U.S. NUCLEAR REGULATORY COMMISSION
REGION I

REPORT/DOCKET NOS.	50-352/94-05 50-353/94-05
FACILITY LICENSE NO.	NPF-39 NPF-85
LICENSEE:	PECo Energy
FACILITY:	Limerick Generating Station, Units 1 and 2
INSPECTION AT:	Limerick, Pennsylvania
INSPECTION DATES:	February 7 - 12, 1994 and February 28 - March 4, 1994

INSPECTOR: Cheryl D. Beardslee 4/11/94
C. D. Beardslee, Reactor Engineer — Date
Materials Section, EB, DRS

APPROVED BY: Herbert C. Modes 4/11/94
M. C. Modes, Chief, Materials Section — Date
Engineering Branch, DRS

Areas Inspected: An announced safety inspection was conducted of inservice inspection activities including review of data associated with the ultrasonic examination of reactor pressure vessel shell welds. Additionally, the licensee's oversight activities of the full service inservice inspection (ISI) vendor were reviewed and non-destructive examination activities performed by the vendor were observed.

Results: Overall, the inservice inspection program was found to be good and the implementation of the program adequate. No major areas of concern were identified, and the inspector concluded that in the areas inspected, the ISI program met Nuclear Regulatory Commission and American Society of Mechanical Engineers Code requirements, with the exception of one unresolved item.

The unresolved item involved differences in calibration block thickness and actual pipe wall thickness and the effect these differences may have on the sensitivity of the examination. This is discussed in paragraph 3.3 of this report.

DETAILS

1.0 INTRODUCTION/SCOPE

The purpose of the inspection was to review the Inservice Inspection (ISI) program and the implementation of the ISI program in order to assess the plants' acceptability for continued safe operation and to determine whether it meets United States Nuclear Regulatory Commission (NRC) and American Society for Mechanical Engineers (ASME) Code requirements.

2.0 ISI PROGRAM (IP 73753)

The Code of Federal Regulations (CFR), 10 CFR 50.55a, requires that inservice inspections be performed on systems and components which are needed for safe operation and shutdown of the nuclear facility, to assure that they will operate when called upon. Specific inspection requirements regarding methodology and frequency are contained in ASME Code Section XI.

The Limerick Generating Station (LGS) Unit 1 facility is in its first 10-year inspection interval, which commenced on February 1, 1986. The ISI program was updated at the end of the third refueling outage, from the ASME Section XI, 1980 edition through Winter 1981 addenda, to the 1986 edition with no addenda. The outage in progress at the time of this inspection, the fifth refueling outage, is the first outage of the third period of the interval.

2.1 Control of Changes Made to the ISI Program

The ISI Program at LGS is a unit specific document which addresses overall ISI requirements including any augmented requirements, during a ten year interval. ISI Tables are part of the ISI Program and provide a detailed list of the total population of components which are potentially subject to examination during the ten year interval. The tables provide the primary basis for development of the ISI Implementing Plan, which identifies the specific components actually selected for examination, and the refueling outage/fuel cycle during which the examination will be performed. Prior to performing any ISI examinations, an ISI Outage Plan must be created. The Outage Plan identifies the components which will be examined during a particular refueling outage/fuel cycle.

Site Engineering has responsibility for creating and revising both the ISI Implementing Plan and Outage Plan. Any changes made to the ISI Program, as a result of components selection changes or component additions, are required to be documented on a log sheet and kept with the ISI Outage Plan hard copy. These requirements are delineated in procedure A-80, Revision 6, "Inservice Inspection," dated January 14, 1994. During the current refueling outage, a number of plant modifications created numerous welds which had to be added to the ISI Program. The inspector verified that these additions were documented on an Outage Plan Update Log. In addition, the inspector verified that the Authorized Nuclear Inservice Inspector (ANII) had reviewed and approved these changes.

2.2 Reactor Pressure Vessel (RPV) Shell Welds Augmented Inspection

The 1993 CFR [10 CFR 50.55a(g)(6)(ii)(A)] revoked all previously granted ASME Section XI reliefs for the volumetric examination of RPV shell welds specified in Table IWB-2500-1, Category B-A, Item B1.10. This includes both longitudinal and circumferential shell welds and only affects the inspection interval in which the augmented examination is performed. The CFR requires all licensees to augment their ISI plan by implementing the examination requirements for RPV shell welds as specified in ASME Section XI 1989 Edition, Table IWB-2500-1, Category B-A, Item B1.10. The requirements consist of volumetric examination of all B1.10 shell welds during the ISI interval in effect on September 8, 1992.

LGS Units 1 and 2 must complete these augmented examinations during their first ten year ISI interval. LGS Unit 1 first ten year interval will be completed in February 1996 and has one refueling outage remaining in the interval. The remainder of the RPV shell weld examinations will be completed during this outage. LGS Unit 2 first ten year interval will be completed in January 2000, and the remainder of the RPV shell welds will be examined during refueling outages three and five. The inspector verified that the examinations were scheduled for Unit 1 and 2 to be performed by the end of the interval. LGS Units 1 and 2 are working to the 1986 ASME Section XI Edition which requires essentially 100% examination of all RPV shell welds during the first ten year interval. This is identical to the augmented examination requirements specified above. Therefore, LGS has stated that the augmented examinations were scheduled to be implemented, prior to the effective date of the rule. LGS stated that if any examinations could not be "essentially 100% complete," as determined during performance of the examination, relief would be requested at that time.

The inspector reviewed ultrasonic testing (UT) data sheets from RPV shell welds previously examined to independently verify that essentially 100% coverage of each weld was obtained. The inspector noted that these records identified the cause of reduced examination coverage, which in most cases was interference by another component. The inspector reviewed several "ISI Ultrasonic Examination Coverage Reports" which, in part, summarized the exact percentage of each RPV shell weld that was examined. The methodology used to calculate percent complete was not specified in these reports, but the inspector was able to glean this information from discussions with those responsible for preparing the report and from independent calculations. LGS calculated the percent of exam volume which was not covered. The inspector determined that this methodology was being used consistently for all RPV shell weld examinations.

LGS utilized automated UT equipment to perform the examinations from the outside of the RPV. Manual UT was used to pick up additional coverage when the automated equipment restricted the amount of weld that could be tested due to component interferences. This practice greatly reduced the percent of each weld which could not be ultrasonically tested.

2.3 Oversight of the Non-destructive Examination (NDE) Vendor

A majority of NDE activities were performed by a full service NDE vendor during this refueling outage. LGS Nuclear Maintenance Division personnel were responsible for providing oversight of the vendor. Oversight activities consisted of review and approval of all vendor NDE procedures, personnel certifications, and a random sampling of examination data generated by the full service vendor. In addition, random ISI examinations were both witnessed and independently re-examined. The required oversight activities were specified in an internal memorandum generated by the NDE Support Group, and were controlled by procedure MAG-CG-440, Revision 0, "NDE Support Group Program," dated November 1, 1993. The inspector reviewed numerous NDE Oversight Reports and determined that oversight activities were being performed as required. The inspector also verified that NDE procedures, personnel certifications and examination data were reviewed and approved by LGS personnel.

As a result of oversight activities, it was determined that discrepancies existed between procedural requirements and vendor work performance of weld centerline marking. The ASME Section XI Code requires a weld reference system be established such that the weld and the surrounding area subject to surface or volumetric examination can be located and identified by a system of reference points. LGS previously determined that numerous welds subject to this requirement had not been marked prior to initial plant startup. Therefore, during this outage the full service NDE vendor was tasked with marking these welds.

Procedure A-80.3, Revision 1, "Material and Weld Marking," dated December 23, 1992, required documentation on the Work Order of any differences between the reference system stamped on each weld and the reference system described in procedure MAG-CG-417, Revision 0, "Weld Crown Location and Marking," dated December 13, 1993. These differences would then be documented in the ISI computer database so that during subsequent examinations, the technician performing the examination would be aware of any discrepancies. LGS personnel determined that this was not done by the vendor NDE personnel. The concern is that if an indication is recorded during an outage, during subsequent outages and re-examinations, it would not be clearly evident as to where the indication was actually located.

As a result of this issue, a Corrective Action Request, LIM-1RO5-2, was initiated. During the review of this issue, it was determined that LGS' expectations on what to do when centerline markings deviated from procedural requirements was not clearly communicated to the vendor technicians performing the work. The inspector noted that although this indicated a weakness in the weld centerline marking program and a weakness in the communications between LGS and the NDE vendor, LGS had identified these weaknesses and was taking actions to prevent reoccurrence.

3.0 NON-DESTRUCTIVE TESTING ACTIVITIES (IP 73753)

3.1 Observation of Automated Ultrasonic Examination

The inspector observed the performance of automated UT on two recirculation system safe end to nozzle welds. The welds consisted of several different materials and were highly attenuative. Thus, the average baseline noise level was above the desired level when the angle beam examinations were performed at the primary reference level. After consultation with the NDE Level III, the NDE Level II reduced the gain, thus the scanning sensitivity, until the average noise level was below forty percent full screen height. This reduction in scanning sensitivity was recorded on the ultrasonic exam data sheet and was permitted by procedure. The procedure UT-LIM-209V0, Revision 0, "Procedure for Automated Ultrasonic Examination of Dissimilar Metal Nozzle to Safe End Welds," dated February 1, 1994, was approved by LGS and was being followed for this examination. The technicians were knowledgeable of the equipment they worked with, the examination method, and the specific requirements of the procedure.

The inspector observed the original calibration which was manually performed on a basic calibration block. The inspector discussed with the licensee the potential difference in the sensitivity of the examination due to the calibration being performed manually versus automatically. The licensee stated that indications which have the characteristics of a crack are recorded regardless of sensitivity level. The calibration verification performed both before and after each examination was performed on a calibration block simulator, as was permitted by procedure.

3.2 Review of Radiography Results

A number of modifications were performed on the residual heat removal system during the outage in progress. The inspector reviewed the radiographs resulting from these modifications and determined that there was adequate film density and density variation, film identification, film quality, and weld coverage.

3.3 Observation of Manual Ultrasonic Examination

The inspector observed manual ultrasonic examination of two class one welds (components FWB-006 and FWB-014). Approved procedures were being followed, specified NDE equipment was being used and examination personnel were knowledgeable of the examination method and the operation of test equipment. The inspector determined, by review of applicable records, that the examination personnel had the appropriate level of qualification and certification for the activities that were performed.

As a result of the review of the ultrasonic data sheets, the inspector identified a concern with the calibration block used for weld FWB-006, reducer to pipe. The inspector reviewed approximately forty more completed ultrasonic data sheets and identified two additional welds of concern (CSA-054 pipe to tee, and CSA-045 elbow to pipe).

ASME Section XI, Mandatory Appendix III, Subsection 3400, requires that basic calibration blocks be made from material of the same nominal wall thickness as the pipe being examined. For the three welds previously indicated, it appears that the nominal wall thickness on the pipe side of the weld is thinner than the pipe on the fitting side of the weld. In each of these cases, the basic calibration block thickness is similar to that of the pipe wall thickness. Thus, sensitivity is being established from the notches on the thinner material. This item is unresolved pending the licensee's assessment regarding the effect the difference in wall thickness has on the sensitivity, and NRC review of the assessment (URI 352/94-05-01).

4.0 CONCLUSIONS

Overall, the inservice inspection program was found to be good and the implementation of the program adequate. No major areas of concern were identified, and the inspector concluded that in the areas inspected, the ISI program met NRC and ASME Code requirements, with the exception of one unresolved item.

5.0 EXIT MEETING

The inspector met with licensee representatives (denoted in Attachment 1) at the conclusion of the inspection on March 4, 1994, and summarized the scope and findings of the inspection.

Attachments:

1. Persons Contacted

ATTACHMENT 1

PERSONS CONTACTED

PECO Energy

K. F. Fisher, NMD/NDE Support
P. Lenair Jr., ANII
* J. A. Muntz, Director/Engineering
B. J. Payne, Component Engineer
* D. L. Schmidt, Engineer/Site Engineering
* G. Schweizer, Manager/Component Engineering
* G. Stewart, Engineer/Experience Assessment
E. P. Troy Jr., Component Engineer

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* Neil Perry, Senior Resident Inspector

* Denotes those attending the exit meeting