PHILADELPHIA ELECTRIC COMPANY

2301 MARKET STREET

P.O. BOX 8699

PHILADELPHIA, PA. 19101

(215) 841-4502

JOHN S. KEMPER
VICE-PRESIDENT
ENGINEERING AND RESEARCH

March 13, 1985

Docket No. 50-352

Inspection Report: 50-352/84-66

Mr. Thomas T. Martin, Director
Division of Engineering and Technical Programs
U.S. Nuclear Regulatory Commission
Region I
631 Park Avenue
King of Prussia, PA 19406

REFERENCE: Limerick Generating Station
Inspection Report No. 50-352/84-66
T. T. Martin, NRC, to S. L. Daltroff, PECo,
dated January 14, 1985

Dear Mr. Martin:

This letter transmits, by attachment, a response to the recommendations and considerations identified in the referenced inspection report. These items addressed the implementation and status of the following task actions identified in NUREG-0737: Post-accident sampling of reactor coolant and containment atmosphere; increased range of radiation monitors; post-accident effluent monitoring; containment radiation monitoring; and in-plant radioiodine measurements. Late submittal of this response was discussed with Mr. Pasiack of your staff and found acceptable. Follow-up inspections were conducted by your staff during the weeks of February 25 and March 4, 1985 to discuss these items in detail. As a result of this review, it is our understanding that all items except the following were resolved to the staff's satisfaction:

I.9, 18, 23, 24
II.3, 5
IV.1, 2

JE06 1/1

Should you have any questions regarding this matter, please do not hesitate to contact us.

Very truly yours,

John S. Kemper

Attachment

cc: Dr. T. E. Murley, Administrator
Mr. J. T. Wiggins, Resident Inspector
See Service List

cc: Judge Helen F. Hoyt (w/enclosure)
Judge Jerry Harbour (w/enclosure)
Judge Richard F. Cole (w/enclosure)
Troy B. Conner, Jr., Esq. (w/enclosure)
Ann P. Hodgdon, Esq. (w/enclosure)
Mr. Frank R. Romano (w/enclosure)
Mr. Robert L. Anthony (w/enclosure)
Ms. Phyllis Zitzer (w/enclosure)
Charles W. Elliot, Esq. (w/enclosure)
Zori G. Ferkin, Esq. (w/enclosure)
Mr. Thomas Gerusky (w/enclosure)
Director, Penna. Emergency Management Agency (w/enclosure)
Angus R. Love, Esq. (w/enclosure)
David Wersan, Esq. (w/enclosure)
Robert J. Sugarman, Esq. (w/enclosure)
Martha W. Bush, Esq. (w/enclosure)
Spence W. Perry, Esq. (w/enclosure)
Jay M. Gutierrez, Esq. (w/enclosure)
Atomic Safety & Licensing Appeal Board (w/enclosure)
Atomic Safety & Licensing Board Panel (w/enclosure)
Docket & Service Section (w/enclosure)
Mr. James Wiggins (w/enclosure)
Mr. Timothy R. S. Campbell (w/enclosure)

Attachment

Limerick Generating Station
Response to Inspection Report No. 50-352/84-66

Number in the parenthesis refers to the inspection report section identifying the finding.

I. Post Accident Sampling System (PASS) II.B.3

1. PASS procedure does not contain instructions on how to obtain a sample at low power and under small-break or non-break conditions. (5.2.1.1)

Response:

The PASS operating procedure has been revised to require that, under either small or non-break conditions with the reactor at low power, the vessel water level be raised to the level of the moisture separator when this action is not inconsistent with the station emergency procedures. This will ensure a representative liquid sample from the jet pump sample point by causing thermally-induced recirculation flow past the sample tap.

2. PASS procedure contains outdated references to the use of tracer gas in stripping the gas from the large volume coolant sample. (5.2.1.1)

Response:

The requirement for the use of tracer gas has been deleted by virtue of the dissolved gas modification. The procedure has been revised to eliminate the outdated references.

3. PASS procedure contains valve designations which do not reflect existing conditions. (5.2.1.1)

Response:

The procedure has been revised to correct inconsistencies in valve designations and to agree with the labels on the plant control panels.

4. PASS procedure contains purge times that do not meet system requirements. (5.2.1.1)

Response:

The design of each of the PASS liquid sample points has been reviewed and the necessary flush times determined. These flush times reflect the appropriate requirements for purging of the sample lines and also reflect post-LOCA ALARA concerns. These will be incorporated into the PASS operating procedure prior to exceeding 5% power.

5. The dissolved gas portion of the system has been upgraded. However, the operating procedure has not been revised accordingly. (5.2.1.1)

Response:

The PASS operating procedure has been revised to incorporate changes necessitated by the dissolved gas modifications.

6. The volume of the ball valve which isolates the sample has not been empirically determined. (5.2.1.1)

Response:

Limerick preoperational testing and troubleshooting revealed that the ball valve used for obtaining metered small volume samples was of the wrong design. The sample panel was therefore disassembled and the ball valve replaced. Prior to reassembly, the replacement ball valve was confirmed to have the correct volume. Further verification will be provided by the error determination addressed in Item 7 below.

7. The error associated with the dilution of the 0.1 ml sample with 10 ml of demineralized water has not been determined. (5.2.1.1)

Response:

Preoperational testing indicated that there was a problem with the accuracy and repeatability of the small volume sample. Troubleshooting indicated that the problems were due principally to: (1) leakage between the sample needle and its attachment fitting, and (2) small amounts of water adhering to the walls of the 1/8" sample tubing.

The former concern has been rectified by a design change to the sample needles. The latter concern has been resolved by increasing the volume of air injected after the 10 ml of demineralized water. Empirical verification of the 100:1 dilution factor will be completed after 5% power, which we understand was agreeable to the NRC staff at the exit interview on October 26, 1984.

8. During the test, reactor coolant was ejected from the system outside of the sample bottle. This occurred because the sample bottle was improperly aligned in the holder causing depression of the center pin, which incorrectly indicated that the bottle was properly in place. (5.2.1.1)

Response:

This problem occurred because the sample needles were bent and did not align properly with the bottle to pierce the septum. The operating procedure has been revised to require that the operator check the condition of the needles and replace them if they are bent, prior to inserting the sample bottle.

9. Drawing (M-30) indicated that the drywell sampling lines are heat traced. However, it was found that a segment of line leading to the station and inside of the reactor building was not. A design modification has been issued to correct this condition. (5.2.1.2)

Response:

The design modification to install additional heat trace to the PASS sample lines inside of the reactor enclosure has been completed and will be verified

operable prior to exceeding 5% power.

10. The microswitch which indicates that the gas sample bottle is in place was found to be inoperative. (5.2.1.2)

Response:

The gas sample panel has been disassembled, and the actuating lever to the microswitch was found to be out-of-position, apparently due to over insertion of the gas vial positioner. A design change is in progress to prevent a recurrence of this problem. Repairs will be completed prior to exceeding 5% power.

11. The criterion for assuring sonic flow through the critical flow orifice is not correctly stated in the PASS procedure. (5.2.1.2)

Response:

The PASS operating procedure has been revised to correctly indicate the methods for assuring sonic flow through the orifice.

12. Based on the preoperational test results, the integrity of the seal of the iodine filter drawer is not assured when the drawer is fully inserted. The sampling procedure does not alert personnel to this possibility. (5.2.1.2)

Response:

During PASS startup testing, it was found that the seal integrity of the iodine filter drawer was lost if the drawer was overtightened beyond the point of limit switch actuation. A precaution has therefore been inserted into the PASS operating procedure. In addition, a mechanical stop will be installed to the drawer to prevent overtightening, prior to exceeding 5% power.

13. The radiation detector which is provided to measure the radioiodine buildup on the sample filter is

inappropriately located above the last filter in a series of four filters, rather than on the first filter. There were no "O" rings between the iodine filters and on the end of the filter chamber to assure a proper seal, and there were no "O" rings in stock. (5.2.1.2)

Response:

A manufacturing error resulted in the reversal of flow path through the iodine cartridge. Rework of the panel internals has been completed to correct this deficiency. Appropriate "O" rings have been installed and added to the stock of spare parts.

14. The PASS procedure anticipates the flow, as read by the rotometer, is in the expected range of 11.8 to 16.5 SLPM. During the test, the flow rate was 10 SLPM. There are no instructions to direct the technician if the flow is outside of the expected range. (5.2.1.2)

Response:

The expected range of 11.8 to 16.5 SLPM was determined from Peach Bottom experimental data. These flow rates will be site-specific due to the various tubing lengths and flow paths unique to each plant. The only impact that the flow rates have upon PASS is in the establishement of minimum required flush times to assure a representative sample. As noted in the response to Item 4 above, the PASS operating procedure will be revised to incoporate the appropriate flush times.

15. Incorrect flow and pressure units were stated in Appendix 2 of EP-231. (5.2.1.2)

Response:

Appendix 2 of EP-231 (the PASS Emergency Operating Procedure) has been revised to incorporate the correct flow and pressure units.

16. Specify in the FSAR and station procedures the correct range of interest and plans for the use of

the ion chromatograph for on-site chloride analysis. (5.2.2.1)

Response:

Revisions to the station procedures have been completed. Changes to the FSAR regarding the use of ion chromatography for on-site chloride analysis have been drafted and are scheduled to be submitted to the NRC during Spring 1985.

17. Demonstrate on-site chloride analysis using the ion chromatograph. (5.2.2.1)

Response:

On-site chloride analysis capability using the ion chromatograph has been successfully demonstrated. Tests have been performed using the NRC Standard Test Matrix (see August 24, 1982 letter from J. F. Stolz, NRC, to E. G. Bauer, PECo) to verify that none of the expected post-accident chemical constituents will interfere with the results of this analysis.

18. Assure that detailed physical and administrative arrangements exist for the shipment of samples to the off-site laboratory. (5.2.2.1)

Response:

Procedures will be revised to control this activity.

19. Specify the analytical method and the correct lower detection limit in the FSAR and station procedure for boron analysis. (5.2.2.2)

Response:

Revisions to the station procedures have been completed. Changes to the FSAR to allow the use of direct current plasma spectroscopy have been drafted and are scheduled to be submitted to the NRC during Spring 1985.

20. Develop a practical technique for withdrawing the required volume from the sample bottle. (5.2.2.2)

Response:

The problems with extracting 4 ml of a 10 ml sample experienced during the demonstration have been rectified by procuring longer sample needles. These needles allow removal of the full 4 ml aliquot without introducing air into the syringe collection chamber.

21. Demonstrate that elements in the standard test matrix do not significantly interfere with the boron analytical method. (5.2.2.2)

Response:

Appropriate tests have been completed using the NRC standard test matrix (ref. 8/24/82 letter from J. F. Stolz, NRC, to E. G. Bauer, PECo) which verify that none of the expected post-accident chemical constituents will interfere with the boron analysis using the direct current plasma spectrometer.

22. The capability to perform pH analysis was not tested during this inspection.

Response:

The pH instrumentation for PASS has been demonstrated to correctly perform this analysis.

23. Provide assurances that a post-accident mixture of radionuclides can be successfully analyzed using the MCA software. This item will be reviewed after low power testing. (52.2.4)

Response::

Sufficient data are available to confirm the capability to perform a complete radionuclide analysis. The MCA software isotopic libraries have been verified to include the appropriate post-LOCA

radionuclides discussed in LGS FSAR Section 11.5.5.4.3

24. Collect and isotopically analyze PASS samples at a future date, when sufficient activity levels are present. This item will be reviewed after low power testing. (5.2.2.4)

Response:

Samples will be taken after 5% power has been achieved, when sufficient activity levels are present, to demonstrate the representative nature of the samples.

25. Evaluate the use of "break-away" needles to prevent sample loss. (5.2.2.5)

Response:

One-piece needles have been ordered and the use of "break-away" needles will be discontinued upon receipt.

26. An Appendix to the procedure for handling high activity liquid samples (EP-241) incorrectly indicates that a 100:1 dilution factor can be obtained by 9.9 ml of dilution water added to 1 ml of sample. (5.3)

Response:

Procedure EP-241 has been revised to correctly state the quantity of dilution water.

27. The licensee's time and motion studies did not present sufficient detail to document that GDC 19 criteria could be satisfied in the collection and analysis of PASS samples. (5.3)

Response:

A detailed time and motion study has been performed as the basis for the dose analysis presented in LGS

FSAR Table 11.5-6, which demonstrates compliance with GDC 19 criteria. This has been reviewed and approved by the NRC's Office of Nuclear Reactor Regulation. The assumptions, rationale and bases for this study were reviewed during the follow-up inspection.

28. The calibration of the three radiation detectors associated with the PASS system was inadequate, in that:

a. There were no procedures;

b. Following the removal of the detector assembly and associated electronic channel unit for calibration, in-situ voltage checks were not conducted to demonstrate that the voltage had not changed when connected to a different cable and in a different environment; and

c. The voltage settings and pulse width were not specified on the data sheet. (5.3)

Response:

a. The calibration of the subject instruments was in accordance with procedure RT-11-00001. RT-11-00001 is a general procedure which covers calibration of all instruments. Since the subject instruments are neither safety-related nor listed in the Technical Specifications, procedure RT-11-00001 permits the instruments to be calibrated in accordance with manufacturer's instructions. The subject instruments are calibrated in accordance with manufacturer's instructions and a specific procedure was not necessary. The results of each calibration are documented on a calibration data sheet. This data sheet provides sufficient documentation that a quality calibration was performed.

b. In the subject calibration, the detector assembly, the associated electronic channel unit, and cable between the two were removed from the PASS rack and the entire unit was taken to a radiation calibration source for exposure to a known radiation level. The only difference between the calibration

configuration and the in-situ configuration is the source of the line voltage supplied to electronic channel unit. The instrument is designed such that differences in line voltages supplied to the various portions of the plant would have an insignificant effect on the instruments and, therefore, in-situ voltage checks are not necessary.

c. The calibration performed on the subject instruments used a manufacturer's recommended method which doesn't require setting and verifying pulse width and, therefore, pulse width is not required to be documented. This method uses setting of the high voltage and verifying unit responses versus known radiation levels. The high voltage setting is documented on the calibration data sheets.

29. During the test, the procedure was read verbatim to the PASS operator by an assistant. This was time consuming and it would be tiring when they wear respirators. A simplified checklist was not available. (5.3)

Response:

This deficiency will be addressed in the PASS training program of chemistry technicians prior to exceeding 5% power.

30. A pressure indicator (PI-661) performed erratically during the test. (5.3)

Response:

This condition will be corrected prior to exceeding 5% power.

31. A spare parts list had not been developed. (5.3)

Response:

A spare parts list for consumable items (e.g. sample bottles, "O" rings, etc.) has been developed. A spare parts list for hardware has been developed for

the post-accident sampling station and the procurement process initiated to obtain the items.

32. The components associated with the PASS had not been included in a routine maintenance and calibration program. (5.3)

Response:

Components associated with the PASS have been included within the Limerick Computerized History and Maintenance Planning Systems (CHAMPS) data base. The CHAMPS computer program will periodically generate Maintenance Request Forms at the appropriate intervals to perform the required routine maintenance and calibrations in accordance with the proper procedures.

33. Safety glasses were not worn when changing injection needles and lead covers of the sample chamber were stored vertically and could cause personal injury. (5.3)

Response:

Procedure EP-231 has been revised to require the use of safety glasses. The proper handling of the lead covers will be addressed in the training program.

34. Demonstrate operability of PASS jet pump sampling line at system pressure and completed valve modification. (10.1.1)

Response:

A manual needle valve has been installed in the GE-supplied PASS piping rack, upstream of the jet pump sample inlet control solenoid valve. The purpose of this valve is to prevent the closure of the upstream jet pump excess flow check valve due to the sudden flow increase or pressure gradient caused by the opening of the solenoid valve.

The needle valve has been set to provide slightly greater than 1 GPM flow with the vessel at operating pressure, and the handle has been removed to ensure

that the valve is not moved from its set position. Ths valve has been verified to perform its function of allowing 1 GPM sample recirculation flow through the jet pump sample line without precipitating excess flow check valve closure. This item was reviewed during the follow-up inspection.

A deferred design change package has been developed to replace this needle valve with a remote-manually controlled throttling valve, to allow operation of the jet pump sample line over a wider range of reactor pressures than would be permitted with the fixed-position needle valve. This would increase operating flexibility; however, the change is not required by the PASS design basis, since the RHR sample points may be used for primary coolant samples once the reactor is depressurized. This is discussed more fully in FSAR Section 11.5.5.1.1.c. The Project Change Request for this work was reviewed during the follow-up inspection.

35. Provide protection from damage for tubing downstream of air-operated valve HV-199A. (10.1.1)

Response:

Appropriate protection has been installed on the majority of the tubing within the RHR pump room. The balance has been rerouted away from the walkway to avoid the potential for damage.

36. The licensee is required to provide justification for the valves (HV-199A & B) location and data supporting basis for selection of valve for its specified service environment. (10.2.1)

Response:

A material suitability review has been performed for those valves that are not accessible following an accident to ensure that they will not degrade and prevent the PASS from performing its sampling function. The results of this review for HV-199A & B indicated the need for some periodic preventive maintenance. A provision to perform this maintenance will be incorporated into the preventive maintenance program within the next year.

II. Noble Gas Effluent Monitor, Item II.F.1

1. Due to a failed electronic component, the licensee was not capable of demonstrating that sample flow rates could be displayed locally and remotely in the control room. (6.3.1)

Response:

The subject electronic component has been repaired and sample flow rates can be displayed locally and in the control room.

2. The system is not equipped with a background subtract or compensation capability to account for the influence of ambient background on detector response. (6.3.1)

Response:

The system is designed so that the background radiation levels will have an insignificant effect on the instrument reading. The major source of the 3.9 R/hr radiation level in the north stack instrument room under DBA conditions is the shine from the north stack. The release concentration under these DBA conditions is still within the range of the mid-range detector. The area radiation effect on the mid-range detector is similar to the high range detector. The response of 130 CPM, due to the area radiation, is less than 1% of the mid-range detector response to the stack release and is insignificant. The effect of area radiation is expected to also be insignificant at other concentrations; therefore, compensation is not required. In addition, the detector background level can be verified by remotely placing the monitor into purge and observing the count rate due to the area radiation level.

3. Procedures required to operate, maintain and service this instrument should be formalized. (6.3.2)

Response:

Measures are being taken to implement operating procedures in a timely manner. Periodic calibrations and functional test are covered under the surveillance test program. Any service and maintenance required on the WRGM will be covered by the Adminsitrative Procedure for Corrective Maintenance A-26.

4. Control room operators and other potential users of the system should be trained in the use of the instrument. (6.3.2)

Response:

Measures are being taken to train control room operators and other potential users in the use of the instrument to the extent necessary for their position.

5. Procedures to compute and enter WRGM instrument response factors for different isotopic mixtures of noble gases should be developed. (6.3.2)

Response:

Response curves for different isotopic mixtures of noble gases have been developed and will be in incorporated into the appropriate procedures to compute WRGM response.

6. Identify the responsible group for changing the noble gas calibration factor of the WRGM. (6.3.2)

Response:

The Dose Assessment Team Leader will determine the necessity for changing the noble gas calibration factor of the WRGM. The changing of the conversion factors will be coordinated between the Dose Assessment Team Leader and Control Room personnel.

7. Selection of the detector response used to calculate the total effluent release rate should be based on

the dynamic range of the detector and whether isokinetic conditions exist. (6.3.3)

Response:

The detectors on the WRGM are configured such that they monitor noble gas releases. This is consistent with the requirements of NUREG-0737 and Regulatory Guide 1.97. Isokinetic requirements are not applicable to noble gases; therefore, the selection of the detector response used to calculate total noble gas effluent release rate is based only on the dynamic range of the detector.

8. System software, firmware and spare parts lists should be developed to ensure that maintenance will not change instrument response or capability. (6.3.4)

Response

The WRGM is quality assured and is included on LGS Q-List. This ensures that the proper replacement parts are used and that maintenance will not change the instrument's capabilities. In addition, when any maintenance is performed which could affect the response of any radiation monitor, the affected monitor is recalibrated prior to placing it back into service. Changes to the software requires the use of a supervisory key and is controlled by an administrative procedure which must first be approved by the Plant Operations Review Committee.

III. Iodine/Particulate Effluent Monitoring, Item II.F.1-2

1. The licensee could not demonstrate the ability to measure sample flow using mass flow techniques due to electronic component failures. This item needs to be repaired and the system retested. (7.3.1)

Response:

The failed electronic component has been repaired and the applicable portion of the system has been retested. Sample flow rate can be displayed locally

and in the control room.

2. Documentation for surveillance test procedures should be finalized and implemented. (7.3.2)

Response:

A routine procedure has been implemented to periodically change out the iodine cartridge and particulate filter. Additionally, the removal and transport of the cartridge/filter under accident conditions is demonstrated during the annual emergency exercise.

3. Documentation for EP-237, "Obtaining the Iodine/Particulate and/or Gas Samples from the North Vent Wide Range Gas Monitor (WRGM)", should be expanded to include the use of the mid/high range grab sample cartridge, shield and crane mechanism. Technicians should be trained on this revised procedure. (7.3.2)

Response:

Procedure EP-237, "Obtaining the Iodine/Particulate and/or Gas Samples from the Wide Range Gas Monitor (WRGM)", has been revised to include the use of the mid/high range grab sample cartridge. The technicians are in the process of being trained on this procedure and in the use of the shield and crane mechanism for the various access routes.

4. The choice of grab sample collection point should be based on the capability of the sample line to provide a representative sample (i.e. isokinetic sampling must exist). Therefore, the choice of the grab sample collection point should be based on the north stack flow rate and the isokinetic properties of each sample line relative to that flow rate. The choice should not be made exclusively on airborne concentration. (7.3.3)

Response:

The WRGM sampling procedure (EP-237) has been revised to include provisions for the evaluation of the representativeness of the samples. If the sample stream is determined not to be representative, alternative sampling actions will be considered.

IV. In-Plant Iodine Instrumentation, Item III.D.3.3

1. Develop and implement a procedure for performing in-plant analysis of radioiodine sampling cartridges, including the provision for a post-sample purge of the cartridge prior to counting. (9.3)

Response:

A procedure will be implemented that satisfies the recommendation prior to exceeding 5% power.

2. Both technical support center and the operations support center do not have the capabilities of supplying backup power to key portable monitoring instrumentation in the event of a loss of off-site power. Evaluate the need for dedicated outlets from the diesel generator bus that could be used in both of these areas to ensure adequate sampling capabilities. (9.4)

Response:

The reliability of electrical power to key portable monitoring instrumentation in both the TSC and OSC is enhanced by the presence of two off-site power sources. This design feature results in a power unavailability factor of approximately 0.01 which is per the guidance of NUREG-0696, Functional Criteria for Emergency Response Facilities. Considering the reliability of the current power supply, dedicated outlets from the diesel generator bus are not necessary.