UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
101 MARIETTA STREET, N.W., SUITE 2900
ATLANTA, GEORGIA 30323-0199

Report Nos.: 50-390/94-85 and 50-391/94-85

Licensee: Tennessee Valley Authority
6N 38A Lookout Place
1101 Market Street
Chattanooga, TN, 37402-2801

Docket Nos.: 50-390 and 391 License Nos.: CPPR-91 and CPPR-92

Facility Name: Watts Bar 1 and 2

Inspection Conducted: December 12-16 and 20-23, 1994

Inspector: J. L. Coley Jr. 1-23-95
J. L. Coley Jr. Date Signed

Approved by: P. E. Fredrickson, Chief, Watts Bar Construction Branch
Division of Reactor Projects 1/23/95
Date Signed

SUMMARY

Scope:

NRC Inspection Manual Chapter (MC) 2512, Construction Phase Inspection Program, was initially completed in 1985 for Watts Bar Unit 1. Post-1985 inspection activities were not correlated to the MC 2512 Program. In anticipation of licensing Unit 1 a decision was made by NRC to reconstitute the completion of the MC 2512 inspection program procedures using post-1985 inspection activity. For inspection procedures that were not satisfied using post-1985 data, inspectors were to complete them by inspection if the activity could be inspected with the plant in its current construction status.

This report documents the completion of the post-1985 data review for the welding and nondestructive examination procedures delineated below. The report also documents inspector activities conducted to examine TVA documents, procedures, and work activities for inspection procedure attributes not sufficiently addressed as a result of the review of post-1985 inspection reports.

The following NRC inspection procedures were examined: 55050 (Nuclear Welding General Inspection Procedure), 55100 (Structural Welding General Inspection

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Procedure), 55093B (Reactor Vessel Internals Welding), 55150 (Weld Verification Checklist), and 57090 (NDE Radiographic Inspection Procedure).

Results:

In the areas inspected one non-cited violation (Failure to Follow Procedure for Marking Bare Wire Welding Filler Materials, NCV No. 50-390,391/94-85-01, paragraph 2.4), was identified. One weakness was identified pertaining to QC verbally releasing a welder to weld prior to signing-off a prerequisite holdpoint, paragraph 2.4. In addition, one inspector concern was identified regarding a welding procedure with base material references which was not readily retrievable to the acceptable materials listed in the AWS Code of Record, paragraph 2.2. This concern will be resolved during the closure review for open violation 50-390,391/86-14-03. Other activities examined were found to be satisfactory.

This report documents the completion of the document review portion for the above welding and nondestructive examination (NDE) inspection procedures. It also documents the inspection results of the on-site inspection phases for the inspection procedures listed in the scope above. Based on the document review and inspection, the above referenced inspection procedures were considered complete.

REPORT DETAILS

1.0 Persons Contacted

TVA Employees

*T. Dean, Nuclear Licensing Engineer
K. Galloway, Welding Engineer
*J. Hubbard, QA Specialist
*M. Medford, Vice President, Engineering & Technical Services
*D. Nunn, Vice President, New Plant Completion
*P. Pace, Compliance Licensing Manager
*G. Pitzl, Welding Engineering Unit Manager
*J. Scalice, Site Vice President
*M. Singh, Plant Completion Group
*L. Spiers, Site QA Manager
*N. Wamack, Corporate Engineering Specialist

Other TVA and contractor employees contacted during this inspection included engineers, QA/QC personnel, craft personnel, technicians, and administrative personnel.

Stone and Webster Engineering Corporation

*A. Reynolds, QC Manager

NRC Employees

*C. Julian, Branch Chief, TVA Startup
*J. Lara, Resident Inspector

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

2.0 MC 2512 Reconstitution Program

Background information

NRC Inspection Manual Chapter (MC) 2512, Construction Phase Inspection Program, was initially completed in 1985 for Watts Bar Unit 1. Post-1985 inspection activities were not correlated to the MC 2512 Program.
In anticipation of licensing Unit 1, a decision was made by NRC management to reconstitute NRC's MC 2512 Inspection Program using post-1985 inspection activity and to document the completion of the inspection procedures. For inspection procedures that were not 100% satisfied using the post-1985 data, inspectors were to determine if the activity could be inspected with the plant in its current construction status and to coordinate the inspection if possible. During this inspection the inspector performed the site examination portion of NRC's MC 2512 initiative for the inspection procedures delineated in paragraphs 2.1, 2.2, 2.3, and 2.4 below.

During the site review of procedures the inspector found that many of the licensee's programmatic procedures were applicable to all Watts Bar (WB) welding processes (ASME, AISC, and AWS) since the most restrictive Code requirements (ASME) were used in their development. Therefore, these programmatic procedures were applicable to attributes in more than one NRC inspection procedure. Procedures in this category which were reviewed by the inspector are as follows:

- SSP 7.50 Revision 10, entitled: Controlling WBS Processes. This site standard practice (SSP) provides processes for use by WBN personnel for the process control of welding, brazing, and soldering (WBS). The SSP implements the welding program specified in TVA's Nuclear Power STD 73 and provides standard processes for a unified program in nuclear power.

- SSP 7.51 Revision 3, entitled: Controlling WBS Materials. The purpose of this SSP is to establish a standard process for controlling WBS materials during the performance of the following activities (1) evaluating, purchasing, receiving, storing, and issuing WBS materials; (2) obtaining, controlling, and returning WBS materials issued for use and maintaining welder certification by using the WBS material requisition cards.

- SSP 7.52 Revision 3, entitled: Qualification, Certification, and Continuity of Personnel Performing WBS. The purpose of this SSP is to establish administrative controls and provide standardized methods and requirements for qualification and certification of nuclear power personnel performing WBS, certification documentation and certification maintenance.

- SSP 10.01 Revision 10, entitled: Procurement of Materials and Services. This document describes the procurement process administratively.

- SSP 10.02 Revision 20, entitled: Material Receipt and Inspection. This document defines the requirements for receipt and inspection of components, materials, and spare parts procured or supplied for the operation, maintenance, and modification at WBN.

- SSP 10.3 Revision 17, entitled: Material Handling, Storaging and Shipping. This procedure defines requirements and establishes controls for handling and storage of material and equipment received at WBN.

- QAI 10.04 Revision 11, entitled: Material Receipt Inspection. The purpose of this instruction is to delineate the receiving inspection requirements of QA Level I, II, and III quality related materials, components, and spare parts procured or supplied for the operation, maintenance and modification of WBN.

- SSP 3.01 Revision 9, entitled: Quality Assurance Program, this procedure implements TVA's Nuclear Power Standard 3.1 (Quality Assurance Program) and verifies program implementation through inspection assessments, auditing, and reviewing processes.

2.1 Nuclear Welding General Inspection Procedure (55050) Unit 1

This inspection procedure is for the examination of materials, welding procedures, welder performance qualification, welding processes and visual and NDE examinations of pipe welds. The MC 2512 reconstitution program provides verification of the completion of the MC 2512 Inspection Program for the specific area examined.

2.1.1 Review of Post-1985 Inspection Reports

The inspector conducted a review of applicable inspection reports for inspections conducted since January 1, 1986, to determine if sufficient documentation existed to satisfy the requirements of Inspection Procedure 55050. Documented inspection activity from the following inspection reports were used to verify the completion of the inspection procedure: Inspection Reports 50-390, 391/86-14; 86-20; 87-10; 89-04; 90-04; 90-28; 91-17; 91-32; 92-20; 93-02; 93-08; 93-19; 93-38; 93-84; 94-05; 94-16; 94-49; and 94-79. All but eight inspection attributes were verified to have been satisfied during this inspection report review. The eight attributes are addressed in paragraph 2.1.2

2.1.2 Site Inspection of ASME Welding Activities

The inspection attributes which were not addressed sufficiently during the data base review of post-1985 inspection activities are listed below, as well as the inspection findings noted during this inspection by reviewing procedures, documents, records, and interviews with cognizant personnel. The applicable code for pipe welding at Watts Bar Unit 1 is the ASME B&PV Code Section III, 1971 Edition with Addenda through Summer 1973.

- Inspection attribute No. 021.b: Evaluate base material/filler metal combinations other than those listed in Table I of the inspection module to determine the suitability of application.

  Inspection finding: Base material/filler metal combinations listed in Table I were inclusive for materials used in ASME welding activities at Watts Bar. The inspector examined this attribute by inspecting filler materials available for issue in the weld rod issue station, reviewing completed ASME weld packages and by interviewing TVA's welding engineer. The inspector considers this issue to have been addressed satisfactorily by TVA.

- Inspection attribute No. 021.c.1: Verify that TVA/contractor has established procedures and instructions for purchasing, receiving, storing, disbursing, and handling of welding materials including welding electrodes, filler material, consumable inserts, fluxes, and gases.

  Inspection finding: The inspector reviewed the following licensee procedures which dealt with the purchasing, receiving, storing, disbursing and handling of welding materials: SSP 7.51 Revision 3, "Controlling WBS Materials," SSP 10.01 Revision 10, "Procurement of

Materials and Services," SSP 10.02 Revision 20, "Material Receipt and Inspection," SSP 10.03 Revision 17, "Material Handling, Storaging and Shipping," and QAI 10.04 Revision 11, "Material Receipt Inspection." The inspector considered this issue to have been satisfactorily addressed by TVA procedures.

- Inspection attribute No. 021.c.2: Review a sample of welding material purchasing and receiving records to verify that these operations are conducted in accordance with approved procedures or instructions.

  Inspection finding: The inspector reviewed the complete requisition packages for the following welding material requisitions: Requisition Nos. 9400021128, 9300013679, and 9400009715. The review of the requisition packages, which included the purchase orders and receiving documentation revealed that these activities were conducted in accordance with the approved procedures.

- Inspection attribute No. 024.a.18: Verify that backgouging, if applicable, is performed as specified.

  Discussions with TVA's Welding Engineer concluded that there has been no ASME welds where backgouging was required since January 1,1986 and none are planned. Work activities have presently progressed beyond the point where backgouging would be performed. Therefore, the inspector concluded that this inspection attribute had been successfully addressed by NRC as a result of the 100% reverification of Class 1 & 2 radiographic film which would reveal backgouging problems.

- Inspection attribute No. 024.a.21.c: Review a repair involving metal removal by thermal cutting or gouging followed by rewelding.

  Discussions with TVA's Welding Engineer revealed that to his knowledge there has been no thermal cutting or gouging on ASME piping in the post-1985 time frame and none is presently planned. A review of ASME weld packages delineated in this report also supported this statement. Therefore, the inspector concluded that this inspection attribute had been successfully addressed by NRC as a result of the 100% reverification of Class 1 & 2 radiographic film which would reveal problems caused by thermal cutting or gouging.

- Inspection attribute No. 024.a.25: Verify that the TVA/contractor has a periodic preventive maintenance program for welding equipment used for welding of safety-related materials.

  The inspector's examination of this issue revealed that TVA did not have their welding equipment in a periodic preventive maintenance program. However, TVA had elected to verify the effective operability of their welding equipment by having QC perform surveillance inspections in accordance with Site Standard Procedure 3.01 Revision 9, paragraph 2.10. These surveillance inspections are conducted five times a week in the welding area and welding equipment voltage and amperage are verified. The inspector reviewed QC surveillance reports for the past 2 years and

concluded that this inspection attribute is satisfied based on the surveillance program in place.

- Inspection attribute No. 025.a: Verify that approved procedures are available for weld joint preheating when required by a welding procedure specification. These procedures should specify acceptable preheating methods and provide requirements for monitoring and recording preheat temperature before, during and if specified, after welding until post weld stress relief.

  The inspector's examination revealed that SSP 7.50 Revision 10, entitled: Controlling WBS Processes, paragraph 4.1.10 pages 10 and 11 and Appendix X pages 138 and 139 adequately addressed this inspection attribute.

- Inspection attribute 025.g: Verify that procedures are available for conduct of intermediate or "non-code" stress relief of in-process components if such treatments are used in component fabrication.

  Discussions with TVA's welding engineer revealed that intermediate or "non-code" stress relief has not been used at Watts Bar and that TVA does not have a procedure for the process.

In performing the regional data base review of this inspection procedure the inspector had noted that previous reports had documented the review of 15 ASME Class I weld packages, 16 Class II weld packages and 7 Class III weld packages. However, the inspection procedure had suggested that records for 30 welds for each ASME subsection should be used. To address the suggested sample size the inspector selected the 15 Class I, 14 Class II, and 23 Class III weld packages listed below to review. The records were reviewed to determine if the proper welding procedure had been used, weld joints were properly identified on reference weld maps, correct weld filler materials and base material combinations were used, proper joint design and preheat used, correct NDE used and inspection holdpoints documented satisfactory.

CLASS I Weld Records Reviewed	CLASS II Weld Records Reviewed
1-062B-T199-23	1-063B-T234-64
1-062B-T199-26	1-063B-T234-77
1-062B-T199-32	1-063B-T234-78
1-062B-T199-35	1-063B-T234-79
1-062B-D036-36	1-063B-T234-80
1-063B-T029-30	1-063B-T234-81
1-062B-T199-35 Repairs 1&2	1-063B-T234-82
1-062B-D036-38	1-001A-N115-16
1-062B-D036-41	1-001A-T115-26E
1-062B-D036-46	1-001A-T115-26F
1-062B-D036-49	1-001A-T118-41
1-063B-T058-40	1-001A-T118-42
1-063B-T061-11	1-001A-T135-13
1-063B-T061-18 Cut 1	1-001B-N095-01
1-063B-D092-07A	1-001B-N095-02

CLASS III Weld Records Reviewed

0-032G-T071-99E
0-032G-T071-99F
0-032G-T071-99H
0-032G-T071-99J
0-032G-T071-99K
0-032G-T071-99L
0-032G-T071-99M
0-032G-T071-99N
0-032G-T071-99P
0-032G-T071-99Q
0-032G-T071-99R
0-032G-T071-99S
0-032G-T071-99U
0-032G-T077-10 Cut 1
0-032G-T077-11 Cut 1
0-032G-T078-25 Cut 1
0-032G-T078-26 Cut 1
0-032G-T085-01D Cut 1
0-062A-T014-05 Cut 1
0-062A-T014-05A
0-003C-T093-04 Cut 1
0-003C-T093-4A Cut 1

Within the areas examined, no violation or deviation was identified. Inspection Procedure 55050 is considered complete.

2.2 Structural Welding General Inspection Procedure (55100) Unit 1

This inspection procedure is for the examination of materials, welding procedures, welder qualification, welding processes and visual and NDE examinations of structural welds. The MC 2512 reconstitution program provides verification of the completion of the MC 2512 Inspection Program for the specific area examined.

2.2.1 Review of Post-1985 Inspection Reports

The inspector conducted a review of applicable inspection reports for inspections conducted since January 1, 1986, to determine if sufficient documentation existed to satisfy the requirements of Inspection Procedure 55100. Documented inspection activity from the following inspection reports were used to verify the completion of the inspection procedure using a representative sample of 15 welds to verify post-1985 production welding: Inspection Report Nos. 50-390, 391/86-20; 89-04; 90-15; 90-28; 90-20; 93-38; 94-49; and 94-79. All but 15 attributes were verified to have been satisfied during the inspection report review. These 15 attributes are addressed in paragraph 2.2.2.

2.2.2 Site Inspection of AWS Welding Activities

The inspection attributes which were not addressed sufficiently during the data base review of post-1985 inspection activities are listed below as well as the inspection findings made this inspection by reviewing procedures, documents, records, and interviews with cognizant personnel. The applicable code is the American Welding Society Code (AWS D1.1, 1972 Edition with revisions through 1974 as modified by TVA's General Construction Specification G-29).

- Inspection attribute No. 021.b: Evaluate base material/filler metal combinations other than those listed in Table 4.1.1 of the AWS Code to determine the suitability of application.

  Inspection finding: TVA uses the gas tungsten arc welding (GTAW) process for AWS welding. This process is not addressed by the AWS Code but base material and filler material compatibility would be similar to the gas metal arc welding (GMAW) process which is referenced in the Code. Therefore, this process was suitable for AWS material applications. This attribute had been satisfactory addressed by TVA.

- Inspection attribute No. 021.c: Verify that welding materials are clearly identified at all times and that contractor/TVA has established adequate controls to assure proper dispersion and handling of welding materials.

  Inspection finding: SSP 7.51 Revision 3, provided adequate controls to assure proper dispersion and handling of welding materials.(See paragraph 2.4, for non-cited violation on marking of bare wire filler materials.) This item had been satisfactorily addressed by TVA.

- Inspection attribute No. 022.a: Verify that the contractor/licensee or fabricator has established procedures or instruction for preparation, qualification approval/certification, distribution and revision of welding procedure specifications (WPS).

  Inspection finding: TVA's Site Standard Practice 7.50, Revision 10, established controls for developing, controlling, and revising welding procedure specifications. This item had been satisfactorily addressed by TVA.

- Inspection attribute No. 022.d. Review two welding procedure (WPS) from each welding process used in production welding and verify their conformance to the AWS Code.

  Since TVA's welding engineer stated that, AWS submerged arc welding (SAW) and flux core arc welding (FCAW) processes were not used at Watts Bar. The inspector needed only to review two GTAW Detail welding procedures to complete this inspection attribute. The two welding procedures reviewed were GT-P-1, Revision 3 and GT-U-1, Revision 2. Both procedures were found to have been developed in accordance with the AWS Code.

Inspection attribute No. 022.e: Verify that each of the procedures mentioned in inspection attribute No. 022.d above has been qualified in accordance with Section 5 of the AWS Code and the supporting procedure qualification records (PQR) are on file.

The inspector's review revealed that TVA had a PQR on file where necessary for each WPS addressed in attribute No: 022.d. The inspector's review also revealed that the AWS Code essential elements were implemented in the PQRs satisfactorily.

Welding Procedures	Supporting PQR"S
GT-P-1 Revision 3	GT11-0-1
GT-U-1 Revision 2	GT-1X-0-1 & GT-1X-0-A
SM-P-1 Revision 15	SM-P-1 & SM11-B-3
SM-U-1 Revision 11	SM11-B-9 & SM11-B-3
GM-SD-L-1 Revision 2	Prequalified PQR Not Required
GM-SD-P-1 Revision 3	Prequalified PQR Not Required

Inspection attribute No. 022.f: Verify that each of the above PQRs lists the essential variables for the specific welding process or processes covered and that the values or ranges of these variables are consistent with those permitted by the WPS and within the limits of the AWS Code.

Essential variables for the welding procedure specifications listed below which include the above WPSs and their PQRs if applicable were reviewed by the inspector.

Welding Specification	Procedure Qualification Report
SM-P-1 Revision 15	SM-P-1 & SM11-B-3
SM-P-6 Revision 1	SM-P-6
SM-P-2 Revision 1	
SM-P-3 Revision 3	
SM-P-7 Revision 1	
SM-P-11 Revision 1	
SM-P-13 Revision 0	SM-P-13
SM-U-1 Revision 11	SM11-B-9 & SM11-B-3
GT-P-1 Revision 3	GT11-0-1
GT-U-1 Revision 2	GT-1X-0-1 & GT-1X-0-A
SM-U-1B Revision 7	
SM-U-4 Revision 2	
GM-SD-L-1 Revision 2	
GM-SD-P-1 Revision 3	
GM-SD-U-1 Revision 2	

The inspector's review of the above WPSs and PQRs revealed only one concern. The concern involved A519 Gr 1018 and 1026 base material reference in WPS SM-P-11. This base material was not delineated in the AWS Code of record for Watts Bar. The WPS had an asterisk by the base material entry and a note at the bottom of the page which stated that, the material was applicable when chemical and minimum yield strength

conformed to the requirements of A709 Grade 36 which was referenced in the code of record. The WPS also did not reference a PQR which would have been required by the code of record. Subsequent discussions with TVA Welding Engineers revealed that the subsequent edition of the AWS Code from the code of record allowed equivalent material to be substituted. In addition, TVA provided a PQR that covered this material application. TVA took immediate corrective action by revising the WPS to include PQR SM-P-13 which would accept this material application. The licensee also stated that a review would be performed to determine if any other WPS had referenced a subsequent edition of the code from the code of record for material acceptance.

Discussions with the senior resident inspector relating to the above concern revealed that there was an open violation (No. 50-390,391/86-14-03) on this issue. The reference used with the code of record which stated, "As modified by TVA's General Construction Specification G-29," had been interpreted by TVA to mean that subsequent editions of the code from that listed in the FSAR could be used. The inspector identified that this issue would be resolved with the closure of Violation 50-390,391/86-14-03, "Failure to Establish Measures to Ensure that Deviations from Design Specification were Controlled."

- Inspection attribute No. 022.g: Verify that all mechanical tests required by Section 5 of the AWS Code have been completed and are properly documented in the PQR.

  The inspector's review of the PQRs listed in attribute No. 022.f. above revealed that mechanical test requirements for all applicable PQRs had been performed and documented. This item is complete.

- Inspection attribute No. 022.h: Verify that the PQRs have been certified by the contractor/TVA and that mechanical test results met or exceed the minimum AWS Code requirements.

  The inspector's review of the PQRs listed in attribute No. 022.f. above revealed that they had been certified by TVA and that they met or exceeded all applicable test requirements.

- Inspection attribute No. 022.i: Verify that any changes or revisions of the WPS essential variables are supported by requalification of the original WPS or a new WPS.

  The inspector's review of WPSs listed in attribute No. 022.f. above revealed that changes to essential variables were supported by requalification of the original WPS or a new WPS.

- Inspection attribute No. 023.a: Verify that the manufacturer has established procedures for qualification of welders and welding operators in accordance with Section 5, Parts C and D of the AWS Code. These procedures should include adequate provisions to preclude falsification of welders and welding operator's qualification.

The inspector's review revealed that SSP 7.52 Revision 3, entitled: Qualification, Certification and Continuity of Personnel Performing WBS, established administrative controls and provided standardized methods and requirements for qualification and certification of personnel performing WBS at Watts Bar. Paragraph 2.1.4.G.1.a of this document also required verification of positive ID prior to taking a performance qualification test.

- Inspection attribute No. 024.k: Verify that shielding gas flow and composition is as specified in the WPS.

  During the inspection period documented by this report the inspector did not observe any AWS welding that used shielding gas. The inspector did observe however, the GTAW process used on the CRDM guide funnels as delineated in paragraph 2.4 of this report. Gas composition and flow was verified during this welding activity which was classified as "non code". Since this process is used infrequently for AWS welding at this time, the inspector concluded that the field observation of the welding process was sufficient to satisfy the intent of this attribute.

- Inspection attribute No. 024.l: Verify that shielding gas flowmeters indicate the gas type for which they are applicable and have appropriate conversion factors if a different gas or gas mixture is used for work under review.

  The inspector observed (as delineated in attribute 024.k. above) that TVA was using argon gas and argon gas gages during this welding activity.

- Inspection attribute No. 024.p: Verify that backgouging, if applicable, is performed as specified.

  Backgouging of AWS welds has not been performed for several years at Watts Bar. The inspector did however, find one repair package Work Order (No. 92-05951-00) which had been completed on October 28, 1992, that had gouged out several defects on welds 1-92-05951-02A & 02B. The inspector reviewed the processes used and the inspection results for this work order and concluded that these actions satisfactorily addressed this inspection attribute.

- Inspection attribute No. 024.r: Verify by direct observation and/or record review that repairs are conducted in accordance with specified procedures.

  As stated for attribute No. 024.p. the inspector reviewed the repair package delineated in Work Order No. 92-05951-00. The inspector's review of this package revealed that all work had been completed in accordance with the applicable procedures and documented satisfactorily.

- Inspection attribute No. 025.d: Verify that approved procedures are available for the conduct of postweld heat treatment and that the fabricator has a system capable of meeting the heating and cooling

rates, metal temperature, temperature uniformity and control limits specified in paragraph 4.4 of the AWS Code.

TVA's SSP 7.50 Revision 10, entitled: Controlling WBS Processes, covers post weld heat treatment. This document is applicable for both ASME and AWS applications.

Within the areas examined, no violation or deviation was identified. Inspection Procedure 55100 is considered complete.

2.3 Radiographic Inspection Procedure (57090) Unit 1

This inspection procedure is for the examination of the radiographic inspection procedure, observation of work activities, and review of records. The MC 2512 reconstitution program provides verification of the completion of the MC 2512 Inspection Program for the specific area examined.

2.3.1 Review of Post-1985 Inspection Reports

The inspector conducted a review of applicable inspection reports for inspections conducted since January 1, 1986, to determined if sufficient documentation existed to satisfy the requirements of Inspection Procedure 57090. Documented inspection activity from the following inspection reports were used to verify the completion of the inspection module: Inspection Reports Nos. 50-390, 391/86-09; 89-04; 90-15; 90-20; 90-28; 91-23; 91-32; 92-20; 93-08; 93-19; and 93-38. All but two inspection procedure attributes were verified to have been satisfied during this inspection report review, these two attributes are addressed in paragraph 2.3.2.

2.3.2 Site inspection of Radiographic Examination Activities (57090) Unit 1

The inspection attributes which were not addressed sufficiently during the data base review of post-1985 inspection activity are listed below:

- Inspection attribute No. 02.01.c: For each digital radiographic image procedure, ascertain that the procedure meets the requirements of the NRC Generic Letter 88-18, "Plant Record Storage of Optical Disks" and ASME Section V, Article 2, Mandatory Appendix, "Digital Image Acquisition, Display, and Storage for Radiography and Radioscopy."

  Discussions between TVA's Nondestructive Examination (NDE) Supervisor and the inspector revealed that Watts Bar had not digitized any radiographs for storage or enhancement and did not have a site procedure or the equipment to do so. Therefore this inspection attribute was not applicable.

- Inspection attribute No. 02.03.d: Review a randomly selected sample of at least 10 but no more than 30 accepted digital radiographic images and determine whether the digital image quality is in accordance with the applicable procedure requirements.

As stated in Inspection Procedure Item No. 02.01.c above, TVA's NDE supervisor stated that, Watts Bar has not digitized any radiographic film; therefore this inspection attribute was not applicable.

Within the areas examined, no violation or deviation was identified. Inspection Procedure 57090 is considered closed.

2.4 Reactor Vessel Internals Welding and Associated Activities (55093B)

This inspection procedure covers verification of weld identification, weld preparation, welding filler materials, and observation of reactor vessel internals welding. The MC 2512 reconstitution program provides verification of the completion of the MC 2512 Inspection Program for the specific area examined.

2.4.1 Review of Post-1985 Inspection Reports

The inspector conducted a review of applicable inspection reports for inspection conducted since 1985 to determine if sufficient documentation existed to satisfy the requirements of Inspection Procedure 55093B. This review revealed that no inspection activity had been performed by NRC in this area during the post-1985 time period.

2.4.2 Site Inspection of Reactor Vessel Internals Welding Activities

During the inspector's visit, TVA elected to initiate an enhancement that Westinghouse had recommended to provide an additional welded lock for the CRDM guide funnels in order to prevent potential damage to the CRD drive shaft. The enhancement required that two 2 X 1/8 inch fillet welds 120° apart be made at the top of the guide funnel to the OD of the thermal sleeve on all 57 CRDM's. As a result the inspector was able to perform this inspection procedure in its entirety as delineated below.

- Inspection attribute No. 1: Ascertain whether weld identification records are established to permit accurate weld data in compliance with TVA's procedures. Select six weld identification records and verify accuracy of these records. Check one weld location for accuracy.

  The inspector reviewed Work Order 94-23246-00, Design Change Notice No. W-33731-A, weld records for each of the 57 CRD Core locations, and the weld map used to identify and coordinate each weld location. The inspector physically verified that welds 1 through 6 were at Weld Map location B4, B6, B8, B10, B12, and C11 as designated. The inspector also observed the welding process on welds No. 2 and 4.

- Inspection attribute No. 2: Ascertain by direct observation whether weld preparation activities insure that the surfaces are smooth, free of scale, rust, oil, and other deleterious foreign material including moisture. In addition verify that the work area is protected from deleterious contamination, and that component alignment and gap is accomplished in accordance with TVA's sequence work specifications.

The inspector observed a QC examiner perform the pre-weld examination for welds No. 1 thru 6. The inspector subsequently verified that the QC examiner had conducted the examinations satisfactory. However, at the conclusion of the pre-weld examination the QC examiner verbally instructed the welder that he could start welding and the examiner prepared to leave. The inspector questioned the QC examiner's verbal acceptance and release of the welder to start welding prior to signing the pre-weld hold point. The inspector was informed by the QC examiner that his procedure allowed him to do that. The inspector requested the QC examiner to bring his procedure with him when he came back to perform additional pre-weld examinations. The QC examiner then explained that his procedure did not specifically allow him to verbally accept a weld or to release the welder to weld. But it required him to fill out a pre-weld checklist each time he made an inspection and he had not brought this checklist with him. In addition, the QC examiner stated that he was also required to make a copy of his signature on the weld records when he signed them. Therefore, he concluded that it would be simpler to perform the additional requirements at a later time. The QC examiner subsequently decided that he should complete his inspection before releasing the welder, and he and the welder went to the examiner's field office to fill out a pre-weld checklist, and to sign and copy the weld records.

TVA's SSP 3.01 entitled: Quality Assurance Program, and SSP 7.50 entitled: Controlling WBS Processes, both state in part that "Work shall not proceed beyond designated inspection points until QC inspection is complete." Although the welder had not welded before the QC examiner had signed the inspection hold point the inspector concluded that this was only because he had challenged the verbal practice. In addition, since this job was being worked on night shift the inspector was concerned that nightshift personnel might not be adhering to procedure requirements which insure that processes are properly controlled. Therefore, this item was identified as a weakness in controlling weld processes. In the exit meeting TVA's Management stated that, an investigation would be performed and that NRC would be informed of it's findings on December 29, 1994. Results of this investigation were discussed with TVA by telecon on December 29, 1994. Corrective actions taken by TVA are delineated in Adverse Condition Report No. WBPER94073.

Inspection attribute No. 3: Ascertain by direct observation and evaluation whether the storage, handling, and control of welding materials complies with TVA's procedures. These procedures should include the following: suitable facilities provided for welding materials; precautions taken to minimize the absorption of moisture coated electrodes; only authorized personnel allowed to withdraw material; proper amounts of correct material are dispersed; unused material returned and properly dispositioned; temperature and humidity are controlled for weld filler materials after removal from original cans; dispensing of welding material is done in accordance with approved documentation controls; and no unidentified weld filler material is in evidence at work and storage areas.

The inspector's examination of TVA's storage, handling, and control of welding material found these to be very good with one exception. The exception was that TVA's Site Standard Practice 7.51, Revision 3, entitled: Controlling WBS Materials, Appendix B, Attachment B, page 13 of 15 states that, "Prior to or immediately after removal of bare WBS materials from identified packages or containers each end shall be tagged with applicable AWS classification or weld filler materials listed below color coded with the appropriate color as outlined in the chart." TVA color codes both ends of the bare wire because it comes in 36" lengths but is cut into two 18" lengths for issue.

Contrary to the above the following bare wire materials were observed with ID or color coding only on one end and in one case (HT. No. AU2603158A) no ID or color coding on either end.

- 1/16" ER308L HT. No. AT6207

- 3/32" ER70S6 HT. No. 81202

- 1/16" ER70S6 HT. No. 57968

- 3/32" ER5356 HT. No. AR1002089D

- 1/16" ER308 HT. No. AT5758

- 1/8" ER308 HT. No. DT6208

- 3/32 RBCUZN-A Naval Bronze HT. No. AU2603158A ** No ID on wire

TVA took immediate corrective action and color coded each end of the stored bare wire filler materials. Examination of bare wire staged for issue revealed that all of these materials were marked correctly. Therefore, since the materials issued were marked satisfactorily and TVA had taken the immediate corrective action of marking each end of the bare wire filler materials reported above this NRC identified violation (50-390,391/94-85-01, Failure to Follow Procedure for Marking Bare Wire Filler Materials) was reported as a non-cited violation because the criteria specified in Section VII.B of the NRC Enforcement Policy were satisfied.

- Inspection attribute No.4: Ascertain whether the attributes listed below are adhered to and in compliance with approved licensee welding procedures. Note: The inspector disposition follows each attribute.

  - Weld identification/location corresponds to respective drawing, work order or other documentation.

    Weld identification/location was identified on a weld map in the work order package. The inspector verified the correct location of welds 1-6.

- Welding material used corresponds with the material specified.

  TVA's Detail Welding Procedure Specification No. GT88-0-1-N Revision 3, required that weld filler materials: Type SFA5.9 F-No.6 A-No.8 Class (ERXXX) be used. The welder correctly used .062 inch, ER308, Heat No. AT5758, which was also the satisfactory size to produce the 1/8 inch fillet weld.

- Welder's qualification meets the requirement for the weld being observed.

  The inspector's review of the welder's certifications revealed that the welder had been qualified by taking a 2" X 3/8" pipe test in the 6G position. This test would qualify him to make a fillet weld in any position.

- Applicable welding procedures are being used and comply with the appropriate specifications and code requirements.

  Welding was performed in accordance with General Welding Specification Procedure 1.M.1.2 (ASME) as required by DCN 33731-A, using Detail Welding Procedure Specification GT88-0-1-N Revision 3. This was the correct welding procedure for the process.

- Fitting and alignment methods secure final weld joints with offsets not to exceed the maximum allowable dimensions specified by the ASME Code.

  As a result of a previous modification the guide funnels had been secured in place on the CRDM thermal sleeve by plug welding. Therefore the alignment had been fixed. In addition, a note on page 9 of DCN 33731-A stated that since this is a locking weld only and not a structural weld the gap between the bell and sleeve need not be considered.

- Tack weld and temporary attachments are removed unless tack welds are allowed to be incorporated into the final welds.

  This attribute is not applicable as stated in the attribute above.

- Filler metal, electrode size, type and shielding gas, current, and voltage has been predetermined for each weld. The essential variables specified and demonstrated in the procedure qualification are being satisfied in the production welds.

  The inspector's review of all the above welding procedure parameters and supporting PQRs revealed that each variable was correct and being used as directed to make satisfactory welds.

- The welding technique is applied as specified for the root portion and the remainder of each joint.

This attribute is not applicable; the fillet weld was made with one pass.

- Surface of welds are free from coarse ripples, grooves, overlaps, abrupt ridges, valleys, and undercut.

  As stated in Inspection attribute No. 2 above, this attribute was confirmed satisfactory in the pre-weld inspection.

- Predetermined hold points are observed for QC examinations and welding does not proceed prior to QC acceptance and release.

  Deviation to this item is addressed in Inspection attribute No. 2 above.

- Starting points of each successive pass are staggered.

  Not applicable, this was a single pass fillet weld.

- The welder inspects each bead or layer and corrects observed deficiencies such as sidewall undercutting.

  The welder did inspect each fillet. However, he did not experience any problem making the fillet welds.

- Interpass temperatures are observed.

  Not applicable, this was a single pass weld.

- Unused filler materials are returned to the welding material storage facility.

  The inspector observed that welders brought back their unused filler material and this material was being properly disposed.

- Weld repair, defect removal technique, defect removal verification and re-examination of repair work comply with applicable procedures, codes and standards.

  No repairs were necessary when the inspector performed his examination of the process.

- NDE is performed as specified.

  The NDE required was visual examination. The inspector did not see a final visual examination on a completed weld by QC. However, the inspector performed a visual inspection of the 2 welds that had been completed as well as the 6 pre-weld visual examinations and no problem was observed with the visual examinations.

Within the areas examined, no violation or deviation was identified with the exception of the NCV reported in Inspection attribute No. 3. above. Inspection Procedure 55093B is considered complete.

2.5 Weld Verification Checklist (55150) Unit 1

This inspection is to provide guidance to the generalists inspector performing inspection of welding activities and is to be used in conjunction with the more detail Inspection Modules 55050 for ASME welding and 55100 for AWS welding.

2.5.1 Review of Post-1985 Inspection Reports

The inspector conducted a review of applicable inspection reports for inspections conducted since January 1, 1986 to determine if sufficient documentation existed to satisfy the requirements of Inspection Procedure 55150. The inspector found that this inspection procedure has been used several times by resident inspectors but usually to document a welding problem such as welder requalification status, rejectable radiographic film, or to status microbiologically induced corrosion (MIC) problems. Therefore, to demonstrate that the elements of this procedure has been satisfactorily accomplished the inspector addressed the checklist attributes with resident and engineering inspection activity which had been used to document inspection modules 55050 and 55100. The following inspection reports were used in this review: Inspection Reports Nos. 50-390, 391/90-28; 92-20; 93-08; 93-38; 93-84; 94-05; 94-16; 94-49; and 94-79.

Within the areas examined, no violation or deviation was identified. Inspection Procedure 55150 is considered complete.

3. Exit Interview

The inspection scope and results were summarized on December 23, 1994, with those persons indicated in paragraph 1. The inspector described the areas inspected and discussed in detail the inspection results listed below. Proprietary information is not contained in this report. Dissenting comments were not received from the licensee.

(Open/Closed) Non-Cited Violation 50-390,391/94-85-01, Failure to Follow Procedure for Marking Bare Wire Welding Filler Materials, paragraph 2.4.2

(Open) Violation 50-390, 391/86-14-03, Failure to Establish Measures to Ensure that Deviations from Design Specifications were Controlled, paragraph 2.2.2

4. Acronyms

AISC - American Institute of Steel Construction, Inc.
ASME - American Society of Mechanical Engineers
AWS - American Welding Society
B&PV - Boiler and Pressure Vessel
CRDM - Control Rod Drive Mechanism
DCN - Design Change Notice

FCAW	-	Flux Core ARC Welding
FSAR	-	Final Safety Analysis Report
GMAW	-	Gas Metal ARC Welding
GTAW	-	Gas Tungsten ARC Welding
HT.	-	Heat
MC	-	Manual Chapter
MIC	-	Microbiologically Induced Corrosion
NCV	-	Non-Cited Violation
NDE	-	Nondestructive Examination
No.	-	Number
Nos.	-	Numbers
NRC	-	Nuclear Regulatory Commission
PQR	-	Procedure Qualification Report
PWHT	-	Post Weld Heat Treatment
QA	-	Quality Assurance
QC	-	Quality Control
SAW	-	Submerge ARC Welding
SMAW	-	Shielded Metal ARC Welding
SSP	-	Site Standard Practice
STD	-	Standard
TVA	-	Tennessee Valley Authority
WB	-	Watts Bar
WBS	-	Welding, Brazing,and Soldering
WBN	-	Watts Bar Nuclear Plant