U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-155/94002(DRS)

Docket No. 50-155 License No. DPR-6

Licensee: Consumers Power Company
212 West Michigan Avenue
Jackson, MI 49201

Facility Name: Big Rock Point Nuclear Plant

Inspection At: Charlevoix, Michigan

Inspection Conducted: February 7 through 25, 1994

Inspectors: C. Gill — C. Gill, Team Leader — Date 3/25/94

K. Salehi — Date 3/25/94

W D Shafer for — T. Tella — Date 3/25/94

NRC Consultant: S. Shuman

Approved By: W D Shafer — W. D. Shafer, Chief, Maintenance and Outage Section — Date 3/25/94

Inspection Summary

Inspection on February 7 through 25, 1994 (Report No. 50-155/94002 (DRS)).
Areas Inspected: This inspection was a routine, announced, region-based, team inspection of engineering and maintenance activities, using selected portions of Inspection Procedures 37700 and 62700, to determine if maintenance work, design changes, engineering support, and corrective actions were effectively controlled and implemented.
Results: Within the areas inspected, two violations of NRC requirements and one unresolved item were identified. In addition, several positive licensee initiatives and several weaknesses were identified, along with other observations.

Apparent violations included failure to promptly correct a root cause for a procedural deviation in accordance with 10 CFR 50, appendix B, Criterion XVI (Section 2.1), and failure to properly implement the Quality Verification program by documenting an unacceptable condition per procedural requirements in accordance with Technical Specification 6.8.1 (Section 9.3). An unresolved item was the apparent failure to meet a commitment stated in the Final Hazards

Summary Report and in a letter to the Commission by allowing system valves to close in less than the committed time (Section 10.1). Positive licensee initiatives included system and roving engineers (Section 4.0), preventive maintenance validation (Section 8.0), and periodic and predetermined activity control (PPAC) (Section 9.0). Weaknesses identified were control of operating experience review (Section 5.0), plant review committee approval control (Section 6.0), jumper, link and bypass/temporary modification process (Section 7.0), peer inspection of maintenance (Section 9.3), documentation of and justification for deferral of PPAC activities (Section 9.5), classification, tracking, and reporting of Nuclear Performance and Assessment Department (NPAD) findings (Section 9.6), and completeness of engineering assessments (Section 10.0). Other observations were the material condition in the areas inspected, except in the pipe tunnel, was acceptable (Section 3.0), and the licensee's handling of the pump trip transient on February 8, 1994, was excellent (Section 9.1).

DETAILS

1.0 Persons Contacted

Consumers Power Company

P. Donnelly, Plant Manager
R. Alexander, Project Engineer
E. Bogue, Chemistry/Health Physics Manager
G. Boss, Systems and Project Engineering Manager
M. Bourassa, Licensing Supervisor
E. Evans, Engineering Supervisor
D. Gaiser, Maintenance Engineer
R. Hill, NPAD
D. Moeggenberg, Engineering Supervisor
T. Mort, Reactor Engineer
T. Petrosky, Public Affairs
J. Rang, Decommissioning Project
D. Turner, Maintenance Manager
G. Withrow, Plant Safety and Licensing Director

U.S. Nuclear Regulatory Commission (NRC)
W. Shafer, Chief, Maintenance and Outage Section
R. Leemon, Senior Resident Inspector

The above individuals attended the exit meeting on February 25, 1994. The inspectors also contacted other licensee employees.

2.0 Licensee Action on Previous Inspection Findings

Several problems and concerns previously identified in previous NRC inspection reports were reviewed for appropriate corrective actions. The items reviewed and the inspectors' evaluations of the actions are discussed in this section.

2.1 (Closed) Unresolved Item (155/91024-01(DRP)):

This item was related to a failure to follow procedural requirements for loading an emergency diesel generator (EDG) on January 8, 1992, and the licensee's pending evaluation of the consequences of overloading the EDG. The licensee (and the EDG vendor) completed evaluation indicated there was no adverse consequence to the EDG since the procedural overload was far below the vendor specified maximum limit. However, deviation report D-BRP-92-021 identified two separate root causes; one relating to licensee's contractor control and the other relating to delegation of responsibility internally between the shift supervisors and the operating staff. The licensee promptly implemented a corrective action for first root cause; however, the second root cause was not corrected until June 30, 1993 when a procedure was revised. The inspectors evaluated this corrective action and considered it to be an appropriate response, therefore this item is closed. However, the failure to take prompt corrective action for the second root cause for the failure to

follow procedural requirements is an apparent violation of 10 CFR Part 50, Appendix B, Criterion XVI. (155/94002-01(DRS))

2.2 (Closed) Open Item (155/91024-04 (DRP)):

This item was related to replacing safety related cables in the recirculation pump room area. These cables had degraded insulation that caused sparking in the cable trays. In response to failing and aging cable insulation concerns, the licensee initiated a five-year program to replace the failing cables. The five-year program was recently completed resulting in replacement of all the questionable cables. The inspectors evaluated the cable replacement program and noted that the safety and nonsafety-related cables were replaced. The exception were those cables which no longer served any systems or components and those low current cables such as connections to thermocouples. This item is closed.

2.3 (Open) Inspection Followup Item (155/93017-01 (DRP)):

This item was related to maintaining several pressed cardboard barrels containing resins on the turbine floor. The concern was that the cardboard barrels apparently constituted a potential fire hazard. The inspectors reviewed the licensee's response to this concern. The barrels, although reduced in quantity from the previous inspection, were still present on the turbine floor. The licensee had performed a technical evaluation of the risks and potential for conflagration of the items. However, the inspectors' review of this analysis generated questions which could not be readily answered. Licensee representatives stated that there would be a more detailed review and more specific response to the inspectors questions and concerns. The inspection of the general surroundings, equipment and the potential for a fire threatening function and operation of the safety-related components and equipment did not warrant an immediate response or action. Further, the licensee was evaluating the appropriate course of action in response to the inspector concerns. Pending the licensee's decision to remove the barrels or performing an appropriate evaluation that concludes they do not pose a fire hazard, this item remains open.

2.4 (Open) Unresolved Item (155/91024-03(DRP)):
This unresolved item relates to a variety of maintenance concerns and improperly set and bypassed torque and limit switch setpoints that resulted in inoperabile motor operated valves (MOVs). Further concerns were identified in February 1992 (see Section 4 of Inspection Report No. 50-155/92006 (DRP)). A violation and two unresolved items were identified during an inspection conducted in April and May, 1992 (see Inspection Report No. 50-155/92010 (DRS)).

Corrective actions performed subsequent to these findings, including Deviation Report D-BRP-92-015 and Event Report E-BRP-92-001, were reviewed and found to address several of the identified concerns. In addition, a number of necessary maintenance procedure revisions were made.

Substantial further licensee work remains before this item can be closed. The MOV program procedure is being revised to incorporate several necessary

changes. A new torque and thrust calculation method is being developed to more accurately predict the as-tested valve capabilities found at the plant, and the existing torque and thrust calculations need to be revised to reflect that method when it is developed and issued. Also, weak link data which had been received from the valve vendor needs to be incorporated into the calculations. In addition, maintenance procedures need to be revised to address the new SMB actuators which have recently been ordered to replace the old SMA actuators for the MO-7051 and 7061 valves. The licensee has scheduled completion of these items for June 1994. An unrelated event which occurred recently, the failure of Emergency Condenser outlet isolation valve MOV-7053 to close during the valve operability test on November 5, 1993, was attributed by the licensee to the improper setting of a torque switch, a similar cause as the original unresolved item. Pending completion of the above licensee actions, this item remains unresolved.

3.0 Observation of Plant Conditions

The inspectors performed plant tours and system walkdowns to observe the material condition, indication of equipment problems, housekeeping and other unusual conditions. The areas inspected included the containment, pipe tunnel, station battery room, switchgear rooms, air compressors, MG sets, emergency diesel generator (EDG) building, lube oil room, screenhouse, core spray room, alternate shutdown building, and guardhouse.

The inspectors concluded that the material condition in the areas inspected, except in the pipe tunnel, was acceptable. The pipe tunnel indicated previous steam leaks on the piping, floor and equipments such as valves and valve operators. Some corrosion was observed on the piping and valve surfaces. There were 15 minor concerns identified in the other areas, including housekeeping, seismic, personnel safety, equipment protection, foreign object intrusion, system operability, and fire protection issues. The licensee responded to these concerns in a timely manner and took appropriate corrective action, as needed.

4.0 Engineering and Technical Support

The engineering organization consisted of a Systems and Project Engineering Manager, two supervisors, one each in the mechanical and electrical areas, and six or seven engineers under each supervisor. This past summer, the plant began a positive initiative to implement a systems engineer philosophy, wherein most major systems have a lead and backup responsible engineer.

The inspectors interviewed several supervisory and support level engineers during the design reviews and plant system walkdowns. The engineering personnel generally seemed conscientious and experienced. However, most of them were working on several change packages and were also trying to become familiar with the systems for which they have responsibility. Most engineers did not know much about their assigned systems and had not had the one day planned system engineer training session (with training personnel, operations and sometimes maintenance). At the time of the inspection, only two of the 21 system (or component specialty) engineering teams had met for their one-day "kick-off" training session. The licensee plans to hold the other sessions by

June 1994. System engineers frequently answered questions about their systems by saying that they hadn't had a chance to get into the system enough to be able to answer the question. System notebooks are in an early state of development for most systems.

The roving engineer concept has been implemented and appeared to be having a positive effect. The function of the roving engineer is to support plant operations and maintenance with short term engineering assistance. The roving engineers are system engineers who are assigned this duty on a one week rotational basis. To improve communications and coordination, they attend the weekly and daily planning/scheduling meetings, and daily plant status (plan of the day) meetings. The roving engineers conduct plant walkdowns and serve as an interface between operations, maintenance and engineering. They are expected to seek out any activities that can benefit from their technical assistance; maintenance and operations are increasingly requesting their assistance. Interviews with plant staff indicate that the roving engineer program has gained widespread acceptance by all departments and their role in plant activities is becoming increasingly beneficial.

5.0 Control of Operating Experience Review

The inspectors evaluated the licensee's control of their operating experience review program. The evaluation of this program as controlled by Administrative Procedure 3.1.10 revealed a weakness. The procedure stated completion of evaluation of NRC's Information Notices, GE's SILs, and INPO's SOER and SER reports should take 60 days. However, the majority of these evaluations were completed considerably longer than 60 days, some as long as a year. After the receipt of these operating experience reports, the licensee quickly disseminated them among the appropriate technical personnel for evaluation and their pertinence to the Big Rock Point plant. Further, the recipients of the distributed experience reports were primarily members of the Plant Review Committee. Since the instructions for evaluation of these reports accompanying them did not require response due dates, the evaluations were performed pending availability of resources. Since the procedure did not require completion of evaluation by a specific duration, the licensee was not violating a procedural requirement. The inspectors' concern was that the lax procedural requirements might lead to an untimely correction of a safety-related problem, although no examples were identified. In response to the inspectors' concern, the licensee considered revising the controlling procedures by changing the 60-day evaluation guideline to 120 days.

6.0 Plant Review Committee (PRC)

The inspectors evaluated the involvement of Plant Review Committee (PRC) in several specific cases. As a result of this evaluation a weakness was identified in use of the PRC as a committee. The weakness and the inspectors' concern was that in certain cases specific issues were reviewed and signed individually by members of the PRC rather than getting reviewed and approved by the committee. When issues were reviewed and approved by individual members, the licensee compromised the full benefit of PRC as a committee. One such example was approval of temporary modification (Jumper, Link, and Bypass) JLB-92-008 whereas the records of PRC minutes did not indicate that

this temporary modification was approved by the PRC. However, the approval sheets for this JLB contained the approval signature, without being documented in the PRC minutes. The licensee stated that this JLB was approved by the PRC as individual members, even though the records did not confirm this.

7.0 Temporary Modifications

The inspectors evaluated the temporary modification process referred to by the licensee as "Jumper, Link and Bypass (JLB)/Temporary Modification." This process was governed by administrative procedure 3.1.1.4.

Most of the JLBs were of short duration and the licensee had only a small number of open temporary modifications. However, the inspectors identified a number of concerns related to procedure 3.1.1.4, and several JLBs prepared at the plant. The inspectors concluded that these concerns in aggregate represented a weakness in the JLB process. Several of these concerns are discussed below:

- The current plant procedure for JLBs requires quarterly reviews only for installed JLBs, and not for uninstalled JLBs. For example, JLB-93-0023, an uninstalled JLB for the purpose of allowing the closure of the inoperable, failed-open Emergency Condenser Loop 2 discharge (outlet) isolation valve MO-7053, if necessary. This JLB was written over three months ago, but had not received a quarterly review because it was not yet installed. However, a number of operational activities would be necessary to affect this modification, if it were needed. The inspectors' concern was that the condition of plant interfaces could change in a way that could affect the ability of the JLB to perform its function once it has been installed. In follow-up discussions, licensee representatives indicated that they planned to modify the JLB procedure to require quarterly reviews for all JLBs whether installed or uninstalled. Subsequent to the inspection, during a maintenance outage in early March 1994, the Loop 2 outlet isolation valve MO-7053 was repaired and the JLB was never used.

- The JLB procedure states that JLBs are for items that are "minor" in scope. The inspectors were concerned that JLB-93-023, which might have been utilized for providing isolation of the Reactor Coolant System and Containment boundary after a design basis accident, was not minor in scope. It was not clear that a procedure written for the purpose of minor modifications was appropriate for this type of activity.

- Three JLBs with identical solutions to the same problem were reviewed. The three independent problems were associated with the potential loss of the alarming capability of multiple temperature sensing devices by failure of one alarm sensing element. The proposed solution as a temporary modification was installation of a dummy cell in each circuit to bypass the alarm function for the failed temperature sensor. The three failed sensors were in the pipe tunnel, the CRD housing area, and a connection to the main generator. These dummy cells allowed the multiple sensing alarms to provide alarm functions for the remaining sensing devices by bypassing the failed sensor.

In the first two instances, an outage provided the opportunity to repair the sensing lines, thus the temporary modifications even though approved, were not installed. In the third case, by the main generator, the temporary modification was installed and has been in place for nearly two years, the maximum allowed time for a temporary modification. The licensee was aware of this situation and plans to resolve this during the next scheduled outage.

- JLB-93-010, which added thermocouples to detect leakage across isolation valves to prevent the possibility of a recurrence of water hammer, was a reissue of JLB-92-008 so as not to exceed the two year time limitation allowed by the JLB procedure. The inspectors were concerned that this appeared to circumvent the intent of the time limitation of the procedure, although it was noted that a new safety evaluation was performed for the reissued JLB.

- The two year installation time limitation currently allowed by the JLB procedure seemed long for a procedure written for the purpose of controlling temporary modifications.

8.0 Engineering Support for Maintenance.

The engineering department developed a preventive maintenance (PM) validation program, using reliability centered maintenance (RCM) techniques, vendor recommendations, and plant experience. In 44 systems evaluated, 91 preventive maintenance activities were deleted, while 16 were added. Based on the critical function of a system/component, additional items were being added to the PM list. The inspectors concluded that the PM validation program is a good initiative.

9.0 Maintenance

The implementation of the maintenance program, based on the observations during this inspection period, was generally adequate. However, weaknesses were observed in peer inspection program; documentation and justification for deferral of Periodic and Predetermined Activity Control (PPAC) activities; and classification, tracking and reporting of Nuclear Performance and Assessment department (NPAD) findings. However, the development of the PPAC program was a good initiative.

9.1 Followup of Maintenance Related Events

The inspector followed up an event that occurred during this inspection relating to a main feed water pump trip. Feed water pump no.1 tripped on February 8, 1994, due to low suction pressure, caused by the opening of the feed pump recirculation valve. The recirculation valve opened due to the failure of a relay in the valve control circuit. The inspector reviewed the incident and followed up the licensee's response to the event. The operators promptly tripped the recirculation pump to reduce the reactor power, so that the unit stabilized, with one feed pump. The inspector reviewed the equipment history of the failed relay FSX 2500-1. This relay has been installed since plant start up. The inspector noted that no similar failures occurred

earlier, and this failure appeared to be due to aging. The licensee replaced the relays on both the pumps, as a precaution.

The inspector attended the licensee's meetings, observed the participation of engineering in resolving the issues, and reviewed the maintenance work done to correct the problem. The inspector concluded that the licensee handled this event well, with all the departments working together as a team. The licensee's handling of this pump trip transient, including interdepartmental communications, root cause evaluation of the pump trip and corrective actions, was considered excellent.

9.2 Observation Of Maintenance Work

The inspector observed the following maintenance activities:

a) Work Order (W.O.) No. 12301921, Maintenance and Testing of Valve SV-4987 as per procedure TR-101, "RDS Depressurization Valve Test".

b) W.O. No. 12410028, Procedure IFP S-6, "Pyrometrics Fire Indicating Unit Operating Voltage Checks".

c) W.O. No. 12410033, Temperature Recorder Calibration of TR-9623 (Main Control Room).

d) W.O. No.12410115, Procedure No. T 7-24, "Battery Pilot Cell Readings" on the Station Battery.

The observed maintenance work was done well, except as noted below in the inspection of Solenoid Valve SV-4987. The maintenance technicians were qualified and familiar with the tasks assigned. Work procedures were available at job sites. The Measuring and Test Equipments (M&TE) used were in calibration. The procedures used were current and approved. The procedures contained necessary acceptance criteria and the applicable tolerances.

9.3 Peer Inspection Of Maintenance

The inspector, during the observation of work on safety related solenoid valve SV-4987 in the Reactor Depressurization System (RDS) on February 9, 1994, noticed that peer inspection was used for the independent inspection of this maintenance task. Maintenance work was suspended at a hold point because the Quality Verifier was not satisfied with the gasket crush on this valve. The inspectors noticed that the unacceptable condition was not documented on the work package, prior to sending it to the work supervisor. Administrative Procedure 1.16, "Quality Verification Program", Revision 1, Section 5.3.4.a.4 requires that "The work crew and/or verifier shall document existing condition on controlling document", when the work being inspected was unacceptable. Contrary to the above, the work crew or the Quality Verifier did not document the unacceptable condition of safety related valve SV-4987 at a Quality Verification(QV) hold point, during a maintenance of this valve on February 9, 1994.

An administrative memorandum was issued by the Maintenance Superintendent on March 24, 1993, clearly stating that the Quality Verifiers must have time to prepare and to resolve concerns. Contrary to this memorandum, the Quality Verifier for the above maintenance work was not given adequate time to prepare for this QV function. The Quality Verifier did not have his own work procedure, to prepare for the Quality Verification. By reporting an unacceptable condition to the work supervisor(who was the supervisor to both the maintenance work crew and the Quality Verifier), without first documenting the condition in the work package at the hold point, it appeared that the Quality Verifier did not maintain a truly "Independent Inspector" status.

The training for the QV program was not comprehensive and did not address how to deal with identified problems. The Quality Verifier referred to above, during his entire on-the-job training of several months, had not previously encountered any unacceptable condition. The training appeared to be ambiguous regarding the person to be contacted, when questions arose or potential problems were identified during inspections. The Lesson Plan No. BQV-03, "Observation of Work Practices - Maint", Revision 0 states in Section III.D.3. that: "We would like you to communicate your concerns or questions to your supervisor or other management personnel ....". In view of the above, it appeared that the Quality Verification (peer inspection) program was not being implemented satisfactorily. In response to the above inspector concerns, a Deviation Report (DR) was issued by the Maintenance Superintendent, on February 16, 1994. The failure of the licensee personnel to implement the Quality Verification program, as per procedure 1.16 is considered a violation of Technical Specification 6.8.1, which requires that written procedures be established, implemented, and maintained for all structures, systems, components, and safety actions defined in the Big Rock Point Quality List. (155/94002-02(DRS))

9.4 Review of Completed Maintenance Work

The inspector reviewed completed maintenance work packages,including:

1) Work Order No. 12300409- D.C. Power supply checks for RDS sensor and Actuation cabinet power supplies.

2) Work Order No. 12300422- Inspection and Test #2 MG Set Over voltage relay.

3) Work Order No. 12300542- Inspect 1A Bus 480 volt Ground Detection relay.

4) Work Order No. 12300567- Load Test Breaker 052-2A61.

5) Work Order No. 12300666- Battery Service Test on Station Battery BAT-1.

6) Work Order No. 12300684- Inspect and Calibrate Containment Sump level transmitters.

7) Work Order No. 12300856- Perform Megger Checks on Rx Recirculation Pump Motor #1.

8) Work Order No. 12300903- Inspect and Repair Limitorque Valve Operators.

The maintenance work packages contained the specified procedures and acceptance criteria, as applicable. The work packages indicated that the Measuring & Test equipment used were in calibration, special tools needed were noted, necessary radiation work permits obtained, and that post maintenance checks were completed, prior to returning the equipment to operational status and closing the work packages.

9.5 Deferral of Preventive Maintenance

The inspector reviewed the licensee's preventive maintenance program, conducted per procedure 3.2.4.1, "Periodic and Predetermined Activity Control"(PPAC), Revision 0. Section 5.12.2 of this procedure states that every effort should be made to perform the preventive maintenance (PM) activities on or close to the "PPAC Schedule Date/Event" listed in the work order. Section 5.14.1 of this procedure states that if the cancellation of a PPAC activity was deemed necessary, the Responsible Department Head and appropriate Engineer/Supervisor shall approve the deletion of a PPAC activity. Section 5.14.3 of this procedure also identified the items (including technical justification), the Responsible Department Head shall consider before cancelling or rescheduling any PPAC activity. Several PPAC (PM) activities were not completed within the grace period around the 1993 outage; however, a proper review and technical justification were not provided for the deferral. The licensee issued Deviation Report No. D-BRP-93-059 on October 20, 1993, to address this issue. As a result of this DR, justifications were provided by the respective departments. The inspector reviewed the justifications for the deferral of the PPAC activities. Some of the reasons given for deferrals were:

1) It is a refuelling outage item.
2) Parts were not available.
3) Engineering evaluation was not completed.

The inspector concluded that these reasons for deferring PPAC activities were weak, and could have been addressed prior to the outage and in time to have met the original schedule.

Sections 5.8.1.1 and 5.12.1 of Procedure 3.2.4.1 also require that weekly and monthly reports be issued on the deleted/rescheduled PPAC activities. These reports were not being issued at the time of the inspection. In view of the above, the inadequate or untimely justification of deferred PPAC activities, and inadequate reporting of deferred PPAC activities, is considered a weakness in implementing the PPAC program. However, the inspector also concluded that the PM deferrals did not affect the operability of any systems.

9.6 Self Assessment

The inspector reviewed the licensee's self assessment of maintenance. Several surveillance and audit reports issued by the licensee's Nuclear Performance and Assessment Department (NPAD) in the areas of maintenance, corrective action and Quality Verification were reviewed. Several of these reports

included recommendations or observations, which the inspector concluded should have been findings, with required follow up and resolutions. Some examples were:

1) Report No. NPAD/B 93-011: Inadequate PM on turbine controls; Ineffective PMs on AC distribution systems.

2) Report No. PA-92-08: Concerns with a repetitive 125 volt DC ground.

3) Report No. PT-93-01: Containment escape hatch pressure tests done at 2 psig, rather than 5 psig.

The licensee's NPAD group issued reports containing findings, recommendations, and observations. The recommendations and observations were not followed up for completion of corrective actions. The NPAD did not track the status of the findings, recommendations or observations included in their reports. No periodic reports were issued to the management on the status of these items, regarding completion of corrective actions. Improper classification by NPAD of self assessment findings; and inadequate tracking and reporting of these items by NPAD was considered a weakness.

10.0 Engineering Assessments

During review of completed facility and specification change packages and ongoing engineering projects, the inspectors identified several instances where the engineering assessments were incomplete or failed to incorporate all relevant requirements into the instructions provided for installation and testing. The inspectors concluded that there was a weakness associated with the completeness of engineering assessments performed at the plant. The following are several examples of this weakness.

10.1 Emergency Condenser Isolation Valve Testing Criterion

The first example of the engineering assessment weakness was the failure to incorporate an appropriate valve closure time criterion into testing and operating procedures, even though the criterion had been known by the licensee for 20 years. After this oversight was identified by the inspectors early in the inspection, the licensee failed to initiate a comprehensive engineering assessment of the system (Emergency Condenser) operability concerns by the end of the inspection.

Specifically, the actual closure times of the Emergency Condenser outlet valves, as measured during surveillance tests, have sometimes been less than the minimum committed closure times discussed in the Final Hazards Summary Report (FHSR) and other licensee commitments to the NRC. As a result, the Emergency Condenser system may have been operated in an unanalyzed condition. Further, the potential may exist for the system to be subjected to significant water hammer under postulated design basis accident conditions. Minimum valve closure times can be critical in mitigating the potential for water hammer in systems which have susceptibility for that phenomenon, including intermittent-use, steam-filled systems such as the Emergency Condenser system.

The discussion for Unresolved Safety Issue A-4, Water Hammer, in Consumers Power letters to the NRC, as well as FHSR Section 6.8.4.4, notes that unusual vibration of the piping connected to the Emergency Condenser occurred in 1974 during a full flow test. The discussion states that water hammer should not be a concern if the outlet valves close in about 9 seconds. Surveillance test procedure, T90-26, which is used to perform a quarterly operability test on these valves, currently includes maximum allowable opening and closing times but does not include minimum closing times for the outlet valves. Furthermore, review of several surveillance test results over the past few years indicated that the Loop 2 outlet isolation valve MO-7053 often closed in as little as 7.9 seconds. For example, MO-7053 closed in less than 9 seconds on February 18, 1992; May 14, 1992; July 21, 1993; and August 7, 1993. This criterion was also not included in system operating procedures and the jumper, link, and bypass modification (JLB-93-023) which was written to specify the procedure to be followed to manually close (inoperable since November 5, 1993) valve MO-7053 to provide Reactor Coolant system isolation during an emergency, if that was found to be necessary. The valve was repaired and declared operable after the inspection ended.

The lack of minimum valve closing time limits in applicable test procedures, as well as exceeding those limits, is an apparent failure to meet the commitments made in Section 6.8.4.4 of the FHSR and in a letter to the Commission, dated February 14, 1983. Pending further licensee review and engineering assessment, this matter is considered an unresolved item (155/94002-03 (DRS)).

10.2 Emergency Diesel Generator Cooling Water System Modifications

A second example of the engineering assessment weakness was that evaluations were not performed for several Q-listed components in a modification for the Emergency Diesel Generator Cooling Water System. In addition, engineering requirements were not provided for the installation of those components.

Specification Changes SC-92-026 and SC-93-010, which made a number of modifications to the Emergency Diesel Generator Cooling Water Q-listed piping and components, were reviewed. These changes were made to replace the suction screens and inlet line check valve to prevent the possibility of blockage and improve flow characteristics, and to replace the pump discharge piping (tubing) to ensure adequate net positive suction head (NPSH) to prevent pump cavitation.

Specifically, SC-93-010 decreased the size of the pump outlet tubing to lower flow and pump NPSH requirements. A one-inch flexible rubber hose was specified for this pump discharge tubing. However, the specification change did not provide an evaluation of the system requirements and corresponding capabilities for the one-inch rubber hose that was selected to connect the pump to the heat exchanger. There was also no part number or other description provided for the clamps that attach the tubing to the pump and heat exchanger. In addition, in the sketch provided to depict the installation arrangement, the attachment details of the tubing and clamps to the existing pipe fittings were not specified but were described as a field fit. After these assessment weaknesses were identified by the inspectors, the

project engineer subsequently performed an evaluation for the subject hose for inclusion in the completed specification change package during the inspection, but had not performed an evaluation of the clamps or installation requirements before the inspection ended.

10.3 Monitoring of Raw Water System Biofouling

The third example of the engineering assessment weakness was the lack of proactive analyses of trends indicated by the raw water system biofouling monitoring program. However, after the inspectors concluded from their analysis of the trends that the potential for biofouling was increasing, the licensee took prudent action as discussed below.

The inspectors reviewed the biofouling monitoring techniques which are being utilized at the plant. Submerged bricks, bioboxes, and visual inspections have all been utilized, and have shown an increased prevalence of Zebra mussels since they were first observed near the plant this past year. This was particularly the case in the effluent discharge path (outfall), which includes the return flows from the circulating water, service water and fire protection systems. The outfall is more hospitable to Zebra mussels because it is approximately 25 F warmer than the intake which is taken from approximately 1/4 mile out in Lake Michigan. The intake path also includes a slipstream bypass from the outfall, which is utilized to take the chill off the intake water in the winter.

There is currently no installed system for either chlorinating or otherwise chemically treating the systems which utilize raw intake water. A chlorination system was being designed under Facility Changes 683 and 683A, initiated in July 1992, for scheduled completion later this year. Individual chlorination treatments have been performed at the plant with limited success (estimated approximately 20% kill rates). Heat treatments have been performed on some systems which take suction from the intake, such as the Fire Protection and Service Water systems, but not on Diesel Generator Cooling Water which takes suction from the outfall.

The Diesel Generator Cooling Water and Fire Protection systems are both Q-listed systems designed primarily for emergency operation and are normally stagnant. During system operation, flow is through the shell sides of the heat exchangers. The Fire Protection system at Big Rock Point provides both the injection flow for Core Spray during the short term and the cooling flow for Core Spray during the long term following a plant transient, in addition to providing water for fire suppression.

Surveillance tests of the Diesel Generator Cooling Water system measure cooling water pump outlet pressure upstream of the heat exchanger. This would have limited value for detecting the presence of bivalves inside the heat exchanger, as compared to measuring pressure downstream of, or measuring flow through, the heat exchanger. Flow tests are currently performed during refuelings by redirecting system flow to a 55 gallon drum, recording the time it takes to fill the drum, and calculating flow. The accuracy of such tests for purposes of detecting flow degradation is questionable because of the difficulty of measuring pump start and stop times and the different system

configuration with no backpressure during the test as compared with the actual system configuration. In response to inspector concerns, the licensee has verbally indicted plans to add permanent flow gauges in this system later this year.

Data taken during the weekly Emergency Diesel Generator test was evaluated by a performance engineer and formally issued in a quarterly report which included some trending of selected parameters. The inspectors reviewed the most recent report, for the third quarter of 1993. Because the data in that report was not recent, the inspectors requested that the curves be redrawn with current data added. Review of the redrawn curves indicated that there have been increases in both engine coolant outlet temperature and cooling water temperature change across the system heat exchanger over the past year. The inspectors concluded that either or both of these could be an indication of partial flow blockage on the raw water side of the heat exchanger. However, this had not been previously identified by performance engineering.

Fire Protection system surveillance during normal operation included monthly pump start tests only. A system functional test which verifies required flow and pressure through direct measurement was performed during refuelings. The inspectors looked at some recent annual performance tests but trending of this data was not possible because of changes made each year for the past several years in the way these tests were performed. Pressure and flow of the fire protection system were not measured during monthly surveillance tests.

At the time of the inspection, the licensee took the above inspector concerns about the bivalve monitoring program under advisement and indicated that consideration would be given to opening up the Emergency Diesel Cooler to inspect for biofouling in the future, and using the results to evaluate the need for future planned surveillance of both the Diesel Generator Cooling Water system and Fire Protection systems, including the Core Spray system. Subsequently, during a short maintenance outage in early March 1994, the licensee opened up and inspected the Diesel Cooler, and did not observe bivalves. The licensee was considering continuing this surveillance program over the course of coming months prior to the next refueling outage.

11.0 Exit Meeting

An exit meeting was conducted on February 25, 1994, at the Big Rock Point Nuclear Plant to discuss the major areas reviewed during the inspection, the apparent violations of NRC requirements, the deviation from a commitment to the NRC, the positive initiatives and weaknesses identified, and the other observations made during the inspection. Licensee representatives and NRC personnel in attendance at this exit meeting are documented in Section 1.0 of this report. The inspectors also discussed the likely informational content of the inspection report with respect to documents reviewed by the team during the inspection. The licensee did not identify any documents or processes as proprietary.