U.S. NUCLEAR REGULATORY COMMISSION REGION I

Report Nos.	50-352/90-22 50-353/90-21	
Docket Nos.	50-352 50-353	
License Nos.	NPF-39 NPF-83	
Licensee:	Philadelphia Electric Company P.O. Box A Sanatoga, Pennsylvania 19464	
Facility Name	: Limerick Generating Station, Units 1&2	
Inspection At	: Sanatoga, Pennsylvania	
Inspection Co	nducted: September 12-19, 1990	9-22-40
inspectors.	J. Canrasco, Reactor Engineer, Materials and Processes Section, EB, DRS	date
	A. Löhmeier, Reactor Engineer, Materials and Processes Section, EB, DRS	<u>10-10-90</u> date 90
	R. McBrearty, Reactor Engineer, Materials and Processes Section, EB, DRS	10/18/90 date
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Approved by:

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H. Gray, Chief, Materials and Processes Section, Engineering Branch, DRS

Inspection Summary: Inspection on September 12-19, 1990 (combined Report Nos. 50-352/90-22 and 50-353/90-21.

10/18/90

date

<u>Areas Inspected</u>: Routine inspection to review the licensee's engineering organization, staffing, communications, management support, design changes and modification process. Also included in the scope of this inspection was 10CFR Part 21 process and Inservice Inspection (ISI).

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DETAIL

1.0 Persons Contacted

Philadelphia Electric Power Corporation

* W. W. Bowers	Manager of Electrical Systems Section
W. J. Boyer	Manager of Electrical Plant
* F. A. Cook	Manager of Site Engineering
W. J. Coyle	Manager of Engineering Programs
* J. J. Gyrath	Branch Head Engineering Assurance
* R. R. Hess	Manager of Mechanical Systems Section
K. Knaide	Maintenance I&C Engineer
* D. B. Neff	Licensing Engineer
* L. B. Pyrih	Manager of Nuclear Engineering
D. Schmidt	Maintenance Programs
T. Sher	Maintenance - I&C
* H. W. Vollmer	Manager of Civil/Mechanical Section

United States Nuclear Regulatory Commission

* T. Kenny

Senior Resident Inspector

2.0 Purpose

The purpose of this inspection was to assess the adequacy of the licensee's program for engineering and technical support of the plant operations including management support, interfaces with other internal and external organizations, staffing levels, experience and training of the engineering staff engaged in safety related work. This inspection included control of design, design changes, plant modifications, reporting of defects and noncompliance (IOCFR Part 21), and Inservice inspection (ISI).

3.0 Engineering Organization (40703) (37700)

Engineering and technical support for Limerick units 1 and 2 are provided by two engineering organizations, the onsite system engineering and the offsite corporate engineering group.

3.1 On-site Engineering Organization

Limerick Generating Station (LGS)'s site engineering consist of a branch head, two working leads (mechanical and electrical), and eight engineers. This LGS site engineering is responsible for LGS units 1 & 2, with the following breakdown:

The mechanical group is composed of one mechanical and one civil/piping engineer per unit. The electrical group is composed of three electrical and one control/systems engineers for the two units. The eight engineers, including their leads, hold a minimum of a bachelor's degree in their respective specialty, five hold professional engineering (PE) licenses, and four have master's degrees. LGS site engineering is responsible for the following work: Engineering Work Request (EWR) responses, Non-Conformance report (NCR) dispositions, small and interim modification packages, conversion from temporary to permanent modifications, and response to verbal requests from the plant.

3.2 Off-site Engineering Organization

The primary corporate engineering support for Limerick 1 is located within short commuting distance from the Limerick station. This engineering organization is known as Nuclear Engineering Division (NED). NED is supplemented by engineering contractor personnel for engineering tasks.

The NED is responsible for providing engineering services and technical support for plant operations which are not performed by the on-site engineering group (e.g. major engineering modifications, special studies and engineering programs and standards) for Limerick and Peach Bottom nuclear stations.

The NED organization is divided into six functional areas under the direction of a manager who is accountable to the Vice-President of Nuclear Engineering and Services. Each functional area constitutes a section, and each section is headed by a section manager. They interact with each other as a task force to the extent necessary to resolve complex engineering tasks, such as those involving multi-disciplines (e.g. major engineering modification). Their responsibilities are as follows:

3.2.1 Civil/Mechanical Plant

This section is responsible for providing engineering and design services in the areas of piping engineering, piping design, site/building facilities engineering, structural engineering and facilities structural design.

3.2.2 Mechanical Systems

This section is responsible for providing system support in the areas of mechanical balance of plant (BOP) systems, mechanical system design, mechanical-nuclear steam supply systems, mechanical turbine heat cycle systems; heating, ventilation and air conditioning (HVAC); fire protection, mechanical equipment and metallurgy.

3.2.3 Electrical Plant

This section is responsible for providing engineering and design services in the areas of power engineering, electrical plant design, physical design, electrical equipment and instrumentation.

3.2.4 Electrical Systems

This section is responsible for providing system support in the areas of electrical BOP systems, electrical system design, electrical-nuclear steam supply systems, and electrical-turbine heat cycle systems.

3.2.5 Engineering Programs and Standards

This section is responsible for providing services in the areas of engineering assurance, process and procedures, configuration baseline, reliability and risk assessment, and equipment qualification.

3.2.6 Site Engineering Coordinator

This section is the link between the sites (Limerick and Peach Bottom) and the NED and consists of only one manager located in the corporate office, and one manager for each site (Limerick and Peach Bottom).

The entire NED which consists of 119 Bachelors of Science in their respective specialties, 52 hold PE licenses, 39 passed the EIT. 27 with Master degrees, and 8 obtained MBA degrees. NED uses supplementary engineering support from an engineering contractor for Limerick on an as-needed basis.

4.0 Findings

The inspector has identified several positive factors as follows:

The licensee's corporate and NED management have a proper perception of the present nuclear electric power market and its demand for excellent engineering services. Their mission is clearly stated in the nuclear policy manual as follows: "To provide timely, cost effective and quality engineering in support of safe, reliable and economic generation of electricity".

NED's first line supervisors are encouraged to practice "management by walking around". To implement this management philosophy, the NED and LGS system engineers are required to perform system walkdowns on a quarterly basis. Also, supervisors are encouraged to expend a significant portion of their time on the engineering floor solving engineering problems, and providing engineering guidance.

NED is composed of a motivated and highly qualified engineering staff, capable of producing effective and efficient engineering services in support of the ongoing design modification and engineering activities at the power generation sites.

NED has a well established goal to enhance their technical and administrative capabilities by hiring a highly qualified engineering force to reduce their dependency on outside architect/engineering (A/E) firms. The goal for the NED is to limit the use of A/Es and other consultants to 25% of the total engineering work.

5.0 Engineering Modification Process and Implementation

Presently, engineering changes to the plant and/or procedures affecting any structure, system or component are controlled through NED's procedures and the Limerick and Peach Bottom station procedures.

Proposed design changes or modifications to the plants are evaluated in accordance with NED procedures 3.1 entitled "Procedure for Handling Modifications," 3.3 entitled "Procedure for performance of 10CFR 50.59 Reviews...," and 3.4 "Procedure for Design Control." These procedures provide the guidelines and requirements for the preparation of the design input and design output documents, including the guidelines for the preparation of the 10CFR 50.59 reviews.

Several other procedures are used during the modification process. For example, procedure 3.6 gives outlines for preparation, review, and as-build dimensioning of engineering drawings, and procedure 3.8 controls the Engineering Review Request Forms (ERRF's).

The inspector found these procedures acceptable and will adequately support the modification process.

Once a modification is approved for implementation by the station modification management group's (SMMG) initial screening process, a project manager is named. The modification team is formed along with the responsible engineer. The modification team is led by a modification project manager who is the only one responsible for the implementation of the modification. He leads and directs the modification team from assembly of the package to its closeout.

The inspector selected two modifications: modification 6101 which is the replacement and modification of the Main Safety Relief Valve (MSRV) and modification 5658 which is the Residual Heat Removal (RHR) head spray deletion.

For the purpose of this inspection, the inspector focused on the following attributes:

- Organization to support and implement the modification.
- Delegation of responsibilities.
- Inter-discipline interaction.
- General assessment of the technical adequacy of the modifications.

To assess the last attribute the inspector visited the Bechtel office at Pottstown. At this location, the inspector reviewed their engineering records, and conducted several interviews with the engineering personnel responsible for modifications. In addition, the inspector interviewed document control personnel engaged in the update of the engineering documentation and drawings associated with the modification process. Bechtel has transferred all their design documentation for the Limerick Plants from their San Francisco office to their Pottstown office. This transfer of documentation is intended to provide a better service to the licensee.

In general, the communication among organizations and disciplines is generally effective and the modification process efficient. Nevertheless, the inspector found that the NCR's, corrective action requests (CARs) and other work request are not formally prioritized, adding unneeded time to the process. Also the drawing update process is not prioritized. However, the licensee indicated an intention to develop a new method to classify the drawings and to establish priority for their update.

In response to the concerns regarding the quality of the NCR responses from engineering, licensee has developed specific quality expectations for the disposition of NCRs. The inspector was informed that an NCR workshop was held on July 19, 1990 for engineering Branch Heads to discuss the expectations and review examples of NCR dispositions completed in the past. Based on recommendations made at the workshop, the NCR procedure is being revised.

In addition, the licensee has created an engineering quality assurance task force to define the conduct of engineering quality assurance activities in the division. The members consulted with other nuclear utilities and INPO in addition to seeking guidance within PECo. The task force recommended the establishment of (1) Design Review Board, (2) technical audits of design output documents, and (3) the analysis and trending of quality indicators such as ERRFs, NCRs, and SEs.

These recommendations were approved by the licensee's management and are being implemented.

6.0 Conclusion

Based on the above, the inspector determined that the licensee's nuclear engineering division is organized to provide adequate engineering services to the plant. In addition, the licensee is taking the proper steps to improve and enhance performance in several areas of engineering related activities.

7.0 Assessment of 10 CFR Part 21 Compliance (36100)

7.1 Scope of Inspection

The inspectors met with members of both Materials Management Section (MMS) and Licensing Section (LS) to ascertain the establishment and implementation of procedures and controls insuring the reporting of defects and noncompliances in accordance with the 10 CFR 21 requirements.

The inspection focused on the MMS responsibility in procurement of basic components and evaluation of these components for defects and non-compliances utilizing the resources of Nuclear Engineering Division (NED) in the evaluation. A system of reporting defects and non-conformance by the vendor to the licensee's responsible individual was reviewed, including licensee reporting to the NRC.

7.2 Procurement Procedures

The licensee, in a response to NRC Generic Letter 89-02, stated that MMS, through its Procurement Engineering Group (PEG), provides for administrative procedures that control procurement and processing of basic components for the Limerick Generating Station (LGS). There are procedures for engineering evaluations and dedication activities that allow the licensee to use commercial grade products in safety related work. These procedures and evaluations define and ascertain critical characteristics of safety related items.

NED provides an evaluation process which includes a safety classification, procurement level, procurement requirements, critical characteristic definition, commercial grade item evaluation, determination of dedication method and acceptance criteria, receipt inspection and storage shelflife testing. Through this evaluation process, the licensee believes it will preclude acceptance of safety related items that deviate from the defined critical characteristics for acceptance. The Material Section Procedures issued by PEG prohibit the acceptance of safety related items by verification of part number only. NUMARC initiatives have been applied to identify fraudulent parts. More specifically, PECo has implemented a screening test to assist in detecting fraudulent items.

Consistent with 10 CFR 21 requirements, the licensee indicated the posting of 10 CFR 21 requirements in a prominent location near the entrance security location. Furthermore, each procurement document for safety related items contains a notification as is required by the Federal Regulation 10 CFR Part 21. In this notification, specific instructions are given for prompt reporting to PECo of any defects or noncompliances that must be reported to the Nuclear Regulatory Commission.

7.3 Procurement Engineering Evaluation

The inspectors reviewed several Procurement Engineering Evaluation Dockets in verification of the procedure for acceptance of safety related items. The dockets provide a Procurement Classification Worksheet and include item identification, references, equipment qualification, safety classification, special requirements, procurement level, critical characteristics, verification method, procurement codes, post installation testing, storage requirements, preventive maintenance requirements, and shelf life determination. A critical characteristics verification plan is included in the docket. Dockets reviewed include the following:

- (1) UNISTRUT Channel (reference 112-54278)
- (2) Wedge Anchors (reference 114-94599)
- (3) Non-Time Delay Fuses (reference 114-94068)
- (4) Vacuum Relief Valve for MSRN Discharge (reference 114-76602)

The licensee provided for review by the inspectors a copy of the User Test Specification for Q-Listed Bolt Miterials. This specification provides Requirements and Acceptance Critinia for Testing. It also provides a Final Disposition and Documentation Procedures for Q-listed fastener materials purchased to a specific materia' specification for the use at PETO Nuclear Facilities.

The inspectors reviewed the "Procedure for Dedication of Commercial Grade Items for use in Safety Related Applications" (NEDP 4.10 Revision 1). This procedure provides for methods for NED personnel to evaluate, select, accept and utilize commercial grade items for safety-related applications at LGS. General Project Requirements for Evaluation and Purchase of Commercial Grade Items for Safety Related Applications were shown to the inspectors in Specification No. 8031-G-29, Revision 4.

An example of Quality Assurance of Received items was provided by the licensee for inspection. For Purchase Order No. LS626754, a sample UNISTRUT channel was given to the metallurgical laboratory for dimensional and material composition verification. The Certified Material Test Reports Coil numbers were checked against the received material coil number to verify identity. Finally, a shear test was performed on resistance welds to verify the material ultimate strength. All documents related to this testing were provided to the inspectors for review and found to be consistent with good practice in documentation and traceability.

Another example of critical characteristics verification was provided to the inspectors for inspection by the licensee. The received items were wedge anchors (P.O. LS628177). The critical characteristic of these tests indicated that the material did not meet the shear strength minimum required value. A non-conformance report No. L90-160 was initiated followed by engineering calculations. These calculations showed that the material strength, although below the required level, did meet the engineering strength levels required. Complete documentation of this issue has been given the inspectors for their review and found to be consistent with good documentation and traceability.

7.4 Reportability Under 10 CFR 21

The licensee provided for inspection a letter of 28 March 1989 (Docket No. 50-352, License No. NPF-39) to the Director, ONRR, USNRC, from the Vice President of LPG in which deficiencies related to control circuit boards were reported by the responsible officer to the Commission in a manner consistent with the requirements of 10 CFR 21. The letter reported

the background, the specific identification of the individuals involved in the issue, the component failure, the nature of defect and the safety hazard. This letter also includes the number of components in use at the facility, the corrective actions taken and the advice given to purchasers or licensees.

7.5 Fraudulent Material Supply

The licensee discussed issues of non-conforming materials supply, including those of NCR Bulletin 88-05, and the awareness and response of PECo to the recommended actions to improve the detection of counterfeit and fraudulently marketed products described in NRC Generic Letter 89-02. PECo, in its procurement and dedication programs, provides three characteristics for effective procurement and dedication programs; these are: involvement of engineering in the procurement and product acceptance process, effective source/receipt/testing programs, and thorough engineering based commercial material dedication programs.

7.6 Conclusions

The licensee Materials Management Section has a comprehensive procurement program in place which utilizes a close interface with the Nuclear Engineering Division to provide for an effective oversight of the materials utilized at Limerick Generating Station. The quality verification documentation, traceability and reporting procedures were consistent with the requirements of 10 CFR 21.

8.0 Licensee Actions On Previous Inspection Findings (92701)

(Closed) Unresolved item 50-353/89-04-01: NDE personnel SNT-TC-1A qualification/certification specific examinations administered as "open book" examinations. Written qualification/certification examinations administered by the General Electric Company to G.E. NDE personnel who performed ASME Section XI nondestructive examinations at the Limerick site were identified by the examination cover page as being "open book." Additionally, the specific examinations were not based on the specific codes and standards applicable to the site.

The licensee and the General Electric Company submitted to the SNT-TC-1A Interpretations Panel questions which were considered to be appropriate to obtain resolution of the NRC concerns. SNT-TC-1A is the document which governs the qualification/certification of NDE personnel. The Interpretation Panel's response to the questions confirmed that the examinations should be "closed book", and further, that the specific examination should be based on the Codes and Standards applicable to a particular site.

Subsequent to the Interpretation Panel's issuance on October 20, 1989 of its response to the submitted questions the licensee performed Quality Assurance Audit No. VA90-05 of the General Electric Company's performance in supplying contract maintenance activities and nondestructive examination services. The audit was performed on March 28-30, 1990, and April 2, 1990 at the General Electric Company's office at King of Prussia, Pa and at the G. E. Technical Service Center at Devon, Pa. The licensee's audit team determined that the General Electric program for the qualification and certification of NDE personnel complies with the requirements of SNT-TC-1A.

Based on the above, this item is closed.

8.1 Inservice Inspection Activities (73753)

The licensee's ISI plan and outage schedule of examinations was selected for inspection to determine that planned examination items are scheduled for examination during the outage. Additionally, an ISI ALARA planning session for contractor personnel was attended to determine the depth of planning and the guidance provided to the contractor personnel responsible for performing examinations at the plant.

The inservice examination plan was inspected with regard to work scheduled for completion during the outage. Planned examinations of Class 1 components in the core spray system, reactor core isolation cooling system and reactor recirculation system were compared to the Class 1 components in those systems which were scheduled for examination.

The inspector found that all of the planned items in the reviewed systems were incorporated into the list of items scheduled for examination during the outage.

Visual examination of reactor internals are planned to be performed remotely using an underwater video camera. Among those items are the steam dryer drain channel welds which are the subject of the General Electric Company SIL No. 474 entitled "Steam Dryer Drain Channel Cracking" that was issued to alert BWR owners of cracking in the welds that attach the drain channels to the steam dryer skirt and in the dryer skirt base material. A visual examination was recommended to determine whether cracks were present. The licensee planned to perform a VI-3 examination of the components which is the routine examination for the internals. After discussions with the inspector the licensee decided to perform a VT-1 examination of the SIL items. The ASME Code Section XI defines VT-1 as the visual examination of choice for finding cracks visually. Although VT-1 is not required by the Code in the case of the SIL items, the licensee made the decision in the interest of assessing, to the greatest extent possible, the condition of the components. Additionally, the licensee has purchased improved equipment for the performance of the visual examinations, and it plans to provide increased supervision of the contractor personnel who are responsible for performing the examinations.

An ALARA briefing was held to provide guidance to contractor ISI personnel and to the personnel responsible for performing the ultrasonic examination of the N2H nozzle. The inspector found that recent radiation surveys of the work areas were available and were discussed with the attendees. The required protective clothing was identified as were the precautions to be observed when in the work areas. Entrance and exit procedures were developed to preclude the spread of contamination and were thoroughly discussed.

No violations were identified.

8.2 Ultrasonic Examination of Recirculation System Nozzle N2H (73753)

During the 2nd refueling outage in the Spring of 1989, the General Electric Company performed an ultrasonic examination of the Limerick Unit 1 recirculation system N2H inlet nozzle to safe end weld. The examination was performed using the General Electric automated "SMART-UT" system and disclosed indications of a reflector which was determined to require monitoring during subsequent refueling outages. The licensee requested that General Electric retain, to the greatest extent possible, the examination equipment for use during subsequent examinations.

The inspector observed a portion of the 45° refracted longitudinal wave examination currently being performed to determine how closely the 1989 examinations are duplicated, and that the examiners are qualified to perform their assigned responsibilities. Additional examinations using 45° shear wave and 60° refracted longitudinal are scheduled subsequent to completion of the 45° RL scans.

The General Electric examiners performing the weld examination are listed on the latest EPRI Registry of Qualified Personnel for the Detection of IGSCC. Flaw sizing will be performed by the G. E. Level III who is responsible for data interpretation and evaluation and who also is listed on the EPRI registry for detection and sizing of IGSCC. Examination calibration data from 1989 are saved on computer discs which permit exact duplication of the appropriate parameters for the current examinations. The data interpreter is the same individual who performed that function in 1989 and who, this year, will be assisted by a representative of the EPRI NDE Center at Charlotte, North Carolina. Also, in response to the licensee's request, the General Electric Company has provided the same examination equipment as was used for the original examinations in 1989.

8.3 Conclusions

The ultrasonic examinations in progress on the N2H nozzle to safe end weld at Limerick Unit 1, represent the state of the art capability regarding techniques and equipment. The licensee has taken the appropriate steps to duplicate the examinations which originally detected the questioned reflector, and to assess the present condition of the weld and its acceptability for continued service. Additionally, contingency plans are established in the event the condition of the weld is found to have deteriorated during the last operating cycle [Mechanical Stress Improvement Process (MSIP) or repair by weld overlay].

9.0 Exit Meeting

The inspectors met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on September 19, 1990. The inspectors summarized the scope and findings of the inspection.

At no time during the inspection was written material provided by the inspectors to the licensee. The licensee did not indicate that proprietary information was involved within the scope of this inspection.