April 14, 2000

Mr. L. W. Myers
Senior Vice President
First Energy Nuclear Operating Company
Post Office Box 4
Shippingport, Pennsylvania 15077

SUBJECT: NRC INSPECTION REPORT NOS. 05000334/2000-003 AND 05000412/2000-003

Dear Mr. Myers:

This letter transmits the results of the NRC team inspection that was conducted at the Beaver Valley Power Station facility from January 24 to February 3, 2000, and continued in the Region I office with necessary follow-up inspection until March 1, 2000. The inspection evaluated your program for preparing safety evaluations relating to changes, tests, and experiments (10 CFR 50.59) at the facility. This inspection also included a review of maintenance and engineering backlogs to evaluate the impact of risk significant items on safety system operability, equipment reliability, and plant operations. The preliminary findings were discussed with Mr. F. von Ahn, Director, Plant Engineering, and other members of your staff on February 3, 2000, and in several subsequent telephone conversations concluding the inspection on March 1, 2000, with Mr. B. Sepelak, Acting Supervisor, Licensing and Compliance.

Based on the results of this inspection, the NRC determined that the 50.59 safety evaluation program was implemented satisfactorily. Gradual progress has been made at reducing some engineering backlogs. No instances were identified where an engineering or maintenance backlog item would adversely impact the function of a risk significant safety system. Notwithstanding, the NRC concluded that actions by maintenance and engineering to resolve some component problems were not always effective. Specifically, over the past year the Unit 2 atmospheric relief valves, feedwater isolation valves, and auxiliary feedwater pump steam supply valves experienced repeat problems that challenged operators and affected the reliability of safety equipment. Additionally, the NRC determined that the deferral of some preventive maintenance (PM) tasks beyond their required frequency without proper evaluation and approval raises questions regarding the sufficiency of PM program ownership and oversight.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

We appreciate your cooperation.

Sincerely,

/RA/ BRIAN E. HOLIAN FOR:

Wayne D. Lanning, Director
Division of Reactor Safety

Docket Nos.: 05000334, 05000412
License Nos.: DRP-66, NPF-73

Enclosure:
Inspection Report Nos. 05000334/2000-003, 05000412/2000-003

cc w/encl:
K. Ostrowski, Plant General Manager
R. Fast, Director, Plant Maintenance
F. von Ahn, Director, Plant Engineering
R. Donnellon, Director, Projects and Scheduling
M. Pearson, Director, Plant Services
W. Pearce, Manager, Operations
M. Ackerman, Manager, Licensing
J. Hultz, Manager, Projects and Support Services, FirstEnergy
M. Clancy, Mayor, Shippingport, PA
Commonwealth of Pennsylvania
State of Ohio
State of West Virginia

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REGION I

License Nos.	DPR-66, NPF-73
Report Nos.	05000334/2000-003, 05000412/2000-003
Docket Nos.	05000334, 05000412
Licensee:	FirstEnergy Nuclear Operating Company Post Office Box 4 Shippingport, PA 15077
Facility:	Beaver Valley Power Station, Units 1 and 2
Inspection Period:	January 24, 2000 through February 3, 2000
Inspectors:	Paul Kaufman, DRS (Team Leader) Aniello Della Greca, DRS Steve Pindale, DRS Marc Ferdas, DRS Leonard Cline, DRS
Approved by:	Lawrence T. Doerflein, Chief Systems Branch Division of Reactor Safety

EXECUTIVE SUMMARY

Beaver Valley Power Station, Units 1 & 2
NRC Inspection Report 05000334/2000-003 & 05000412/2000-003

Maintenance

- NRC and FENOC identified deficiencies related to implementation of the preventive maintenance program. In particular, preventive maintenance activities were not performed within the required frequency. Activities were deferred beyond their due dates without proper approval or evaluation. The preventive maintenance program lacked sufficient oversight and ownership, resulting in the observed problems. Deficiencies in the preventive maintenance program allowed equipment to degrade to the extent that led to plant transients and forced plant shutdowns, such as the recent service water system transient that was a result of not performing a preventive maintenance activity within the required period. Some prior opportunities existed where preventive maintenance program deficiencies could have been properly characterized and resolved in a more timely manner. The maintenance, engineering and operation organizations remained challenged by some repetitive equipment problems caused by some ineffective preventive maintenance activities. (Section M2.1)

- The corrective maintenance backlog was being managed acceptably. The preventive maintenance backlog was above the established backlog goal and was not trending toward the goal. FENOC has implemented several actions to provide more rigor in reducing this backlog to a more manageable level. Similarly, the maintenance procedure backlog was above the established backlog goal, and FENOC has initiated efforts to reduce the backlog to a more manageable level. (Section M2.2)

Engineering

- The procedures that control safety evaluations provided acceptable guidance to determine if a proposed design change or plant modification could be implemented without prior approval by the NRC. Training of the engineering staff involved in the preparation, review, and approval of safety evaluations was appropriate. As a result, the safety evaluations reviewed were reasonable and indicated proper implementation of the 10CFR 50.59 requirements. The process for determining the need for a safety evaluation was also acceptable. The Onsite Safety Committee (OSC) members assigned to review and approve the safety evaluation demonstrated a questioning attitude and provided additional insights and recommendations for the safety evaluations presented. (Section E1.1)

Engineering (Continued)

- No engineering backlogs items were identified that would adversely impact the safety function of the top five risk significant systems. Engineering effort over the past two years has gradually reduced some engineering backlogs. However, engineering actions to resolve repeat equipment deficiencies were ineffective in that degraded material conditions were not adequately acted upon to correct reoccurring problems of the Unit 2 atmospheric relief valves, feedwater isolation valves, and auxiliary feedwater pump steam supply valves. (Section E2.1)

- The licensee was slow in addressing the Westinghouse-identified and reported generic finding regarding emergency core cooling system (ECCS) pump performance at higher than nominal emergency diesel generators (EDG) frequencies. Several years later, when the issue was addressed, the licensee estimated the minimum EDG loading instead of calculating the loading conditions. This resulted in a non-conservative estimate, however, based on the calculation the safety significance was low and there was no adverse safety consequence. (Section E2.2)

- Trending of maintenance work orders, preventive maintenance activities, and equipment and system performance was adequate, but some deficiencies were apparent. The recently instituted computerized data system contained inconsistent, incomplete, and in some cases, unreliable data. These deficiencies resulted in challenges to the end users of the system (typically the system engineers). FENOC identified weaknesses in identifying and trending maintenance rework items, for which they initiated efforts to evaluate and correct. (Section E2.3)

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Report Details

II. Maintenance

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Preventive Maintenance Program

a. Inspection Scope (62702)

The team reviewed FENOC's evaluation of the preventive maintenance program following an event where a Unit 2 service water system vacuum break check valve failure resulted in an expansion joint over pressurization. The vacuum break check valve failed after its preventive maintenance activity was not performed as required. The team reviewed the details of the event, interviewed responsible personnel, and reviewed the associated multi-disciplined analysis team report that conducted a detailed evaluation of the preventive maintenance program.

b. Observations and Findings

As a result of FENOC's investigation into the expansion joint over pressurization and subsequent discovery of problems in properly implementing the preventive maintenance program, condition report 993581 was initiated. This CR documented that preventive maintenance activities were being deferred beyond their due dates without proper approval or evaluation. FENOC formed a multi-disciplined analysis team (MDAT) to evaluate the preventive maintenance problems documented in the CR.

The team reviewed the MDAT report and discussed the results with the lead MDAT evaluator. The MDAT determined that the preventive maintenance deficiencies were principally human performance related. Procedure NPDAP 8.31, "Preventive Maintenance Program," was not followed by the work groups, due dates were exceeded without proper approval and documentation (deferral forms not completed) as required by NPDAP 8.31, and the performance indicators and associated reports were not effectively utilized. The team reviewed NPDAT 8.31, reviewed the MDAT report, and interviewed the lead MDAT evaluator, and determined that responsibilities for the preventive maintenance program were fragmented and no specific individual was responsible for the program. FENOC similarly recognized this and the MDAT recommended a specific person be assigned the responsibilities of the preventive maintenance program.

The team reviewed the immediate corrective actions recommended by the MDAT with respect to preventive maintenance program implementation. A similar review was conducted by the resident inspectors and is documented in inspection report (50-334 & 412/99-10). The team found the MDAT investigation and associated recommended corrective actions to be thorough.

The team independently reviewed completed deferral forms to ascertain whether they were properly performed. This review was conducted because the MDAT's review of preventive maintenance backlog assumed that the deferral forms that were completed were properly evaluated and approved. The team reviewed over 100 completed deferral forms. Four were found to have not received proper technical justification for deferral. One was for a Unit 1 river water check valve (RW-4; valve inspection), and three were for reactor coolant system valves (two diaphragm replacements and one flange inspection). FENOC acknowledged this NRC identified deficiency and promptly initiated condition report 00-0522 to document and evaluate these improper deferrals.

FENOC had initiated several CRs in the past for individual preventive maintenance deficiencies. Two notable CRs were related to the recent preventive maintenance problems. CR 991684 (July 1999) stated deficiencies were noted regarding the process to defer equipment maintenance. CR 991685 (July 1999) stated that frequent deferral of preventive maintenance tasks had resulted in several equipment problems, and had contributed to a high preventive maintenance backlog causing increased vulnerability to equipment failure. The associated CR evaluations were acceptable; however, the associated short term corrective actions had not been effective in preventing continuing repetitive equipment problems. Additionally, the 1999 Quality Services Unit audit of BVPS Maintenance identified problems with the appropriateness of evaluations permitting preventive maintenance activity omission. These identified problems were not entered into the condition report system because of existing condition reports recently documented on the same problems. The team concluded that although the July 1999 CRs properly characterized preventive maintenance deficiencies, these and other prior opportunities to thoroughly address problems were not timely in preventing additional problems. Deficiencies in the preventive maintenance program allowed equipment to degrade to the extent that led to plant transients and forced plant shutdowns, such as the service water system vacuum break check valve failure which caused a system transient because a preventive maintenance activity for the valve was not performed as required.

c. Conclusions

NRC and FENOC identified deficiencies related to implementation of the preventive maintenance program. In particular, preventive maintenance activities were not performed within the required frequency. Activities were deferred beyond their due dates without proper approval or evaluation. The preventive maintenance program lacked sufficient oversight and ownership, resulting in the observed problems. Deficiencies in the preventive maintenance program allowed equipment to degrade to the extent that led to plant transients and forced plant shutdowns, such as the recent service water system transient that was a result not performing a preventive maintenance activity within the required period. Some prior opportunities existed where preventive maintenance program deficiencies could have been properly characterized and resolved in a more timely manner. The maintenance, engineering and operation organizations remained challenged by some repetitive equipment problems caused by some ineffective preventive maintenance activities.

M2.2 Maintenance Backlog Reviews

a. Inspection Scope (62702)

The team reviewed several of the backlog items within the maintenance department, including the corrective maintenance backlog, preventive maintenance backlog, and the maintenance procedure backlog. The team reviewed associated performance indicators and system reports, reviewed associated maintenance backlog lists, selected and assessed several individual items in the backlogs, and interviewed responsible station personnel.

b. Observations and Findings

Corrective Maintenance Backlog

The team found that FENOC provided acceptable management and oversight of the corrective maintenance backlog. The corrective maintenance backlog includes "corrective" and "general" open work orders. Corrective items are associated with power production equipment and general items are general material condition of non-power production equipment. At the time of this inspection, the corrective maintenance backlog (open work orders) for Units 1 and 2 combined was about 800. It had ranged between 1000 and 1200 for the prior three years.

The team reviewed the backlog of corrective maintenance items, with particular emphasis on the top five risk significant systems for each unit, and did not identify any safety concerns. The team selected several items for further review, with emphasis on proper characterization and prioritization of the open work orders. In general, the items reviewed were properly characterized and prioritized. One exception was an item that was not properly scheduled as necessary following an interim temporary repair. Specifically, work order 99-211221-000 was not completed or scheduled to replace a 4 kV breaker in a non-safety related application as expected. Work was initially performed to address the breaker 's failure to close during testing; however, the initial work (performed in June 1999) only temporarily resolved the problem by lubricating specific components. As documented by the system engineer in the work order, the temporary repair was acceptable for six to seven months at which time the breaker was to be replaced. The team found that the breaker replacement activity, which was originally targeted to work on December 6, 1999, was dropped from the work schedule and was not re-scheduled. In response to this NRC identified deficiency, FENOC initiated condition report 00-0361 to evaluate and correct this problem.

The team identified another item in the corrective maintenance backlog related to a leaking diaphragm on Unit 1 boron injection surge tank sample isolation valve 1SI-112 (work order 98-072812). It was a relatively high priority (3), but had been in the backlog for over one year. When the team questioned the priority and status of work for this valve, maintenance personnel informed the team that this work order had been improperly classified in the database, and that it was outage related work. Further, FENOC informed the team that this and other (more than 150) work orders had been requested to be worked during the upcoming Unit 1 outage, but the proper outage work addition forms had not been completed. These forms were required because the

requests were initiated after the outage freeze date. FENOC had previously identified and documented these concerns in condition report 00-0355.

The team found that FENOC acceptably managed the maintenance backlog. However, review of equipment performance over the past year revealed that some repetitive equipment problems continued to challenge operators, engineers, and maintenance technicians and impact plant operations. Examples included repeat problems associated with Unit 2 atmospheric relief valve, Unit 2 feedwater isolation check valves, and Unit 2 auxiliary feedwater turbine driven steam supply valve.

Preventive Maintenance Backlog

FENOC trends the on-line preventive maintenance backlog, which is the number of tasks that are beyond their current scheduled due date. The goal for this backlog is 67; however, the actual backlog since November 1999 had varied between 107 and 206. FENOC had recently implemented actions to improve the overall effectiveness and efficiency of maintenance, which included changes in the initial screening and assignment of incoming work. The Fix-it-Now team performs the initial screening and work validation, and works on the majority of the incoming corrective maintenance. Since the Fix-it-Now team is handling these maintenance activities, the maintenance shops are expected to be able to focus on surveillance tests, the corrective maintenance backlog, and preventive maintenance tasks. There had been historical problems associated with management and oversight of the preventive maintenance program, and a recent operational transient was determined to be caused by these problems. These problems also contributed to the relatively high preventive maintenance backlog. (see section M2.1)

Maintenance Procedure Revision Backlog

On January 17, 2000, the maintenance procedure revision backlog was 1018, which is further characterized as either priority 1 (168) or enhancement (850) procedure change requests. The priority 1 procedure change requests must be performed before the procedure can be used again, and the procedures with enhancement change requests remained available for use.

The NRC reviewed about 10 percent of the procedure change requests for the risk significant systems in August 1999, and again in February 2000 (See NRC Inspection Reports 50-334 & 412/99-05 & 99-10). In each instance, the inspectors did not identify any procedure change requests that were incorrectly classified.

The team noted that the overall procedure revision backlog had remained high, although a slight improving trend was apparent associated with priority 1 procedure change requests. However, a large number of procedure change requests (about 250), currently characterized as enhancements, will become priority 1 upon issuance of a particular technical specification amendment. FENOC plans to provide additional resources to improve the procedure change request backlog, with particular emphasis on priority 1 requests.

c. Conclusions

The corrective maintenance backlog was being managed acceptably. The preventive maintenance backlog was above the established backlog goal and was not trending toward the goal. FENOC has implemented several actions to provide more rigor in reducing this backlog to a more manageable level. Similarly, the maintenance procedure backlog was above the established backlog goal, and FENOC has initiated efforts to reduce the backlog to a more manageable level.

III. Engineering

E1 Conduct of Engineering

E1.1 Review of the 10 CFR 50.59 Safety Evaluation Program

a. Inspection Scope (37001)

The team reviewed the licensee's implementation of the 10 CFR 50.59 requirements. The inspectors reviewed the procedures that described how safety evaluations should be prepared, developed, and approved, and how the plant's design basis should be updated; examined selected portions of the applicable training program and the qualifications of several engineering staff members; and reviewed a sample of safety evaluations for temporary and permanent design changes, new and revised plant procedures, technical evaluations, and UFSAR revisions. The team also conducted engineering interviews and attended an Onsite Safety Committee (OSC) meeting that included the review of safety evaluations of planned design modifications.

b. Observations and Findings

10 CFR 50.59 Procedures and Controls

The team found that the existing procedures correctly interpreted the 10 CFR50.59 requirements and provided sufficient guidance for evaluating the existing design, assessing the impact of proposed design changes on the current design, determining whether a safety evaluation was required, and for preparing, reviewing and approving safety evaluations, when required. The procedures acceptably delineated the responsibilities of the individuals who were tasked to prepare, review and approve the safety evaluations.

Engineering Staff Training and Qualifications

The team reviewed the licensee's training program and conducted engineering interviews to ascertain that the personnel tasked to prepare safety evaluations were knowledgeable of the requirements of 10 CFR 50.59. The team determined that FENOC conducted initial as well as refresher training on the guidance of procedure NPDAP 8.18 Rev. 8, "10 CFR 50.59 Evaluations," and that all personnel responsible for preparing safety evaluations and 50.59 applicability determinations received the training. FENOC had recently conducted refresher training sessions and those individuals who passed remained on the qualified list. Interviews of selected engineering personnel identified no concerns in this area.

Implementation of the 50.59 Procedures and Processes

The team selected a representative sample of approximately 20 plant changes for which a safety evaluation was required. The sample included temporary and permanent plant modifications, operating procedure and UFSAR changes, and selected technical evaluation reports. The team found the safety evaluations were thorough, complete and contained sufficient justification as to why the change was not an unreviewed safety question (USQ). The sample of documents reviewed also included two design changes which FENOC had determined constituted a USQ. The team determined that the licensee had correctly processed these findings.

The team also reviewed approximately 15 design changes that FENOC had determined did not require a safety evaluation in accordance with 10CFR50.59. The team observed that the screening process was reasonable and that the documentation accompanying the proposed changes included sufficient justification as to why the changes did not require a safety evaluation. The team did not identify any change in this category for which a 50.59 safety evaluation should have been prepared.

The team confirmed that the UFSAR revisions reviewed had been included in the "Beaver Valley Power Station Unit 1 10 CFR 50.59 Annual Report", dated July 21, 1999.

Onsite Safety Committee

The team attended a scheduled Onsite Safety Committee (OSC) meeting during which several safety evaluations were presented by the engineering staff. Based on the proceedings of that meeting, the OSC members demonstrated a good questioning attitude and provided additional insights and recommendations to the issues being discussed. As a result of their review, the OSC approved several safety evaluations. In some other cases, the recommended changes and enhancements resulted in the responsible engineer having to revise the safety evaluation presented and resubmit it to the OSC at a later date.

c. Conclusion

The procedures that control safety evaluations provided acceptable guidance to determine if a proposed design change or plant modification could be implemented without prior approval by the NRC. Training of the engineering staff involved in the preparation, review, and approval of safety evaluations was appropriate. As a result, the safety evaluations reviewed were reasonable and indicated proper implementation of the 10 CFR 50.59 requirements. The process for determining the need for a safety evaluation was also acceptable. The Onsite Safety Committee (OSC) members assigned to review and approve the safety evaluation demonstrated a questioning attitude and provided additional insights and recommendations for the safety evaluations presented.

E2 Engineering Support of Facilities and Equipment

E2.1 Engineering Backlogs

a. Inspection Scope (37550)

The team reviewed the open engineering work backlogs for each unit and selected specific backlog items for detailed evaluation that were risk significant and could potentially be an initiator of a plant transient or reactor trip. The team assessed the content of the engineering backlogs, focusing on the top five risk significant system backlog items. Specific backlog items were evaluated for impact on safety system operability and plant operations. The items evaluated included design change packages (DCPs), engineering memorandums (EMs), condition reports (CRs)/corrective actions (CAs), vendor technical information (VTI) updates, operator work arounds, and procedure change requests. The team examined approximately 21 DCPs, 59 EMs, 25 VTIs, 14 operator work arounds, over 65 CRs/CAs, and 12 procedure change requests.

b. Observations and Findings

Prioritization and timeliness of corrective actions of engineering backlog items was recently reviewed and documented in NRC inspection report 50-334 & 412/99-05.

The team reviewed the listing of FENOC's pending design change packages (DCPs) which showed a total of 165 DCPs compared to 176 open DCPs in January 1998. A total of 21 pending DCPs within the backlog were related to the top five risk significant systems. The team evaluated the 21 pending DCPs and assessed the potential affect on the safety function of the plant systems. The team concluded that none of the 21 pending DCPs would significantly affect safety system operability or plant operations. The team reviewed the listing of major design changes supporting the Unit 1 refueling outage scheduled to begin February 15, 2000, and did not identify any significant design changes omitted or dropped from the Unit 1 refueling outage. Based on the information reviewed the team concluded that over the past two years gradual progress was made in reducing the DCP backlog.

The engineering memorandum (EM) backlog consisted of approximately 368 open EMs. A total of 59 open EMs were related to the top five risk significant systems. The team did not identify any risk significant EMs, among the 59 EMs examined, that would adversely impact the safety related system function or plant operations.

FENOC's vendor technical information (VTI) backlog list dated January 2000, indicated a total of 392 open VTIs, of which 50 were priority 1 VTIs, needing a technical evaluation compared to 295 open VTIs in January 1998. Even though the VTI backlog has increased over the past two years the team did not identify any priority 1 VTI items that would adversely impact the safety performance of the risk significant plant systems.

The operator work-around list dated November 1999 for each unit was reviewed. Priority 1 work-arounds are those equipment deficiencies, including design deficiencies that impact operator response during a transient, while priority 2 work-arounds include equipment deficiencies that impact day-to-day operations requiring compensatory actions that inhibit the operators ability to monitor plant equipment or perform other duties. Unit 1 had one priority 1 work-around and eight priority 2 work-arounds while Unit 2 had 22 priority 2 work-arounds. The teams assessment of these operator work-arounds concluded that none of these particular items would adversely impact safety system performance.

Review of open condition reports (CRs) and corrective actions (CAs) assigned to engineering was focused on backlog items within the top five risk significant systems. Several items were selected for detailed evaluation from approximately 205 open condition reports and 380 open corrective actions. Detailed CR/CA reviews were conducted on safety significant equipment that had repeat deficiencies over the past year. The team assessed repeat problems of the Unit 2 atmospheric relief valves, feedwater isolation valves, and auxiliary feedwater pump steam supply valves which are safety significant components that affected system reliability and challenged plant operators. The team concluded that the actions taken by engineering and maintenance were ineffective in that degraded material conditions were not adequately addressed to resolve these equipment problems. The team also determined that no open CR/CA items associated with the risk significant systems would adversely impact the safety related function of the systems.

The procedure backlog was 300 revision requests affecting 174 Nuclear Engineering Design procedures in January 1998. Currently there are only 77 open procedure change requests affecting 47 configuration management and design engineering procedures. The team reviewed the list of 77 open procedure change requests and did not identify any pending changes that would impact safety system operability. Based on the information reviewed the team concluded that effective progress was made in reducing the engineering procedure backlog.

c. Conclusions

No engineering backlogs items were identified that would adversely impact the safety function of the top five risk significant systems. Engineering effort over the past two years has gradually reduced some engineering backlogs. However, engineering actions to resolve repeat equipment deficiencies were ineffective in that degraded material conditions were not adequately acted upon to correct reoccurring problems of the Unit 2 atmospheric relief valves, feedwater isolation valves, and auxiliary feedwater pump steam supply valves.

E2.2 Unit 1 High Head Safety Injection Pumps at Near Runout Conditions

a. Inspection Scope (37550)

During review of the engineering backlog, the team selected condition report (CR) No. 980569 for a detailed evaluation. This CR reported a discrepancy between design analysis 8700-DCM-3072, which assumed an emergency diesel generator (EDG) output frequency range of ±1%, and Technical Specifications (TS) 4.8.1.1.2.a.5, which allowed an EDG output frequency range of ±2%. The CR noted that exceeding the 1% frequency could result in a potential run-out condition of the high head safety injection (HHSI) pumps. The team reviewed the licensee's actions to address this discrepancy since the performance problems concerning this issue were previously addressed and documented in Inspection Report 99-03 and 99-04.

b. Observations and Findings

Background

On November 17, 1993, Westinghouse, in their Nuclear Safety Advisory Letter (NSAL) No. 93-022, informed licensees that their safety analysis had not "assumed sustained systematic [Emergency Diesel Generator] frequency variations that deviated from the nominal value of 60 Hz." Therefore, licensees should provide protection against ECCS pump runout at 61.2 Hz (60 Hz + 2%), as some plant Technical Specifications (TS) allowed. At the time of the Westinghouse letter neither the Beaver Valley TS nor the acceptance criteria of the EDG surveillance test procedures addressed the EDG output frequency. Later, in 1995, for independent reasons, the licensee revised both documents, but did not consider the Westinghouse NSAL and required that the EDG frequency range be maintained between 58.8 and 61.2 Hz.

On March 29, 1996, the licensee completed Calculation No. 8700-DMC-3072, Revision 1, in which they evaluated the high head safety injection (HHSI) flow requirements. At that time, although the effective TS allowed sustained EDG frequencies of ±2%, the licensee assumed a maximum EDG frequency of only 1% above the EDG nominal frequency. It was this analysis that two years later resulted in the licensee issuing the condition report CR 980569.

Technical Review

At the time of the inspection, the Unit 1 EDGs were equipped with mechanical governors. Therefore, the speed and output frequency of the EDGs could not be maintained constant. Instead, the EDGs varied with the applied load. The licensee recognized this EDG feature. To address the identified discrepancy, in July 1998 the licensee completed several analyses and concluded that the EDGs could carry the increased loads resulting from an EDG output frequency as high as 61 Hz and that the Emergency Core Cooling Systems (ECCS) pumps and motors could perform their intended function at the same frequency. The conclusions were specified in Basis for Continued Operation (BCO No. 1-98-010). At the same time, the licensee initiated steps to modify the EDG design to replace the mechanical governors with electronic governors. This governor modification would maintain the EDGs at a constant engine speed and frequency with changes in EDG loading was scheduled to be implemented during the April 2000 Unit 1 refueling outage.

As a result of the analyses, in December 1998, the licensee revised the TS stating that the frequency would not exceed 60.6 Hz at full accident loading. Although not specifically stated, the licensee defined full accident loading as the maximum calculated loads that would be imposed on a diesel as a result of a design basis accident concurrent with a loss of offsite power and a single failure of one of the diesels.

Since the full load assumption was not conservative from the pump flow and motor operating horsepower standpoint, the licensee evaluated the impact on this equipment at lesser EDG loads. The licensee's evaluation at the 61 Hz EDG output frequency was intended to address minimum EDG loading. However, this minimum loading was estimated and did not consider all operating conditions. Based on verbal data supplied to the team following the inspection, the licensee determined that the EDGs minimum load would be approximately 200 kW less than the value (2300 kW) used in the July 1998 evaluations.

The team compared the new kW value against a kW-Hz plot that the licensee had developed from EDG surveillance tests data and concluded that, although the kW change supported an EDG frequency increase of approximately 0.1 Hz, the maximum EDG anticipated frequency probably would not exceed 61 Hz. Therefore, the team concluded that the licensee's failure to calculate the minimum EDG load did not involve a safety concern.

Previously the NRC reviewed the licensee's performance regarding this and similar issues and concluded that the licensee's control of design and corrective actions had been less than adequate and documented a Non-Cited Violation of design control and corrective actions in Inspection Reports 99-03 and 99-04.

c. Conclusions

The licensee was slow in addressing the Westinghouse-identified and reported generic finding regarding emergency core cooling system (ECCS) pump performance at higher than nominal emergency diesel generators (EDG) frequencies. Several years later, when the issue was addressed, the licensee estimated the minimum EDG loading instead of calculating the loading conditions. This resulted in a non-conservative estimate, however, based on the calculation the safety significance was low and there was no adverse safety consequence.

E2.3 System and Equipment Performance Trending

a. Inspection Scope (37550)

The team reviewed documents and indicators used to identify performance trends. These included the quarterly system status reports for risk significant systems and printouts generated from the computerized equipment data base. The team also interviewed station personnel involved in system and equipment performance trending.

b. Observations and Findings

The team found that trending of equipment performance has been marginally effective. This appeared to be attributed to several causes, but primarily were related to the conversion to a new computerized data system (DEMMAND), lack of expertise in using the system, and deficiencies related to data input.

The DEMMAND system was implemented in January 1999 for Unit 1 and in August 1999 for Unit 2. Based upon data review and discussions with engineering personnel, the team determined that DEMMAND contained inconsistent, and in some cases unreliable, data. The system provides several important functions, including analyzing and trending data for inclusion in the quarterly system status reports (reports that indicate overall health of systems), providing input for maintenance rule performance decisions, and overall tracking and trending of work order data.

System engineers are responsible to generate a performance monitoring report printout from DEMMAND, which is designed to identify adverse performance trends such as failures of risk significant equipment or repeat equipment failures. From the report, system engineers are instructed to document their review by completing the trend analysis section of the report. However, several problems have been experienced by system engineers. Some system engineers had software and/or hardware problems in generating reports; and some reports were generated, but due to incomplete data, the reports were not meaningful. As an example, the Unit 1 125 Vdc system status report documented for both the 2nd and 3rd quarters indicated that a performance monitoring trend report was not generated due to DEMMAND conversion (instead, a manual review of work orders was performed).

FENOC had initiated several condition reports related to the DEMMAND system. Some of the problems included the following:

- Failure codes were allowed to be left blank and several were not filled out for work order data entry (CRs 99-0852 and 99-2675).

- Documentation and data input for items such as cause and corrective action were not sufficient to obtain accurate work order history trends (CR 99-1153).

- Although current practices have improved relative to data input, work order historical information is incomplete and requires updating (CR 99-1936).

- Some work orders were incorrectly coded as preventive maintenance, and as such, system engineers do not review the work orders for possible adverse trends (CR 99-1995).

The team found that engineers manually review the information retrieved from the DEMMAND system to validate it, and if necessary, obtain data separately to compensate for the hardware, software and data completeness deficiencies. Nonetheless, the known deficiencies in the DEMMAND system can lead to failing to detect adverse trends in a timely fashion. The team reviewed several completed word orders, and did not identify any adverse trends not previously recognized by engineering.

The team also conducted a review to determine whether maintenance rework and post-maintenance testing failures were identified, trended and evaluated. The team found that personnel documented post-maintenance test failures in condition reports as per station procedures. However, changes in work order system management (via DEMMAND and associated procedure changes) have inadvertently reduced the administrative barriers that were previously in place to ensure rework was properly characterized and evaluated. Previously, a post-maintenance test failure typically resulted in characterizing further maintenance as rework, initiating a rework maintenance work request, and initiating a condition report. Subsequent to implementation of the DEMMAND system, procedure NPDAP 7.5, “Processing a Work Request,” eliminated the term rework and did not direct that a condition report be initiated for rework situations. FENOC recognized this issue during separate reviews, and initiated CR 00-351 for evaluation and correction.

c. Conclusions

Trending of maintenance work orders, preventive maintenance activities, and equipment and system performance was adequate, but some deficiencies were apparent. The recently instituted computerized data system (DEMMAND) contained inconsistent, incomplete, and in some cases, unreliable data. These deficiencies resulted in challenges to the end users of the system (typically the system engineers). FENOC identified weaknesses in identifying and trending maintenance rework items, for which they initiated efforts to evaluate and correct.

E8 Miscellaneous Engineering Issues

E8.1 (Closed) Violation 50-412/98-09-01: Design Control - Failure to Ensure Breaker Design Requirements Were Properly Applied and Verified

a. Inspection Scope (92903)

The NRC identified that licensee Engineering had incorrectly calculated the dc control voltage that would be available to the Unit 2 - 4160 Volt circuit breakers following a design basis event concurrent with loss of offsite power. This error resulted in the licensee's failing to recognize the potential for several circuit breakers receiving control voltages below the minimum required by design. The team reviewed the action taken by the licensee to address this issue.

b. Observations and Findings

In response to the violation, Engineering initiated condition report (CR) 982188 to document and evaluate the finding. The team reviewed the CR and found that it accurately characterized the deficiency. The team also determined that the licensee had evaluated the impact of the NRC finding on other calculations and had identified a similar error in the Unit 1 dc voltage calculations. To address their finding and the NRC findings, the licensee reviewed the calculations assumptions and recalculated the voltage at the affected breakers. The licensee concluded that acceptable voltages were available at the breaker closing coils.

The NRC had previously reviewed the Unit 2 circuit breakers operability (NRC Inspection Report 50-334 & 412/98-09) and concluded that operability was not an immediate safety concern. This conclusion was validated during this inspection through a review of the recalculated breaker closing coil voltages. The team determined that the licensee had reevaluated the length and operating temperature of the control cables of the affected circuit breakers and found that both parameters had been conservatively estimated. Using actual parameter values, the licensee acceptably demonstrated that sufficient voltage was available at the breakers closing coil. In addition, the licensee evaluated previous breaker performance tests and found that the required breaker closing voltage was above the minimum recommended by the vendor.

Regarding engineering performance, FENOC determined that several human errors had occurred during the initial revision of the calculations. Specifically, engineering had not recognized that the battery chargers would become current limiting during emergency diesel generator loading. Additionally, engineering had not detected the error during the verification and approval cycle. The licensee took appropriate action to address the human performance issues.

c. Conclusions

Engineering properly evaluated and corrected the NRC finding regarding potential inadequate control voltage at the closing coil of several 4160 Volt circuit breakers. The licensee's review and evaluation were thorough and correctly addressed extent of condition. The corrective actions were also appropriate. This violation is closed.

V. Management Meetings

X1 Exit Meeting Summary

The team discussed preliminary inspection findings with management and other members of your staff on February 3, 2000. During a subsequent telephone conversation on March 1, 2000, with Mr. B. Sepelak, Acting Supervisor, Licensing and Compliance inspection results were presented which concluded the inspection. FENOC acknowledged the findings presented. FENOC did not indicate that any of the information presented during the inspection was proprietary.

INSPECTION PROCEDURES USED

IP 37001	Safety Evaluation Program
IP 37550	Engineering
IP 62702	Maintenance
IP 92903	Engineering Follow-up

ITEMS OPENED, CLOSED, AND DISCUSSED

Closed

50-412/98-09-01	NOV	failure to ensure breaker design requirements