, the low flow trip setpoint was set excessively high. This resulted in both control room chillers being inoperable, contrary to Technical Specification 3.7.3 which requires two independent control room chiller subsystems to be operable when the plant is in operational conditions 1, 2, 3, and when irradiated fuel is being handled in the reactor building, during core alterations, and during operations with a potential for draining the reactor vessel and uncovering irradiated fuel. With the excessively high setpoint, the control room chillers could have inadvertently tripped when the EDGs started following a postulated design basis accident rendering them unable to perform their intended safety function without operator action.

I. THE REASON FOR THE VIOLATION

NMPC admits to these violations and has taken actions both for the specific issues and underlying causes. The SMT has evaluated the cited violations and has determined that although fundamentally sound, enhancements to the NMPC design control program are necessary. Following is a discussion of the reason for each event, and the underlying causes.

Violation IIA

The cause of NMPC's failure to verify the validity of run efficiency was inadequate management attention and oversight. As a result, NMPC failed to monitor industry direction and adequately review assumptions used in pressure locking calculations.

Violation IIB

The calculation entitled "RCIC pump cooler differential pressure evaluation" dated June 15, 1992 did not include the suction pressure of the RCIC pump due to a personnel error by the engineer performing the calculation. In addition, at the time of that error, there were no requirements for checking and approving calculations for operability determinations. Therefore, there was no formal check and approval of the subject calculations. However, subsequent calculations in accordance with Generic Letter (GL) 91-18 "Information to Licensees Regarding Two NRC Inspection Manual Sections on Resolution of Degraded and Nonconforming Conditions and on Operability" demonstrated the operability of the system.

Violation IIC

The cause of the incorrect pressure input in calculation A 10.1-H-005 dated September 23, 1996 is personnel error made by the performer, and inadequate verification of the calculation by the checker and the independent reviewer. These errors are examples of inadequate attention to detail by the individuals involved. NMPC would not have expected Site Operating Review Committee (SORC) to identify this incorrect input as SORC does not review calculational details of design.

Violation IID

When the setpoint calculation for the low condenser flow trip of the control room chillers was performed in 1988, the engineers did not evaluate the full range of transients. It is not possible to determine the cause of the Architect/Engineers not evaluating the required range of transients, due to the time period which has elapsed. However, as noted in Section I of the reason for Violation I.C, a potential contributor to this event was the lack of a detailed analytical model of transient conditions for the service water system.

Underlying Causes

The SMT has reviewed the issues underlying these violations and concluded that the primary cause is a lack of management attention and reinforcement of expectations regarding attention to detail, and questioning attitude. Contributors were knowledge deficiencies regarding design and license basis, as well as individual accountability and ownership of assigned tasks.

II. CORRECTIVE ACTIONS TAKEN AND RESULTS ACHIEVED

The equipment affected by each of these violations has been re-analyzed and placed in a conforming condition. With regard to Violation IIA, motor operated valves which had been evaluated using run efficiency for pressure locking conditions were re-evaluated using pull out efficiency. Based upon that analysis, four valves (2CSH*MOV107, 2ICS*MOV126, 2RHS*MOV25A and 2RHS*MOV25) were modified during RFO5. With regard to Violation IIB, the RCIC turbine lube oil cooler pressure control valve (2ICS*PCV115) was modified during RFO5 and a 10CFR50.59 evaluation completed. With regard to Violation IIC, calculation A10.1-H-005 was revised and the proper orifice size determined on December 18, 1996, and an Operability Determination was completed on December 19, 1996. Subsequently, 2ICS*RO207 has been replaced. With regard to Violation IID, the setpoint for the low condenser flow trip to the control room chillers was revised on August 14, 1996.

The following additional corrective actions have been taken:

1) With regard to Violation IIA, NMPC has increased its participation in the industry motor operated valve owner groups.

2) With regard to Violation IIB, Engineering guidelines have been revised as described in our response to NOV 96-05-2A&B to emphasize the role of a supervisor in checking the DER deviation description with the results of a calculation.

3) With regard to Violation IIC, the engineers who erroneously performed calculation A-10.1-H-005 have been counseled and a sample of previous calculations which they performed or reviewed had been reviewed with no additional errors identified.

4) With regard to Violation IID, a detailed computer model of the service water system has been developed and is being validated for use in analysis of the service water.

The issues identified in these violations were centered within the Mechanical Design Group. The group supervisor involved has been replaced and several of the engineers involved have had their qualifications to perform design removed pending remediation and concurrence of the new supervisor that they meet his expectations. These performance weaknesses have also been the subject of a stand down meeting with the entire Engineering Department. Nuclear Engineering management realizes that to assure that the problem is limited, increased attention to group and individual performance is required. Therefore, a more focused assessment of performance issues by Nuclear Engineering management has been implemented. For example, the new Supervisor of Mechanical Design has formalized his expectations for members of the Mechanical Design Group. These expectations focus on DER dispositions, Engineering Supporting Analysis and design changes.

Since these actions were taken, the SMT has identified an increased sensitivity by engineers and their supervisors for the quality and completeness of their work, including a heightened questioning attitude regarding the adequacy of design, assumptions and inputs. Examples indicating heightened sensitivity are 1) identification of several aspects of pressurization concerns while evaluating Generic Letter 96-06 which were beyond the original scope of the GL, and 2) identification of the potential impact of hot shorts causing mechanical damage to motor operated valves previously evaluated as a result of NRC Information Notice 92-18, "Potential for Loss of Remote Shutdown Capability During a Control Room Fire." Engineers at both units determined that piping segments between vents, drains and test connectors could be subjected to pressurization similar to penetrations identified in GL 96-06, "Assurance of Equipment Operability and Containment Integrity During Design-Bases Accident Conditions." In addition, the Unit 2 Engineering Branch identified pressurization problems with hydraulic fluid penetrations. With respect to hot shorts, IN 92-18 specifically states that motor operators with thermal overload protection need not be evaluated for the hot short scenario. In late 1996, Nuclear Engineering personnel re-evaluated our previous disposition of this issue and determined that thermal overload protection will not prevent mechanical damage to a motor operated valves since the overload will not trip for 10 seconds, which would not prevent stall thrust being applied. We believe that these and other examples are indications of heightened sensitivity and overall improved performance in Nuclear Engineering.

III. ACTIONS TAKEN TO PREVENT RECURRENCE

As stated in Section I above, NMPC has concluded that the causes of these violations are lack of adequate management oversight, inadequate attention to detail and insufficient questioning attitude on the part of individuals performing calculations. The following actions are being taken to prevent reoccurrence:

1) Additional focus has been placed on the selection and training of managers and supervisors to assure that these positions are filled with the best available candidates to oversee engineering activities. NMPC has developed and implemented an Assessment Center Program that evaluates leadership and technical skills of supervisory candidates. In addition, annual 360 degree reviews are performed for incumbents, by supervisors, peers and subordinates.

2) An ongoing effort to include Engineering supervision in the Plant License and/or System Certification Courses will continue, thereby increasing the knowledge base of the engineering staff. To date seven have completed the certification program.

3) To ensure resources are adequate for the workload, Engineering management and plant management have met routinely in the past to determine the priority of work, but too often resources and schedules were not aligned. The current method for setting priority of work includes determining the resources

available using project management techniques, thus reducing the potential to be short of resources when the work is approved for scheduling.

4) The concept of a Design Review Board is being implemented at the discretion of Engineering supervision. Review boards made up of senior personnel will be used to critique and advise design engineers on scheduled modifications prior to their design being finalized for implementation. The review boards will be implemented by a Nuclear Engineering Guideline. The draft guideline contains management direction on organization, responsibilities and the process of review and what should be reviewed by the board. Nuclear Engineering management will finalize the guideline by June 1, 1997. Performance of the review boards will be monitored by Nuclear Engineering management to assure that the depth and breadth of review is appropriate.

5) At the request of Nuclear Engineering, the Independent Safety Engineering Group (ISEG) and the Quality Assurance Department are providing additional assessment of engineering activities. The initial focus of these assessment activities is on individual knowledge and performance. Nuclear Engineering, ISEG and QA will evaluate the results of this oversight to determine the scope, focus and frequency of future oversight.

Additional actions to prevent reoccurrence of these types of events are:

1) The SMT believes that continued focus and dedication to these principles in the Nuclear Division Business plan will assure continued safe operation. Principles for Continued Improvement are included to implement this mission. These principles include nuclear and industrial safety, problem identification and resolution, leadership, quality, accountability/responsibility and self-assessment. These principles form the cornerstone for the continued safe operation of NMP1 & 2. In accordance with the Business Plan, Back to Basics training (design and licensing basis) was provided by the Manager of Licensing in 1996. Therefore the SMT will reinforce these principles throughout all levels of the organization. In addition, the SMT and Branch Managers will critically assess performance based upon these principles.

2) License/design basis training and expansion of the SRO/plant certification efforts will be completed in accordance with the NMPC Nuclear Division Business Plan. Nuclear Engineering has been providing this training to Managers, Supervisors and other selected personnel.

IV. DATE WHEN FULL COMPLIANCE WILL BE ACHIEVED

Full compliance for the motor operated valves, RCIC turbine lube oil cooler pressure control valve and the low condenser flow trip to the control room chillers was achieved prior to startup from RFO5 on November 2, 1996. On December 19, 1996, an Operability Determination was completed for the improper size of 2ICS*RO207. On April 22, 1997, 2ICS*RO207 was modified to be in full compliance.