



UNITED STATES
 NUCLEAR REGULATORY COMMISSION
 REGION II
 101 MARIETTA STREET, N.W.
 ATLANTA, GEORGIA 30323

Report No.: 50-416/90-22

Licensee: System Energy Resources, Inc.
 Jackson, MS 39205

Docket No.: 50-416

License No.: NPF-29

Facility Name: Grand Gulf Nuclear Station

Inspection Conducted: October 22-26, 1990

Inspector: B. R. Crowley 11/8/90
 B. R. Crowley Date Signed

Approved by: E. H. Girard 11/8/90
 J. J. Blake, Chief Date Signed
 Materials and Processes Section
 Engineering Branch
 Division of Reactor Safety

SUMMARY

Scope:

This routine, announced inspection was conducted on-site in the area of Inservice Inspection (ISI). The inspection included a review of the ISI inspection plans for this outage; reviews of nondestructive examination (NDE) procedures; observations of in-process NDE examinations; review of NDE personnel qualifications; review of NDE equipment calibration and material certification documentation; and review of completed NDE examination data. Also, NRC TI 2500/27 was used to evaluate licensee's response to NRC Bulletin 87-02. Implementation of Generic Letter 90-05 was examined.

Results:

In the areas inspected, violations or deviations were not identified. This inspection indicated that, in general, a good ISI program was in place with good implementation. ISI nondestructive examinations were being conducted by qualified personnel in accordance with applicable procedures. The procedures and examination techniques used to conduct the examinations were adequate and documentation of examination results was very good. The administrative control procedure for ISI needs to be enhanced to provide more detailed guidelines on how the program is accomplished (see paragraph 2.a). Also, the inspector found that some inspections were being performed under poor lighting conditions (see paragraph 2.c).

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REPORT DETAILS

1. Persons Contacted

Licensee Employees

- *C. Abbott, Supervisor, Inspections
- *R. Courtney, Supervisor, NDE
- W. Cottle, Vice President - Nuclear Operations
- B. Crocker, NDE Level III
- *M. Dietrich, Director, Quality Programs
- *J. Dimmette, Manager, Maintenance
- R. Hutchinson, Grand Gulf Nuclear Station General Manager
- S. Lewis, Senior Technical Specialist - Nuclear Plant Engineering (NPE)
- *C. Renfroe, Testing/Inspections Programs Supervisor
- *J. Roberts, Manager, Performance and System Engineering
- S. Scott, Technical Specialists - ISI
- *J. Summers, Compliance Coordinator
- L. Thorton, Level III - VT

Other licensee employees contacted during this inspection included craftsmen, engineers, security force members, inspectors, technicians, and administrative personnel.

NUTECH

- J. Axline, Shift Supervisor
- R. Montgomery, Site QA Manager

General Electric (GE)

- S. Whiddon, NDE Level III

NRC Resident Inspectors

- *H. Christensen, Senior Resident Inspector
- J. Mathis, Senior Resident Inspector

*Attended exit interview

Acronyms and Initialisms used throughout this report are listed in the last paragraph.

2. Inservice Inspection (ISI)

The inspector reviewed documents and records, and observed activities, as indicated below, to determine whether ISI was being conducted in accordance with applicable procedures, regulatory requirements, and

licensee commitments. The applicable code for ISI is the American Society of Mechanical Engineers Boiler and Pressure Vessel (ASME B&PV) Code, Section XI, 1977 edition with addenda through summer 1979 plus some portions of the 1980 edition, winter 1980 addenda. The Safety Evaluation Report (SER) for the first ten year ISI plan and relief request is dated July 22, 1986. Grand Gulf is in the 2nd outage of the 2nd 40 month period, of the 1st ten year ISI interval. The current outage will be the last outage prior to the end of the 2nd period.

The licensee's Quality Programs organization is responsible for the nondestructive examination (NDE) program. Contractors furnish inspection examiners and supervisors. For the current outage, U. S. Testing is performing the majority of NDE examinations. GE is performing Ultrasonic (UT) examinations of the reactor vessel nozzle to safe-end welds after Induction Heat Stress Improvement (IHSI) and other selected welds being inspected for Intergranular Stress Corrosion Cracking (IGSCC).

a. ISI Program Review (73051)

The inspector reviewed the following documents relating to the ISI program to determine whether relief requests had been approved by NRR, the services of an Authorized Nuclear Inservice Inspector (ANII) had been procured, the plan had been reviewed by the ANII, the plan had been approved by the licensee and to assure that procedures and plans had been established (written, reviewed, approved and issued) to control and accomplish the following applicable activities: program organization including identification of commitments and regulatory requirements, preparing plans and schedules, and qualification, training, responsibilities, and duties of personnel responsible for ISI; repair and replacement program requirements; personnel qualification requirements; and guidance for identifying and processing relief requests.

- Specification SERI-M-489.1, revision 5, SERI Grand Gulf Nuclear Power Station Unit 1 Standard for the Ten-Year Inservice Inspection Plan
- Plant Operations Manual Procedure 01-S-07-10, revision 8, Preservice and Inservice Inspection
- Specification SERI-M-489.0, revision 0, ASME Section XI, Division 1 Repairs and Replacements
- Nuclear Plant Engineering (NPE) Procedure 337, revision 0, ASME Section XI Design
- Plant Operations Manual Procedure 01-S-07-28, revision 7, ASME Section XI Repair/Replacement Program

Review of the above specifications and procedures, discussions with ISI personnel, and observation of ISI activities revealed that the administrative control of the ISI program is largely personnel dependent. It appeared that good dedicated personnel were in charge of the program and the program was being accomplished in accordance with requirements. However, the controlling procedure, 01-S-07-10 contains minimal details on how the Ten-Year plan requirements are translated into outage packages, packages are accomplished and results are evaluated and dispositioned. Licensee personnel responsible for the program agreed that the administrative procedure lacks detail and agreed that the procedure will be evaluated for enhancements in this area. Enhancement by adding administrative details will improve the licensee's program.

b. Review of NDE Procedures (73052)

(1) The inspector reviewed the procedures listed below to determine whether these procedures were consistent with regulatory requirements and licensee commitments. The procedures were also reviewed in the areas of procedure approval, requirements for qualification of NDE personnel, compilation of required records, and division of responsibility between the licensee and contractor personnel, if applicable.

- Specification SERI-M-489.2, revision 2, Standard for the Performance of ASME Section XI Examinations
- QAI-N 9.13, revision 3, Liquid Penetrant Examination, (PT) Solvent Removable (ASME, Section XI)
- QAI-N 9.14, revision 2, Magnetic Particle Examination (MT) (Yoke Method) (ASME, Section XI)
- QAI-N 9.03, revision 4, Manual Ultrasonic Examination of Similar Metal Welds (Section XI)
- UT-51, revision 3, Procedure for Automated Ultrasonic Examination of Dissimilar Metal Welds

(2) Liquid Penetrant Examination (PT)

The inspector reviewed the PT procedure to ascertain whether it had been reviewed and approved in accordance with the licensee's established QA procedures. The procedure was also reviewed for technical adequacy and conformance with ASME, Section XI and Section V, Article 6, and other licensee commitments/requirements in the following areas: specified method; penetrant material identification; penetrant materials analyzed for sulfur; penetrant materials analyzed for total halogens; surface

temperature; acceptable pre-examination surface conditioning; method used for pre-examination surface cleaning; surface drying time prior to penetrant application; method of penetrant application; penetrant dwell time; method used for excess penetrant removal; surface drying prior to developer application, if applicable; type of developer; examination technique; evaluation techniques; and procedure re-qualification.

(3) Magnetic Particle Examination (MT)

The inspector reviewed the MT procedure to ascertain whether it had been reviewed and approved in accordance with the licensee's established QA procedures. The procedure was reviewed for technical adequacy and for conformance with the ASME Code Section XI and Section V, Article 7, and other licensee commitments/requirements in the following areas: examination methods; contrast of dry powder particle color with background; surface temperature; suspension medium and surface temperature requirement for wet particles; viewing conditions; examination overlap and directions; pole or prod spacing; current or lifting power (yoke); and acceptance criteria.

(4) Ultrasonic Examination (UT)

The inspector reviewed the UT procedures to ascertain whether they had been reviewed and approved in accordance with the licensee's established QA procedures. The procedures were also reviewed for technical adequacy and conformance with ASME, Sections XI and V, and other licensee commitments/requirements in the following areas: type of apparatus used; extent of coverage of weldment; calibration requirements; search units; beam angles; DAC curves; reference level for monitoring discontinuities; method for demonstrating penetration; limits for evaluating and recording indications; recording significant indications; and, acceptance limits.

c. Observation of Work and Work Activities (73753)

The inspector observed work activities, reviewed certification records of NDE equipment and materials, and reviewed NDE personnel qualification records as detailed below.

(1) Liquid Penetrant Examination (PT)

The inspector observed the in process PT examinations as indicated below. The observations were compared with the applicable procedure and the ASME B&PV Code in the following areas: specified method, penetrant materials identified; penetrant materials analyzed for halogens and sulfur; acceptable pre-examination surface; surface temperature; surface drying time prior to penetrant application; method of penetrant

application; penetrant dwell time; method used for excess penetrant removal; surface drying prior to developing, if applicable; type of developer; examination technique; evaluation technique; and, reporting of examination results.

Examinations Observed

Weld 1B21G115-1G-08-11
 Weld 1B21G115-1G-08-12
 Weld 1B21G115-1G-08-13
 Weld 1B21G115-1G-08-14

(2) Magnetic Particle Examination

The inspector observed the in-process MT examination, including the 10 pound lift test for calibration check, indicated below. The observations were compared with the applicable procedures and the Code in the following areas: examination methods; contrast of dry powder particle color with background; surface temperature; viewing conditions; examination overlap and directions; pole or prod spacing; current or lifting power (yoke); and acceptance criteria.

Examinations Observed

Weld 1E51G004-15-8-2

(3) Ultrasonic Examination (UT)

The inspector observed calibration activities and the in-process UT examinations as indicated below. These observations were compared with the applicable procedures and the ASME B&PV Code in the following areas: availability of and compliance with approved NDE procedures; use of knowledgeable NDE personnel; use of NDE personnel qualified to the proper level; type of apparatus used; calibration requirements; search units; beam angles; DAC curves; reference level for monitoring discontinuities; method of demonstrating penetration; extent of weld/component examination coverage; limits of evaluating and recording indications; recording significant indications; and, acceptance limits.

Examinations Observed

Weld 1E51G004-15-8-2
 Weld 1E51G004W13
 Weld 1B13-N2G-KB*
 Weld 1B13-N2A-KB*

* UT being performed after IHSI

(4) Personnel Qualifications

The inspector reviewed personnel qualification documentation as indicated below for examiners who performed the examinations detailed in paragraphs (1), (2), and (3) above. These personnel qualifications were reviewed in the following areas: employer's name; person certified; activity qualified to perform; current period of certification; signature of employer's designated representative; basis used for certification; and, annual visual acuity, color vision examination, and periodic recertification.

Examiner Records Examined

<u>Method</u>	<u>Level</u>	<u>Employer</u>	<u>Number</u>
PT	II	GE	2
PT	I	GE	1
MT	I	GE	1
UT	II	GE	2
UT	I	GE	1
PT	II	U.S. Testing	2
MT	II	U.S. Testing	3
UT	II	U.S. Testing	1

In addition, 3 licensee and 1 GE level III qualification records were reviewed.

(5) Equipment Certification Records

Equipment certification records as listed below, for equipment used in the inspections detailed in paragraphs (1), (2) and (3) above, were reviewed to ensure compliance with all applicable requirements.

<u>Equipment Type</u>	<u>Equipment Identification</u>
Penetrant Cleaner	Batch 027C4
Penetrant	Batch 710G1
Penetrant Developer	Batch 45F6
UT Pulser	Serial 204228401
UT Receiver	Serial 205228401
UT Gate	Serial 206368401
UT Pulser	Serial 204178503
UT Receiver	Serial 205178503
UT Gate	Serial 206458401
UT Couplant	Batch 8858
UT Transducer	Serial 88-275
UT Transducer	Serial 88-259
Cal Std	2-B
Thermometer	Serial 1483
MT Powder	Batch 87C021
MT Cal Weight	M&TE A049
UT Transducer	Serial 031332
UT Transducer	Serial 30225

During examination of welds 1E51G004-15-8-2 and 1E51G004W13, located in the steam tunnel, the inspector noted that lighting was very poor. A number of the plant lights were out and the welds being inspected were in a dark area in the bottom of the tunnel. The examiners were using "D" cell flash lights. Even though the lighting was poor, it appeared the inspectors performed an adequate inspection. However, based on the added burden the inspectors were already under, i.e., double clothing and gloves, poor lighting only adds additional burdens to the inspection process and can hinder obtaining accurate inspection results. When brought to the attention of the licensee, immediate corrective action was taken to provide better lighting to the inspectors. The licensee also stated that plant lighting in the steam tunnel would be improved.

d. Data Review and Evaluation (73755)

(1) NDE Examinations

The current outage is the last outage for the 2nd period. A sample of three systems were selected to evaluate the licensee's completion of inspections required for the second period. For this purpose, the planned inspections for the current outage and the inspections performed for the selected systems during the 1st outage were compared with the 10 year plan requirements for the second period. The following systems were selected:

E21 Low Pressure Core Spray - WO # 20014 for current outage

C41 Standby Liquid Control - WO # 20012 for current outage

E51 Reactor Core Isolation
Cooling - WO # 20018 for current outage

In all cases, 2nd period inspections not performed during the 1st outage were included in inspection packages for the current outage.

(2) Repairs and Replacements

The inspector reviewed repair and replacement package WO No. 00020281 for compliance with procedure 01-S-07-28. This package covered replacement of a defective snubber, 1G41G016R27. Material Nonconforming Report (MNCR) 0181-90 and Discrepant Material Report (DMR) documented the defective condition.

In the areas inspected, no violations or deviations were identified.

3. Induction Heat Stress Improvement (IHSI)

In accordance with NRC Generic Letter (GL) 88-01, welds containing Inconel 182 butter contain nonconforming material. As noted in the Grand Gulf SER dated October 1, 1990, there are 34 such welds - 27 nozzle to safe-end welds, 5 safe-end to safe-end-extension welds and 2 safe-end to penetration seal welds - all classified as IGSCC category "D" welds. The licensee was in process of performing mitigating actions, IHSI, on these welds during the current outage. The inspector evaluated IHSI activities as follows:

- The following controlling documents were reviewed:
 - Specification SIP-NES-02, revision 1, Process Specification for IHSI
 - Procedure SIP-NES-02, revision 1, Implementation Procedure for Induction Heating Stress Improvement (IHSI)
- Completed IHSI weld package for weld 1B13-N2-N-KB was reviewed.
- In-process IHSI was observed for weld 1B13-N1-B-KB.

In the areas inspected, no violations or deviations were identified.

It appeared that the program was under good control, personnel were knowledgeable, procedures were being followed, and good, detailed records were being completed.

4. Corrosion/Erosion Inspection

The inspector examined the licensee's program for corrosion/erosion inspections. The following summarizes the program in place:

- NPE is responsible for providing the plant inspection locations, acceptance criteria, and evaluating and trending inspection results.
- Memoranda PMIs 85/10403 dated 11/9/85, 87/07001 dated 11/5/87 and 90/03721 dated 9/17/90 have been issued for this purpose.
- Currently, 58 locations have been identified. The program currently requires inspection of each location each refueling outage.
- Plant procedure 17-S-05-322, revision 0, implements NPE requirements for inspecting, providing initial disposition of results, and providing results to NPE for evaluation and trending.

The inspector found that the program does not include written details on trending results and defining program details such as logic for disposition of findings, e.g., when to change (increase, decrease, or

discontinue) inspection frequency, when to replace pipe, etc. Licensee personnel stated that an Engineering Standard is planned which will provide more details for the decision process.

Within the areas inspected, no violations or deviations were identified.

5. Generic Letter 90-05

NRC issued GL 90-05 to provide licensees guidance for performing temporary non-code repairs of ASME code class 1, 2, and 3 piping. The inspector examined the licensee's implementation of this GL.

Discussions with responsible licensee personnel revealed that since the licensee had not had need to perform non-code temporary piping repairs, site specifications and procedures had not been revised to incorporate the guidance of the GL. Personnel indicated that, if the need arose for such a repair, the guidelines of the letter would be followed. The inspector pointed out that under certain conditions, expeditious "stop gap" temporary repairs might be needed and that procedures should include provisions meeting the GL guidelines, including required NRC relief from code, for such repairs. The licensee agreed and stated that Specification SERI-M-489.0 would be revised to include the GL guidelines as appropriate.

6. NRC Temporary Instruction (TI) 2500/27

The licensee responded to NRC Bulletin 87-02 by letters AECM-88/0012 (Unit 1), dated January 15, 1988 and AECM-88/2-0002 (Unit 2), dated February 17, 1988. The Unit 2 letter indicated that for sample No. GGNS-2-A1, ASTM A194-2H Heavy Hex Nut 3/4", the hardness results did not meet specification. The above TI was issued to evaluate this condition.

The inspector evaluated the inspection data for the nuts in question and discussed the data with licensee engineering personnel. The following summarizes the evaluation:

- The licensee did not consider the out of specification hardness to be a safety problem based on the fact that the nuts passed the proof load test and were intended for non-safety related applications only.
- The hardness measured was Rockwell "C" 15, which is below the normal range for the Rockwell "C" and therefore cannot be considered a reliable hardness indication of the material in question. As indicated in the licensee letter, the nuts satisfactorily passed the proof test, which showed they would accept the design loads without stripping or rupture. This test is a better test of the capability of the nuts, especially given that the hardness data reported was outside the reliable range for the "C" scale.

- Based on the above discussion, the out of specification hardness is not considered to be of safety significance and this issue is considered closed.

7. Exit Interview

The inspection scope and results were summarized on October 29, 1990, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results. Although reviewed during this inspection, proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

8. Acronyms and Initialisms

ANII	-	Authorized Nuclear Inservice Inspector
ASME	-	American Society of Mechanical Engineers
B&PV	-	Boiler and Pressure Vessel
DMR	-	Discrepant Material Report
DAC	-	Distance Amplitude Curve
GL	-	NRC Generic Letter
ID	-	Identification
IHSI	-	Induction Heat Stress Improvement
ISI	-	Inservice Inspection
MNCR	-	Material Nonconforming Report
MT	-	Magnetic Particle
MHz	-	Megahertz
NDE	-	Nondestructive Examination
No.	-	Number
NPE	-	Nuclear Plant Engineering
NRC	-	Nuclear Regulatory Commission
PT	-	Liquid Penetrant
QA	-	Quality Assurance
UT	-	Ultrasonic