U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 50-318/78-22

Docket No. 50-318

License No. DPR-69 Priority -- Category C

Licensee: Baltimore Gas and Electric Company

P. O. Box 1475

Baltimore, Maryland 21203

Facility Name: Calvert Cliffs Nuclear Power Plant, Unit 2

Inspection at: Lusby, Maryland

Inspection conducted: September 25-29, 1978; October 17-18, 1978

Inspectors: R. A. McBrearty 11/6/78
R. A. McBrearty, Reactor Inspector — date signed

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_____ date signed

Approved by: S. D. Ebneter 11/7/78
S. D. Ebneter, Acting Chief, Engineering Support Section No. 1 RC & ES Branch — date signed

Inspection Summary:
Inspection on September 25-29 and October 17-18, 1978 (Report No 50-318/78-22)
Areas Inspected: Routine, announced inspection of the Steam Generator Inspection Program and Inservice Inspection (ISI) Activities. This included observation of eddy current examination of steam generator tubes, review of ISI program and associated procedures and observation of ISI work in progress. The inspection involved 39 inspector-hours on site by one regional based NRC inspector.
Results: No items of noncompliance were identified.

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Region I Form 12
(Rev. April 77)

DETAILS

1. Persons Contacted

Baltimore Gas and Electric Company

*R. E. Denton, Supervisor, Technical Support
*R. M. Douglas, Chief Engineer
T. Forgette, ISI QA Auditor
*T. L. Syndor, Performance Engineer (ISI)

Southwest Research Institute

H. Diaz, QA Engineer
T. Mayces, Team Leader
S. Richter, Inspection Engineer

*denotes those present at the exit interview.

2. Inservice Inspection (ISI) Activities

A. ISI Program

The inspector reviewed the licensee's ISI Program which was developed for the first ten year inspection interval from April 1, 1977 to April 1, 1978. This program was prepared to meet the requirements of the ASME Boiler and Pressure Vessel Code, Section XI, 1974 Edition through summer 1975 Addenda. The ten year plan identifies the components to be examined and specifies the method, extent and frequency of examination. The plan also identifies the items requiring examination during each forty month period of the inspection interval. Prior to the current refueling outage a plan was developed to identify all the items which would be examined, including method and extent of examination, during the outage.

The inspector found that the ten year program met the requirements of the ASME Code, Section XI, 1974 Edition through summer 1975 Addenda as modified by the Facility Technical Specification.

B. ISI Implementing Procedures

The inspector reviewed the following Baltimore Gas and Electric Company (BG&E) and Southwest Research Institute (SwRI) NDE Procedures:

-- SwRI-NDT-200-1, Revision 42, dated July 1978, entitled "Liquid Penetrant Examination - Color Contrast Method."

-- SwRI-NDT-300-1, Revision 14, dated June 1978, entitled "Dry Powder Magnetic Particle Examination."

-- SwRI-NDT-600-3, Revision 46, dated June 1978, entitled "Manual Ultrasonic Examination of Pressure Piping Welds."

-- SwRI-NDT-800-17, Revision 17, dated July 1978, entitled "Special Procedure for Manual Ultrasonic Examination of Austenitic Components with High Acoustic Attenduation Properities."

-- SwRI-NDT-800-36, Revision 15, dated January 1978, entitled "Manual Ultrasonic Examination of Thin wall Piping Welds."

-- SwRI-NDT-900-1, Revision 42, dated July 1978, entitled "Visual Examination of Nuclear Reactor Components by Direct or Remote Viewing."

-- BG&E-NDE-5.700, Revision 4, dated September 3, 1976, entitled "Visual Examination of Welds."

-- BG&E-NDE-5.701, Revision 2, dated September 16, 1976, entitled "Visual Examination of Valves."

-- BG&E-NDE-5.702, Revision 4, dated December 29, 1976, entitled "Visual Examination of Pipe Systems and Attached Components."

-- BG&E-NDE-5.704, Revision 0, dated February 2, 1977, entitled "Visual Examination of Nuclear Reactor Components."

The above procedures were considered with respect to the requirements of the ASME B&PV Code, Section XI and Section V, 1974 Edition through summer 1975 Addenda and the Facility Technical Specification. In addition, NDT-200-1, NDT-300-1, and NDT-800-36 were reviewed for technical adequacy. This included, but was not limited to, the parameters described below for the ultrasonic, magnetic particle and liquid penetrant method.

a. Ultrasonic Examination

(1) The type of apparatus including frequency range is specified.

(2) The extent of coverage, beam angles and transducer size are specified.

(3) Calibration requirements are specified and consistent with the ASME Code.

(4) The reference level for monitoring discontinuities is defined and scanning gain setting is consistent with the applicable ASME Code.

(5) Acceptance limits are consistent with ASME, Section XI.

b. Magnetic Particle Examination

(1) The examination is to be done by the continuous method.

(2) Adequate material surface preparation is specified.

(3) The dry particles provide good color contrast with the background.

(4) The examination is conducted with sufficient overlap to achieve 100% coverage and two separate examinations are made with field directions perpendicular to each other.

(5) Acceptance criteria are specified or referenced and are consistent with the applicable ASME Code Section.

c. Liquid Penetrant Examination

(1) The penetrant, penetrant remover and developer are identified and consistent with the applicable ASME Code.

(2) Examination surface preparation is specified.

(3) Penetrant materials used for the examination of nickel based alloys and austenitic stainless steel are required to be analyzed for sulfur content and total halogens and the specified limits are consistent with the applicable ASME Code.

(4) The specified examination surface temperature range is consistent with the penetrant manufacturer's recommendations and is within the range of 60°F to 125°F.

(5) The method for removal of excess penetrant is specified and does not permit flushing the examination surface with penetrant remover.

The inspector noted that SwRI ultrasonic examination procedures NDT-600-3 and NDT-800-17 contain provisions for performing examinations using test frequencies not specified in Section V or Section XI of the ASME Code.

On September 27, 1978 the inspector interviewed SwRI representatives concerning the apparent conflict. The inspector stated that such deviations are permitted by the code if justification for the deviation is provided. The inspector was informed that, up to that time, all ultrasonic examinations had been done using a test frequency of 2-25 MH_z as specified in the ASME Code. The inspector was informed also that the question would be referred to the SwRI Home Office.

Prior to the exit meeting on October 18, 1978, in response to the inspector's question, the inspector was informed by the SwRI representative on site that weld number 30 RC-21A-7 in the reactor coolant loop and welds in the pressurizer surge line were examined using a test frequency of 1.0 MH_z and that safety injection system 12 inch piping welds were examined using a test frequency of 1.5 MH_z.

To justify the use of 1.5 MH_z, the following was provided by the licensee for the inspector's review:

-- SwRI Document Number 17-5298(7) dated September 29, 1978 on the use of 1.5 MH_z search units for the examination of austenitic piping.

-- Report prepared by Southwest Research Institute and entitled "Detailed Analysis of the Fundamental Ultrasonic Response Data from Stainless Steel Stress Corrosion Crack Specimens."

-- Report prepared by Battelle-Columbus Laboratories for the Electric Power Research Institute (EPRI) and entitled "Investigation into the Performance Characteristics of Three Experimental Ultrasonic Transducers."

The above reports each address the problem of detecting stress corrosion cracks in austenitic stainless steel.

After a review of the above listed documents the inspector had no further questions on the use of the 1.5 MH_z for the detection of intergranular stress corrosion cracks in austenitic stainless steel.

The inspector requested from the licensee the following:

(1) Documentation which will demonstrate that test frequencies of 1.5 MH_z and 2.25 MH_z are equally capable of detecting the various types of defects found in welds.

(2) Documentation to justify the use of 1.0 MH_z for examination of the pressurizer surge line welds and reactor coolant loop weld number 30 RC-21A-7 at Calvert Cliffs Unit 2.

The requested documentation was not available at the time of this inspection and the inspector stated that this item is considered unresolved pending availability and NRC evaluation of the requested documentation. (78-22-01.)

C. Observation of NDE In Progress

The inspector observed the liquid penetrant examination of the following safety injection system welds:

-- Weld Number 2 SI-2005-5, Pipe to Pipe.

-- Weld Number 2 SI-2005-11, Pipe to Valve Number SI-113.

The examination was performed using solvent removable, visible dye penetrant by individuals certified to NDE Level I and NDE Level II in the liquid penetrant method. The welds were examined in accordance with penetrant examination procedure NDT-200-1.

The inspector observed the longitudinal beam ultrasonic examination of weld number 30 RC-21A-1, a nozzle to transition piece weld in the reactor coolant loop cold leg. The examination was done by a team composed of one NDE Level I and one NDE Level II individual. The inspector's observations included initial instrument calibration, examination of the weld and base material at a test frequency of 2.25 MH_z, and recording of test results in accordance with UT procedure NDE-600-3.

The inspector found that the penetrant and ultrasonic examinations were done by properly qualified personnel using certified and calibrated equipment. Applicable procedural requirements were met.

No items of noncompliance were identified.

3. Eddy Current Examination of Steam Generator Tubes

An examination of selected tubes in number 21 and number 22 steam generator was performed by Baltimore Gas and Electric Comapny (BG&E) personnel to satisfy the requirements of the Facility Technical Specification. Zetec, Inc. was contracted to evaluate and interpret test data.

The inspector observed the Eddy Current Examination of the following tubes in number 22 steam generator:

LINE	ROW
1	72
1	74
1	78
1	80
1	84
1	92

The examinations, which inculded 325 tubes in each steam generator, were done in accordance with BG&E procedure NDE-5.500, Revision 3, dated August 28, 1978, entitled "The Eddy Current Examination of Steam Generator Tubes." Data were evaluated with respect to regulatory guide 1.83 and the Facility Technical Specification.

A test frequency of 400 KH_Z was used to perform the tube examinations. Examination personnel were qualified to NDE Level I and NDE Level II and the Zetec, Inc. data evaluator was qualified to NDE Level IIA.

The inspector observed that data were collected as the test probe was withdrawn from each tube and was recorded on magnetic tape and a strip chart recorder. The test system was calibrated using Inconel 600 calibraction standards, serial number 25, heat number 6707 and serial number 42, heat number 6586 supplied by Zetec, Inc.

No items of noncompliance were identified.

4. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, item of noncompliance, or deviations. Unresolved items disclosed during the inspection are discussed in Paragraph 2c.

5. Exit Interview

The inspector met with licensee representatives (denoted in Paragraph 1) at the conclusion of the inspection on October 18, 1978. The inspector summarized the purpose and scope of the inspection and the findings.