U.S. NUCLEAR REGULATORY COMMISSION

Docket No.	50-390/391
Report No.	93-034
License No.	CPPR-91/92
Licensee:	Tennessee Valley Authority Knoxville, Tennessee
Facility Name:	Watts Bar Electric and Steam Generating Station
Inspection At:	Spring City, Tennessee
Inspection Dates:	May 17-20 and June 1-4, 1993

Inspector: [signature] for 7/1/93
R. H. Harris, Technician, Date
Mobile NDE Laboratory, EB, DRS

Approved by: [signature] 7/1/93
M. C. Modes, Chief, Mobile NDE Laboratory, Date
Engineering Branch, DRS

Inspection Summary and Conclusions: An announced inspection was conducted at the Watts Bar Electric and Steam Generating Station during the period May 17-20 and June 1-4, 1993, using the resources and personnel of the NRC Mobile NDE Laboratory. The purpose of this inspection was the independent evaluation of material traceability for selected components in order to ascertain whether the material placed into service met the requirements prescribed for it in the procurement documentation. During this inspection thirty six (36) components were checked for strength by determining the relative hardness of the material placed into service. In addition anchor bolt imbedment length and hardness was evaluated at five (5) areas of the plant. NRC Mobile Laboratory personnel performed insitu chemical analysis of six (6) locations in the plant and eight (8) randomly chosen components from the secured warehouse. The results of these independent evaluations compared favorably with the requirements for hardness, strength and chemical content prescribed for the components selected. Within the limits of the analysis performed, there was no independently obtained quantitative result that intimated the material placed into service did not meet the procurement requirements established for it.

1.0 Introduction

The Code of Federal Regulations (CFR), Title 10, Part 50, Appendix B, Criteria IV, VII and VIII establishes the requirements for the controlled procurement of purchased materials. Criteria VII requires that documentary evidence that material and equipment conform to the procurement requirements shall be available at the nuclear powerplant site prior to installation or use of such material and equipment. This documentary evidence shall be retained at the nuclear powerplant site and shall be sufficient to identify that specific requirements, such as codes, standards, or specifications, has been met by the purchased material and equipment. This traceability is further expanded by the requirement for measures to establish the identification and control of materials, parts and components, including partially fabricated assemblies. These measurements shall assure that identification of the item is maintained by heat number, part number, serial number, or other appropriate means, either on the item or on records traceable to the item, as required throughout fabrication, erection, installation, and use of the item. These identification and control measures shall be designed to prevent the use of incorrect or defective material, parts, and components. It was not clear to NRC Region II personnel from the records kept by Watts Bar that these series of requirements were being satisfied for components, parts or systems in the plant such as ventilation supports, cable tray supports, instrument and air line supports, piping supports and structural reinforcement attachments. These components, parts, and systems indirectly contribute to the prevention or mitigation of the consequences of a postulated accident that could cause undue risk to the public health and safety.

2.0 Hardness Evaluation

2.1 Test Method

Some of the components, structures and assemblies, chosen for evaluation, were located in remote areas of the plant. These areas were such that the method used to determine the essential service parameters would have to be highly portable. If was for this reason that hardness measurements utilizing elastic recoil was used. The equipment is rugged, reliable and portable. The method is also well understood with generally accepted conversion charts available. It is possible to take a recoil value, correct it for probe position, convert it to a standard hardness number and convert the standard hardness number into a tensile value. The correction factor, conversion to standard hardness number and conversion of hardness number to strength each introduce error in the process. This additive error is substantial enough to make the method too inaccurate to comprehensively conclude the specification of a material (such as ASTM A 36) from a small number of hardness values. This is further exacerbated by thin materials because the elastic deformation of the material will contribute to the increase in elastic rebound. This additional energy increases the rebound number. This makes the material ultimately appear softer than it really is. The net result of this error is an added conservatism in determining the strength of thin materials.

2.2 Evaluation

The following components were evaluated for hardness by the NRC NDE Mobile Laboratory personnel: Large Bore Pipe Support 1-74-007; Large Bore Pipe Support 74-1RHR-R63; Large Bore Pipe Support 1-63-585; Large Bore Pipe Support 1-63-358; Large Bore Pipe Support 1-62-359; Small Bore Pipe Support 47A435-8-4; Small Bore Pipe Support 1-63-407; Cable Tray Support 1-CTSP-293-0584; Cable Tray Support 0-CTSP-292-1025; Cable Tray Support 0-CTSP-292-0090; HVAC support 2030-DW920-09H-2502; HVAC Support 2030-DW920-08H-0075; HVAC support 0031-DW930-01H-2841; Conduit Support 0-CSP-292-17523X; Conduit Support 0-CSP-292-35329; Instrument Line Support 1-ISLS-998-0122; Instrument Line Support 1-ISLS-998-0112; Instrument Line Support 1-ISLS-998-105; Large Bore Pipe Restraint Mk RH2: Dwg. 48W937-3; Large Bore Pipe Support W14X211: Dwg. 48W937-2; Reactor Well Liner Plate E16-E16: Dwg. 48N935-16; Large Bore Pipe Support 1067-A450-2-8; Instrument Line Support 1-FOS-63-1193; Cable Tray Support 0-CTSP-292-0160; HVAC Support 0030-DW910-02H-1335; Lare Bore Pipe Support 1063-1SIS-R185; Instrument Line Support FOS-6229-11; Small Bore Pipe Support 1063-1-63-325; Embedded Plate #4: Dwg. 48N995-2A; Instrument Line Support FOS-947; also: Plate 48W937-3-R11, Mk-RC-4; Plate 48W937-2-R17, View AA; Plate 48W937-3-R11, Mk-RH-3; Plate (top and bottom) 48W937-2-R17, View DD; Beam 48W937-2-R17, W10X72; Clamp 48W937-2-R17; Concrete Wall Reinforcing Plates and Bolts in the Auxiliary Building near: Door A143, El:757 of Unit 1; Door A180, El:772 of Unit 1; Door A187, El:772 of Unit 1; Door A193, El:772 of Unit 2; Door A188, El:772 of Unit 2.

2.3 Results

The results of the hardness evaluation were consistent with the requirements prescribed for the component, assembly or structure chosen. These results compared favorably with the results obtained by the licensee for the samples independently verified by the NRC.

3.0 Chemical Analysis

3.1 Test Method

In order to confirm the results of the hardness tests and independently assess the licensees corrective actions in the area of material traceability two sets of samples were chosen for evaluation by x-ray backscatter emission spectroscopy. This method of chemical analysis depends on a source x-ray interacting with the atoms of some elements in the material being tested causing them to emit x-rays which are characteristic of the element. The source x-rays used for this analysis are Cd^{109} and Fe^{55}. These sources are housed in a portable scanning chamber that allows for field analysis of materials that contain sympathetic elements. The instrument used by the NRC is capable of analyzing for Ti, V, Cr, Ni, Cu, Mo, Nb, W, Co, Fe, and Mn when contained in a background matrix of another element. These elements are atomically heavy enough to be excited by an impinging x-ray. This natural limit to the method precludes its application is sorting grades of mild steel because the defining elements that constitute the various grades of steel are too light to be excited by this method (i.e. C, Si, P, S). The samples chosen for this method of analysis must contain a sufficient amount of these heavy elements for the instrument to differentiate the levels among closely grouped types (i.e. 309 and 316 grades of stainless steel). One set of samples fitting these requirements was chosen for insitu testing in the plant. Another set of samples was chosen at random from components contained in the secured material warehouse at Watts Bar.

3.2 Evaluation

The following components were tested insitu: 48W935-19-R9, Section BB, Ladder MK-3, Detail A and Section BB; 48N935-16, Section E16-E16, Curb at Azmith 180, top of the fuel pool, 48N935-16 Section E16-E16, Azmith 180, Liner Top; 48N935-2, Sections D16-D16 and C16-C16. The following components were chosen at random from the secured warehouse: Agitator Shaft, 0-MIXR-062-0226; 2" Flange, TIIC BBY476B, 982957-02; Seamless Annealed Pipe, 1½" O.D. x 0.065" w/t, TIIC BTK 588V, Contract 416 47E; 3" Flange, TIIC BBY 475D, Contract 982957-02; 2" Socket Weldolet, TIIC AGG-795B, Contract 4A1503G; 4" Sch 40S 45° Weldolet, TIIC AAL 433Y, Contract 41575E; Bolt 5" long x 1"-8 thread, TIIC BEE 527L, RD 102464.

3.3 Results

Except for conflicting certification of the bolt, which had no effect on the bolt's serviceability, the results of the NRC's chemical analysis compared favorably with the material make up prescribed by the procurement documentation.

4.0 Management Meetings

Licensee management was informed of the scope and purpose of the inspection at the entrance meeting on March 23, 1992. The findings of the inspection were discussed with the licensee representatives during the course of the inspection and presented to licensee management at the exit interview conducted on June 3, 1993. The licensee did not indicate that proprietary information was involved within the scope of this inspection nor did the licensee express any objections during the exit meeting.

4.1 Persons Contacted

Tennessee Valley Authority

W. Museler	VP
R. Lewis	Proj. Mgr. QA Records
J. Christensen	Site Qual. Manager
D. Koehl	Technical Support Manager
W. Elliot	Engr. Mgr.
L. Peterson	Manager
B. Martocci	Public Relations Manager
T. Dean	Licensing
L. Katcham	Principal Engineer
R. Hicks	Matls. Engineer

U.S. Nuclear Regulatory Commission

J. Blake	Chief, Materials Section RII
B. Crowley	Reactor Inspector RII
K. Ivey	Resident Inspector RII
M. Glassman	Resident Inspector RII

The above listed personnel were present at the exit meeting. The inspector also contacted other administrative and technical personnel during the inspection.