EXHIBIT 5

RIMS NO: TH296121983 3

90

CORRECTIVE ACTION DOCUMENT CLOSURE PACKAGE

FOR

TRACKING NO: WBPER950246 R0

2-1998-023

EXHIBIT 5
PAGE 1 OF 90 PAGE(S)

ORIGINAL

ADVERSE CONDITION REPORT
CONTINUATION PAGE

☒ PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, recurrence controls required, corrective actions required, etc.)

NOTE: Entries made on this sheet must be signed and dated.

I ACCEPT RESPONSIBILITY FOR THE ACCURACY AND COMPLETENESS OF THE CLOSURE PACKAGE FOR THIS ISSUE AT TIME OF ITS SUBMITTAL.

RESPONSIBLE/ACCOUNTABLE

7/25/95
DATE

TABLE OF CONTENTS

TAB A

DESCRIPTION OF CONDITION

ORIGINAL

ADVERSE CONDITION REPORT

☒ PER ☐ SCAR ☐ Identified/Initiated by Site Nuclear Assurance

Tracking No. WBPER 950246 Revision No. 0 RIMS Closure No. See Page 1

PART A:

A1 Description of Condition: After the completion of the WBN Unit 1 ice loading and weighing, it was discovered that approx 170 ice basket sheet metal screws (heads, and 32 whole screws were found in the temporary waste ice melt tank. Note: completion of ice loading was on February 17, 1995 However the melt tank was not removed from containment until April, at which time it was cleaned of debris.

Date of Occurrence: ~~12/21/93 12/3/94 12/17/94~~ → 2/17/95 Date Discovered: 4/19/95 Method of Discovery: Visual

A2 Requirement Violated and Source: N3-61-4001 Sect. 3.2.19.3 "Ice Baskets", Interconnection coupling & stiffening rings are located @ the bottom & 6' levels respectively of ea. basket section. The bottom coupling & stiffening ring are cylindrical in shape & approx 3" high w/a rolled internal lip. The lip provides stiffening to the baskets and a stop for the cruciforms @ 6' intervals. These cruciforms prevent ice in baskets from displacing axially in event of loss of ice by sublimation or due to accident conditions. These couplings are attached to baskets by locking sheet metal screws & detents.

A3 Component ID and Description: WBN-1-BSKT-061-B001A1 (ICE BASKET) sub component: Sheet metal screw item no. 09 of W Dwg No. 1191E57 contract 71C62-54114-1

A4 Plant(s)/Organization(s) Affected: WBNP **System No(s):** 061

Unit(s): 1

A5 ASME-Related? Yes ☐ No ☒ If YES, what section? III ☐ XI ☐

A6 Reference Documents: None

INITIATOR: CURTIS C. OVERALL (Print or Type Name) **Organization:** Technical Support

Signature: [signature] **Phone No.:** 3075 **Date:** 4-21-95

PART B: MANAGEMENT REVIEW (Initiator's supervisor and Senior Management Review Committee)

B1 Immediate Actions Required? Yes ☐ No ☒ (If YES, document on continuation sheet)

B2 Confirmed Adverse Condition? Yes ☒ No ☐
Is another ACP more appropriate? Yes ☐ No ☒ (If YES, ACP Tracking No. _____)
Meets SCAR/II criteria? Yes ☐ No ☒

B3 Potentially Reportable? Yes ☒ No ☐
Note: Appendix E1 from SSP-4.05 must be included with this determination for all PERS.

B4 Responsible Organization: WBONSS **Coordinated with:** Landy L. McCormick

Initiator's Supervisor: [signature] **Date:** 4/26/95 4/26/95

B5 Affects operability at WBN? Yes ☐ No ☐ N/A per SRO **Other sites?** Yes ☐ No ☐

SRO Signature: [signature] **Date:** 4-26-95

B6 Senior Management Review Committee Chairperson: [signature] **Date:** 4/26/95

ADVERSE CONDITION REPORT
CONTINUATION PAGE

ORIGINAL ☒ PER ☐ SCAR

Tracking No. WBPER95C246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, Corrective Actions required, etc.). *NOTE: Entries made on this sheet must be signed and dated.*

Transfer the Responsible Organization for Completing the Corrective Action for PER (WBPER95C246) RC From WBC-NSS to WGP-LCE-LAK

Lady L McCormick 7/10/95
TRANSFER FROM Date

James H. Collins 7/12/95
TRANSFER TO Date

TAB B

INTERIM ACTIONS

ADVERSE CONDITION REPORT
CONTINUATION PAGE

ORIGINAL

☑ PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, Corrective Actions required, etc.). *NOTE: Entries made on this sheet must be signed and dated.*

C1 Interim Actions:

None Required.

5/19/95

TAB C

CAUSE ANALYSIS

A. SUMMARY OF CAUSE (WITH TROI CAUSAL FACTOR CODES)

B. DETAILED ANALYSIS

ORIGINAL

ADVERSE CONDITION REPORT
CONTINUATION PAGE

☑ PER ☐ SCAR

king No. WBPER950246 Revision No. 0

ify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, :ctive Actions required, etc.). *NOTE: Entries made on this sheet must be signed and dated.*

G1J PROBLEM PERFORMING REPETITIVE TASKS/SUB TASKS

C4 Causal Factor Analysis:

There are 1944 ice baskets in the Unit 1 ice condenser. Each basket contains approximately 100 sheetmetal screws, with totaling in all baskets of approximately 194,400 screws. During construction, these screws were to be installed and tightened sufficiently to be seated with the heads flush with the basket, as directed in the Ice Basket Installation Procedure, WAT-EP-10, Section 4.0 Installation Sequence step 4.8. Due to the large amount of screws to install and the long duration of this repetitive task, it is Technical Support's view that the apparent cause of this event was attributed from the inadvertent over-tightening of these screws. In addition, other contributing factors, i.e., expansion and contraction of ice baskets and their components over the years from initial ice loading in 1984, the complete melt-out of the ice condenser in 1991, and the second cooldown, ice loading, and weighing in 1995 could have resulted in the failure of the ice basket screws.

Curtis O'Neal 5/19/95

ORIGINAL

ADVERSE CONDITION REPORT
CONTINUATION PAGE

☒ PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (ie. Description of Condition, Recurrence Controls required, Corrective Actions required, etc.). *NOTE: Entries made on this sheet must be signed and dated.*

C4-CAUSAL FACTOR ANALYSIS (BARRIER ANALYSIS)

Event: After completion of the WBN unit 1 ice loading and weighing, approx. 170 ice basket sheet metal screws Heads and 32 whole screws were found in the Temporary waste ice melt tank. This Tank was used with vacuum recovery system To remove waste ice generated from ice Loading.

PROBLEMS / ISSUES	BARRIERS/CAUSE FACTOR	CORRECTIVE ACTIONS
	Equipment XE.	
NA CCO 5/17/95	Admin Control XA.	
	Procedures & Instructions XP.	
	Operations Control XO.	
	Supervision & Oversight XS.	
after WBN unit 1 ice condenser was loaded to 5/16/95 approx. 170 ice basket sheetmetal screws and heads and 32 whole screws were found inside the Temporary Waste ice melt Tank.	Worker Performance XW. / G1J	N.E. To perf. metallurgical tests & evaluation on screws to determine mode of failure. - Tech Support to coordinate w/mmg an camera inspection of approx 399 ice baskets To determine condition & to evaluate metallurgical tests and camera inspection & provide recommendations. - Tech Support To review/revise procedures as req'd based on CA. results Trans module etc.
NA CCO 5/17/95	Verification & Test XV.	
	Management Methods	

Departments Involved: Technical Support

Programs Involved: ICE condenser Procedures & TRUG. Module

Evaluator: [signature] 5-18-95

CCO 5/18/95

Manager: _____

TAB D

RECURRENCE CONTROLS

(ACTIONS TO PREVENT RECURRENCE, APR)

ADVERSE CONDITION REPORT
CONTINUATION PAGE

ORIGINAL

☑ PER ☐ SCAR

acking No. WB PER 950246 Revision No. 0

entify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, orrective Actions required, etc.). *NOTE: Entries made on this sheet must be signed and dated.*

C10 Recurrence Control:

See Corrective Action Steps No. ~~5~~ 3 ~~7~~ 4, TO REVISE AFFECTED ~~MAI~~ PROCEDURES, AS REQ'D.
JC 7-21-95 JC 7-21-95

L A Katcham 7/21/95
Curtis C. O'Neal 5/19/95

TAB E

EXTENT OF CONDITION

Page _____ of _____

ORIGINAL

ADVERSE CONDITION REPORT
CONTINUATION PAGE

☑ PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, Corrective Actions required, etc.). *NOTE: Entries made on this sheet must be signed and dated.*

C5 Extent of Condition:
ALL THE ICE BASKET SCREWS ARE AFFECTED, HOWEVER,
The small amount of failed screws discovered, i.e., 180 represents .093% of the total population of 194,400 screws. In addition, all ice baskets except one which was dropped during ice loading, Reference WBPER950026, were lifted and weighed without further incident.

Larry A. Kahle 9/21/95
Curtis C. Orrell 5/19/95

TAB F

CORRECTIVE ACTIONS

ORIGINAL

ADVERSE CONDITION REPORT

☑ PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

PART C: CORRECTIVE ACTION PLAN DEVELOPMENT (Responsible Organization)

C1 Interim Actions Required? Yes ☐ No ☑ If YES, specify: _____

C2 Control of Nonconforming Material Required? Yes ☐ No ☑ If YES, specify method of control used.
(Transmit documentation to Corrective Action Administrator)

C3 Reactivity Management Issue? Yes ☐ No ☑ If YES, send a copy to Reactor Engineering.

C4 Causal Factor Analysis: Root ☐ Apparent/Basic ☑ (Document analysis on continuation form)
TROI Causal Factor Code(s): G1J Barrier Analysis: XW

C5 Extent of Condition: (Document evaluation on continuation form)

C6 Generic Review Required? Yes ☑ No ☐ BFN ☐ SQN ☑ BLN ☐ Corporate ☐
Justification: SQN is the only other TVA ICE condenser plant affected

C7 Affects Hardware? Yes ☑ No ☐
If YES, method of disposition: *Repair ☐ *Accept-As-Is ☐ Rework ☐ Scrap ☐
To be determined by corrective action step 3 4 ☑ (*Nuclear Engineering technical evaluation required)

C8 Affects Opposite Unit? Yes ☑ No ☑ 5/16/95 Explain: ICE LOADING ACTIVITIES have not begun on Unit 2; this Unit is still under modifications control.

C9 Reevaluation against the SCAR criteria of SSP-3.04, Appendix B, confirms this condition to be properly documented: Yes ☑ No ☐ CCO 5/16/95

C10 Recurrence Controls Required? Yes ☑ No ☐ (Document basis on continuation sheet)

C11 Corrective Actions Required? Yes ☑ No ☐ (Document basis on continuation sheet)

C12 Overall Completion Schedule Date(s): 10/6/95

C13 Corrective Action Plan Approvals (implementing organization concurrence on continuation sheet):

PRINT OR TYPE NAME	INITIALS	DATE
Preparer: Curtis C. Overall / Larry A. Ketcham	CCO [illegible]	7/21/95 5/19/95
Supervisor: James G. Adair	[illegible]	7/21/95
Designated Reviewer: R. E. LEWIS	[illegible]	7/21/95
Nuclear Assurance: (As required) NA CCO 5/19/95		
SMRC: Steve Caskel	[illegible]	7/21/95 7/26/95
ANI/ANII: NA CCO 5/19/95		
Department Mgr: (As required) See above 10-16-95		
Plant Manager: (As required) NA CCO 5/19/95		

C14 Reportable to the NRC? Yes ☐ No ☐
(To be completed before closure) RIMS No. _____

ADVERSE CONDITION REPORT

CONTINUATION PAGE

X PER ___ SCAR

Tracking No. WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, Corrective Actions required, etc.) *NOTE: Entries made on this sheet must be signed and dated.*

C11: CORRECTIVE ACTION

STEP:

1. Technical Support to coordinate with Site Nuclear Engineering (NE) and Central Laboratories to perform metallurgical testing and evaluation of the failed ice basket screws in determining the mode of failure.

   WBO NSS CCO due date Complete

2. Mechanical Maintenance to remove several installed screws from Unit 1 ice condenser ice baskets and obtain several screws from stock. These screws to be transmitted to NE so comparison testing and analysis can be performed in conjunction with Corrective Action No. 1, Ref. WO 95-02791-00.

   WBO MMG KEC due date Complete

3. NE to Request Westinghouse to evaluate the data collected from Corrective Actions numbers 1 and 2.

   WBP LCE LAK due date Complete (T30950623836 & T33950628801)

4. NE to issue DCN to document Westinghouse evaluation and results for acceptable existing conditions and to revise implementing procedures as necessary.

   WBP LCE LAK due date 7/24/95

7/21/95

TAB G

CORRECTIVE ACTION COMPLETION VERIFICATION (DOCUMENTATION)

ADVERSE CONDITION REPORT

ORIGINAL ■ PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

PART D: CLOSURE VERIFICATION (Responsible Organization and/or Nuclear Assurance)

D1 Responsible Organization Verification Statement:

SCAR EVALUATION Re-evaluation against SCAR criteria of SSP-3.04, confirms this condition to be properly documented as a PER.

CLOSURE VERIFICATION Documentation and actions discussed in this Closure Verification Package have been reviewed and verified to provide satisfactory completion of corrective/recurrence control actions for this document. See ACR Continuation Sheet for more detail.

If part C7 is checked YES, final disposition? *Repair ☐ *Accept-As-Is ■ Rework ☐ Scrap ☐

*Nuclear Engineering technical evaluation required. Evaluation document(s): WAT-D-~~10350~~ 10048 (T30950623836) LCD 7/28/95

D2 Nuclear Assurance's Verification Statement: See Continuation page JwA 9-15-95

D3 Closure Approvals:

PRINT OR TYPE NAME	INITIALS	DATE
Preparer: L. E. PERRY	LEP	7/28/95
RA / Supervisor: L. A. KATCHAM	LAK	7 28/95 ~~7/28/95~~
Designated Reviewer: R. E. LEWIS	REL	7/28/95
Department Manager: James G. Allain for WLE	JGA	7/28/95
SMRC: NA	JwA	9-15-95
Nuclear Assurance: (As required) NA	JwA	8-15-95
QC Tags Removed: (As required) N/A LAK 7/28/95		
ANI/ANII: N/A LAK 7/28/95		
Corrective Action Administrator: D. Miller	CAM	12-19-96

ORIGINAL

ADVERSE CONDITION REPORT
CONTINUATION PAGE

■ PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description, Condition, Recurrence Controls required, Corrective Actions required, etc.). *NOTE: Entries made on this sheet must be signed and dated.*

CORRECTIVE ACTION COMPLETION VERIFICATION:

Corrective Action Step 1

Technical Support to coordinate with Site Nuclear Engineering (NE) and Central Laboratories to perform metallurgical testing and evaluation of the failed ice basket screws in determining the mode of failure.

Corrective Action Step 1 Verification

As evident by the Central Laboratories Services (CLS) report (RIMS No. E13950619303) the metallurgical testing and evaluation was performed (see Tab G1)

Corrective Action Step 2

Mechanical Maintenance to remove several installed screws from Unit 1 ice condenser ice baskets and obtain several screws from stock. These screws to be transmitted to NE so comparison testing and analysis can be performed in conjunction with Corrective Action No. 1.

Corrective Action Step 2 Verification

As evident by CLS report, sheet 1, fractured screws that were in service, new screws, and screws that were removed from the installed condition were tested. (See Tab G1).

Corrective Action Step 3

NE to request Westinghouse to evaluate the data collected from Corrective Actions numbers 1 and 2.

Corrective Action Step 3 Verification

As evident from Westinghouse letter WAT-D-10048 (RIMS NO. T30950623836) Westinghouse evaluated the broken ice baskets screws and determined that the ice condenser may be considered operable for the defined deviations (see Tab G2).

7/26/95
for L. E. Perry

ADVERSE CONDITION REPORT
CONTINUATION PAGE

■ PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, Corrective Actions required, etc.)

NOTE: Entries made on this sheet must be signed and dated.

D2: NUCLEAR ASSURANCE STATEMENT

RECURRENCE CONTROLS: See corrective action steps #3 & #4.

CORRECTIVE ACTIONS:

1) Perform metallurgical testing and evaluation of the failed ice basket screws in determining the mode of failure.
2) Mech. Maint. to remove several installed screws from Unit 1 Ice Condenser baskets and obtain several screws from stock. Transmitt these screws to NE for comparison testing and anaylsis in conjunction with C/A #1.
3) NE to request Westinghouse to evaluate the data collected from C/A's #1 & #2.
4) NE to issue DCN to document Westinghouse evaluation and results for acceptable existing conditions and to revise implementing procedures as necessary.

CORRECTIVE ACTION VERIFICATION:

1) Central Laboratories report of the metallurigical testing is in the attached "Central Laboratories Technical Report - Number 95-1021". A copy is included in the PER.
2) The results of the comparison test in included in the Central Lab. Report.
3) The Westinghouse evaluation is documented in letter WAT-D-10048. The result is "use as is"
4) NE issued DCN S-37159-A to document the Westinghouse evaluation, this DCN was closed on 6/24/95.

No field inspection performed for closure of this PER, ice baskets are inacessible. NA verification is not a procedural requirement for this PER. Review performed in accordance with management direction.

Closure of the PER is ACCEPTABLE.

Tom McCollum August 10, 1995.

ORIGINAL

ADVERSE CONDITION REPORT
CONTINUATION PAGE

■ PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, Corrective Actions required, etc.). ***NOTE: Entries made on this sheet must be signed and dated.***

CORRECTIVE ACTION COMPLETION VERIFICATION:
(continued)

Corrective Action Step 4

NE to issue DCN to document Westinghouse evaluation and results for acceptable existing conditions and to revise implementing procedures as necessary.

Corrective Action Step 4 Verification

NE issued DCN S-37159-A to document the Westinghouse evaluation on vendor drawings 1197E57 sheets 1 through 3. As a result of Westinghouse's evaluation and the fact that all ice condenser screws are in place and the task is complete (the determined cause of this condition was the long duration of a repetitive task) no implementing procedures need to be revised.

7/26/95
L. E. Perry

ADVERSE CONDITION REPORT
CONTINUATION PAGE

x PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, Corrective Actions required, etc.). ***NOTE: Entries made on this sheet must be signed and dated.***

I HAVE REVIEWED THE COMPLETENESS AND ACCURACY OF THIS PER AND FIND THAT IT IS READY FOR CLOSURE AS ALL OF THE CORRECTIVE ACTIONS ARE COMPLETE.

7/26/95
LARRY A KATCHAM R/A

TAB G1

CENTRAL LABORATORIES SERVICES
TECHNICAL REPORT

WBPER 950246

Tennessee Valley Authority E13 950619 303

CENTRAL LABORATORIES SERVICES TECHNICAL REPORT	Report No. 95-1021 Sheet No.: 1 of 2 Date of Report: JUN 19 1995
Plant/Project:	Watts Bar Nuclear Plant
Subject:	ICE CONDENSER BASKET SCREWS
Standards Used:	904694, 901387, 516825
Copies Sent to:	Vonda Sisson, IOB 1M-WBN (4); RIMS; Lab Files
Prepared by: Daryl A. Smith / LAB	Approved by: Delsa L. Frazier

Eight sets of self-tapping, plain carbon steel screws were received by Central Laboratories Services (CLS) with a request to determine the failure mode and verify the material type. Westinghouse Equipment Specification No. 678956 (attached) stated that the screws were made from 1022 plain carbon steel, heat treated to surface hardness minimum C-52, a core hardness of C-32-40, and a protective coating of either cadmium plating, zinc plating, or zinc phosphate. The eight sets of screws received by CLS were labeled as follows:

Set "A" : Ten fractured screw heads that were in service (seen in the upper left view of Figure 1) , and one whole screw that was not in service (not shown).
Set "B" : Twelve new screws, seen in the upper right view of Figure 1.
Set "C" : Two screws removed from service, labeled "Bay '24' Top Ring D-6".
Set "D" : Two screws removed from service, labeled "Bay '24' Bottom Ring D-6".
Set "E" : Two screws removed from service, labeled "Bay '12' Top Ring A-6".
Set "F" : Two screws removed from service, labeled "Bay '12' Bottom Ring A-6".
Set "G" : Two screws removed from service, labeled "Bay '1' Top Ring A-6".
Set "H" : Two screws removed from service, labeled "Bay '1' Bottom Ring A-6".

All screws removed from service had varying amounts of corrosion products on them, mostly in the threaded region. The lower view of Figure 1 shows a typical set of screws that were removed from service.

The chemical compositions of representative screw samples from each set was checked with Energy Dispersive X-ray (EDX)* analyses, and the results are presented in Table I. Note that the screws examined had chemistries similar to that of plain carbon steel. The surface coating on the whole screw from set "A" was examined by EDX* analysis as seen in Table I. Note that zinc and phosphorus were detected, which indicates that the screws probably have a zinc phosphate coating.

Carbon and sulfur amounts were measured using Induction Furnace Combustion Techniques on a representative sample from each set of screws, and the results are presented in Table II. Note that each representative sample from each group had chemistries similar to 1022 carbon steel; however, Westinghouse Equipment Specification No. 678956 requires a hardened surface. The screws appeared to have a carburized case, as indicated by the carbon contents that were measured in Table II and the microhardness traverses depicted in Figures 13 through 15. Note that the microhardness traverses shown in Figures 13 through 15 were obtained on screw samples from a representative new screw from set "B", a screw removed from service in set "H" that was noticed to contain cracks at its thread roots, and a screw removed from service in set "D" in which no cracks were detected in examined sections.

Microhardness values were obtained at the case and core for a fractured screw from set "A", the whole screw from set "A", a representative new screw selected from set "B", and a screw removed from service in set "G". The average results are presented in Table III.

The fractured screws that were in service in set "A" were examined in a Scanning Electron Microscope (SEM) in order to determine the mode of failure. Figures 2 and 3 show that the screws fractured in a brittle manner

(continued on next page) 26

as indicated by the intergranular failure mode seen on the screws that were examined. There was usually a small final-fracture area on the fracture surface near the center of the shank that failed in a ductile manner.

An arbitrarily selected fractured screw (that was in service) from set "A" was cut so that a longitudinal cross-section through the fracture surface could be examined. Note that a secondary crack of intergranular nature was noticed above the fracture surface as seen in Figure 4. A screw from set "G" was similarly sectioned, and two cracks were found in adjacent thread roots as seen in Figures 5 and 6. Similar intergranular cracks were discovered in a transverse section of the whole screw from set "A" and at the thread roots of a screw from set "H" (Figure 7).

EDX* analysis of the material in one of the cracks seen in the longitudinal cross section of a screw from set "G" revealed the presence of zinc as seen in Table I. Note in the upper view of Figure 6 that a lapped area was present at the thread roots of a screw from set "G". Similar lapped regions were discovered at the tip, face, and roots of every screw that was examined and is typical of the thread rolling process.

Screws from sets "C", "G", and "H" contained intergranular cracks similar to those seen in Figures 5, 6, and 7. Note that the intergranular crack found in a representative sample taken from a fractured screw in set "A" seen in Figure 4 differed from the intergranular cracks seen in Figures 5 through 7 because it was probably a secondary crack (since it is above the primary fracture and perpendicular to the curved neck of the screw rather than at the thread roots).

Two screws, one from set "A" and one from set "G," were intentionally fractured with a hammer in order to determine the failure mode. SEM photography shows in Figures 8 and 9 that the screw from set "G" failed by intergranular fracture in the case and mixed-mode fracture (cleavage and void coalescence) in the core, while the whole screw from set "A" failed by quasi-cleavage in the case and void coalescence in the core. At the customer's request, additional screws were broken (two from set "C" and two new screws from set "B") in the same manner, except at 15°F. Subsequent SEM analysis of the resultant fracture surfaces revealed that the screws failed by void coalescence.

The general microstructure of representative screws from each set was determined to be tempered martensite (see Figures 10 and 11). Note in Figure 12 that slack-quenched areas consisting of ferrite networks on prior-austenite grain boundaries in a matrix of intermediate transformation products was discovered near the thread roots of four new screws from set "B" and one screw from set "H". The screw samples from set "G" were destroyed for other testing and could not be checked for the presence of the slack-quenched microstructure.

In conclusion, the failure mode of the fractured screws from set "A" was intergranular separation. The screws that were checked for chemistry were similar to the 1022 carbon steel which was specified in Westinghouse Equipment Specification No. 678956.

All test equipment and instrumentation used in the performance of this evaluation are calibrated in accordance with applicable TVA standards and Quality Assurance (QA) Procedures and conform to applicable portions of ANSI N45.2, 10 CFR 50/Appendix B, and 10 CFR 21. Standards used are traceable to the National Institute of Standards Technology (NIST), natural physical constants, or commercially accepted practices. All personnel, procedures, and instructions used comply with the requirements of the Central Laboratories Services (CLS) QA Program.

In the event that additional information or subsequent testing regarding this sample should be required, please refer to Report No. 95-1021.

*EDX is a semi-quantitative technique which uses no standards.

DAS
Attachments: Tables I through III
Figures 1 through 12
Westinghouse Equipment Specification No. 678956 (2 pages).

TABLE I

REPORT OF CHEMICAL COMPOSITION BY
ENERGY DISPERSIVE X-RAY ANALYSIS (EDX)*

REPORT NO. 95-1021

Elemental Weight Percent (Wt%)

Element	Base Metal**	Surface Coating**	Material in crack of screw from set "G"
Aluminum	–	0.4	3.4
Silicon	0.6	0.9	3.2
Phosphorus	–	24.8	0.5
Calcium	–	0.3	1.2
Manganese	1.0	0.6	0.7
Iron	Bal.	Bal.	Bal.
Zinc	–	28.5	2.8
Copper	–	0.4	–
Potassium	–	0.6	–
Chlorine	–	0.3	–

* EDX analysis is a semi-quantitative technique which uses no standards. TVA No. 453855
** The base metal and surface coating were checked on the whole screw from set "A".

Analyzed By: Daryl Smith

Date: 5/31/95

TABLE II

REPORT OF CHEMICAL COMPOSITION ANALYSIS (WEIGHT PERCENT)

BY INDUCTION FURNACE COMBUSTION TECHNIQUES

REPORT NO. 95-1021

STANDARDS: 904694 (NBS 19h)

Sample	Carbon	Sulfur
Fractured Screws from Set "A"	0.24	0.023
New Screws (Set "B")	0.22	0.021
In-service Screws (Set "C")	0.26	0.029
In-service Screws (Set "D")	0.27	0.31
In-service Screws (Set "E")	0.27	0.027
In-service Screws (Set "F")	0.27	0.023
In-service Screws (Set "G")	0.25	0.027
In-service Screws (Set "H")	0.21	0.028
1022 carbon steel	0.18-0.23	Typically 0.050 max.

Comments: The carbon and sulfur limits for 1022 carbon steel are listed for reference purposes only.

Analyzed by: Phillip Gass

Date of analysis: 5/22/95

TABLE III

REPORT OF MATERIAL HARDNESS

REPORT NO. 95-1021

STANDARD(s): 901387 (62GM)

Set	Average Hardness*, Shank Case (Tip of Thread)	Average Hardness*, Shank Core	Average Hardness*, Head Case	Average Hardness*, Head Core
A**	54.6 HRC (625.6 HK)	44.6 HRC (460.6 HK)	61.6 HRC (768.2 HK)	44.9 HRC (465.7 HK)
A***	52.1 HRC (579.3 HK)	43.6 HRC (447.7 HK)	Not Measured	44.1 HRC (454.8 HK)
B	64.0 HRC (823.0 HK)	44.1 HRC (454.4 HK)	Not Measured	Not Measured
G	59.5 HRC (723 HK)	42.5 HRC (432.3 HK)	Not Measured	Not Measured

LABORATORY STANDARD TEST BLOCK SET TVA No. 901387

Serial No.	Standard Value	Measured Results and Average				
62GM	556 ± 15 HK	557.1	553.2	555.1	$\bar{X}$	555.1 HK
62GM	556 ± 15 HK	557.1	552.2	555.1	$\bar{X}$	554.8 HK

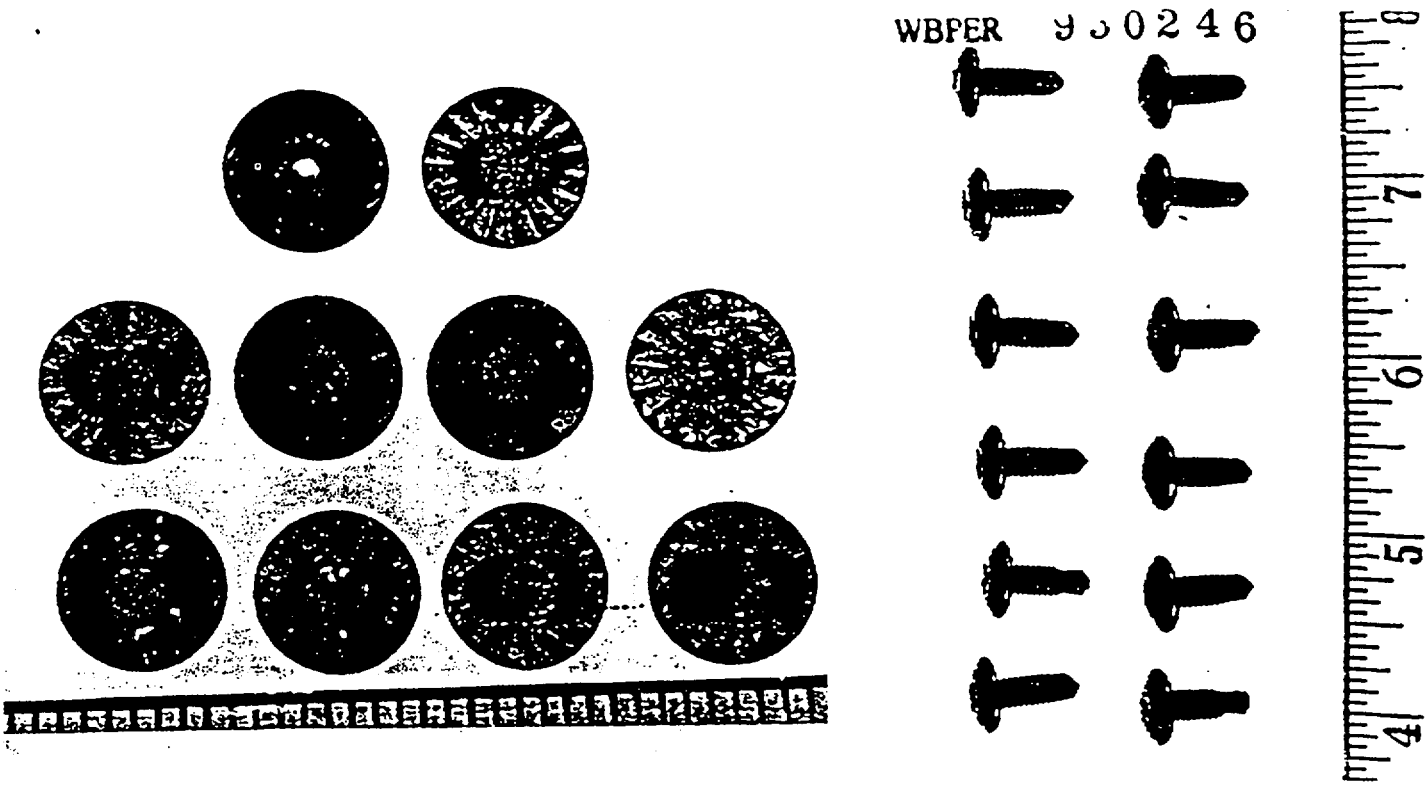
Measured By: Daryl Smith

Date: 5/26/95, 6/16/95

* The value reported is an average of three readings. Measured values are shown in parenthesis following converted values. Source of conversion is the Wilson Digital Microhardness Tester, which is based on ASTM A370.

** Measurements made on a representative fractured screw from set "A".

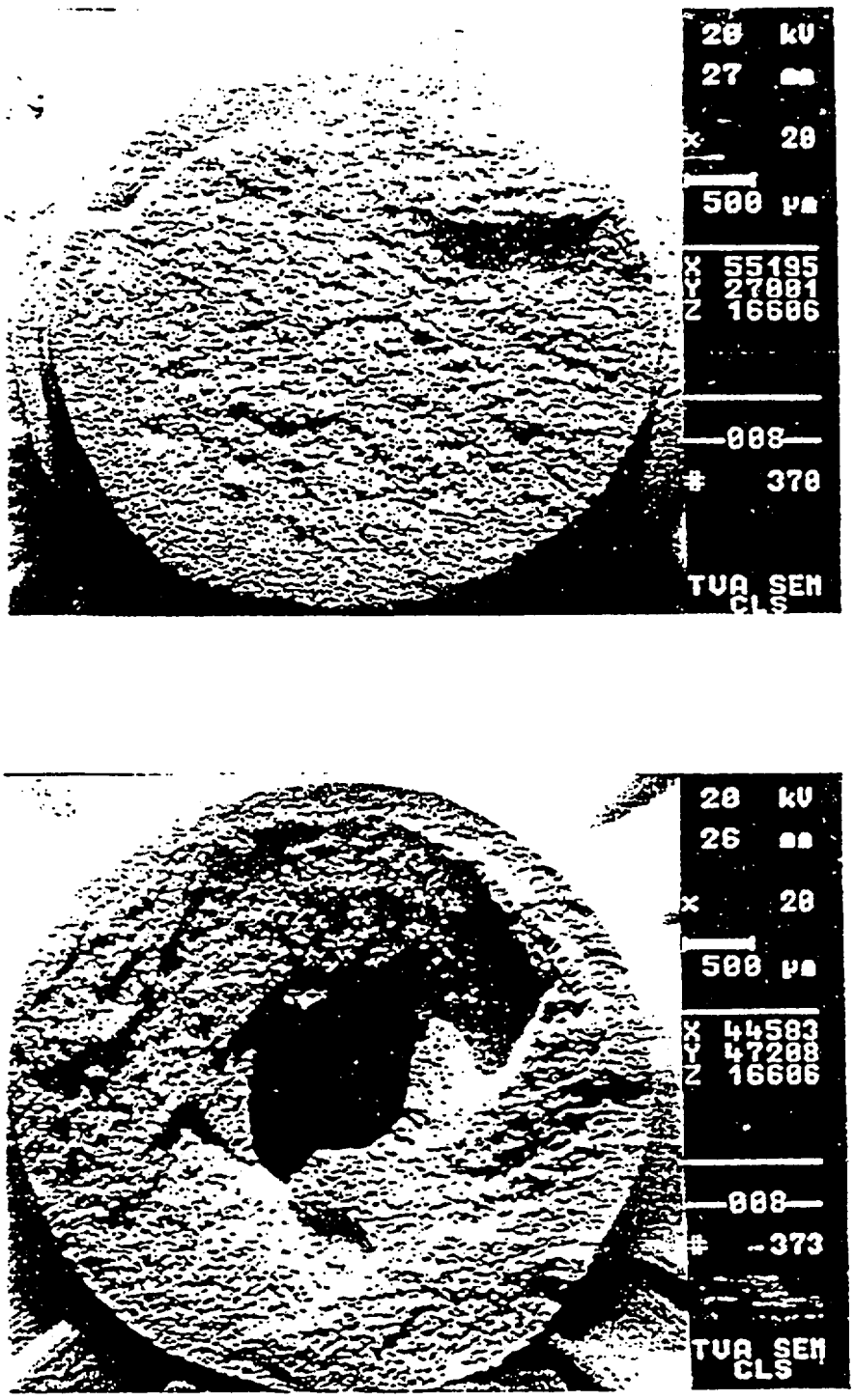
*** Measurements made on the whole screw from set "A".



Left: As-received photograph of the fractured screws (set "A"). Note that the unfractured screw from this set is not shown. Right: As-received photograph of the new screws (set "B").

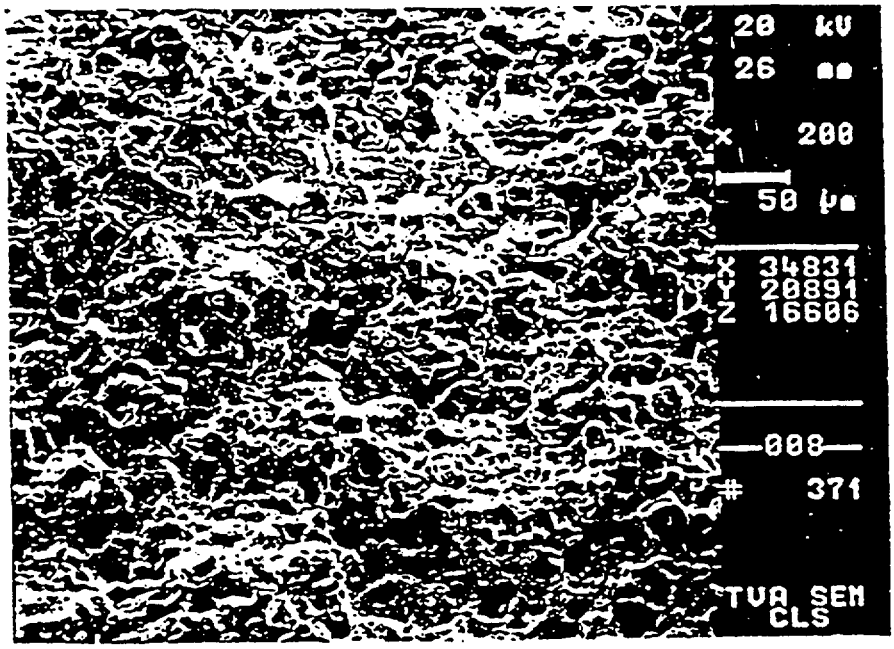
As-received photograph of a typical pair of used screws. Note that each set of used screws (set "C" through set "H") varied in degree of corrosion.

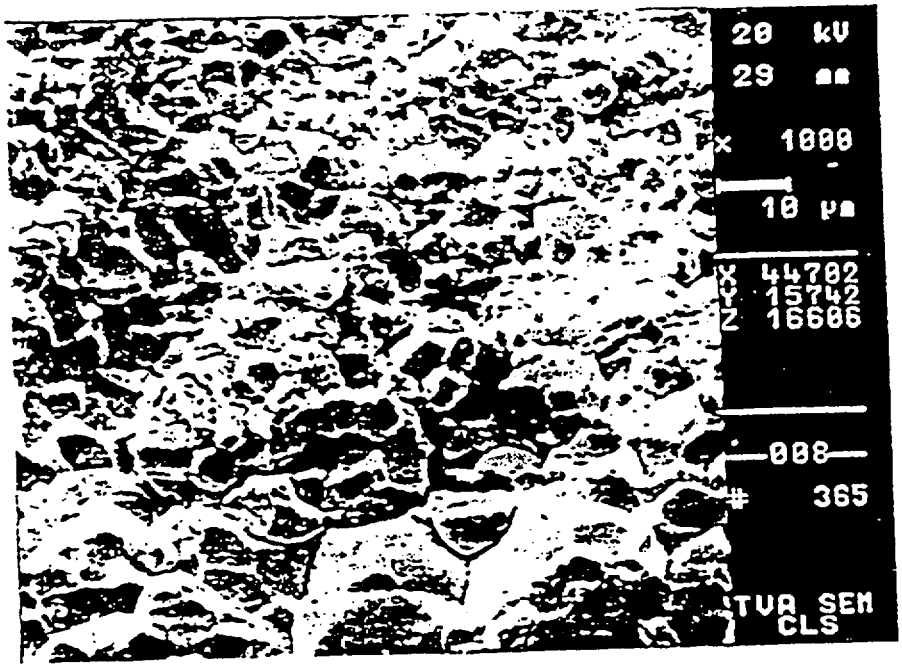
Figure 1 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.



SEM photographs of typical fracture surfaces taken from fractures screws (set "A"). Note that all fractured screws received in set "A" failed in a brittle manner (except for the small final fracture area near the center, which failed in a ductile manner). 20X.

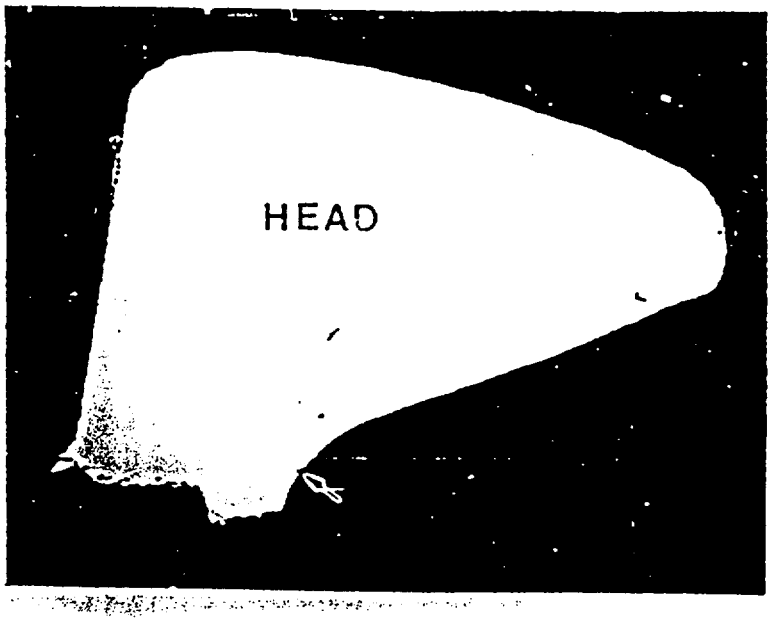
Figure 2 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.



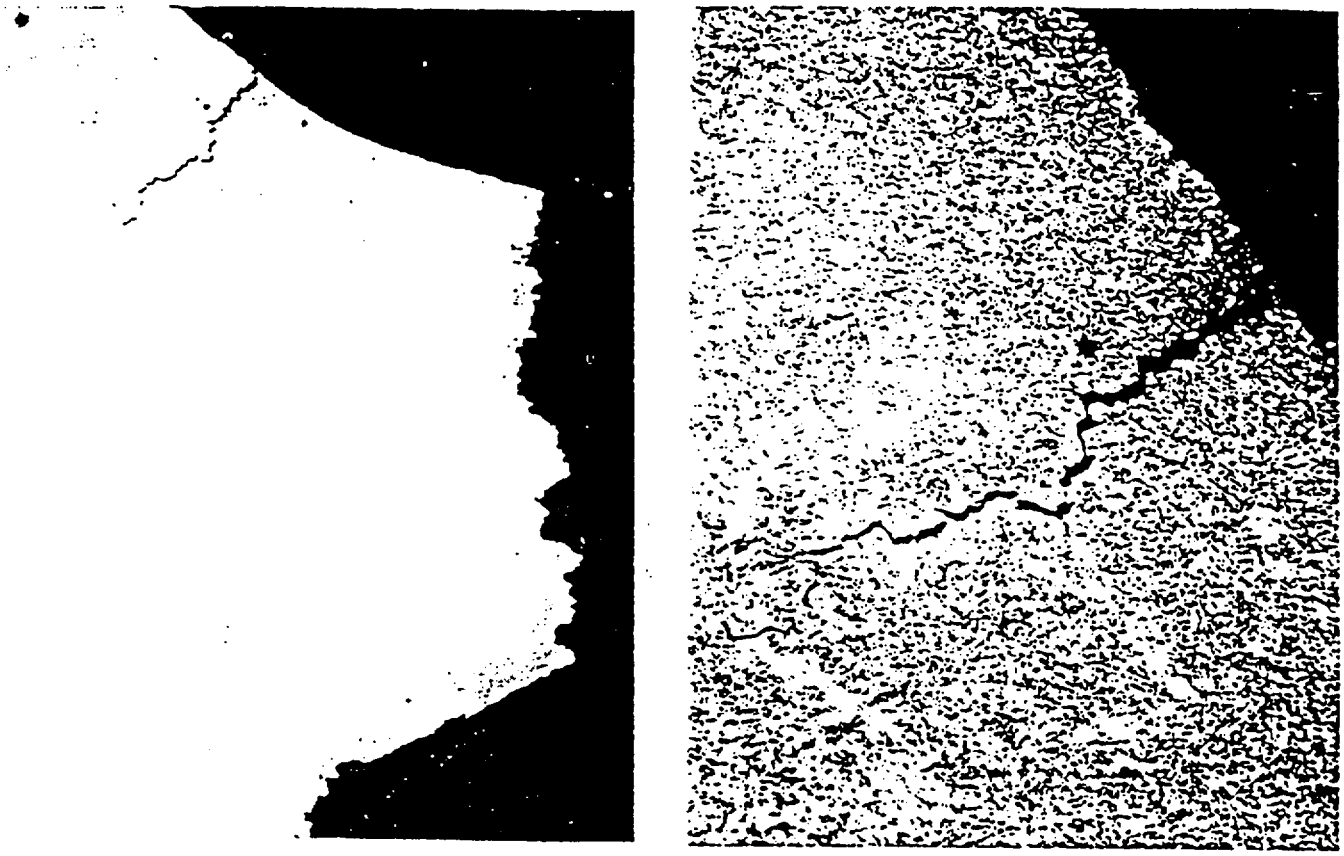


SEM photographs of typical fracture topography seen on failed screws in set "A". The "rock-candy" appearance licates that these screws failed in a brittle, intergranular manner. Top: 200X; Bottom: 1000X.

Figure 3 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No: 95-07. Laboratory Report No. 95-1021.

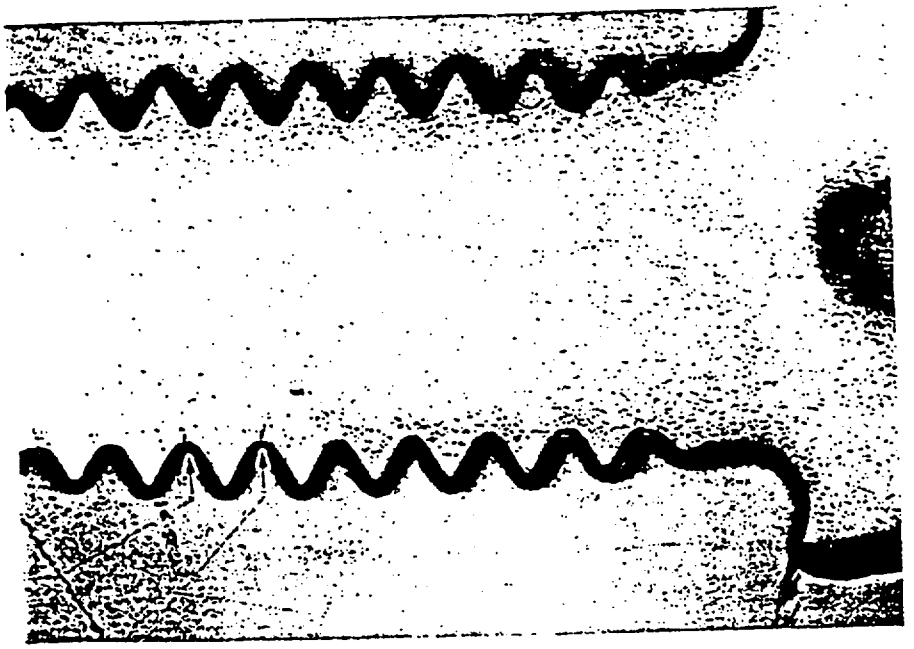


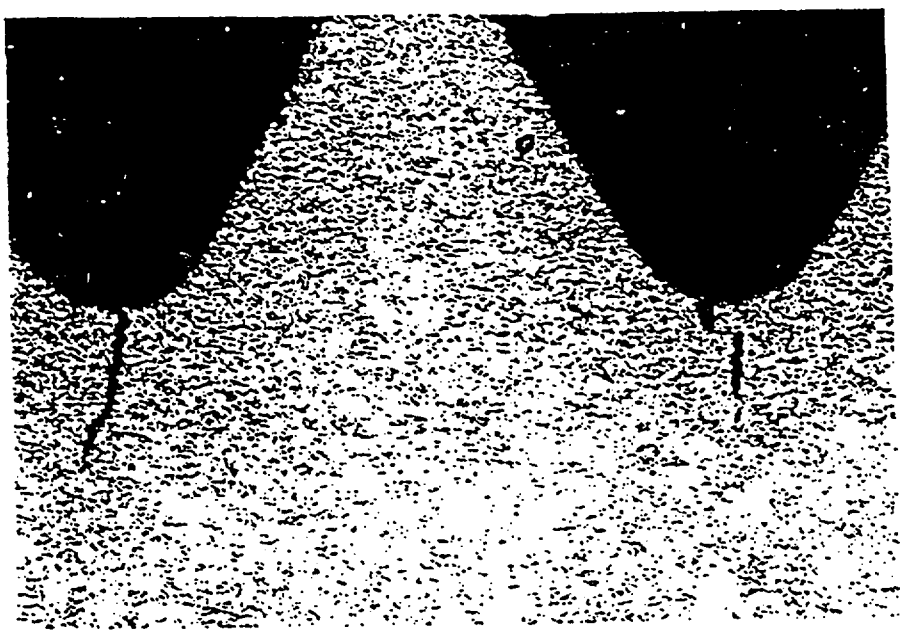
Longitudinal cross-section through a fractured screw. The arrow points to a secondary crack above the fracture surface. 20X. As-polished.



Close-up views of secondary crack seen in the upper view of this Figure. Left: As-polished, 125X; Right: Vilella's etch, 400X.

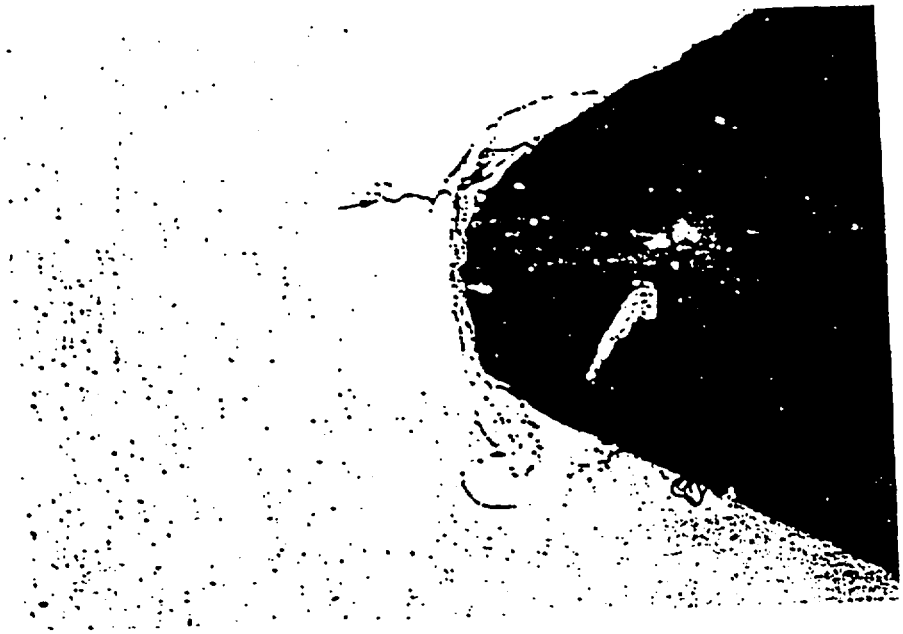
Figure 4 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.



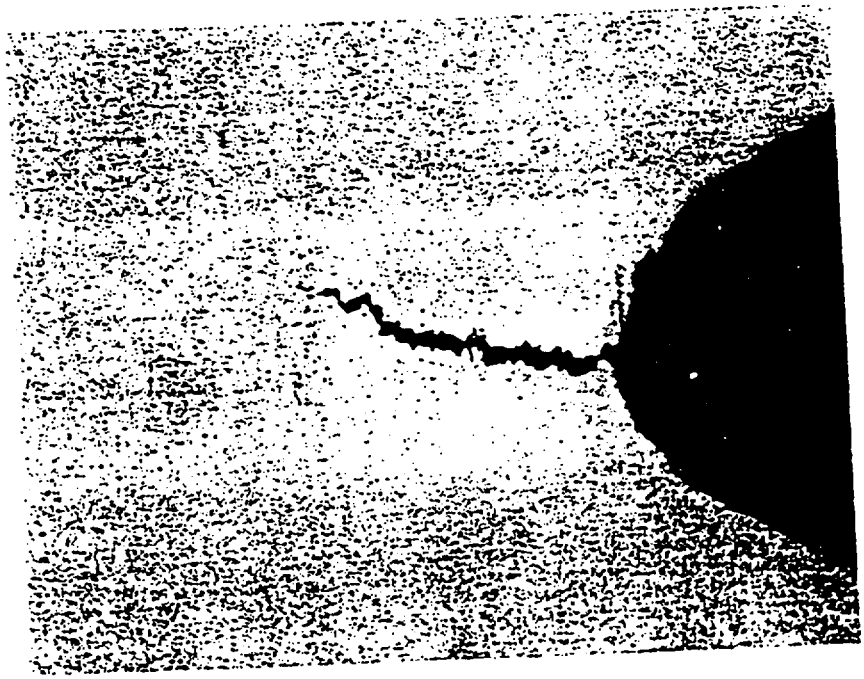


Longitudinal view of cracks present in one of the screws that were removed from service in set "G". Top: 12X; Bottom: 100X.

Figure 5 - Ice Condenser Basket Screws. Watts Bar Nuclear Plant. Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.

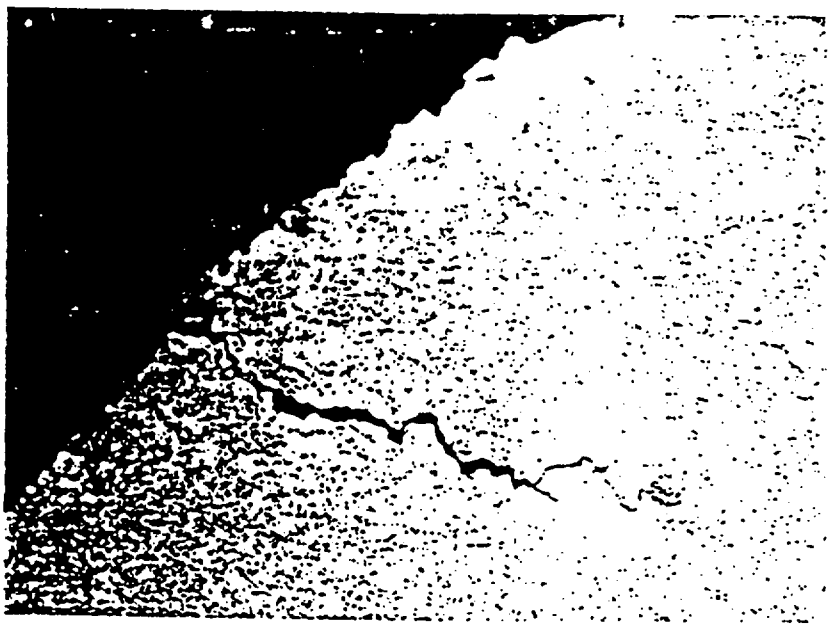


As-polished, longitudinal view of lapping present at tooth root of a screw that was removed from service in set "G". 200X.

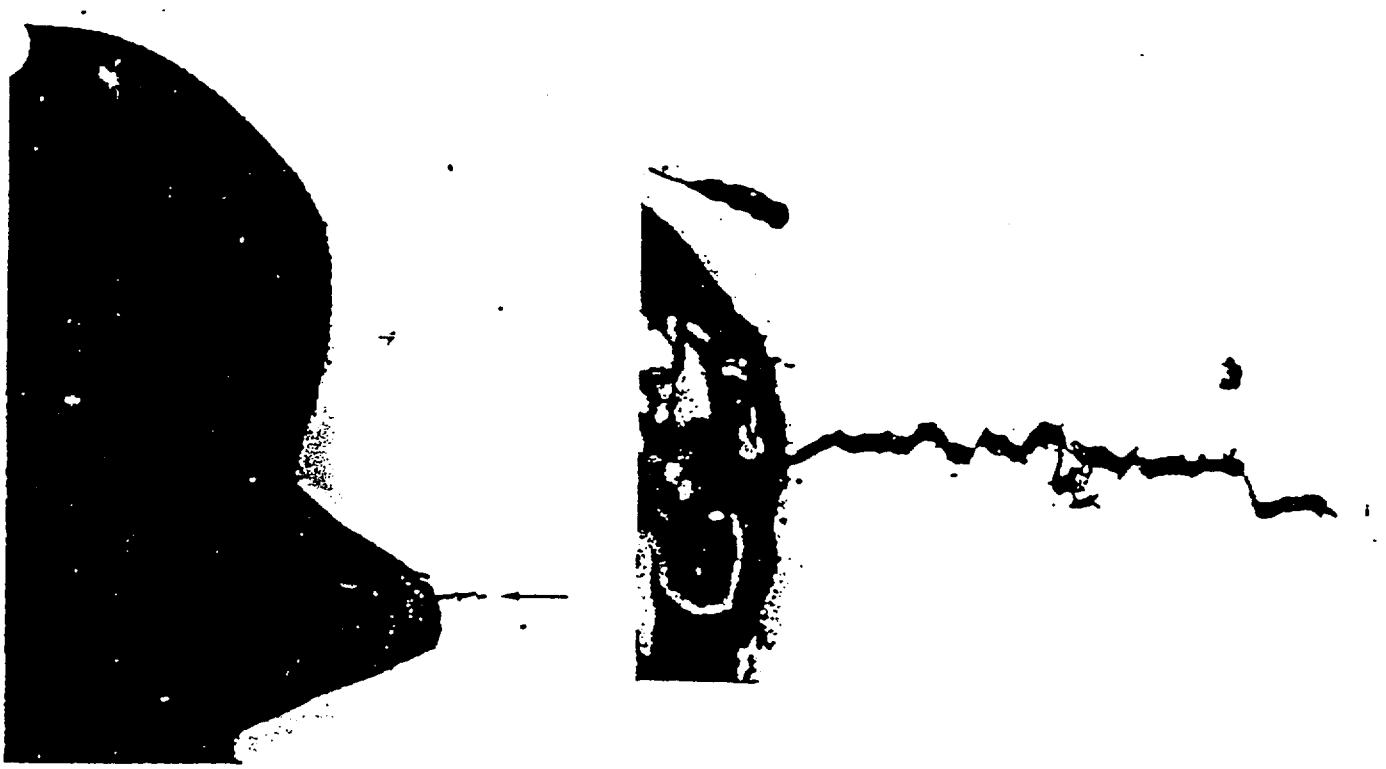


As-polished, longitudinal view of crack present at tooth root of a screw that was removed from service in set "G". 200X.

Figure 6 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.

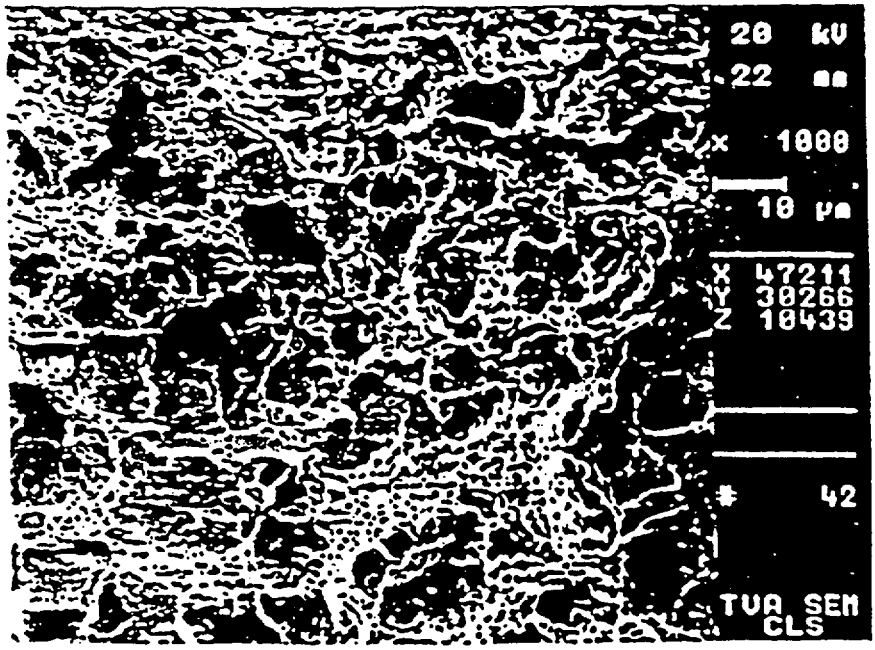


Transverse cross-sectional view of a crack present in the screw that was not in service from set "A". 400X. Vilella's etch.

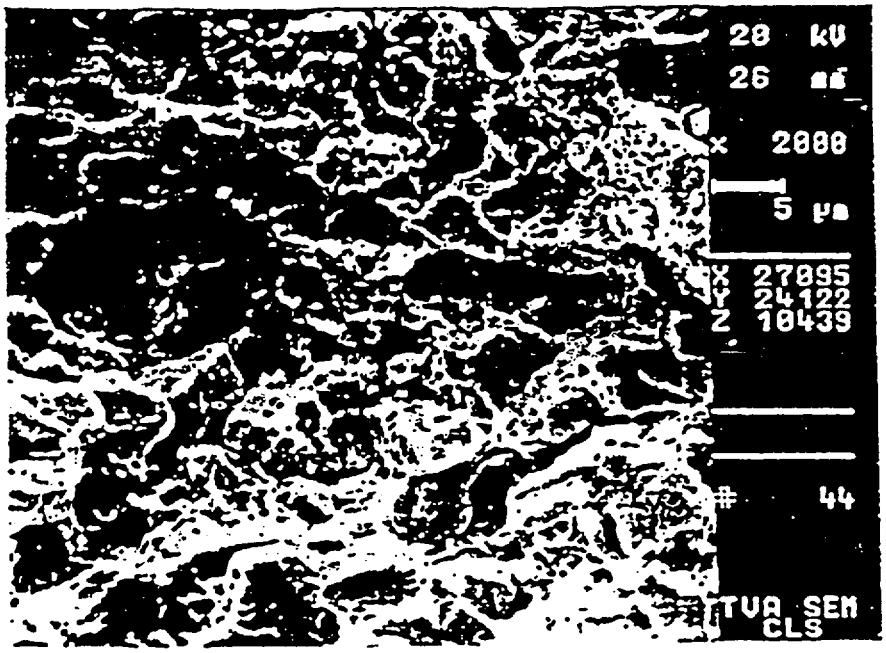


ergranular crack found at thread root of first thread below head in a longitudinal cross section of a screw that as removed from service in set "H". Left: 50X; Right: 500X. As-polished condition.

Figure 7 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.

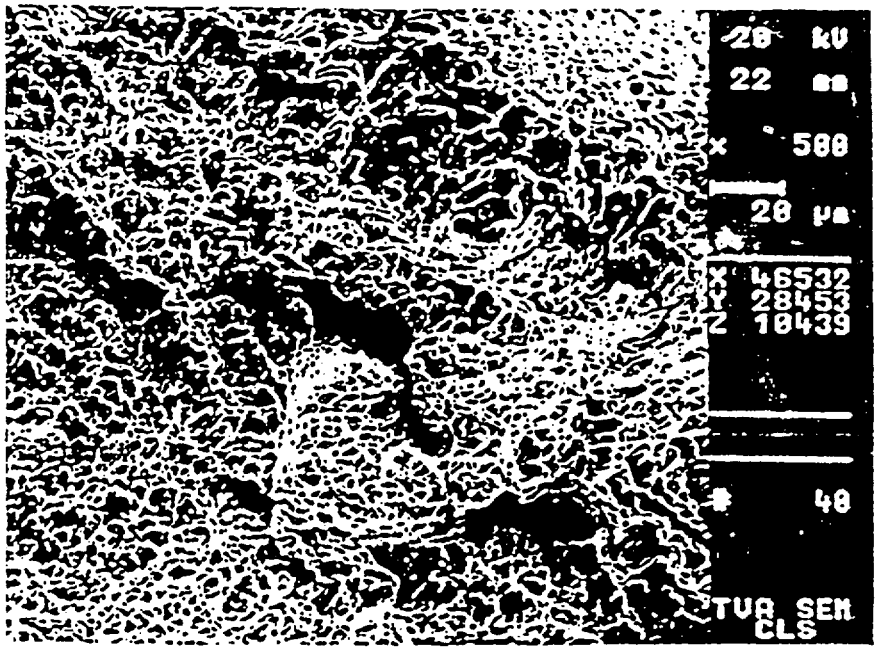


SEM photograph of fresh fracture surface showing quasi-cleavage in the case of a new screw. 1000X.

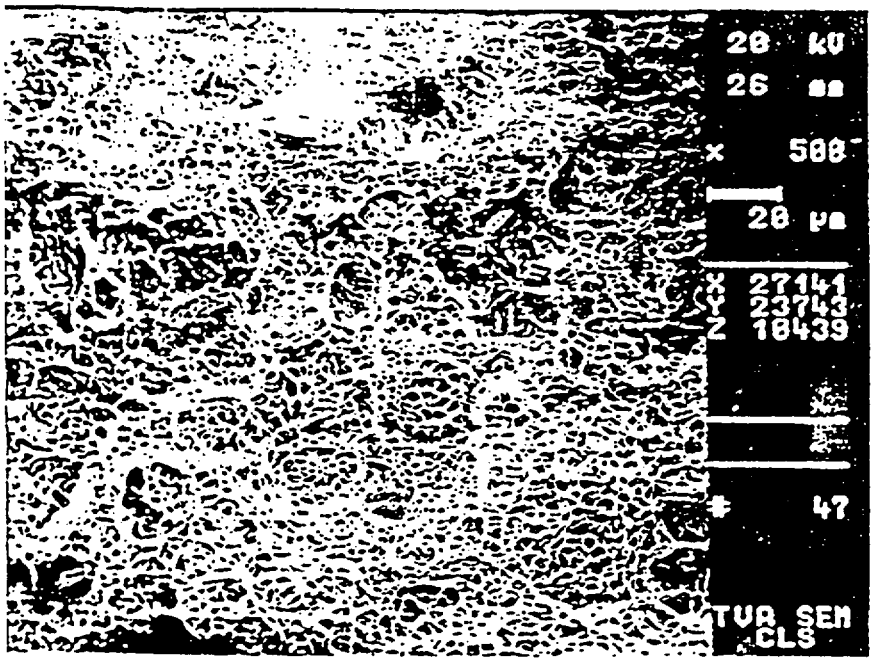


SEM photograph of fresh fracture surface showing intergranular separation (with some void coalescence) in the case of a screw that was removed from service in set "D". 2000X.

Figure 8 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.

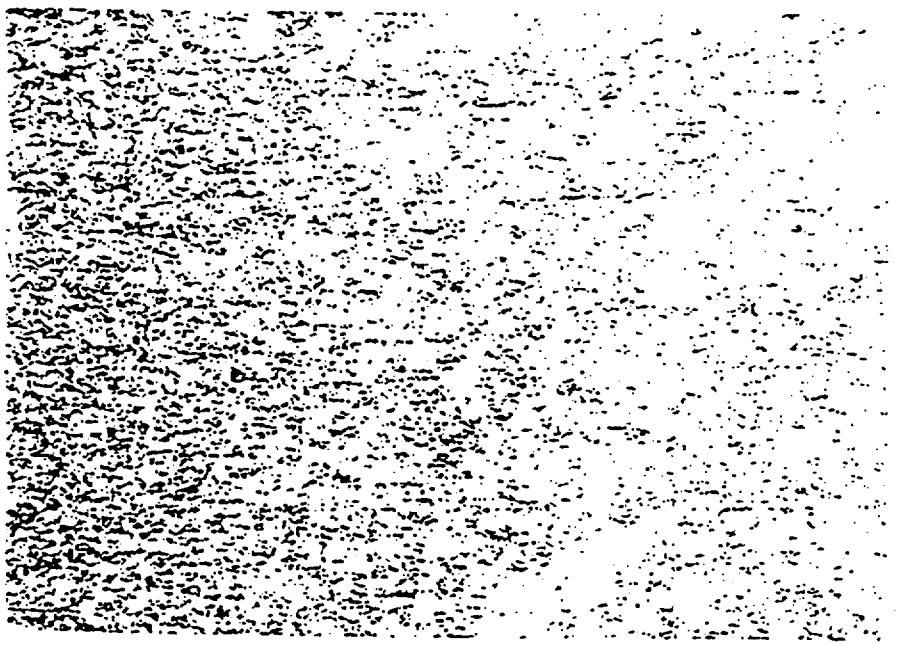


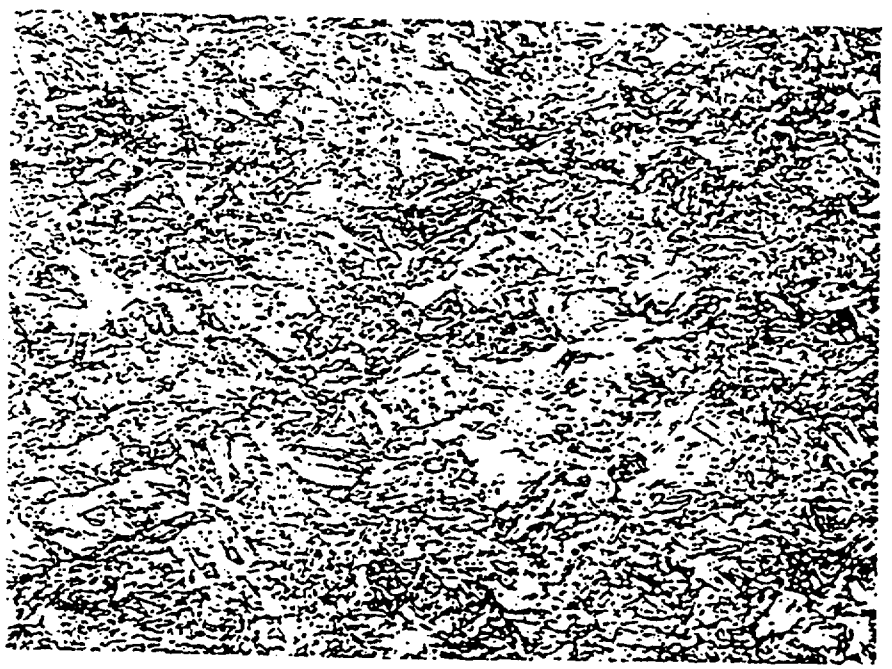
SEM photograph of fresh fracture surface showing void coalescence in the core of a new screw. 500X.



SEM photograph of fresh fracture surface showing mixed-mode separation (cleavage and void coalescence) in the core of a screw that was removed from service in set "D". 500X.

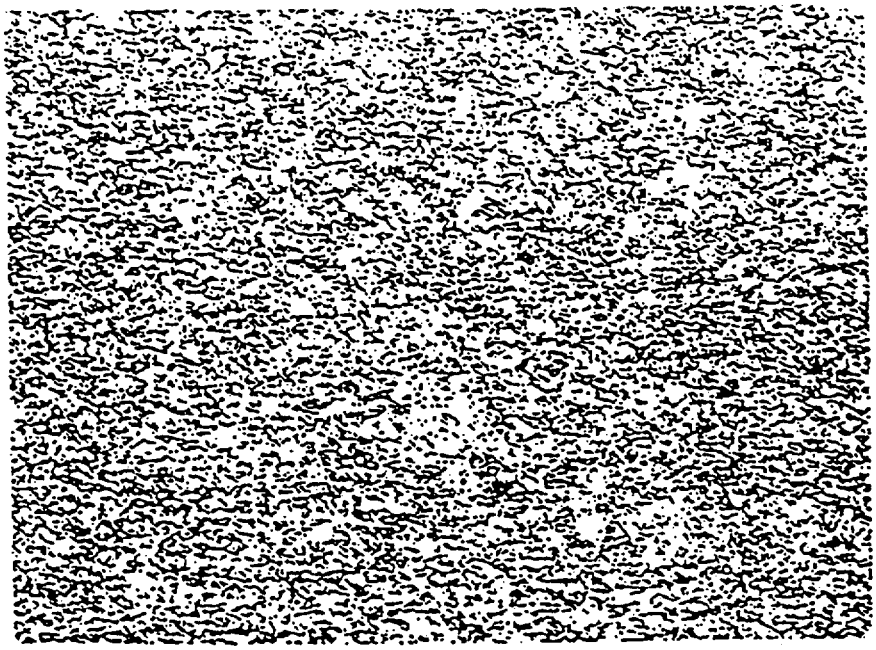
Figure 9 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.

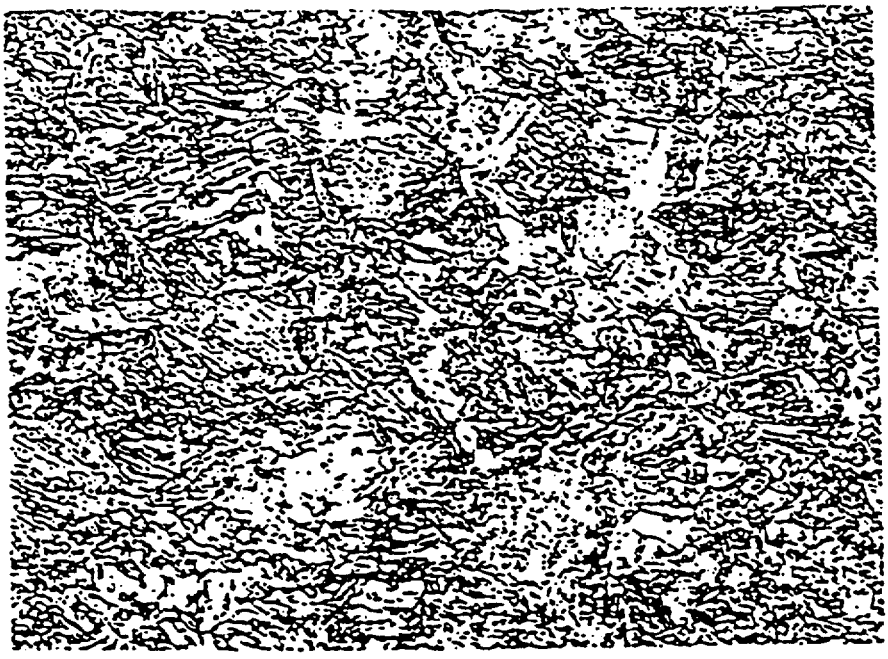




General microstructure of a typical new screw: tempered martensite. Top: 100X; Bottom: 500X.

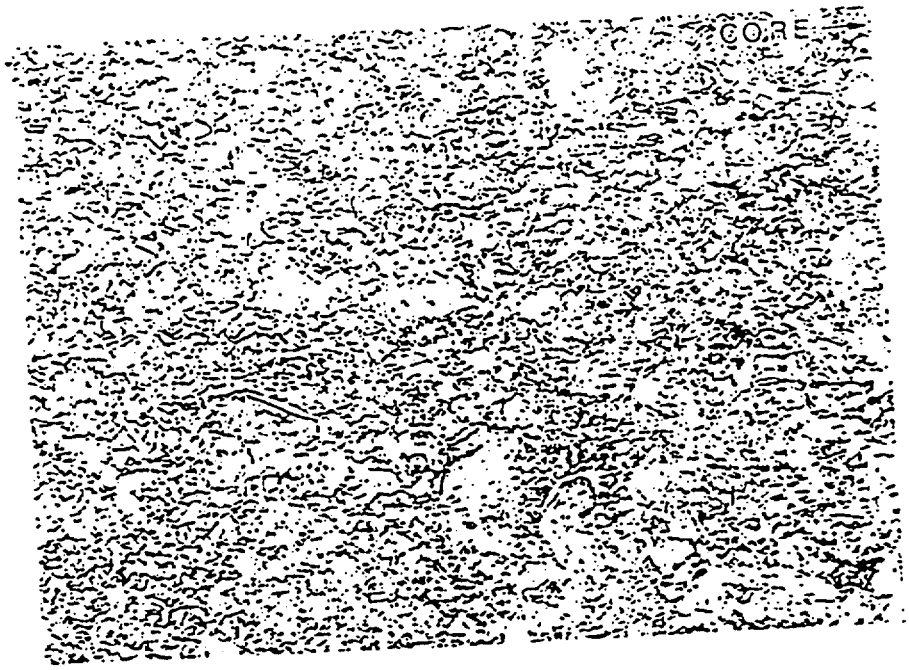
gure 10 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.

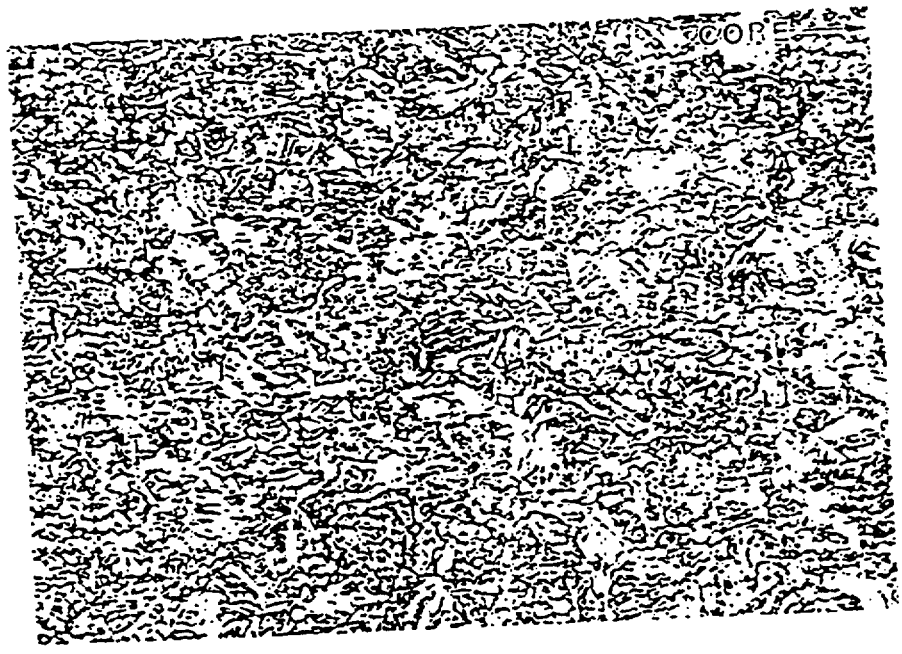




General microstructure of a typical screw that was remived from service in set "G": tempered martensite. Note 'crostructure was similar for screws in each set that was removed from service. Top: 100X; Bottom: 500X.

Figure 11 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.





Slack-quenched areas near thread roots consisting of pro-eutectoid ferrite on prior-austenite grain boundaries in a
ıtrix of intermediate transformation products. Top: Longitudinal cross section of a new screw from set "B".
ɔttom: Longitudinal cross section of a screw removed from service in set "H". 500X, 2% nital etch.

Figure 12 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.

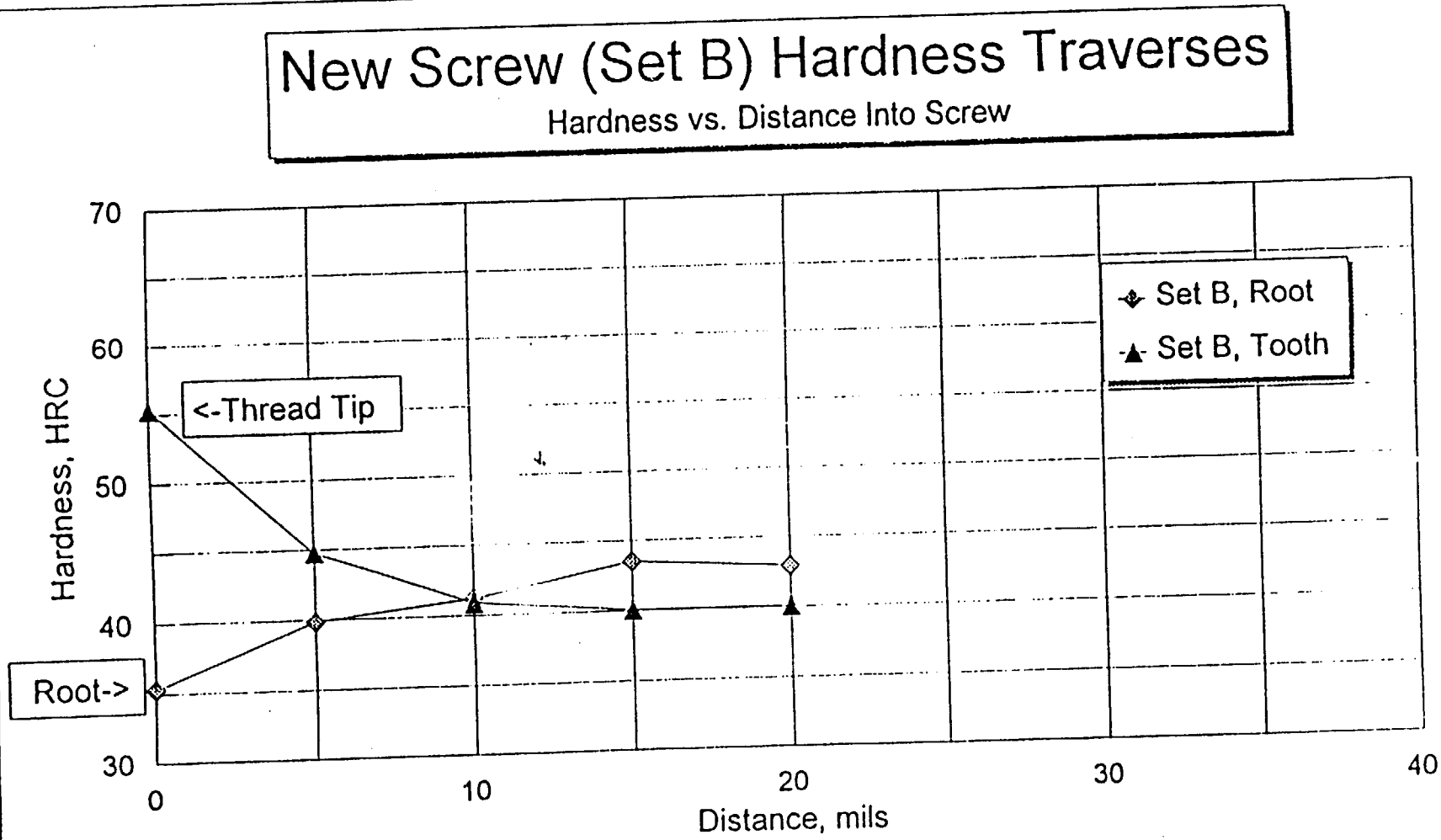


Figure 13 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.

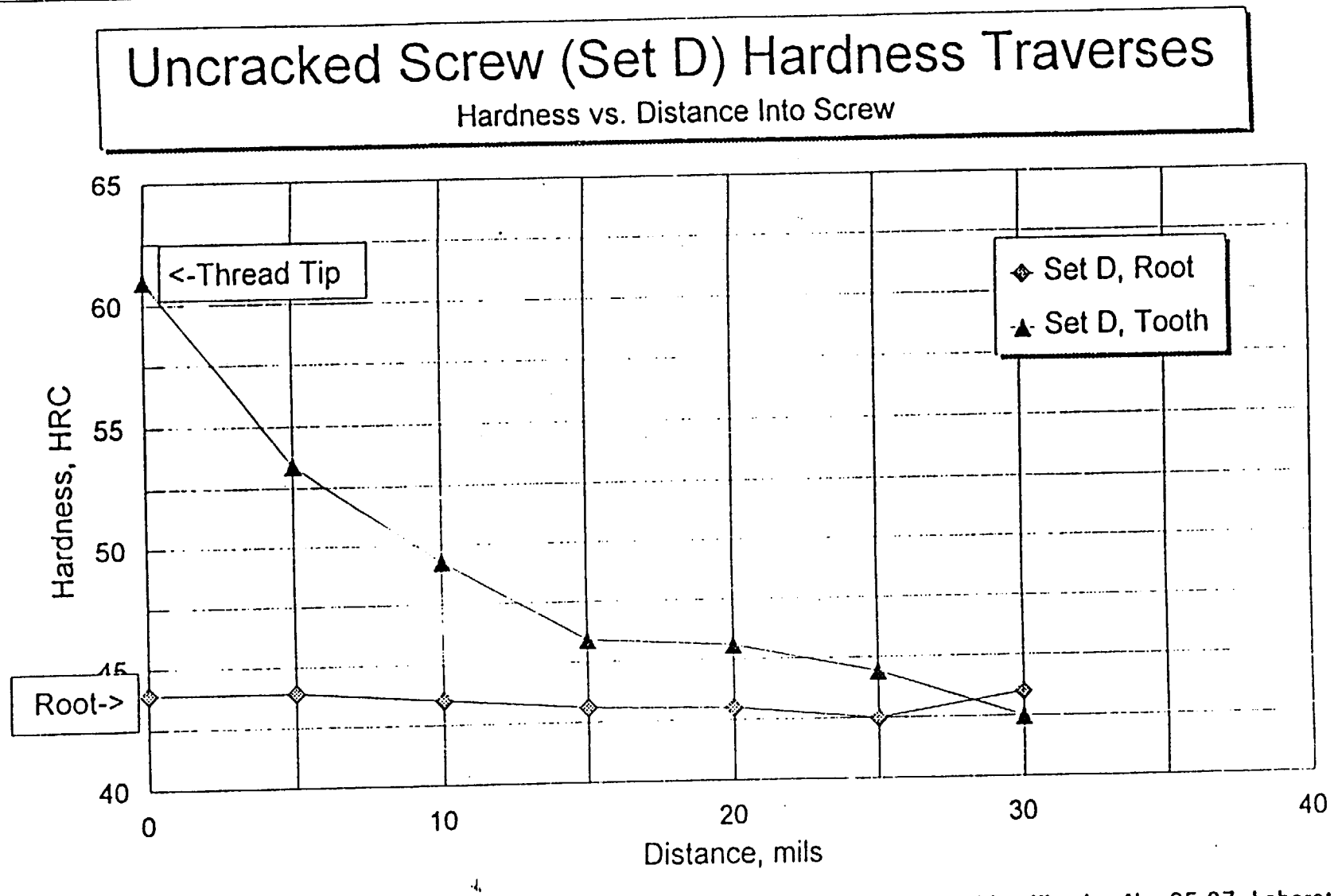


Figure 14 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.

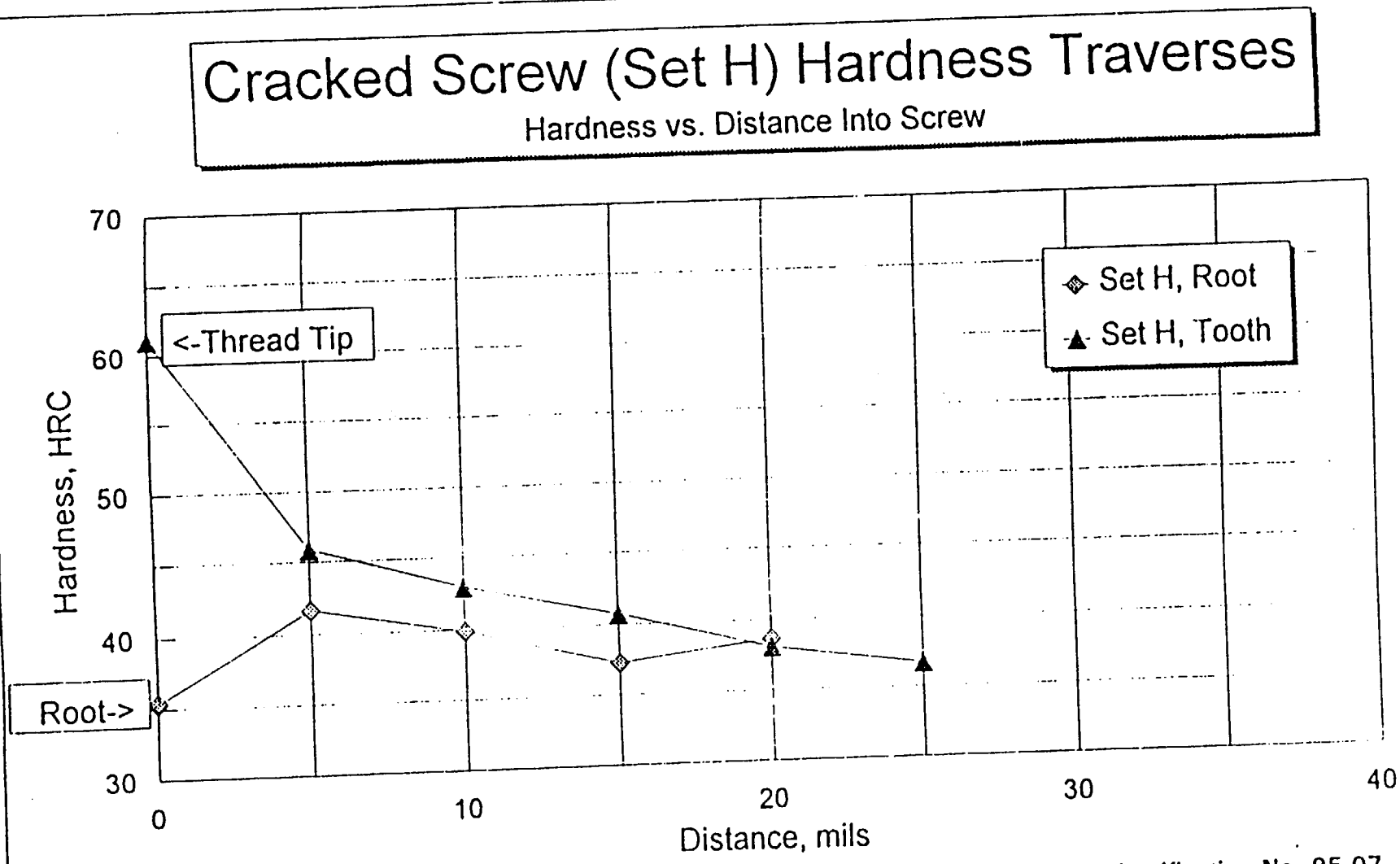


Figure 15 - Ice Condenser Basket Screws, Watts Bar Nuclear Plant, Unit No. 1. Customer Identification No. 95-07. Laboratory Report No. 95-1021.

WBPER 9502 46

EQUIPMENT SPECIFICATION COVER SHEET WBPER 950246

WESTINGHOUSE FORM E40B4C

Westinghouse Electric Corporation
Nuclear Energy Systems
P.O. Box 355
Pittsburgh, Pennsylvania 15230

EQUIPMENT SPECIFICATION	DATED	REVISION NO.	DATED	ORIGINAL ISSUE	SUPERSEDES PREVIOUS REVISIONS
678956	2/26/73	4	6/11/74		X

PROJECT: GENERAL

EQUIPMENT: ICE CONDENSER ICE BASKET (GALVANIZED)

SHOP ORDER: 902

SYSTEM: ICE CONDENSER

SPIN NO. CNHDIB

ANS SAFETY CLASS 2

ATTACHMENTS

W Administrative Spec.
W QCS-1

FOR SUPPLIER'S CONVENIENCE

REV. NO.	REVISION ENTERED BY & DATE

APPROVALS

		REV.	REV.	REV. 3	REV. 4
AUTHOR	A. F. Satterlee/A. V. Pradhan			A.V.P. 2-11-74	
SHOP ORDER HOLDER	D. I. Frelin			D.I.F. 2/12/74	D.I.F. 6/12/74
MANAGER	J. A. George			JAG 2/11/74	JAG 6/12/74
PROJECT MANAGER					

3.0 DESIGN REQUIREMENTS

The equipment is designed by W NES and the supplier is not to make design changes unless approved in writing by W NES.

4.0 MATERIALS

Materials listed in Paragraph 4.1 below are acceptable for this application.

4.1 Acceptable Materials

4.1.1 Sheet steel (couplings, stiffeners and basket end) shall be ASTM A-622, Hot rolled DQ-SK steel sheets with 32,000 psi specified minimum yield.

4.1.2 Bolts and clevis pins shall be SAE J429 Grade 8 steel.

4.1.3 Sheet metal screws shall be ASTM C-1022 heat treated to surface hardness minimum C-52 and a core hardness C-32-40.

4.1.4 Nuts shall be heat treated carbon steel (quench and temper).

4.1.5 The plate shall be ASTM A-36.

4.1.6 Lug, mounting bracket rest and mounting bracket shall be ASTM A-588 steel.

4.1.7 Cadmium plating, zinc plating and zinc phosphate coatings are acceptable for bolts, nuts, pins, washers and screws.

4.1.8 Wire screen and trap door shall be ASTM A-641 zinc coated carbon steel wire.

4.1.9 Sheet steel (perforated metal) shall be either ASTM A-569 commercial quality hot rolled steel with 32,000 psi specified minimum yield or sheet steel per Section 4.1.1.

4.1.10 Grid bars shall be ASTM A-570 Grade B steel.

4.1.11 Ice Support insert shall be ASTM A-366 steel.

4.2 Unacceptable Materials

Only those materials listed in 4.1 of this specification are acceptable.

TAB G2

WAT - D - 10048

WESTINGHOUSE ASSESSMENT OF BROKEN ICE BASKET SCREWS

WBPER 950246

Westinghouse Electric Corporation Energy Systems

P.O. Box [illegible]
Pittsburgh, Pennsylvania [illegible]

WAT-D-10048
June 22, 1995

Ref. 1) WATM-10356

Mr. W. L. Elliott
Manager of Engineering
Tennessee Valley Authority
Watts Bar Nuclear Power Plant
IOB-1A, P.O. Box 2000
Spring City, TN 37381

Attention: Steve Robertson

T30 950623 836

Tennessee Valley Authority
Watts Bar Nuclear Plant Units 1 & 2
Ice Condenser System - Assessment of Broken Ice Basket Screws

Dear Mr. Elliott:

In response to the referenced Field Deviation Report (ref. 1), attached is the Westinghouse Assessment of Broken Ice Basket Sheet Metal Screws for the Ice Condenser System.

If you have any questions on this matter, please contact this office.

Very truly yours,

J. W. Irons, Manager
TVA Watts Bar Project
Domestic Customer Projects

cc: S. L. Robertson, 1L, 1A

Watts Bar Unit 1 Ice Condenser System
Westinghouse Assessment of
Broken Ice Basket Sheet Metal Screws

Summary Report
MSE-REE-1371
June 22, 1995

1.0 Issue

TVA Watts Bar personnel identified to Westinghouse that 162 Ice Condenser Ice Basket Sheet Metal Screw Heads were found in an ice melt tank after cleanup from the recent Ice Bed Ice Loading operations at the Watts Bar Unit No. 1 Plant (References 1, 2). It was postulated by TVA that the screw heads had been broken off during the recent ice loading and ice weighing operations, since prior to initiation of this recent ice loading operations the ice condenser area had been cleaned.

2.0 Assessment Program

The intent of the assessment program was to insure the structural adequacy of the ice condenser system based upon configuration parameters contained in this report..

The results of this assessment are reported herein and are supported by calculations in the Westinghouse ice condenser engineering project file. The scope of the investigation was the following:

- Perform statistical evaluation establishing probability of screws missing in any single ice basket connection based on random occurrence.

  The evaluation concentrates on the probability of one and two screws missing at any one single ice basket connection, and the probability of two adjacent screws missing at any single ice basket connection.

- Evaluate the ability of the ice basket coupling connection to resist the design basis loadings with a minimum of 10 sheet metal screws versus the design basis that has 12 sheet metal screws.

- Consider an ice basket column (or portion of column) becoming a missile, evaluate:

  - whether the basket can impact the top deck structure and cause damage to safety systems outside of the ice condenser compartment

  - the structural integrity of the top deck structure if ice basket impact occurs

- the structural integrity of the intermediate deck given an unrestrained ice basket column impact.

- the potential for bypass flow paths being opened up around the ice condenser making it inoperable.

The results obtained from the investigation in each of these areas are described in the sections that follow. Prior to discussing the results, the hardware design condition is described.

3.0 Hardware Description

There are 186,624 sheet metal (AISI 1022 steel) screws in the 1944 ice condenser ice basket columns. Each basket column is made up of four 12 foot long perforated sheet metal ice baskets coupled together on end with an internal sheet metal coupling ring. There is a double row of 6 equally spaced #10-32 x 0.50 long sheet metal screws in each basket side of the coupling, or 24 sheet metal screws at each basket joint. There is also a double row of 6 sheet metal screws at the very bottom of the basket column attaching the bottom attachment assembly ring to the bottom of the bottom basket, and a double row of 6 sheet metal screws attaching a coupling ring to the very top of the column which acts as a reinforcement for maintenance lifting purposes.

4.0 Statistical Evaluation

During an inspection, personnel at the Watts Bar Unit 1 ice condenser discovered the heads of 162 sheet metal screws believed to be from the coupling connections of the ice basket columns (assumed to be randomly distributed within the ice condenser compartment). There are 1944 ice basket columns in a Westinghouse ice condenser containment system. Each ice basket column contains eight mechanical connections with 12 sheet metal screws in each connection. A statistical evaluation was performed to establish the probability associated with two and three sheet metal screws missing from the same mechanical connection. Based on a random distribution of failed ice basket sheet metal screws throughout the ice bed there is a 1 in 7 million chance (probability equals 1.43×10^{-07}) that 3 sheet metal screws are missing from the same mechanical connection. Consequently, this evaluation will focus on two sheet metal screws missing from the same mechanical connection.

The random distribution of failed ice basket screws is justifiable based on the fact that the entire ice bed was ice loaded and ice weighed under the same procedures and operations prior to the discovery of the 162 broken screw heads.

5.0 Structural Considerations

5.1 Coupling Connection Evaluation

It was found from the statistical evaluation performed that having more than two screws missing at the same mechanical connection is remote, and the probability that two sheet metal screws are missing from the same mechanical connection is very small. Therefore, the purpose of the coupling connection evaluation was to demonstrate the adequacy of the coupling connection with the loss of two sheet metal screws at the same mechanical connection. It is noted that in the statistical study performed the azimuthal location of the missing screws is not restricted.

The maximum design shear load applied to a single sheet metal screw (original configuration 12 screws per connection) was determined to be 278 lbs. The maximum design load occurs at the 12 ft. elevation for the load combination Case I (deadweight (D) plus operating basis earthquake (OBE)). Using the ice condenser design criteria developed in 1974, which is based on the design allowables of the AISC code, a single sheet metal screw connection is rated to 670 lbs (shear load). Actual tests for AISI 1022 (Reference 3) have demonstrated that the ice basket mechanical connection (12 screws) is capable of supporting a load of 14,500 lbs or 1,208 lbs per sheet metal screw. As required by the ice condenser design criteria, the test load is derated for the Case I load combination by the factors 1.1 and 1.87 (equivalent to 1.1 x 1.87 = 2.057). The resulting design shear load based on tests is 587 lbs per sheet metal screw, implying that the original design factor of safety in the connection is 2.11 (i.e., {587/278}).

The shear load imparted on a single sheet metal screw is a function of the horizontal and vertical loads in the ice basket column and its azimuthal location in the basket connection. Horizontal reactions from the lattice frame generate an internal moment in the basket column which is reacted through each mechanical connection by the sheet metal screws in shear. In the evaluation performed, enveloping missing screw configuration cases are considered. To envelope the possible connection configurations the following formula for the maximum shear load, Vmax was defined:

$$Vmax = Max\ [(0.326*H+0.167*V), (0.329*H+0.125*V)]$$

This formula is based on the original interaction formula for the maximum sheet metal screw load:

$$Vmax = 0.163*H+0.0833*V$$

The resulting Vmax for the controlling case, Case I, is calculated to be 556 lbs.

The margin against design allowable (i.e., {Vallowable / Vmax}) in the connection with two sheet metal screws missing at the same mechanical connection (10 screws remain from a possible of 12) are at least equal to the following for the different loading cases.

Case I - Dead Load plus Operating Basis Earthquake	1.06
Case II - Dead Load plus Design Basis Accident (DBA)	2.45
Case III - Dead Load plus Design Basis Earthquake (DBE)	1.10
Case IV - Dead Load plus DBA and DBE	1.13

As seen from this evaluation, the connection is within the allowable limits with two missing screws considering DBA and seismic conditions.

6.0 Functionality Concerns

6.1 Ice Basket Missile Evaluation

In the highly unlikely event that the loss of the structural integrity of an ice basket connection occurs, the 48 foot ice basket column or portion thereof could become a missile. Given only a seismic event, the seismic excitation cannot cause uplift since the vertical seismic component is under one g. This is not true for the design basis accident condition where the LOCA load can reach a force of 2543 pounds on a 48 foot ice basket column. The ice basket condition with the most energy to cause damage was found to be a 48 foot column with one-third of the ice melted (basket plus ice weight of 983 pounds). A conservative low minimum ice basket column ice weight of 1100 pounds was used in lieu of the current Watts Bar minimum ice weight of 1212 pounds in anticipation of future ice weight reduction programs. The forcing function applied to the ice basket considering dead weight effect is given in the table below.

Forcing Function Applied to Ice Basket		
Time [sec]	Force [lbs]	Net Force [lbs]
0.0000	0	-983.0
0.0275	0	-983.0
0.0375	43	-940.0
0.0470	375	-608.0
0.0564	1109	126.0
0.0659	1876	893.0
0.0754	2346	1,363.0
0.0833	2505	1,522.0
0.0933	2543	1,560.0
0.1068	2435	1,452.0
0.1241	2054	1,071.0
0.1427	2123	1,140.0
0.2123	1791	808.0
0.2459	2100	1,117.0
0.3133	1792	809.0
0.3913	1472	489.0
0.4692	1329	346.0
0.5472	1174	191.0

Forcing Function Applied to Ice Basket		
Time [sec]	Force [lbs]	Net Force [lbs]
0.6378	1002	19.0
0.7513	947	-36.0
0.8596	835	-148.0
0.9716	765	-218.0
1.0924	733	-250.0

6.2 Ice Basket Vertical Uplift

A time history analysis was performed using the DBA ice basket forcing function as defined in the table given in Section 6.0 to determine how far the 48 foot ice basket column of 983 pound weight will move up in the vertical direction. It was found that the maximum vertical displacement of the ice basket will be less than 13.5 feet and have no potential to become a missile outside of the ice condenser compartment.

6.3 Integrity of Top Deck Structure

Since it was determined that the maximum uplift distance of an ice basket column is less than 13.5 feet, there will be no impact of the top deck structure by the ice basket. Therefore, the structural integrity of the top deck structure will not be impaired.

6.4 Integrity of Intermediate Deck Structure

The bottom of the intermediate deck structure is about four inches from the top of the ice basket columns. Impact of an ice basket with this structure can potentially occur given the loss of the ice basket coupling connection and the occurrence of the DBA. An evaluation of the structural integrity of the intermediate deck was performed. The intermediate deck consists of doors attached to W8x31 beams that have a yield stress of 50 ksi. The doors open 0.1 seconds after the start of the LOCA (DBA). There is a 3.71" clearance between the top of the ice basket and the bottom of the beam. For the ice basket (983 pounds basket column) to reach this height takes about 0.2 seconds; therefore, the doors will have opened. Once the doors are opened, the hinge loads on the beams are small. Approximately thirty percent of the baskets can pass through the space left with the doors open without impacting the deck structure. Therefore, 70% of the ice baskets could potentially impact the structure. The controlling stress in the design calculation is due to bending in the beams. The beams are simply supported, and the worst case would be for the ice basket to strike the beam in the center. Only one ice basket is considered to strike the structure because of the very low probability that more than one basket could uplift and strike the same portion of the intermediate deck structure. Even if more than one basket uplifts and strikes the same intermediate deck member, the probability that the two baskets would impact the beam simultaneously is remote.

Impact loads on the W8x31 were established based on energy conservation formulations. No reduction in load for nonlinear behavior (e.g., yielding, local crushing of the ice basket) was considered. From the time history analysis performed (Section 6.0) at the time of impact it was determined that the ice basket velocity is 60 in/sec. It is noted that this velocity is conservative for the minimum weight basket condition assumed since the effect of friction, potential binding, and frozen in place baskets is not considered. It was found that for a direct impact of the ice basket in the center of the beam the stress is below the bending stress allowable considering dead load plus ice basket impact, plus LOCA. If the ice basket strikes the beam with an eccentricity causing torsion, lower impact loads will result because the impact stiffness is lower. Further, the beam is free to twist because of the simple connection at the ends. Twisting may cause bending moments in the columns that support the beam. These moments will not induce sufficient stress in the columns that will cause the beams to fall. The columns will still be able to perform their design function providing vertical support. The connections at the ends of the beam will not fail causing the beams to fall. Further, since the doors are open prior to the ice basket impact with the beam, the opening of the doors will not be impaired by any local buckling or permanent set in the beams or columns.

In conclusion the intermediate deck will resist postulated impact loads and remain within the allowable stress range.

6.5 Bypass Flow Paths/Blockage

The maximum vertical displacement of an ice basket column is less than 13.5" as discussed above. Therefore, a total ice basket column will not leave the ice bed. Thus, it will not be possible to have a bypass flow condition. Further, if any local structural damage, or blockage, or flow bypass paths occurs from the falling ice baskets after they reach their maximum height, this would be after the peak blowdown pressure and flow rate has occurred and is of no consequence to ice condenser function.

The potential for an ice basket column, or portion of, to cause blockage of flow passageways between ice basket columns was also evaluated and determined to be of minor consequence. Flow blockages of up to 15% have been determined to be acceptable for ice condenser operability. A single ice basket column, inelastically deformed upon impact with the intermediate deck structure, has been assessed at potentially providing 0.05% flow blockage to the entire ice bed. Based on the statistical probability and distribution of baskets with failed sheet metal screws, the fact that the initial peak blowdown forces are over prior to any potential impact with the intermediate deck structure, and the ice baskets have uplifted less than four inches prior to potential impact with the intermediate deck, flow passageway blockage is insignificant. In addition, any prior existing flow passageway blockage from ice and frost formations and accumulations will have been eliminated from the ice bed at the time of initial blowdown forces, thus providing compensation for any postulated flow blockage from damaged

baskets.

7.0 Conclusion

In conclusion, based on the evaluations performed, the following reasons are given why the ice condenser may be considered operable for the defined design deviation.

Structural

1. The statistical evaluation concluded that the failure probability of the ice basket coupling due to the missing screws is remote.

Functionality

2. Ice basket ejection from LOCA loads cannot reach the Top Deck Structure which is 15 feet away, and therefore cannot be considered a missile in the containment. The maximum ice basket displacement is 13.5 feet vertically up and out of the ice bed.

3. Since the ice baskets can at most lift up 13.5 feet, the ice bed geometry is not compromised resulting in flow bypass paths.

4. The Intermediate Deck Structure Support Beams and Door Framing can stop the Ice Basket Columns from ejecting out of the Ice Bed and still maintain its integrity (stresses are within design criteria allowable).

5. Ice Basket couplings are justified to perform their function against all design basis accident loads and surveillance loading with a minimum of 10 sheet metal screws in lieu of 12 sheet metal screws.

8.0 References

1. FDR No. WATM-10356, Ice Basket Sheet Metal Screws, 6/15/95.

2. TVA PER, Tracking No. WBPER950246, Rev. 0, 4/26/95.

3. Duke Load Test Results of Ice Condenser Couplings, Duke Power Transmittal Letter MMEE-91-313, August 7, 1991.

TAB G3

DCN S-37159-A

WBPER 950246

APPENDIX A
Page 1 of 6

ISSUE RIMS T56 950623 820 CLOSURE RIMS

1 DCN TYPE M [ ] S [X] F [ ] W [ ] O [ ]	DESIGN CHANGE NOTICE	2 DCN NO. 37159-A 3 PAGE 1

PART I REQUESTED CHANGE

4 PLANT / UNIT	5 REASON CODE
WATTS BAR NUCLEAR PLANT UNIT - 1	NONE

6 AREA / BLDG LOC	7 EQUIP ID NO(S) / SYS CODE(S)
REACTOR BUILDING / R129	NA /061
8 AUTHORIZING DOCUMENT	9 REFERENCE DOCUMENTS
NONE	WBPER950246
10 DESCRIPTION SUMMARY	11 REMARKS
ASSESSMENT OF BROKEN ICE BASKET SCREWS	NONE

12 DESCRIPTION OF PROBLEM / REQUESTED CHANGE — ADVANCE AUTHORIZATION REQUESTED YES [ ] NO [X]

SEVERAL ICE BASKET SCREW HEADS WERE FOUND IN THE ICE MELT TANK AFTER CLEANUP FROM THE RECENT ICE BED ICE LOADING. A TECHNICAL EVALUATION IS REQUIRED TO DETERMINE STRUCTURAL ADEQUACY AND ANY REQUIRED CORRECTIVE ACTIONS.

13 JUSTIFICATION / REASON FOR CHANGE

ENSURE FUNCTIONALITY OF ICE CONDENSOR SYSTEM

14 REQUESTED BY	ORGANIZATION	EXT	DATE	NEED DATE	14A ORIGINATOR'S SUPV	DATE
C. R. ALLEN	NE	x3579	6/23/95	6/23/95	Jan A. Adams	6/23/95

15 REVIEWED BY RLE	DISCIPLINE ASSIGNMENT	DATE	15A PROJECT MANAGER APPROVAL	PWL No.	DATE
Jan A. Adams	LLE	6/23/95	S. D Fenell	N/A	6/23/95
			15B ENGINEERING APPROVAL TO INITIATE		DATE
			S. D Fenell for WCE		6/23/95

PART II APPROVED CHANGE

16 PROBLEM SOLUTION / APPROVED CHANGE (INCLUDE BASIS FOR APPROVAL)

SEE CONTINUATION SHEET

ADVANCE AUTHORIZATION APPROVED YES [ ] NO [ ]

AUTHORIZING ENGINEER	DATE
6/23/95	

17 TE	DATE	22 DESIGN VERIFIER	DATE
	6-23-95		6/23/95
18 OTHER NOT REQUIRED	DATE N/A	23 RLE	DATE 6/23/95
19 OTHER NOT REQUIRED	DATE N/A	24 EM	DATE 6/23/95
20 OTHER NOT REQUIRED	DATE N/A	25 WORK COMPLETION	DATE
21 QA NOT REQUIRED	DATE N/A	26 FINAL WORK TRACK. CLOSURE	DATE

REVISION LOG

Revision No.	DESCRIPTION OF REVISION	Date Approved
A	INITIAL ISSUE	6-23-95

WBPER 950246

DCN # 37159-A

PAGE 3

DCN PACKAGE INDEX

	DCN CONTENTS	Included Y	Included N	Page #
1.	DCN Coversheet	☑	☐	1
2.	Revision Log	☑	☐	2
3.	Index Sheets	☑	☐	3-5
4.	Coversheet Continuations			
	BLOCK 12	☐	☑	—
	BLOCK 16	☑	☐	6
5.	Changes/Additions to Design Basis Documents	☐	☑	—
6.	Installation/Testing Requirements	☐	☑	—
7.	DCAs and EMS Data Sheets	☑	☐	7-9
8.	ALARA Review Checklist	☐	☑	—
9.	Other Documents	☐	☑	

2 sheets
6/23/95

TOTAL PAGES IN DCN: 9

DCN PACKAGE INDEX

	Design Impacts	Y	N	RIMS # IF REQUIRED
1.	Civil Issues (e.g., equipment seismic, pipe rupture, structural attachments, piping analysis).	☐	☑	—
2.	Environmental Equipment Qualification (EQ) Program on Mechanical Equipment Qualification Program. Does the DCN involve any cable or devices within these programs. See EAI-7.05 and 7.07.	☐	☑	—
3.	10CFR5J Appendix R (Fire protection analysis). See EAI-7.02	☐	☑	I30950623 840
4.	Nuclear Safety Related	☐	☑	—
5.	Quality Related	☑	☐	Not Regd
6.	SAR Change Will the change require a revision to the Final Safety Analysis Report (FSAR). Issue a change request for Licensing Document per SSP-4.02 when a change is required.	☐	☑	
7.	ALARA Impact. See SSP-5.02.	☐	☑	—
8.	List any additional checklists if required.	☐	☑	—
9.	Other	☐	☑	
10.	Other	☐	☑	

DCN PACKAGE INDEX

DCAs/Drawings Issued With the Package:

Type	Status	DCA/Drawing	Rev	Unit	Base Drawing (DCA Only)	Type of Dwg	Rev of Base Dwg
DCA	CN	37159-01	0		71C62-54114-1 1191E57 SHEET 1 OF 3	MD	6
DCA	CN	37159-02	0		71C62-54114-1 1191E57 SHEET 2 OF 3	MD	6
DCA	CN	37159-03	0		71C62-54114-1 1191E57 SHEET 3 OF 3	MD	6

BLOCK 16 - PROBLEM SOLUTION/APPROVED CHANGE (Continued):

The identified problem has been evaluated by Wesunghouse as documented in letter WAT-D-10048 (T30 950623 836). That correspondence verifies that this problem will not impair the ice basket structural integrity to an unacceptable level and that no corrective action is required.

DCCM was screened on 6/23/95 for prerequisites affecting this change, and the following prerequisites were found:

Prerequisites		Found But Determined Not To Be Prerequisites	
Doc. No.	Status	Doc. No.	Status
		S-35775-A	CLOSD

DRAWING CHANGE AUTHORIZATION (DCA)

NOTE: SEE WAT-D-10048 (T30 950623 836) FOR WESTINGHOUSE EVALUATION OF BROKEN ICE BASKET SCREW HEADS.

THIS DCA IS NOT TO BE INCORPORATED.

REV	TE	DV	REASON FOR CHANGE
0	[signature] 6/23/95	[signature] 6/23/95	Document evaluation of ice basket screw heads.

WATTS BAR NUCLEAR PLANT UNIT NO. 1

TITLE: Assessment of Broken Ice Basket Screw Heads

DCA - 37159-01 CN

AFFECTED DOCUMENT/DRAWING

NO. 1191E57 SHT. 1 [signature] 6/23/95 REV. 6

VENDOR CONTRACT NO. 71C62-54114-1 SUPPL. # N/A

DRAWING CHANGE AUTHORIZATION (DCA)

NOTE: SEE WAT-D-10048 (T30 950623 836) FOR WESTINGHOUSE EVALUATION OF BROKEN ICE BASKET SCREW HEADS.

THIS DCA IS NOT TO BE INCORPORATED.

REV	TE	DV	REASON FOR CHANGE
0	6/23/95	6/23/95	Document evaluation of ice basket screw heads.

WATTS BAR NUCLEAR PLANT UNIT NO. 1

TITLE: Assessment of Broken Ice Basket Screw Heads

DCA - 37159-02 CN

AFFECTED DOCUMENT/DRAWING

NO. 1191E57 SHT. 2 REV. 6

VENDOR CONTRACT NO. 71C62-54114-1 SUPPL. # N/A

DRAWING CHANGE AUTHORIZATION (DCA)

NOTE: SEE WAT-D-10048 (T30 950623 836) FOR WESTINGHOUSE EVALUATION OF BROKEN ICE BASKET SCREW HEADS.

THIS DCA IS NOT TO BE INCORPORATED.

REV	TE	DV	REASON FOR CHANGE
0	6/23/95	6/26/95	Document evaluation of ice basket screw heads.

WATTS BAR NUCLEAR PLANT UNIT NO. 1

TITLE: Assessment of Broken Ice Basket Screw Heads

DCA - 37159-03 CN

AFFECTED DOCUMENT/DRAWING

NO. 1191E57 SHT. 3/2 REV. 6 6/27/95

VENDOR CONTRACT NO. 71C62-54114-1 SUPPL. # N/A

TAB H

ACTIONS TO PREVENT RECURRENCE (APR) IMPLEMENTATION VERIFICATION (DOCUMENTATION)

ADVERSE CONDITION REPORT
CONTINUATION PAGE

ORIGINAL

■ PER ☐ SCAR

Tracking No. ~~WBP950246~~ WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, Corrective Actions required, etc.). ***NOTE: Entries made on this sheet must be signed and dated.***

ACTIONS TO PREVENT RECURRENCE IMPLEMENTATION VERIFICAITON

None required.

L. E. Perry

TAB I

A. REPORTABILITY EVALUATION

B. OPERABILITY DETERMINATION

C. GENERIC APPLICABILITY JUSTIFICATION

D. OPPOSITE UNIT APPLICABILITY

E. ENGINEERING TECHNICAL JUSTIFICATION

ADVERSE CONDITION REPORT
CONTINUATION PAGE

ORIGINAL

■ PER ☐ SCAR

Tracking No. ~~WBP950246~~ WBPER950246 TW7-2995 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, Corrective Actions required, etc.). *NOTE: Entries made on this sheet must be signed and dated.*

REPORTABILITY EVALUATION

See Tab I1

OPERABILITY DETERMINATION

See Tab A, Part B5

GENERIC APPLICABILITY JUSTIFICATION

See Tab F, Part C6

OPPOSITE UNIT APPLICABILITY

See Tab F, Part C8

ENGINEERING TECHNICAL JUSTIFICATION

See Tab G2

L E Berry 07/28/95

TAB I1

REPORTABILITY EVALUATION

JUN 20 1995

T03 950620 933

Corrective Action/ACP Manager, R. M. Norton, Technical Support Supv., NET 1B-WBN

WATTS BAR NUCLEAR PLANT (WBN) - DETERMINATION OF REPORTABILITY FOR PROBLEM EVALUATION REPORT (PER) WBPER950246 (Rev 0)

The subject document has been evaluated by Site Licensing in accordance with Site Standard Practice (SSP)-4.05. The reportability determination is as follows:

Reportable under 10 CFR 50.55(e): Yes ☐ No ☒

Additional remarks: _____

The reportability worksheets are attached.

P. L. Pace
Compliance Licensing Supervisor
FSB 2K-WBN

WL:
Attachment(s)
cc (Attachment[s]):
R. T. Purcell, MOB 2R-WBN--(if reportable)
O. J. Zeringue, FSB 1C-WBN--(if reportable)
B. S. Schofield, FSB 2K-WBN--(if reportable)
J. E. Sanders, FSB 2K-WBN
NRC Resident Inspector, FSB 1J-WBN--(if reportable)
Responsible Organization Mgr., L. L. McCormick, NPB 1B-WBN
RIMS, QAC 1G-WBN

APPENDIX E-1

10CFR50.55(e) SCREENING FORM
GUIDELINES FOR POTENTIAL REPORTABILITY DETERMINATION
10CFR50.55(e) POTENTIAL REPORTABILITY

PLANT/UNIT WBN/1 Item Number WBPER950246, R0

BRIEF DESCRIPTION OF DEFICIENCY: After the completion of the WBN Unit 1 ice loading and weighing, it was discovered that approximately 170 basket sheet metal screws heads and 32 whole screws were in the temporary waste melt tank.

I. Is the deficiency associated with a quality-related or safety-related component or activity?

☒ YES ☐ NO ☐ INDETERMINATE

If the above answer is NO, the deficiency is not potentially reportable. Stop the screening at this point and sign below. If the above answer is either YES or INDETERMINATE, continue with the screening process.

II. Can you confirm that the affected system or component could have performed its required safety function, without reliance on other components, future tests, or operator actions[5] (and left uncorrected)? If unsure, mark "INDETERMINATE" or "NO."

☒ YES ☐ NO ☐ INDETERMINATE

Briefly explain YES answer: (See the attached engineering evaluation.)

NOTE: You should consider the following attributes when answering the above question: (1) environmental qualifications, (2) seismicity, (3) flood analyses, (4) loss of offsite power, (5) materials application, (6) effect on operator information, and (7) any other attributes which may have an impact on operability.

If the answer to the above question is YES, the deficiency is not potentially reportable. If the answer to the above question is either NO or INDETERMINATE, the subject deficiency is potentially reportable. Provide a copy of this form and associated ACP deficiency document to Site Licensing as soon as practicable.

Signature Date: 06/20/95

WBPER 950246

The ice condenser ~~ice~~ ice baskets would continue to perform their safety related function for the condition noted here-in. ~~An~~ A preliminary analysis has shown that the baskets even with screws not functioning would not eject from the ice bed during a LOCA. The maximum height of movement would be 158" out of a total of 576". The majority of baskets cannot come out even if unanchored due to the intermediate deck structure. Based on the above there would not be a loss of ~~the~~ safety function.

Note: Screws missing from the baskets is not a seismic concern since the lattice framing is every 6 ft along the vertical and the baskets are 12 ft in length. Therefore the baskets (loose) would be restrained from horizontal release.

Walt Lanellyn

TAB J

BACKGROUND AND HISTORICAL INFORMATION (OLD REVISIONS, INFORMAL, CORRESPONDENCE, EXTENSION REQUESTS, ETC.)

APPENDIX A
Page 1 of 1

ORIGINAL

ADVERSE CONDITION CHECKLIST[8]

PER Number WBPER WBPER950246

	CAP APPROVAL	YES	NO	NA
1.	Apparent cause analysis/TROI code identified?	✓		
2.	Extent of condition documented and identified?	✓		
3.	Interim measures identified?			✓
4.	Recurrence control actions address cause(s) and identified?	✓		
5.	Corrective actions clearly identified?	✓		
6.	PER has been reevaluated against SCAR criteria?	✓		
7.	Implementing organization concurrence?	✓		
8.	Schedule dates identified including overall completion date?	✓		
9.	Generic review justification included?	✓		
10.	Opposite unit applicability addressed?	✓		
11.	Technical justification for accept-as-is or repair determination?	✓		
12.	Supervisor approval obtained?	✓		
13.	Designated reviewer review?	✓		

Responsible Organization Manager S.E.TORTORA

	CLOSURE VERIFICATION	YES	NO	NA
1.	All corrective actions are complete and documented?	✓		
2.	Supporting documentation, RIMS number(s), or hardcopy of documentation are attached and/or referenced?	✓		
3.	Implementing DCNs/WRs/WOs/ACPs cross-referenced and WR/WO closure statement provided?	✓		
4.	Extent of condition documented and identified?	✓		
5.	PER has been reevaluated against SCAR criteria?	✓		
6.	Preparer verification signature?	✓		
7.	Supervisor approval obtained?	✓		
8.	Designated review/direct report concurrence?	✓		

The interim, recurrence, and corrective actions have been fully implemented and verified. The attributes above have been checked and are adequately documented. This PER is submitted for closure.

Responsible Organization Manager L E Berry 7/28/95

ORIGINAL

ADVERSE CONDITION REPORT
CONTINUATION PAGE

☑ PER ☐ SCAR

Tracking No. WBPER950246 Revision No. 0

Identify the information that is being continued on this sheet (i.e., Description of Condition, Recurrence Controls required, Corrective Actions required, etc.). *NOTE: Entries made on this sheet must be signed and dated.*

C6 Generic Review Required:

SQN is the only other TVA ice condenser plant affected.

THIS PER HAS BEEN RE-EVALUATED AGAINST SCAR CRITERIA AND FOUND TO REMAIN A PER. JZ 7-21-95

Curtis C. Overall 5/19/95

L29 951017 801

QA RECORDS

October 17, 1995

R. P. Saputa, CA Coordinator, FSB 2V-WBN

FINAL SUMMARY OF GENERIC REVIEW FOR DOCUMENT No. WBPER950246
(RETURN TO THE ORIGINATING ORGANIZATION ONLY)

The purpose of this memorandum is to forward the results of the generic reviews performed for the subject document.

SUBJECT OF GENERIC REVIEW:

Missing and/or broken ice basket sheet metal screws were found in the temporary waste ice melt tank at Watts Bar.

CONCLUSION

BFN: RIMS Number: N/A Date of Response: _____
Conclusion: _____

SQN: RIMS Number: _____ Date of Response: 9/14/95
Conclusion: Sequoyah performs periodic structural inspections on ice baskets every 40 months in accordance with 0-SI-MIN-061-003.0. No missing or broken ice basket screws have ever been found except those few (10 or less) that are directly attributable to basket disassembly activities or upper reinforcement ring replacement.

WBN: RIMS Number: N/A Date of Response: _____
Conclusion: _____

BLN: RIMS Number: _____ Date of Response: _____
Conclusion: _____

SUMMARY

Based on the Sequoyah response, this issue is applicable only to Watts Bar. However, Sequoyah will continue to perform periodic structural inspections which includes checking for loose, broken, and missing screws.

Reviewer: G. I. Strickland

Terry R. Woods
Chief Materials and Inspection Engineer
LP 4H-C

TRW:GIS:DM
Attachments
cc (Attachments):
D. Morgan, LP 4H-C
S. B. McAnena, LP 4J-C
RIMS, CST 13B-C

Update TROI: to indicate "final closure memo issued", add this documents' RIMS number and indicate "Y" in "closed" and "completed" fields.

users4/d615w/GenRvws/WBPER950246_GIS_Oct

MIC

To: ___ BFN, S. Shelton-Staten, PSB 1K-BFN

___ WBN, K. D. Rankin, NET 1B-WBN

___ BLN, D. A. Sanders, OSE 1C-BLN

X DNE, S. B. McAnena, LP 4J-C

___ NA, B. J. Bates, BR 4J-C

Date: 9/28/95

Subject: Response To Request For Generic Review

Attached is Sequoyah's response to your request for generic review of WBPER950246.

J. M. Stitt
OPS 5S-SQN

Recd 10/02/95

Due 10/13/95

To: J. H. Casey, SQO/HVA

From: J. M. Stiff, Nuclear Assurance, OPS 5S-SQN

Date: 9/14/95

Subject: Generic Review of PER WBPER950246

Attached is a copy of the subject PER. The SQN Generic Review Committee has assigned your organization to review this PER for applicability to SQN. In accordance with SSP-3.4 you are required to complete the generic review by 10/13/95. An action has been loaded into TROI for your organization.

THE CONDITION DESCRIBED BY THE SUBJECT PER ___ IS, ✓ IS NOT APPLICABLE TO SEQUOYAH.

SQN PER NO. IF APPLICABLE N/A.

OR,

JUSTIFICATION FOR DETERMINING THE PER IS NOT APPLICABLE TO SQN:

1. After a total of 12 refueling outages at SQN (2 per unit), no broken or missing ice basket screws have ever been found during any of the post-servicing periods, except for those few (10 or less) which are directly attributable to basket disassembly activities or upper reinforcement ring replacement. Post maintenance clean-up activities in the ice condenser are always quite thorough, yet no evidence of failed basket screws has been noted.

2. SQN performs a structural inspection of the baskets every 40 months per 0-SI-MIN-061-:003.0. No missing or broken screws have been detected.

3. SQN does not use Westinghouse-provided screws for replacements. Qualified replacements screws from an alternate vendor have been used exclusively since 1988.

Reviewer 9/22/95 Date

Supervisor 9-23-95 Date

To: ___ BFN, S. Shelton-Staten, PSB 1K-BFN

X WBN, K. D. Rankin, NET 1B-WBN

___ BLN, D. A. Sanders, OSE 1C-BLN

___ DNE, S. B. McAnena, LP 4J-C

___ NA, B. J. Bates, BR 4J-C

Date: 6/12/97

Subject: Response To Request For Generic Review

Attached is Sequoyah's response to your request for generic review of WBPER950246.

J. M. Stitt
OPS 5S-SQN

MINUTES
GENERIC REVIEW COMMITTEE

TODAY'S DATE IS 6/8/95

ATTENDEES

W.A. Pruett, NA &L
J.R. Walker, OPS
V.A. Bianco, NE
P.G. Trudel, Tech Support

PER'S DISCUSSED	DISPOSITION
1. SQ950168PER	Sent to WBN for generic review.
2. SQ950353PER	Sent to WBN & BFN for "INFO ONLY."
3. SQ950354PER	Sent to WBN for generic review.
4. WBPER950071	Sent to SQN NE for "INFO ONLY"
5. WBPER950246	Sent to SQ0/TSS for "INFO ONLY"
6. BFPER940978	Sent to SQN NE for generic review.
7. BFPER950248	Sent to SQN NE for generic review.
8.	
9.	
10.	
11.	
12.	
13.	
14.	

6/12/95
RECORDED BY

T03 950620 933

JUN 20 1995

Corrective Action/ACP Manager, R. M. Norton, Technical Support Supv., NET 1B-WBN

WATTS BAR NUCLEAR PLANT (WBN) - DETERMINATION OF REPORTABILITY FOR

PROBLEM EVALUATION REPORT (PER) WBPER950246 (Rev 0)

The subject document has been evaluated by Site Licensing in accordance with Site Standard Practice (SSP)-4.05. The reportability determination is as follows:

Reportable under 10 CFR 50.55(e): Yes ☐ No ☒

Additional remarks: _____

_____

_____

_____

_____

The reportability worksheets are attached.

P. L. Pace
Compliance Licensing Supervisor
FSB 2K-WBN

WL:
Attachment(s)
cc (Attachment[s]):
R. T. Purcell, MOB 2R-WBN--(if reportable)
O. J. Zeringue, FSB 1C-WBN--(if reportable)
B. S. Schofield, FSB 2K-WBN--(if reportable)
J. E. Sanders, FSB 2K-WBN
NRC Resident Inspector, FSB 1J-WBN--(if reportable)
Responsible Organization Mgr., L. L. McCormick, NPB 1B-WBN
RIMS, QAC 1G-WBN

APPENDIX E-1

10CFR50.55(e) SCREENING FORM
GUIDELINES FOR POTENTIAL REPORTABILITY DETERMINATION
10CFR50.55(e) POTENTIAL REPORTABILITY

PLANT/UNIT WBN/1 Item Number WBPER950246, R0

BRIEF DESCRIPTION OF DEFICIENCY: After the completion of the WBN Unit 1 ice loading and weighing, it was discovered that approximately 170 basket sheet metal screws heads and 32 whole screws were in the temporary waste melt tank.

I. Is the deficiency associated with a quality-related or safety-related component or activity?

■ YES ☐ NO ☐ INDETERMINATE

If the above answer is NO, the deficiency is not potentially reportable. Stop the screening at this point and sign below. If the above answer is either YES or INDETERMINATE, continue with the screening process.

II. Can you confirm that the affected system or component could have performed its required safety function, without reliance on other components, future tests, or operator actions[5] (and left uncorrected)? If unsure, mark "INDETERMINATE" or "NO."

☒ YES ☐ NO ☐ INDETERMINATE

Briefly explain YES answer: (See the attached engineering evaluation.)

NOTE: You should consider the following attributes when answering the above question: (1) environmental qualifications, (2) seismicity, (3) flood analyses, (4) loss of offsite power, (5) materials application, (6) effect on operator information, and (7) any other attributes which may have an impact on operability.

If the answer to the above question is YES, the deficiency is not potentially reportable. If the answer to the above question is either NO or INDETERMINATE, the subject deficiency is potentially reportable. Provide a copy of this form and associated ACP deficiency document to Site Licensing as soon as practicable.

Signature Date: 06/20/95

The ice condenser ~~ice~~ ice baskets would continue to perform their safety related function for the condition noted here-in. ~~A~~ A preliminary analysis has shown that the baskets even with screws not functioning would not eject from the ice bed during a LOCA. The maximum height of movement would be 158" out of a total of 576". The majority of baskets cannot come out even if unanchored due to the intermediate deck structure. Based on the above there would not be a loss of ~~a~~ safety function.

Note: Screws missing from the baskets is not a seismic concern since the lattice framing is every 6 ft along the vertical and the baskets are 12 ft in length. Therefore, the baskets (loose) would be restrained from horizontal release.

Walt Lenelly

APPENDIX E-1

10CFR50.55(e) SCREENING FORM
GUIDELINES FOR POTENTIAL REPORTABILITY DETERMINATION
10CFR50.55(e) POTENTIAL REPORTABILITY
Page 1 of 1

PLANT/UNIT WBN/Unit 1 Item Number WBPER950246 R0

BRIEF DESCRIPTION OF DEFICIENCY: Approximately 170 ice basket sheet metal screw heads and 32 whole screws were found in the temporary waste ice melt tank.

I. Is the deficiency associated with a quality-related or safety-related component or activity?

☒ YES ☐ NO ☐ INDETERMINATE

If the above answer is NO, the deficiency is not potentially reportable. Stop the screening at this point and sign below. If the above answer is either YES or INDETERMINATE, continue with the screening process.

II. Can you confirm that the affected system or component could have performed its required safety function, without reliance on other components, future tests, or operator actions[5] (and left uncorrected)? If unsure, mark "INDETERMINATE" or "NO."

☐ YES ☒ NO ☐ INDETERMINATE

Briefly explain YES answer: _____

NOTE: You should consider the following attributes when answering the above question: (1) environmental qualifications, (2) seismicity, (3) flood analyses, (4) loss of offsite power, (5) materials application, (6) effect on operator information, and (7) any other attributes which may have an impact on operability.

If the answer to the above question is YES, the deficiency is not potentially reportable. If the answer to the above question is either NO or INDETERMINATE, the subject deficiency is potentially reportable. Provide a copy of this form and associated ACP deficiency document to Site Licensing as soon as practicable.

Signature Date: 4/26/95

Exhibit # 1

BP-371
Revision 3
Page 5 of 5

ATTACHMENT A
P2/TROI TARGET DATE CHANGE AUTHORIZATION

1. P2 ACTIVITY NUMBER N/A (CH 5/23/95) 2. OWNER/R.O. GSE - USS (CH)

3. ITEM TYPE KP 4. TROI ITEM IDENTIFIER WBIL95-246 5. PWL N/A (CH 5/23/95)

6. AC ACTION SCHEDULES:	TROI CODES	REQUEST #1 DATE
Current Date 05/24/95	R - DEVELOP CAP (Sequence No. 03)	6/16/95
	A - IMPLEMENT CAP (Sequence No ___)	N/A (CH 5/23/95)
	B - RECURRENCE CONTROL (Sequence No. ___)	N/A (CH 5/23/95)

7. LICENSING ITEM ACTIONS:	
#R - PROVIDE CLOSURE PACKAGE (Sequence No. ___)	___/___/___
*S - PROVIDE DRAFT SUBMITTAL (Sequence No. ___)	___/___/___
#Y - PROVIDE NER RESPONSE (Sequence No. ___) N/A	___/___/___
# - PROVIDE NRC OPEN ITEM CLOSURE PACKAGE (Sequence No. ___)	___/___/___
OTHER (Sequence No. ___) (CH 5/23/95)	___/___/___

8. JUSTIFICATION FOR CHANGE The corrective action plan for this PER requires further coordination with NE, (R), and Mech Maint in order to firm up the actions and due dates. The population/schedule for how many baskets to inspect is not resolved. Also we are coordinating with (R) on when they can supply us ~~stated~~ criteria for what is acceptable as far as the # of screws required per basket and location.

(Use additional sheet where required)

9. ACTIONS TAKEN TO DATE Action plan has been drafted, Supervisor comments are being resolved. Also several screws and screwsheets are being analyzed by the central labs (R) to help determine the cause of the screw failures. This analysis is needed to finalize the cause

(Use additional sheet where required)

10. SCHEDULE/RESOURCE IMPACT None

(List associated activities impacted by this change)

AUTHORIZING SIGNATURES		DATE
11. DEPARTMENT MANAGER (R.O.) (Required)	R E Bradley for DK (On 5/23/95)	5/24/95
12. LICENSING PROJECT MGR (LPM) (Where applicable - see attached instructions)		___/___/___
13. SITE NUCLEAR ASSURANCE MGR (Where applicable - see attached instructions)	N/A	___/___/___
14. SITE LICENSING MANAGER (Where applicable - see attached instructions)		___/___/___
15. SITE VICE PRESIDENT (Where applicable - see attached instructions)		___/___/___
16. TRACKING ORGANIZATION (This signature indicates readiness to encode new information in P2/TROI only. It is not intended to indicate approval)	Steve Ballew	5/25/95

Revision #2

BP-371
Revision 3
Page 5 of 5

ATTACHMENT A
P2/TROI TARGET DATE CHANGE AUTHORIZATION

1. P2 ACTIVITY NUMBER N/A 2. OWNER/R.O. CAL - NSS - LLM

3. ITEM TYPE NP 4. TROI ITEM IDENTIFIER 50-327/95-246 5. PWL N/A

6. AC ACTION SCHEDULES:	TROI CODES	REQUEST #2 DATE
Current Date 06/16/95	R - DEVELOP CAP (Sequence No. 13)	7/14/95
	A - IMPLEMENT CAP (Sequence No. ___)	W/A
	B - RECURRENCE CONTROL (Sequence No. ___)	W/A

7. LICENSING ITEM ACTIONS:

#R - PROVIDE CLOSURE PACKAGE (Sequence No. ___)	___/___/___
*S - PROVIDE DRAFT SUBMITTAL (Sequence No. ___)	___/___/___
#Y - PROVIDE NER RESPONSE (Sequence No. ___)	___/___/___
# PROVIDE NRC OPEN ITEM CLOSURE PACKAGE (Sequence No. ___)	___/___/___
OTHER (Sequence No. ___)	___/___/___

8. JUSTIFICATION FOR CHANGE The corrective action plan for the PER requires further coordination with NE, W, & Tech. Support in order to finalize the corrective actions and due dates. NE & W are discussing the bases for the upgraded screws and their relationship during accident conditions and metallurgical findings, etc.

(Use additional sheet where required)

9. ACTIONS TAKEN TO DATE Preliminary action plan was drafted, however this may need to be revised and finalized after SE issues and concerns have been resolved from the technical discussions currently in progress between NE, W, & Tech. Support. This resolution is necessary to finalize this issue.
INTERIM Actions: None Required. Plant in cold S/D 6/16/95
(Use additional sheet where required) GENERIC REVIEW: Yes, applies to SNP only. SNP is only other ice cond. PWR in TVA system.

10. SCHEDULE/RESOURCE IMPACT None

(List associated activities impacted by this change)

	AUTHORIZING SIGNATURES	DATE
11. DEPARTMENT MANAGER (R.O.) (Required)	K. Parcel	6/15/95
12. LICENSING PROJECT MGR (LPM) (Where applicable - see attached instructions)		___/___/___
13. SITE NUCLEAR ASSURANCE MGR (Where applicable - see attached instructions)	N/A	___/___/___
14. SITE LICENSING MANAGER (Where applicable - see attached instructions)		___/___/___
15. SITE VICE PRESIDENT (Where applicable - see attached instructions)		___/___/___
16. TRACKING ORGANIZATION (This signature indicates readiness to encode new information in P2/TROI only. It is not intended to indicate approval)	Steve Bullen	6/16/95

APPENDIX E
Page 5 of 5

NUCLEAR ASSURANCE ADMINISTRATIVE CLOSURE REVIEW CHECKLIST

Adverse Condition Number: WBPER950246 Resp. Org.: NE

		YES	NO	N/A
1.	For ASME; have ANI/ANII signature been obtained?	☐	☐	☑
2.	Is the reportability review complete and attached?	☑	☐	☐
* 3.	Has generic applicability been documented with adequate responses or justification for not being generic?	☑	☐	
4.	Is root cause preparer qualified and has an approved method been documented?	☐	☐	☑
5.	Has a designated reviewer signed at CAP and closure if processed after August 1, 1994? Has a department manager signed?	☑	☐	☐
6.	Tagging review documented and removal documented?	☐	☐	☑
7.	Is operability review(s) in the package?	☐	☐	☑
8.	Administrative Detail:			
	All pages have adverse condition number on top?	☑	☐	☐
	All pages are legible?	☑	☐	☐
	All blanks addressed?	☑	☐	☐
	All pages sequentially numbered?	☐	☐	☐
	All pages raised to the latest revision level?	☑	☐	☐
	Closure RIMS number and QA stamp on cover page?	☐	☐	☐
	Sign closure block Part D3 or appropriate continuation page?	☐		
	SCAR effectiveness review date entered in TROI?	☐		☑
	TROI type code updated for superseded or invalidated?	☐		☑
	All TROI actions closed and item status closed?	☐		

* JB 8-16-95

CORRECTIVE ACTION ADMINISTRATOR _____ DATE _____

RETAIN IN CAA's WORKING FILES