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License Nos. DPR-53
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Licensee: Baltimore Gas and Electric
MD Rts 2 and 4, P.O. Box 1535
Lusby, Maryland 20657

Facility Name: Calvert Cliffs Unit 1 and Unit 2

Inspection At: Lusby, Maryland

Inspection Conducted: March 23 - April 3, 1992

Inspectors: Robert A. McBrearty
for George A. Koch, Reactor Engineer,
Materials Section, EB, DRS

4/29/92
Date

Robert A. McBrearty
R. A. McBrearty, Reactor Engineer,
Materials Section, EB, DRS

4/29/92
Date

Approved By: E. H. Gray
E. Harold Gray, Chief
Materials Section, EB, DRS

4/29/92
Date

Areas Inspected: An announced inspection was conducted of the licensee's inservice inspection program, associated activities, and the steam generator tube eddy current examination program. The inspection was conducted to ascertain whether the programs conformed to applicable requirements, and whether the activities were performed in a way that confirms the plant's acceptability to return to service.

Results: The licensee's ISI program is approved by the NRC and is being implemented by knowledgeable, competent staff members. The steam generator tube eddy current examination program for the current Unit 1 refueling outage exceeds the plant's Technical Specification requirements. Examination personnel were determined to be properly certified to the appropriate level of competence in accordance with the provisions of SNT-TC-1A, the governing document. Programmatic weaknesses were identified regarding the licensee's evaluation of ISI results and documentation thereof, the lack of procedural specificity regarding certain equipment used when performing liquid penetrant examinations, the lack of detail for carrying out responsibilities defined in procedure ME&A IP 5.03, Revision 0, and guidance related to the need for requesting relief from code requirements in cases regarding partial examinations. Another area requiring additional attention is related to the establishment of a mechanism to assure that all items requiring examination are included in the ISI program.

1.0 Inservice inspection (ISI) Program (73051)

Inservice inspection is mandated by the ASME Boiler and Pressure Vessel Code, Section XI, and, because it confirms the structural integrity of the reactor coolant system and other piping systems pressure boundary, is essential to protect public health and safety.

Both units of the Calvert Cliffs facility are in the second ten-year inspection interval. The interval at each unit is scheduled to continue until April 1997 and the applicable code is the 1983 Edition of ASME Section XI through Summer 1983 Addenda.

1.1 ISI Program Plan Review

The Calvert Cliffs ISI program is defined in a document prepared by a BG&E contractor, Southwest Research Institute. NRC regulations specify that the plan must be structured around the requirements of the American Society of Mechanical Engineers (ASME) Code Section XI. Additional requirements for administrative controls on the plan preparation and approval are located in Baltimore Gas & Electric (BG&E) Quality Procedure QAP 13. The plan was compared to both these documents to verify that the licensee had a sound basis from which to implement inservice inspections. The inspection revealed that the plan was submitted as required to the NRC for approval and that final approval was granted in October of 1990. The category of ASME Class 1 components was selected as a sample to verify compliance to ASME Section XI and agreement was found. Examination methods were compatible with the component categorization and examination deferral limitations were met. The BG&E QAP 13 requirements were also found to have been met. The plan was approved by the BG&E Principal Metallurgist and approval by the Plant Operating Safety Review Committee (PORSC) was in evidence.

The ISI Program Plan is implemented for each outage of each unit in an Outage Examination Plan. The total compilation of the items requiring examination and the document used to record scheduling and status is the Long Term Plan. Both documents were prepared by Southwest Research Institute and are being administered by BG&E. Samples of component categories showed agreement between the Long Term Plan and the ASME Code Section XI in the areas of examinations type and extent. The Long Term Plan was examined to verify that items required by Calvert Cliffs Technical Specification (Augmented Inspections para 4.4.10.1.2) are included and a line walk-down was performed to verify accuracy. Compatibility between the information in the Long Term Plan and the Outage Plan was verified by comparison to assure that the ASME Code Section XI requirements were met in the document being used to implement Inservice Inspection for the outage underway. Examinations did not reveal violations but did raise a concern

about the plan comprehensiveness. The change record for the long term plan revealed a number of additions not caused by plant modifications. This demonstrated that a potential problem existed in developing a complete original plan. It was expected that BG&E personnel recognized that a problem potential existed but no evidence could be provided to show it had been evaluated. In response to this concern, BG&E personnel generated an Issue Report No. IRO-006-463 in accordance with procedure CCI 169 which will force resolution. Safety significance of the concern was judged to be negligible due to the types of items being added.

Based on plant design limitations regarding examination access, 10 CFR 50.55a(g)(4) and provisions of ASME, Section XI, which discuss examination access, no NRC relief from code requirements is necessary as long as the examination is performed to the greatest extent practical. When partial examinations are performed at the plant, the extent of the examination and the reason for the limitation is documented on the examination data sheet. The licensee's position on this matter is documented in a letter dated September 23, 1988 to its authorized Nuclear Inservice Inspector (ANII). The licensee was advised that its position did not agree with the NRC position, based on ASME Code Section XI Code Case N-460, that when less than 90% of required examination coverage is accomplished, NRC approval of relief from the code requirement is necessary. The licensee plans to follow up on the matter with the NRC (NRR). The inspector had no further questions at this time regarding the matter.

1.2 Quality Assurance

Since Southwest Research Institute plays a major role in the Calvert Cliffs ISI program, the inspector reviewed how BG&E qualifies vendors and assures that vendors are worthy of continued qualification. Vendors are evaluated in accordance with procedure VAUP-2 Rev. 6. Initially they are placed on an Approved Vendors List (AVL) using criteria consistent with industry practice. Suppliers may be added if they possess an ASME Section III Certificate, or if they can successfully withstand an audit and possess an acceptable quality system. Audits may be performed by BG&E personnel or a recognized industry group. Once suppliers are placed on the AVL, yearly reviews are performed to determine eligibility. Criteria for re-evaluation is also consistent with industry practice and vendors are allowed to remain on the AVL if they maintain a ASME Certificate, have an acceptable procurement quality history, continue to maintain an acceptable quality program, or pass an audit or survey. Review of the records shows that Southwest Research Institute was added to the AVL in accordance with the BG&E procedure. They successfully passed an audit in 1989 and were allowed to remain on the list on the basis of satisfactory quality history in 1991. However, a program weakness was

identified. The method for evaluating service vendors includes industry information but no information about plant performance. There is no documented method for vendor performance at the plant to be brought to the attention of the audit group. This allows vendors to remain on the AVL regardless of the quality of the service they were supplying to the plant if the vendor did not have problems that surfaced elsewhere in the industry. The licensee has committed to reviewing how the plant performance history can be factored into vendor re-evaluation.

Quality auditing of the ISI program was included in the scope of the inspection. Auditing the program is a plant technical specification requirement (para 6.5.4.8.1) and is required on a frequency no greater than once every twenty-four months. Compliance to this requirement was verified as audits were conducted in 1988, 1990, and one was scheduled for this outage in 1992. Audits were performed using well defined checklists that included both compliance and performance items. The performance based portions of the past audits were performed by a single auditor and he was interviewed to verify his level of knowledge in the methods of non-destructive examination. The interview showed that the individual possessed an acceptable knowledge level to perform the work.

1.3 Inservice Inspection Implementation (73753)

1.3.1 Organization and Training

Calvert Cliffs inservice inspection plan is administered by the Nuclear Inspection Services (NIS) organization. This group is responsible for development of the program plan, interfacing with contractors, coordinating inspection schedules with outage management, providing guidance to NDE inspectors, interfacing with Repair and Replacement Engineering to assure component inspection baselining, and changing the program due to corrections or to match plant modifications. An ISI Engineer position is established to perform the necessary activities but the NDE is performed by other BG&E personnel supported by contractors as necessary. The records for training and the educational background for the ISI Engineer were reviewed and determined to be adequate. Evidence showed continued training in Calvert Cliffs procedures and an off-site training seminar with ISI/ASME Section XI as the subject. Test results were available as evidence of satisfactory completion. Verification of NDE personnel certification was performed by reviewing the master list of qualified individuals and examining the records of a sample comprised of BG&E and contractor inspectors. The records were judged to meet the provisions of SNT-TC-1A, the governing document.

1.3.2 Procedures

The implementation of the ISI program is accomplished through NDE procedures and the procedure that defines the working of the NIS organization (ME&A IP5.03). Selected NDE procedures were reviewed for technical adequacy and agreement with ASME Section XI. Three concerns were identified. The procedure for controlling liquid penetrant inspection did not specify how to verify the temperature of items being inspected. This resulted in the use of an improper gage during one examination witnessed during the inspection. Issue Report No. IRO-006-465 was issued which resulted in revision of the procedure to identify the appropriate type of thermometer and also, to identify the need to review past examination records for use of an inappropriate thermometer. Secondly, NDE reports shown in the procedures do not contain a definitive statement of acceptance or rejection. This was viewed as negative control requiring individuals not performing the test but using the information to make assumptions which may lead to errors. The third concern was the fact that BG&E personnel are not reviewing contractor NDE reports unless the contractor determines that reportable conditions are present. This eliminates one line of defense in assuring that the inspection was performed correctly and the information on the condition of the plant is valid. Issue Report No. IRO-003-262 was issued to identify the problem with recommendation to create a procedure to document the licensee's review and approval of vendor and licensee results. The licensee additionally, issued a memorandum instructing the cognizant BG&E personnel to review all ASME Section XI NDE results and ensure that the results are characterized as either acceptable or rejectable in accordance with applicable standards. Procedure ME&A IP 5.03 was also reviewed which raised another concern. The procedure is intended to control implementation, however it did not define how activities were to be performed and some activities being performed by the NIS group were not described. This is viewed as minimal control since it allows employees to determine their own method of satisfying requirements.

1.3.3 Performance

Two red visible dye liquid penetrant examinations were witnessed during the inspection. Both were performed on weld #20 on line 14CC-14-1005 by a BG&E level I and contractor Level II team. Qualification records were reviewed for both inspectors and found acceptable. Penetrant materials were manufactured by Sherwin and were traceable to material certifications through a batch number and

BG&E identification number (124A4, 626F47, 96B6-12, & 75E4). Procedure NDE 5.210 Rev. 0 was used in both examinations. Performance of both examinations was judged to be acceptable. Drying, and penetrant dwell times listed in the procedure were followed and the inspectors used caution not to flood the metal surface with cleaner when removing the excess penetrant. Results were evaluated by the Level II member of the team and reports were written. In the first examination Digital pyrometer #T-17 was provided to determine the temperature of the surface prior to application of materials. It was recognized by the team and NRC inspector that it was not the proper instrument for the application because of the design and performance. Another was requested and #T-19 was obtained but it was identical in design to the other. Both were immersion type pyrometers rather than contact type. A review of the procedure showed that the type of instrument was not specified. The team demonstrated good judgement by continuing with the test with the understanding that any results would be conditional until the pyrometer issue was resolved. However the test results could not be evaluated because surface roughness caused excessive bleeding of penetrant. The team requested surface preparation of the weld.

The second examination witnessed was performed after the surface preparation was completed. A contact type pyrometer was used and compared to the readings obtained by the immersion type. Maximum difference was 16 degrees Fahrenheit with the immersion type reading low. Licensee has changed the liquid penetrant procedure to specify the type of instrument and is evaluating past liquid penetrant reports to assess the magnitude of improper instrument use and significance. The second examination was properly evaluated as a rejection due to linear indications that appeared to be the result of a past grinding operation.

2.0 Steam Generator Tube Eddy Current Examination (73753)

Calvert Cliffs Units 1 and 2 each contain two Combustion Engineering Series 67 steam generators, each containing 8519 tubes. The tubes are fabricated of mill annealed Inconel 600, outside diameter 0.750" and a wall thickness of 0.048". The plants have operated with AVT water chemistry since the startup of each unit. The condenser tubing, originally copper-nickel, was replaced with A1-6X in May 1982 at Unit 1, and with titanium at Unit 2 in December 1982. All feedwater heaters are of the original stainless steel construction, and the moisture separator reheaters, originally copper-nickel were changed to 439 stainless steel in 1984 at Unit 2 and in 1986 at Unit 1. The sludge buildup at each unit is being controlled with the use of morpholine chemistry.

The steam generator tube eddy current examinations scheduled for the current Unit 1 refueling outage had not yet commenced, but preparations were in progress at the time of this inspection.

The licensee has scheduled the inspection of 100% of the tubes in each steam generator at Unit 1. The inspections will be performed using a bobbin coil probe over the entire length of each tube starting at the hot leg side (tube sheet to tube sheet). Additional inspections of 2221 tubes in steam generator #11 and 2113 tubes in steam generator #12 are scheduled to be performed using a motorized rotating pancake coil probe. The probe will be used over strategically located portions of the selected tubes based on past plant and industry experiences. The facility Technical Specification 4.4.5.0 requires that the licensee inspect 3% (256) of the tubes in one steam generator.

The status of each Unit 1 and Unit 2 steam generator at the present time is as follows:

<u>Steam Generator</u>	<u>Total Tubes Plugged</u>	
SG #11	107 tubes	
SG #12	70 tubes	Unit 1
SG #21	75 tubes	
SG #22	38 tubes	Unit 2

All of the above tubes were plugged based on bobbin coil probe data with the exception of two tubes in SG #12 which were plugged due to through wall leaks.

Conclusion

The past history of the steam generator tubes at Calvert Cliffs is evidence that the Baltimore Gas and Electric Company has operated the steam generators with safety in mind. The company aggressively implements the eddy current examination program as evidenced by the 1992 scope which includes a much larger sample than required by the Technical Specification, and by the use of a special probe in areas where problems are anticipated.

3.0 Exit Meeting

The inspector met with licensee representatives (denoted in Attachment 1) at the conclusion of the inspection on April 3, 1992. The inspector summarized the scope and findings of the inspection.

ATTACHMENT 1

Persons Contacted

Baltimore Gas and Electric Company

- * A. Anuje, Superintendent, QUA
- * S. Buxbaum, NDE Unit, FESD
- * G. Detter, Director, NRM
- * R. Franke, Compliance Engineer, NRM
- * R. Heiber, Manager, NQAD
- * K. Hoffman, Supervisor, Materials Group
- * P. Katz, Superintendent, Technical Support
- * P. Klein, NISU
- * R. Olson, Director, State Regulatory Matters
- * L. Smith, LCMU
- * D. Song, NISU
- * A. Thornton, Technical Services, Fossil Engineering
- * B. Thurston, QUA
- * R. Wenderlich, Acting Plant General Manager
- * L. Wenger, Project Engineer, Compliance

* denotes those present at the exit meeting.