U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket/Report Nos.:	50-220/96-11 50-410/96-11
License Nos.:	DPR-63 NPF-69
Licensee:	Niagara Mohawk Power Corporation P. O. Box 63 Lycoming, NY 13093
Facility:	Nine Mile Point, Units 1 and 2
Location:	Scriba, New York
Dates:	September 8 - October 19, 1996
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EXECUTIVE SUMMARY

Nine Mile Point Units 1 and 2
50-220/96-11 & 50-410/96-11
September 8 - October 19, 1996

This integrated inspection report includes reviews of licensee operations, engineering, maintenance, and plant support. The report covers a 6-week period of resident inspection. In addition, it includes the results of an announced inspection by a regional specialist in the area of radiological protection.

PLANT OPERATIONS

During this inspection period, Unit 2 started its fifth refueling outage (RF05). The use of a specific procedure to aid the control room operators in monitoring safety functions and assuring that required safety systems were sufficiently available for the shutdown condition was an enhancement to safe operations.

The Unit 2 refueling activities were generally well performed; this was the first time that Unit 2 performed a core shuffle vice a full core offload. However, there was one mispositioning event, due to multiple personnel errors; specifically, poor supervisory oversight and over-reliance upon the other bridge crew members to identify any problems.

A review of overtime use at Unit 1 identified tracking inconsistencies between the branches, and sometimes within a branch; but no violations were identified. Also, some individuals were identified as working ten or more consecutive days; the inspectors were concerned that this could result in personnel fatigue problems.

MAINTENANCE

At Unit 1, a surveillance was observed to be especially well controlled and conducted in a professional manner, with good coordination between the senior I&C technician and control room operators.

For Unit 2 RF05, the licensee staffed the outage control center with three senior managers, which contributed to a better focus by the center staff and provided for excellent coordination of activities. The Unit 2 Plant Manager was observed frequently in the plant.

ENGINEERING

Due to an inadequate plan for the inspection and cleaning of the Unit 2 suppression pool during RF04, NMPC did not remove a significant amount of debris that was located in the downcomers. As a result, a significant amount of debris was found in the suppression pool and downcomers during RF05. The preliminary engineering evaluation indicated that the operability of the emergency core cooling system (ECCS) pumps could have been compromised due to suction strainer clogging. This is unresolved pending further NRC review. (URI 96-11-01)

Executive Summary (cont.)

The design of the new alternate decay heat removal (ADH) system was conservative. The installation of the ADH system was well coordinated. The engineering involvement, and the maintenance and operations departments support, during the construction and testing of the system were noteworthy. The acceptance testing had good supervisory oversight. Overall, the ADH modification was appropriately managed.

PLANT SUPPORT

Overall, performance in the radiation protection (RP) area was considered to be good. Radiological controls were effectively implemented during the Unit 2 refueling outage. The RP organization was well staffed and able to meet the outage workload. Radiation worker practices appeared to have improved relative to previous observations.

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SUMMARY OF ACTIVITIES

Niagara Mohawk Power Corporation (NMPC) Activities

Unit 1

During this inspection period, Nine Mile Point Unit 1 (Unit 1) operated at full power.

Unit 2

Nine Mile Point Unit 2 (Unit 2) started the inspection period at full power. On September 27, 1996, NMPC shutdown Unit 2 for the refueling outage. The turbine generator output breaker was opened at 8:45 p.m. on September 27, and the reactor was shutdown at 2:17 a.m. on September 28. The outage duration was scheduled for 35 days.

Nuclear Regulatory Commission (NRC) Staff Activities

Inspection Activities

The NRC conducted inspection activities during normal, backshift, and deep backshift hours. In addition to the inspection activities completed by the resident inspectors, a region based inspector conducted a review of the radiological protection program.

Updated Final Safety Analysis Report (UFSAR) Reviews

A recent discovery of a licensee operating their facility in a manner contrary to the UFSAR description highlighted the need for additional verification that licensees were complying with UFSAR commitments. While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the UFSAR related to the areas inspected. The inspectors verified that the UFSAR wording was consistent with the observed plant practices, procedures and/or parameters.

I. OPERATIONS

O1 Conduct of Operations (71707) [1]

O1.1 General Comments

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. In general, the conduct of operations was well controlled and focused on safety. Specific events and noteworthy observations are detailed in the sections below.

O3 Operations Procedures and Documentation

O3.1 Unit 2 - Shutdown Safety Verification

a. *Inspection Scope*

Unit 2 shutdown during the inspection period to start their fifth refueling outage. Since the shutdown condition is an infrequent mode of operation, a specific procedure is used by NMPC for shutdown safety verification. The inspectors reviewed the Unit 2 procedure for adequacy and clarity.

b. Observations and Findings

On September 27, 1996, Unit 2 was shutdown to start the fifth refueling outage (RFO5). To support the shutdown operation, assist the operators in monitoring safety systems, and assure that a minimum number of the safety systems were available during the changing system configurations, NMPC used a procedure designed to verify that safety functions were adequately available. The six safety functions were:

- reactor vessel decay heat removal,
- spent fuel pool decay heat removal,
- inventory controls,
- electrical power availability,
- reactivity controls, and
- secondary containment

The inspectors reviewed Unit 2 procedure N2-ODI-5.60, "Shutdown Operations Protection Instruction," Revision 2, and compared it to the Nine Mile higher tier Nuclear Interface Procedure (NIP) NIP-OUT-01, "Shutdown Safety." The inspectors verified that the systems and requirements of the NIP were translated into the

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[1] Topical headings such as O1, M8, etc., are used in accordance with the NRC standardized reactor inspection report outline. Individual reports are not expected to address all outline topics. The NRC inspection manual procedure or temporary instruction that was used as inspection guidance is listed for each applicable report section.

Unit 2 procedure, including the delineation of responsibilities for the operations department. The inspectors noted the operations department was responsible for maintaining the unit in a safe condition by monitoring plant status and ensuring that equipment was maintained using a defense-in-depth configuration. The NIP also noted that the outage department was charged with scheduling work activities such that redundant equipment within each safety function was not scheduled for maintenance at the same time.

c. Conclusions

During independent safety verifications, the inspectors confirmed that all noted safety functions were consistent with the Unit 2 staff assessment. In addition, the inspectors considered the shutdown safety verification procedure to be an enhancement to aid the control room operators in monitoring plant conditions and assuring that safety functions are sufficiently available for the shutdown condition.

O4 Operator Knowledge and Performance

O4.1 Mispositioning of Fuel Bundle During Unit 2 Refueling Outage

a. Inspection Scope

On October 13, 1996, while performing a core shuffle at Unit 2 as part of the refueling outage, a core verification of fuel bundle locations by reactor engineering personnel identified a discrepancy in the loading pattern. The inspectors reviewed the fuel handling procedure, discussed the event with shift management and personnel, and reviewed the shutdown margin calculations.

b. Observations and Findings

In previous Unit 2 outages, the licensee off-loaded the entire core to the spent fuel pool (SFP), then reloaded the core with a combination of new fuel bundles and partially expended fuel bundles. During RFO5, the licensee shuffled fuel for the first time. During the fuel shuffle, a percentage of the fuel bundles were removed from the core and placed in the SFP. The remaining fuel bundles were moved within the core to a new location; the core loading was completed by moving new fuel and expended fuel back into the core from the SFP.

Fuel moves were accomplished from a refueling bridge, which traverses on rails over the SFP and the reactor core. The crew of the refueling bridge consists of at least four people:

- the on-site supervisor, a licensed fuel-handling senior reactor operator (LSRO);
- the fuel handler, the individual responsible for controlling the fuel bridge and the fuel grapple, in this case, a General Electric contract employee;
- the reactor analyst, one of two individuals responsible for verifying that the correct fuel bundle is being moved and placed in the right position; and

- the fuel spotter, the second individual responsible for verifying the correct fuel bundle and location, also a General Electric contract employee.

On October 13, 1996, during a core verification by Unit 2 reactor engineering personnel, a discrepancy was identified in the loading pattern. Specifically, core location 05-12 should have been empty, but contained a fuel bundle; and location 07-12 should have contained a fuel bundle, but was empty. All fuel movement was stopped until the discrepancy could be resolved.

NMPC documented the event on a deviation/event report (DER 2-96-2628). The licensee determined that instead of removing the fuel bundle in core location 05-12, the refueling crew inadvertently removed the fuel bundle from core location 07-12. The DER described the root cause as being poor work practices, combined with fatigue and poor visibility due to thermal currents in the reactor vessel. The fuel handler thought that he had grabbed the correct fuel bundle; the bridge was positioned properly, but a slight angle of the grapple mast resulted in grabbing an adjacent fuel bundle. The reactor analyst "verified" that the correct bundle was grabbed; but he was unsure because of the ripple effect on the pool surface due to thermal currents. The fuel spotter also could not see clearly. In addition, the fuel spotter was tired due to working every day for the last 40 days, and reporting for work early that day. Both the reactor analyst and the fuel spotter relied on the other to identify any discrepancies.

Immediate corrective actions by NMPC included stopping all core alterations until the cause of the mispositioning was determined, and an analysis of shutdown margin was performed. Prior to recommencing fuel shuffling, the mispositioned fuel bundle was returned to the correct position. In addition, the crews were reminded regarding monitoring for fatigue; and the crews were rotated more frequently, every two hours vice every three. Several other enhancements improved the ability of the spotters to accurately verify conditions in the core. In addition, NMPC management emphasized the need to independently verify proper fuel moves with the refueling crews.

The inspectors discussed the event with Unit 2 operations management and some of the personnel involved with the mispositioning. The inspectors reviewed the DER and the fuel handling procedure (N2-FHP-13.3, "Core Shuffle," Revision 0) prior to NMPC restarting fuel movement. Also, the inspectors monitored the fuel handling activities frequently during the remainder of the core load and observed no further instances of mispositionings. The failure to adequately ensure that the proper fuel bundle was being moved during the core shuffle was a violation of N2-FHP-13.3. However, based on the low safety significance of this event, the immediate corrective actions and actions taken to preclude recurrence, this licensee identified violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy.

c. Conclusions

The Unit 2 refueling activities were generally well performed. However, there was one mispositioning, due to multiple personnel errors; specifically, poor oversight by the LSRO on the refueling bridge, worker fatigue, and over-reliance upon the other bridge crew members to identify any problems.

O8 Miscellaneous Operations Issues (71707,92901)

O8.1 Review of Local Public Document Room

On August 28 and 29, 1996, representatives from the NRC Office of Administration visited the local public document room (LPDR) for the Nine Mile Point and Fitzpatrick nuclear power stations. The LPDR material was found to be in good order, and the local staff was knowledgeable in the use of the NRC's document retrieval system (NUDOCS). The NRC staff conducted two demonstrations of the NUDOCS system, which were observed by employees of both sites, and members of the public.

O8.2 Review of Unit 1 Overtime

a. Inspection Scope

The inspectors conducted a review of the use of routine overtime at Unit 1 to verify compliance with the requirements of TS 6.2.2.h, including the administrative procedure, "Control of Working Hours," GAP-FFD-02, Revision 02, governing the use of overtime. The inspectors reviewed a sampling of operator time sheets; discussed overtime policy with staff and management; and examined the tracking of work time with supervision and management.

b. Observations and Findings

The inspectors reviewed time sheets for two, three-week periods. One of the three-week periods encompassed the forced outage to repair the #13 feedwater pump. Time sheets for the following branches were reviewed: operations, reactor engineering, chemistry, radiation protection, and mechanical and electrical maintenance.

Each branch recorded and managed the time reporting uniquely. Inconsistencies often existed within the same branch with respect to the documentation for shift turnover and meal times and total working hours. Most branches did not specifically delineate how personnel spent their time on site; this caused confusion during the review of the time sheets. The inspectors questioned supervision regarding working hours which appeared to exceed TS 6.2.2.h requirements. Supervisors often assumed that excessive working hours resulted from extended shift turnovers and meal breaks. The inspectors considered the lack of detailed documentation to be a weakness in the control of overtime and could lead to unknowingly exceeding the TS requirements.

The inspectors reviewed several Overtime Deviation Requests. All the requests were approved by plant management, as required. The requests appeared to be based exclusively on completion of critical path work associated with the repair of #13 feedwater pump. However, the inspectors noted that there was not a routine use of Overtime Deviation Requests. Many approved requests would result in personnel exceeding the requirement for no more than 72 hours in a 7-day time period.

Individual overtime guidelines specified in procedure GAP-FFD-02, Section 3.2.1, were consistent with the TS, with one exception. The procedure allowed the exclusion of non-working lunch breaks and shift turnovers from total working hours; the TS only discussed shift turnover time. The inspectors reviewed NMPC internal correspondence dated December 7, 1995, which stated that the Station Operations Review Committee (SORC) "concurred with the exclusion of non-working lunch breaks based upon their knowledge of license basis information." The inspectors discussed the discrepancy regarding the working lunch breaks with the NRC Office of Reactor Regulation, and found that this practice is not uncommon and is considered acceptable. The inspectors noted that only the radiological protection and maintenance branches used the non-working lunch break and deducted this time from total hours worked.

The inspectors identified that some operations personnel worked 10 consecutive days and up to 12 hours/day; some maintenance personnel worked 14 consecutive days and up to 12 hours/day; and, a reactor engineer worked 17 consecutive days. However, none of the above exceeded the TS requirements. The inspectors were concerned that excessive days worked without a break could lead to fatigue and ultimately errors. They discussed their concern with NMPC management, who stated that they understood the concern, but that the individual and respective supervisor were responsible for ensuring worker attentiveness. Management noted that the practice of working consecutive days was not routine, but utilized only when required to support critical path work and schedule deadlines.

The inspectors did not identify any current personnel errors at Unit 1 directly attributable to fatigue. However, an individual at Unit 2 worked 40 consecutive days; and fatigue was identified as a contributing cause to the wrong fuel bundle being moved during the Unit 2 core shuffle. (see Section O4.1 of this report)

c. Conclusions

The tracking of overtime at Unit 1 is not well delineated or formally structured. Inconsistencies were noted between the branches, and sometimes within a branch, including the use of non-working meal breaks. The use of deviation requests to allow an individual to exceed TS requirements was primarily production oriented, to expedite completion of critical path work. No violations of TS overtime requirements were identified.

II. MAINTENANCE [2]

M1 Conduct of Maintenance (61726, 62707)

Using Inspection Procedures 61726 and 62707, the inspectors periodically observed plant maintenance activities and performance of various surveillance tests. In general, maintenance and surveillance activities were conducted professionally, with the work orders (WOs) and necessary procedures in use at the work site, and with the appropriate focus on safety. Specific activities and observations are detailed below. The inspectors reviewed procedures and observed portions of the following maintenance/surveillance activities:

- N1-ISP-036-007 Unit 1 - Hi/Low Reactor Pressure Trip Channel Test/Calibration (½ Scram)
- N2-MFT-125 Unit 2 - Modification Functional Testing for the Alternate Decay Heat Removal System
- N2-STP-047 Unit 2 - Thermal Performance Testing of the Alternate Decay Heat Removal System
- N2-TTP-ADH-001 Testing of Secondary Containment Boundaries for the Alternate Decay heat Removal System

M1.1 Unit 1 - Reactor Pressure Trip Channel Calibration

a. Inspection Scope (61726)

On September 25, 1996, the inspectors observed performance of a Unit 1 surveillance procedure, N1-ISP-036-007, Revision 1, "Hi/Low Reactor Pressure Trip Channel Test/Calibration (1/2 scram)." The surveillance test verified the operability and calibration of the reactor high pressure scram, the reactor low pressure main steam isolation, and the remote shutdown panel reactor pressure instrument channels.

b. Observations and Findings

The inspectors reviewed the reference procedure and applicable TS prior to the surveillance test. The surveillance procedure scope and content adequately verified the operability and calibration of the affected instrument channels. Instrument & Control (I&C) technicians and control room staff adhered to the appropriate TSs regarding instrument channel operability during conduct of the surveillance.

The surveillance was controlled from the Unit 1 control room by a senior I&C technician, with I&C supervisory oversight. All directions originated from the control room to the I&C personnel at the remote locations in the reactor building. The inspectors monitored the performance of the test from both the control room

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[2] Surveillance activities are included under "Maintenance." For example, a section involving surveillance observations might be included as a separate sub-topic under M1, "Conduct of Maintenance."

and reactor building. Communications were sufficient to ensure an adequate transfer of information, though not strictly using the three-way format recently adopted at Unit 1.

The inspectors questioned the technicians and supervisors regarding expected equipment response. All parties were knowledgeable and appeared experienced in system operation and anticipated system response. Control room operations staff were cognizant of the evolution in progress. In accordance with the surveillance procedure, the I&C technicians periodically updated the control room staff regarding the testing status.

The inspectors reviewed the completed surveillance procedure. The surveillance test results were evaluated by I&C maintenance supervision and considered satisfactory. The final recorded data was complete and within required specification.

c. Conclusions

Overall, NMPC conducted the surveillance test in a controlled and professional manner. The inspectors noted good coordination between the senior I&C technician and control room operators. I&C communications between the control room and reactor building were adequate to ensure the transmitted information was accurate and understood. The surveillance test package received a prompt and thorough supervisory review. The inspectors did not identify any safety concerns.

M1.2 Unit 2 - Outage Observations

The Unit 2 fifth refueling outage (RFO5) started on September 27, 1996. The outage was scheduled to be completed in 35 days. The major work scheduled included refueling, high pressure turbine blade replacement, non-safety related bus work, and chemical cleaning of the service water system.

The inspectors monitored portions of the shutdown and cooldown, observed refueling activities and ongoing maintenance, and frequently attended the shift planning meetings. During this outage, the "war room" was staffed with three senior managers, called Outage Shift Managers, during each shift; the inspectors noted that this seemed to contribute to a better focus by the war room staff compared to previous outages. This provided for excellent coordination of activities, and included the flexibility for one shift manager to follow specific issues while the other shift managers maintained the cognizance of the overall direction of the outage. The inspectors noted that the Unit 2 Plant Manager routinely attended the shift meetings, and was observed frequently in the plant monitoring activities and progress of work. During tours of the unit, the inspectors discussed minor problems with the local supervisors and/or the war room shift managers. As of the end of the inspection period, no major deficiencies were identified.

III. ENGINEERING

E2 Engineering Support of Facilities and Equipment (37551)

E2.1 Unit 2 - ECCS Pumps Inoperable due to Debris in Downcomers

a. Inspection Scope

On October 14, 1996, NMPC identified foreign material in the Unit 2 suppression pool downcomers during an inspection. Subsequently, on October 16, the licensee identified that seven of the eight downcomers directly under the reactor vessel had, what appeared to be, hard plastic covers on the top of the downcomers.

The inspectors reviewed the video tapes of the camera inspections, the DERs, and associated draft engineering evaluations. The inspectors questioned the operability of the suppression pool and the potential negative impact on the emergency core cooling system (ECCS) pump suction strainers.

b. Observations and Findings

During Unit 2's fourth refueling outage (RFO4), conducted April - June 1995, NMPC cleaned the suppression pool in expectation of the issuance of related NRC guidance. The efforts during RFO4 did not include cleaning or an examination of the downcomers. NRC Bulletin 95-02, "Unexpected Clogging of a RHR Pump Strainer While Operating in Suppression Pool Cooling Mode," was issued October 17, 1995. NMPC's response to the Bulletin (dated November 16, 1995), noted the following:

> "... suppression chamber was thoroughly cleaned and inspected prior to initial filling ... The ECCS and RCIC suction strainers and suppression pool ... were also thoroughly cleaned during the last refueling outage ... No debris remained in the pool of a size or quantity that could plug the strainers. ..."

On October 14, 1996, during the fifth refueling outage (RFO5), NMPC found a significant amount of additional foreign material during an inspection of the Unit 2 suppression pool; the inspection was being performed remotely by use of a submersible camera. The inspection was not expected to identify any substantial amount of debris because of the cleaning conducted during RFO4. A diver was contracted to clean the pool; the diver had recently performed a cleaning and inspection at the LaSalle nuclear power plant. As part of the inspection at LaSalle, the licensee (Commonwealth Edison) had examined the downcomers and found minimum debris. A downcomer is a hollow steel vent pipe, about 50 feet in length, which penetrates the drywell floor, and connects the drywell atmosphere to the water in the suppression pool. The suppression pool is filled with water and provides for the rapid condensation and cooling of the steam-water mixture which would result from a loss of coolant accident (LOCA). There are 121 downcomers in the Nine Mile Point Unit 2 primary containment; eight of the downcomers are located directly beneath the reactor vessel, inside the pedestal support.

Based on the diver's recommendation, NMPC initiated an examination of ten downcomers, as a sample population, using a camera lowered down from the top of the pipe. Debris was found in 3 of the first 5 inspected. Subsequently, a deviation/event report (DER 2-96-2640) was initiated, and the inspection was expanded to include 100% of the 121 downcomers. On October 16, during the visual examinations, NMPC found that seven of the eight downcomers located in the pedestal support under the reactor vessel appeared to have a hard cover over the top of the downcomer. DER 2-96-2690 was initiated to resolve this condition. NMPC believed that the covers were left over from the initial construction of Nine Mile Point Unit 2. The initial results of the visual examinations were: 49 downcomers were clean , 48 had minimal debris (e.g. a piece of tape or a pen), 17 had excessive debris (large plastic bags, hard hats, rubber gloves, tygon tubing), and 7 that were covered under the reactor vessel remained uninspected as of the end of the inspection period.

Preliminary analysis by NMPC engineering indicated that the design suppression function of the pool was not exceeded. However, the analysis also indicated that the ECCS pumps would potentially have been inoperable due to clogging of the pump suction strainers. Based on the visual inspections of the downcomers, NMPC estimated that 47 square foot (ft^2) of material was available to block the strainers. There are six pumps designed to take a suction from the suppression pool. The suction strainers for the high pressure core spray (HPCS) pump and the low pressure core spray (LPCS) pump each have a surface area of approximately 20 ft^2. The high pressure reactor core isolation cooling (RCIC) pump and the three low pressure coolant injection (LPCI) pumps each have a surface area of approximately 33 ft^2. The high pressure pumps (HPCS and RCIC) initially take a suction from the condensate storage tank (CST); when the level in the CST decreases to a predetermined value, the HPCS and RCIC pumps swap the suction to the suppression pool. The low pressure pumps only take a suction from the suppression pool.

NMPC started cleaning the downcomers and initiated an engineering evaluation to review the design basis of the suppression pool. The engineering evaluation will include a determination of the minimum number of downcomers needed for accident analysis, the specific significance of the under vessel downcomers, and the effect the foreign material in the downcomers would have on the ECCS suction strainers. Pending further NRC review, this item will remain unresolved.
(URI 50-410/96-11-01)

c. Conclusion

Due to an inadequate plan for the inspection and cleaning of the Unit 2 suppression pool during RF04, NMPC did not remove a significant amount of debris that was located in the downcomers. The preliminary engineering evaluation by NMPC determined that the ECCS pumps would potentially have been inoperable due to suction strainer clogging. The immediate corrective actions of cleaning the downcomers and initiating a detailed engineering evaluation were appropriate. This is unresolved pending further NRC review.

E2.2 Unit 2 - Alternate Decay Heat Removal Modification

a. Inspection Scope

NMPC recently designed and installed an alternate decay heat removal system for Unit 2. This plant modification would allow both trains of the residual heat removal system to be removed from service for simultaneous maintenance.

The inspectors monitored portions of the construction activities, reviewed the safety evaluation report and the installation/test procedures, walked down the system, and observed the performance acceptance test.

b. Observations and Findings

To facilitate maintenance on the Unit 2 residual heat removal (RHR) system during major outages, NMPC designed an alternate decay heat removal (ADH) system. The ADH system, in conjunction with natural circulation, is a surrogate for the shutdown cooling mode of RHR. Unit 2 TS 3.9.11.1 requires at least one loop of RHR to be in the shutdown cooling mode whenever the plant is in a refueling condition. If no RHR shutdown cooling mode loop is operable, the TS limiting condition for operation (LCO) action statement requires the establishment of an alternate method of decay heat removal. The ADH system was designed and installed to satisfy this requirement, and allow both trains of RHR to be removed for maintenance at the same time.

The primary loop of ADH takes suction from spent fuel pool (SFP), passes the water through a heat exchanger, and returns the water to the SFP using the existing SFP cooing system. The primary loop is housed entirely in the reactor building. The heat from the primary water is transferred to a closed secondary loop via the heat exchanger, which in turns is cooled by a mechanical draft cooling tower. The secondary loop is outside, with the exception of the connections to the heat exchanger, which required two penetrations into the reactor building.

The inspectors monitored portions of the construction of the ADH system, most of which occurred while Unit 2 was operating. As part of the installation, holes needed to be drilled through the reactor building walls for the supply and return headers of the secondary loop. Unit 2 TS 3.6.5.1, requires secondary containment integrity be maintained during power operations. The inspectors questioned the system engineer with regards to maintaining secondary containment integrity during construction. Procedure N2-TTP-ADH-001, "Testing of Secondary Containment Boundaries for the Alternate Decay Heat Removal System," Revision 0, described the process and steps by which secondary containment integrity was being maintained during the installation of ADH. The procedure applied to both electrical and piping penetrations. A temporary box was installed on the inside wall of the reactor building; a leak rate test was performed on the temporary box prior to drilling the holes in the wall. The box became the secondary containment boundary during the installation of the ADH penetrations. After the piping and conduit were installed and sealed, the temporary box was removed and the piping/conduit

became the secondary containment boundary. The inspectors reviewed the procedure, and the results of each leak rate test. The installation process and the associated procedure were adequate to ensure that secondary containment was maintained.

The ADH system is not described in the Unit 2 Updated Final Safety Analysis Report (UFSAR). Therefore, the inspectors reviewed the licensing document change request (LDCR 2-96-UFS-062) and the safety evaluation (SE 96-061) related to the installation of the ADH system. The inspectors considered the LDCR, including the proposed changes to the UFSAR, and the SE to be detailed and thorough. The ADH system, as a whole, was classified as quality-related, non-safety; however, the interface with the spent fuel pool cooling system is safety related, as are the penetrations of the secondary containment.

Prior to final acceptance, the inspectors reviewed the operating procedure and the associated functional and thermal performance test procedures:

- N2-OP-115 Alternate Decay Heat Removal System, Revision 0
- N2-MFT-125 Modification Functional Testing for the Alternate Decay Heat Removal System, Revision 0
- N2-STP-047 Thermal Performance Testing of the Alternate Decay heat Removal System, Revision 0

The inspectors also walked down the ADH system, and performed an independent valve lineup check during the performance of N2-STP-047. The procedures were adequate to ensure proper testing and operation. NMPC identified several procedural enhancements during the various tests, and generated the necessary changes before proceeding. The inspectors noted a few minor discrepancies and discussed them with the system engineer and the SSS in charge of the acceptance testing.

c. Conclusion

The design, and subsequent installation, of the ADH system were well executed. The coordination and support of the engineering, maintenance and operations departments during the construction and testing were noteworthy. The acceptance testing was satisfactorily controlled, with good supervisory oversight. The ADH system enhanced the ability of Unit 2 to perform simultaneous maintenance on both trains of the RHR system, without compromising plant safety. Overall, the inspectors considered the ADH modification to be appropriately managed.

E8 Miscellaneous Engineering Issues

E8.1 (Closed) URI 50-410/94-15-01: Plant Computer Inappropriately Used to Determine Control Rod Position

In August 1994, while operating at 100% power, Unit 2 experienced a failure in the rod drive control system (RDCS). The failure resulted in the operators being unable to manually move the control rods. When the RDCS initially failed, NMPC thought

that the rod position indication system (RPIS) was also inoperable; subsequently, it was determined that the specific malfunction within RDCS did not affect RPIS. The RDCS was returned to service after approximately six hours.

Unit 2 TS 3.1.3.7 requires the RPIS to be operable when the reactor was at power. If RPIS was inoperable, the reactor is to be shutdown within the next twelve hours. However, NMPC was using the plant process computer as an alternate means of rod position indication; therefore, they did not consider themselves to be in the TS Limiting Condition for Operation (LCO). The inspectors disagreed with the NMPC interpretation in that the computer was not part of the required TS surveillance for the RPIS. TS surveillance requirement 4.1.3.7 requires that the rod position indication change during the weekly control rod exercise surveillance. The associated surveillance procedure did not ensure that the computer rod position indication changed when the control rod was moved. This issue was originally classified as an unresolved item (URI) pending further review.

The inspectors discussed this issue with staff from the NRC's Office of Nuclear Reactor Regulation (NRR) Technical Specification Branch, Systems Branch, and Instrumentation and Control Branch, as well as the NRR Project Manager. The NRR staff indicated that the Unit 2 TS did not permit the computer to be an acceptable alternative to RPIS, for the following reasons:

(1) The surveillances required by TS that support the operability of RPIS did not include a verification that the computer indication of rod position would change when control rods were moved.

(2) The computer is not qualified or calibrated to perform the task, even if the surveillance had been performed.

(3) The computer is not described as part of the RPIS in the Unit 2 UFSAR.

(4) They acknowledged that the computer is allowed for performance of the TS required thermal calculations. However, the codes used for those calculations have been reviewed and verified by the NRC staff.

Based on the above NRR guidance, the inspectors determined that the use of the plant process computer as a backup to the rod position indication system was not acceptable. The inspectors discussed this position with NMPC management; the licensee is considering the need for further action. Nonetheless, in this case, since the repairs were completed within approximately six hours, and before the allowed outage time expired for the RPIS, no violation existed and this unresolved item is closed.

IV. PLANT SUPPORT

Using Inspection Procedure 71750, the resident and specialist inspectors routinely monitored the performance of activities related to the areas of radiological controls,

chemistry, emergency preparedness, security, and fire protection. Minor deficiencies were discussed with the appropriated management, significant observations are detailed below.

R1 Radiological Protection and Chemistry (RP&C) Controls (83750)

R1.1 Unit 2 - Refueling Outage Radiation Protection

a. Inspection Scope

The inspector reviewed radiological controls implemented in the Unit 2 refueling outage (RF05). The inspector observed recirculation pump work, refueling floor work, suppression pool cleanup work, and other work activities. For the work observed, and other ongoing activities, the inspector reviewed the associated As-Low-As-is-Reasonably-Achievable (ALARA) reviews, radiation work permits (RWPs), and surveys. The inspector reviewed outage pre-planning, with an emphasis on work orders (WOs) added after the scope freeze date. The inspector made frequent tours of the radiologically controlled areas (RCAs), and interviewed radiation protection (RP) supervision, radiological engineers, and several RP technicians (RPTs).

b. Observations and Findings

ALARA

Work was being conducted in accordance with established ALARA plans. The licensee was effectively implementing ALARA program elements as exemplified by the following:

- A dedicated time frame was provided in the schedule, prior to the conduct of bulk work within the drywell, for RP related activities preparation work such as shielding installation.
- There were about 4,400 WOs initiated for RF05. There were an additional 152 WOs added (≈3.5% growth) after the April 1, 1996, RF05 outage scope freeze date. Review of selected "scope adds" and discussions with the Unit 2 General Supervisor, ALARA, indicated that effective work planning had not been precluded.
- ALARA personnel were satisfied with the performance and cooperation given by in-service inspection, operations, and engineering personnel.
- ALARA briefings attended by the inspector were well-focused.
- When challenged by the inspector, workers were aware of the dose rates in their work locations.
- The inspector noted that RPTs were very attentive and challenged individuals entering HRAs.
- Strategically placed video cameras provided direct observation of job sites and work activities. (See R2.1)

External Exposure Controls

- External exposure controls for recirculation pump and suppression pool work were excellent.
- Individuals were wearing the required dosimeters (see Section R8.2 for a licensee-identified exception).
- The entrance to the drywell was controlled as a high radiation area (HRA).

Internal Exposure Controls

- Test results of air used for breathing were acceptable for suppression pool and under-vessel work.
- Breathing air equipment for the suppression pool divers was well maintained by the RPTs and contract personnel.
- The licensee initiated in-vitro bioassay for the suppression pool divers to verify exposure evaluation.

Contamination Controls/Housekeeping

- No significant contamination control inadequacies were noted.
- There were no hot particle contamination events of regulatory concern.
- Postings and labels were generally established in accordance with the regulations. (see Section R8.1)
- Some isolated radiological housekeeping problems pertaining to the control of hoses from contaminated areas were noted. Notwithstanding, overall radiological housekeeping was good.

c. Conclusions

Implementation of radiological controls in the Unit 2 refueling outage was characterized by very good application of planning and controls for work in radiologically controlled areas.

R2 Status of RP&C Facilities and Equipment (83750)

R2.1 Unit 2 RCA Access Control during RFO5

a. Inspection Scope

The inspector interviewed RP personnel, used the RCA access control system during the course of the inspection, and observed the flow of personnel through the Unit 2 RCA control point.

The inspector toured various portions of Unit 2 and the Unit 1 turbine building, and reviewed HRA access controls. The inspector conducted surveys and discussed access controls with RP supervision.

b. Observations and Findings

The inspector noted that the Unit 2 RCA control point was separated into smaller areas ("islands"). With the exception of the refueling floor and the drywell, each ingress island was assigned an RPT to provide RP instructions. Satellite RP control points were established at the refueling floor and the entrance to the drywell. The inspector noted that it was easy for RP staff to monitor and assist workers as they entered or exited the Unit 2 RCA. Access to the Unit 2 RCA was controlled by separating the ingress and egress points. A sufficient number of portal monitors were stationed at the Unit 2 RCA control point, which helped to minimize congestion in this area. The licensee stationed junior (i.e., less experienced) RPTs to frisk items as workers left the Unit 2 RCA. Junior RPTs were also stationed at the Unit 2 RCA control point to ensure that workers made proper entries and that the electronic dosimeters had been properly reset.

All individuals entering the RCA were provided with an electronic dosimeter and signed onto a computerized radiation work permit (RWP). Workers were able to monitor their own individual accumulated exposure and area dose rate. By using satellite computer stations, workers could change to a different radiation work permit or task in the field without returning to the RCA control point. No breakdown in RCA access controls was noted during periods of high personnel flow through the RCA control point, such as the initial morning entries and lunch break. Access to the Unit 2 drywell was improved by limiting the movement of equipment through the personnel hatch area.

Responsibility for cameras was transferred from I&C to the RP department. For RF05, 27 cameras and 25 monitors were installed to monitor drywell and refueling floor activities. This was accomplished with just 70 man-hours and 300 millirem (mrem) of exposure. For comparison, during RF04, 24 cameras were installed and maintained for 250 man-hours and 750 mrem of exposure. This improvement over RF04 was achieved by: (1) upgrading the electronics and therefore improving system reliability, (2) testing equipment prior to installation, and (3) using RP personnel who were familiar with the drywell.

New decontamination facilities were completed prior to RF05 which permitted decontamination of several individuals simultaneously.

c. Conclusions

RP related facilities and equipment were well maintained and established to support outage activities. Significant improvement was noted compared to previous outages. No degradation of the RP program was noted as a result of any facilities or equipment changes.

R5 Staff Training and Qualification in RP&C (83750)

R5.1 Review of Contract RPTs used during RFO5

The inspector reviewed contract RPT resumes and observed on-going work to determine the breadth and appropriateness of contract RPT qualifications with respect to the tasks for which they had been assigned. The inspector noted that the contract RP staff were well-qualified, experienced, and well-supervised. In many cases, the contract RPTs were assigned to provide coverage for tasks which they had covered during other refueling outages, or were assigned to tasks commensurate with their experience. The inspector concluded that the outage RP organization was augmented with appropriately qualified staff.

R6 RP&C Organization and Administration (83750)

R6.1 RFO5 RP Organization and Staffing

a. Inspection Scope

The inspector reviewed the RP outage organization to determine whether staffing was sufficient to maintain occupational radiation protection safety in a high activity period for the RP organization. The inspector interviewed station personnel and observed work activities.

b. Observations and Findings

The Radiation Protection Branch Manager (RPM) informed the inspector that the RP organization was augmented by 50 senior RPTs, 8 ALARA specialists, and one site coordinator for outage contractor support. In addition, 43 junior RPTs were assigned to duties such as access control, control point assistants, and laundry. RP field supervision was augmented by the Unit 1 General Supervisor - ALARA, the Unit 2 General Supervisor - Instrumentation, 2 individuals from the emergency preparedness department, and 1 from training. Several RPTs from Unit 1 were assisting Unit 2 during the outage. Also, 32 decontamination technicians were assigned to RP for plant recovery.

RP supervision spent considerable time in the field. RP functions such as dosimeter issuance and whole body counting were generally staffed for continuous outage support. RP field operations technicians were assigned to areas of Unit 2 to provide more dedicated coverage. There were no areas of the Unit 2 RCAs where RP technicians were overly burdened.

c. Conclusions

The outage RP organization was well staffed to meet the outage workload.

R8 Miscellaneous RP&C Issues (83750, 92904)

R8.1 Improperly Controlled Unit 2 High Radiation Area

The inspector reviewed licensee actions regarding an improperly controlled high radiation area (HRA) to determine the effectiveness of licensee corrective actions. The issue was documented on DER 2-96-2376.

On October 1, 1996, a swing gate barrier to the north drywell access was found taped open by an RPT. This area was being controlled as an HRA at the access step-off-pad. Corrective actions were appropriate and included a walkdown of other HRAs to ensure that the controls were effective, discussions of the event with station staff by departmental managers, and disciplinary actions. The licensee also planned to benchmark other nuclear power plants to try to improve the controls to HRAs from a human factors standpoint.

This licensee-identified and corrected violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1 of the NRC Enforcement Policy.

R8.2 (Update) VIO 96-06-05: Inadequate Adherence to RWPs

On October 9, 1996, an individual entered the Unit 2 RCA without an electronic dosimeter, as required by the appropriate RWP. Corrective actions that should have prevented this infraction were already being implemented as a result of NOV 96-06-05; as a result the violation remains open. Additionally, disciplinary actions were imposed on the individual who entered the RCA without the electronic dosimeter and on the RP individual assigned to the RCA checkpoint.

The licensee stated that improved RWP practices were noted during the outage. To date in the outage, the inspector's observations support that radiation worker practices have generally been very good.

R8.3 (Closed) LER 50-220/96-07: Misinterpretation of Technical Specification Action Time Intervals Results in Technical Specification Violation

On August 7, 1996, Unit 1 plant management determined that technical specification (TS) 4.0.1, "Surveillance Intervals," had been inappropriately applied to TS action statements. TS 4.0.1 allows a 25 percent extension for routine surveillances contained in Section 4.0 of the TS. Surveillances required as a result of a Limiting Condition for Operation (LCO) are not permitted to be extended beyond the stated frequency. The specific surveillances pertained to out-of-service service water radiation monitors; the LCO action statement required sampling and analyzing every 12 hours. Several samples exceeded the 12-hour frequency.

During the root cause investigation, NMPC concluded that chemistry personnel did not differentiate between routine surveillance sampling intervals and those required by TS action statements. In this case, chemistry personnel believed that a 12-hour sample frequency requirement could be extended up to a 15-hour interval.

NMPC identified the apparent cause to be a knowledge deficiency regarding applicability of the 25 percent allowance for routine surveillance requirements. The licensee noted an additional contributing cause as a lack of administrative controls to differentiate between routine surveillance sampling and TS action statement sampling.

The inspectors reviewed the LER and determined that it satisfactorily described the event, the root cause evaluation, and corrective actions to prevent similar occurrences in the future. Based on the low safety significance, this licensee identified violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1. of the NRC Enforcement Policy.

R8.4 (Closed) LER 50-410/96-09: Misinterpretation of Technical Specification Action Time Intervals Results in Technical Specification Violation

On August 16, 1996, Unit 2 management determined that chemistry personnel had misinterpreted TSs similar to the practice at Unit 1 (see Section R8.3). Unit 2 TS, Section 4.0.2, allows a 25 percent extension of routine surveillances contained in Section 4.0. That latitude had been applied to some chemistry LCO action statement surveillances. Specifically, TS Table 3.3.7.9-1, "Radioactive Liquid Effluent Monitoring Instrumentation," Action 130, requires sampling and analyzing every 12 hours if a service water radiation monitor is inoperable. Some samples were collected and analyzed in excess of the 12-hour frequency.

The root cause and corrective actions discussed for Unit 1 also applied to Unit 2. The inspectors determined that the LER satisfactorily described the event. This licensee identified violation is being treated as a Non-Cited Violation, consistent with Section VII.B.1. of the NRC Enforcement Policy.

S7 Quality Assurance in Security and Safeguards Activities

S7.1 Contractor Tested Positive for Alcohol During FFD Screening

On October 21, 1996, during the Unit 2 refueling outage, an NMPC I&C supervisor was anonymously notified that a contractor supervisor was acting abnormally and appeared to have alcohol on his breath. In accordance with the NMPC Fitness for Duty (FFD) program, the I&C supervisor notified NMPC security, who escorted the contractor off-site to be tested "for-cause." The test results indicated a blood alcohol content (BAC) above the limit in 10 CFR 26.

NMPC terminated the contractor's access based on the FFD test. In addition, they reviewed his activities from when he came on site that day until he was escorted off for testing. The inspectors considered the actions taken by NMPC to be appropriate.

V. MANAGEMENT MEETINGS

X1 Exit Meeting Summary

At periodic intervals, and at the conclusion of the inspection period, meetings were held with senior station management to discuss the scope and findings of this inspection. The radiation protection specialist inspection exit meeting was held on October 11, 1996. The final exit meeting occurred on November 22, 1996.

Based on the NRC Region I review of this report, and discussions with NMPC representatives, it was determined that this report does not contain safeguards or proprietary information.

ATTACHMENT
PARTIAL LIST OF PERSONS CONTACTED

Niagara Mohawk Power Corporation

R. Abbott, Vice President, Nuclear Generation
J. Aldrich, Maintenance Manager, Unit 1
M. Balduzzi, Operations Manager, Unit 1
B. Barcomb, Radiation Protection Manager, Unit 2
C. Beckham, Manager, Quality Assurance
D. Bosnic, Operations Manager, Unit 2
J. Burton, Director, ISEG
J. Conway, Operations Manager, Unit 2
K. Dahlberg, General Manager Projects
R. Dean, Manager, Unit 2 Technical Support
M. McCormick, Vice President, Nuclear Engineering
L. Pisano, Maintenance Manager, Unit 2
N. Rademacher, Plant Manager, Unit 1
P. Smalley, Radiation Protection Manager, Unit 1
K. Sweet, Technical Manager, Unit 1
B. Sylvia, Executive Vice President - Nuclear
W. Yaeger, Manager, Engineering, Unit 1

INSPECTION PROCEDURES USED

IP 37551:	On-Site Engineering
IP 40500:	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observation
IP 71707:	Plant Operations
IP 71750:	Plant Support
IP 83750:	Occupational Radiation Exposure Control
IP 90712:	In-Office Review of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 92700:	Onsite Followup of Written Reports of Nonroutine Events at Power Reactor Facilities
IP 93702:	Prompt Onsite Response to Events at Operating Power Reactors
IP 92901:	Followup - Operations
IP 92902:	Followup - Engineering
IP 92903:	Followup - Maintenance
IP 92904:	Followup - Plant Support

ATTACHMENT
ITEMS OPENED, CLOSED, AND UPDATED

OPENED

50-410/96-11-01	URI	ECCS Pumps Inoperable due to Debris in the Downcomers

CLOSED

50-410/94-15-01	URI	Plant Computer Inappropriately Used to Determine Control Rod Position
50-220/96-07	LER	Misinterpretation of TS Action Time Intervals Results in TS Violation
50-410/96-09	LER	Misinterpretation of TS Action Time Intervals Results in TS Violation

UPDATED

50-220 & 50-410/96-06-05	VIO	Inadequate adherence to RWPs

LIST OF ACRONYMS USED

ALARA	As Low As Reasonably Achievable
CFR	Code of Federal Regulations
dpm	disintegrations per minute
ECCS	Emergency Core Cooling System
ESF	Engineered Safety Feature
HRA	High Radiation Area
IFI	Inspection Followup Item
IR	Inspection Report
LER	Licensee Event Report
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
RHR	Residual Heat Removal
RP	Radiation Protection
SRV	Safety Relief Valve
TS	Technical Specification