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Inspectors:	Wayne L. Schmidt; Team Leader, Senior Resident Inspector Maryann M. Biamonte; Human Factors Specialist, NRR Robert R. Temps; Project Engineer, DRP Carl E. Sisco; Operator Licensing Inspector, DRS

Approved By:

Clifford J. Anderson, Chief, Projects Section 2B Date 4/20/94

Edward C. Wenzinger, Chief Projects Branch 2 Date 4/22/94

SPECIAL TEAM INSPECTION REPORT 94-09
LIMERICK GENERATING STATION

EXECUTIVE SUMMARY

PECO conducted the Unit 1 refueling outage safely and in a very well managed manner. The team reviewed five events specifically using the NRC's Human Performance Investigation Process (HPIP). One of these events, the February 9 inadvertent isolation of shutdown cooling during a relay replacement did not have any human performance causes. As shown in Table 1 of the attached report, in the other four cases the team assessed a common cause of personnel inattention-to-detail. In the HPIP process the team determined that this issue most appropriately fell into the category of the PECO policy for self-check, which did not prevent the events. The common cause in two of the events was that supervision did not provide full support (i.e., complete briefings and direct observation) before and during activities.

Outage scheduling, planning, and conduct were strengths. While the team did not specifically review PECO's process for shutdown risk mitigation, the schedule appeared to minimize the affects of outage work on plant safety. In discussion with plant workers the team found that the outage schedule was challenging, but that adherence to the schedule, which PECO had developed to reduce shutdown risk, contributed to the safe completion of the outage. Workers believed that they were being held accountable by the outage organization and plant management to meet the schedule. Further, the involvement of individuals from maintenance, engineering, operations and planning in the development of the schedule enhanced the worker acceptance and desire to complete work within schedule constraints.

The PECO performance enhancement process (PEP) was functioning well, allowing personnel to identify issues for management attention and corrective actions. The team reviewed PEPs initiated during the outage and found that they were appropriate and that interim corrective actions appeared appropriate. In discussions with plant personnel, there was a lack of a common understanding about what issues were to be documented in the PEP system. PECO recognized this and was in the process of developing department specific guidelines for PEP reportability issues.

PECO maintained adequate systems in place to control work authorizations and the return of equipment to service. When operators identified mis-positioned equipment they documented it in the PEP system, and management took corrective actions. The process for plant startup required the completion of emergency core cooling systems check-off-lists to ensure proper system alignment. The team independently reviewed system alignments in the plant and the control room and noted no deficiencies.

The control room operating crews performed very well, conducting the start-up safely in a well controlled and professional manner. The start-up procedure was a strength, allowing safe and efficient coordination of the start-up effort. The operators demonstrated good skills during reactor reactivity changes.

The team noted that PECO may not be performing testing on station batteries in such a way as to adequately track overall degradation, based on the installation of new battery cells into the battery bank prior to testing. This has the potential for masking degradation of older cells, and presents the possibility that degradation testing may not be in accordance with technical specification testing requirements. This issue was considered unresolved pending further review of PECO documentation by the NRC staff to determine if technical specification requirements are being met.

The team observed continued examples of poor fire protection practices. These examples were similar to issues for which a violation was cited in Combined Inspection Report 94-02. PECO is requested to address the issues discussed in section 6.3 of this report, in their response to the previous violation.

An unresolved item was identified dealing with a missed technical specification requirement for a roving fire watch at Unit 2. PECO determined that this issue was not a TS violation and therefore not reportable based on a 1985 TS interpretation, which allowed the use of other people in the areas as compensation for the missed watch. The team considered this issue unresolved pending determination whether the two individuals constituted a fire watch or only mitigated the event.

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DETAILS

1. PURPOSE

The purpose of this special team inspection was to review five events that occurred at the Limerick Generation Station (LGS) during the Unit 1 refueling outage (1RO5), and to verify that the PECO Energy Company (PECO) controlled and completed the outage safely. The team independently reviewed the specifics of each event using PECO documentation and procedures, and interviews with management and the individuals involved. The team evaluated each case using the NRC's Human Performance Investigation Process (HPIP) system (NUREG/CR 5455). In addition, to ensure that the PECO staff was identifying problems and that management was taking appropriate corrective actions, the team reviewed the performance enhancement process (PEP) issues generated since the beginning of the outage. To assess the adequacy of outage work, the team reviewed outage scheduling and planning, work control activities, and the overall condition of the plant for reactor start-up. This review included: discussions with personnel who planned and conducted outage work, direct observation of outage activities in the control room and the plant, and independent plant tours.

2. EVENT REVIEW

The team conducted a human performance review of five events, which occurred between February 6 and February 24, 1994, at LGS. Since the five events occurred during the Unit 1 outage, the team's review included consideration of the outage scope and schedule. The team conducted interviews with a cross-section of outage workers and assessed the working atmosphere present during the outage. The team also reviewed the specific PEP documentation, procedures, logs, and work documentation. The team looked for any connections between the physical work environment, worker attitudes, and the events.

The team found that each event, as discussed on the individual PEPs, was properly documented. Review of each issue and the associated PEPs showed that PECO had taken appropriate interim corrective actions. In all cases, the final PECO root cause analysis on these events had not been completed, at the time of the inspection.

Each event is discussed below. A summary of the team's HPIP conclusions is documented in attached Table 1.

2.1 Inadvertent Isolation of Residual Heat Removal Service Water During Shutdown Cooling

On February 6, the chief (common) operator, while shutting down the residual heat removal (RHR) system in the suppression pool cooling mode at Unit 2, mistakenly secured the RHR service water (RHRSW) supply to the RHR heat exchanger in use for the RHR shutdown

cooling (RHRSDC) mode at Unit 1. Following this, another operator observed increasing reactor coolant temperature and increased the RHR flow through the heat exchanger. This action, because the RHRSW flow was secured, did not decrease coolant temperature. After a second observation of reactor coolant temperature increase, approximately thirty-six minutes after the RHRSW flow was secured, operators identified that the RHRSW had been secured and restored RHRSW flow to the RHR heat exchanger. During this time period the reactor coolant temperature increased from 100°F to 110°F from the reactor decay heat. PECO generated PEP I0001416 to document, review, and take corrective actions for this event.

The team determined that operator inattention-to-detail was the main contributor to this event. Further, a potentially confusing switch arrangement and operators training only on Unit 1 RHR/RHRSW operation in the simulator were potential contributors.

The team found that the operator was knowledgeable about the procedure for securing RHRSW from the suppression pool cooling mode, but did not properly verify the selected components nor the desired outcome. Because it was a routine and simple task, the operator did not use the procedure step-by-step. When he secured the RHRSW pump and the RHR heat exchanger he observed that the flow indicators appropriately decreased, but did not realize that the indicators were for the wrong components. He then went to perform some work in the back areas of the control room. The operator was unaware that he had secured the train of RHR service water being used for Unit 1 shutdown cooling until he returned to the main control area about 30 minutes later and saw several operators from Unit 1 gathered around the panel.

RHRSW is a common system for both units and is on a single panel in the control room. The layout of the control room panel for the common pumps and the specific unit RHR heat exchangers, the lack of color blocks on the panel to group controls by unit, and the lack of devices to highlight which train was in use for each unit made it difficult to discriminate the appropriate control. The panel layout displays valve switches for the four heat exchangers with the "A" exchangers for both units to the left of center on the panel and the "B" exchangers to the right of center on the panel. Therefore, when viewing the panel and moving from left to right the arrangement is Unit 1 (1A) control, Unit 2 (2A) control, Unit 1 (1B) control and Unit 2 (2B) control. The heat exchanger line up existing at the time of the error was: 1A not in use, 2A used for Unit 2 suppression pool cooling, 1B used for Unit 1 shutdown cooling and 2B not in use. When the operator secured the pump and heat exchanger he manipulated the 1B controls rather than the 2A controls.

An additional possible contributor was the simulator, which does not model Unit 2 in the common RHRSW system. All tasks performed on the simulator on the RHRSW panel would allow the operator to observe a response only when manipulating Unit 1 controls. Therefore, all activities related to this panel are done only with Unit 1 controls.

2.2 Inadvertent Isolation of Residual Heat Removal Shutdown Cooling, During Relay Replacement

On February 9 an inadvertent isolation of RHRSDC occurred during a planned maintenance activity. The activity consisted of replacing relay C71A-K7G in Unit 1 panel 10-C609 by an instrumentation and controls (I&C) technician. Following verification that the technician had caused the isolation, operators quickly restored RHRSDC. PECO documented this event on PEP I0001444.

The team determined that the operations crew and the technician were aware of the possibility and had planned for a possible RHRSDC isolation during relay replacement. The team found that there were no indications of a human performance issue surrounding this event.

The relay was replaced using proper procedural directions contained in Station Work Order C0146012. The I&C technician initially planned on replacing this relay with the circuitry de-energized, but the operations department desired to replace the relay with the circuit energized so that RHRSDC would not have to be removed from service. The plan was developed and proper contingencies taken to address the possible isolation. A pre-job brief was conducted with the plant operations staff prior to the start of work. The inadvertent isolation of RHRSDC occurred when an electrical lead touched a metal surface while the I&C technician was replacing the relay. The technician knew that he had caused the isolation. The operators took appropriate steps to restore shutdown cooling after the isolation.

2.3 Inadvertent Isolation of Shutdown Cooling, During Surveillance Testing

On February 12, while performing a procedure that was designed to prevent an inadvertent RHRSDC isolation during instrument line testing, an I&C technician completed several procedure steps incorrectly. These steps led to the primary containment isolation system (PCIS) getting a false low reactor vessel water level signal, causing the isolation. Procedure ST-2-036-704-1, "Excess Flow Check Valve Functional Test" directed the I&C technician to input a high level signal to two reactor vessel water level Rosemount trip units. This was being done, as stated in the procedure to prevent an inadvertent reactor protection system scram or PCIS isolation of RHRSDC, as instruments were valved out of service during excess flow check valve testing. PECO generated PEP I0001468 to document their review of this event.

The team determined that inattention-to-detail, unfamiliarity with the task to be conducted, failure to resolve a conflict between an actual response and the procedure, and inadequate supervision were the primary contributors to this event. Less importantly the procedure could have provided a clearer statement of the potential consequence of mis-operation of equipment during the test.

A review of the procedure identified that, if it had been followed, the isolation would not have occurred. The technician when directed to increase the signal to the Rosemount trip unit, decreased the signal. He verified the stable current potentiometer fully counter-clockwise, causing a low signal rather than fully clockwise, as directed by the procedure.

The process for determination of task assignment/qualification process appeared to have contributed to this incident. PECO requires that only the lead technician be fully qualified to conduct an assigned task. The lead technician can use judgement, without specific criteria, to determine when a less than fully qualified worker may conduct activities without direct supervision. In this case, the technician had not performed this task before, was unfamiliar with its purpose, was not fully qualified, and was not directly supervised. While he had completed normal Rosemount trip unit calibrations, the actions required by this non-routine procedure were opposite from those required during a normal calibration. During a normal calibration, the technicians turn the stable current fully counter-clockwise and then gradually clockwise until a specific response is observed. While the procedure stated that it was being performed to prevent an inadvertent isolation, the technician did not understand the way that it was to be accomplished. He did not receive any specific instruction from supervision on the task to be preformed or the potential for causing a RHRSDC isolation, nor was he directly supervised.

Supervision and the technician did not properly investigate and perform a procedural change when a procedural step could not be completed. This issue was the subject of a previous violation documented in Combined Inspection Report 94-02. The technician performed a procedural step incorrectly and subsequently reached a step which could not be completed. Specifically, the technician mis-operated the stable current potentiometer, which led to the Rosemount trip LED indicator being on rather than off as specified in the procedure. As required, the technician contacted his immediate supervisor when the unexpected response occurred. Neither the technician nor his supervision went back to check the steps that had been performed. Therefore, they did not realize that the response was to be expected for the incorrect action that had been taken. The foreman directed the technician, over the phone, to increase the stable current. A procedural change was not written when the step to readjust the stable current was reentered. The correct Rosemount trip response was received (i.e., the LED went out), and the technician proceeded to the next phase of the procedure. The next phase involved performing the same evolution on another reactor vessel water level instrument. The technician performed the steps exactly as he had originally done on the first instrument level. He received the same unexpected response, and completed the same correction without realizing why the error had occurred. The test was halted based on the resulting loss of shutdown cooling. The technician was unaware of his error and its effect until he and his supervisor were reviewing the procedure line-by-line in an attempt to identify the cause of the isolation.

Several factors related to the procedure may have contributed to the incident. There were no warnings or cautions in the procedure about the unique nature of this step nor was there any indication of the consequences of incorrect task performance. Further, the test procedure could have provided more objective criteria such as Rosemount transmitter output vice using fully counter-clockwise and fully-clockwise movement of the stable current potentiometer.

2.4 Improper Lowering of a Fuel Bundle onto the Core Top Guide During Refueling

On February 16, during core reload activities, a fuel bundle was lowered past the normal point at which final element alignment should have been checked, until it contacted the core top guide. The bridge spotter noticed that the bridge operator had lowered the bundle past the 360" point and that the bundle came down on the top of the core. At this point the spotter told the operator to stop lowering the bundle and the limited senior reactor operator (LSRO) on the bridge directed that the bundle be raised to 360". Following notification of shift management, the bundle was returned to the spent fuel pool location from which it was taken. PECO's review of the specific bundle and surrounding bundles showed no damage as a result of this incident. PECO initiated PEP I0001497 to review this event.

The team found that this event was caused by inattention-to-detail by the refueling bridge operator, during repetitive fuel handling operations. However, good attention to detail by the spotter limited the potential for fuel damage. The team discussed this event with the LSRO who was on the bridge at the time and determined that he directed proper actions following the event and promptly notified proper plant and nuclear maintenance division management of this issue.

2.5 Inadvertent Recirculation Pump Trip, Due to Fuse Removal - Unit 2

On February 24 a licensed reactor operator pulled a fuse from an operating Unit 2 recirculation pump motor generator (MG) set, when he was sent to perform the task on a secured MG set at Unit 1. This caused the Unit 2 MG set to trip forcing the unit to operate in single loop operation. PECO initiated PEP I0001564 to allow evaluation of this issue.

The team identified that inattention-to-detail by the operator, a lack of detailed written guidance on the work to be performed, and an ineffective pre-job briefing by the supervisor contributed to the event. Another possible contributor was a misleading work aid.

The I&C department asked the work control center (WCC) for help in pulling fuses for the Unit 1 MG set in order to complete some scheduled work. An evaluation of an existing clearance determined that the requested work was within the scope and therefore could be completed. The I&C technicians provided a copy of a portion of an electrical print of the MG set which was highlighted in green to show the specific fuses to be removed. This marked-up print was given to the licensed operator assigned to the WCC and a briefing was held. The operator was informed that the work was within the bounds of an existing clearance and that the required notations would be added to the clearance. The location of

the cabinet containing the MG set fuses was discussed. The operator was told that the cabinet was located "right out on the 269 elevation," the same elevation as the WCC. The operator proceeded to the MG set fuse cabinet closest to the WCC, which was for the Unit 2 MG sets. He checked inside the cabinet and identified the fuses to be pulled aided by the green highlighted electrical print. He then obtained and used the appropriate safety gear to pull the appropriate fuse. He did not notice that the Unit 2 MG set was running and pulled the fuse, when the fuse arced as it was removed, the operator realized his mistake and reinserted the fuse, but the MG set had already tripped.

The team found that while not required by PECO procedure, the operator did not have the specific clearance in hand when the fuses were pulled nor was it reviewed. The operator was only provided with the copy of the electrical print, which did not clearly identify the fuses specifically as Unit 1 equipment. The clearance would have provided the operator with the specific cabinet equipment number (location), which would have included a designator 1 indicating that the fuses were at Unit 1. The Unit 2 cabinet, from where the fuse was removed, was appropriately labeled with the Unit 2 equipment number. The WCC supervisor did not verify that the operator understood the location of the work to be performed. While cabinets for MG set fuses for both units are located on the 269 elevation, the Unit 2 cabinet is within 25 yards of the exit from the WCC to the power block and the Unit 1 equipment is at the other end of the building. The use of the green highlighter to circle the fuses to be removed on the print supplied to the operator also may have been a contributor. Green color coding at LGS usually refers to Unit 2.

2.6 Summary of Events

As documented in Table 1, the team independently determined that inattention-to-detail by each individual was a common contributor to each of these errors. Further, the team assessed that the lack of immediate supervision over activities contributed to two of the events. Other than these issues, the team considered that there were no specific ties between each event. The physical work environment was also reviewed and did not appear to be a contributing factor to any of the incidents. The team found that the organizational environment, which was focused on increasing individual personnel accountability and adherence to schedule commitments, did not directly affect any of these events. Interviews with workers and supervisors indicated that although the outage was of short duration, schedular pressure was not a contributing factor to the incidents. Several of the workers interviewed expressed concern about possible management actions if standards of accountability were not met or if mistakes were made. The team did not identify any specific reasons for these concerns or indication that these concerns were a factor in any of the five events that the team evaluated. The shortened length of the outage was attributed to better pre-planning, better scheduling and coordination, more efficient use of available man-power, and greater use of on-line system outages throughout the year rather than only during outages.

3. PERFORMANCE ENHANCEMENT PROGRAM REVIEW

The team found that the performance enhancement program (PEP) was functioning well to allow PECO to identify and correct problems. PECO implemented this system in late 1993 as the integrated method for reportability determinations, and problem and event reporting and assessment. The team reviewed the PEPs opened since the beginning of the Unit 1 outage. The PEP process was discussed with plant personnel and management. On a sampling basis, the team determined that the system has been used during the outage to identify problems. Each PEP selected was reviewed for; clarity of the problem stated, adequacy of problem discussion, reportability aspects, and adequacy of interim and/or final corrective actions.

Further, management has taken and appropriately prioritized corrective actions. The individuals interviewed understood the process, but there were some questions on the type and severity of issues which needed to be entered into the system. PECO planned actions to provide examples of issues that should be reported by specific departments.

The team's review of specific PEP items is discussed below:

- Two PEPs dealt with operator performance. PEP I0001446 detailed an inadvertent draining of a condensate storage tank to the Unit 1 suppression pool, caused by poor communications between operators. In this case, the control room directed that a core spray pump suction be aligned to the CST. Then, because of changing priorities, the plan was canceled. The operator in the field did not get the word that the CST suction should be closed. Subsequently, the control room operator opened the normal suppression pool suction valve without assuring that the CST valve was closed, setting up a siphon path to the suppression pool. In another event, it was identified that (I0001495) the refueling platform operator almost contacted the fuel pool gates, during fuel moves. In both cases, the corrective actions were appropriate.

- There were two PEPs initiated to document issues with respect to the radiation protection program. PEP I0001421 documented that workers moved a radiation protection posting to access a light at the rad waste radiologically controlled area entrance. PEP I0001517 documented a worker not complying with a radiological work permit requirement for the use of finger ring extremity dosimeters. The team discussed these issues with the radiation protection manager and found that adequate corrective actions had been taken. These issues have been discussed with the Region I radiation protection inspector and will be reviewed during a subsequent inspection.

- PEP I0001586 documented a PECO quality assurance concern with the controls implemented by a contractor over welding rods used during the performance of safety-related modifications. The PEP clearly documented several cases where PECO identified that the contractor was not adequately controlling the coated weld rods and properly destroying rods that had not been properly handled. Because of the

continued identification of these issues, PECO initiated this PEP to ensure that corrective actions were taken by the contractor and that these actions would prevent recurrence.

- The team reviewed the circumstances concerning the return to service of Emergency Diesel Generator (EDG) D11 without completion of post-maintenance testing (PMT) as documented on PEP I0001599. The inspector determined EDG D11 was removed from service to calibrate the voltage regulator. EDG D11 was returned to service in accordance with work order R0268880 that did not clearly state that PMT was a requirement following the calibration.

  PECO identified this missed PMT about two days later, following a review of completed work orders. EDG D11 was declared inoperable and an adequate PMT completed without any need for rework. PECO took prompt corrective actions to revise all EDG voltage regulator work orders to assure each plainly requires a PMT. In addition, operations management provided a written description of this event to plant operators to increase their awareness of EDG PMT requirements. The team determined EDG operability was not in question as the plant mode did not require that EDG D11 to be operable at anytime during the two day period.

- The inspectors reviewed PEP I0001546 which documented that an hourly fire watch patrol had not been completed for a two hour period on February 19, 1994. This hourly watch was required by Technical Specification 3.7.7 because of an impairment in a fire barrier (PSA-116-P005). The missed watch was identified by the security force member originally assigned to check the impairment, and the area was subsequently inspected and verified to be in a safe condition. PECO determined that this event was not a violation of the technical specifications (TS) and therefore was not reportable under 10CFR50.73, because two contractor workers were in the area during the two hour period. Further, these individuals had not observed smoke or fire in the area. PECO considered that, since there were people in the area, they provided coverage equivalent to the hourly watch, even though they were not the assigned fire watch nor fire watch trained. PECO had documented this position in a 1985 technical specification interpretation. The team concluded that this issue was unresolved pending determination of whether the individuals satisfied the TS requirement or simply mitigated the consequences of the missed fire watch. **(Unresolved Item 94-09-01)**

4. OUTAGE SCHEDULING AND PLANNING

The team found that PECO management expressed a clear desire for the plant staff to conform to the planned outage schedule. The team discussed the outage planning methodology and coordination with outage supervision and workers, engineers, and operators. The overall management of system restoration and testing was reviewed.

PECO implementation of safety-related system outage windows worked very well. These windows included all activities needed to be completed. While the specific process, used by PECO, for minimizing outage risk (ORAM) was not reviewed, the team found that the windows were appropriately controlled and sequenced. Written schedule lay outs, which presented the tasks needing completion to close specific windows were very useful. This allowed management and worker focus on completion of a window. PECO also employed a strategy where a specific person was named as a make-it-happen-manager for a specific task. The make-it-happen managers and the schedule made it very apparent to outage workers what tasks needed to be focused on.

PECO maintenance workers, system managers, and operators were involved in the development of the specific system windows. Maintenance personnel at the foreman level were involved in determining the required man loading and sequencing of tasks to enhance the use of their personnel. System managers were very knowledgeable of their system outage work including corrective and preventive maintenance, post-maintenance testing, and surveillance testing. The operations department was involved in the overall sequencing and determination of times for clearance application and removal and system operability testing. This involvement by all groups demonstrated ownership of the schedule and, therefore, a desire to complete work within the schedule time. There was no appearance of inappropriate scheduler pressure.

The separate outage organization was a strength. It allowed individual work groups to identify things that stood in the way of good performance to the outage organization. This provided confidence that the issue would get resolved. In discussions with the operations department personnel, the team found that the outage organization held the operators accountable to complete their tasks such as: establishing and removing clearances and conduct of evolutions to support the outage. Some operators felt that the schedule took some flexibility away from their activities. The outage shift supervisors felt that the schedule and the outage organization supported the operations department well. They believed that having a strong outage organization, to which equipment problems could be turned over was a definite strength. This reduced the need for the operations crew to contact all individuals necessary to evaluate and correct a problem, allowing for better overall control of activities.

Operations and maintenance department control and monitoring of overtime were reviewed and found adequate. This included a review of administrative procedure A-45 and the appropriate department surveillance tests conducted to document the specific reviews.

The team reviewed the work backlog at Unit 2 and assessed that the overall number and trend of open issues has not specifically changed since Unit 1 was in an outage. This indicated that the priority of Unit 2 activities had not been affected by the Unit 1 outage.

5. EQUIPMENT CONTROL

The team observed that the removal and return to service of safety-related equipment by the plant operations staff was conducted safely and in accordance with station procedures. The team reviewed the process for the release of system clearances, work activities, and surveillance testing, finding that activities were well scheduled initially, leading to little room for error.

The process for ensuring correct system configuration prior to start-up was reviewed. This included reviewing the system check-off-lists (COLs) conducted and the processes in place. The team found that the appropriate valves were verified to be in their correct positions as systems were turned over to operations. This review also included review of valve out-of-position issues identified by operators. The team found that the operations department was identifying these issues and properly trending them. None of these issues were safety significant.

PECO implemented adequate methods for identifying equipment problems, temporary equipment conditions, and temporary modification control. The programs were properly documented in station procedures and the programs were being appropriately implemented. The number of temporary modifications was low, and there were very few regarding safety-related systems. The team did note several weaknesses:

- During discussions with the control room staff, the team determined the operator's knowledge of the reason for deficiency tags on control room switches and alarms was weak. PECO took prompt corrective action to ensure all control room operators and supervisors reviewed control room deficiency tags. In subsequent discussions with the control room staff, the inspector determined that in all cases, the corrective actions taken by PECO were adequate, and all operators and supervisors were knowledgeable of all control room deficiencies.

- In what appears to be an isolated case, the team found that the procedural controls over non-safety-related valves used to supply make-up water to the fuel pool skimmer tanks at both units did not comply with the LGS Operations Manual Section 6.13.2, Abnormal Equipment Status Control. The procedure requires the use of equipment status tags (EST) to identify and track equipment that is not in its normal position nor tracked by some other approved method. PECO took appropriate actions to change the operating procedure and COL to reflect changes in normal valve positions from closed to open. A specific procedure change to reflect the operation of the normally open valve, closed by the EST was not made since the operation was simple and on a non-safety related system. The team found this acceptable. In a review of the other ESTs in the plant the team made no significant observations.

- Several alarm inputs to the control room alarm "GENERATOR SLOT/BAR BUSHING HI-TEMP" were out of service and scheduled for repair at a later date. As a result of the out of service alarm inputs, the inspector determined the alarm response procedure did not provide clear procedural directions to the operating staff. PECO revised the alarm response procedure to provide clear procedural directions to specify operator response in the event of the alarm condition.

6. PLANT TOURS

The team toured areas of the Unit 1 plant as outage activities were completed and during start-up. Housekeeping in most areas of the plant was adequate, however, the team was concerned over the large amount of scaffolding, tools, and transient combustible materials present in the RHR pump rooms even as plant startup commenced. The team assessed that conditions could have been better in these rooms. Radiation protection posting appeared appropriate.

A walkdown was conducted of accessible portions of the RHR and HPCI systems to verify proper component alignment, in accordance with their system check-off-lists, to support plant startup and operation. No adverse conditions were noted and equipment appeared to be in good condition. System alignment in the control room was also verified to be proper.

During these tours, the team found that plant and contractor personnel were knowledgeable of activities being conducted. This included high pressure coolant injection and reactor core isolation cooling (RCIC) system maintenance and operation during start-up. Radiation technicians provide good coverage for personnel entering the RCIC room during operation.

Based on plant tours, the team reviewed the issues discussed below:

6.1 Safety-Related Battery Performance Testing

Five cells of the 60 cell station battery 1B2 were replaced prior to the conduct of the technical specification battery capacity surveillance test. This test was required every 60 months or every 18 months as specified in TS 4.8.2.1.f., if battery degradation was detected. TS 4.8.2.1.f defines degradation as when battery capacity drops more than 10% of rated capacity from its average on previous performance tests, or is below 90% of the manufacturer's rating. A comparison of the 1994 test and the last test conducted in 1989 showed that the battery had not degraded, possibly as a result of replacing the five old cells with the new cells. As a result, PECO determined the next surveillance test was required to be performed in 1999. The team was concerned that replacing cells before the performance test could mask overall battery degradation, and therefore, the enhanced frequency testing of the battery per TS 4.8.2.1.f would not be conducted. This issue is unresolved pending determination of the acceptability of replacing battery cells, which might mask overall battery bank degradation. **(Unresolved Item 94-09-02)**.

6.2 Emergency Core Cooling System Unit Coolers Operability

The observations of numerous equipment trouble tags on control switches for safety-related pump room coolers raised the question of equipment operability. Based on subsequent discussions with PECO personnel and reviews of engineering documentation, the team determined these coolers were operable, in support of pump operability. The problems with the equipment appeared to focus on the room temperature controllers. These controllers function to start the fans when temperature increases in the respective rooms. In some cases, a room cooler may not have started if a high temperature was reached. The team found that in all cases the pump room coolers would automatically start in the event the associated pump started. Further, PECO demonstrated this during performance of logic system functional testing. In those safety related pump rooms with out-of-service ambient high temperature starts, a room cooler was in continuous operation to preclude an ambient high temperature condition. The team had no further questions.

6.3 Fire protection issues.

The team noted several instances where plant workers, primarily contractor workers, failed to adhere to PECO's administrative procedures governing control of combustible materials and ignition sources. These findings were similar to, and an extension of, fire protection program problems identified in NRC inspection report 50-352&353/94-02 and for which a violation was issued. The team was concerned over the adequacy of contractor oversight by PECO in ensuring compliance with their site administrative procedures in this area.

Among the several deficiencies noted, two occurred in safety-related areas and therefore were of greater concern.

- Oxygen and acetylene bottles were being stored in the common RHRSW/ESW tunnel. Contrary to administrative procedures, the bottles were stored along side each other without a fire barrier between them and the bottles were not restrained from tipping over.

- During restart of Unit 1, combustible materials were present in a combustible free zone near the core spray injection valves. The inspector notified the fire protection group of the concern. The following day, the inspector identified that the materials were still present in the zone. Following identification of the concern again, the materials were removed. Further, the inspector determined that a health physics technician had also identified the deficient condition to the fire protection group.

Other noted conditions, prohibited by administrative procedures included: six instances of improperly secured compressed gas cylinders; combustible materials stored at the bottom of a reactor building stairwell; two instances where fire watches were using fire extinguishers with out-of-date inspections tags; two instances where unattended welding machines were left energized; and one instance where a welder failed to take measures to catch hot slag from falling into the condenser bay despite instruction to do so on the ignition source permit for the welding activity.

All of these concerns were discussed with fire protection personnel and the inspectors expressed their concern that many deficiencies were found. The majority of the deficiencies involved contractor work activities. The team noted that PECO personnel had identified similar fire protection issues in the PEP system. PECO Energy has been requested to describe their plans to address these findings in their response to the previous violation issued in Combined Inspection Report 94-02.

7. START-UP REVIEW

Unit 1 startup activities were observed to ensure they were conducted in accordance with procedures, with proper coordination, and attention-to-detail. Control room operators conducted start-up activities very well, using procedures, and demonstrating a safe and professional approach. Members of the team observed different portions of activities leading up to and after reactor mode switch change to start-up. Senior station management presence was noted routinely in the control room. Observations in the control room showed that the outage shift supervisors were clearly in command. These individuals provided good shift briefings and good specific briefings for activities such as the starting of a recirculation pump. The team assessed that the procedure developed by PECO for the sequencing of necessary activities before start-up and through power ascension (GP-2) was very strong. This included a clear graphic representation of the GP-2 sequence, which emphasized the items which could be performed in parallel. Senior licensed operators provided proper instructions for reactivity changes to the reactor operators.

TABLE 1
Human Performance Investigation Process Issues

Event description and discussion of Human Performance Investigation Process Causal Factors [1]					
Procedures	Training	Communications	Management and Supervision	Human Engineering	Individual Supervision
2/6/94 Inadvertent Isolation of Residual Heat Removal Service Water during Shutdown Cooling (See section 2.1 of the report)					
N/A	Operators only trained at simulator on Unit 1, since Unit 2 is not modeled.	N/A	**Inattention-to-detail. PECO policy for self-checking not adequately communicated to the individual.**	Panel arrangement of RHRSW pump and heat exchanger valve switches was not clearly separated or highlighted.	N/A
2/9/94 Inadvertent Isolation of Residual Heat Removal Shutdown Cooling. (See Section 2.2 in the report) The team did not identify any Human performance issues in review of this event.					
N/A	N/A	N/A	N/A	N/A	N/A

[1] Primary causes are in bold type. The other causes listed are seen as possible contributors

TABLE 1
Human Performance Investigation Process Issues

Event description and discussion of Human Performance Investigation Process Causal Factors [2]					
Procedures	Training	Communications	Management and Supervision	Human Engineering	Individual Supervision
2/12/94 Inadvertent Isolation of Residual Heat Removal Shutdown Cooling during Surveillance Testing.					
Procedure lacked specific warnings of the consequence of actions.	**Lack of understanding of the specific task.**	N/A	**Inattention-to-detail. PECO policy for self-checking not adequately communicated to the individual.** **The individual did not fully evaluate and correct the problem when the procedure could not be followed.**	N/A	**Supervision did not ensure that the individual knew what the procedure being performed was to accomplish.**

[2] Primary causes are in bold type. The other causes listed are seen as possible contributors

TABLE 1
Human Performance Investigation Process Issues

Event description and discussion of Human Performance Investigation Process Causal Factors [3]					
Procedures	Training	Communications	Management and Supervision	Human Engineering	Individual Supervision
2/16/94 Improper Lowering of a Fuel Bundle onto the Core during Refueling (See Section 2.4 of the report).					
N/A	N/A	N/A	**Inattention-to-detail. PECO policy for self-checking not adequately communicated to the individual.**	N/A	N/A
2/24/94 Inadvertent Recirculation Pump Trip due to fuse removal - Unit 2					
N/A	N/A	N/A	**Inattention-to-detail. PECO policy for self-checking not adequately communicated to the individual.**	N/A	**Supervision did not provide the individual with detailed information on location of fuse to be pulled.** **A mis-leading and incomplete work package was given to the individual.**

[3] Primary causes are in bold type. The other causes listed are seen as possible contributors