U. S. NUCLEAR REGULATORY COMMISSION
REGION I

NILE POINT UNITS 1 AND 2 MAINTENANCE PERFORMANCE ASSESSMENT TEAM INSPECTION

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EXECUTIVE SUMMARY

The staff of the U. S. Nuclear Regulatory Commission (NRC) conducted a Maintenance Performance Assessment Team Inspection (MPAT) at Nine Mile Point Units 1 and 2, October 11-15, 1990. The inspection team evaluated the quality of Niagara Mohawk's efforts in the performance of maintenance activities in progress during the week of the inspection. The focus of the team was to make a performance-based assessment of maintenance activities performed by Niagara Mohawk to determine whether sufficient progress had been made in the resolving the maintenance area deficiencies noted in the most recent SALP report issued on August 1, 1990 (SALP Assessment Period - March 1, 1989 to February 28, 1990) and in resident inspection reports issued since the end of the SALP period. Team members directly observed the performance of corrective maintenance, preventive maintenance, and surveillance tests as well as the implementation of modifications and assessed the quality with which these activities were accomplished.

In the mechanical maintenance area, the team concluded that through its observations of mechanical maintenance field activities, review of maintenance procedures, and work packages, work is performed well and controlled acceptably in the mechanical maintenance department. Maintenance workers were knowledgeable of their responsibilities and understood the work control process as it applied to their activities.

In the electrical maintenance area, the team observed that electrical maintenance work was performed appropriately and safely. The electrical maintenance technicians, their supervisors, and the supporting engineers were found to be knowledgeable of the work tasks, the associated procedures, and how to handle problems encountered in the field.

In the instrumentation and control (I&C) maintenance area, the team concluded that the performance of I&C personnel during observed maintenance activities was good. The activities were well controlled and performed by qualified technicians. I&C management oversight appeared to be appropriate for the complexity of the activities observed. The cross checking of calibration data between the calibration data sheets and vendor prints was a noted strength.

During their observations of field activities, team members also assessed the quality of the maintenance/operations interface and the maintenance/engineering interface. The team found that the field personnel informed operations shift personnel of expected control room instrument reactions and changes in plant status that could be expected due to the work being performed. While the review process required for the release of maintenance work packages from the control room appeared to be somewhat cumbersome, the team concluded that the maintenance/operations interface was acceptable and worked particularly well once work packages were released to the field for performance.

The team concluded that the site and systems engineering groups interfaced well with the maintenance department. The engineers were knowledgeable and enthusiastic. Engineering representation and coordination during outage meetings was assessed to be good.

In the areas of work control and outage planning, the team found that the Nine Mile Point Unit 1 work control center (WCC) was effectively planning, scheduling and controlling maintenance work with the plant in an operational mode. At Nine Mile Point Unit 2, the team found that while steps were always taken to ensure that work packages taken into the field were complete, problems were noted in the adjustment of the outage schedule (due to delays in ongoing outage activities and the associated adjustment of plant conditions) and in less than complete pre-outage preparation of work packages. While Niagara Mohawk's efforts to reassess outage work plant impacts were appropriate and thorough, the extent of these efforts could have been minimized by more thorough pre-outage planning input. The team noted that enhanced participation of the WCC operations planning function in the outage planning/scheduling area during the week of the inspection contributed substantially to the reestablishment of schedular integrity. This demonstrated the importance of informed input to the plant impact portion of outage preparations.

The team identified several concerns with regard to the control and use of scaffolding at Nine Mile Point Unit 2. These concerns included the lack of engineering evaluations for scaffolding erected in the vicinity of safety related equipment and inadequate personnel safety tagging of erected scaffolds. The team concluded that the lack of adequate control and use of deficient scaffolding were widespread as evidenced by the significant number of scaffolds that required rework or disassembly following engineering evaluation. The corrective actions committed to by site management appeared to be adequate. The failure to follow established procedures for the control and use of scaffolding was identified as a violation.

Overall, the team found the performance of maintenance work during the week of the inspection to be good. Although work efforts were occasionally delayed due to the existing process for release of work or the need to ensure the completeness of work packages, actions were always taken to assure that plant impact was properly assessed for the performance of work and for system restoration. The problems noted in scaffolding area were indicative of a weakness in Niagara Mohawk's control of an important maintenance support function.

1.0 INTRODUCTION

1.1 Background

A Maintenance Team Inspection (MTI) was performed at Nine Mile Point Units 1 and 2 in November/December 1988. The overall conclusion of the MTI was that Niagara Mohawk was implementing an effective maintenance program and that noted problem areas had already been acknowledged by Niagara Mohawk internal evaluations (as noted in the Nine Mile Point Unit 1 Restart Action Plan published in December 1988). The problems noted in the areas of management oversight of maintenance performance, effectiveness of corrective actions, and adequacy of and compliance with maintenance procedures were being addressed by corrective actions noted in the RAP.

Despite the overall positive findings of the MTI, subsequent occurrences of maintenance-related operational events again raised questions about the effectiveness of the maintenance program. These events included reactor scrams, forced outages, and inadvertent safety system actuations at both units as well as a flooding event at Unit 2.

Nine Mile Point received a Category 3 rating in the maintenance area for its most recent SALP period (March 1, 1989 to February 28, 1990). This rating was based primarily on the aforementioned continuation of equipment failures and maintenance-related operational events. A recommendation was made in the final SALP report dated August 1, 1990 that a team inspection be performed to assess maintenance performance. The SALP report also recommended that the inspection be performed during the 1990 Nine Mile Point Unit 2 refueling outage to allow for the evaluation of a significant variety of maintenance activities and also to allow for a concentration of inspection efforts on Unit 2 where the more significant maintenance-related deficiencies had been noted.

1.2 Scope

The scope of this team inspection was to make a performance-based assessment of the quality and effectiveness of maintenance work performed at Nine Mile Point. Since the recent programmatic assessments of the maintenance area did not point out significant areas of concern, performance-based assessment was stressed as the means to determine the possible causes for recent problems.

1.3 Methodology

The focus of the inspection team was to determine the status of Niagara Mohawk's performance in the maintenance area through performance-based evaluations of ongoing maintenance activities. Team members directly observed the performance of corrective maintenance, preventive maintenance, and surveillance tests as well as the implementation of modifications and assessed the quality with which these activities were accomplished. While programmatic evaluation was not the primary focus of this inspection, team members evaluated adherence to procedures and administrative controls, communications within and between departments, the quality of procedures and associated documentation used, the ability to identify and correct problems, and attention to radiological and industrial safety as part of their observation of individual activities. Some backshift inspections were performed in order to assess pertinent activities.

2.0 DETAILS OF INSPECTION

2.1 Mechanical Maintenance

The team observed safety-related mechanical maintenance work in progress at Nine Mile Point Unit 2. To determine the effectiveness of the implementation of the mechanical maintenance program the team reviewed personnel staffing, training, planning, scheduling, procedures, engineering support, work request packages, and progress of work performed in the field. The team also reviewed Administrative Procedure AP-5.0, Maintenance Program, to provide a point of reference with regard to the compliance of work performed in the field with established program guidelines.

2.1.1 Staffing and Training

The general supervisor of mechanical maintenance reviewed planned work and assigned maintenance activities to assistant supervisors for completion. He also determined which activities were to be assigned to the mechanical maintenance area. Work to be performed by mechanical maintenance was based on technical expertise and past experience, formal training for the task, available dose allowance of the mechanics, and certain job tasks negotiated by the union which were not contracted. Six assistant maintenance supervisors assigned the tasks to their appropriate crews. The assistant supervisors were responsible for communicating support activities needed from other departments, evaluating equipment condition for reportability, updating the senior shift supervisor regarding maintenance activities, and ensuring assigned crews perform maintenance activities in accordance with plant instructions and that activities were properly documented.

Niagara Mohawk has recently upgraded the maintenance training program. Each discipline had a training coordinator who communicates department needs to the Maintenance Training Advisory Committee. Maintenance training is ongoing with at least one crew in training each week. The training coordinator maintained training records of mechanics which were utilized when determining task assignments.

2.1.2 Review of Mechanical Maintenance Work in Progress

The team reviewed work in progress and the associated work request packages in the field. Through discussions with the mechanics performing the task and review of the work packages and procedures, the team also assessed the understanding of and compliance with procedure requirements.

The team observed of the following maintenance activities in the field:

-- stack up of recirculation pump 2RCS*P1A stuffing box

-- various tasks associated with disassembly of recirculation pumps 2RCS*P1A and 2 RCS*P1B

-- reinstallation of main steam safety valve PSV 128

-- disassembly of MSIV 6D actuator

-- functional testing of 2 mechanical snubbers

-- replacement of internals to ADS N2 supply solenoid valves 2IAS*SOVX186 and 2IAS*SOVY186

-- replacement of containment monitoring system valve CMS-V6B

-- preventive maintenance on standby liquid system pump

During observation of these activities the team noted the presence of supervision. Engineering support was noted at various times with regard to the recirculation pump activities. All work packages observed at the work site appeared to be complete with the appropriate documents. Protective markups (equipment tagging) reviewed by the team were properly established with no discrepancies. For complex activities (e.g., recirculation pump disassembly, and installation of main steam safety valves) equipment specific procedures were utilized and prerequisite signoffs were completed. For simpler activities (repair/replace valve) generic maintenance instructions were utilized. In all cases work packages included the recently developed work in progress (WIP) sheets to identify plant impact and post-maintenance testing. Quality Control (QC) inspectors were seen in the field supporting activities when required. A quality control inspection report (QCIR) reviewed in the field for valve CMS-V6B replacement appeared to be adequate to the team.

The team monitored the performance of two snubber functional tests. The tests were performed by a vendor (Pacific Scientific (PSA)) under the direction of the maintenance engineer/snubber engineer. The tests were completed in accordance with the maintenance procedure and test results met the acceptance criteria. The maintenance engineer/snubber engineer is responsible for the implementation and performance of the snubber program. His position is within the maintenance support group and he also provides engineering assistance for the mechanical maintenance department for ongoing maintenance activities.

The team reviewed the snubber program with the engineer. The team found the program to be adequate with one exception. To control the potential affect of removed snubbers on plant system operability, every snubber has an Equipment Status Log (ESL) entry documented on the work request prior to issuance from the senior shift supervisor. The team reviewed the two work packages for the snubbers being tested and noted that one did not have an ESL entry in effect. The snubber originally had an ESL entry when snubber removal was authorized, but the ESL entry was cleared when the snubber was not removed due to lack of crane rigging support. A few days later the work was reauthorized without an ESL entry, in error, by another senior shift supervisor. After this problem was identified by the inspector, an additional ESL entry was entered for the snubber. Further review by the team determined this error to be an isolated case, with negligible safety significance. Technical Specification 3.7.5 allows a snubber to be removed for 72 hours prior to its affected system being declared inoperable. The subject snubber had been removed 11 hours prior to the team identifying that it was not properly logged in the ESL.

In addition to functional tests, technical specifications require a 100% visual inspection of installed snubbers. The team reviewed the surveillance test and found the instructions detailed with adequate acceptance criteria to identify potential inoperable snubbers. The team reviewed the training records for the QC inspectors performing the visual inspections. The inspectors met the certification requirements.

2.1.3 Interface with Outage Planning/Work Control

The team also observed the interface between mechanical maintenance and related work control functions. The team found the work control/outage planning interface with mechanical maintenance to be acceptable. However, the team noted some degree of administrative burden on the assistant supervisors responsible for ongoing maintenance performed in the field. As part of the planning process, the assistant supervisors reviewed the work packages and estimated times for job completion. The estimates were then used by outage planning for generation of a 4 day look-ahead schedule for work estimated to be performed or in progress over the next four days of the outage. These efforts by the assistant supervisors occasionally conflicted with their efforts to follow the progress of work in the field, prevent job delays by resolving problems, communicate needs to responsible parties, and change priorities of crews when directed by management.

The team also noted several work delays in the field due to activity coordination problems. Activities related to the disassembly of the recirculation pump brought out several examples of these delays, including: delay in release of the markup for the B pump due to change in protective isolation; holdup in pump disassembly until fuel pool gates were installed; delay in fuel pool gate installation due to availability of crane rigging to allow access of gates to refuel floor; plant contamination resulted in a radiological hold on required tools and mechanic's safety shoes; delay in rigging of A recirculation motor due to release of markup for crane PM (responsible markup man was not available to authorize clearance); change in priorities from the B pump to the A pump until repairs to RCS*MOV18B were completed. Although some of these delays could not be controlled, time could have been saved if more effort had been placed in setting up the required coordination of tasks for large scale activities. It appeared to the team that the assistant supervisors were excessively burdened with helping to resolve these activity coordination efforts in addition to their other administrative and technical duties. Although progress of work was slow, the team did not identify any safety concerns when tasks were performed.

2.1.4 Housekeeping

During a tour of the reactor building with the mechanical maintenance supervisor, the team noted that general housekeeping was very good for a refueling outage. The supervisor stated that improvements have been made in housekeeping due in part to a recent site staff reorganization. Housekeeping responsibilities presently fall under the mechanical maintenance department. During various plant tours the team noted individuals responsible for housekeeping maintaining the level of cleanliness. In addition work crews are held accountable to keep their job site clean to minimize the housekeeping burden.

In summary, the team concluded that through its observations of mechanical maintenance field activities, review of maintenance procedures, and work packages, work is performed well and controlled acceptably in the mechanical maintenance department. Maintenance workers were knowledgeable of their responsibilities and understood the work control process as it applied to their activities.

2.2 Electrical Maintenance

The team observed several electrical maintenance activities to determine the quality of work performance, and the level of adherence to the established administrative guidelines which control the performance and documentation of work. All of the activities observed were related to the Unit 2 refueling outage.

2.2.1 Observations of Electrical Maintenance Work in Progress

Team observations of electrical maintenance work in progress are detailed in the following paragraphs:

Preventive Maintenance (PM) for Motor Operated Valve (MOV) Motor SWP*MOV-21B, Fuel Pool Emergency Makeup Valve

This valve motor was located in the reactor building and required environmental qualification. A metallic tag was located on the valve motor indicating its qualification. The PM procedure used was N2-EPM-GEN-R520, AC Limitorque Operator and Associated Motor Control Unit. While performing the work, the electrician observed that the terminal block inside the limit switch compartment was damaged. Two of the terminal point barriers had broken away. The electrician searched the limit switch compartment for the broken chips but did not find them. The wiring for the terminal block was arranged in such a way that only the alternate terminal points were used. However, no wiring shared the same terminal point barrier. Since the valve motor is located outside the drywell,

where the post-accident environment is relatively mild, the operability of the damaged terminal block did not appear to be a significant issue. The electricians generated a deficiency tag to report the problem. A work request was subsequently written to replace the terminal block. The team observed the replacement of the terminal block by the electricians with a Quality Control inspector present. The team noted that the electricians were knowledgeable of the work they were performing and adhered to the PM procedure.

Troubleshooting of Battery Charger 2C1

During the team observations of surveillance tests performed on battery charger 2C1, the maintenance technicians identified that the battery charger had failed to maintain 130 volts at full current as required by the test procedure. A work request was subsequently generated to troubleshoot the problem. The troubleshooting steps were properly documented by the system engineer in the work package. The problem component was promptly determined to be the current limiter (a potentiometer). The current limiter was adjusted and the problem was resolved. The team observed the entire troubleshooting evolution and observed that the system engineer was knowledgeable of the equipment and that the electricians properly adhered to the procedure. The team found the associated work package to be comprehensive and the plant impact noted on the associated WIP sheet to be acceptable.

Preventive Maintenance for 13.8KV Switchgear

The team observed a PM on the 2EPS*SWG001 and 2EPS*SWG002 13.8 kV switchgear which feed power to the high speed recirculation pump motor. Maintenance personnel performing the work were observed to be knowledgeable of plant impact requirements and of technical issues in the area.

Surveillance Test for Molded Case Circuit Breakers

The team observed PMs performed on two molded-case circuit breakers for the emergency and control room cabinet lighting. Breaker 2LAC*PNLE06 was rated for 100 amps at 208 volts and breaker 2LAC*PNL100A was rated for 45 amps at 600 volts. The tests consisted of three parts including a thermal trip timing test, instantaneous trip tuning tests and contact resistance tests. The tests were performed safely and in accordance with the procedure and both circuit breakers successfully passed the test.

Electrical Breaker Maintenance

The team observed various portions of other breaker PM activities performed on the recirculation pump 13.8kV safety-related breakers, the 4160V recirculation pump motor generator breaker, and the 600V and 208/120V emergency lighting breakers. In each case, the team observed that the appropriate equipment markups were in place and that the procedural prerequisites and signoffs were accomplished. The following specific observations were made by the team for each activity.

(1) During a PM performed on the 13.8kV breakers, the team identified an area where the metallic surfacing on an arcing contact was separating from the contactor base. As a result the PM activity was temporarily suspended and work requests were initiated to address the arcing contact and additional component deficiencies noted by the technicians in the field. The team observed that the technicians demonstrated good working knowledge of the equipment and understood both the scope of the repairs and the content of the PM procedure.

(2) The PM procedure used for the 4160V breaker was a newly revised procedure. During the performance of the PM, one section of the procedure required an adjustment and measurement of the trip coil lever arm play. As the technicians attempted to use the procedure, they encountered some problems in the procedure wording. Particularly, the actual methods for performing the measurements and adjustments were not adequately described. The methodology was important since there was a 1/32 inch tolerance requirement for the measurements to be taken. The technicians consulted the vendor manual for clarification but the manual also provided limited instructions. In accordance with Administrative Procedure AP-5.4, Conduct of Maintenance, the technicians halted work and notified their supervisor. The supervisor came to the job site with a maintenance engineer. The technicians, the supervisor, and the maintenance engineer discussed the procedure and possible resolutions to the problem.

The team concluded that the technicians appropriately followed the administrative procedure. In addition, the team noted that the observed effort effectively resolved the technical problem and was indicative of effective administrative control of problems encountered with field work. However, the team expressed a concern to the electrical maintenance supervisor that the same procedural problem may exist in other procedures for similar breakers. The electrical maintenance supervisor stated that the possible generic implications of this procedure problem would normally be addressed through the maintenance (engineering) support group and electrical shop discussions. The supervisor further stated that the generic implications of this procedure would be addressed.

(3) During the PM performed on the 600V and 208/120V emergency lighting breakers, the team observed that the technicians were familiar with the technical and procedural requirements of the PM. The technicians were also knowledgeable in the use of the required test equipment. In addition, the team observed that the markup process used when reinstalling the breakers was in accordance with procedures.

In summary, electrical maintenance work observed by the team was performed appropriately and safely. The electrical maintenance technicians, their supervisors, and the supporting engineers were found to be knowledgeable of the work tasks, the associated procedures, and how to handle problems encountered in the field.

2.3 Instrumentation and Control Maintenance

The team witnessed selected refueling outage maintenance activities performed by Nine Mile Point Unit 2 Instrumentation and Control (I&C) Department technicians to determine whether properly approved procedures were in use, details were adequate, test instrumentation was properly calibrated and used, Technical Specifications were satisfied, testing was performed by qualified personnel, test results satisfied acceptance criteria or were properly dispositioned, and activities were adequately controlled. The activities observed included 18 month calibration surveillance tests, instrument loop calibrations, and the replacement and calibration of a safety related level transmitter. Specifically, portions of the following activities were reviewed:

N2-ISP-MSS-R102	Operating Cycle Channel Calibration of Main Steam Line High Flow Instrument Channels
N2-ISP-RDS-R101	Scram Discharge Volume Water Level Instrument Channel Calibration

N2-ICP-GEN-001	Safety Related Loop Calibration of Temperature Switch 2HVH*TS1008A
N2-ICP-GEN-001	Safety Related Loop Calibration of Pressure Switch 2EGO*PS1503
N2-ICP-GEN-001	Safety Related Loop Calibration of Pressure Switch 2EGO*PS1505
WR 180850	Replace Rosemount Transmitter Identified in 10 CFR 21 Support List 2CMS*LT9A

The team observed that all test procedures used were the current approved revision and were properly stamped as controlled copies. All procedures required and received control room approval before the tests were started. The test procedures contained clear and concise guidance with sufficient detail. All procedure steps were strictly followed. Most procedures were logically organized providing for a sequential step-by-step test methodology. However, the team found that one of the surveillance tests (N2-ISP-MSS-R102) required the user to alternately switch between one procedure section and one of the procedures' sixteen attachments. The procedure section contained the detailed test steps while the attachment provided the required step signoffs. The I&C Department had previously recognized that this type of procedure organization could lead to personnel errors and had implemented a procedure upgrade program to reorganize all I&C surveillance procedures to the sequential step-by-step method. The procedure upgrade effort was in progress at the time of inspection. The technicians using N2-ISP-MSS-R102 appeared to have no difficulty following the procedure.

All observed testing required the use of measuring and test equipment (M&TE). All M&TE was found to be within its required calibration periodicity. M&TE serial numbers, calibration dates, and range(s) used were recorded on both the test procedure and the M&TE user's card as required.

The technicians performing the observed activities were all qualified to perform the assigned work and were knowledgeable of the maintenance being performed. Each activity was supervised by a senior technician or chief (foreman) I&C technician depending on the complexity of the maintenance.

Management oversight of work activities appeared to be appropriate for the complexity of the observed maintenance activities. During the safety related loop calibration of 2EGO*PS1005, the technicians found that the pressure switch trip setpoint listed on the loop calibration data sheet was not in agreement with the setpoint listed on a vendor drawing of the switch. The work was stopped and the responsible I&C assistant supervisor was contacted who subsequently resolved the discrepancy. The team was informed that cross checking calibration data sheets against vendor drawings was a routine practice and that in only a few instances had discrepancies between the documents been identified. The team also observed I&C supervisors periodically checking the progress of work activities during the shift.

Communications between the I&C technicians and the control room operators during the observed testing was good. The operators were always informed prior to testing which resulted in control room alarms, half scram signals, or half main steam isolation valve isolations.

During the calibration of the suppression chamber wide-range level transmitter following its replacement, the team noted two moisture chambers to accumulate condensation from the humid air of the suppression chamber atmosphere. In response to the team's questions, Niagara Mohawk personnel stated that there was no scheduled, periodic draining of the chambers and that when the chambers filled and affected the level reading, the condition was noted during the daily channel check and then drained. The team stated that periodic, scheduled draining of these moisture chambers was appropriate, and Niagara Mohawk agreed to evaluate which method would best accomplish the draining and stated that periodic draining would be implemented. The team concluded that this corrective action was acceptable.

In summary, the team concluded that the performance of I&C personnel during observed maintenance activities was good. The activities were well controlled and performed by qualified technicians. All procedures were strictly followed and M&TE used was found to be properly calibrated. I&C management oversight appeared to be appropriate for the complexity of the activities observed. Communications during maintenance was found to be good. The cross checking of calibration data between the calibration data sheets and vendor prints was a notable strength.

2.4 Operations/Maintenance Interface

The team examined the interface between the maintenance and operations departments for the performance of outage work at Nine Mile Point Unit 2. The team observed the processing of work requests in the control room and accompanied workers during the performance of maintenance work including modification installation, corrective and preventive maintenance, and surveillance tests. The team also attended planning meetings which included the interface between the operations and maintenance departments.

2.4.1 Control Room Activities

Once a work request was released for performance by the outage planning organization, it was delivered to the control room by the lead maintenance organization responsible for performing the work (as noted on the work request). The work request was then examined by a senior licensed operator (one who was not standing watch) who reviewed the work request package to determine if current plant conditions would support the activity and the acceptability of the plant impact assessment and post-maintenance test requirements noted on the

work-in-progress (WIP) sheet attached to the work package. When deemed acceptable, the work package was then given to the station shift supervisor (SSS) and chief shift operator (CSO) for final review and authorization prior to performance of the work. If a markup (equipment tagging) was required to establish equipment isolation for the safe performance of the work, the operations personnel also verified the markup prior to releasing the work package to the individual responsible for the activity. The team observed that since the CSO was the focal point for release of work to the field, delays occasionally occurred in the release of work from the control room if the CSO had to attend to other activities such as the acknowledgement of annunciators or answering the telephone. The CSO was observed to be performing his duties properly, even during periods when there was a high demand for release of outage work packages from the control room. The team concluded that the process for release of work packages to the field, however cumbersome, was safe and conservative.

In some cases, the team observed what appeared to be extensive amounts of time dedicated by the operators in the control room to the reevaluation of plant impact assessments from the WIP sheets for work packages to be released to the field. While team review of selected work package WIP sheets prior to control room reevaluation generally did not reveal any deficiencies of safety significance, a lack of detail was noted in some cases. Specifically, plant impact assessments occasionally discussed only equipment impact (i.e., affected equipment is out of service) with no reference to potential interactions with other systems or other jobs in progress. Also, post-maintenance test requirements were vague in some cases. During the week of the inspection, Niagara Mohawk acknowledged that problems had been noted in this area and that additional operations department personnel had been assigned to the outage planning/work control area. This was done in an attempt to improve the quality of the WIP sheet content prior to delivery of work packages to the control room for release to the field. While improvements in the work package plant impact assessments were noted by the team during the inspection as a result of this increased effort, the team acknowledged the cautious actions taken by the control room operators due to a general loss of credibility in the integrated outage schedule. The role of the planning department in adversely effecting and subsequenting correcting the quality of work packages is discussed in Section 2.6 of this report.

2.4.2 Field Activities Observed

The team observed a variety of mechanical, electrical and I&C maintenance activities during the inspection to determine the level and quality of interaction with the operations department once the outage work packages were released to the field. The team found that the field personnel frequently informed operations shift personnel of expected control room instrument reactions and changes in plant status that could be expected due to the work being performed. The team concluded that the maintenance/operations department interface worked well once work packages were released to the field for performance.

2.5 Engineering/Maintenance Interface

The engineering support function at Nine Mile Point is divided into the following major groups: Design Engineering (out of the corporate office), Systems Engineering in the Technical Support group, Site Engineering and a small staff of maintenance department engineers. Team review of this area consisted of the observation of the engineering interface in the field, daily outage and engineering planning meetings, and interviews with various levels of personnel within the maintenance department.

2.5.1 System Engineering

Field walkdowns and/or interviews were conducted with system engineers for the control rod drive (CRD), reactor water cleanup, feedwater system and reactor building ventilation systems. Emphasis was placed on maintenance interface, system configuration, modifications and system technical problems.

During the outage, fifteen (15) control rod drives (CRD) were scheduled to be changed out for preventive maintenance. The inspector reviewed the selection criteria used by Niagara Mohawk in determining which drives should be changed. The CRD systems engineer developed the selection criteria based on scram time and stall flow data and other pertinent information. The team found the selection process to be performance-based and technically well founded. The engineer was actively involved in the preparations for the CRD drive exchange work and frequently interfaced with maintenance and General Electric contract personnel who were assigned to perform the work.

The team reviewed system engineering trending data on the frequency of recharging hydraulic control units (HCU) due to nitrogen bleeddown caused by leaks in the system. It was noted that during Nine Mile Point Unit 2 operation prior to shutdown, HCUs 2RDS*HCU26-11 and 2RDS*HCU46-23 required recharging on a daily basis. Work requests for repair of the HCUs were initiated several months ago. The corrective maintenance to the HCUs was not scheduled to be repaired during the outage due to a low priority assigned to the work. The team noted that the daily bleeddown of the HCUs (which results in control room annunciation and requires operator action) is an operational nuisance, counterproductive to safe operations. The team concluded that the extended delay in this corrective maintenance represented poor communication between operations, maintenance, engineering, and planning personnel.

Modifications to the feedwater system were reviewed and discussed with the systems engineer. The engineer was knowledgeable of the feedwater pump vibration and mechanical seal durability issues, and was tracking installation of feedwater system piping and valve modifications in progress. Also, the team acknowledged the system engineer's development of a long range plan to increase the reliability of the pump mechanical seals.

Preparations to perform Special Test Procedure N2-STP-2, Emergency Recirculation Ventilation System Unit Coolers 2HVR*UC413A/B Performance Evaluation Test were reviewed by the team. The test director was the systems engineer for reactor building ventilation system. The procedure was reviewed and found to be well written and thorough. During installation of temperature probes, the engineer was at the work site and interacted well with I&C technicians in resolving installation problems. The guidelines of Station General Order 89-02, Special Tests and Experiments, were followed.

2.5.2 Site Engineering

Site engineering response and interaction with maintenance personnel to two emergent issues was observed by the inspector. The first issue was a problem report generated on the D circulating water pump (2CWS-P1D). While trying to repack the pump, maintenance found the gland follower stud hole threads were stripped. The assigned engineer reviewed the design documentation to establish the proper hole size and then visited the job site. It was determined the stud holes were actually one and one-quarter inches in diameter rather than one and one-eighth inches as specified in the design drawing. The problem report was dispositioned to clean the threads and procure one and one-quarter inch gland studs. The interaction between maintenance and engineering was observed to be good.

Coincidentally, the team observed that the engineer crossed a radiologically controlled boundary and failed to perform the required contamination checks. It appeared to the team that a radiation protection (RP) technician stationed at the control point did not notice the incident. The team raised the concern to the engineer and the RP technician. The engineer returned to the control point and performed a proper frisk. This incident was discussed with the Unit 2 radiation protection supervisor.

A second issue observed dealt with a Non-Conformance Report (NCR) processed to evaluate a damaged lead on the B emergency diesel generator fuel oil transfer pump motor (2EGF*MIB) identified by electrical maintenance. The motor was stored in an intermediate storage area following refurbishment offsite. The insulation of the motor lead was damaged and engineering was requested to evaluate the damage. The engineer examined the motor lead and the NCR was dispositioned to return the motor to the vendor for repair. The engineer was responsive and interacted well with the maintenance personnel.

During daily outage meetings, it was noted that site, systems and design engineering groups were represented. In general, the representatives were aware of current status of engineering issues and were sensitive to high priority items. The team found it noteworthy that after each outage meeting, an engineering planning meeting was held to coordinate engineering work assignments.

The team concluded that the site and systems engineering groups interfaced well with the maintenance department. The engineers were generally knowledgeable and enthusiastic. Engineering representation and coordination during outage meetings was assessed to be good.

2.6 Work Control

The team observed activities related to the planning, scheduling, and control of maintenance work at both Nine Mile units to determine the quality of established work controls and the effectiveness with which those controls are implemented. Specifically, the team evaluated job planning, work prioritization, work package development, work scheduling, work in progress, and disposition of completed work requests. With Nine Mile Point Unit 1 in steady-state operation at 75% power and Nine Mile Point Unit 2 in its first refueling outage, evaluations of both operational mode work control (Unit 1) and outage work control (Unit 2) were made by the team.

2.6.1 Operational Mode Work Control

At Nine Mile Point Unit 1, the team observed effective control of maintenance work with the plant in an operational mode. The current work control organization at Unit 1 (following a September 1990 site reorganization) consists of (1) a work control center (WCC) which prepares incoming maintenance work requests for field work and documents work progress and planned work in a computerized data base as well as a tabulated daily schedule, (2) an outage planning department which prepares work schedules for major outages, and (3) a planning support department which develops customized reports for plant supervisors based on the maintenance work data bases (including preventive maintenance and surveillance tests).

The WCC is the focal point for the planning, scheduling and control of day-to-day maintenance work. Incoming work requests are staged for work by WCC work planners/evaluators in each of the three maintenance planning areas of mechanical, electrical and I&C maintenance. Staging includes the assignment of primary and supporting work responsibilities, work prioritization, markup (tagging) requests, materials and parts requests, required permits (fire, radiation work permits, asbestos, etc.), inclusion of appropriate procedures and drawings, identification of required post-maintenance testing, completion of a newly developed work in progress (WIP) sheet, and acquiring appropriate pre-implementation approvals. The maintenance planning areas are supported by an operations scheduling department within the WCC which develops the daily work schedule. This schedule includes preventive maintenance and surveillance testing as well as corrective maintenance. The daily work schedule includes work planned for the day as well as work planned for the upcoming week. Operations scheduling is currently working on the development of a quarterly look-ahead schedule for preventive maintenance and surveillance tests to allow for better assessment of manpower needs over that time frame. WCC planners and support personnel observed during the week of the inspection were found by the team to be knowledgeable of the plant and cognizant of their duties within the work control process.

Daily planning meetings provided an effective means of assessing work in progress and planning future work. A meeting was held each weekday morning to discuss plant status, work to be done that day, and work which had been completed on the previous day. The need to address required surveillances which were approaching the limit of their allowed surveillance interval was also a topic of discussion. This morning meeting was chaired by an individual from the operations department (the operations planner) who interfaces almost continuously with the WCC. The operations planner works for the operations department, not for the operations scheduling group within the WCC.

Another planning meeting was every weekday afternoon to discuss the progress of work being performed that day and preparations for work to be done on the evening shifts. This meeting was chaired by the General Supervisor of the WCC with significant input from the operations planner. In addition to the mechanical, electrical and I&C maintenance planners, this meeting (as well as the morning planning meeting) was attended by individuals from other site departments (radiation protection, fire protection, chemistry, reactor analysis, regulatory compliance, materials, site and system engineering, and inservice inspection) who have been designated to provide support to the work planning efforts of the WCC. Also, a weekly planning meeting has recently been established at which a plan of action for all work for the following week is discussed, including planned corrective maintenance requests, contingency work requests (corrective maintenance work requests which are staged but are yet to be scheduled), preventive maintenance, and surveillance tests. The team observed one of these meetings which was chaired by the operations planner and other operations department personnel. This meeting appeared to provide an effective means for all plant departments to voice their needs and concerns regarding the scheduling and performance of upcoming work.

In summary, the team found that the Nine Mile Point Unit 1 WCC was effectively planning, scheduling and controlling maintenance work with the plant in an operational mode. Scheduled, periodic planning meetings provided a valuable group interface among all site departments who perform, support, or are affected by maintenance work. Individuals from other departments who are designated to support WCC efforts are cognizant of their responsibility to interface with the WCC as evidenced by their presence in planning meetings and by observed

interactions with WCC personnel. The inclusion of the operations planner position within the operations department has provided a strong interface between plant operations and the work control function and appears to have increased work planning effectiveness through knowledge of plant status and informed assessments of plant impact. While not evaluated in detail at Unit 1, the team noted that the operations planner is cognizant of his responsibility to maintain a constant interface with the outage planning side of the Unit 1 work control organization to provide needed continuity in the area of operations department interface and plant impact assessment for outage activities.

2.6.2 Outage Planning and Work Control

At Nine Mile Point Unit 2, the team observed Niagara Mohawk's efforts in maintaining and controlling work for the refueling outage and in adjusting the outage schedule, as needed, to compensate for delays in the completion of certain outage activities. While problems in providing the plant staff with a realistic, useable outage work schedule were noted, the team noted that the schedular problems were acknowledged and that appropriate actions were taken to assure that upcoming work was performed in the proper sequence and that plant impact was appropriately addressed.

Planning for the 1990 Unit 2 refueling outage began in early 1990 with the formation of the outage management group. This group consisted of both Niagara Mohawk employees and contract personnel, some with Nine Mile Point plant operations experience. The outage management group did not work within the same department as those who were controlling day-to-day maintenance work at Unit 2 prior to shutdown for the refueling outage. While the September 1990 site reorganization placed operational mode work control (the WCC) and outage planning in the same department (similar to Unit 1), Niagara Mohawk decided to maintain the pre-outage organization due to the close proximity of the start of the outage. The Unit 2 WCC was designated to contribute to the outage management effort by staging incoming work requests during the outage and notifying the outage management group of the need to adjust the schedule due to the incoming work.

Outage management group efforts prior to the outage involved placing specified corrective maintenance, preventive maintenance, surveillance tests, and modifications into an integrated schedule. Work packages were readied for implementation by planners within the outage management group. During the week of the inspection, the team observed several outage planning and status meetings, interviewed outage planning and WCC personnel, and reviewed outage work packages.

Early in the week, scheduling problems were apparent. Significant alteration of the outage schedule had been required due to delays in certain major outage activities. In particular, recirculation pump work, local leak rate testing, and a recent change in the scope of the Division 2 electrical bus outage required large scale shifting of outage activities within the schedule. These large scale changes required concurrent efforts to assure that the altered sequence of outage activities was logical, efficient, and sensitive to plant conditions and plant safety. The initially revised schedules were somewhat confusing due to inaccurate job time estimates, improper logic sequences for certain activities, consideration of resources impacts for concurrent activities, and incomplete plant impact assessments. These difficulties resulted in an apparent lack of confidence in the schedule by the plant staff as evidenced by reactions during outage status/planning meetings and by delays in the implementation of jobs in the field. WCC planners who monitored the ongoing outage work noted that the published 4 day look-ahead work schedule was not particularly realistic and that the sheer volume of information contained in that 4 day look-ahead schedule made it difficult for anyone to make an overall assessment of schedule progress. Also, the team noted significant delays in the release of work to the field by the control room staff. In some cases, the team noted significant control room staff efforts to completely reverify work package plant impact assessments.

Niagara Mohawk acknowledged the schedular difficulties and took actions to compensate for them. An increase in the amount of interaction between outage management personnel and WCC personnel was noted. Additional personnel from the operations department were assigned to the operations scheduling portion of the WCC to assist in the reevaluation of work packages to assure readiness for implementation. Efforts were made to assure that the plant impact portion of the WIP sheets for each job was correct. The team observed that the large majority of the work package WIP sheets had to be either significantly reworked or redone in their entirety. This was in part due to inadequate WIP preparation during the pre-outage planning stage. The team also observed that modification package WIP sheets were somewhat lacking in detail with regard to plant impact. The work package reevaluation effort during the week of the inspection was observed to be thorough and technically sound, and resulted in notable improvements in the pre-implementation plant impact assessments.

In a concurrent effort to reestablish credibility for the outage schedule, outage management commenced manual input to the scheduling program. Also, an additional daily planning meeting was established to promote closer monitoring of outage work and potential interface problems by outage management and WCC planning personnel. These efforts appeared to be an effective approach to re-establishing the integrity of the schedule.

Overall the team found that Niagara Mohawk always took steps, to assure that outage work packages were ready for field implementation and that plant impact was properly assessed for the performance of work. The team noted, and Niagara Mohawk acknowledged, that the pre-staging of work packages prior to the outage was in some cases lacking, particularly in the area of plant impact assessment.

While Niagara Mohawk's efforts to reassess outage work plant impacts were appropriate and thorough, the extent of these efforts could have been minimized by more thorough pre-outage planning input. The team noted that enhanced participation of the WCC operations planning function in the outage planning/scheduling area during the week of the inspection contributed substantially to the reestablishment of schedular integrity. This demonstrated the importance of informed input to the plant impact portion of outage preparations. Formal adoption of the new organizational structure (with the WCC and outage planning functions in the same department) is intended to provide needed continuity for the operations planning area as it relates to outage preparation.

2.6.3 Work In Progress (WIP) Sheets

As a result of past problems noted in the areas of work activity coordination and the assessment of the impact of work on the plant, Niagara Mohawk recently instituted the inclusion of a Work In Progress (WIP) sheet in work packages. The WIP sheet includes information related to equipment and plant impacts, post-maintenance test requirements, and other pertinent information which designates the conditions under which the work can be performed. Approval of the information included on the WIP is required by the licensed operators in the control room prior to the performance of work.

The team observed the development of the WIP sheets as part of the work planning process, control room review and approval of WIP sheets prior to the release of work to the field, and adherence to the information provided in the WIP sheets for work performed in the field. The team found that the WIP sheets are generated, reviewed, approved and employed in the field as prescribed in the station administrative procedure which describes their use (AP-5.2.5, Work In Progress). The team found that the information included on the WIP sheets reviewed was, for the most part, in sufficient detail and adequately researched. However, the team noted several areas where the WIP sheets could have contributed to more effective performance of work by the inclusion of more detail. Particularly, at Nine Mile Point Unit 2, WIPs developed prior to the refueling outage for outage work packages lacked significant detail. While the team acknowledged that the pre-outage assessment of plant impact must be somewhat preliminary due to unanticipated schedule changes during the outage, an appreciable amount of detail may still be included on the WIP sheet (i.e., Technical Specifications affected, control room annunciators which will sound, potential ALARA considerations, and known system interactions). To the contrary, the team found that a significant amount of resources were dedicated during the inspection to bringing outage work package WIPs up to an acceptable level of detail prior to the implementation of work. The team also noted similar lack of detail in some of the WIPs prepared by design engineering for outage modification packages.

The team concluded that the use of the WIP sheets provided a good method of controlling the impact of maintenance work. While the WIPs released to the field were always found to provide an adequate amount of detail for the work being performed, more specific detail could have been provided in some cases and a better understanding of operational plant impacts could have resulted in better pre-outage development of WIP sheets.

2.7 Control and Use of Scaffolding

The team identified several concerns with the control and use of scaffolding at Nine Mile Point Unit 2. These concerns included the lack of engineering evaluations for scaffolding erected in the vicinity of safety related equipment and inadequate personnel safety tagging of erected scaffolds.

Niagara Mohawk's Nuclear Engineering and Licensing Procedure NEL-064, "Temporary Scaffolds in Areas Containing Safety Related Components - Engineering Evaluation," step 6.2.5.c states that "use of scaffolding is not permitted until Engineering has inspected and approved the support system for use." The purpose of the engineering evaluation was to ensure that in the event of a seismic event, the scaffolding would not damage safety related equipment.

The team found that 25 scaffolds (approximately one-half of all scaffolds inspected) erected in safety related areas released for use, lacked the required engineering evaluation. Of particular concern was a scaffold erected on top of and supported by the Division I Emergency Diesel Generator (EDG) with posts and runners installed between various EDG support components without adequate clearances. The Division 1 EDG was required to be operable by technical specifications. Another scaffold of particular concern was erected adjacent to the Division III EDG which was found to have inadequate clearance (approximately 1/4 inch) between the scaffold platform and the EDG's fuel filter. This EDG was not operable at the time of the inspection. In response to the team's concerns, an evaluation by Niagara Mohawk's Site Engineering Department resulted in the removal of the scaffold on the Division I EDG and the relocation of the scaffold associated with the Division III EDG. Additional scaffolds were identified by Site Engineers as seismic concerns and were removed.

The apparent root cause for engineering evaluations of scaffolds not being performed was that the scaffold erection foremen failed to notify Site Engineering as required by Maintenance Administrative Instruction S-MAI-5.4-002 "Administrative Control of Scaffolding." It appeared that since approximately October 7, 1990, no scaffolds in safety related areas were evaluated by the Site Engineers as required.

The team also identified several scaffolds that were improperly tagged. 5-MAI-5.4-002 required that scaffolds erected without the required toe boards, top rails, midrails, bracing, or screening be tagged with a red card requiring any user to take appropriate compensatory personnel safety measures (e.g., safety harnesses). For scaffolds which met all requirements, a green card was used to inform users that no additional personnel safety equipment was required. Over 20 scaffolds were identified that did not meet all requirements but which had green card tags or had no tags at all.

The team brought these concerns to senior management attention, and their response to the concerns was good. At the end of the inspection, Niagara Mohawk committed to perform the following corrective actions:

-- Identify all scaffolds that lacked the required engineering evaluation and correct any deficiencies,

-- ensure scaffold personnel safety tags were correct or to correct scaffold deficiencies, and

-- conduct training for personnel involved with the erection of scaffold to reinforce Niagara Mohawk's scaffolding requirements.

These corrective actions were in the progress at the end of the inspection. Subsequent to the inspection, Niagara Mohawk determined that approximately 118 scaffolds were erected in Unit 2 safety related areas excluding the drywell, of which approximately 60 required rework or disassembly.

The team concluded that the identified deficiencies represented a weakness in Niagara Mohawk's oversight of an important maintenance support function, i.e, the control and use of scaffolding. Engineering evaluations were not performed for erected scaffolds in safety related areas as required by procedure. Scaffolds were incorrectly tagged as being safe for personnel use contrary to written procedure. The lack of adequate control and use of deficient scaffolding was widespread as evidenced by the significant number of scaffolds that required rework or disassembly following engineering evaluation. Once brought to the attention of site management, response to the team concerns was good. The corrective actions committed to by site management appeared to be adequate. The failure to follow established procedures for the control and use of scaffolding is a violation (50-410/90-80-01).

3.0 MANAGEMENT MEETINGS

On October 19, 1990 the MPAT team conducted an exit meeting to discuss the team's findings with Niagara Mohawk management representatives. Meetings to discuss preliminary inspection findings with site management were held by the team leader throughout the week of the inspection.