EXHIBIT 13

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ATTACHMENT 2

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J. E. Maddox, EQB 1A-WBN

WATTS BAR NUCLEAR PLANT ICE CONDENSER SCREWS

Attached for your information is a copy of the report which reconciles primarily technical differences in TVA Central Laboratory documents, issued during the June 1995 timeframe, regarding Watts Bar ice condenser screws. The reconciliation effort identified two important findings which were associated with omission of technical data from reports issued. However, it is concluded that these omissions were inadvertent, and that laboratory test results indicate overall metallurgical core properties of the screws were adequate for the intended application.

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2-1998-023

EXHIBIT 13
PAGE 1 OF 14 PAGE(S)

RECONCILIATION OF WATTS BAR NUCLEAR PLANT (WBN)
ICE CONDENSER BASKET SCREWS REPORT

Introduction

The purpose of this document is to provide reconciliation of differences in information contained in the June 2, 1995 report (first report), an intermediate endorsement on June 12, 1995, and the June 19, 1995 report (second report) from TVA Central Laboratory on Watts Bar ice condenser basket screws. This reconciliation will address differences in data and terminology presented in each document, and also assess the impact of inclusion or exclusion of information from either report. An itemized listing of these differences has been prepared by TVA Central Laboratories Metallurgical Section, and the results are shown in Attachment A. Also, Central Laboratories has prepared a detailed comparison of the similarities and difference in information for each screw sample set in each report. These results are given in Attachment B. The attachments were reviewed by the TVA Nuclear (TVAN) Chief Metallurgical Engineer and will be used in conjunction with each report as the basis for this reconciliation effort.

Discussion

The primary difference between the two reports center around information that was either included in, or excluded from, the second report which was dated June 19, 1995. More specifically, this reconciliation will address the following four items.

1. The second report deletes customer provided background statements.

2. The second report deletes the "bulletized" conclusion section which was contained in the first report, thereby, omitting some of the information that was contained therein.

3. Pertinent information regarding cracks found in a new screw from sample sets A and B, which was given in the first report, was omitted from the second report. Also, the second report differed in terminology when referring to the new screw from set "A".

4. Additional test data and results, which were not presented in the first report due to time restraints, along with data from additional testing (which was requested after issuance of first report), was presented in the second report.

A detailed discussion of each of these issues is provided as follows.

Items 1 and 2

The deletion of information from the second report pertaining to Items 1 and 2 was based on the fact that much of the information was not, nor could be, substantiated through metallurgical laboratory testing. In referring to Item 1, Report 1 states that "the customer indicated that the screws were cyclically cooled and warmed between 15°F and room temperature. The customer also indicated that the screws were probably over-torqued when installed." In Item 2, the bulletized conclusion (2) also addresses possible over-torqueing, and contributes it to stresses higher than design limits. The conclusion (7) also states that thermal cycling may have initiated micro cracking. Based on a review of the first report during June 1995, no objective evidence from metallurgical testing or document review was provided regarding stresses exceeding design limits or that the ice condenser was thermally cycled. Upon discussion with Central Laboratory personnel, it was concluded that this information was included in the report based on verbal input from the customer and was not necessarily the results of any findings from laboratory analyses. It was also concluded and agreed to that Central Laboratory personnel did not have access to

information regarding design limits nor did they have first hand knowledge pertaining to operational mode of the Watts Bar ice condenser. Therefore, it was jointly agreed between Central Laboratory personnel participating in this evaluation and the TVAN corporate and site engineering representatives to remove the above information from the June 19,1995 (second report) since testing did not provide any objective evidence which could support those conclusions.

The remaining information captured in these bullets was essentially integrated into the text of the second report with few modifications.

Item 3

The next major issue pertains to omission of metallurgical data and results regarding pre-existing cracking in new screws. The first report states that "similar cracks were discovered in the new screw received in set "A" and in the transverse section of a new screw sample examined from set B." It also refers to Figure 7 which shows a 400X as polished transverse view of a crack present in a new screw from set B. However, in the second report, the terminology differed when addressing the new screw from set "A", and also there was a total omission of any information pertaining to cracking in the new screw from set B.

The second report refers to the new screw from set "A" as being "one whole screw that was not in service." This statement leads one to assume that the new screw and whole screw is "one in the same," indicating that it was a new screw directly from Power Stores. However, the assumption may be misleading, because there is no evidence that any new screws from set "A" were ever checked out of Power Stores and submitted to TVA Central lab for this evaluation. Upon conferring with site personnel, the screws origin could not be verified, but it is postulated that the screw was probably one of the screws that was retrieved from the ice condenser floor and submitted along with the fractured screws of set "A" for metallurgical evaluation. Examination of this screw showed evidence of what is considered to be fabrication induced cracking which was restricted to the case or surface hardened region. This finding was documented in the first report and subsequent endorsement. The second report makes a comparison between features (fracture surface deposits) which indicate fabrication induced case cracking in set "G" screws and the whole screw from set "A" . Therefore, based on the metallurgical evidence contained in the first report and the relative comparison which was discussed in the second report, it is concluded that the whole screw from set "A" most probably experienced cracking during the fabrication process.

The information regarding pre-existing cracking in a new screw from set "B" is contained in the first report only. Neither the endorsement or the second report mentions any evidence of cracking in this screw set. However, the evidence from the first report suggests that cracking did occur during the fabrication process. This should have been considered an important finding by the Central Laboratory Metallurgical Staff and should have been included in the second report which was issued to the site. Failure to include such pertinent information could impact or alter corrective actions employed to address this issue.

The primary reason provided by Central Laboratory personnel for omission of statements from the second report pertaining to cracking in the new set “B” screw is given as follows.

The first report was done on an emergency basis and all samples received were not completely analyzed. After issuing the first report a request was made to perform additional testing/analysis on those screws that were not addressed in the initial report. The results of the additional request was initially documented in the intermediate endorsement. However, after it was determined that a

second report would need to be issued in order to address certain unsubstantiated information contained in the first report, it was decided to also incorporate the additional test results in the second report. In order to maintain the flow of the original report, the initial figure 7 was reconfigured to include these results. Figure 7 was selected because the cracking observed in the original figure 7 (depicting samples A and B) was similar to that observed in sample H and in the "whole screw A" depicted in the revised figure 7. Therefore this substitution of H instead of B documented a similar cracking mode but failed to capture the fact that the cracking observed in B was from a new screw.

An explanation pertaining to the omission of this information was documented by informal memorandum from "Delsa Frazier , Metallurgical Engineer Central Laboratory and Field Testing Services" to "Terry R. Woods" dated September 3, 1998. Based on the information provided in this memorandum, and subsequent interview of Central Laboratory personnel involved in this effort, the data pertaining to cracking in the new screw was inadvertently omitted from the second report during efforts to prevent duplication of similar failure mode while maintaining the flow of the first report.

Item 4

Additional testing was performed on screws from all sample sets after issue of the first report. This testing consisted of additional hardness measurements and metallographic examinations to further document the condition of the screw material. Also, Central Laboratory personnel performed impact type testing at room temperature and 15°F on screws from sets A, B, C, and G, and the results were issued in the second report.

The most important finding from additional metallography was that a slack quench microstructure was identified in certain portions of screws from sets B and H. This finding showed that the microstructure was not homogeneous throughout. A quenched and tempered (Q&T) microstructure is considered to be the preferred microstructure for this application because it yields optimum mechanical properties. Slack quenching results in a mixed microstructure (i.e., ferrite plus pearlite plus bainite) and tends to lower mechanical properties of the material. However, since some screws that contained cracks were not specifically examined for slack quenching, and some screws which were cracked showed cracking in the Q&T portion instead of slack quench region, it is inconclusive as to the role or effect this mixed microstructure may have played, if any, in the cracking of these screws.

Additional hardness testing showed values which were consistent with those presented in the first report. However, it is noted that the average core hardness in all screws tested from both the first and second report exceeded the Westinghouse Specification of 40 HRc. A comparison of these hardness values to the observed microstructure determined that the slightly higher average core hardness values did not have an adverse effect on the mechanical properties of the material.

Results of the screws that were broken in the lab, both at room temperature and 15°F, showed fracture surfaces that were consistent with surface hardening type heat treatments in medium carbon steels. A cleavage type fracture was noted (in general) in the hardened outer surface and void coalescence (ductile type failure) was noted (in general) in the core. Although surface cracking may have been previously observed in some of the screws, this testing, along with the micro-hardness traverse suggest that the overall heat treatment produced desirable core properties in the material.

Conclusion

The most important finding from the reconciliation effort was that information regarding possible fabrication induced cracking in a new screw (1 of 12) from set "B" was omitted from the second report. This information, if evaluated independently, may have suggested that a fabrication or process deficiency exist which could result in screws not meeting minimum required properties for the intended application. Also, key information regarding mixed microstructure and "impact type" testing was addressed in the second report and was not part of the first report. Its significance is that , although the mixed microstructure is not considered optimum, the laboratory impact test results along with hardness measurements indicates that the overall core metallurgical properties were adequate for the intended application. Each of these findings are important in that they should be considered when determining appropriate corrective action for adequately addressing this issue.

ATTACHMENT A

CENTRAL LABORATORIES SERVICES (CLS)
INVESTIGATION INTO DIFFERENCES IN WATTS BAR
ICE CONDENSER BASKET SCREWS
CLS REPORT 95-1021 DATED 6/2/95 (E13 950602 302)
CLS REPORT 95-1021 DATED 6/19/95 (E13 950619 303)

1. First report states that the screws were zinc plated, while second report states that screws had a coating of zinc plating, cadmium plating, or zinc phosphate. The second report clarifies source of the screw description and also included that the customer requested verification of material type.

2. Wording on description of screws state that one was new (1st report) versus one had not been in service (2nd report).

3. First report contains statements from the customer (cyclically cooled between 15 deg F and room temperature) and the screws were probably over-torqued when installed. Second report does not state this.

4. Both reports list the chemical results that were found on a representative/typical screw, but second report states from which screw (screw "A") the data was reported. The second report states that the screws were probably zinc phosphate coated, but the data is listed in both reports.

5. The first report does not have microhardness traverse graphs included to indicate carburization, but both reports talk about higher carbon values than those for AISI 1022 steel and Table III, which shows a difference in case to core hardness which would indicate carburization.

6. In the fractography section, both reports discussed the examination of screw "A" (failed) and a screw from "G". A different micrograph is shown in Figure 7 for new screw "A" (1st report) versus whole screw "A" (2nd report). The second report does not mention set "B" (figure 7), and the first report does not mention set "H" (figure 7). Figure 7 is different in each report.

7. The 1st report does not mention the particular screw in which the presence of zinc was found, but both talk about pre-existing cracks, laps at the tip, face and roots of every screw. But there is no mention in second report of fatigue.

8. More explanation was given in the second report concerning the other screws in which no

   photographic documentation is shown, but the information concerning the screws is given by saying that "similar cracks were found both in the new and used screws."

9. The specific screws that were broken at CLS are not mentioned by name in the 1st report. Additional screws were broken at 15 deg F and reported in the second report (possibly additional info from customer). First report used the word "ductile" and "brittle" while the second report refers to it as "void coalescence" and "cleavage", respectively - both words indicating the same type of failure. The 2nd report discussed "quasi-cleavage", here again, the 1st report states "more ductile" and "more brittle," both stating a mixed mode of failure.

10. Because the additional time to do testing on set "H", "G", and "B", metallography was performed and reported in the 2nd report. A different microstructure was discovered showing slack quenching.

11. Possible conclusions were not bulleted in the 2nd report as in the 1st, but the lower ductility of the screws were mentioned in the 2nd report when cleavage or brittle fractures were discussed. No mention of high stress appears in the 2nd report, nor design limits.

12. The presence of stress concentrators is mentioned in both reports in the discussion of laps found at tips, face, and roots.

13. Corrosion is not mentioned in the 2nd report as a possible failure mechanism, but is mentioned at the beginning of the second report as being present in the threaded region.

14. Carbon content, higher values for some samples is mentioned in both reports, but no tie back to lower ductility expected in the 2nd report.
15. Pre-existing cracks (quench cracks) were mentioned in the 2nd report when the intergranular were discovered in the traverse section of the whole screw from set "A".

16. The second report does not mention thermal changes on the material, but tests were performed in the 2nd report to indicate that this was a concern (testing at 15 deg F).

17. The endorsement to the 1st report (E13 950612 303) lists which samples had a slack quenched microstructure.

ATTACHMENT B

INFORMATION ON SAMPLES FROM 95-1021

<u>SAMPLE A – FRACTURED</u>

1st Report:

- Received ten fractured screw heads
- Corrosion product observed on screws mostly in the threaded region
- Possibly case hardened --- higher carbon content and microhardness readings
- Screws failed in a brittle manner as indicated by the intergranular failure mode seen on all screws. Final fracture area was ductile
- Metallography showed a secondary intergranular crack above the fracture surface
- Lappings from the forming process was observed in the face and root and along pitch of the screws.
- General microstructure was tempered martensite.
- Factors leading to failure: lower ductility, over-torquing, stress concentrators, corrosive environment, quench cracks, thermal cycling.
- Failure mode was intergranular separation and the mechanism was stress overload

Endorsement of June 12, 1995

- Not mentioned.

2nd Report:

- Received ten screw heads that were in service
- Varying amounts of corrosion product was observed mostly in the threaded portion
- Chemistry was similar to 1022 carbon steel.
- Possible case hardened – higher carbon content and microhardness readings
- Fractography showed a intergranular failure, brittle surface. Final fracture area near the center of the shank was ductile.
- Metallography showed secondary intergranular cracks above the fracture surface
- Set "A" that was not in service - just says a crack not secondary crack.
- Microstructure is given as tempered martensite.
- Failure mode was intergranular separation.

<u>SAMPLE A – NEW OR NOT IN SERVICE</u>

1ST Report:

- One screw received
- Chemistry was similar to AISI 1022 carbon steel.
- Possibly case hardened – from chemistry
- Intergranular cracks (metallography) were found in tooth roots
- Laps and cracks were found in the new screws (not identified as to which new screw) – 2nd Paragraph, 2nd page
- New screw (not identified) was fractured in the laboratory to determine failure mode. Intergranular fracture in the case and mixed mode in the core was observed.
- General microstructure was tempered martensite

Endorsement of June 12, 1995:
- Cracks found in screw.
- Note that orientation was not the same on all samples, therefore cutting may have been done in an area that was not slack-quenched or did not have cracks.
- Could not be evaluated for metallography as destroyed in previous tests.

INFORMATION ON SAMPLES FROM 95-1021
SAMPLE A – NEW OR NOT IN SERVICE (Continued)

2nd Report:
- Whole screw that was not in service received for testing
- Chemistries similar to 1022 carbon steel, zinc phosphate coating found on surface
- Possibly case hardened – high carbon content and microhardness readings
- Intergranular cracks were discovered in a transverse section of the screw
- Lapped regions were discovered at the tip, face, and roots of every screw that was examined and is typical of the thread rolling process
- Whole screw fractured in the lab and failed by quasi-cleavage in the case and void coalescence in the core
- Microstructure was tempered martensite

SAMPLE B – NEW SCREWS

1ST Report:
- Twelve screws received
- Possible case hardened at the thread tip – listed in text, but improperly identified in Table III
- Carbon steel – met carbon and sulfur requirements for AISI 1022
- Intergranular cracks found in transverse section
- All screws had laps from forming process
- Cracks in the thread roots
- General microstructure consisted of tempered martensite
- New screw (not identified) was fractured in the laboratory to determine failure mode. Intergranular fracture in the case and mixed mode in the core was observed

Endorsement of June 12, 1995:
- New set of twelve screws submitted for metallography
- No cracks found
- Slack-quenched microstructure
- Note that orientation was not the same on all samples, therefore cutting may have been done in an area that was not slack-quenched or did not have cracks.

2nd Report:
- Twelve new screws received
- Chemistry similar to 1022 carbon steel
- Case hardened at the tip not the root of the threads based on microhardness in Figure 3, improperly identified in Table III
- Laps found in the tip, face, and roots of the threads

- Simulated testing by fracturing samples at 15°F showed the failure mode to be void coalescence

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- Microstructure consisted on tempered martensite
- Slack quenched region found in the thread roots

SAMPLE C

1ST Report:

- Two samples received
- Case hardened – higher carbon content
- May be 1022 carbon steel – carbon higher

INFORMATION ON SAMPLES FROM 95-1021
SAMPLE C - 1St Report (Continued)

- All screws had laps from forming process
- Used screw not identified in simulated laboratory fracture testing that produced intergranular fracture at the case and mixed mode fracture at the core
- Tempered martensitic structure
- Used screws possibly harder due to higher carbon content

Endorsement of June 12, 1995:

- One of two samples contained cracks
- No slack quenched observed
- Note that orientation was not the same on all samples, therefore cutting may have been done in an area that was not slack-quenched or did not have cracks.

2nd Report:

- Two screws received
- Chemistry similar to 1022 carbon steel
- Case hardened based on carbon content
- Intergranular cracks found in thread roots
- Simulated testing by fracturing samples at 15°F showed the failure mode to be void coalescence
- Tempered martensitic structure

SAMPLE D

1ST Report:

- Two screws received
- Screws appeared to be case-hardened because of carbon amounts
- All screws examined have laps from forming process
- Used screw (not identified) in simulated laboratory fracture testing that produced intergranular fracture at the case and mixed mode fracture at the core
- Tempered martensitic structure
- Used screws possibly harder due to higher carbon content

Endorsement of June 12, 1995:
- No cracks found
- No slack quenching observed
- Note that orientation was not the same on all samples, therefore cutting may have been done in an area that was not slack-quenched or did not have cracks.

2nd Report:
- Two samples received
- Case hardened – microhardness results and chemistry has high carbon content
- Similar to 1022 carbon steel
- No cracks found in examined sections
- Laps found
- Tempered martensitic structure

INFORMATION ON SAMPLES FROM 95-1021

SAMPLE E

1ST Report:
- Two samples received
- Screws appeared to be case-hardened because of carbon amounts
- All screws examined have laps from forming process
- Used screw (not identified) in simulated laboratory fracture testing that produced intergranular fracture at the case and mixed mode fracture at the core
- Tempered martensitic structure
- Used screws possibly harder due to higher carbon content

Endorsement of June 12, 1995:
- No cracks found
- No slack quenching observed
- Note that orientation was not the same on all samples, therefore cutting may have been done in an area that was not slack-quenched or did not have cracks.

2nd Report:
- Two samples received
- Case hardened –chemistry has high carbon content
- Similar to 1022 carbon steel
- Laps found
- Tempered martensitic structure

SAMPLE F

1ST Report:
- Two samples received

- Screws appeared to be case-hardened because of carbon amounts
- All screws examined have laps from forming process
- Used screw (not identified) in simulated laboratory fracture testing that produced intergranular fracture at the case and mixed mode fracture at the core

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- Tempered martensitic structure
- Used screws possibly harder due to higher carbon content

Endorsement of June 12, 1995:
- No cracks found
- No slack quenching observed
- Note that orientation was not the same on all samples, therefore cutting may have been done in an area that was not slack-quenched or did not have cracks.

2nd Report:
- Two samples received
- Case hardened –chemistry has high carbon content
- Similar to 1022 carbon steel
- Laps found
- Tempered martensitic structure

INFORMATION ON SAMPLES FROM 95-1021

SAMPLE G

1ST Report:
- Two samples received
- Screws appeared to be case-hardened because of carbon amounts and microhardness results
- Intergranular cracks found in roots of threads
- Presence of zinc in cracks
- All screws examined have laps from forming process
- Used screw (not identified) in simulated laboratory fracture testing that produced intergranular fracture at the case and mixed mode fracture at the core
- Tempered martensitic structure
- Used screws possibly harder due to higher carbon content

Endorsement of June 12, 1995:
- No mention in this report

2nd Report:
- Two samples received
- Case hardened – microhardness results and chemistry has high carbon content
- Similar to 1022 carbon steel
- Intergranular cracks found in thread roots
- Presence of zinc in crack
- Laps found

- Screw fractured in the lab and failed by intergranular fracture in the case and mixed mode failure in the core.
- Tempered martensitic structure
- Could not be checked for slack quench as destroyed by other testing

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SAMPLE H

1ST Report:

- Two samples received
- Screws appeared to be case-hardened because of carbon amounts
- All screws examined have laps from forming process
- Used screw (not identified) in simulated laboratory fracture testing that produced intergranular fracture at the case and mixed mode fracture at the core
- Tempered martensitic structure
- Softer than new screws

Endorsement of June 12, 1995:

- One sample had cracks
- One sample was slack quenched
- Note that orientation was not the same on all samples, therefore cutting may have been done in an area that was not slack-quenched or did not have cracks.

INFORMATION ON SAMPLES FROM 95-1021
SAMPLE H Continued

2nd Report:

- Two samples received
- Case hardened – microhardness results and chemistry has high carbon content
- Similar to 1022 carbon steel
- Intergranular cracks found in thread roots
- Laps found
- Slack quench structure observed
- Tempered martensitic structure

Both reports mention the fact that the samples that had been in service contained corrosion products.