U. S. NUCLEAR REGULATORY COMMISSION

REGION I

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Facility Name:	Peach Bottom Atomic Power Station Units 2 and 3	
Dates:	September 8, - November 9, 1996	
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EXECUTIVE SUMMARY
Peach Bottom Atomic Power Station
Inspection Report 96-08

This integrated inspection report includes aspects of resident and region based inspection of routine and reactive activities in: operations; surveillance and maintenance; engineering and technical support; and plant support areas.

Overall Assurance of Quality:

The licensee (PECO Energy) operated both units safely over the period.

Overall PECO management responded well to two Unit 2 trips caused by turbine trips which resulted from generator protective relaying action, and also removal of the Unit 2 turbine from service due to a high bearing temperature condition (Section M2). During the November 7 nuclear review board (NRB) meeting the Vice-President, Nuclear Operations challenged plant management to aggressively pursue the root causes for these equipment failures (Section O7).

PECO implemented an effective radiological controls self-assessment program (Section R7).

Plant Operations:

Operators conducted routine and planned activities well, including: shutdown of Unit 2 for the eleventh refueling outage (2R11), three Unit 2 start-ups, and several power reductions at Units 2 and 3. The inspectors found good material condition at both units. However the operators were challenged by several equipment issues following the Unit 2 outage. Operators responded well to stabilize plant conditions during unexpected transient events at both units (Sections 01, 02 and 04).

Operators performed well during the refueling outage, including control of plant conditions, response to transients, and identification of the high pressure coolant injection (HPCI) bearing/seal problems during start-up testing. Three minor performance issues were identified dealing with control room operators including: improper electro-hydraulic control (EHC) load-set during unit start-up leading to one unexpected and one possible operation of a bypass valve; a situation where the inspector questioned whether the Unit 2 reactor operator (RO) was paying adequate attention to the instruments and controls at Unit 2 while adjusting the Unit 3 generator controls; and two on-shift senior reactor operators (SROs) who were unable to describe the available methods for determining spent fuel pool (SFP) temperature during refueling operations. Subsequent interviews verified adequate corrective actions had been completed (Section 04.1).

While walking past the control room panel, a RO was distracted and inadvertently bumped a Unit 2 safety relief valve (SRV) control switch to the open position, he immediately recognized the error and shut the valve; the operating crew responded well to this event. PECO implemented appropriate corrective actions designed to remove potential distractions from the control room (Section O4.4).

Maintenance and Surveillance:

PECO personnel conducted the observed routine maintenance and surveillance activities well. Observed post-maintenance testing (PMT) requirements were appropriately completed using routine surveillance testing. These routine PMT surveillance tests identified the HPCI seal/bearing problem and the mis-wiring in the E-42 panel (Section M1.2).

PECO properly tested the Unit 2 control rods prior to exceeding 40% reactor power. The diaphragm alternative response test (DART) method appeared to be adequate for ensuring acceptable control rod performance following replacement of the scram solenoid pilot valve (SSPV) (118) diaphragms. The inspector noted a minor concern in that the technical specification (TS) bases could allow the use of DART testing for PMT activities other than the 118 valve diaphragm replacements (Section M1.3).

The inservice inspection program was implemented and controlled in accordance with NRC requirements and commitments. Nondestructive examinations were performed by qualified inspection personnel and data analysis was performed in accordance with procedures and ASME Code requirements (Section M2.3).

Overall PECO responded well to several equipment failures during the restart from the Unit 2 outage, this included good plant management and engineering involvement in the investigations and corrective actions. In the reviewing these instances the inspector did not identify any specific common maintenance problems. However, it appeared that the HPCI and #12 bearing problems were caused by maintenance activities and should have been prevented. The inspector will review how PECO trends these occurrences though the maintenance rule program (Section M2.1).

Through a review of qualifications for electrical and mechanical maintenance vendor personnel who performed safety-related maintenance during the Unit 2 outage, the inspector found that PECO did not maintain an adequate systems approach to training (SAT) program. This included not maintaining documentation of qualification to perform tasks such as soldering, torquing and wire connection crimping. This was a violation of 10 CFR 50.120 **(VIOLATION 96-08-01)**. Unresolved item (URI) 96-04-03, dealing with a previous vendor qualification issue following a HPCI failure was closed, the corrective actions will be reviewed as part of the violation response (Section M5.1).

Engineering:

The PECO engineering organization provided good support to plant activities, including troubleshooting of equipment problems. Despite the good engineering responses, the inspectors were concerned that the modification process did not ensure that a wire was properly removed during an E42 bus breaker modification. This error allowed the simultaneous closure of the both offsite power breakers, during testing (Section E.1).

On October 7, PECO did not perform well at assessing and evaluating all available plant indications, which led to an unidentified inaccurate setting of the average power range monitors (APRMs) outside of the 2% of rated thermal power (RTP) band allowed by TS.

This was a violation of the TS action statement in that the APRM functions were not restored within one hour and a shutdown action statement was not entered. These conditions were unknown to the PECO reactor engineer and the reactor operators, at the time, but PECO finally identified them. However, the inspectors determined that there was sufficient information available that the reactor engineer (RE) and operators should have identified the condition when it occurred. On this basis this violation was cited **(VIOLATION 96-08-02)**. PECO continued to review the controls over parameters used by the plant computers to calculate core thermal power and the adequacy of current failed sensor information. These issues will remain unresolved pending review of PECO's determination **(URI 96-08-03)** (Section E2.1).

PECO performed a good engineering evaluation of two Unit 2 core spray (CS) system piping indications internal to the reactor vessel; and the maximum spent fuel temperature prior to 2R11 (Section E2.2 and E2.3).

Plant Support:

The inspector identified that prior to 2R11 PECO had staged several combustible material items inside an area located on the Unit 2 135' elevation. This area was marked as a combustible free zone. PECO had not performed a specific analysis prior to storing these materials, however, PECO promptly established a fire watch for the affected area. The inspector determined that PECO's response was adequate, and did not observe any other examples of improper material storage during the period (Section F1.1).

Three inspector followup items opened during the last Peach Bottom emergency preparedness (EP) program inspection were closed during a recent Limerick EP inspection (Section P8).

As-low-as-reasonably-achievable (ALARA) planning, internal and external exposure controls, radiation worker training, contamination controls were effective (Sections R1.1, R1.2, R1.3, R1.4, R1.5, and R5.1).

PECO identified a minor radiological performance issue when two 55 gallon drums used to store radioactive material on the Unit 2 refueling floor were improperly marked. This issue was considered a non-cited violation (Section R1.5).

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SUMMARY OF PLANT ACTIVITIES

Unit 2 began the inspection period operating in end-of-cycle (EOC) coastdown at 51% power. Operators shutdown the unit on September 13 for 2R11. PECO completed the outage and restarted the unit on October 1. Several equipment problems delayed the power ascension as discussed in section O4.2 below, these included two automatic reactor scrams due to generator negative phase sequence relay problems, on October 6 and 15. The unit achieved 100 % power on October 24 and operated essentially there through the end of the inspection period.

Unit 3 began the inspection period operating at 100% power and remained at this power level for essentially the entire inspection period. PECO occasionally reduced unit load for control rod pattern adjustments and the following:

- On September 10 unit load was reduced to approximately 75% power for condenser waterbox cleaning.
- On October 25 unit load was reduced to about 58% power for waterbox cleaning, control rod drive scram time testing, and 3A reactor feed pump maintenance.
- On October 29 power was reduced to about 60% power to mitigate a lowering condenser vacuum condition which developed due to off-gas recombiner system problems.

I OPERATIONS

O1 Conduct of Operations[1]

O1.1 General Comments (71707)

Routine observations showed that operators conducted normal activities including three Unit 2 start-ups and several planned power reductions well. Operators responded well to stabilize plant conditions transient conditions at Unit 2 such as two automatic reactor scrams, a turbine bearing high temperature condition, and an inadvertent opening of the 71D SRV. The operators responded well to a lowering condenser vacuum condition at Unit 3 following an unexpected isolation of the recombiner system. Despite the generally good performance, the inspectors identified several minor knowledge and performance weaknesses, as discussed in the applicable sections of this report.

O2 Operational Status of Facilities and Equipment

a. Scope:

The inspectors used Inspection Procedure 71707 to walkdown accessible portions of the following engineered safety feature (ESF) systems:

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[1]Topical headings such as O1, M8, etc., are used in accordance with the NRC standardized reactor inspection report outline. Individual reports are not expected to address all outline topics.

- standby gas treatment (SGTS)
- low pressure coolant injection (LPCI) - Unit 2
- emergency diesel generators (EDG)
- emergency service water (ESW)

The inspector reviewed the overall plant material condition during and following the Unit 2 outage including: a walkdown of the drywell and torus interior and review of control room equipment deficiencies.

b. Observations and Findings:

During the ESF system walkdowns, the inspectors identified no substantive concerns finding acceptable equipment operability, material condition, and housekeeping. The inspectors identified several minor discrepancies, which PECO corrected.

The inspectors toured the drywell finding good material conditions and proper access controls. The tour of the torus interior showed good material condition and proper control of foreign materials.

PECO reduced the backlog of control room equipment deficiencies to near zero at the end of the outage.

c. Conclusion:

The inspectors found good material condition at both units.

O4 Operator Knowledge and Performance

a. Scope (60710, 71707)

The inspectors reviewed Unit 2 outage activities including normal control room conduct, fuel handling and core verification, the unit restart, and operator responses to equipment problems.

b. Observations and Findings

O4.1 Refueling Outage - Unit 2

Control Room Activities and Control of Equipment

During the course of the outage the inspectors observed that PECO properly controlled the need for emergency core cooling system (ECCS) operability through general procedure (GP)-20 "Temporary Defeating of ECCS Auto Initiation Signals During Outages" and the circulation and temperature monitoring of reactor coolant while shutdown in accordance with GP-12 "Core Coolant Procedure". The inspectors further reviewed these procedures finding that they complied with the appropriate TS requirements for these situations.

PECO used a status board in the control room to provide clear and concise information about equipment status and core decay heat load. Video cameras were appropriately used to provide control room operators with information from the refueling floor, such as local SFP temperature and level and SFP cooling skimmer surge tank level.

Work on the safety-related electrical busses was well controlled and necessary TS action statements were entered for both Unit 2 and the operating Unit 3.

Operators had generally very good knowledge of plant conditions. The inspector noted one minor knowledge deficiency during refueling operations involving two on-shift SROs who were unable to describe the available methods for determining SFP temperature. The inspector subsequently questioned three ROs regarding SFP temperature monitoring and received the proper responses, indicating PECO corrective actions were appropriate.

Conduct of Refueling

The refueling activities were performed well with the following specific strengths noted:

- The limited senior reactor operators (LSROs) for fuel handling provided excellent command and control of the fuel handling evolutions.

- Communications between the personnel on the refueling bridge and with the control room were good. The unit shift supervisor was kept well informed regarding the status of the refueling operations.

- Good housekeeping controls and water clarity were maintained during the refueling activities.

Reactor Start-up

The inspectors observed that control room operators performed well during the start-up from the refueling outage and from the October 6 and 15 reactor scrams. The inspectors found:

- The ROs and SROs performed reactivity changes in a controlled manner and properly monitored neutron measuring instrumentation.

- Communications between the control room supervisor and the plant personnel were good.

- Reactor cavity shield plugs were properly controlled during the initial start-up activities.

- PECO transitioned smoothly from the reactor vessel pressure test to the reactor start-up.

- The inspector did note two minor weaknesses with respect to the control of the EHC system load-set setpoint during two of the reactor startups, specifically, the

load-set was left near the actual reactor power at about 15%. In one instance this caused a bypass valve to open as power was increased above the load setpoint and in the other case the inspector identified, as the ROs began to increase power, that the load-set was set near the current reactor power and that a bypass valve would open. In both cases the operators subsequently increased the load setpoint to 115% power. The inspector noted that the startup procedure did not specify where to set the load setpoint. PECO was pursuing providing additional information to the operators.

O4.2 Operator Response to Equipment Problems

Equipment Related Problems Following the Outage - Unit 2

Operators responded properly to the two automatic reactor scrams discussed above, and to the main generator and HPCI bearing issues. Further, the plant auxiliary operator at the HPCI turbine did a very good job identifying the bearing/seal problems before serous damage resulted.

Lowering Condenser Vacuum - Unit 3

On October 29 Unit 3 experienced a lowering condenser vacuum due to a problem with the offgas system jet compressor. Operators responded very well. The reactor operator quickly reduced reactor power, limiting the decrease in vacuum and the spare jet compressor was successfully placed in service. The inspector did note one minor issue while observing the response to this transient. The Unit 2 reactor operator, in an effort to help the Unit 3 reactor operator, took a phone call from the PECO grid load dispatcher and subsequently crossed the control room and adjusted the Unit 3 generator voltage controller to limit the VARs being produced. While this was a technically correct action, the inspector questioned whether the Unit 2 RO was paying adequate attention to the instruments and controls at Unit 2 while adjusting the Unit 3 generator controls. PECO took good corrective actions on this issue by reinforcing the boundaries of the individual unit reactor operators.

Inadvertent Safety Relief Valve Opening - Unit 2

On October 30, a RO inadvertently bumped the 71D safety relief valve (SRV) control switch to the open position. The RO recognized the error and immediately shut the valve; the operating crew responded well to this event. The inspector reviewed the control room strip chart operating data and did not observe any reactor parameter changes resulting from the event. PECO investigated this event and implemented appropriate corrective actions designed to remove potential distractions from the control room.

O4.3 Conclusions - Operator Knowledge and Performance

Operators performed well during the refueling outage, including control of plant conditions. However the operators were challenged but responded well to several equipment issues following the Unit 2 outage. The auxiliary operator identification of the HPCI bearing/seal problems was very good.

Three minor performance issues were identified dealing with control room operators. First the control of the EHC load-set during unit start-up was not clear, leading to one unexpected and another prevented operation of a bypass valve. Second, a situation where, during at Unit 3 plant transient, the Unit 2 reactor operator manipulated generator controls for Unit 3. This could have, but did not, lead to a lack of monitoring of Unit 2 parameters. Third, several SROs did not have a clear understanding of available instruments and information to determine and monitor spent fuel pool temperature, during refueling operations.

O7 Quality Assurance in Operations

During the NRB meeting of November 7, discussions were generally focused on nuclear safety topics. The plant manager presented a good discussion of the Unit 2 outage activities and initiatives being developed to track plant performance. The Vice-President, Nuclear Operations challenged the plant management to understand the recent equipment problems during the restart from the Unit 2 outage. This challenge appeared appropriate to ensure aggressive pursuit of the root causes.

The inspector noted that during a surveillance of refueling floor activities a quality assurance assessor identified that the lifting of reactor cavity shield blocks was not being done in accordance with the approved procedure. The assessor identified lifting of the blocks higher than assumed in the associated heavy load analysis (over the cavity hand rail). The assessor appropriately addressed the situation with nuclear maintenance personnel and the blocks were subsequently moved properly.

II MAINTENANCE AND SURVEILLANCE

M1 Conduct of Maintenance and Surveillance

a. Scope (61726, 62706)

The inspectors observed: the replacement of the 72A reactor vessel level transmitter, an electrical circuit breaker preventive maintenance activity on the 3A high pressure service water (HPSW) pump compartment, and several maintenance and modification activities during the E-22 and E-42 emergency bus outages.

The inspector also reviewed numerous surveillance tests conducted during and following the Unit 2 outage.

The NRR Project Manager reviewed the post maintenance tests (PMTs) conducted following work on control rod drive mechanisms and hydraulic control units to verify compliance with TS 3.1.4.3.

b. Observations and Findings

M1.1 Conduct of Maintenance

The technicians who replaced the reactor vessel water level instrument were knowledgeable and performed the change-out well using good electrical and radiological practices.

The electricians involved in the HPSW breaker activity were well prepared and used the approved procedure.

The inspectors observed the following during the modification and maintenance observations performed on the E22 and E42 busses:

- The E22 bus work clearance boundary was walked down and found to provide adequate protection for the workers and allowed testing of the system.
- The work included modifications to the offsite breaker control circuits that had been previously completed on four of the eight other busses at both units.
- The work was conducted well, using approved procedures and work orders.
- PMTs appeared to cover the areas that were worked and properly identified a wiring error. Post-modification testing included the simulated simultaneous loss of coolant accident (LOCA) and loss of offsite power (LOOP) test.
- In one instance PECO testing found that the wiring for the E42 bus breaker had not been properly modified as a result of not including the removal of a known extraneous wire in the modification package. This led to the closure of the normal supply breaker in parallel with the alternate supply breaker, a condition that should not be allowed to occur. PECO properly responded to this event and determined through thorough troubleshooting that the wire, which had been identified during a pre-modification walkdown as needing to be removed, had been left installed. This wire sent a trip and a closed signal to the offsite breaker when an undervoltage condition was inserted, and also allowed a closed signal to the alternate breaker.

M1.2 Surveillance Activities

During surveillance testing PECO personnel identified and properly addressed two out-of calibration issues. First, during the test of the automatic start of all emergency diesel generators (EDGs), the E-2 machine indicated that it did not reach full voltage of 4160 to 4400 volts. PECO determined that this was caused by an out-of-calibration voltage recording device. Second, during the initial HPCI run at 175 psig, the high steam flow instrument indicated greater than its assumed band of 5-25 inches of water. PECO determined that this instrument had a calibration error and it was subsequently replaced.

M1.3 Scram Pilot Solenoid Valve Maintenance

During 2R11 PECO performed maintenance activities on certain control rods and their associated drive and control equipment. Among maintenance activities conducted, PECO performed 19 control rod drive (CRD) exchanges. In addition PECO replaced the diaphragms in 16 scram pilot valves (one SSPV-117 (117) valve and 15 SSPV-118 (118) valves) for the control rods that demonstrated the slowest scram times during the shutdown. PECO has been replacing 118 valve diaphragms as part of a program to address diaphragm hardening problems that have been a recent generic industry concern. (See Inspection Report 50-277, 278/95-26.) The 118 valve diaphragms that were replaced were a mixture of BUNA-N and Viton material diaphragms. The replacement diaphragms were of BUNA-N.

TS SR 3.1.4.3 requires PECO to verify following work on control rods that could affect scram times, that a control rod scram time test is conducted before declaring the rod operable. Prior to declaring the control rods operable per TS 3.1.4.3, PECO performed PMT control rod scram time testing for all rods which had undergone CRD exchange and for the one control rod (Rod 23-34) which had undergone replacement of the diaphragm on the 117 valve. However, for the 15 rods that had undergone only replacement of the 118 valve diaphragm, the licensee performed testing that evaluated diaphragm performance as a means of determining that scram time was not adversely affected by the maintenance activity.

The inspector found PECO's basis for not conducting scram time testing on these 15 control rods acceptable. The test method used, referred to as diaphragm alternative response testing (DART), monitors transient air flow (air pressure) in the exhaust port of the 118 valve as an indication of diaphragm response. PECO performed as-found and as-left DART testing and determined that valve response was improved for all replaced diaphragms.

Prior to the outage, PECO revised the TS Bases for SR 3.1.4.3 to reflect that DART testing could be used to meet the SR, if it could be concluded that DART testing monitored the performance of all affected components. PECO performed an evaluation of the Bases change pursuant to 10 CFR 50.59. The 50.59 evaluation specifically considered the use of DART testing as a means of meeting the SR for replacement of the 118 diaphragm. The licensee concluded that because the 118 valve and 117 valve acted in series with the scram valves and other CRD scram related components, changes in 118 diaphragm performance provided a direct indication of the change in rod scram time introduced by the 118 diaphragm replacement activity. In the 50.59 evaluation, the licensee concluded that DART testing could be used in lieu of scram time testing for 118 valve diaphragm replacement only.

The inspector reviewed the as-found and as-left DART testing traces for two SSPVs which had undergone exhaust diaphragm replacement. The inspector confirmed that 118 valve response improved as a result of the replacement and agreed that the DART test adequately monitored the potential effect of diaphragm replacement on scram time. The inspector concluded that use of the DART testing was adequate to meet the scram time

verification requirements of SR 3.1.4.3 for those rods that had undergone 118 valve diaphragm replacement.

The inspector noted that scram time testing was performed for all 185 rods prior to exceeding 40% power during the startup as required by TS SR 3.1.4.1 and that all rods met the acceptance criteria.

The inspector did observe one issue of concern. The revised TS Bases for SR 3.1.4.3 did not sufficiently describe limits on use of DART testing as a substitute for scram time testing. The revised Bases stated that the SR could be met by performance of scram testing or by DART testing when it is concluded that DART testing monitors the performance of all affected components. The inspector expressed concern that the revised Bases did not reflect that to date, DART testing was confirmed as an adequate means to meet the SR only for 118 valve maintenance activities. As such, the inspector was concerned that the Bases could be used to support use of DART testing for other PMT activities without the rigorous review that was conducted for the 118 valve replacement activity.

M1.4 Conclusions - Conduct of Maintenance and Surveillance

PECO personnel conducted the observed routine maintenance and surveillance activities well. Observed PMT requirements were appropriately completed using routine surveillance testing. These routine PMT surveillance tests identified the HPCI seal/bearing problem and the mis-wiring in the E-42 panel.

PECO properly tested the Unit 2 control rods prior to exceeding 40% reactor power. The DART test method appears adequate for ensuring acceptable control rod performance following replacement of the 118 valve diaphragms. The inspector noted a minor concern in that the TS Bases could allow the use of DART testing for PMTs other than the 118 valve diaphragm replacements.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Significant Maintenance Related Equipment Challenges

Following the outage there were four significant equipment-related issues dealing with equipment that PECO worked on during the outage:

- On October 2, while testing the system at less than 175 psig reactor pressure, the HPCI booster pump outboard seal and bearing overheated due an improper alignment. Maintenance personnel reworked the bearing and HPCI testing was subsequently completed satisfactorily.

- On October 6 the unit automatically scrammed in response to a turbine trip/generator lock-out caused by a generator negative phase sequence relay actuation. PECO troubleshot the relay and generator and restarted the unit on October 7.

- On October 9 a high temperature condition on the generator #12 bearing (exciter outboard) caused operators to halt the reactor power increase at approximately 86% power. PECO reduced power to remove the turbine from service, corrected the bearing problem and returned the generator to service on October 11.

- On October 15 the unit automatically scrammed following a second generator negative phase sequence relay actuation. PECO replaced the relay and restarted the unit on October 16.

b. Observations and Findings

High Pressure Coolant Injection Seal/Bearing Failure

PECO tested the HPCI system as required by TS 3.5.1 (SR 3.5.1.9). Upon initiation of the system, the operator stationed in the pump room noted smoke emanating from the booster pump outboard bearing and seal area. PECO promptly secured the system and declared it inoperable. PECO entered the 14-day TS action statement, and notified the NRC per the reporting requirements of 10 CFR 50.72, as appropriate.

Operations, maintenance, and engineering personnel met to determine a course of action. A visual inspection of the outboard bearing/seal shaft area did not reveal any obvious damage. The licensee elected to conduct a "slow start" of the system after connecting vibration monitoring equipment to existing instrumentation ports. Additionally, an external temperature monitoring device was used to monitor the shaft seal area temperature during the slow start of the system.

Using procedure AO 23C.3-2, "HPCI Manual Slow Start Operation," operators restarted the system, however, the operator secured the system after observing seal housing temperature increase rapidly and metal shavings exited in the shaft seal area.

PECO's investigation determined the problem to be improper alignment of the booster pump outboard bearing. The bearing alignment problem allowed contact between the wear bushing and the pump shaft during operation. PECO replaced the bushing and outboard seal and retested the system satisfactorily on October 2.

PECO investigated the root cause(s) for this event and determined that the bearing alignment problem developed during reassembly of the booster pump assembly following an outage corrective maintenance activity. Several causal factors were identified, involving the adequacy of maintenance procedures and the technicians' knowledge of dowel alignment pins; which had been improperly installed during a prior maintenance activity.

PECO implemented an appropriate plan to diagnose and correct the observed problem. The repairs to the booster pump problem were effective and PECO identified several appropriate corrective actions. Overall, the licensee efforts during and following the failure were very good.

Negative Phase Sequence Relay Actuation

The negative phase sequence relay (346) provides protection to the generator from grid developed phase imbalances. The installed relay has an alarm feature and a subsequent generator lock-out feature. The lock-out would cause a generator trip, a turbine trip, and a reactor scram. During the outage the Unit 2 346 relay was removed, calibrated, and reinstalled.

During reactor power increase following start-up, operators received the 346 alarm. Before they could take the actions required by the alarm response card, the reactor scrammed due to a generator lock-out and turbine trip.

Following this scram, PECO investigated possible causes for the relay receiving a current signal high enough to cause a trip. They determined that the relay possibly saw an erroneous signal due to a loose connection in the voltage transformer circuit. PECO corrected the loose connection and restarted the unit, after installing a temporary plant alteration (TPA) that allowed monitoring of the input signal to the 346 relay. After over a week the monitor showed no problems with the input signal and it was removed.

Several days after the monitor was removed this relay again caused a reactor scram. PECO determined that the relay needed to be replaced, using a newer model that allowed monitoring of the relay negative phase current. PECO also approved the removal of the generator lock-out function and installed additional monitoring equipment prior to restart. The old relay was sent to the manufacture for examination to determine the cause for the actuation. The manufacture determined, preliminarily, that an internal connection, which had not been soldered, may have caused the spurious actuation. Subsequently, PECO performed a TPA on the Unit 3 346 relay, to remove its lock-out function to prevent having any unnecessary reactor scrams if that relay had the same fault as the initial Unit 2 relay. The 346 relay provided a nonsafety-related, back-up generator protective function.

Generator Bearing Overheating

During the outage PECO performed work on the #12 (excitor outboard) turbine/generator bearing, including installing a new vibration probe. Following placing the generator on the grid and increasing power, operators noticed an increasing trend in temperature on this bearing and a subsequent reduction in lubrication oil flow. The generator was removed from service to allow bearing disassembly. Upon disassembly, PECO identified that the bearing needed to be replaced, but could not determine a specific cause for the failure.

After extensive analysis of the bearing PECO identified that electrolysis of the bearing material had occurred, characterized by microscopic pitting. Subsequent review indicated that PECO had modified the generator shaft grounding device during the outage and had not properly returned it to operation. This allowed the generated current to flow through the #12 bearing to ground causing the microscopic pitting. PECO also identified that a post-outage routine test of generator shaft voltage should have identified the ground path through the bearing, but did not. PECO was pursuing why this test did not identify the ground path and other corrective actions for not installing the shaft grounding device.

M2.2 Conclusion - Maintenance and Material Condition of Facilities and Equipment

Overall PECO management attention to these issues was very good, this included plant management and engineering involvement in the investigations and corrective actions.

In reviewing these instances the inspector did not identify any specific common maintenance problems. However, the HPCI and #12 bearing problems were caused by maintenance activities and should have been prevented. These occurrences are trended through the maintenance rule program, which monitors the effectiveness of maintenance activities.

M2.3 Inservice Inspection Program Review

a. Inspection Scope (73753)

The inspector reviewed PECO's inservice inspection (ISI) plans and schedules for the current inspection period. In addition, the inspector reviewed the qualifications and certifications of all contractor personnel involved in ISI.

Lastly, the inspector observed manual ultrasonic and magnetic particle examinations of welds, and visual examination of components inside the reactor pressure vessel.

b. Observations and Findings

The inspector determined that changes to the ISI plan were properly documented and approved.

The inspector determined that the qualifications and certifications of inspection personnel properly reflected pertinent information, such as; employer's name, person certified, activities qualified to perform, level of certification, effective period of certification, signature of certifying official, the basis used for certification, and annual eye examinations. The inspector determined that the inspection personnel met the required ASME standards, and the qualifications and certifications were appropriately reviewed by licensee personnel.

Through observation of nondestructive examination (NDE) activities, the inspector determined that approved procedures were available and being followed. Examination personnel were knowledgeable of the examination method and operation of NDE equipment. NDE calibrations, examinations and data analysis were performed in accordance with ASME Section XI requirements. Examination results and evaluation of the results were recorded as specified in the ISI program and NDE procedures.

PECO performed an examination of a reactor water cleanup system weld in accordance with NRC Generic Letter (GL) 88-01, "NRC Position on IGSCC in BWR Austenitic Stainless Steel Piping." An indication was identified. The NRC inspector observed that the analysis and inspection scope expansion were in accordance with the PECO's GL 88-01 program commitments. The indication was corrected using a weld overlay process endorsed by an NRC approved Code case. No further indications were identified.

c. Conclusions

PECO's inservice inspection program was implemented and controlled in accordance with NRC requirements and commitments. Nondestructive examinations were performed by qualified inspection personnel and data analysis was performed in accordance with procedures and ASME Code requirements.

M5 Maintenance Staff Training and Qualifications

M5.1 Vendor Craft Training Program
(OPEN) VIOLATION (96-08-01) - Failure to Adequately Control Vendor Training/Qualification
(CLOSED) URI (96-04-03) - High Pressure Coolant Injection Failure due to Failed Solder Connection

a. Scope

The inspector reviewed PECO's vendor craft training program. The program plan, as described in VCT-1 (Vendor Craft Training Program Plan) contains guidance for ensuring proper qualification of vendor craft personnel performing specific tasks such as the crimping and soldering of electrical leads, and torquing of mechanical components. The program described three methods for qualification of vendor personnel including: a documented review of the individual's previous qualifications and experience, task specific testing, or completion of PECO training.

This review focused on the qualification records for five selected contract electricians who performed independent safety-related modification installation activities during 2R11 and on two recent events.

Specifically, the selected individuals had performed multiple activities involving the torquing of fasteners and the crimping of electrical leads during modifications 2-P232 which replaced the E-224 load center transformer and modification 2-P262 which changed the E-42 emergency bus control circuit.

b. Observations and Findings

The inspector reviewed the PECO vendor task specific qualification matrix and identified that none of the individuals reviewed, who performed crimping or torquing during modifications 2-P232 and 2-P262, had been documented as qualified to perform these activities. The inspector interviewed PECO contract services and training department personnel and determined that PECO had not implemented the VCT-1 qualification program for the selected individuals. Specifically, PECO had not tested, trained or reviewed the qualifications of these individuals prior to allowing them to perform safety-related work activities.

The inspector did not have a specific safety concern regarding this work since a PECO quality verification inspector verified its adequacy. Additionally, the selected craft personnel were reported to have been qualified electrical journeymen and had received a

vendor crimp training lecture. PECO, however, had not evaluated the adequacy of these programs or the individuals qualifications.

The inspector noted two other recent events where vendor personnel performed maintenance activities without their qualifications having been formally evaluated by PECO:

- The first event occurred in March 1995, and involved an improper Unit 3 HPCI system solder connection (URI 96-04-03) that had been performed by a vendor technician. The solder connection had not been performed in accordance with PECO's requirements and ultimately failed, resulting in the Unit 3 system being inoperable for about 25 hours.

- The second event occurred in October 1996, and involved the post-modification pressure testing of a capped Unit 2 primary containment penetration following a transversing in-core probe (TIP) system modification. A PECO quality assurance audit determined that the vendor technician who performed the test had not been properly certified. The individual who performed the test had been previously employed by PECO and was certified to perform this type of testing while a PECO employee.

c. Conclusions

10 CFR 50.120 requires PECO to maintain a SAT based program for electrical and mechanical maintenance personnel. The statements of consideration for 10 CFR 50.120 indicate that the such a program applies to contract personnel who perform independent work activities. A key element of such a program is the evaluation of the trainee's mastery of the subject. Contrary to the above, PECO did not evaluate the qualifications of individuals performing independent electrical and mechanical maintenance activities. This is a violation of 10 CFR 50.120 **(NOV 96-08-01)**.

The inspector closed URI 96-04-03 and will review the corrective actions for the HPCI system failure as part of the violation response.

III ENGINEERING

E1 General Engineering Comments

The PECO engineering organization provided good support to plant activities, this included good troubleshooting support for: restoration of the E42 electrical bus, the HPCI seal/bearing failure, negative phase sequence current relay actuation, and the #12 generator bearing failure.

Despite the good response to the E42 electrical bus closure of both offsite power breakers, discussed in Section M1.1 above, it was noted that the modification process had previously identified a wire installed that needed to be removed during installation. This wire was not removed and caused the simultaneous closure of the offsite power breakers.

E2 Engineering Support of Facilities and Equipment

E2.1 Average Power Range Monitor Calibration Error - Unit 2
(OPEN) VIOLATION 96-08-02 - Failure to Meet TS requirements for APRM instrument Surveillance/Operability
(OPEN) URI 96-08-02 - Controls over the Core Thermal Power Calculation Programs

a. Inspection Scope

The inspectors reviewed a PECO identified event involving a non-conservative calibration of the Unit 2 APRMs due to an incorrect indication of core thermal power (CTP) on October 7.

b. Observation and Findings

Core Thermal Power Calculation - Background

The plant monitoring system (PMS) computer gathers data on plant parameters for use in the calculation of CTP. The actual CTP calculation is completed in the 3D Monicore computer using data input from the PMS computer. The 3D Monicore computer continually calculates and displays CTP on the core power and flow log (CPFL) computer screen in the control room. Operators and reactor engineers (REs) use the CPFL to set the APRM instrument gain to ensure that the monitors are reading within the accuracy required by TS (± 2% of rated thermal power) of core thermal power. The CPFL also displays APRM gain adjust factor (AGAF) which is an indication of how close the APRMs are reading to actual CTP. An AGAF of 1.00 means that the APRM is indicating CTP calculated by the CPFL. An AGAF of greater than 1.0 means that the APRM is indicating less than the CTP and conversely an AGAF of less than 1.0 indicates that the APRM is reading higher than calculated CTP.

The 3D Monicore computer also does an additional calculation of CTP to be used in determining the core thermal limits in the P-1 program. The P-1 program has an imbedded check to ensure that plant efficiency meets given values depending on plant power level, in the gross energy tracking (GET) sub-program. This includes a comparison of CTP to generator electrical output. If the plant efficiency is less than or greater than the limit, the P-1 program will not produce an output. This is a possible indication of a failed sensor or a faulty input.

Timeline

The following represents an approximate timeline of events, developed by the inspectors from review of: operator and reactor engineer logs, Performance Enhancement Process (PEP) documentation, plant computer print-outs and discussions with reactor engineering and operations personnel. [Inspector analysis of the issues is bracketed following timeline entries.]

October 7

- Initial Conditions: Unit 2 was in MODE 1 (RUN) operating at approximately 36% power during power ascension. The 2C reactor feed pump (RFP) was inservice supplying all the feedwater flow to the vessel (approx. 5.0 Mlbs/hr).

- At 3:58 p.m., the reactor operator placed the 2B RFP in-service, in preparation for increasing reactor power. Through review of information the 2B RFP was developing approximately 0.5 Mlb/hr. The 2C RFP flow automatically decreased from 5.0 to 4.5 Mlb/hr to maintain feedwater flow and reactor vessel level constant.

  Indicated CTP, as calculated by the 3D Monicore computer system decreased by approximately 150 megawatts thermal (MWt).

  The RE's log indicated that the RE was aware of the CTP decrease and attributed the drop to starting the 2B RFP.

  [The following did not change: reactor vessel level, generator electrical output, and actual reactor power. The PMS computer places acceptance limits on the inputs to ensure the data is valid. PECO's post-event evaluation found that the 3D Monicore system assigned a value of 0.0 Mlb/hr to the 2B feedwater flow input since it was below the 0.7 Mlb/hr acceptance limit. Consequently, the indicated CTP was incorrectly calculated based on a total feedwater flow of 4.5 Mlb/hr rather than the actual total of 5.0 Mlb/hr.]

  At 4:00 p.m., the 3D Monicore routine automatically generated core thermal limits printout did not run. The printout stated that the GET sub-program was terminating due to a problem and that the automatic P-1 report scheduled for 4:00 p.m. could not be produced.

  [The P-1 report was not produced since the calculated plant thermal efficiency was now greater (i.e., the same electrical power output for less CTP) and had exceeded the GET sub-program limit for the given CTP.]

  PECO's post-event review indicated that this P-1 printout failure was apparently not noticed or evaluated by the RE or the RO.

- At 4:35 p.m., the AGAFs were reset to lower the APRM output to the lower (and incorrect) CTP value indicated by the CPFL (i.e., all AGAFs on the CPFL indicated less than 1.0).

  [The plant data indicated, at this time, that all six APRMs were adjusted to read approximately 130 MWt less than actual CTP (about 3.5% of rated CTP). This prevented the APRMs from meeting TS surveillance requirement (SR) 3.3.1.1.2 which required the APRMs to read within 2% accuracy of RTP.]

[Unknown to the operators, this placed Unit 2 into TS action statement 3.3.1.1.C since failure to meet SR 3.3.1.1.2 made all APRMs inoperable per Functions 2b and 2c of TS Table 3.3.1.1-1. The action statement required PECO to reestablish the APRM operability within one-hour.]

- At 4:50 p.m., after a control rod group was partially withdrawn, operators requested a P-1 report to verify core thermal limits. However, the 3D Monicore failed to produce a P-1 report because the plant efficiency was beyond the allowable range. Power ascension was halted until an official 3D Monicore P-1 could be produced.

- At 5:00 p.m., the reactor engineer initiated a PEP to document the problem with the 3D Monicore during the start-up.

- At 5:35 p.m., PECO did not meet TS action statement 3.3.1.1.C. TS action statement 3.3.1.1.D then required PECO to enter TS action statement 3.3.1.1.F which required PECO to place Unit 2 in hot shutdown within 6 hours (11:35 p.m.).

  [PECO did not enter TS action statement 3.3.1.1.F, as required, because they had not recognized the problem by this time.]

- At 8:20 p.m., based on previous discussions between the RE and the RE Manager, PECO increased the 3D monicore plant efficiency upper acceptance limit, which enabled 3D Monicore to produce a P-1 report to allow PECO to recommence power ascension.

  [This allowed P-1 to be run with the inaccurate feed flow data, thus P-1 calculated the same incorrect CTP as the CPFL. The inspectors noted that PECO's assessment that the 3D Monicore plant efficiency limits were too restrictive was incorrect and that a formal technical evaluation had not been performed prior to this modification. Instead, the RE and the RE Manager based their decision to increase the upper efficiency limit on an event that recently occurred at Limerick which they believed to be similar.]

- From 9:00 to 10:30 p.m., as power ascension resumed, feedwater flow from the 2B RFP was increased from 0.5 Mlb/hr to 3.2 Mlb/hr.

  [The inspectors noted that the 3D Monicore reported the correct total feedwater flow and CTP on the CPFL as soon as feedwater flow from the 2B RFP increased above 0.7 Mlb/hr.]

- At 10:36 p.m., all AGAFs were adjusted to indicate properly with correctly calculated CTP values.

  [The inspectors noted that the total seven hour period allowed for operation with the APRMs outside their acceptance limits had not been exceeded.]

November 7

- During PEP review a reactor engineer identified that actual core thermal power had been 3.5 % higher than indicated following the AGAF change on October 7 at 4:35 p.m.

The inspectors noted the following concerns:

-- The RE and operating crew did not properly diagnose the reason for the decrease in indicated CTP. Multiple plant indications were available such as feedwater flow, generator output, and the 4:00 p.m. P-1 report failure that should have caused these individuals to correctly determine the reason for the decrease in indicated CTP.

-- The 3D monicore database was updated to raise the upper thermal efficiency acceptance limit without a formal engineering evaluation.

-- There was no indication to the operator that a feed flow input was outside its allowable limit. The CPFL as discussed in the procedure for setting APRM gains is supposed to have a failed sensor identification feature. A section of the procedure requires operators to verify that the CPFL does not have any failed sensor that does not make sense for the given plant conditions. If a sensor is failed the procedure directs the operator to another routine test which allows the inputting of a substitute value. The zero flow indication should have been recognizable to the RE as a faulted value.

c. Conclusions

The RE and operating crew did not perform well at assessing and evaluating all available plant indications. This led to an unidentified inaccurate setting of the APRMs outside of the 2% RTP band allowed by TS. Further, while this condition was identified by a PECO review, it was not timely with respect to identifying the poor RE and operator performance.

Technical specification action statement 3.3.1.1.C required PECO to restore the APRMS to within ± 2% of RTP within one hour. TS action statement 3.3.1.1.D then required PECO to enter TS action statement 3.3.1.1.F, which would require that the plant be placed in hot shutdown in six hours if the APRM could not be returned to within the ± 2% RTP limit.

Contrary to the above, on October 7, PECO did not restore the APRM accuracy to within the SR 3.3.1.1.2 accuracy limits within the one hour period and did not enter TS 3.3.1.1.F as required. These conditions were unknown to the PECO RE and the reactor operators, but finally identified by PECO. However, the inspectors determined that the RE and operators should have identified the condition at the time that it occurred. There was sufficient information available including no change in generator electrical output and the inability of P-1 to calculate core thermal power to cause a review of APRM settings at the time. On this basis, this violation was cited **(VIOLATION 96-08-02)**.

PECO continued to revie: the controls over 3D Monicore database and whether the CPFL should have indicated a failed sensor. These issues will remain unresolved pending review of PECO's determination (URI 96-08-03).

E2.2 Core Shroud and Core Spray System Inspections

PECO inspected selected accessible portions of the core shroud and the CS system during 2R11. The inspectors noted that two crack like indications were identified on the core spray sparger T-box head. PECO performed a safety analysis of the indications and determined that operation through the next operating cycle was acceptable. Additionally, PECO inspected another CS T-box assembly and did not identify any other indications. PECO submitted their analysis to the NRC as required by NRC Bulletin 80-13. The appropriate NRC technical staff reviewed PECO's position and determined that the safety analysis and the additional inspection activities were acceptable. The inspectors noted that PECO engineering personnel were prompt and thorough in their response to this issue.

E2.3 Spent Fuel Pool Heat Load Control

Prior to 2R11 the inspector reviewed PECO's evaluation performed to determine the maximum spent fuel pool (SFP) temperature during the refueling outage. PECO's analysis utilized a number of conservative assumptions related to SFP loading and determined that the design temperature limit of 150 degrees F would not be exceeded provided 2 of 3 SFP heat exchangers were in-service. The inspector found PECO's analysis to be acceptable.

The inspector reviewed the 2R11 refueling operations and noted that the fuel movement activities were bounded by PECO's analysis. The inspector performed several energy balances and determined that the actual SFP heat loading was bounded by the analysis. Additionally, the inspector noted that SFP temperature was always maintained well below the design limit temperature.

IV PLANT SUPPORT

F1 Conduct of Fire Protection Activities

F1.1 Combustible Material Storage

The inspector identified that prior to the Unit 2 refueling outage PECO staged several combustible material items inside an area located on the Unit 2, 135' elevation marked as a combustible free zone. The inspector discussed the storage of the items with the Fire Protection System Manager and learned that PECO had not performed a specific analysis prior to storing these materials. PECO promptly established a fire watch for the affected area. The inspector determined that PECO's response was adequate, and did not observe any other examples of improper material storage during the period.

P8 Miscellaneous EP Issues

The following items, which were opened during the last Peach Bottom Emergency Preparedness (EP) program inspection and were also applicable to Limerick (since the Emergency Plan is common to both facilities), were closed during the recent Limerick EP inspection (NRC Inspection Report 50-352, 353/96-09).

P8.1 (Closed) Inspection Follow-Up Item 50-277;278/95-14-01;Discontinuance of emergency information brochure.

The licensee discontinued the distribution of emergency information brochures to Pennsylvania residents within the 10-mile Emergency Planning Zone (EPZ). The licensee currently provides emergency information to the public in local telephone directories for the Limerick and Peach Bottom areas. The licensee also mails an information survey to EPZ residents for both plants which provides the opportunity for people to express any special needs they may have, and to request an emergency information brochure if they so desire. Information calendars are still provided to residents of Maryland. NRC review determined that this practice meets the requirements of 10 CFR 50, Appendix E, IV.(d) for the distribution of emergency information to the general public.

P8.2 (Closed) Inspector Follow-up Item 50-277;278/95-14-02; Emergency Plan errors.

Inadequate quality control over the Plan and emergency response procedure (ERP) revisions resulted in numerous omissions and typographical errors. The licensee committed to do a review of the Plan and ERPs to correct these errors.

During this inspection, the inspectors verified the licensee's review of the Plan and ERPs. They also reviewed the Plan and spot-checked the ERPs for recurring errors; none were identified.

P8.3 (Closed) Inspection Follow-Up Item 50-277;278/95-14-04; Corporate EP training deficiencies.

Although the corporate EP organization had been tasked with training and qualification of emergency operations facility (EOF) responders, there was no documented plan to complete the training. Additionally, numerous EOF responders had been granted waivers to exceed their requalification dates for annual retraining.

Inspectors reviewed the document that the licensee developed to specifically address the corporate training issues, titled "Maintenance of the EOF ERO and Training Program." They also reviewed the EOF training program plan, the course plan, qualification manuals, and course handouts. These documents were appropriately detailed and specifically described the training requirements for the emergency response organization (ERO) responders in the EOF. Training, which included facility walk-throughs, classroom instruction, testing, and a mini-drill, was implemented. The inspectors verified that training was conducted in accordance with the training procedures in 1995 and 1996 for all six ERO response teams.

R1 Radiological Protection and Chemistry Controls

R1.1 Unit 2 Refueling Outage Radiological Controls (Program Changes)

a. Scope (83750)

The inspector reviewed selected radiological controls program changes implemented since the previous inspection in this area. Areas reviewed included organization and staffing, facilities and equipment, and procedure changes.

b. Observations and Findings

PECO implemented a radiological controls organization change in early September 1996 involving the departure of the current Radiation Protection Manager (RPM) and the temporary promotion of the Radiological Engineering Manager to the RPM position. The acting RPM met applicable qualification guidance of Regulatory Guide 1.8.

A new individual was assigned to provide training of station personnel in the area of radioactive material shipping. This individual appeared to have limited experience and training in the area PECO was aware of this matter and initiated a plan to compensate for the individual's limited experience and knowledge in radioactive material shipping.

c. Conclusion

No program changes were identified that would appear to reduce the effectiveness of the radiological controls program.

R1.2 Unit 2 Refueling Outage Radiological Controls (Planning, Preparation, Emergent Work Control and Review)

a. Inspection Scope (83750)

The inspector reviewed the planning and preparation for the Unit 2 refueling outage including control and review of emergent work. The inspector reviewed records, discussed outage planning issues, and observed activities to verify proper radiological work controls.

b. Observations and Findings

The ALARA exposure estimate review indicated effective planning and preparation for planned and emergent outage radiological work activities. PECO closely tracked conformance with pre-established ALARA goals. As of September 24, 1996, the licensee had accrued about 229 person-rem out of an expected year to date value of 266 person-rem. The inspector noted very good ALARA plans for significant radiological work activities (e.g., traversing incore detector replacement). PECO reduced its exposure during lead shielding installation by about 50%, due to, in part, better efficiency and planning.

PECO was in the process of bench marking itself against similar facilities relative to aggregate occupational exposure sustained for specific tasks (e.g., control rod drive removal and replacement). Such an activity may allow for identification and use of previously unidentified occupational exposure reduction methods.

c. Conclusions

PECO implemented overall effective ALARA planning for the Unit 2 refueling outage including emergent work.

R1.3 Unit 2 Refueling Outage Radiological Controls (Internal Exposure Controls)

a. Inspection Scope (83750)

The inspector selectively examined the internal exposure control program. The inspector reviewed records, discussed the program with cognizant personnel and observed exposure control practices during tours of the RCA. The inspector independently calculated expected personnel exposure using estimated radioactive material intakes.

b. Observations and Findings

The inspector observed work in progress and noted air sampling to be representative of air in occupied zones. Also, DAC-hours were calculated and tracked, as necessary. The inspector noted that, as of the end of the inspection (including the outage), no individual had sustained any significant intake of airborne radioactivity.

The inspector noted that the licensee performed a comprehensive particle size analysis to support internal exposure assessment during outage turbine blade grit blasting activities.

c. Conclusions

PECO implemented an effective internal exposure control program.

R1.4 Unit 2 Refueling Outage Radiological Controls (External Exposure Controls)

a. Scope (83750)

The inspector selectively examined the external exposure control program. The inspector reviewed records, discussed the program with cognizant personnel and observed exposure control practices during tours of the RCA and observation of work activities. The areas toured included: the Unit 2 drywell, reactor building, torus room, refueling floor, and turbine building. The inspector reviewed high radiation area controls and general radiological posting, implementation of the radiation work permit program, and implementation of the dosimetry program.

The inspector also reviewed the radiological control of a troubleshooting activity conducted during refueling operations on August 18 that was intended to correct minor leakage from the Unit 2 refueling bridge pneumatic system.

b. Observations and Findings

PECO maintained a real time exposure data base by use of an electronic dosimetry (ELD)/access control system. Dosimetry alarms were conservatively set, including those provided for high radiation areas. PECO provided workers briefings, as required, by applicable radiation work permits and 10 CFR 19.12. No workers (vendor or licensee)

exceeded 2 rem calendar year exposure. Workers were observed to be wearing dosimetry as prescribed and were noted to be generally knowledgeable of radiological work conditions. However, although radiological conditions in the area were insignificant, two workers questioned in the outboard main steam line isolation valve (MSIV) room on September 23, 1996, were not generally knowledgeable of ambient radiological conditions. The workers overestimated conditions and were immediately reinstructed on the actual radiological conditions.

The inspector reviewed PECO's radiological controls provided for removal of the drywell personnel hatch, equipment hatch, and refueling floor shield blocks (first layer) while at power. The licensee provided effective controls for this activity, including neutron monitoring and surveys consistent with Regulatory Guide 8.14, "Personnel Neutron Dosimeters," dated August 1977.

The inspector noted that PECO's personnel dosimetry system was retested in August 1996 in accordance with National Voluntary Laboratory Program guidance, following a previous failure of the dosimetry to meet test criteria in a testing category (category VII). The dosimetry passed the retest.

Areas (e.g., high radiation areas, radiation areas) were properly posted and locked (as appropriate). However, the following observation was noted.

- During a tour of the Unit 2 drywell on September 23, 1996, the inspector noted that the licensee used posting and flashing lights to inform personnel of elevated exposure rate locations. However, several areas were identified that exhibited exposure gradients (i.e., personnel could pass from about a 20 mR/hr radiation field to greater than 100 mR/her field in a short distance) that contained no such posting or lights. Furthermore, it was not immediately apparent that one was entering into such radiation fields due to the sharp gradients.

  Regulatory Guide 8.38, "Control of Access to High and Very High Radiation in Nuclear Power Plants," dated June 1993, indicates that high radiation area boundaries may be established at locations beyond the immediate boundaries of the high radiation area to take advantage of natural or existing barriers. The guide also indicates that individual high radiation areas (except in relatively small areas) should be barricaded and posted separately when this option is utilized. The inspector noted that PECO was using the drywell personnel access hatch as the high radiation area control point.

  PECO subsequently toured the drywell and identified several areas for improved posting and placed additional high radiation area posting within the drywell. The licensee also posted low dose wait areas on the lower elevations of the drywell. The licensee initiated action to provide for review of drywell posting for future outages.

  PECO established "standing" radiation work permits (RWPs) for areas as well as other types of RWPs (e.g., special). The inspector noted that the RWPs typically permitted certain defined work and also included a statement (as work description)

that other "approved work" was authorized. The inspector questioned personnel, including radiation protection control point personnel, as to what constituted "approved work." The inspector was not able to identify a consistent definition for approved work and was concerned that such a RWP statement might provide inadequate work control. PECO initiated a review of this matter.

The inspector observed one example where an individual, who attempted to tighten a fitting during troubleshooting of an air leak from the refueling bridge pneumatic system, did not comply with the scope of his RWP. The individual performed the work under the refuel floor area standing RWP (PB0991003) which required the individual to discuss the intended work evolution with and receive a briefing from the health physics (HP) technician. The HP briefing only discussed performing a visual inspection of the fitting and did not address tightening of the fitting. PECO health physics procedure (HP-C-310) requires that all work performed under an area standing RWP be approved by health physics. The inspector noted that since the air system was reported to be free of contamination; tightening of the fitting would not have been expected to increase the radiological risk to the worker.

c. Conclusions

PECO implemented a generally effective external exposure control program. A few minor performance issues of low radiological consequence were noted.

R1.5 Unit 2 Refueling Outage Radiological Controls (Control of Radioactive Materials and Contamination)

a. Scope (83750)

The inspector selectively reviewed radioactive material and contamination control practices. The inspector reviewed the adequacy of supply, maintenance, and calibration and performance checks of survey and monitoring instruments; and the use of personal contamination monitors and friskers, including the means used to identify hot particle contamination.

b. Observations and Findings

PECO implemented generally effective contamination control work techniques and prompt correction and cleanup of contamination. Contaminated areas, including the Unit 2 drywell, exhibited generally low levels of contamination. Calibrated and checked survey instrumentation was available and used throughout the station.

The inspector identified two 55 gallon drums on the refueling floor on September 23, 1996, that were not labeled consistent with the licensee's procedures or 10 CFR Part 20. The drums measured 80 mr/hr and 30 mr/hr on contact, respectively, and only exhibited a radioactive material label. No additional information was contained on the label. Procedure HP-C-810, Rev. 1, Section 5.1.5, specifies that radioactive material be labeled with information, as necessary to permit individuals handling or working in the vicinity thereof to avoid or minimize exposure.

The inspector noted that a sign was posted near the drums, and other drums, alerting personnel to general radiation fields in the area. Also, radiation protection personnel monitored work activities on the refueling fuel. The drums were immediately labeled and personnel were re-instructed to properly label radioactive material.

c. Conclusions

PECO implemented a generally effective contamination control program. A minor performance issue was identified where two 55 gallon drums used to store radioactive material on the Unit 2 refueling floor were improperly marked. This issue is considered a non-cited violation consistent with Section IV of the NRC Enforcement Manual.

R5 Training and Qualifications in RP&C

R5.1 Radiation Workers/Radiological Controls Personnel

a. Scope (83750)

The inspector reviewed the training and qualification records of selected contractor radiological controls personnel, and radiation workers. The training and qualification of these individuals were reviewed relative to applicable TS and procedural requirements and 10 CFR 50.120. The review included training records, personnel resumes, and qualification criteria.

b. Observations and Findings

PECO implemented a generally well-defined training and qualification program for contracted radiological controls personnel who were responsible for radiological oversight during the outage. Job coverage standards (e.g., system breaches, reactor cavity draindown, reactor disassembly, removal of items from fuel pools) were established and implemented to provide guidance for radiological coverage of various significant work tasks. Contractors were provided training on new procedures and procedure changes. Contractors were evaluated on task performance capabilities using mock-up systems and remote controlled radiation survey meters. Radiological controls personnel were qualified in accordance with applicable requirements and radiation workers were provided applicable general radiation safety training. PECO provided a comprehensive refueling outage handbook to all personnel, as well as, an outage organization chart.

c. Conclusions

PECO implemented an effective program to train and qualify contractor radiological controls personnel providing radiological oversight of outage radiological work activities. Radiation workers were provided appropriate training in radiological controls.

R7 Quality Assurance in Engineering Activities

R7.1 Radiological Incident Reports

a. Scope (83750)

Selected PECO radiological self-assessments were reviewed.

b. Observations and Findings

PECO took effective and timely action on self identified concerns. The inspector noted generally good performance-based oversight of activities.

c. Conclusions

PECO implemented an effective program for self-identifying and correcting self-identified issues and concerns.

S8 Miscellaneous Security and Safeguards Issues

S8.1 (Closed) LER 2-96-008, Revision 1: Weaknesses in the Control of Safeguards Information

PECO revised LER 2-96-008, which discussed the inadequate control of safeguards material, to include PECO's completed investigation of the event. This event was discussed in NRC Inspection Report 50-277, 278/96-06 and a NRC specialist inspection is scheduled to review the results of PECO's event investigation.

V MANAGEMENT MEETINGS

X1 UFSAR Review

A recent discovery of a licensee operating their facility in a manner contrary to the Updated Final Safety Analysis Report (UFSAR) description highlighted the need for a special focused review that compares plant practices, procedures and/or parameter to the UFSAR description. While performing the inspections discussed in their report, the inspectors reviewed the selected portions of the UFSAR that related to the areas inspected. No UFSAR discrepancies were identified during this review.

X2 Exit Meeting Summary

At the conclusion of the report period, on November 26, the inspectors discussed the findings and conclusions and the overall period conclusions with members of PECO management. In all cases the findings and conclusions presented were acknowledged.

X2 Management Meeting Summary

On September 12 and 13 the NRC Region I Administrator visited Peach Bottom. He held discussions with a number of plant supervisors and management personnel and conducted a plant tour.

LIST OF ACRONYMS USED

APRM gain adjust factor (AGAF)
as-low-as-reasonably-achievable (ALARA)
average power range monitors - neutron (APRMs)
control rod drives (CRDs)
control room emergency ventilation (CREV)
core power and flow log (CPFL)
core spray (CS)
core thermal power (CTP)
diaphragm alternative response test (DART)
electro-hydraulic control (EHC)
eleventh refueling outage (2R11)
emergency core cooling system (ECCS)
emergency diesel generators (EDG)
emergency preparedness (EP)
emergency service water (ESW)
end-of-cycle (EOC)
engineered safety feature (ESF)
functional testing (FT)
general procedure (GP)
Generic Letter (GL)
health physics (HP)
high pressure coolant injection (HPCI)
high pressure service water (HPSW)
hydraulic control unit (HCU)
improved TS (ITS)
inservice inspection (ISI)
inspector followup items (IFIs)
intermediate range monitor - neutron (IRM)
licensee event report (LER)
limited senior reactor operators (LSROs)
limiting conditions for operation (LCO)
load tap changer (LTC)
loss of coolant accident (LOCA)
loss of off-site power (LOOP)
low pressure coolant injection (LPCI)
motor generator (MG)
nuclear review board (NRB)
offsite power start-up source #2 (2SU)
offsite power start-up source #3 (3SU)
performance enhancement program (PEP)
plant equipment operator (PEO)
post-maintenance testing (PMT)
primary containment (PC)
primary containment isolation system (PCIS)
rated thermal power (RTP)
reactor engineer (RE)
reactor feed pump (RFP)
reactor operator (RO)

reactor protection system (RPS)
residual heat removal (RHR)
safety evaluation report (SER)
safety relief valve (SRV)
scram solenoid pilot valve (SSPV)
secondary containment (SC)
senior reactor operator (SRO)
source range monitor (SRM)
spent fuel pool (SFP)
standby gas treatment (SGTS)
standby liquid control (SLC)
station blackout (SBO)
surveillance requirement (SR)
surveillance test (ST)
systems approach to training (SAT)
technical requirements manual (TRM)
technical specification (TS)
temporray plant alteration (TPA)
turbine bypass valve (BPV)
turbine control valve (TCV)
turbine stop valve (TSV)
undervoltage (UV)
unresolved item (URI)
updated final safety analysis report (UFSAR)