U.S. NUCLEAR REGULATORY COMMISSION
REGION I

DOCKET/REPORT NOS.: 50-277/95-21
50-278/95-21

LICENSEE: PECO Energy

FACILITY: Peach Bottom Unit Nos. 2 and 3

DATES: August 21-25, 1995

INSPECTORS: Alfred Lohmeier, Senior Reactor Engineer, MS, DRS
Michael McBrearty, Reactor Engineer, MS, DRS

Alfred Lohmeier, Sr. Reactor Engineer
Materials Section
Division of Reactor Safety
Date 19 Sept 95

APPROVED BY:
Michael C. Modes, Chief
Materials Section
Division of Reactor Safety
Date 9/21/95

Areas Inspected: Assessed the effectiveness of engineering activity. This included evaluation of PBAPS' revised process for performing plant modifications, detailed review of several planned and/or completed plant modifications, evaluation of the effectiveness of engineering response to significant plant events, evaluation of the effectiveness of the temporary plant alteration process, review of backlogged engineering work, management oversight of engineering activity, and review of PBAPS engineering self-assessment activity.

Results: Change to the new engineering modification process was good, effective engineering performance was demonstrated in modification-related activities and issue resolution, good performance in implementing temporary plant alteration processes, engineering self-assessment was found to be comprehensive and effective, engineering response to recent events was good, steady reduction in backlogged engineering work indicates that PBAPS has developed an effective process for managing the engineering workload, and management oversight of engineering at PBAPS provides for good engineering performance.

EXECUTIVE SUMMARY

An inspection was conducted at the Peach Bottom Atomic Power Station (PBAPS) of PECO Energy in Delta, Pennsylvania, during the week of August 21, 1995, to assess the effectiveness of the engineering activity at PBAPS in providing for the protection of public health and safety. The scope of the inspection included the evaluation of PBAPS' ongoing revisions of its process for performing plant modifications, detailed reviews of several planned and completed plant modifications, evaluation of the effectiveness of engineering in responding to recent plant events, evaluation of the effectiveness of the process for performing temporary plant alterations (TPA), review of backlogged engineering work, assessment of management oversight of engineering activities, and review of PBAPS engineering's self-assessment.

PBAPS' planned changes to the process for performing plant modifications, based on a critical self-assessment of the current process and employee feedback, will be effective in making the modification process more efficient. In addition, PECO has developed a good plan, with appropriate emphasis on employee training, for changing to the new process.

The design, planning, and implementation of the reviewed modifications was good. The modification packages were complete and well prepared. Design control and installation activities were good. PBAPS took prompt corrective action to determine the root cause and prevent recurrence of a weakness noted in performance of quality verification function for a pipe support modification on the Unit 3 HPCI.

PBAPS performed well in self-identifying weaknesses in its temporary plant alteration (TPA) program, and has taken effective corrective action in revising the process for controlling and monitoring TPAs. The specific TPAs reviewed during the inspection were installed in accordance with plant procedures, and proper design configuration control was demonstrated.

The scope and quality of PBAPS' self-assessment of the implementation of design configuration control was good, and PBAPS showed strength in taking aggressive action to prevent recurrence of modification-related problems.

The engineering department demonstrated good performance in responding to three recent events including: (1) high pressure coolant injection (HPCI) system failure, (2) failure of the reactor feed pump turbine (RFPT) control system, and (3) slow control rod scram times. Engineering took prompt action in assessing the problems, determining immediate corrective actions, evaluating the root cause of the failures, and developing long term corrective action plans to prevent recurrence.

PBAPS' engineering has an effective process for managing the engineering workload that has resulted in a steady reduction of backlogged engineering work.

PBAPS management recognizes the need to perform modifications to increase the effectiveness of plant operation in providing safe and efficient generation of nuclear energy. Engineering management oversight of the many engineering activities showed strength in planning and implementing engineering activity with the digital computer as an oversight tool. The oversight of engineering self-assessment and self-suggested corrective action programs demonstrated good management perspective toward achievement of effective site engineering operation. The abundance of good engineering initiatives is indicative of good management judgement and oversight.

DETAILS

1.0 SCOPE OF INSPECTION (INSPECTION PROCEDURE 37550)

This inspection was conducted at the Peach Bottom Atomic Power Station (PBAPS) of PECO Energy in Delta, Pennsylvania, during the period August 21 - 25, 1995, to assess the effectiveness of the engineering activity at PBAPS in providing for the protection of public health and safety. The scope of the inspection included the evaluation of PBAPS' ongoing revisions of its process for performing plant modifications. Detailed reviews were made of several planned and completed plant modifications and the effectiveness of the process for performing temporary plant alterations (TPAs) was assessed. The inspection evaluated the effectiveness of engineering in responding to significant plant events. PBAPS reduction of backlogged engineering work was reviewed. An evaluation was made of PBAPS' engineering self-assessment activity and management oversight of engineering.

2.0 REVIEW OF PLANT MODIFICATIONS

The inspectors assessed PBAPS' on-going plans to revise its modification process to make the process less prone to error in interpretation of required action. Toward that end, the inspectors reviewed several PBAPS in-progress modification activities. These included upgrading pipe supports for safety-related motor-operated valves necessitated by the power re-rate program, refurbishment and improvement of the traversing in-core probe (TIP) system, installation of a more effective equipment monitoring system, and improvement of the fire alarm system effectiveness.

2.1 PBAPS Revision of Modification Process

PBAPS began to revise its plant modification process in early 1995 in response to a critical self-assessment of the current process; feedback was solicited from engineering and maintenance personnel. The revision is intended to produce a more efficient and less confusing process for the initiation, design, and implementation of plant modifications, by consolidating numerous existing modification-related procedures into a single Modification Manual, along with three or four controlling procedures.

The NRC inspectors met with PBAPS' management to discuss the current status and plans for changing to the new process. The new modification manual and procedures are scheduled to be issued in September of 1995. It is scheduled to occur concurrently with a planned revision of PECO's computer-based Plant Information Management System (PIMS). In addition, PBAPS has prepared and scheduled employee training to ensure that site personnel understand the new process. Through various site publications, the inspectors noted that site personnel have been kept informed of the key elements of the new process and transition schedule.

The NRC inspectors determined that PBAPS had developed a good plan, including emphasis on employee training, for changing its modification process to make it more efficient for engineering and maintenance personnel. It is also commendable that PBAPS actively monitors and reacts to the feedback of its employees when weaknesses are identified.

2.2 Unit 3 Pre-Outage Motor-Operated Valve Pipe Hanger Modification

The NRC inspectors performed a review of a PBAPS modification for upgrading safety-related motor-operated valves and associated pipe supports necessitated by power re-rate. This inspection effort focused on the design and pre-outage installation of the pipe supports. The details of the valve and operator hardware upgrades, which are included in the scope of PECO's Generic Letter 89-10 program, were not addressed.

The NRC inspectors held discussions with the lead responsible engineer (LRE) related to the program details and reviewed the Design Input Document (DID) and 10 CFR 50.59 Safety Evaluation. A total of 24 hangers are being modified or added. PBAPS is performing 11 pipe modifications prior to the upcoming outage. The NRC inspectors found the DID and the 50.59 Safety Evaluation were complete and of good quality. The design of the modifications was consistent with the design bases for the respective systems. The modification package identified the necessary revisions to the affected Design Basis Documents (DBD), Piping and Instrumentation Drawings (P&ID), UFSAR Sections, and Inservice Inspection (ISI) Drawings.

During discussions with the LRE, the NRC inspectors questioned how system operability was ensured during the pre-outage work. Pipe supports that are being reworked may not be able to perform their design function during the installation activity. The LRE provided a work/release schedule ensuring system operability during all phases of the pre-outage work. This schedule clearly identified specific milestones and approvals to be completed before work could progress on individual supports. For supports being reworked, PBAPS performed an analysis to demonstrate that the system remained operable within design basis loads.

The NRC inspectors selected two in-progress modifications for detailed review and walkdown. The first involved adding supports to the Reactor Core Isolation Cooling (RCIC) System pump discharge minimum flow line, and the second involved reworking of a support on the High Pressure Coolant Injection (HPCI) System pump discharge minimum flow line. The RCIC modification added two supports to piping downstream of the minimum flow discharge isolation valve, while the HPCI modification added a diagonal brace to an existing overhead vertical beam support. The NRC inspectors reviewed the applicable Action Requests and Work Orders, performed a walkdown of the modifications with the LRE, and met with the supervisor of the contractors performing the installation.

The RCIC system modification was partially complete. Based on discussions with the LRE and the contractor supervisor, the NRC inspectors found the work to be well controlled, and progressing without any problems. The HPCI system modification had just been completed the previous week. While reviewing the HPCI work package, the inspectors noted that an Engineering Change Request (ECR) was issued related to a problem with the modified support. Specifically, a 4" x 5" baseplate that was welded to an existing vertical support was not installed in accordance with the design installation drawings. The NRC inspectors found that the condition of the as-installed support was not identified during the required quality verification (QV) review, but was

subsequently identified by PBAPS engineering personnel. PBAPS generated a Performance Enhancement Program (PEP) issue to determine why the QV review did not identify the problem, and define the appropriate corrective actions to be taken.

Based on the above review, the NRC inspectors determined that the design of the modifications are consistent with the design basis for the respective systems, planning of the pre-outage work was good, the work packages were complete and well prepared, and the installation is progressing as scheduled. The inspectors also noted that PBAPS promptly identified the problem with the HPCI installation and was taking actions to determine the root cause and prevent recurrence. This revealed an isolated QV performance weakness.

2.3 Traversing Incore Probe System Upgrade Modification (MOD P00068)

The NRC inspectors reviewed PBAPS preparations for implementing the Traversing Incore Probe System (TIPS) Upgrade Modification for Unit 3 during the forthcoming refueling outage. The review included examination of the Design Information Document (DID) and 10 CFR 50.59 Safety Review (SR), discussion of the reasons for the TIPS modification with a PECO Energy Headquarters (Chesterbrook) engineer, review of the component parts arrangement for TIPS, examination of the pre-outage and post-outage planning schedule, and walk-down of the installation to view the progress to-date prior to the outage.

In discussion of the reasons for the TIPS modification and review of the associated DID, the NRC inspectors found that the TIPS upgrade modification is necessitated by the degraded reliability over the past 2 years due to outmoded control electronics and mechanical parts of the system being worn as a result of use over this period. A review of work orders and RWP history indicated that operation and maintenance costs and radiation exposure as a result of repairs could be reduced by the modification. The NRC inspectors found the DID to be comprehensive.

The modification will include replacement of the five TIP systems with a system having three drive mechanisms, six indexers (one for each drive mechanism on each side of the primary containment), and a flux mapping and control console. The TIP valve control units will be retained and portions of the TIP guide tubes will be relocated in conjunction with the replacement of the TIP indexer in order to maximize the tube bend radius and facilitate maintenance. The existing gamma TIP detectors will be used in the new drives. Special instructions will be provided to keep personnel exposure ALARA. The inspectors reviewed the interim drawing change Notice M-2810 that graphically indicated the changes to the neutron monitoring system.

The NRC inspectors reviewed the TIP system upgrade safety review and found it to comprehensively provide for a review of safety in accordance with 10 CFR 50.59. The modification is considered to be non-safety related, with the exception of two TIP tubing containment penetrations (including shear plug

isolation valves). These valves will not be changed. Since the modification affects Technical Specifications Section 3/4 D, Tables 3.7.1 and 3.7.4 will be revised. A License Change Request 94-008 has been initiated to revise the Technical Specification. The modification also requires an amendment to the Operating Licenses DPR-44 and DPR-56.

The modification will make changes to the facility described in the Safety Analysis Report (SAR). The modification will not change the design function of the system, but will make changes to the configuration and operation of the system. Changes to the UFSAR are detailed in the UFSAR Change Request P-00552 initiated for this modification. The modification does not make changes to procedures described in the SAR nor does it involve tests or experiments not described in the SAR.

In review of the 10 CFR 50.59, the NRC inspectors found that a comprehensive discussion of the safety evaluation considerations indicated no increase in the probability of occurrence of an accident previously evaluated in the SAR, no increase in the consequences of an accident previously evaluated in the SAR, and no possibility creating an accident of a different type than previously evaluated in the SAR.

A review of the TIPS modification schedule indicated the planning for implementation and timeliness of completion of the modification was good. A walkdown of the accessible parts of the modification work area by the inspectors provided a verification of the timeliness of implementation together with an observed cleanliness and orderliness of the work area.

The inspectors found the DID and 10 CFR 50.59 documents to be comprehensive, the reasons for the modification to be appropriate improvements to the system, the system arrangement will provide for improved operation of TIPS, the planning to provide a comprehensive format for efficiently completing the modification within the schedular constraints of the outage. The walkdown of the modification revealed timely progress toward completing the modification and the modification area was found in a clean and uncluttered condition.

2.4 Vibration Monitoring Network Modification (MOD P000240)

On review of planned temporary plant alterations (TPAs) at PBAPS, the NRC inspectors noted the predominance of scheduled modifications relating to the installation of equipment performance monitoring equipment, a nonsafety-related program. These included monitoring of heat cycle performance, M/G performance, plant re-rate performance, cooling tower level trip, valve leakage, reactor feed pump turbine performance, main turbine vibration, Alterex vibration, MG regulation, and HPCI steam line vibration.

Of these modifications, PBAPS found that vibration monitoring projects were considered an important initiative for PBAPS to pu.sue because they provide the means by which one can detect and trend operational behavior to preclude unexpected equipment operating problems. Although not directly safety-relat-d, failure to trend these monitored conditions could result in consequences requiring a greater frequency of exercising the plant operation beyond that normally expected.

The NRC inspectors found that a network vibration modification is under development by PBAPS for the purpose of detecting impending main turbine vibration. This network can indicate needed replacement of unreliable portions of the main turbine. It can perform reactor feedpump turbine and turbine supervisory instrumentation alarm and trip functions, provide advanced predictive maintenance capabilities on high-payback equipment, and eliminate alarm masking on condensate pumps. The network can facilitate the transmission of information from the affected part of the system to work stations, performance management system (PMS) computers, alarms, trips, and analysis stations. The implementation schedule for the vibration network will be performed during outages 3R10 and 3R11.

The inspectors found this modification program to be a good initiative to provide for monitoring and trending performance of critical equipment affecting the safe and efficient operation of PBAPS.

2.5 Fire Alarm Annunciation System Modification (MOD P00520)

The inspectors reviewed a modification to the fire alarm system at PBAPS. The objective of this modification is to upgrade the existing fire alarm annunciation system to provide electrical supervision of existing field alarming devices, and to add an automatic recording device to record incoming alarm signals. A temporary coded fire alarm horn and a permanent fire alarm annunciator will be installed in the main control room, along with a loss of power alarm. Power line conditioners will be installed on the line side at smoke detector panels to eliminate recurring problems caused by power source transients. This modification is for fire protection and is non-nuclear safety related.

Under the present system, a wire break, short, or grounding will only activate a trouble alarm, requiring "trouble-shooting" to determine the nature of the problem. A major weakness of this system is that it "masks" out other alarms that are electronically "downstream" from the fault. Existing horn circuits are wired in series. Should a horn fail, the entire loop is inoperable until time-consuming trouble-shooting locates the problem. There is no device in the existing system to automatically record the source, date, and time of the fire detection alarms and suppression systems.

The requirements of the new fire alarm system provide alarm and trouble annunciation along with acknowledgement of alarms in accordance with National Fire Protection Association (NFPA) requirements. The system shall be capable of providing "hard copy" output of all events that occur on the system in the sequence that they occur. The events printer serves as a visual alarm indicator for the control room operator.

The NRC inspectors find the fire alarm annunciation system provides a more effective alarm system such that the location of the trouble area can be more rapidly discerned. Furthermore, the recording system provides for a precise accounting of the sequence of events, enabling evaluation of the progression of the trouble and obtaining a firmer basis on which to invoke corrective action.

3.0 TEMPORARY PLANT ALTERATION PROCESS

The NRC inspectors reviewed PBAPS' process for implementing and controlling Temporary Plant Alterations (TPAs) that was revised in December of 1994, with the issuance of Procedure MOD-C-7, "Temporary Plant Alterations (TPAs)." The necessity for revising the process was attributed to past problems with configuration control and tracking of TPAs identified in a critical 1993 QA audit performed by PBAPS.

The inspectors reviewed Procedure MOD-C-7 and found it to be well written and comprehensive. TPAs are processed, initiated, and installed as engineering change requests (ECRs). The procedure describes specific situations for which TPAs may and may not be used, and provides a detailed procedure for TPA initiation, evaluation, review, approval, installation, status, and removal. For each shift, plant operators are required to review new and existing TPAs for impact on current plant conditions. For TPAs greater than 90 days old, the procedure requires that either the appropriate system manager or a cognizant individual perform a quarterly walkdown to verify that the TPA is still required, and that it is properly installed and tagged.

At the time of the inspection, there were 11 TPAs installed in Unit 2 and 12 in Unit 3. PBAPS indicated that they expect to remove all but two of the Unit 3 TPAs during the upcoming 3R10 outage. All current Unit 2 TPAs are scheduled to be removed either by the end of 1995, or during the next Unit 2 refueling outage. The inspectors reviewed the documentation and 50.59 safety evaluations for two TPAs, ECR 94-11440 and ECR 94-11401, and found them to be complete, and in accordance with the requirements of MOD-C-7.

The inspectors reviewed a recent PBAPS QA audit report of the implementation of MOD-C-7. The audit included a review of 10 TPAs and concluded that the transition to the new process had gone well. One issue was identified with one of the TPAs involving failure to annotate the proper drawings in the control room. The root cause of this discrepancy was attributed to a deficiency in the old TPA process under which that particular TPA was initiated. PBAPS subsequently reviewed all installed TPAs and verified that there were no similar problems.

Based on the above, the inspectors concluded that PBAPS performed well in self-identifying the weaknesses in its TPA program, and has taken effective corrective actions. The specific TPAs reviewed were installed in accordance with plant procedures, and the appropriate design control documents were properly annotated to reflect the installation.

4.0 PBAPS SELF-ASSESSMENT ACTIVITIES

In June 1995, PBAPS senior management met to review the findings of the 1995 annual self-assessment program. As a result of this review, it was determined that improvement was to be focused on work control, administrative procedures, the corrective action process, change management, modification control, and human performance. Of particular significance to the NRC engineering inspection were the strengths and weaknesses identified by the Site Engineering Division. The weaknesses of each engineering section within the Site Engineering Division were identified together with corresponding corrective action plans.

4.1 Engineering Identified Weaknesses and Corrective Actions

The weaknesses and corrective actions were described in detail. Relevance to the area for improvement identified by senior management is indicated parenthetically for some corrective action plans. Completion dates were given for each committed corrective action plan. For example, the Design Engineering Section identifies the following weakness:

> "Inability of the Design Engineering Section to perform Dynamic Qualifications (DQ) in a timely manner to support station needs. (Procedure Adequacy/Administration Procedure Usage)"

The action plan prescribed is as follows:

> "a. Develop transition plan with Chesterbrook (CB) Engineering.
> b. Complete review approval of DQ guidelines.
> c. Provide training of affected disciplines.
> d. Assess program implementation, and make necessary adjustments, if required."
>
> A commitment was made to complete the action plan on December 15, 1995.

The inspectors found a total of 53 specific weaknesses identified for the engineering sections. An action plan of one to several items was identified for each weakness identified.

A good continuing program for self-assessment of engineering activity is carried out at PBAPS. Weaknesses are identified and commitments are made to assure the timeliness of corrective action necessitated by the weakness.

4.2 1994 Self-Assessment Program Corrective Action Followup

The NRC inspectors reviewed the results of PBAPS corrective action in addressing weaknesses identified in the 1994 self-assessment program. These weaknesses included poor communications between engineering branches, component engineering does not provide validation of ASME Code compliance in PIMS,Design Engineering has difficulty accessing calculations needed for operability determinations, and Performance and Reliability Engineering has not met requirements for failure trending.

In discussion with the Director of Engineering, the NRC inspectors noted that since the 1994 self-assessment program, corrective action had been taken for each of the identified weakness areas determined through the self-assessment program process.

The inspectors find the self-assessment program of the engineering division sections and branches to be a comprehensive continuing effort to improve engineering effectiveness in carrying through the corrective action required to eliminate identified weaknesses in the engineering operation at PBAPS.

4.3 Design Change Configuration Control (Administrative Guide AG-123)

The NRC inspectors met with the Senior Manager of Design Engineering to discuss the recent self-assessment of the implementation of Administrative Guide AG-123, "Maintaining Configuration Control of Design Changes," effective July 11, 1995. This procedure was implemented in July 1995, following a self-imposed cessation of all modification activity. AG-123 is currently being implemented on all planned modifications, and was also used to re-review previously implemented modifications.

The NRC inspectors found that AG-123 was utilized over the past month in an extensive review of planned and completed modifications. The self-assessment performed by Design Engineering included the development of a table which identified the modifications to which the procedure was applied, and whether any new action was required as a result of the AG-123 review. It was found that the large majority of the modifications satisfied the initial AG-123 screening criteria, and were determined to be satisfactory. For the small number of modifications which did not satisfy all of the AG-123 criteria, it was typically because of concerns identified with the installation and acceptance testing. PBAPS is planning to issue a revised AG-123 (expected to become effective on August 29) which includes the lessons learned from the self-assessment, and plans to incorporate it into the revised modification process (Section 2.1).

The scope and quality of PBAPS' self-assessment of the implementation of AG-123 was good, and it is a strength that PBAPS is continuing to take aggressive actions to prevent recurrence of modification-related problems.

5.0 REVIEW OF ENGINEERING ISSUE RESOLUTION

The NRC inspectors reviewed several significant engineering issues including: (1) engineering involvement in responding to three recent events, and (2) current plans for assessing vibrations observed on the High Pressure Coolant Injection System (HPCI). The review focused on the performance of the engineering personnel in identifying the issue, determining the corrective action required to resolve the issue, and implementing the corrective action in an effective manner.

5.1 HPCI System Failure (LER 29031)

The NRC inspectors assessed the engineering department's activities in responding to the failure of the U3 HPCI steam admission valve, MO-3-23-014, during a surveillance test performed on July 6, 1995. MO-3-23-014 failed in mid-stroke after receiving an auto-open signal per test Procedure ST-I-023-100-3. At the time of the test, the HPCI system was inoperable to allow performance of the test, and the Fix It Now (FIN) Team, a multi-disciplined maintenance team, was tasked with trouble-shooting the valve to identify the cause of the failure. The FIN team determined that the motor had failed, and replaced the motor to allow restoration of system operability. The failed motor was disassembled and evaluated on-site by personnel from PBAPS' Component Engineering and PECO's Corporate Laboratories Division, and was then transported to the Corporate Laboratories for more detailed failure analysis.

The inspectors discussed PBAPS' activities in response to this event with the HPCI System Manager and the System Engineering Manager. PBAPS indicated that they had performed a search of the Nuclear Plant Reliability Database System (NPRDS), and found approximately 70 other instances of motor failures attributed to motor winding problems. However, the search did not reveal useful information concerning the cause of the failures because motor failures are typically treated as sub-component failures and replaced without performing an in-depth failure analysis. PBAPS also generated a level 2 PEP issue (PEP issue number I0004192) which described the failure, and required that a root cause evaluation and corrective actions be developed. Level 2 PEP issues require a written report to the Nuclear Review Board (NRB) prior to closure. A draft of the NRB PEP report (the report was in a review/approval cycle at the time of the inspection) was reviewed, along with the failure analysis report generated by Corporate Laboratories.

The Corporate Laboratories failure analysis report concluded that the motor failed due to an electrical short circuit caused by frayed armature compensating coil electrical insulation. Further, the report indicated that the mounting of the compensating coil, along with both electrical and mechanical vibrations, were the main contributing factors to the electrical short. The mechanical vibrations were attributed to the HPCI steam line vibration issue which is currently under evaluation by PBAPS (see Section 5.4). The failure analysis report provided several recommendations to address potential generic implications. The inspectors determined that the PEP and the draft NRB report were consistent with the recommendations provided in the Corporate Laboratories failure analysis report.

The Engineering Department performed well in supporting other technical disciplines in performing the test, and in trouble-shooting the problem. Additionally, engineering produced a thorough root cause evaluation, and is currently implementing corrective actions to prevent recurrence.

5.2 U3 Scram due to Reactor Feed Pump Turbine Control Signal Failure (Event 29134)

The NRC inspectors reviewed PBAPS' response to the issue of Unit 3 Scram from 70 percent of rated power on July 30, 1995. There were no reported inoperable systems, structures, or components that contributed to the event. The "B" reactor feed pump (RFP) was not in service at the time. The "A" RFP speed suddenly increased, increasing feedwater flow to the core, the "C" RFP speed automatically decreased, but the reactor water level continued to increase until the high water level main turbine trip setpoint was reached (45 inches). Subsequently, the turbine stop valves closed, and the reactor protection system (RPS) Scram logic was activated. Primary containment isolation system (PCIS) was activated when the water level dropped below 0 as a result of void collapse upon insertion of the control rods. The "C" RFP restored the reactor water level to normal. PCIS logics were reset and State and Local Officials, and NRC was notified of the event.

Trouble-shooting determined that the "A" RFP motor control unit (MCU) failed, caused an increase in "A" RFP speed and the consequent high reactor water level. It was determined that the firing circuit within the "A" MCU failed. The exact cause of the firing circuit failure has not been determined and the failure analysis will be made at the PECO Energy Test Facility.

The inspectors noted that no actual safety consequences resulted from the event. Subsequent to the event, PCIS and RPS Scram logics were reset and the affected systems were restored. Four electronic cards within the firing circuit were replaced and the system tested. The corrective actions received PORC approval without comment. The PECO Energy test center is evaluating the performance of the electronic cards to determine generic implications and appropriate corrective actions to be taken. A modified firing circuit with improved digital logic is under development for installation during a future outage.

No inappropriate procedures in the engineering evaluation of the event or in the corrective course of action were taken. PECO engineering has followed appropriate procedures in trouble- shooting, technical review, distribution for root cause determination and interim corrective action in pursuit of the appropriate corrective action response to the event.

5.3 Slow Control Rod Scram Times due to Scram Solenoid Valve Diaphragm Degradation (EVENT # 29189)

The NRC inspectors reviewed the corrective action program of PBAPS related to the Technical Specification Section 3.3.C.2 minimum requirement for insertion times. PBAPS Event Number 29189 reported a Technical Specification mandated shutdown of Unit 2 on August 13, 1995, because the average of the Scram

insertion times tested was .398 seconds for 3 rods in a group of 4. This was greater than a corrected Technical Specification limit of .382 seconds. The Technical Specification shutdown started within 24 hours. The last time the set of rods that failed were tested was in November of 1994.

The cause of the event was attributed to slow response time, due to deterioration of solenoid valve diaphragms that had replaced original equipment. The problem is not a new one; it has been reflected in a GE SIL No. 584, January 5, 1995, GE SIL 575, October 27, 1993, and NRC Information Notice 94-71 (Degradation of Scram Solenoid Pilot Valve Pressure and Exhaust Diaphragms). On July 25, 1994, GE provided a 10 CFR Part 21 notification related to slow Scram times for Scram solenoid pilot valves on hydraulic control units for most GE BWR/2s through GE BWR/5s, due to degraded BUNA-N diaphragms in ASCO dual type solenoid valves.

Analysis of the problem by GE indicated that the diaphragms, produced later than 1989, were cured in such a manner as to result in susceptibility to hardening. Other assessments related to possible changes in diaphragm maintenance procedures, or improper installation of the diaphragms. GE reduced the assessment of the estimated diaphragm life from 6 to 4 years.

The inspectors examined a map of susceptible solenoid valve array locations that indicated the location of valves installed later than 1989. These are designated as "susceptible." There are 29 susceptible locations in Unit 2 and 64 in Unit 3 (based on the date of installation of the valve arrays).

At the present time, while PBAPS is continuing to investigate the problem, the PBAPS corrective action plan will replace the scram solenoid pilot valve diaphragms in Unit 2 by the end of 1995. GE is evaluating the remaining diaphragm life. Scram time testing is required every 4 months by the Technical Specification (including a grace period).

PBAPS is appropriately monitoring the scram solenoid valve performance through the required Technical Specification test requirements. They are closely following the GE studies on determining the cause of the diaphragm degradation and estimations of diaphragm remaining life. PBAPS has committed to an action plan of diaphragm replacement in Unit 2 by the end of 1995.

5.4 HPCI Steam Supply Line Vibrations (URI 95-18-001)

The NRC inspector reviewed the HPCI steam line vibration monitoring program, resumed in response to URI 95-018-001 reported in Inspection Report 95-18. The installation of vibration pickups on the HPCI steam supply line has been authorized through an Engineering Change Notice that provides for generation of a TPA. The TPA will provide instructions and control for installation of vibration probes at the steam supply drain pot, and at two pipe elbows in the torus room. A pressure transmitter will be installed to provide pressure input to the data collection device. Heat shielding will be provided at areas where the pipe insulation has been removed to preclude extraneous heat signal alarms from external temperature elements. Data will be collected by means of portable data collection devices.

The NRC inspector reviewed the details of the approved disposition details relating to the installation of the accelerometers, the tagging requirements under the rules for TPA installation, and the verification of the proper operation of the accelerometers. The NRC inspectors reviewed the 10 CFR 50.59 to verify that consideration of TPA safety has been given by PBAPS.

Operating experience of both Unit 2 and 3 has shown that the HPCI steam line vibration varies with time and/or power level. The vibration monitors will provide for steam line vibration level trending of load during both shutdown to the refueling outage and reloading to operation for the next fuel cycle. The steam line vibration monitoring project is an appropriate starting point in determining the root cause of the HPCI steam line vibration. URI 95-18-001 remains open until the root cause of the vibration is determined.

6.0 CONTROL OF BACKLOGGED ENGINEERING WORK

The NRC inspectors met with PBAPS' management to discuss the planning, scheduling, and control of engineering work, and the progress made in reducing the engineering backlog over the past year. The engineering backlog consists of various types of engineering issues such as engineering change requests (ECR), nonconformance reports (NCR), modification change ECRs (MDCH-ECR), and engineering work requests (EWR). For each different type of issue, PBAPS has graphical indicators illustrating the current status, the established goal, as well as trends over the past several months.

The overall engineering backlog shows fairly steady reduction. In some areas, such as ECRs and NCRs, an increase in the backlog occurred in July and August of 1995, which PBAPS attributed to the implementation of AG-123 (see Section 4.3). At the time of the inspection, PBAPS' Design Engineering indicated that the total backlog was approximately 200, which was down from approximately 400 (a year ago), and approximately 1200 (two years ago). PBAPS attributed the reduction to the increased emphasis placed on planning and scheduling engineering work, including the development of specific checkpoints and milestones (e.g., required reviews, ordering and receipt of parts) which must be reached before the work installation is scheduled.

PBAPS' engineering has an effective process for managing the engineering workload. This has resulted in a steady reduction of backlogged engineering work.

7.0 MANAGEMENT OVERSIGHT

In review of the results of the engineering inspection, the NRC inspectors found management recognition of needed modifications to increase the effectiveness of plant operation in providing safe and efficient generation of nuclear energy. Engineering management oversight of the many engineering activities was good in that it utilized sound practices in planning and implementing engineering activity, largely by means of the digital computer. The oversight of engineering self-assessment and self-suggested corrective

action for uncovered weaknesses required a good management perspective toward achievement of an effective site engineering operation. The abundance of initiatives to improve the efficiency of engineering and plant operation are indicative of good management judgement and oversight.

8.0 SUMMARY AND CONCLUSIONS

- PBAPS is revising its process for performing plant modifications in response to a critical self-assessment and feedback from site personnel, and has developed a good plan for transitioning to the new process.

- Good performance was demonstrated in modification-related activities for adding/reworking safety-related pipe supports, upgrading the TIP system, providing for an equipment performance monitoring system, and upgrading the fire alarm system. An isolated weakness in performing quality verification was noted in reworking a pipe support on the Unit 3 HPCI system. PBAPS took prompt corrective actions to address the problem.

- Selected review of temporary plant alteration processes indicates good performance in following plant procedures, including proper annotation of design control documents to reflect the ongoing changes.

- Engineering department self-assessment of their activities is comprehensive and effective in providing for identification of engineering division weaknesses and implementing appropriate corrective action.

- PBAPS' engineering discipline demonstrates good performance in responding to several recent events, including HPCI system failure, reactor scram due to reactor feed pump turbine control signal failure, slow control rod scram times due to degraded diaphragms, and HPCI steam supply line vibration.

- The scope and quality of PBAPS' self-assessment of the implementation of Design Change Configuration Control (AG-123) was good, and PBAPS is continuing to take actions to prevent modification-related problems.

- The steady reduction in backlogged engineering work indicates that PBAPS has developed an effective process for managing the engineering workload.

- Management oversight of engineering at PBAPS provides for good engineering performance in modification implementation, issue resolution, and performance improvement.

9.0 MANAGEMENT MEETINGS

The inspectors met with PBAPS representatives at the entrance meeting on August 21, 1995, and at the exit meeting on August 25, 1995, at the Peach Bottom Atomic Power Station in Delta, Pennsylvania. The names of licensee personnel attending the entrance and exit meetings are shown on Attachment A.

The findings of the engineering inspection were discussed with PBAPS management at the exit meeting. The licensee did not disagree with the findings of the inspectors.

Attachment - Management Meeting Attendance List

ATTACHMENT

Personnel Attending Management Meetings

PECO Energy Company

*	H.	Abendroth	Engineer	Atlantic Electric
*	J.	Armstrong	Sr. Manager	Plant Engineering
*	W.	Bowers	Engineer	ISEG
	J.	Cohen	Manager	Materials
*	F.	Cook	Sr. Manager	Design Engineering
*	A.	Dycus	Engineer	NQA
*	G.	Edwards	Plant Manager	PBAPS
	A.	Fulvio	Manager	NQA
*	J.	Hufnagel	Manager	Performance and Reliability
*	J.	Hunter	QV Support	NQA
	M.	Kelly	Manager	ISEG
	T.	Mitchell	Director	Site Engineering
*	A.	Raush	Engineer	Design Engineering
*	R.	Smith	Engineer	Experience Assessment

United States Nuclear Regulatory Commission

	W.	Schmidt	SRI	USNRC Region I