BROOKHAVEN NATIONAL LABORATORY

TECHNICAL REVIEW REPORT

Dates of Review: April 22-26, 1985

Site: Limerick Generating Station (LGS)

Licensee: Philadelphia Electric Company (PECo)

BNL Technical Specialists: J. C. Higgins — Date: 5/9/85

B. Miller — Date: 5/9/85

1. PERSONNEL CONTACTED

The following PECo personnel were contacted during the course of the onsite review of the Automatic Depressurization System (ADS).

J. Armstrong	Operations
G. Beck	Mechanical Engineering
J. Carolan	Electrical Engineering
D. Clohecy	Quality Assurance (QA)
J. Corcoran	Quality Assurance
V. Cwietniewiez	Instrumentation & Control
J. Cotton	Maintenance
T. Dey	Quality Assurance
P. Duca	Surveillance Testing
R. Dungey	Maintenance
G. Edwards	Operations
H. Hansell	Mechanical Engineering
J. Harding	Field Engineering
C. Harmon	Quality Assurance
D. Helwig	Mechanical Engineering
G. Leitch	Plant Superintendent
J. Rainey	Instrumentation & Control
K. Walsh	Surveillance Testing
C. Wiedersum	Mechanical Engineering
K. Wilpizeski	Mechanical Engineering

The reviewers also discussed issues with various operations, test, maintenance, engineering, and QA personnel. Additionally, the following NRC personnel were consulted prior to and during the onsite review: J. Beall, R. Gallo, and J. Wiggins.

2. DOCUMENTS REVIEWED

The following materials or documents were reviewed:

1. Limerick Final Safety Analysis Report (FSAR), Rev. 41
2. Limerick Probabilistic Risk Assessment (PRA)
3. Limerick Technical Specifications (Tech Specs)
4. ADS Descriptions
5. Off-Normal, Operational Transient, and Trip Procedures
6. Limerick Safety Evaluation Report
7. Limerick Maintenance Procedures

   - M-020-001, Rev. 0 — Diesel Generator 18 Month Examination & Maintenance
   - M-020-077, Rev. 0 — Diesel Engine 18 Month Examination & Maintenance
   - PMQ-500-78-0 — Preventive Maintenance Procedure for Examination & Repair of Q-listed Target Rock Solenoid Operated (Fail Closed) Globe Valves and Internal Wiring

8. Surveillance Procedures and Test Results:

ST-2-042-661	ECCS-ADS Drywell Pressure Bypass timer Div. 1 Calibration/Functional Test
ST-2-042-600	ECCS - Reactor Vessel Water Level Levels 1, 2 and 8; Div. 1, Channel A (Core Spray, LPCI, ADS, RCIC, and D/G) Functional Test.
ST-2-042-405	ECCS - Reactor Vessel Water Level - Levels 1, 2, and 8; Div. 1, Channel A (CS, LPCI, ADS, RCIC, and D/G) Calibration and Functional Tests
ST-2-050-600	ECCS-ADS Timer; Div. 1, Calibration/Functional Test
ST-2-0510412 and 612	ECCS-RHR LPCI Mode Pump Discharge Pressure High; Div. 1 (ADS Permissive, Pump A) Calibration and Functional Tests
ST-2-052-409 and 607	ECCS - Core Spray Pump Discharge Pressure High; Div. 1 (ADS Permissive, Pump A) Calibration and Functional Tests
ST-2-042-433 and 628	ECCS - Reactor Vessel Water Level - Low Level 3; Div. 1, Channel A (ADS Permissive) Calibration and Functional Tests
ST-6-092-312-1	D12 Diesel Generator Operability Test Run Rev. 5, 4/9/85
ST-1-050-101	Div. 1, ADS Logic System Functional/Simulated Automatic Actuation
ST-4-041-210-1	Main Steam Relief Valve Test
ST-2-059-400-1	ECCS-ADS Accumulator Backup Compressed Gas Low Pressure Calibration/Functional Test (PT-59-1512A, PISL 54-152A)
ST-1-050-101-1 & 102-1	Div. 1 ADS Logic System Functional/Simulated Auto Actuation
ST-1-LLR-005 thru 09	Automatic Depressurization System Leak Rate Test (M41/59)

9. Limerick Operating Procedures

S59.9.A	Routine Inspection of Primary Containment Instrument Gas System
S59.8.A	Placing the Automatic Depressurization System Backup Nitrogen Supply System in Operation
S59.1.A	Placing the Primary Containment Instrument Gas System in Normal Operation
S59.1.B	Startup of Primary Containment Instrument Gas System Following a Primary Containment Isolation
S59.2.A	Shutdown of Both Primary Instrument Gas Compressors
S59.2.B	Shutdown of One Primary Instrument Gas Compressor
S50.1.A	Automatic Depressurization System and Main Steam Relief Valve Lineup
S50.1.A (COL)	Equipment Alignment of the ADS & MSRV for Normal Operation

10. Calculations Reviewed

M-41-18	Allowable Leakage for Short-term ADS Accumulator Tanks
M-59-7	ADS Valve Seismic I Gas Supply Nitrogen Bottles Required
ME-116	ADS Air Supply

11. Annunciator Response Cards for Primary Containment Instrument Gas System, Automatic Depressurization System, and Emergency Service Water System
12. PECo Responses to TMI Action Items II.K.3.28 and II.K.3.18
13. Modification Packages:
    MPCR No. 0318 for D/G exhaust lines
    MPCR No. 0315 for D/G Gage Panel Supports
    Field Change Request No. C11, 793F for D/G Upper Level Gratings
14. Preoperational Test
    - 1P-83.2.A ADS (NSSS) Test of High Drywell Pressure Permissive Bypass Feature
    - Retest Records of Blue Line Wiring Checks for ADS

3. REVIEW OF PREVIOUSLY IDENTIFIED ITEMS

3.1 Emergency Service Water (ESW)

3.1.1 Items Closed (7 of 10)

1. Dirt and debris in control room cabinets: The licensee had all control room cabinets cleaned. The control room cabinets are now locked. Several cabinets were opened for inspection and a few were identified in the ESW system which had some additional debris, apparently from a modification. This was satisfactorily cleaned.

4. Lack of level detector/alarm for Wet Pit: This item was originally raised because it was associated with a failure mode significant to the ESW system based on the LGS PRA ESW fault tree. It was concluded that the addition of such a detector and alarm would noticeably improve ESW reliability. The licensee has subsequently re-examined the ESW fault tree and determined that there was an error in the area of loss of the wet pit. Correction of this fault tree error lowers significantly the contribution of wet pit loss to overall ESW unavailability. Hence, while addition of the subject alarm would improve plant design, it is no longer a significant contributor to ESW unavailability and this item is closed.

5. ESW pump design flow rates: This item was reviewed by the NRC Resident Inspector and closed in his October, 1984 monthly inspection report.

6. Preoperational Tests for ESW Check Valves: Procedures ST-6-011-231 and ST-6-011-232 were completed and have verified proper check valve operation. Manual valve 1006 was properly verified open in ESW operational procedure S11.1.A-C.O.L. #1, "Equipment Alignment of Emergency Service Water - Loop A System."

7. Setpoints not included in all Annunciator Response Cards (ARCs): All ARCs for the ESW System were reviewed and setpoints are now properly included.

9. Program for Locked valves and control room keylocked handswitches: This program was reviewed satisfactorily by NRC Region I in paragraph 4.4 of Inspection No. 50-352/85-03.

10. Technical Specification Outage Time for shared systems: The licensee has agreed, in a letter to NRC Region I dated 11/7/84, to perform a thorough review of the Limerick Technical Specifications before Unit 2 becomes operational. This commitment satisfactorily addresses this item.

3.1.2 Items Remaining Open (3 of 10)

2. Recalibration of Control Room (CR) Panel-Mounted Instruments: The licensee has divided the CR instruments into several groups. Some instruments are calibrated per the Limerick Tech Specs, some on a 2-year interval, some on a 3-year interval, and some still have no current scheduled recalibration (e.g., ESW temperature and pump motor ampere gauges). The licensee is currently undecided as to whether or how often these remaining instruments will be recalibrated.

3. Automatic Return of ESW valves to non-safety position on ESW pump trip: The licensee interprets the cited documents such that his design complies with them. However, it appears that the design does not meet IEEE-279, or Bulletin 80-06. Additionally, the design could put the system in an unnecessarily risk-prone situation given a single failure during the post-accident phase. NRC Region I will conduct further review of this item.

8. Lack of Off-Normal Procedures for ESW: The licensee's written response did not address the cited issues. Further it appears that the procedures in question are mandated not only by good operating practice but also by the licensee's commitment to Regulatory Guide 1.33, Rev. 2 (Appendix A, item 6.g). This item will receive further review by NRC, Region I.

3.2 Emergency AC and DC Power

3.2.1 Items Closed (14 of 20)

1. Loose Metal Components in 4KV Switchgear: The licensee removed or fastened all loose components and conducted a QC inspection to verify satisfactory conditions. A sample of electrical panels were examined internally for loose items. None were identified.

2. Broken Floor Gratings in D/G Rooms: The licensee fastened down some loose gratings and removed other loose pieces. Structural drawings were appropriately revised per Field Change Request No. C11. 793F to reflect the permanent installation arrangement. The D/G rooms were examined and the situation was adequately corrected.

4. Debris in D/G Rooms: The licensee cleaned the D/G rooms and conducted QC inspections of the same. The D/G rooms were examined and no debris was found.

5. Battery Chargers' Load Testing Less Than Required: The battery charger loads, battery bus loads, load testing, and subsequent licensee reanalysis was reviewed for each of the four batteries. Each bus was tested through the four hour simulated post-accident loading sequence in three load steps: Step 1 - 0 to 1 minute; step 2 - 1 to 239 minutes; and step

3 - 239 to 240 minutes. The loading at each step of the preoperational test was stated to be conservatively chosen to allow for future load increases. However, the most recent load analysis (March, 1984), issued subsequent to the test, showed that the loads for some of the steps, on some of the battery buses, were greater than the test loads. In each case, however, the non-conservatism was during the one minute step 1 or step 3 and there was still room to spare in the long (238 minute) step 2. Hence licensee calculations were able to show that the battery and battery charger had sufficient additional capability to supply the actual loading.

9. Switchyard Disconnect Position: The original finding was that disconnect switch No. 4B7 was closed by procedure S35.8.D while drawing E-1 showed the switch blocked open. The switch was also physically closed. The licensee response letter stated that it is acceptable for the switch to be open or closed (as long as the series switch 4B5 was open) and that the "blocked open" note would be removed from drawing E-1. Onsite, the reviewers were shown a 3/14/85 memo from PECo Electrical Engineering to the Station Superintendent, which stated that, in accordance with PECo practice, for personal safety, both disconnects (4B5 and 4B7) should be normally open. In response to this memo, PECo revised procedure 535.8.D to place switch 4B5 and 4B7 open. All documents and the switches are now in agreement.

10. D/G Vent Fan Capability and D/G Operability: The licensee performed an engineering analysis and determined that each D/G cell has two - 50% capacity fans which can maintain the cell below its 115°F design limit with an outdoor temperature of 95°F and both fans in operation. With half of the ventilation flow (i.e., one fan) the cell temperature differential would double to 40°F. Hence one fan can adequately maintain design temperature as long as outside air is 75°F or less. These conclusions were transmitted to the Station Superintendent in a memo dated 3/20/85. The reviewers asked how this information was formally provided to the operating shifts. The licensee could not provide any documentation and hence issued a memo dated 4/26/85 directing shift supervision to declare a D/G inoperable if one exhaust fan is inoperable and outside air temperature is (or is expected to be) greater than 75°F.

11. D/G Vent Fan Discharge Damper Position Indication: A tour was made of the D/G rooms and fans were observed both running and in standby. The damper positions were verified both by indicating lights and actuator positions. When the fans were off (or in standby) the dampers were shut and when the fans were on, the dampers were open. No discrepancies were identified.

12. D/G Exhaust into Reactor Building Intake: The licensee has performed extensive studies and concluded that a modification to the D/G exhaust line is warranted to avoid discharging smoke into the Reactor Building. Modification Package No. MDCP 416 has been issued and is the in process of being implemented. The package and partially completed work were reviewed and no discrepancies were identified.

13. Refueling Cycle D/G Maintenance Procedures: The licensee has written and issued two new refueling cycle D/G maintenance procedures, M-020-001 and 002 dated 4/23/85, which now incorporate the diesel manufacturer's recommendations for long term periodic maintenance.

14. Vendor Recommended D/G Operational Checks: The licensee has a set of computer-aided log-taking routines called the plant electronic note book. A new log routine (No. 15) has been added to the electronic note book to take daily rounds or logs of the D/Gs and D/G rooms. These new logs incorporate the vendor recommendations. The format and output of the new electronic log system appear very useful and comprehensive.

16. Verification of D/G Cooling System within design limits: The licensee has issued Rev. 5 of procedure ST-6-092-312 dated 4/9/85 which now periodically verifies that the D/G cooling system functions within its design limits in accordance with paragraph C.2.c.(2) of Reg. Guide 1.108.

17. Trending of D/G Operating Parameters: The new Rev. 5 of procedure ST-6-092-312 also records D/G operating parameters during the monthly surveillance load test for trend analysis purposes.

19. Loss of Offsite Power Procedure Items: The licensee has issued Rev. 1 to Procedure E10/20 which now references the offsite power Tech Spec, references use of the 33KV backup offsite power line, and has consistent breaker names.

20. Station Blackout Procedure Items: Rev. 2 to procedure E-1 dated 4/17/85 has been issued. This revision has expanded the system pressure control band (SRV use is guided by the TRIP procedures). Additionally, step 3.15 now references procedure T-244, which gives the details on use of the diesel fire pump for emergency reactor vessel water supply.

3.2.2 Items Remaining Open (6 of 20)

3. D/G Ventilation Panel Labels: Temporary labels were still in use.

6. Alarm Response Cards (ARC) for Local Panels: These ARCs have not yet been completed by the licensee.

7, 8 33KV Offsite Power Supply Items: No additional new information was provided on these two items. These items will receive further review from the NRC, Region I.

15. D/G Physical Condition Discrepancies: The licensee has addressed and corrected four of the five items identified here. Corrective actions were verified by document review and tours of the D/G rooms, as follows: no loose tubing or clamps were noted in any D/G rooms; the skid-mounted instrument rack supports were re-adjusted, plus a modification was issued based on new vendor recommendations to improve the panel's supports; all instrument panel doors were tightly closed and properly gasketed; and Step 8.2.4 of procedure S92.1.N places the D/G control switch in the remote position. These four items have been satisfactorily addressed. The licensee has not completed his evaluation of the excessive smoke in D/G room D-12.

18. ESW Throttle Valve for D/G Cooling: The licensee has confirmed that the throttled position is the correct one and will revise procedures as necessary. The licensee also intends to place tags on these and other throttling (or balancing) valves to warn operators of their use and position. This item remains open pending completion of these actions.

4. SCOPE

During this review of the Automatic Depressurization System the following areas and items were addressed. Each of the below items was reviewed against the major ADS failure modes identified in the Limerick PRA, as having significant importance with regards to plant safety.

4.1 Pre-operational and Surveillance Testing

This included review of numerous procedures and evaluation of completed test results.

4.2 System Hardware

This included a system walkdown encompassing a detailed review of the SRVs, piping, backup systems, auxiliary nitrogen connections, valve lineups, control room/auxiliary equipment room/remote shutdown panel annunciators, and instrumentation and controls for the ADS and associated systems.

4.3 Procedures

This included a review and evaluation of the operating procedures, maintenance procedures, alarm response procedures, and emergency procedures. Training programs associated with these procedures were also reviewed.

5. PLANT TOUR

A system walkdown was conducted of the Automatic Depressurization System (ADS), including system logic, controls, test equipment, Safety Relief Valves (SRVs) and the three nitrogen supply points for the ADS. The three nitrogen supply points are: a) the Primary Containment Instrument Gas System (PCIGS) compressors (the normal operating supply of nitrogen); b) the two intermediate nitrogen bottle racks (a seven day supply, used as backup to the ADS accumulators); and c) the two long term hookup points for additional nitrogen bottles. With the exception of the items discussed below, the overall equipment and instrumentation appeared acceptable and capable of performing their function design.

During the week of the review it was observed that there appeared to be a leak at the intermediate N_2 bottle facility in the instrumentation measuring the pressure in one of the three bottles. This leak did not impair operation of the ADS since procedures (ST-6-107-590-1 and S59.8.A) require daily surveillance, when operating in modes 1, 2 or 3, to ensure a minimum pressure of 500 psi in one bottle and a combined three bottle total of 2400 psi. Additionally, discussions of this matter with operations personnel indicated they were aware of this potential problem and were in the process of initiating corrective action.

When reviewing the PCIGS compressors it was observed that only one of the two compressors was in service. This was not of major consequence since this system is a non-safety grade system and is not relied on to supply short or long term N_2 to the ADS following an accident. The PCIGS is the normal supply of N_2 pressure. When header pressure decreases below 90 psi, the intermediate bottle system comes on-line automatically.

One significant item noted on the walkdown of the system was that the vent port on the solenoid valves, that control the operation of the SRVs, was covered over with tape. The solenoid valves are vented when closing the SRVs only. The licensee was asked as to determine why the vent port was taped over, but could not. All tape was removed from all SRV solenoids prior to completion of the review. It was concluded that since the SRVs had been recently successfully cycled, the tape impairment was not significant. The licensee agreed however to research the possibility that the taping may have held the SRVs open longer than intended and contributed to a possible high tailpipe temperature experienced earlier in the year.

With the exception of the items mentioned above, the equipment and instrumentation appeared in good working condition.

6. CONTROL ROOM

The review of the control room included an evaluation of the annunciators, lights, controls and instrumentation used to indicate ADS status to the operators. All controls and instruments were evaluated for correctness, proper labeling, and compatibility with procedures. No discrepancies were identified. One item worthy of followup was identified as discussed below.

The licensee had previously issued trouble tags (ETT 5059, & 6467) for instrument PISL-59-152.A & B being out of calibration. This indicator(s) controlled the automatic switch over from the PCIGS to the intermediate bottle or backup system. As a result ST-2-059-400-1, a calibration/functional test procedure was reviewed and found acceptable. This will be discussed in greater detail in Section 7.

7. PROCEDURES

7.1 Surveillance Procedures

Surveillance procedures were reviewed for technical content, conformance with plant Technical Specifications, proper Inservice Testing per the ASME code Section XI, completeness, and appropriate interface with system operation.

- In the Daily Surveillance Log ST-6-107-590-1 and procedure S59-8A "Placing the automatic depressurization system back up nitrogen supply system in operation" a discrepancy was observed regarding the minimum N_2 pressure. ST-6-107-590-1 called for a minimum bottle pressure of 500 psig and a total of 2400 psig in three bottles, while S59-8A called for a minimum pressure of 500 psig. A revision to procedure S59-8A was already developed and in its last phase of approval, addressing this discrepancy so that the procedure will be in

agreement with the Daily Surveillance Log. The bases for the 500 psig and 2400 psig is addressed in Section 9.

- Review of procedures ST-1-LLR-007, 8 and 9, Automatic Depressurization System Leak Rate Test (M41/59), revealed a discrepancy regarding the position of valve 50-1018S. Procedures 008 and 009 require, upon completion of the test, that manual valve 59-1018S be left open, whereas procedure 007 leaves it closed. When this error was brought to the attention of the licensee, the procedure was revised.

  To clarify concerns regarding the development of the acceptance limit for minimum N_2 pressure before automatic switchover to the backup N_2 bottles, surveillance test procedure ST-2-059-400-1, "ADS Accumulator Backup Compressed Gas Low Pressure Calibration/Function Test (PT-59-152A, PISL-59-152A)" was reviewed with the licensee. This procedure calibrates and tests the trip unit that insures 90 psig is always in the header supplying nitrogen to the accumulators, It was reviewed in detail including its development, acceptance criteria bases, performance, and instrument tolerances. The licensee satisfactorily addressed all areas of concerns.

7.2 Operating Procedures

This review included verification and assessment of procedures associated with the normal, accident and post-accident operation of the ADS. In particular, the procedures were evaluated to ascertain how they addressed transients, small LOCAs, and the ADS inhibit feature. Operator training was also reviewed. As an example, the licensee was asked how ADS would be operated if an anticipated transient without scram (ATWS) occurred. Also examined were the conditions with degradation of the Feedwater and HPCI systems that would cause the operator to inhibit the operation of the ADS. The licensee produced trip procedures T.A101 and 102 that clearly stated the actions required by an operator in these circumstances. Additionally these procedures are utilized in training operating personnel.

Also reviewed were the Alarm Response Cards (ARC) in the control room to verify that setpoints, logic, and action to be taken were consistent with system operation. (See Section 11 for comments.)

7.3 Maintenance Procedures

This area of review was concerned with the following:

- procedure development,
- manufacturer recommendations,
- plant procedures on lubricants,
- how the aging of non-metallic parts was addressed with respect to qualified life,

- how qualified life was determined and how it affected short and long term operability, both prior to and following an accident,

- upon completion of a procedure how was equipment verified to be in the correct position or alignment to meet operating requirements, and

- training of maintenance personnel.

In all cases the licensee successfully addressed the concerns by showing how a procedure was developed, who performs the procedures, how mechanical or electrical engineering establishes qualified life, reviewing a procedure(s) in detail, and general discussion of PECo policy toward maintenance. The licensees programs appeared thorough and effective.

8. SYSTEM HARDWARE DESIGN

In response to inquiries as to the basis of establishing the allowable leakage criteria for the ADS accumulator system and the backup system, the acceptability of the accumulator for actuating the SRVs, and the duration they can perform this function following an accident, the licensee provided three calculations, viz.,

M-14-18 "Allowable Leakage for Short-Term ADS Accumulator Tanks,"
M-59-7 "ADS Valve Seismic I Gas Supply-Nitrogen Bottles Required," and
ME-116 "ADS Air Supply."

The purpose of these calculations was to: a) determine the allowable leak rate and leakage margin for short term ADS accumulator operability, b) determine the number of nitrogen bottles required to operate the ADS system during a long term cooling mode of operation, and c) determine the minimum allowable ADS air supply bottle pressure.

The review included methodology, assumptions and boundary conditions used in the calculations and associated procedures. The licensee successfully responded to all inquires in this area.

9. INSTRUMENT CALIBRATION

The Automatic Depressurization System uses a number of instruments to initiate and control the system, each of which generally has multiple channels. Included among these instruments are: Reactor Vessel (RV) Low Level (Level-3), RV Low Level (Level-1), High Drywell Pressure, RHR and Core Spray Pumps Permissive on High Discharge Pressure, a timer to delay initiation of ADS for 105 seconds, and a 7 minute timer to allow automatic bypass of the High Drywell Pressure signal on sustained Low RV Level. The Limerick Technical Specifications (Tech Specs) define the trip setpoints for these instruments and also the maximum allowable setpoints (the value to where the setting may drift without a required report to the NRC). For each of the ADS instruments, the calibration procedure was reviewed to ensure that the acceptance criteria and set point bands properly incorporated Tech Spec requirements. Selected procedures were reviewed for technical adequacy as well. Completed procedures and data sheets were reviewed to ensure that actual instrument set-

tings were in accordance with Tech Spec and procedural requirements. With the exception of one minor item, no discrepancies were identified. In procedure ST-2-042-433-1, Rev. 1, dated 9/3/84, for calibrating the Low RV Water Level Permissive Trip, the milliamp (ma) value for the trip setpoint was rounded nonconservatively to 7.33 ma, which is slightly below the Tech Spec minimum of 12.5 inches. Actual instrument settings were within the procedure allowable band of 7.33-7.37 ma and above the Tech Spec required minimum of 12.5 inches. The licensee revised the procedure and made the allowable band 7.34-7.38 ma.

10. LOGIC REVIEW

As the majority of the dominant failure modes for the ADS system were associated with the automatic initiation logic, this was reviewed in some detail. Items reviewed for accuracy, consistency, and correctness included: the PRA fault trees, the FSAR logic diagrams, the General Electric and site logic wiring diagrams and associated design change documents, the Preoperational Test Procedures, the site functional test procedures, the control room and auxiliary equipment room panels, and the alarm response card actions.

The PRA was completed before the most recent ADS modifications, so the fault trees did not fully reflect the current design (in fact PRA results influenced the decision to modify the system). The other documents were generally consistent and correct with a few exceptions noted below. The test procedures were thorough and tested all appropriate features of the system both during the preoperational phase and the periodic functional testing phase in accordance with tech spec requirements. For the periodic functional testing, while some relays and contacts were tested in instrumentation procedures and some in the ADS Logic procedure, there was sufficient overlap so that all parts of the circuitry were tested and proven operable.

Regarding the wiring diagrams, some discrepancies were identified and are discussed in Section 11 below.

Each annunciator window in the control room has a procedure or alarm response card (ARC) associated with it. The alarm response cards were reviewed and four discrepancies identified:

1. Throughout the ARCs, the RHR and CS pump permissive setpoints were listed as 150 psig, when the RHR setpoint is 125 psig and the CS setpoint is 145 psig.

2. The ADS High Drywell Pressure Bypass Timer setpoint was listed as 8 min. vice 7 min.

3. The pump permissive interlock was incorrectly listed as being required to get the "ADS Timer Initiated" alarm.

4. For ADS windows A-4 and C-4 the ARC procedure says that, if ADS is not desired go to "Inhibit". However, if the operator does not go to "Inhibit" within 105 sec. of the timer starting, then the ADS will not be inhibited due to the logic seal-in feature. ADS, however, may still be inhibited, if desired, by selecting "Inhibit" and by pressing the reset button.

Before the end of the on-site review, the licensee had drafted appropriate changes to correct all the above ARC discrepancies.

The FSAR logic drawing (Figure 7.3-8, Rev. 38) was noted to contain an error in the logic E train. Both the manual initiation button and the seal-in feature are shown after the pump permissives, when in actuality they are before the pump permissives. The licensee agreed to revise the Figure.

11. DRAWINGS

As previously described, the wiring diagrams for the ADS system were reviewed in detail. These drawings consist of 11 sheets and are supplied by General Electric (GE) as Drawing No. 791E403TN. The drawings are reviewed by Bechtel for the site and given site control numbers in the B21-1060-E-series. Drawing changes are generally initiated by GE Field Deviation Disposition Requests (FDDRs), which are subsequently incorporated into drawing revisions. Onsite, when there are outstanding, unincorporated FDDRs (or other change documents such as FDIs or ECNs) procedures call for a "blue sheet" to be attached to controlled drawings to inform the user of these applicable design changes.

During the ADS logic review, it was noted that, in a few areas, the logic shown on the wiring diagrams did not agree with that demonstrated in the procedures. The system test engineer stated that FDDR No. HH1-4436, dated 9/4/84 revised the drawing to correct the logic errors. Further review showed that the logic per the FDDR was indeed correct, but that all site controlled drawings did not have blue sheets attached which referenced this FDDR. Followup on this discrepancy identified the fact that this was not an isolated item, but applied to numerous site GE drawings. A similar issue had been identified in late January, 1985 by PECo site QA, but had not been adequately resolved. Licensee investigation during the week revealed the following. GE had revised numerous drawings in the last 5 months to incorporate outstanding changes and sent them to Bechtel, S.F., who had not transmitted them to the site. Site document control, in an effort to correct the discrepancies identified by QA, had used a very recent compilation from GE which showed many drawings had no outstanding design changes. Document control thus instructed controlled drawing users to remove the Blue sheets. This was incorrect since the site did not yet possess the updated GE drawings. Hence the site drawings were now neither updated nor referenced the outstanding change documents. A related issue identified was that not all site controlled drawing holders (e.g., Field Engineering and the Surveillance Test group) followed Document Control instructions in removing the Blue Sheets. Additionally, a sampling review of the overall current status of site GE drawings revealed an excessive number of outstanding design changes for this stage of plant completion. Regarding all of the above items the licensee began prompt corrective action. Memos were issued to appropriate personnel warning of the incomplete status of site GE drawings; a commitment was obtained from Bechtel, S.F., to officially transmit 150 revised GE drawings to the site within one week; and plans were made to correct the posting of Blue Sheets.

An additional, unrelated, minor drawing problem was identified with sheet 3 of ADS drawing No. B21-1060-E-3.10 (Rev. 22 thru 25). Two relay contact sets (K3E and K7E) were incorrectly labeled and the ADS bypass timer was listed as an 8 minute timer instead of a 7 minute timer. An Engineering Change Notice was initiated to correct these discrepancies.

12. SUMMARY OF FINDINGS

12.1 Open Findings

Below are listed, in summary fashion, the identified items which were not resolved during the review.

1. Drawing Control: ADS drawings not posted with pertinent FDDRs and design changes; controlled drawing holders not properly following document control instructions; excessive design changes outstanding against GE drawings; and errors on sheet 3 of ADS logic drawing. (Section 11)

2. ADS logic drawing (FSAR Fig. 7.3-8) is incorrect. (Section 10)

12.2 Resolved Findings

Below are listed the identified items which were corrected by the licensee.

1. ADS Alarm Response Cards contained errors in setpoints, in the alarm logic, and in operator actions.

2. Safety Relief Valve solenoid vent ports were taped.

3. Reactor Vessel low level calibration procedure set the trip value slightly in the nonconservative direction.

4. Surveillance Test for ADS check valve leak rate left N_2 isolation valve closed vice open.

13. EXIT INTERVIEW

The reviewers met with licensee representatives and the NRC Senior Resident Inspector at the conclusion of the Technical Review on April 26, 1985 to discuss the scope and findings of the review. No items were identified as being proprietary in nature.