Docket No. 50-390
and 50-391

14 OCT 1986

Mr. S. A. White
Manager of Power
Tennessee Valley Authority
6N 38A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Dear Mr. White:

SUBJECT: REQUEST FOR INFORMATION CONCERNING DRAFT WATTS BAR EMPLOYEE CONCERNS SPECIAL PROGRAM ELEMENT REPORT," HEAT CODE AS RELATED TO MATERIAL CONTROL

The subject draft report (Attachment 1) was provided to the Commission by the House Interior Staff and referenced by Congressman Sikorski during an October 1, 1986 congressional hearing. Congress has requested that the NRC review this report, evaluate its findings and assess any broader implications that may be involved. As stated above, the copy we received was a draft; however, if this document has been subsequently revised, an updated copy should be forwarded to the staff as soon as possible. If the report has not yet been finalized, please provide a scheduled completion date.

In order for the staff to complete our review of this report, several of the referenced documents are required. These documents are listed in Attachment 2. You should reply to this letter and provide the requested documents no later than 30 days from the date of your receipt of this letter.

If you have any questions concerning this matter, please contact B.D. Liaw (FTS-492-7460).

Sincerely,

/S/

B.J. Youngblood, Director
PWR Project Directorate #4
Division of PWR Licensing-A

cc: See next page

DISTRIBUTION:

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PDR ADOCK 05000390
A PDR

Mr. S. A. White
Tennessee Valley Authority

Watts Bar Nuclear Plant

cc:

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Regional Administrator, Region II
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J. A. McDonald
Tennessee Valley Authority
Watts Bar Nuclear Plant
P.O. Box 800
Spring City, Tennessee 37381

Attachment 2

REQUEST FOR ADDITIONAL INFORMATION

DOCKET NOS.: 50-327/328

1. Provide a copy of the latest version (draft or final) of the TVA Employee Concerns Special Program Report "Heat Code as Related to Material Control."

2. If you have not completed the preparation of this report, also provide the date when the report will be finalized.

3. Provide a copy of the following reports and documents referenced in Item #1 above:

   a. Responses to NSRS Report I-84-34-SQN recommendation which were prepared by the Office of the Manager of Construction (C01-85-0529-007) and by the Director of NSRS (Q01-85-0709-054).
   b. Watts Bar Nuclear Plant (WBN) Employee Concerns Task Group (ECTG), (Q01-85-0709-054), "Material Control, Procedural Control, Heat Code", report number MC40703.
   c. SQN Contstruction Specification No. N2M-865, "Field Fabrication, Assembly Examination, and Test for Pipe and Duct Systems," Rev. 3, dated 4/12/77
   d. SNP Construction Procedure No. M-7, Revs 0 through Rev. 15
   e. SNP Inspection Instruction No. 30, "Receipt Inspection" (II-30) Rev. 0 through Rev. 7
   f. SNP Construction Procedure No. P-34, "Heat Number Validation" Rev. 0 and Rev. 1
   g. SNP Inspection Instructino No. II-39. "Heat Code Transfer and ASTM Designator Transfer" Rev. 0 through Rev. 2
   h. SNP Inspection Instruction No. 74,"Fit up and Cleanliness", Rev. 0 through Rev. 6
   i. An Example of a "Weld History Record"
   j. An Example of a "TVA SQN Weld Map"
   k. An Example of a TVA 209 Receiving Report
   l. An Example or description of the "LM Sheets"

You should also forward any other related documents that in your opinion would be necessary or helpful to our performance of this evaluation.

7007

SPECIAL PROGRAM

REPORT TYPE: Sequoyah Nuclear Plant - Element

REVISION NUMBER: 0

TITLE: Heat Code as Related to Material Control

REASON FOR REVISION: Mtg on Wed 9/17/86

9/12/86
JLW - Please review & discuss with me Monday 9/15
WBA

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PREPARATION

PREPARED BY:

SIGNATURE DATE

REVIEWS

PEER:

SIGNATURE DATE

TAS:

SIGNATURE DATE

CONCURRENCES

SIGNATURE DATE

CEG-H:

SRP: SIGNATURE DATE

APPROVED BY:

ECSP MANAGER DATE

MANAGER OF NUCLEAR POWER CONCURRENCE (FINAL REPORT ONLY) DATE

1815T

I. INTRODUCTION

The evaluation of the Sequoyah Nuclear Plant (SQN), Construction Heat Code Program was performed due to recommendations contained in the Nuclear Safety Review Staff (NSRS) Report number I-84-34-SQN as follows:

> "Therefore, it is NSRS's recommendation that a search of documents/files/procedures be made so that a history of the Heat Number Sort can be reconstructed to include the following:
>
> (1) The purpose/reason the Heat Number Sort was generated.
>
> (2) Those management controls designed and implemented to administer the program.
>
> (3) The function the program was designed to serve and the function it has been serving, if different.
>
> (4) The confidence OC management has with the available information in the program (Heat Number Sort printout)."

A response to these recommendations was prepared by the Office of the Manager of Construction (CO1-85-0529-007) and was deemed not satisfactory by the Director of NSRS (CO1-85-0709-054). NSRS had planned to investigate this matter further; however, no indication of further investigation could be found, thus leaving the matter unresolved.

Also, a Watts Bar Nuclear Plant (WBN) Employee Concerns Task Group (ECTG) report "Material Control, Procedural Control, Heat Code", Report number MC 40703, performed at WBN and made generic to other TVA Nuclear Plant Sites, including SQN.

II. SUMMARY OF PERCEIVED PROBLEM

The perceived problem, as derived from the following concerns, is there is a lack of credibility of methods used in the Construction Heat Number Sort Program (HNSP) and Nuclear Power, Power Storeroom Requisition, (Form TVA-575), for verification of properly Certified Pressure Boundary Materials, at installation.

A. Construction:

IN-85-545-X07
WI-85-008-002

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B. Nuclear Power:

EX-85-023-001
IN-85-660-001

III. EVALUATION METHODOLOGY

A. Construction:

1. Reviewed expurgated files to obtain additional information.

2. Reviewed upper-tier criteria to determine the requirements governing the installation of pressure-retaining materials.

3. Reviewed site procedures to determine how the upper-tier criteria was implemented.

4. Conducted interviews to determine the process used in the verification of installed materials.

5. Performed a random sample of pressure boundary material installations and a review of the associated weld documentation to determine if the material installed was properly identified and traceable to its Certified Material Test Report (CMTR).

B. Nuclear Power:

LATER

IV. SUMMARY OF FINDINGS

A. Construction:

1. A review of the expurgated files revealed no additional information.

2. A review of the upper-tier criteria revealed the following:

a. The Final Safety Analysis Report (FSAR), Revision 3, does not contain a clear definition of the applicable Code of Record for Nuclear Class I, II, and III construction activities at SQN. Discussions with personnel in the Codes and Standards and Materials Engineering Group of the Nuclear Engineering Branch (NEB), Knoxville, confirmed this situation. They stated, "The applicable Code of Record is ANSI B31.7 (1969) and 1970 Addenda for the fabrication, inspection, and test requirements of Nuclear Class I, II, and III (TVA Class A, B, and C/D) piping systems and that a revision to the FSAR section 3.2.2.5 is necessary to clarify this situation." The FSAR stated,

"Fabrication, inspection, and test requirements of ANSI B31.7, including B31 Case 115, have been used in lieu of the applicable nuclear code cases for all piping systems *except the primary coolant loops and the pressurizer surge line piping. B31 Case 115 accepts ASME Code, Section III as meeting B31.7 requirements."

Since the applicable code requirements for the primary coolant loops are not defined and there is no clear distinguishing boundary between it and its branch lines, the Chemical Volume Control System (CVCS) and Safety Injection System (SIS), piping material included in this report has been evaluated based upon the applicable Code of Record, ANSI B31.7 (1969) and 1970 Addenda including, the ANSI B31.7c-1971 Addenda paragraph 1-723, for materials identification and certification, per SQN Construction Specification NO. N2M-865, "Field Fabrication, Assembly Examination, and Test for Pipe and Duct Systems", Revision 3, dated 4/12/77.

The Code of Record, ANSI B31.7, (1969), 1970 Addenda and 1971 Addenda c paragraph 1-723, for material identification and certification, paragraph 1-723.1.3(a) states in part ". . . identification of pressure-retaining material shall consist of marking the material with the applicable material specification and grade, heat number, or heat code of the material, *and any additional marking required to facilitate traceability of the reports of the results of all tests and examinations performed on the material. Alternatively, a marking symbol may be used which identifies the material specification number and grade, and a marking code may be used which identifies the material heat number with the Certified Materials Test Report. *The Certified Materials Test Report shall contain an explanation of both the symbols and the code."

*UNDERLINE ADDED FOR EMPHASIS

b. SQN is committed, in section 3.1.2.1 of the FSAR, to the requirements of 10 CFR 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants", which states in Criterion VIII,

> "Measures shall be established for the identification and control of materials, parts, and components, including partially fabricated assemblies. These measures 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."

3. Review of site procedures:

a. Site Procedures used during the construction of SQN pertaining to marking and identification of received material, consisted of the following:

SNP Construction Procedure NO. M-7, "Erection and Documentation Requirements For Piping Systems Within The Scope of the Quality Assurance Plan" (M-7), Revision 0, dated 08/25/72 through Revision 15, dated 01/02/80.

SNP Inspection Instruction NO. 30, "Receipt Inspection" (II-30), Revision 0, dated 05/04/77 through Revision 7, dated 09/20/82.

SNP Construction Procedure NO. P-34, "Heat Number Validation" (P-34), Revision 0, dated 06/13/77 and Revision 1, dated 12/13/78.

SNP Inspection Instruction NO. II-39, "Heat Code Transfer and ASTM Designator Transfer" (II-39), Revision 0, dated 05/04/77 through Revision 2, dated 12/11/78.

SNP Construction Procedure NO. P-31, "Identification and Marking of Permanent Material" (P-31), Revision 0, dated 05/04/77 through Revision 2, dated 12/17/79.

A review of these procedures revealed that only one procedure, M-7, Revision 0, dated 08/25/72 provided met for the material to be traced to the certification reco as per the code. Later revisions of M-7 and additional associated procedures, were developed that required rece materials to be marked, so that, at best, materials coul only be traced back to the procurement contract. The procedures governing "heat number validation" upon mater receipt (i.e., P-31, P-34, and II-39) do not contain a method for material identification and marking traceable the CMTR.

b. Site procedures used during construction of SQN pertainin to material identification/verification at installation, consisted of the following:

SNP Construction Procedure NO. M-7, "Erection and Documentation Requirements For Piping Systems Within Th Scope of the Quality Assurance Plan" (M-7), Revision 0, dated 08/25/72 through Revision 15, dated 01/02/80.

SNP Inspection Instruction NO. 74, "Fitup and Cleanliness" (II-74), Revision 0, dated 02/14/77, throug Revision 6, dated 07/28/82.

A review of these procedures revealed that only one procedure, M-7, Revision 0, dated 08/25/72, required the material certification to be on hand and be acceptable. Later revisions only required the material to be listed on the Weld History Record, which was then certified to be in accordance with applicable drawings, codes, and specifications, by signature.

Site procedure II-74, Revision 0, dated 02/14/77, required examination and verification of acceptable material identification, heat number, material specification and grade, and ASME Classification, with the provision that all material used shall have mark and/or heat number, which was certified, by signature, on data sheet or equivalent data card.

Site procedure II-74, Revision 1, dated 05/12/77, required the examination and verification of only the material identification, with the provision that material used shall have mark and/or heat number, which was certified, by signature, on data sheet or equivalent data card.

Site procedure II-74, Revision 3, dated 11/07/78, and subsequent revisions, required examination and verification that the component identification was as specified on the applicable weld map, with a provision that piping material required heat number verification, which was certified, by signature, on data sheet or equivalent data card.

Note: No site procedure could be found to describe the heat number verification process.

Note: No site procedure could be found governing the accuracy of the information or the use of the HNSP, only a User's Guide was found, describing how information should be encoded.

4. Interviews conducted with persons who performed inspections and/or verifications of material during the construction of SQN revealed the following:

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Interviewee A

Interviewee was a Quality Control Record Reviewer in construction. Interviewee said, "July 31, 1977, was the approximate date the weld review group was formed to input information that was available onsite into a computerized program. This contract information was used to develope a heat code or heat sort printout for material received with CMTRs, MTRs, or COCs. Material for SQN procured by Quality Engineering Branch Contracts by Knoxville and inspected at the factory were not always encoded because Knoxville received all of the CMTRs, COCs and other related documentation. The information encoded in the printout consisted of the heat number, sometimes the class of material, if known, the 209 number, the contract number, and a description of the material. Interviewee did not know of a procedure governing the use of the printout or for its control, there was a Users Guide and other information compiled to aid in the encoding process involved. When interviewee began working in the QCRU group, part of the responsibility of the group was to review the weld cards (SNP-II-74). When the cards were received they were checked for the following. All blanks were filled in or N/A, the welder was certified to the process used, the inspector was certified to the inspection procedure, and that both components' heat numbers were in the printout. If the heat numbers were in the printout it meant that there was either a COC or CMTR or some kind of documentation."

Note: During the interview it was revealed there was some problem with some people not knowing the difference between a CMTR and a COC.

Interviewee said, "There was not a requirement for the reviewer of the data card to check for class, size, type or grade of the material. When the review of the cards was complete the heat numbers were then written on the weld map. The heat code printout was up-dated, usually once a week."

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Interviewee B

Interviewee was a Construction Welding Inspector from December 76 until August 77. Interviewee said, "I do not remember very much about the program that was used at that time except that they recorded the information, heat numbers of the material welded together, on a data card. They wrote the heat number down which was on the material and then wrote it down on the data card. They verified the heat numbers against the printout, but, I do not remember if they were required to check to see if it was the correct code class."

Interviewee C

Interviewee worked in construction as a QC Welding Inspector from January 1977 until April 1981. Interviewee said, "There was a procedure used before SQN II-74. An (M-7), where code welds were controlled on what was called a Weld History Record. It contained all information needed to track the work. I think the information on the Weld History Record was then transferred to the data card. They used the weld map to determine what material was to be used but there was not a requirement that they go back to the printout to see if what the fitters had was the correct code class. We did check to see if the material was in the printout."

Interviewee D

Interviewee was a Construction Welding Inspector from 1977 until 1982. Interviewee said, "I verified the material was correct by checking the heat sort printout. Some of the material had the code class marked on it with a pink paint stick. If we could not find the class in the printout or if it wasn't marked on the pipe we would rely on the craft to tell us if it was the right material."

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Interviewee E

Interviewee was a QC Inspector from 1979 until 1982 in construction. Interviewee said, "I verified material by use of the II-74 data card." The question was asked, "If the interviewee checked the class of the material before signing the card?" Interviewee said, "No, I only wrote down the number of the material that was used. I did not use the printout, I think Record Review checked this later because if we made a mistake they would send the card back." Interviewee stated again, "I didn't use the printout, I only checked the weld maps and filled out the data card."

Interviewee F

Interviewee was a Construction Welding Inspector who said, "We verified heat numbers by checking to see that they were on the material being used, we then wrote this number down on the data card, QCRU reviewed the cards and I think they checked to see if the number was in the printout. We (welding inspection) did not do any checking to see if the material was the correct code class, I did not use the heat sort printout. I only wrote down the heat number that was on the material. Before we used the data cards we verified material on a weld history record under a different procedure. I do remember, one case, where I found some schedule 40 material with the same heat number as schedule 80, but this was changed out."

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Interviewee G

Interviewee was a Construction Welding Inspector from March 1975 until December 1979. Interviewee said, "The fitters would have a piece of material with a mark number and/or heat number written on it. I would log the heat number down on the Weld History Record. Later, we used data cards to log the material down on." The question was asked, "Did you check to see if the material was the right class and type or grade?" Interviewee said, "Inspectors were not required to check the class but sometimes the class was written on the material with a pink paint marker. I only checked to see if it was in the printout which was kept in the pipe shop. If it was in the printout it was considered good. Sometimes it would not be in the printout and we would call the Mechanical Engineer, over the system, if the engineer said the material was good, I would sign the card."

Interviewee H

Interviewee was a SQN Mechanical Engineer from 1973 until 1979 in Construction. Interviewee did not know of any official system or process used to verify that additional checks other than inspection, were performed to ensure that the correct class of material was used. Interviewee stated, "That an employee who worked in Welding did a lot of checking of material to see if it had a CMTR. There was a printout in Welding and when the inspectors called in, the employee would look it up to see if it was in the printout, if not, the employee would check to see if it was good material. Good means it has a CMTR. The program changed as did the procedure through our construction. This was due to recognizing a need for better control. I have a high degree of confidence that material used was of the correct class but do not know of the special programs or procedures that assured this. My feeling is based on very good and confident Engineers and Craftsmen, that took pride in doing the best job possible."

Interviewee I

Interviewee was a Mechanical Supervisor at SQN from November 1972 until May 1977, and worked in SQN QC from May 1977 until April 1979. Interviewee relied on the HNSP whenever a question of material verification came up. NAVCO supplied pipe had unique serial or mark numbers on it. Some TVA loose material had TVA mark numbers and is identified this way; however, material bought on I.Q.T. contracts did not have mark numbers, only heat numbers.

Interviewee J

Interviewee was a welding inspector at SQN from 1975 until 1979 and stated, "I was connected with the program in some way, shape, or form and correct class verification of material was not used, inspectors only checked to see if the material's heat number was in the printout, if it was, it was considered good material and used in any code system. I feel SQN is required to use code material and all Class A must have a CMTR for Class A or material must be up-graded, which requires a CMTR and an NDE, PT, minimums."

Interviewee K

Interviewee was a Mechanical Engineer at SQN from 1973 through 1979. Interviewee stated, "We found material installed at SQN, that we did not have CMTRs for and the manufacturer supplied them at a later date. There were cases where no CMTR could be obtained and this material was cut out and removed. (Replaced with different material). The venders started supplying CMTRs with some material no matter how it was requested. SQN has also received CMTRs for material that they may not have even received. Loose Material, referred to as LM sheets designated what material was to be installed at what location. However, during construction it was learned these could not be relied upon for accuracy, due to warehousing lack of control in issuing material. Prior to QC becoming involved in issue of material, approximately December, 1974, warehousing personnel would pick up a like fitting and write the needed LM number on it and issue it."

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Note: No site procedure was found describing the use of "Loose Material (LM) sheets or numbers.

Interviewee further stated, "SQN operated under the principle that if they, SQN, had a CMTR or MTR for a particular heat number, it was considered good for any product or type piece of material that was made out of it. There was a lot of material that was installed that SQN did not have a CMTR for and interviewee contacted the manufacturer to obtain a CMTR, if one could not be obtained, the material was cut out. CMTRs for Class A were not looked at as being unique to the actual material that was received."

Interviewee L

Interviewee was part of a task force set up to correct heat codes on weld documentation from 1977 through 1979. The following is a summary of interviews with this person.

If the weld documentation material identification (heat code) did not agree with the heat code on the adjacent weld documentation the interviewee was directed by supervisory personnel to analyze and correct erroneous and discrepant weld documentation/heat numbers, as required. Interviewee stated, "Inspectors were used to reverify, discrepant heat codes. If the heat number could not be read in the field, the supervisors instructions were to change the weld documentation so that both documents would agree, with the information on the document with the latest date."

Interviewee changed approximately ten to twenty discrepant heat codes per day, from 1977 through 1979. These were lined through, initialed and dated by the interviewee, based upon, inspectors information, or personal judgment that the heat code number had been incorrectly written, (e.g., character transposition or omission) based upon how the heat code appeared in the HSNP.

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Note: Interviewee expressed doubt that all the heat code numbers to be rechecked were actually field verified.

Interviewee stated, "When weld documentation was lost or could not be located the inspectors were requested to check the field installed material, if no identifying markings were found, new documentation was constructed from the best available information, obtained from the following: inspectors' memory, inspection log sheets or Operation Checklist."

Note: No site procedure could be found describing or defining the function of the "Operation Checklist."

5. Random Sample Review

A review of material identified on 16 TVA SQN weld maps, consisting of 8 for Unit 1 and 8 for Unit 2, on Class "A" Systems (Chemical Volume Control System, 62, and Safety Injection System, 63) was performed to determine if material with the proper certification was installed.

The reviewed Weld Map Drawings are as follows:

Unit 1	Unit 2
1-CVC-500-1W	2-CVC-500-1W
1-CVC-501-1W	2-CVC-501-1W
1-CVC-501-2W	2-CVC-501-2W
1-CVC-502-1W	2-CVC-502-1W
1-CVC-502-2W	2-CVC-502-2W
1-CVC-503-1W	2-CVC-503-1W
1-CVC-509-1W	2-CVC-509-1W
1-SI-500-1W	2-SI-500-1W

This review was limited to a small sample of drawings for 1" through 2", TVA Class "A" pressure boundary materials.

The heat codes used for material identification shown on these drawings were tabulated and consisted of 69 heat codes, identifying 517 items. The construction HNSP (dated 4-25-84) was reviewed to determine if these heat codes were traceable t their CMTRs. From references listed in the HNSP for these hea codes, TVA Receiving Reports (TVA-209s), containing material quantities and documentation received, were obtained.

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Note: In some cases the TVA-209 reference was in error, omitted or did not contain the material documentation.

A review of the TVA-209s and their attached documentation revealed:

1. Class "A" and "B" or lesser material was received with identical heat codes, material description, and no marks to distinguish between classes.

2. Material with identical heat codes was received with differing material descriptions, (e.g., size, schedule, or pressure class).

3. Some material was identified by a Loose Material (LM) Number (e.g., NAVCO Piping), and some was not (e.g., Capitol Pipe & Steel Products). LM numbers are not unique to the heat number/code, pressure class, material discription or product form, and in most cases are not referenced on the CMTR, filed with the TVA-209.

4. Some material had additional markings identifying it as acceptable for Class "A" use.

Therefore, a comprehensive walkdown of the piping on the referenced drawings was performed by Modifications Unit personnel to determine what, if any, additional markings were on the installed material.

Results of this walkdown differed significantly from the heat code information on the Weld Maps; therefore, a detailed review of the weld documents for these drawings was performed, comparing the documented material identification information with that on adjacent weld documents and information obtained from the piping systems walkdown. This review, consisting of 573 weld documents, revealed that 65% of the documented welds contained material identification discrepancies (e.g., incomplete heat numbers, disagreement with walkdown information, illegible entries on weld documents, missing weld documents, disagreement between adjacent weld documents).

The following list of examples is presented as representative of some of the findings of this evaluation; however, it must not be considered comprehensive in nature.

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Example A:

"CMC" is used as the heat code for material identification of one of the components on the weld document for weld number 2CX-0114A 1, on weld map 2-CVC-501-2W. "CMC" is listed in the HNSP and refers to items of various heat codes, classes, and material descriptions, manufactured by Colonial Machine Co. However, "CMC" is not a heat code; rather, it is the manufacturer's identification code and stands for Colonial Machine Company.

Example B:

"CCI" is a heat code for a 2" 6000# socket weld (S/W) coupling (cplg.), Schedule (Sch) 160 Bore, A182 F304, for which there are two entries in the HNSP, one each for Class "A" and "B". The material identified in the HNSP as Class "A" was received on 10-2-75, on TVA-209 #76-7823. The CMTR filed with this TVA-209 identified the fittings as having been Liquid Penetrant tested and as Nuclear Class I-TVA Class "A"; however, no special identification markings were denoted on the CMTR, traceable to the fittings. The material identified in the HNSP as Class "B" was received on 8-21-75, on TVA-209 #76-1379. The CMTR filed with this TVA-209 identified the fittings as Nuclear Class III-TVA Class "B"; again, no special identification markings were denoted on the CMTR, traceable to the fittings. Approximately 40 of these fittings are installed, per the walkdown performed for this evaluation. One example of installation is weld map 2-CVC-503-1W, weld numbers 2-CX-01256 and 2-CX-01257.

Example C:

"CZC" is a heat code for 2"X3/4" 6000# inserts, A182 F304, fo both Sch 160 bore and a special 0.375 inch bore. The HNSP revealed three references to TVA-209s, one for Class "A" and two for Class "B". The material identified in the HNSP as Class "A" was received on 9-17-75 on TVA-209 #76-2235. The CMTR filed with this TVA-209 identified the fittings as having a special bored inside diameter (ID) of 0.375 inch, as having been Liquid Penetrant tested and as Nuclear Class I-TVA Class A; however, no special identification markings were denoted on the CMTR, traceable to the fittings. The material identified in the HNSP as Class "B" was received on 3-17-75 on TVA-209s #75-5643 and #75-5674. The CMTR's filed with these TVA-209s identified the fittings as having a Sch 160 bore and as Nuclea Class II; again, no special identification markings were denoted on the CMTRs, traceable to the fittings. Approximatel 10 of these "CZC" fittings are installed, per the weld documentation for the reference weld map drawings; however, th walkdown performed for this evaluation identified only two.

Note: The FSAR in paragraph 3.2.2.1 states in part, "...Branch piping 3/8-inch inside diameter or smaller, or protected by a 3/8-inch diameter or smaller orifice, is exempted from Class A..."

The use of the 3/8-inch diameter or smaller orifice is not consistently identified on the weld documents for material identification.

An example of installation is Weld Map 1-CVC-502-2W; weld numbers 1-CX-02143 and 1-CX-02144 1. These weld documents do not denote this fitting as having a special 3/8-inch bore, as required by the weld map. The field walkdown revealed this fitting is a 2"X3/4" S/S reducing insert stamped "CZC".

Another example is Weld Map 2-CVC-502-1W; weld number 2-CX-01255 identifies the material as a 2"X3/4" reducing insert with the heat code "CMC" which has been lined through, initialed and dated, and changed to "CZC". Adjacent Weld number 2-CX-01256 identifies the material as a 2"X3/4" special flow insert, with heat code "CZC".

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Example D:

"CCF" appears on the marked up copy of Weld Map 2-CVC-500-1W and is identified as a 2"X3/4" reducing insert 6000# S/W. "CCF" is not listed in the HNSP. The weld documentation for 2-CX-01020 and 2-CX-01021 were reviewed to determine what is documented as installed. Weld document for 2-CX-01020, (dated 4-16-79) denotes a 2"X3/4" 6000# insert with the heat code "CNC". Adjacent weld document for 2-CX-01021, (dated-4-11-79) denotes a 3/8" special rest, with the heat code "CNC".

Note: Weld number 2-CX-01021 has been cut out and reinstalled 2 additional times, creating weld documents for (2-CX-01021 1) and (2-CX-01021 2).

Weld document for 2-CX-01021 1, (dated-5-11-79) denotes a 3/4" Special Flow Restrictor with heat code "CVC", this heat code was lined through, initialed and dated (5-30-79), and changed to "CCV".

Weld document for 2-CX-01021 2, (dated 11-17-79) denotes a 2"X3/4" insert S/S (flow restrictor) with the heat code "CCV".

The field walkdown revealed that no identification markings were on this fitting.

Note: The heat code for the fitting was initially identified as "CNC", later changed to "CVC", and then changed again to "CCV"; however, the field walkdown revealed no identification markings.

Example E:

"CNC" is a heat code for 2"X3/4" 6000# and 3000# reducing inserts, bored for Sch 160 and Sch 40, respectively. "CNC" is also the heat code for other material descriptions. From references in the HNSP two TVA-209s were found, TVA-209 #75-6874 and #75-6875, both were received on 5-27-75. The CMTRs filed with these TVA-209s revealed the material to be 2"X3/4" 6000# reducing inserts, Sch 160 bore, as having been Liquid Penetrant tested and as Nuclear Class I-TVA Class "A"; however, no special identification markings were denoted on the CMTR, traceable to the fittings.

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Approximately 3 of these fittings were installed per the weld documentation. Examples of installation are:

Weld Map 2-CVC-500-1W; weld number 2-CX-01059 and adjacent weld number 2-CX-01060 both identify the material as a special reducing insert, with heat code "CNC".

Weld Map 2-CVC-502-1W; weld number 2-CX-01158 and adjacent weld number 2-CX-01159 both identify the material as a reducing insert (special 3/8" ID. flow restrictor); with heat code "CNC".

Weld Map 2-CVC-503-1W; weld number 2-CX-01245A and adjacent weld number 2-CX-01245B both identify the material as a 2"X3/4" reducing insert, with heat code "CNC".

Note: No documentation could be found showing any 2"X3/4" 6000# reducing inserts, with a special 3/8" bore, with the heat code "CNC", as having been received.

Example F:

"S4HDY" is a heat code for 2"-6000#, S/W, 45° ell, ASTM A182-F304. The HNSP contains four entries for this heat code; two for Class "A", one for Class "B", and one with no Class. The Class "A" entries reference TVA-209 #76-0399, received on 7-21-75. A review of the documentation filed with this TVA-209, revealed there were CMTRs filed with it that identified the fittings as NUCLEAR CLASS 2, and stated the specific markings were, "(L) 2" 6000# WOG A182F304 S4HDY", and also as NUCLEAR CLASS 1, having been Liquid Penetrant inspected and having specific markings, "(L) 2" 6000# WOG A182F304 S4HDY PTB". One of the CMTRs also referenced TVA-209, #75-7057.

A review of TVA-209, #75-7057 revealed that this material was received on 6-5-75. The CMTRs filed with the TVA-209 identified the fittings as NUCLEAR CLASS 2 and having specific markings, "(L) 2" 6000# WOG A182F304 S4HDY". One of the CMTR's contained the following handwritten notation,

"6 PIECES WITH HEAT NO S4HDY SHALL BE UPGRADED TO CLASS A. THE UNIQUE HEAT NO SHALL BE DESIGNATED AS S4HDYPT. UPGRADE TEST TO BE LIQUID PENETRATE (SIC) ON ALL ACCESSIBLE SURFACES INSIDE AND OUT PER. . ."

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Note: Engineers' and Inspector's names omitted in this quotation.

Note: S4HDY PTB is in the HNSP; however S4HDY PT is not.

An example of installation is Weld Map 1-CVC-503-1W; weld number 1-CX-02161 2 and adjacent weld number 1-CX-02162 2. Weld documents for these welds denote this fitting as a 2" 6000# 45° Ell, with heat code "S4HDY". The field walkdown revealed this fitting is "S4HDY".

The manufacturer of this fitting, when contacted for an explanation of the marking code shown on this fitting, revealed the following:

1. "S4HD" denotes the heat number of the fitting identifying its chemical and physical analysis.

2. "Y" denotes the heat treatment received by a particular batch of fittings.

3. Had the fitting been Liquid Penetrant tested it would have been stamped, "PTA", "PTB", etc, identifying the technician who performed the test.

4. The markings on the fittings do not provide traceability to its CMTR.

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Another example is Weld Map 2-CVC-502-1W; weld number 2-CX-01143C and adjacent weld number 2-CX-01143B 1 (See figure 1 below).

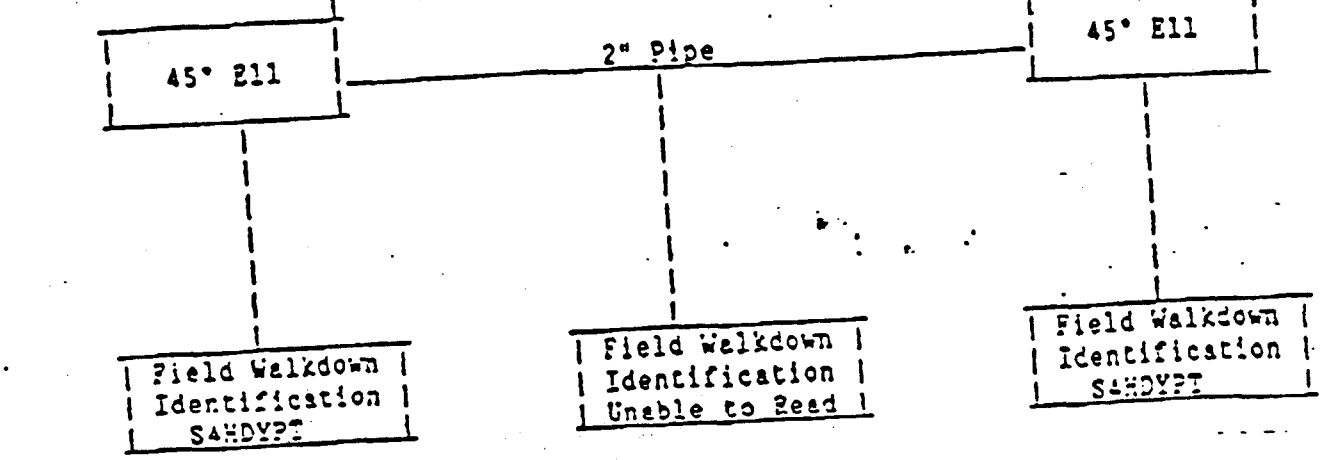

Figure 1

INFORMATION ONLY

Examole G:

"S4MAR" is a heat code for a 2" 6000# 90° Ell S/W A182 F304. From a reference in the HNSP, TVA-209 #76-5529, dated 2-13-76, was found. A review of the CMTR filed with this TVA 209 revoaled no NUCLEAR CLASS, and the specific markings on the fittings are, "(L) 2" 6000# WOG A182 F304 S4MAR & S4KTR".

Weld Map 2-CVC-503-1W; weld number 2-CX-01250 revealed the material identification to be 2" 6000# 90° with the heat code "S4MAR", adjacent weld number 2-CX-01251 revealed the material identification to be 2" 6000# 90° L A182 with the heat code "S4HXM".

The field walkdown revealed the material identification to be "S4MAR PTA".

Examole H:

"AX" appears on the marked up copy of Weld Mao 1-CVC-502-1W and is identified as a 2" 6000# S/W 90° ell. "AX" is not listed, by this material description, in the HNSP. No CMTR could be found for this material.

Weld number 1-CX-02091 2 revealed the material identification to be 2" Sch 160, 90° ell A182 with the heat code "S4KNAX" which was lined through, initialed and dated, and changed to "AN" this was lined through, initialed and dated, and changed to "AX". Adjacent weld number 1-CX-02092 2 revealed the material identification to be 2" 6000# 90° Ell, A182 with the heat code "AX".

The field walkdown revealed the material identification to be "S4KNAX-PTA".

Example I:

"M9963" appears on the marked up copy of Weld Map 2-SI-300-1W as 1 1/2" Sch 160 S.S. A376 TP 304 pipe. The HNSP reveals one entry identified as Class "A" referencing TVA-209 #75-5536. This TVA-209 revealed that an undetermined quantity of this material was received. The CMTR filed with this TVA-209 did not reveal the quantity that was tested nor any specific material identification markings traceable to the material.

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Example J:

During the Weld Document Review performed on Weld Map 1-CVC-502-2W the weld documents for weld numbers 1-CX-02113 and 1-CX-02116 could not be found. The weld documents were not located on the microfilm rolls and the weld tabulation sheet had been "whited out".

Note: These were the only two weld documents of the 573 reviewed that could not be located; however, during the search for these documents it was learned that a document audit was not performed verifying their existence, prior to the system transfers to Nuclear Power.

Example K:

"Class Change Discrepancies"

Inconsistencies in denoting changes from Class "A" to Class "B" were discovered during the weld map review for Class "A" material installations. TVA flow Diagram 47W813-1, Revision 27, "Flow Diagram Reactor Coolant System", and 47W809-1, Revision 27, "Flow Diagram Chemical and Volume Control System", were reviewed to determine the accurate locations of these Class changes.

This review revealed the following:

1. The 1" supply line to the "Excess Letdown Heat Exchanger" from the "Loop Number 3 Cold Leg" is shown on 47W813-1, Revision 27, as changing from Class "A" to Class "B" at the Cold Leg, upstream of valve 68-579; however, when the continuation of this line is followed on to 47W809-1, Revision 27, there is another change from Class "A" to Class "B" noted, downstream of valve 68-579.

2. Note number 8 on 47W813-1, Revision 27, and note number 9 on 47W809-1, Revision 27, states, "Special transition piece (3/8" I.D. Flow Restrictor) required for transition from Class A to Class B pipe." There are several locations on these drawings where these notes are referenced and no clear statement of Class change is made.

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Consequently, this has resulted in the piping systems being installed in a manner not depicted by the Flow Diagrams and whose failure could cause a loss of reactor coolant which would not permit an orderly reactor shutdown and cooldown, assuming that makeup is only provided by the normal makeup system..

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Example L:

"BVK24H", "BVM13Z", and "BVK24C" appear on several weld maps as heat codes for 2" Sch 160 A376 TP304 S/S pipe. The field walkdown revealed that, in most cases, the factory markings and TVA paint stick markings have been removed. The following are examples of discrepancies that exist between those that can be read and the weld documentation.

TVA Weld Map 1-CVC-503-1W; weld document 1-CX-02160 1 identifies this material as, A376 2" Sch 160 pipe with the heat code "BVM13Z". Adjacent weld document 1-CX-02161 2 identifies this material as, A376 2" Sch 160 pipe with the heat code "BVK24C". The field walkdown revealed this material to have heat code "BVK24C" marked on the pipe with a paint stick and factory markings "BVM13Z" etched on the pipe.

TVA Weld MAP 1-CVC-502-2W; weld document 1-CX-02114A identifies this material as, 2" Sch 160 S/S pipe LM 34-13 with the heat code "BVK24H". Adjacent weld document 1-CX-02115 identifies this material as 2" Sch 160 S/S pipe LM 34-13 with the heat code "BVM13Z", which has been lined through, initiated and dated, and changed to "BVK24H". The field walkdown revealed this material to have heat code "BVM13Z" (Factory Mark).

B. Nuclear Power:

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CONCLUSIONS:

A. Construction:

The FSAR does not clearly define the applicable Code of Record for Nuclear Class I, II, and III piping systems nor does it define the applicable Code of Record for the primary coolant loops and pressurizer surge line piping; however, SQN is committed by its Code of Record and 10 CFR 50 Appendix B to the use of Nuclear Class Piping Components, the identification of which is maintained throughout their fabrication, erection, installation, and use. The site procedures, with the exception of the initial issue of SNP-CP-M7, did not provide adequate measures to ensure these commitments were met.

The individuals involved in the material identification verification process lacked an understanding of the significance of why, or the manner in which, Nuclear Class Piping Components should be identified. Although a variety of methods were employed to verify the identification of the installed material, no consistent method was developed, except the reliance upon the heat code/number. Heat codes/numbers at SQN were considered good; "if it was in the HNSP", "been used before", or "if it existed on the material"; however, since heat codes/numbers are not unique to Nuclear Class, Pressure Class or material description, they cannot be relied upon for adequate material identification.

The Nuclear Class Piping Components installed at SQN, do not comply with the requirements of the Code of Record and 10 CFR 50 Appendix B for identification and control of these components during their fabrication, erection, installation, and use. This non-compliance has resulted in the receipt, storage, and installation of material that cannot be traced to the CMTR, attesting to it's suitability for the Nuclear and/or Pressure Class in which it is installed.

B. Nuclear Power:

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V. ROOT CAUSE

A. Construction:

TVA personnel responsible for the adequacy and accuracy of site procedures, nor material manufacturers, either were not cognizant of or did not have full appreciation of the Code of Record and 10 CFR 50 Appendix B requirements regarding maintenance and control of Nuclear Class Piping Components.

B. Nuclear Power:

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VI. CORRECTIVE ACTION:

A. Construction:

To be provided by line organization.

B. Nuclear Power:

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VII. GENERIC APPLICABILITY:

A. Construction:

Determined generic to the Sequoyah Nuclear Plant Material Identification Verification Program and Material Manufacturers' Material Identification Marking Program for Nuclear Class Piping Components, i.e., Nuclear Class I, II, III, and/or TVA Class A, B, C/D.

The generic applicability of WBN-ECTG report number, MC 40703 remains valid for all other TVA Nuclear Plant Sites; however, it must be revised to include the Material Manufacturers' Material Identification Marking Program for Nuclear Class Piping Components.

B. Nuclear Power:

LATER

TABLE 3.2-4

SUMMARY OF CODES AND STANDARDS FOR SAFETY CLASS COMPONENTS OF THE WATTS BAR NUCLEAR PLANT

Code Requirements

R.G. 1.26 QUALITY GROUP	Safety Class ANS. N-18.2	TVA Class	Seismic Category	Code Classification Piping, Pumps, Valves, and Vessels
A	1	A	I	ASME Code, Sec. III, Class 1
B	2a	B	I	ASME Code, Sec. III, Class 2
C	2b	C	I	ASME Code,** Sec. III, Class 3
	3	D	I	ASME Code, Sec. III, Class 3

*NOTE: In some cases, certain equipment which is not certified to the requirements of ASME, Section III, may be installed in TVA Safety Class Systems (noted as vendor-supplied, safety-related equipment on the drawings). This equipment has been determined to be equivalent to components designed to ASME Section III, and is suitable for use in the respective safety systems.

**ANSI B31.1 code is an acceptable substitute for the ASME code for installation of piping and valves on class C instrument lines attached to TVA class M, Q, and S systems.

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TABLE 3.2-5

NON-NUCLEAR SAFETY CLASSIFICATIONS

TVA Class	Seismic Category	Code Classification				
		Piping	Pumps	Valves	Vessels	
G	I(L)	ANSI B31.1	Manufac-turers Standards	ANSI B31.1 B16.5, or MSS-SP-66	ASME Code, Sec. VIII, Div. 1	
H	Note 1	ANSI B31.1	*	ANSI B31.1, B16.5, or MSS-SP-66	*	2
J	-	*	*	*	*	
K	I(L)	*	*	*	*	
L	Note 1	*	*	*	*	28

*Code used is determined by the design requirements of the equipment.

Note 1: Those portions of TVA class H and L systems located inside seismic category I structures are seismic category I (L). The balance of these systems are not designed for seismic loading. 28

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TABLE 3.2-6

TVA Heating, Ventilation, and Air Conditioning Classifications

TVA Class	ANS Safety Class	Code Jurisdiction	Seismic Category
M	2b*	ANSI B31.5	I or I(L)
N	None	ANSI B31.5	Note 1
Q	2b*	Round Duct, Steel, Spiral or Longitudinal Locked or Welded Seam, ASTM A 211 and SMACNA High Velocity Duct Construction Standards, 2nd Edition, 1969, as modified by ORNL-NSIC-65 Paragraph 2.8.	I or I(L)
S	2b*	Rect. Duct, Steel, Locked Seam or Welded, SMACNA High Velocity Duct Construction Standards, 2nd Edition, 1969, as modified by ORNL-NSIC-65 Paragraph 2.8	I or I(L)
U	None	Round Duct, Steel, SMACNA Low Velocity Duct Construction Standards, 4th Edition, 1969.	I(L)
V	None	Rect. Duct, Steel, SMACNA Low Velocity Duct Construction Standards, 4th Edition, 1969.	I(L)

*TVA Class M, Q, and S designations are also used on Heat, Ventilation, and Air-Conditioning systems which have no ANS Safety Class requirements if seismic requirements are involved.

Note 1: Those portions of TVA Class N systems located inside seismic category I structures are seismic category I(L). The balance of these systems are not designed for seismic loading. 49

Revised by Amendment 49