

PHILADELPHIA ELECTRIC COMPANY

NUCLEAR GROUP HEADQUARTERS

955-65 CHESTERBROOK BLVD.

WAYNE, PA 19087-5691

(215) 640-6000

February 15, 1990

Docket No. 50-353

License No. NPF-85

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555

SUBJECT: Limerick Generating Station, Unit 2
Safety Parameter Display System
Results of Field Verification Testing
and Operational Status

Dear Sir:

By letter dated December 5, 1988, Philadelphia Electric Company (PECo) requested that Limerick Generating Station (LGS), Unit 2 be allowed to complete Safety Parameter Display System (SPDS) verification testing during the Power Ascension Test Program and initially declare the LGS Unit 2 SPDS operational within 30 days after completion of the LGS Unit 2 100-Hour Warranty Run. In that letter, PECo also committed to provide the NRC with a report summarizing the problems encountered, if any, during the verification testing, the solutions implemented to make the SPDS operational, and the results of the field verification tests within 30 days after declaring the LGS Unit 2 SPDS operational. The NRC found this schedule acceptable as stated in Section 18.2.2 of NUREG-0991 (the LGS Safety Evaluation Report), Supplement No. 8 (SSER-8) dated June 1989. However, the same paragraph of SSER-8 later indicates that the NRC expects PECo to submit the report within 30 days after completion of the 100-Hour Warranty Run. We understand that PECo's commitment is to submit the SPDS report within 30 days after the LGS Unit 2 SPDS is declared operational. Submittal of the attached report satisfies this commitment.

The validation process for the LGS Unit 2 SPDS has been completed successfully. The attached report outlines the field verification test program for the Unit 2 SPDS and indicates that no significant problems were encountered with the SPDS during LGS Unit 2 power ascension testing. The 100-Hour Warranty Run for LGS Unit 2 was completed on January 6, 1990, and as a result of the successful validation testing, the LGS Unit 2 SPDS was declared operational and released to the operations personnel for their use on January 16, 1990.

Additionally, Section 18.2.2 of NUREG-0991, Supplement No. 8 states that PECo is required to certify to the NRC the status of the SPDS for LGS Unit

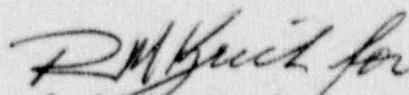
90022601B1 900215
PDR ADOCK 05000353
P PNU

A003
11

2 in accordance with Generic Letter 89-06, "Task Action Plan Item I.D.2 - Safety Parameter Display System," dated April 12, 1989. By letter dated July 11, 1989, PECO responded to GL 89-06 indicating at that time that LGS Unit 2 was involved in the startup testing program and committed that the LGS Unit 2 SPDS would meet the requirements of NUREG-0737, Supplement 1, "Requirements for Emergency Response Capability," taking into account the guidance provided in NUREG-1342, "A Status Report Regarding Industry Implementation of Safety Parameter Display Systems," when it is declared operational. This letter verifies that the SPDS, in accordance with GL 89-06, meets the requirements of NUREG-0737, Supplement 1 taking into account the guidance provided in NUREG-1342.

If you have any questions, please do not hesitate to contact us.

Very truly yours,



G. A. Hunger, Jr.
Director
Licensing Section
Nuclear Services Department

Attachment

cc: W. T. Russell, Administrator, Region I, USNRC
T. J. Kenny, USNRC Senior Resident Inspector, LGS

ATTACHMENT A

RESULTS OF THE FIELD VERIFICATION TESTING

OF THE

LIMERICK GENERATING STATION UNIT 2

SAFETY PARAMETER DISPLAY SYSTEM

1.0 SCOPE

This report documents the results of field verification testing of the Limerick Generating Station (LGS) Unit 2 Safety Parameter Display System (SPDS). A summary of SPDS related problems encountered during LGS Unit 2 power ascension testing and the resolutions implemented is also provided.

2.0 BACKGROUND

The LGS Unit 2 Safety Parameter Display System was purchased from the General Electric Company (GE) by the Philadelphia Electric Company (PECO). The system is essentially identical to the GESSAR II Safety Parameter Display System¹. In 1984, the Nuclear Regulatory Commission (NRC) audited and reviewed the GESSAR II SPDS and concluded that the design was acceptable². The NRC also concluded that utility applicants who reference the GESSAR II SPDS must complete plant specific validation programs and report the results of those programs to NRC staff.

3.0 FIELD VERIFICATION TEST PROGRAM

The objectives of the LGS Unit 2 SPDS field verification testing were:

- 1) to verify proper installation and configuration of the system, and
- 2) to verify that the system would function as designed in the plant environment.

These objectives were accomplished during the Preoperational and Power Ascension Test phases of the LGS Unit 2 Startup Test Program. Section 6.0 provides a listing of SPDS test procedures. The results are summarized below.

3.1 Component Technical Testing, (Preoperational Test Phase)

The individual components within the scope of the SPDS were inspected, tested, and adjusted in accordance with the LGS Unit 2 Startup Technical Program. Correct component installation, configuration and operation were verified.

3.2 System Integration Testing, (Preoperational Test Phase)

System Integration Testing successfully verified that the entire SPDS met its functional, performance, and interface design requirements. The results of this testing

were used to generate system problem reports (SPR) which were transmitted to GE for resolution. Any SPR resolution which resulted in a change to the system required subsequent reperformance of all related/affected integration test procedure sections. This process was repeated several times until all SPDS problems were resolved.

3.3 Simulated Signal Testing, (Preoperational Test Phase)

Simulated Signal Testing verified that the SPDS correctly responds to abnormal plant operating conditions. Input values which simulated emergency conditions were provided to the SPDS. The SPDS response was then verified against its design specifications.

3.4 System Acceptance Testing, (Preoperational Test Phase)

System Acceptance Testing verified correct physical termination and calibration of field inputs to the SPDS. Each plant input to the SPDS was loop checked and the input point database was verified and validated. After completion of this testing, all subsequent input calibrations and point database changes were controlled and documented by plant procedures to ensure the continued validity of the database and to provide a high level of confidence in the information being processed and displayed by the SPDS.

3.5 Hot Functional Testing, (Power Ascension Test Phase)

Hot Functional Testing was performed at various plant power levels during the LGS Unit 2 power ascension testing. Validation of the SPDS was performed under cold shutdown, heat-up, low pressure, IRM / APRM overlap , and rated conditions. For each condition, the SPDS displayed parameters were compared with other plant indicators for accuracy and consistency. The algorithms used by SPDS to calculate and display parameters and flags were verified. In addition, plant specific constants used in the SPDS were calculated, verified, and entered into the database under site procedural control.

4.0 PROBLEM SUMMARY

Problems encountered during LGS Unit 2 power ascension testing were minimal. This can be attributed to a number of factors:

- 1) the experience gained by GE and PECO in implementing the SPDS on Limerick Unit 1,
- 2) the experience gained by GE in implementing similar SPDS's at other plants,
- 3) the similarity of the Unit 1 and Unit 2 systems,

- 4) the maturity of the GE SPDS product, and
- 5) the quality and quantity of testing performed during the preoperational test phase.

A small number of equipment failures did occur during power ascension testing. These failures were anticipated, and were quickly resolved under existing plant procedures.

During STP 31.1, "Loss of Turbine-Generator and Offsite Power," a disturbance on the non-safeguard 125 VDC bus caused several data acquisition system (DAS) power supplies to shutdown and restart (i.e. ,cycle). The power supplies cycled as designed to protect downstream DAS input modules from damage. This only resulted in a temporary loss of data to the SPDS since the power supplies returned to normal automatically within several seconds. The actual data loss for any single input was of a short duration (5 to 90 seconds). The DAS power supplies fed from safeguard 125 VDC buses, the computer system, and operator display stations were not affected by the disturbance on the non-safeguard 125 VDC bus. Since the temporary loss of data from such a disturbance is of a short duration, this would have a negligible effect upon overall SPDS availability and operability.

5.0 CONCLUSION

The SPDS field verification testing demonstrated that the LGS Unit 2 SPDS was properly installed, is correctly configured, and will perform in the plant environment as designed. The test results have been reviewed, approved, and accepted by the plant. Documented test results are on file for review. In summary, the LGS Unit 2 SPDS was successfully field tested and will perform its intended function with a high degree of accuracy and reliability and is considered operable.

6.0 SPDS TEST PROCEDURES

2A-31.1A Acceptance Test Procedure, Plant Monitoring System, Functional Testing.

2A-31.1C Acceptance Test Procedure, Plant Monitoring System, Input/Output Point Test.

C95-00125-TRVZ General Electric Company, Field Disposition Instructions, Site Integration Test Procedure.

Limerick Unit 2 Plant Monitoring System, Simulated Signal Test Document.

2HF-050 Hot Functional Test Program, Plant Monitoring System, Plant Variable Display Test.

2HF-051 Hot Functional Test Program, Plant Monitoring System, Regulatory Guide 1.97, Reasonableness Test.

1 General Electric, Licensing Topical Report for the General Electric Emergency Response Information System:

NEDE-30284-P, November 1983.

2 U.S. Nuclear Regulatory Commission, Safety Evaluation Report Related to the Final Design Approval of the GESSAR II BWR/6 Nuclear Island Design, NUREG-0979, Supplement No. 4, July 1984