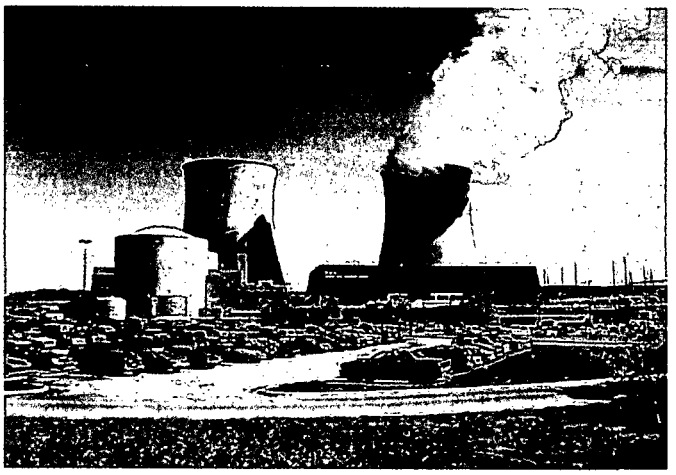
001_TVA_WBN_U2_ ET _OF_ SG_1 of 3

Westinghouse

STEAM GENERATOR PRE-SERVICE EDDY CURRENT REPORT



TVA WATTS BAR NUCLEAR POWER PLANT UNIT 2

MRS-FSR-1796-WBT
Rev. 0

Baseline Inspection
February 2010

Prepared by: _____ Date: 3-2-2010
Riley Looper– ECT Level III

Approved by: _____ Date: 3-3-2010
Robert Michalski – ECT Project Manager

Approved by: _____ Date: 3-3-2010
Dan Folsom -TVA Eddy Current Level III

(Page Count 453)

VOLUME 1
TABLE OF CONTENTS

1. PROJECT MANAGER SUMMARY/
   - EDDY CURRENT EXAMINATION ACQUISITION AND ANALYSIS SUMMARIES

2. WATTS BAR NUCLEAR PLANT – UNIT 2 "STEAM GENERATOR EDDY CURRENT EXAMINATION GUIDELINE", REV. 0 FEBRUARY 1, 2010

3. TECHNIQUE SHEETS
   - ACQUISITION TECHNIQUE SHEETS (ACTS)
   - ANALYSIS TECHNIQUE SHEETS (ANTS)

4. "MULTIFREQUENCY EDDY CURRENT EXAMINATION OF NON-FERROMAGNETIC STEAM GENERATOR TUBING" MRS-SSP-2194-WBT REVISION 1

5. "STEAM GENERATOR DATA MANAGEMENT" WITH SIGNED APPENDICES SGM 2.2.1 GEN-011 REVISION 14
   - SCAN PLAN REV. 1

6. COMPUTER DATA SCREENING SORTS (ADS)

7. CALIBRATION STANDARD INFORMATION
   - CALIBRATION STANDARD DRAWINGS
   - MATERIAL CERTIFICATIONS

8. WBN-2 USE OF APPENDIX H QUALIFIED TECHNIQUES

9. LIST OF TUBES FOR PLUGGING

VOLUME 2
TABLE OF CONTENTS

(Page Count 533)

1. QA REPORTS & PERSONNEL INFORMATION
   - QA SURVEILLANCE REPORTS
   - LETTER OF ACCEPTANCE FOR PERSONNEL
   - NDE PERSONNEL CERTIFICATION TRANSMITTAL REV.4
   - LETTER OF ACCEPTANCE OF ANALYSTS

2. ANALYST PERFORMANCE DEMONSTRATION RECORDS
   - DATA ANALYSTS SIGNATURE LOG
   - SSPD TESTING RECORD

3. MRS-TRC-1860 R0 "SITE-SPECIFIC EVALUATION TENNESSEE VALLEY AUTHORITY (TVA) EDDY CURRENT TESTER EQUIVALENCY CoreStar Omni 200 to Zetec MIZ-70"

4. DATA DISTRIBUTION LIST
   - IAS ADMINISTRATION DATABASE (CAL BOARD)

5. EQUIPMENT (OMNI 200 TESTERS) CERTIFICATIONS

6. SOFTWARE RELEASE

7. SHIFT LOGS

8. CERTIFICATES OF CONFORMANCE FOR EDDY CURRENT PROBES

9. WATTS BAR NUCLEAR PLANT UNIT 2 BASELINE DEGRADATION ASSESSMENT REPORT

10. MISCELLANEOUS
    - NRC 88-02 AVB DATA
    - CAQR NUMBER CH5880045
    - ECT LOOSE PARTS FROM S/G
    - ECT TUBING NOISE CHARTS

VOLUME 3
TABLE OF CONTENTS

(Page Count 628)

1. STEAM GENERATOR 1 LISTING OF ALL WATTS BAR 2 BASELINE EDDY CURRENT INSPECTION DATA

2. STEAM GENERATOR 2 LISTING OF ALL WATTS BAR 2 BASELINE EDDY CURRENT INSPECTION DATA

3. STEAM GENERATOR 3 LISTING OF ALL WATTS BAR 2 BASELINE EDDY CURRENT INSPECTION DATA

4. STEAM GENERATOR 4 LISTING OF ALL WATTS BAR 2 BASELINE EDDY CURRENT INSPECTION DATA

CERTIFICATE OF CONFORMANCE

TENNESSEE VALLEY AUTHORITY
WATTS BAR NUCLEAR POWER PLANT UNIT 2
WESTINGHOUSE NETWORK NUMBER 310963
STEAM GENERATOR EDDY CURRENT EXAMINATION
2010 BASELINE

References: 1) TVA Contract with Westinghouse Electric Company, Contract Number 65717
2) TVA Contract Work Authorization Request, Number WEST-WBT-2009-044
Task: Eddy Current Testing & Primary Side Support Services

Westinghouse has completed the subject services. The on-site activities were performed in accordance with the Westinghouse Quality Assurance Program. Documentation attesting to this work is contained within the Final Report and in the Quality Records, which were retained by TVA.

Field Service Quality hereby certifies that the services described herein were provided in accordance with the Westinghouse Quality Assurance Program. Any exceptions to these requirements have been documented and evaluated by properly executed deviation notices. No deviations were documented at the time of this report.

The Independent ECT Level III QDA's (Qualified Data Analyst) were supplied by Westinghouse and NDE Technology but reported administratively to TVA and worked in accordance with TVA procedures. Westinghouse has audited the subcontractors QA program and has approved this company to supply NDE services.

The Westinghouse ECT Level III signature certifies that the technical content of the services are in conformance with the supporting procedures including codes, specifications and standards of the referenced client order and have been independently verified to be accurate.

G.S. BLOOMQUIST
Westinghouse Field Service Quality

Westinghouse Outage Services ECT Level III

1. PROJECT MANAGER SUMMARY/
   - EDDY CURRENT EXAMINATION ACQUISITION AND ANALYSIS SUMMARIES

CUSTOMER: TENNESSEE VALLEY AUTHORITY
SITE: WATTS BAR UNIT 2 BASELINE
DATES OF SERVICES: February 1, 2010 – March 2, 2010

SERVICES PROVIDED: **Video Inspection of existing plugs, Eddy Current Acquisition, Analysis, and Platform Audio/Video Support.**

Introduction:

During the period of February 1, 2010 through March 2, 2010 Westinghouse Electric performed the following services:

1. Video Plug Verification was performed on the two plugs in both hot legs and cold legs of Steam Generator 2 & three plugs in Steam Generator 4 at the beginning of the inspection. Steam Generators 1 and 3 have no plugs.

2. Eddy current inspections were performed on Steam Generators 1, 2, 3 & 4 using the bobbin coil, motorized rotating 3 coil (+Point, 115 Pancake, and 080HF Pancake), and motorized rotating +Point U-bend probe. Motorized rotating probes were used for diagnostic tests. In addition a Ghent probe was also used for diagnostic purposes. See Volume 3 of this report for listings of tubes tested.

3. This report does contain the final tube plug list for each steam generator, which will be plugged at a later date.

All applicable procedures and related documentation, acceptance letter of certifications and data packages are in the appropriate sections of this report. All videos made during the inspection activities were recorded on portable hard drives and have been turned over to TVA.

All activities were performed in accordance with the requirements of the Westinghouse QA program.

Prepared By: R.A. Michalski
Robert Michalski
Steam Generator Project Manager

EDDY CURRENT EXAMINATION ACQUISITION AND ANALYSIS SUMMARIES

Introduction

Westinghouse Field Services Department performed eddy current examinations of the steam generator (SG) tubing at Tennessee Valley Authority's Watts Bar Nuclear Power Plant Unit 2 (WBN2) during February 2010. The purpose of the examination was to assess the condition of the steam generators, identify tubes requiring repair, and provide the information necessary to fulfill plant Technical Specification requirements.

The Four (4) Model D-3 steam generators were designed and fabricated by Westinghouse. Each steam generator contains 4,674 U-Bend Inconel 600 tubes, with nominal dimensions of 0.750" O.D. X 0.043" wall thickness.

The examination program included multi-frequency bobbin testing on 100% full length of all open tubes in all four steam generators for indications of degradation, loose parts, dings, and motorized pancake/plus point testing for further evaluation of detected bobbin indications. The program also included 100% testing of the hot leg top of tube sheet and U-bends in rows 1 thru 4 in each of the four steam generators.

Westinghouse performed eddy current examinations in accordance with procedure MRS-SSP-2194-WBT, "Multi-frequency Eddy Current Examination of Non-Ferromagnetic Steam Generator Tubing", Revision 1. All examinations were in compliance with the Section XI, Appendix IV, of the 2001 Edition with the 2003 Addenda ASME Code. The inspection program was also designed to meet or exceed the recommendations contained in EPRI PWR Steam Generator Examination Guidelines, Revision 7.

On February 5, 1988 the NRC issued a Bulletin No. 88-02 "Rapidly Propagating Fatigue Cracks in Steam Generator Tubing". The U-bend eddy current data needed for this analysis was obtained and provided to Westinghouse Engineering. A printout of the data is contained in Volume 2 of this report.

Westinghouse and various vendors performed the eddy current analysis in accordance with Watts Bar Nuclear Plant – Unit 2 Steam Generator Eddy Current Examination Guideline Revision 0 issued February 1, 2010. Primary analysis was performed manually for all bobbin and RPC data. Secondary analysis utilized a computer data screening program (ADS) for bobbin and manual analysis for the RPC data. The analysis set-ups (sorts) that were used for the ADS program are included in this report as ADS Sorts.

The STMAX Database Management System software was used to manage the eddy current examination data acquisition and analysis. Procedure SGMS 2.2.1 GEN-011 Revision 14, Steam Generator Data Management, was used along with the procedure close out and check list requirements. Refer to Section 5, Volume 1 of this report.

Summary

Data was collected and Analyzed in ANSER format using servers on site and at Waltz Mill. At site a data conversion was performed to put the data into Eddynet format and a copy was provided to TVA (TVA Hard Drive). A copy of the ANSER data was also placed on the TVA Hard Drive. The ANSER data was copied to optical disc for storage at site.

A tube end to tube end bobbin coil inspection was performed on 100% of the open tubes in Watts Bar Steam Generators 1, 2, 3, and 4 during the February 2010 baseline. Tubes in Rows 5 and above were tested full length with a 0.610" diameter LLMC bobbin probe (except one tube in Steam Generator 1 and 4 tubes in Steam Generator 2 that were tested with a 0.590" LLMC). All in tubes rows 1 through 4 were tested from top support plate to the tube end with a 0.610" diameter LLMC bobbin probe. All in tubes rows 1 through 4 were tested through the U-bend region (top support to top support) using a Plus Point coil. All hot leg tubes were tested at the tube sheet (+2 inches -2 inches) using a 3 coil rotating probe.

SUMMARY OF WATTS BAR UNIT 2 BASELINE
SG EDDY CURRENT INSPECTION/TUBE PLUGGING RESULTS

EDDY CURRENT EXAM TYPE	S/G 1	S/G 2	S/G 3	S/G 4	Totals
610 Full-Length Row 5 and Above	4218	4216	4218	4216	16868
610 Straight-Length Bobbin Row 1-4 CL	456	456	456	455	1823
610 Straight-Length Bobbin Row 1-4 HL	456	456	456	455	1823
610 Top of Tubesheet Plus Point HL	4674	4672	4674	4671	18691
Low Row U-bend Plus Point Row 1-4	456	456	456	455	1823
All Tests for PID	13	3	1	0	17
HL Special Interest Plus Point	198	175	173	210	756
CL Special Interest Plus Point	355	181	101	317	954
UB Special Interest Plus Point	99	133	25	41	298
Total Exams Completed	10925	10748	10560	10820	43053

Special Interest Testing

To maximize the special interest testing each steam generator had different criteria for determining the types of indications that required further inspection. Listed below is a description of each steam generator:

SPECIAL INTEREST CRITERIA BY STEAM GENERATOR

SG - 1

BOBBIN I-CODES
PTE, NTE, BLG AND MRS
OXP >= .8 INCHES
DNG AT TSP >= 2 VOLTS
DNG IN FREESPAN >= 5 VOLTS
MBM WITHIN .75 INCHES OF A DNG
PVN AT HTS WITH MAG BIAS +PT
ALL OTHER PVN WITH GHENT
SELECT BOBBIN PLP TESTED WITH RPC
SELECT RPC PLP BOXIN

SG - 4

BOBBIN I-CODES
PTE, NTE, BLG AND MRS
OXP >= .7 INCHES
DNG AT TSP >= 2 VOLTS
DNG IN FREESPAN >= 5 VOLTS
MBM WITHIN .75 INCHES OF A DNG
PVN WITH MAG BIAS +PT
PVN FROM MAG BIAS +PT WITH GHENT
SELECT BOBBIN PLP TESTED WITH RPC
BOXIN ALL RPC PLP

SG - 2

BOBBIN I-CODES
PTE, NTE, BLG AND MRS
OXP >= 1.0 INCHES
UB & HL DNG AT TSP >= 2 VOLTS
UB & HL DNG IN FREESPAN >= 5 VOLTS
CL DNG AT TSP >= 5 VOLTS
CL DNG IN FREESPAN >= 5 VOLTS
MBM WITHIN .75 INCHES OF A DNG
PVN AT HTS WITH MAG BIAS +PT
ALL OTHER PVN WITH GHENT
BOXIN PLP NOT SEEN WITH BOBBIN

SG - 3

BOBBIN I-CODES
PTE, NTE, BLG AND MRS
OXP >= 1.0 INCHES
UB & HL DNG AT TSP >= 2 VOLTS
UB & HL DNG IN FREESPAN >= 5 VOLTS
CL DNG AT TSP >= 5 VOLTS
CL DNG IN FREESPAN >= 5 VOLTS
MBM WITHIN .75 INCHES OF A DNG
PVN AT HTS WITH MAG BIAS +PT
ALL OTHER PVN WITH GHENT
BOXIN PLP NOT SEEN WITH BOBBIN
SELECT BOBBIN PLP TESTED WITH RPC

Test Equipment

Pegasys manipulators and dual guide tube fixtures were used to perform testing from the hot leg plenums and cold leg plenums of all steam generators. Single guide tube testing

was performed when required. All acquisition personnel were trained and qualified in the eddy current method and were certified to a minimum of Level I.

Corestar Omni 200 multi-frequency eddy current testers were used to energize the test probes. An Eddy Current Tester Equivalency CoreStar Omni 200 to Zetec MIZ-70 tester is included in Volume 2, Section 3 of this report. Hewlett Packard 3600 computers loaded with ANSER Version 8.4.3 Revision 264 software dated 07/29/09 were used to acquire the eddy current data and control the Pegasys manipulators. Dual manipulator positioning verification was achieved using the Pegasys sensor based system and manipulator encoders. All tubes in steam generators 1, 2, 3 and 4 had position verification using this verification process. Data Analysis was ANSER 8.4.3 Rev. 366 dated 08/14/09.

Eddy Current Probes & STMAX Database
Listed below are the description and functions of probes used at Watts Bar Unit 2.

STMAX Probe Code	Probe ID in Summary
	Bobbin Coil Probes
610SBACC	EC-610-LLMC-110/36-C
590SBACC	EC-590-LLMC-110/36-C
610SBACS	EC-610-LLMC-120/36-C
610ZBAZC	EC-610-LLMC-110/36-Z
610NBAZC	SBPF-LLMC-EC-.610-110-36
	Rotating Coils Straight Leg Diagnostics
610NPSNM	ZRPS-DH3-E00.610-C01-00G0EA0
610ZPSMB	M/+PT-610-115/36/S80(664)52PH
590ZGSMB	M/RG34-590-MRPC/52PH(.620-.670)
	Rotating Coils U-Bend Diagnostics
580ZPUN4	+PT-580-MRPC/FH/PP11A/24/52PH (.664) _ZM001
560ZPUM4	M/+PT-560-MRPC/FH/PP11A/24/52PH (.654) _ZM001
580NPUM4	ZRPF-FH-E00.580-MPP11A-0FG0EA0

Note: All rotating coil probes were attached to SMUS-9DNS-E00.610-0-ABB0000 motor units. Probe extensions were used as required.

Test Frequencies, Probe Speeds, and Sample Rates

All eddy current testing was done in accordance with the appropriate Acquisition Technique Sheet (ACTS – Volume 1 of this report). The types of tests performed during WBT Baseline are discussed below:

Bobbin Coil Probe Tests – Bobbin probe testing was done for the purpose of detecting AVB wear in the U-bend, wear at Drilled Supports and Baffles Plates in the straight section, pitting, thinning, manufacturing burnish marks, dents, ID/OD anomalies, loose parts and loose parts wear.

The bobbin probe testing was done at test frequencies of 550 kHz, 300 kHz, 130 kHz, and 35 kHz using the ASME standards for calibrating the system. The tubes in rows 5 and higher were pulled full length at speeds of 55" per second and 1800 samples per second using a 0.610" size probe. The lower rows 1 through 4 were pulled at the 24" per second and 800 samples per second H08 through HTE (Hot Leg Side) or C14 thru CTE (Cold Leg Side) using a 0.610" size probe.

Rotating Coil Probe Tests – Motorized rotating straight body probes (RPC) were used for all straight tube rotating probe tests. These probes have a plus point coil and a 0.115" pancake coil operating at frequencies of 300 kHz, 200 kHz, 100 kHz, (35 kHz pancake coil only for locating) and a 0.080" high frequency shielded pancake coil operating at 800 kHz, 600 kHz, and 300 kHz. The plus point coil on these probes is used for detection and characterization of ODSCC, PWSCC and volumetric type indications such as loose part wear. Calibration of the system for RPC testing was done using an EDM notch standard of the type recommended by Rev. 7 of the EPRI Steam Generator Examination Guidelines. MHI Guide Tube Standards were used on the hot leg sides.

The straight body RPC probes were scanned (pushed) at 0.80 inches per second (IPS) and a sample rate of 2200 samples/second (s/sec) at 1500 RPM for top of tubesheet testing. Diagnostic testing (not dings) in the straight length of the tubing was conducted at the same inspection speeds.

Testing for diagnostics in the U-bend regions was done with a single plus point U-bend style probe operating at frequencies of 400 kHz, 300 kHz, 150 kHz, and 35 kHz. The U-bend probes were scanned (pulled or pushed) at 0.50 IPS with a sample rate of 1500 s/sec at 1000 RPM. Calibration of the system for U-bend probes was done with the EPRI, Rev. 7 type EDM notch standard. This type probe is used for diagnostic testing of bobbin indications and for detection and characterization of PWSCC, ODSCC or Wear.

Diagnostic testing of dings using the straight body RPC probe(s) or U-bend single plus point style probe(s) was performed at 0.20 inches per second (IPS) and a sample rate of 900 samples/second (s/sec) at 540 RPM.

Calibration Standards

The ASME standards used for the bobbin coil examination were designed to satisfy Sections V and XI of the 2001 with 2003 addenda ASME code. The EDM notch standards for RPC testing are in accordance with the recommendations provided in the EPRI PWR Steam Generator Examination Guidelines: Revision 7. The MHI Guide Tube Standards were used on the hot leg side. If additional sizing information was required the

EPRI EDM Notch standard was used. The drawings for all calibration standards are located in Volume I of this report.

Data Analysis

All data analysis personnel assigned to the Watts Bar Unit 2 Baseline examination were Qualified Data Analysts (QDA) in accordance with Appendix G of the EPRI PWR Steam Generator Examination Guidelines, Revision 7. Training classes for the resolution analysts were conducted on site. Training was also performed at the remote data room. A minimum of 16 hours was dedicated to this process. The training included:

1) Study and open book examination on the Watts Bar Nuclear Plant –Unit 2 Steam Generator Eddy Current Examination Guideline, Rev. 0 (Included in Volume I).
2) Watts Bar Practice Data Sets and Site Specific Performance Demonstration

Each analyst was required to obtain a passing score on each examination. The written examination required 80% of the questions to be answered correctly on both the study material and the Owner Experience (OE) information. The practical test required an 80% probability of detection with a 90% confidence level.

1) Written examination
2) Bobbin data from the Watts Bar Unit 1(D-3) containing absolute drift, dents, MBM's. The Westinghouse data superposition software was utilized to inject indications in the tubing as part of the performance testing.
3) RPC data containing PLP's and volumetric indications at TTS.
4) Reference material was required to be reviewed from Comanche Peak, Oconee, Seabrook, Palo Verde, TMI, St. Lucie and Shearon Harris. Material also included experiences concerning eddy current testers and support structures which were missing or different from design.

Included in Volume 2 are signature logs and graded test results of the analysts who participated in the Baseline analysis, as well as affirmation of the review of various industry events.

The ECT data was transmitted from the acquisition stations to the on-site servers via a local area network (LAN) and stored on computer hard drives. Subsequently the data was transmitted via wide area network (WAN) to servers at a remote data room where Primary and Secondary analysis (Madison, PA) was performed. All analysis was performed using ANSER 8.4.3 Rev. 366 dated 08/14/09. The analyzed results were transmitted back to the Watts Bar data room where Resolution analysis was performed.

The four QDA certified analysts that performed resolution analysis during the baseline met the TVA experience requirements for this position. At the completion of the outage, the raw ECT data along with the evaluated results from these analyses were transferred to optical discs and one additional hard drive for permanent storage that was retained by

TVA. Westinghouse will retain a copy of the ANSER format data and results on a hard drive in Waltz Mill. For a distribution of the eddy current data and optical discs along

with the Cal Groups contained on each one, refer to Section 4 of Volume 2 "DATA DISTRIBUTION LIST."

The Analyst Performance Tracking System (APF) was used during this outage. The Data Analysts were required to review the APF once a day to obtain feedback that compares the analyst results to the final results recorded by the Resolution Analysts. Indications that were requested by the production analysts to be reconsidered were reviewed by the Independent QDA and the Lead Level III on the project.

There were two independent qualified data analysts (IQDA) that reviewed the material as defined in the Watts Bar Nuclear Plant Unit 2 Steam Generator Eddy Current Guidelines, Section 10.5 under Duties and Responsibilities.

The bobbin analysis also required the use of ALFS Mix (P2) for the cold leg top of tube sheet expansion. ALFS Mixing utilized three frequencies to suppress one top of tubesheet expansion area. The calibration process required the 100%, 60%, and 20% calibration holes to be saved and the calibration standard support ring, cold leg top of tube sheet transition to be suppressed. The ALFS mix channel was used for loose part wear that could be located in close proximity to the top of tube sheet region.

Reporting Acronyms

The data base reports located in various sections of this report contains the following reporting acronyms:

Acronym	Description
ADI	Absolute Drift Indication
BLG	Bulge Signal
DFI	Distorted Freespan Indication
DSI	Distorted Support Indication
DNG	Deng
GEO	Geometry
IDC	Inside Diameter Chatter
INR	Indication Not Recordable
LCI	Ligament Crack Indication
MBM	Manufacturing Burnish Mark
NDF	No Degradation Found
OBS	Obstructed Tube
OXP	Over Expansion (+.5")
PBC	Previous Bobbin Coil Call
PID	Positive Identification

%	Percent Wear Indication
PLI	Support Plate Ligament Indication
PLP	Possible Loose Part
PVN	Permeability Variation
RAD	Retest Analyst Discretion
RBD	Retest Bad Data
RIC	Retest Incomplete
RMB	Retest Mag Bias Probe
RND	Retest No Data
RRT	Retest Restricted Tube
TBP	To be Plugged
VOL	Volumetric

Further description of these acronyms may be found in the Watts Bar Nuclear Plant – Unit 2 Steam Generator Eddy Current Examination Guideline and in the Westinghouse ANTS.

Results

The following will detail the indication codes used during baseline.

INDICATIONS (Indications)	**S/G 1**	**S/G 2**	**S/G 3**	**S/G 4**	**Totals**
ADI	1	3	7	2	13
DFI	45	41	81	45	212
DNG	1810	2232	816	451	5309
DSI	4	3	0	3	10
IDC	1	5	2	2	10
LCI	0	0	1	0	1
GEO	6	2	0	0	8
BLG	6	1	0	3	10
OXP	187	299	367	1336	2189
PLP	57	49	112	87	244
PLI	0	0	1	0	1
PRO	5	58	0	8	71
PVN	35	18	61	124	238
MBM	22	20	23	66	131
VOL	15	4	8	15	42

PLUGGING STATUS	**S/G 1**	**S/G 2**	**S/G 3**	**S/G 4**	**Totals**
Previously Plugged Tubes (Shop & Field)	0	2	0	3	5
Projected Plugging Baseline	16	10	3	5	34
TUBES PROJECTED FOR PLUGGING (See Attachment 1)	16	12	3	8	39

ADI There were ADI's reported in each of the Steam Generators. These indications were inspected with the rotating coils and resulted in no degradation found (NDF). The ADI type indication was a MBM response with a Ding.

DFI There were a total of 212 differential freespan indications reported in all four Steam Generators. All indications were inspected with the rotating coil and disposition as no degradation found (NDF), VOL (Volumetric), or MBM (Manufacturing Burnish Mark).

DSI There was 10 distorted support signal (DSI) reported in Steam Generators. Each of the indications was inspected with rotating coil and disposition.

PCT No wear indications were detected.

GEO There were a total of 8 geometric indications in 8 different tubes inspected using the rotating coils. No damage was detected in any of these tubes.

BLG There were a total of 10 bulges reported in Steam Generator 1 (6), Steam Generator 2 (1), and Steam Generator 4 (3). Steam Generators 3 had no reported bulges. Bulges were identified by the bobbin probe which was two volts or greater above the tubesheet. All bulges were tested with rotating probe and reported no degradation found (NDF).

PLP There was 244 possible loose part signals (PLP) reported in the 4 Steam Generators. A more detail overview of the activities that occurred during the PLP search is identified in this report under PLP Overview.

PVN There was 238 permeability (PVN) indications reported in Steam Generators. PVN reported during the Top of Tubesheet Plus Point HL was retested with a magnetic bias 3-coil Plus Point. The reported PVN from the bobbin coil on Steam Generator 1 was retested using a magnetic bias 3-coil Plus Point. This retesting with the magnetic bias 3-coil Plus Point did not reduce the PVN response. A magnetic bias Ghent RG3-4 probe was used on the same bobbin PVN and this probe reduced the PVN to acceptable amplitude. The M/RG34 was used on all bobbin reported PVN.

MBM There were 131 manufacturing burnish marks (MBM's) in all four Steam Generators.

VOL There were 42 volumetric (VOL) indications reported in the Steam Generators. These indications were a result of rotating all reported differential freespan (DFI) indications. The volumetric indications were sized with a percent using EPRI ETSS 21998.1.

OXP Overexpansion is reported when the tubesheet expansion is higher than .5 inches above the tubesheet interface. There were 2189 reported in the steam generators. CAQR number CH5880045 (See Volume 2, Section 10) identified 12 tubes for plugging due to tubesheet expansions. During this baseline inspection an additional two tube were identified for plugging.

DNG 5309 Dings were reported in the 4 steam generators. The reporting was at 2 volts and greater freespan or structure. A rotating probe inspection was conducted on some of the dings. The criteria for this inspection changed per steam generator.

PLP Overview

During the testing of SG1 (the second component examined in sequence) a pattern of PLP (possible loose part) indications became evident in the low row, low column area of the tube bundle on the hot leg side of the SG located between support plates H01 and H03. Diagnostic MRPC examination data showed numerous small amplitude indications in the free span region and lodged within the annulus between the tube and support plate. In an effort to determine the nature of these PLP indications a sample of material removed during sludge lancing was obtained and the metallic parts were placed on a tube sample in the ECT data acquisition area. The tube sample was tested using bobbin and MRPC probes and the results were compared to the in-generator responses. Signals from machining curls closely matched those observed in the steam generator. Visual examination of the flow baffle plate in this area confirmed the presence of this material. The video also shows more material present (that is not in contact with the tube) resting on the baffle plate than the ECT detects. This material would seem to represent a high probability of tube wear during operation if it is not retrieved or otherwise chemically dissolved. The video appears to show that some of the material is rusted and may be bonded to the support plate.

A comparison of bobbin coil and MRPC responses on the tube sample suggested that similar indications could be detected in the SG with a revised auto-data-screening sort. Consequently, the 35 KHz differential channel was reprogrammed to detect PLP indications that were $\geq$ 0.25 volts. All data from SG 4 was reprocessed with the revised sort (revision 2) as well as all data processed as of this date (2/12/2010) in SG 1. This sort was also applied for all data in SG 2 & 3.

Following the completion of the base examination scope in the last SG (3) a meeting was held with TVA to discuss the PLP indications and determine whether any additional testing was necessary prior to demobilizing the inspection team. It was decided to perform additional MRPC examinations based on the following objectives:

1) To furnish additional information to be used in an engineering analysis assuming that the loose parts remain in the SG. We don't want to have to unnecessarily plug tubes or plug <u>and</u> stabilize tubes.

2) To obtain baseline data on PLPs – Tube Integrity Guidelines allow presence or absence of PLP in historical data to be used in Operational Assessment. For example, PLP in first ISI detected. No wear is present so it is unlikely that wear will be present at next inspection (assuming that the time interval is the same).

3) To better describe affected areas – the MRPC will detect PLPs in the flow baffle and drilled supports where the bobbin cannot.

After completion of the expanded MRPC scope in SG 3 the following discussion was transmitted by the independent QDA via e-mail:

In consideration of number 1, it is important to understand the limitations of the technique. For instance if there is a long part present between several or more tubes there is at least some potential for a tube rupture. However, if the part is limited to a contact point between only two adjacent tubes then a rupture scenario is unlikely. So, what do we know about MRPC sensitivity? In a model D3 SG the nominal tube pitch is 1.0625 inches, the tube OD is nominally .75 inches, resulting in a gap between tubes of 0.3125 inches. We know, based on the Watts Bar tube to tube proximity standard that we can detect a neighboring tube when it is < .125 inches away. So what could be hidden in the nominal gap between tubes? An infinitely thin object can be no further away than half the tube gap without it becoming closer to the neighboring tube which is always inspected with the bounding strategy that we're using. We took a hacksaw blade which is .025 inches thick and placed it approximately .150 inches away from the tube OD and ran an MRPC test. We cannot detect the object. A review of the March 2009 EPRI report on loose part detection with ECT (1018561) shows that these on-site results are generally consistent with their mockup results. MRPC detects most objects up to 2mm (.079") away from the tube, possibly detects objects 3mm (.118") away, and mostly doesn't detect objects 4mm (.157") away. Given these results, what ECT information is useful in an integrity analysis other than the presence and location of the PLP?

In consideration of number 2, based on what we know from the visual examinations (machining curls/chips) is it a reasonable expectation that the objects will remain in their current location after power operations? And, aren't we going to try and remove these anyway before operation?

In consideration of number 3, when we analyzed the MRPC data in the low row, low column we found additional PLPs. We already know that the other three SGs have one or more PLP indications from the base program in the same area. If the same modifications were made ("cat-eyes" in the wrapper) isn't it a reasonable expectation that when we perform additional MRPC we'll find additional PLPs? For the purposes of removal planning wouldn't we make this assumption anyway? And, given the detection limitations of ECT, wouldn't the definitive conclusion be based on visual inspection data?

In overall consideration of the above, what is it that we hope to achieve with additional examinations in the other three SGs?

On March 2, 2010 TVA decided not to perform additional ECT inspections at this time in SGs 1,2, & 4.

Data Quality

DATA QUALITY MONITORING AT ACQUISITION STATIONS

Westinghouse addresses data quality requirements by using software that is setup in acquisition as DQV. The parameters are established for both bobbin and rotating coil data according to Westinghouse Procedure MRS-GEN-1127 Rev. 9, "Guidelines for Steam Generator Eddy Current Data Quality Requirements". This procedure addresses the EPRI Interim Guidance Letter dated March 16, 2004. When acquisition collects eddy current data, there are three choices the operator has when a DQV failure occurs. Depending on the failure message, non-essential adjustments can be made and the tube can have the DQV performed again, the tube can be re-run if an extent issue occurs, or the tube can be passed on for data analyst review to accept by putting a three letter code in the "Utility 2" field of the report. If the tube data is not acceptable, the data analysts will RBD the tube. A DQV log is generated and stored on each REEL of eddy current data. Data Management (STMAX) monitors the DQV log and will print out a listing of tubes that indicate a failure with no pass message and does not contain an accept code in the "Utility 2" field. These listings are reviewed to determine if the ECT data is acceptable or rejectable.

TUBE NOISE MEASUREMENTS

Westinghouse Electric has developed software that can be used to measure noise during the inspection of tubes with eddy current. The software was design to meet the EPRI general and specific functional requirements to perform automated noise measurements in steam generator eddy current data and constructing cumulative distributions of noise for each Region of Interest (ROI). Noise measurements were conducted on 100% of the steam generator tubing that was tested by the bobbin coil inspection at TVA Watts Bar Baseline. Noise may come from the test system (parasitic noise) or the environment (deposit, structure, and tube condition). Copies of the distribution curves are included in Volume 2, Section 10 of this report.

The table below summarizes the results of the noise measurements:

Location	S/G 1 @ 95%	S/G 2 @ 95%	S/G 3 @ 95%	S/G 4 @ 95%
FCL – Vvm	0.090 Volts	0.110 Volts	0.075 Volts	0.080 Volts
FHL - Vvm	0.047 Volts	0.075 Volts	0.039 Volts	0.075 Volts
FUB - Vvm	0.190 Volts	0.210 Volts	0.160 Volts	0.130 Volts
SCC - Vvm	0.104 Volts	0.080 Volts	0.078 Volts	0.078 Volts
SCH - Vvm	0.094 Volts	0.080 Volts	0.078 Volts	0.090 Volts
SEC - Vvm	0.220 Volts	0.220 Volts	0.180 Volts	0.370 Volts
SEH - Vvm	0.210 Volts	0.240 Volts	0.180 Volts	0.370 Volts

Region Of Interest (ROI)

FCL – Freespan Cold Leg
FHL – Freespan Hot Leg
FUB – Freespan U-Bend
SCC – Support Plate Center Cold Leg
SCH – Support Plate Center Hot Leg
SEC – Support Plate Edge Cold Leg
SEH – Support Plate Edge Hot Leg

Attachment 1

Projected Tube Plugging (Provided by TVA)

S/G	ROW	COL	Indication	Location	Characterization
1	2	5	DNG	H07+6.75	Preventive-DNG
1	12	9	DNG	H07+25.38	Preventive-DNG
1	1	7	OXP	HTS+1.12	Preventive-OXP
1	1	48	OXP	HTS+1.92	Preventive-OXP
1	1	84	OXP	HTS+1.67	Preventive-OXP
1	2	28	OXP	HTS+1.42	Preventive-OXP
1	29	73	OXP	HTS+1.60	Preventive-OXP
1	36	24	OXP	CTS+1.29	Preventive-OXP
1	36	25	OXP	CTS+1.06	Preventive-OXP
1	37	24	OXP	CTS+1.35	Preventive-OXP
1	38	24	OXP	CTS+1.34	Preventive-OXP
1	39	24	OXP	CTS+1.32	Preventive-OXP
1	40	24	OXP	CTS+1.32	Preventive-OXP
1	38	72	VOL	AV4+29.55	Preventive-VOL-(39%)
1	34	87	VOL	C14+0.20	VOL-(41%)
1	28	83	VOL	C14+0.49	VOL-(46%)
2	32	53	PLG	0.00	I-600 PLG
2	5	104	OBS	0.00	Obstructed Tube
2	41	70	BLG	HTS+0.19	Preventive-BLG
2	3	96	DNG	H07+34.77	Preventive-DNG
2	6	98	DNG	C13+27.74	Preventive-DNG
2	27	58	DNG	HTS+26.23	Preventive-DNG
2	12	72	OXP	HTS+0.97	Preventive-OXP
2	46	49	OXP	CTS+0.83	Preventive-OXP
2	2	75	PVN	H08+7.41	Preventive-PVN
2	25	28	VOL	C10+13.37	VOL-(48%)
2	27	31	VOL	C01+12.32	VOL-(57%)
3	19	54	IDC	HTS+0.27	Preventive-IDC
3	2	111	PVN	C13+15.06	Preventive-PVN
3	40	42	VOL	H01+1.97	Preventive-VOL-(38%)
4	2	12	PLG	0.00	I-600 PLG
4	13	28	IDC	HTS+0.54	Preventive-IDC
4	1	60	OXP	CTS+1.34	Preventive-OXP
4	45	48	PRO	C13+15.06	Preventive-PRO
4	46	48	PRO	AV4+18.88	Preventive-PRO
4	47	48	PRO	AV4+22.49	Preventive-PRO

2. WATTS BAR NUCLEAR PLANT – UNIT 2 "STEAM GENERATOR EDDY CURRENT EXAMINATION GUIDELINE", REV. 0 FEBRUARY 1, 2010

WATTS BAR NUCLEAR PLANT UNIT 2

STEAM GENERATOR EDDY CURRENT GUIDELINES

FEBRUARY 1, 2010

Prepared by:	Daniel Folsom TVA Eddy Current Level III	Signature	Date
Approved by:	Clayton Webber SG Program Manager	Signature	Date

TENNESSEE VALLEY AUTHORITY

REVISIONS

Rev. No.	Revision	Date
0	Original Issue, Baseline Examination	February 1, 2010

Table of Contents

1.0 Purpose **5**
2.0 Scope **5**
3.0 References **5**
4.0 Definitions **6**
5.0 Steam Generator Design **7**
6.0 Watts Bar Steam Generator History – Unit 2 ..... **10**
7.0 Industry History – Main Types of Degradation **10**
8.0 Data Evaluation Personnel and Equipment **13**
9.0 Data Quality **16**
9.1 Data Quality 16
9.2 Bobbin 16
9.3 +Point 16
10.0 Personnel Responsibilities **16**
10.1 All Analysts 16
10.2 Production Analysts (Primary and Secondary) 17
10.3 Resolution Analysts 17
10.4 Senior Analyst 23
10.5 Independent QDA 27
10.6 Data Cop (Acquisition data quality analyst). 28
10.7 Data Quality Analyst (DQA) 28
10.8 Quality Assurance (QA) – this is an optional group. 28
10.9 Data Management 29
10.10 System Administrator 31
10.11 Analyst Tracking System 31
11.0 Data Evaluation-Bobbin **37**
11.1 Frequencies 37
11.2 Calibration 37
11.3 Axial Scale and Location. 37
11.4 Data Analysis 39
11.5 Extent 39
11.6 Reporting Requirements 40
11.7 Indication Codes for Bobbin 44

12.0 Data Evaluation - U-Bend RPC 46
12.1 Frequencies 46
12.2 Calibration 47
12.3 Axial Scale and Location. 47
12.4 Data Analysis 47
12.5 Extent 47
12.6 Probe and Rotational Speed 48
12.7 Reporting Requirements 48
12.8 U-Bend Sizing 50
13.0 Data Evaluation - Straight Body RPC 50
13.1 Frequencies 50
13.2 Calibration 50
13.3 Axial Scale and Location 50
13.4 Data Analysis 51
13.5 Extent 51
13.6 Probe and Rotational Speed 51
13.7 Reporting Requirements 52
13.8 Sizing 53
13.9 Support Plate Cracking (LCI) 54
13.10 Data Evaluation – Array Coil – Intelligent Array Probe 54
13.11 Frequencies 54
13.12 Calibration 54
13.13 Axial Scale and Location 54
13.14 Data Analysis 54
13.15 Extent 55
13.16 Probe Speed 55
14.0 Calibration Standard Descriptions – Bobbin and RPC Bobbin 56
14.1 Bobbin 56
14.2 Rotating Coil 56

1.0 Purpose

1.1.1 The purpose of this guideline is to establish parameters and define specific requirements and responsibilities for analyzing steam generator eddy current data at **Watts Bar Nuclear Plant, Unit 2.** This guideline is designed to provide consistent analysis, discrepancy resolution, reporting and documentation criteria from one examination to the next.

1.1.2 This guideline adheres to the applicable section of the EPRI Steam Generator Examination referenced in section 3.1.2.

2.0 Scope

2.1.1 Synopsis of Information in the Guideline.

2.1.1.1 A description of the Watts Bar steam generator design specifics.

2.1.1.2 A chronological operating history of the Watts Bar Generators.

2.1.1.3 Industry experience of defects mechanisms common to the Westinghouse series D3 steam generators.

2.1.1.4 Qualification requirements and data room responsibilities for data analysis personnel.

2.1.1.5 Eddy current analysis guidelines structured to achieve proper and consistent data evaluation.

2.1.2 Training Data

2.1.2.1 Associated with this evaluation guideline are training data including bobbin and motorized rotating probe coil from TVA Steam Generators and also industry data containing common defect mechanisms associated with Westinghouse series D3 steam generators. Associated tube mock-ups and standards are also included.

2.1.3 Training Schedule

2.1.3.1 A typical schedule of time allotted for the proficiency demonstration includes 2 to 3 days for training, written exam for bobbin and rotating data analysis. If qualification for crack sizing is required, an additional day maybe allotted.

3.0 References

3.1.1 Steam Generator Reference Book, Palo Alto, California, Electric Power Research Institute, 1985.

3.1.2 PWR Steam Generator Examination Guidelines: Revision 7, Palo Alto, California, Electric Power Research Institute, 2007

3.1.3 ASME Boiler and Pressure Vessel Code, Section XI, Appendix IV, 2001 Edition with 2003 addenda.

3.1.4 ASME Boiler and Pressure Vessel Code, Section V, Article 8, Appendix II, 2001 Edition with 2003 addenda.

3.1.5 ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel (Document No. ASNT-CP-189)

3.1.6 Examination Technique Specification Sheets (current outage)

4.0 Definitions

4.1.1 Data Set – Term used to describe a segment of data, e.g. "Cal Group".

4.1.2 Datasheet - Term used to describe the final report output generated by the data analyst after completing analysis of a designated data set.

4.1.3 Degraded Tube - A tube with a measured indication depth greater than or equal to 20% through-wall.

4.1.4 Defective Tube - A tube that contains an indication which is evaluated to be greater than or equal to the repair limit.

4.1.5 Dent - A reduction in inner tube diameter that results in an eddy current response clearly attributable to a deformation of the tube and discernible from inherent tube noise. (Normally ≥2 volt)

4.1.6 Ding – A dent that's been present since the baseline and has not significantly changed.

4.1.7 Flaw - A condition that represents a deviation from the as-designed structure. Flaw conditions can be created during manufacturing, transportation, installation, and service. Many common flaws are not considered "defects" requiring repair, but their indication signals may require measurement such that changes or growth can be monitored as a preventative maintenance measure.

4.1.8 Lead Analyst – The Lead Resolution analyst for the shift.

4.1.9 Lissajous – The term to describe the pictorial or screen graphic of the x/y display of the data component on the analysis or acquisition system.

4.1.10 Normalize – Usually used when referring to setting a voltage relationship between frequency channels and the primary examination frequency/channel or mix.

4.1.11 Pluggable Indication – An indication that is equal to or exceeds the established plugging limit.

4.1.12 Qualified Data Analyst (QDA) – An eddy current data analyst who has successfully passed the EPRI Steam Generator Eddy Current Data Performance Demonstration examinations.

4.1.13 Recordable Indication - Used to denote an indication in which the results should be recorded to the recording media for reporting and final disposition.

4.1.14 Resolution Analyst – Resolves data analysis discrepancies.

4.1.15 RPC – An Acronym for Rotating Probe Coil technology. Usually used as a supplement to the bobbin probe examination, or for specialized examination for flaws or other anomalies that is difficult to detect or characterize with bobbin probe.

4.1.16 Screening - Term used to describe the default visual display the analyst will use to examine the data as it is played into the analysis system.

4.1.17 Significant Change – Term used to describe a change in an eddy current indication from one inspection to the next that's not within the range of the anticipated error of an eddy current examination. Usually a phase change of 10 degrees and a voltage change of 20 percent.

5.0 Steam Generator Design

5.1.1 The Watts Bar Nuclear Plant (WBN) Unit 2 Steam Generators are Westinghouse Model D3 with Mill Annealed Inconel 600 3/4" OD, 0.043" wall tubing with full depth hard rolled tubesheet expansions. These steam generators were manufactured and installed in the 70's. The steam generators have been through various stages of layup.

5.1.2 The tube-sheet as shown in Figure 5-1 is a square pitch design with tubes designated by row and column. There is a maximum of 49 rows and 114 columns in each leg of the four steam generators. The tubes are expanded full length of the tube-sheet using the Westinghouse mechanical expansion process.

5.1.3 Support structure measurements are provided in Table 5-1 illustrates a cross-sectional view of the steam generator support structures and specific support nomenclature.

5.1.4 Table 5-2 list all dimensional and design specifics relative to the support structures within the Watts Bar steam generators.

5.1.5 The nominal tube diameter (OD) is 0.750 inches with a nominal tube wall thickness of 0.043 inches.

Westinghouse Series D3 Tubesheet

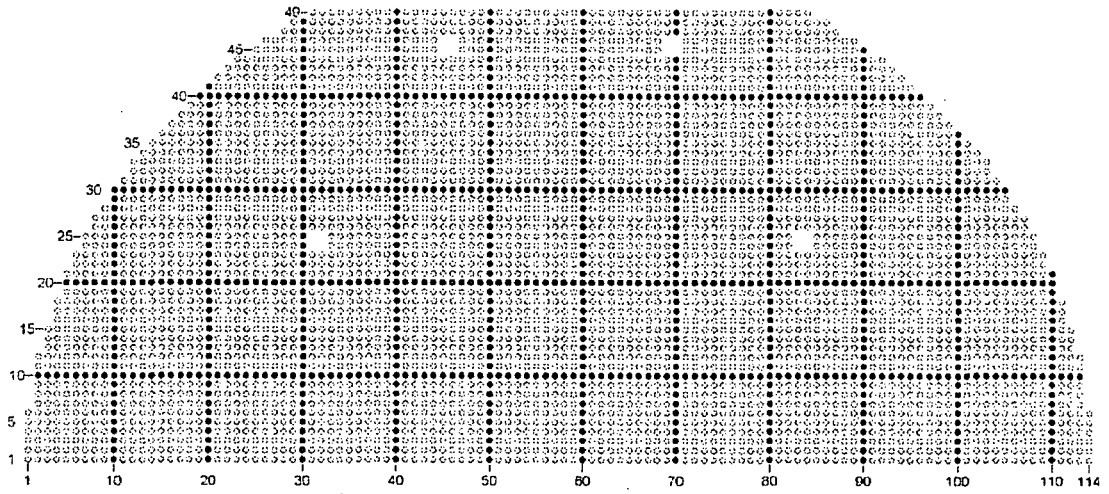


Figure 5-1

Watts Bar Unit 2 Support Structure Measurements

Location	Inches from TE	Center to Center	Set Scale
Tube End	0.0		0.0
Top of Tubesheet	21.03	21.03	21.0
Center #1HL / #1CL TSP	29.40	8.375 / 8.375	8.4 / 8.4
Center #2HL / #2CL TSP	49.40	20.00 / 20.00	20.00 / 20.00
Center #3CL TSP	57.40	8.0	8.0
Center #4CL TSP	65.40	8.0	8.0
Center #3HL / #5CL TSP	73.52	24.12 / 8.0	24.1 / 8.0
Center #6CL TSP	95.40	22.0	22.0
Center #7CL TSP	106.40	11.0	11.0
Center #4HL / #8CL TSP	117.40	43.88 / 11.0	43.8 / 11.0
Center #9CL TSP	128.40	11.0	11.0
Center #10CL TSP	139.40	11.0	11.0
Center #5HL / #11CL TSP	161.40	44.0 / 22.0	44.0 / 22.0
Center #6HL / #12CL TSP	205.40	44.0 / 44.0	44.0 / 44.0
Center #7HL / #13CL TSP	249.40	44.0 / 44.0	44.0 / 44.0
Center #8HL / #14CL TSP	293.40	44.0 / 44.0	44.0 / 44.0

Table 5-1

Watts Bar Unit 2 Design Specifics

Tube Sheet Data	
Hole diameter	0.767 inches
Pitch	1.0625 inches
Thickness	21.03 inches
Expansion process	Westinghouse mechanical expansion
Tube Support Data	
Hole diameter	0.766 inches
Hole geometry	Drilled hole
Thickness	0.750 inches
Material	Carbon Steel
Note: H01 had a design modification to increase flow distribution.	
Anti-Vibration Bar Data	
Shape	Square
Thickness	0.296 inches
Material	Inconel 600
Tube Data	
OD	0.750 inches
ID	0.664 inches
Wall thickness	0.043 inches
Material	Mill Annealed Inconel 600
Number of tubes/SG	4674
U-bend Radius	
Minimum	2.25 inches
Maximum	53.25 inches

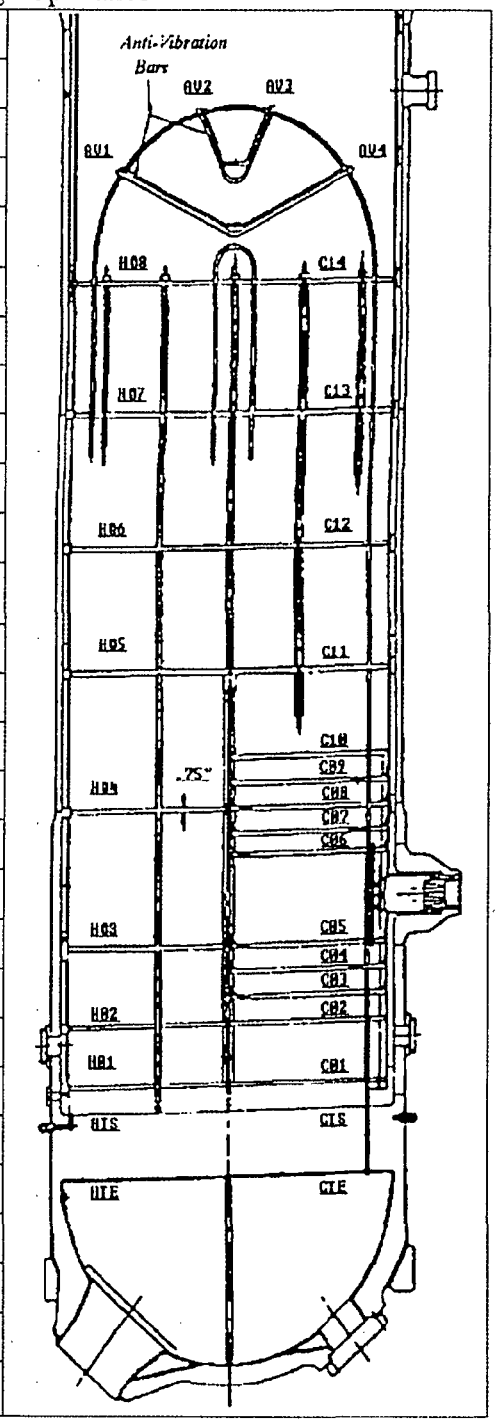


Table 5-2

6.0 Watts Bar Steam Generator History – Unit 2

6.1.1 The Watts Bar Nuclear Plant Unit 2 Steam Generators are Westinghouse Model D3 with Mill Annealed Inconel 600 3/4" OD, 0.043" wall tubing with full depth hard rolled tubesheet expansions. These steam generators were manufactured and installed in the 70's. The steam generators have been through various stages of layup.

6.1.2 Tube-to-tubesheet Roll Expansion Rework "1986"

6.1.2.1 Hot leg full depth tubesheet Westinghouse hard roll expansion, joint evaluation, and rework were performed. Roto-peening was completed on the hot leg expansion transition zone. Eddy current tubesheet profile was performed on the hot leg tubesheet.

6.1.2.2 Cold leg full depth tubesheet Westinghouse hard roll expansion, joint evaluation, and rework were performed. Eddy current tubesheet profile was performed on the cold leg tubesheet.

6.1.3 Heat Treatment of Rows 1 and 2 U-bends was performed in 1986.

6.1.3.1 Eddy current was performed to verify heat treatment.

6.1.3.2 Eddy current analysis indicated that the following tubes have marginal heat treatment: **S/G #1** R2 C14, **S/G #2** R1 C12, R1 C16, R1 C17, R1 C18, R1 C20, R1 C24, R1 C30, R2 C7, R2 C10, R2 C11, R2 C12, R2 C15, R2 C16, R2 C19, R2 C22, R2 C31. A second heat treatment was performed on these tubes per NR-WBT-68-00055.

7.0 Industry History – Main Types of Degradation

7.1.1 Thinning – Wall thinning or wastage has occurred in the sludge pile region above the tube-sheet and within the first and second tube supports plates of peripheral cold leg tubes of some re-circulating steam generators (RSGs) using all volatile treatment. The wastage above the tube sheet was caused by aggressive conditions developing as a result of chemical concentration processes in dry-out regions of the sludge pile. It has not been determined what caused the wastage within the first and second support plates of the cold leg peripheral tubes.

7.1.2 Pitting – Serve pitting has occurred in the tube-sheet sludge pile region of several PWRs. The pitting appears to be acid attack associated with the introduction of chlorides, sulfur ions, and copper oxides into the steam generator. Pitting has occurred in freespan regions as a result of chemical excursions. Sequoyah and Watts Bar have been aggressive in the removal of sludge during refueling outages in order to avoid the large sludge accumulation associated with stress corrosion cracking and pitting.

7.1.3 Denting – Is the process where corrosion of the carbon steel support plate crevice occurs in the tube-to-tube support plate annulus. The corrosion products fill the annulus and squeeze the tube, causing dents in the tube. This process ultimately cause several problems, such as cracking from the primary or secondary side at the tube support plate dents, deformation and cracking of U-bends, cracking of the tube support plate ligaments, and tube support plate flow slot deformation. (Figure 7-1)

7.1.4 Intergranular Attack and Stress Corrosion Cracking – Intergranular attack and secondary side initiated stress corrosion cracking have occurred in the tube-sheet crevices of both partially and full expanded tubes and tube support plate intersections. This attack appears to be caused by a caustic in the crevices and in the sludge pile on top of the tube-sheet. (Figure 7-1) Stress Corrosion cracking has also been identified in the freespan regions of various steam generators.

Denting and Primary Side SCC

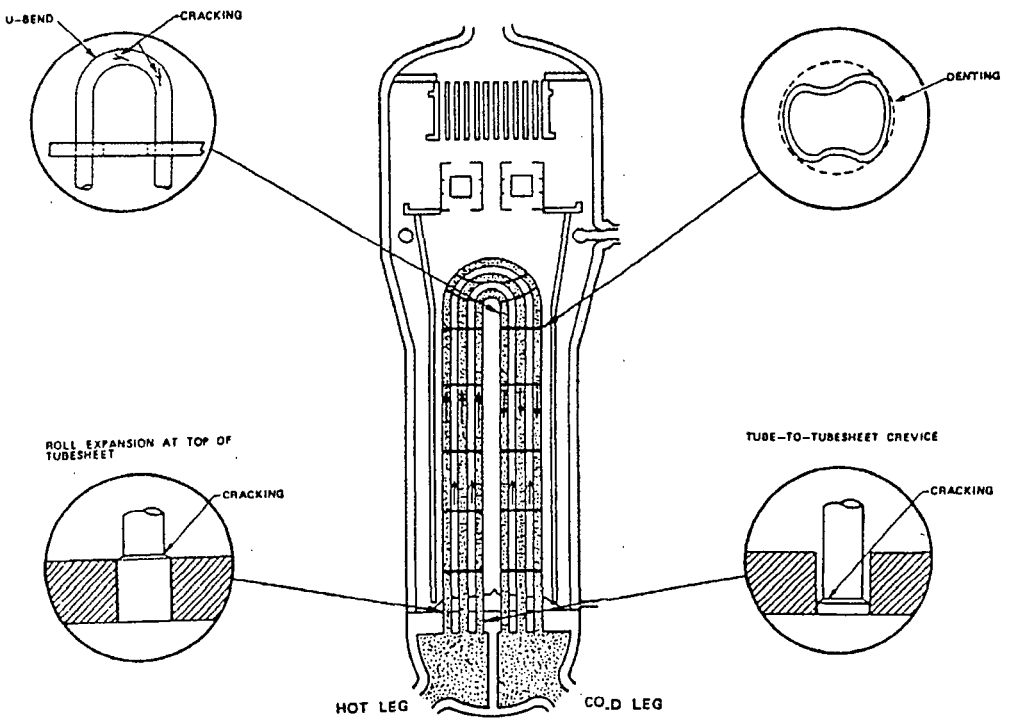


Figure 7-1

7.1.5 Primary Water Stress Corrosion Cracking – This occurs at U-bends and at transitions in the tube-sheet area, apparently as a result of residual stress, as well as at U-bends and tube support plate intersections due to denting. The cracking appears to require a susceptible microstructure for the Alloy 600 tubes combined with high residual stress due to fabrication and/or high stress and strains due to service induced deformation. (Figure 7-1)

7.1.6 AVB and Pre-heater Wear Requirements – Wear indication have been discovered in various steam generators including Westinghouse series 51 and D3 models. Wear at AVB's (Anti-Vibration Bars) has been known to develop in as little as one cycle. Degradation from wear has gone to 100% in as little as two years, or has gone to 20% and stabilized. Model D2/D3 steam generators include a pre-heater section in the cold leg, which has also developed wear from the inherent flow patterns. This form of wear typically occurs near the outer periphery opposite the feed-water inlet. (Figure 7-2)

AVB and Pre-heater Wear

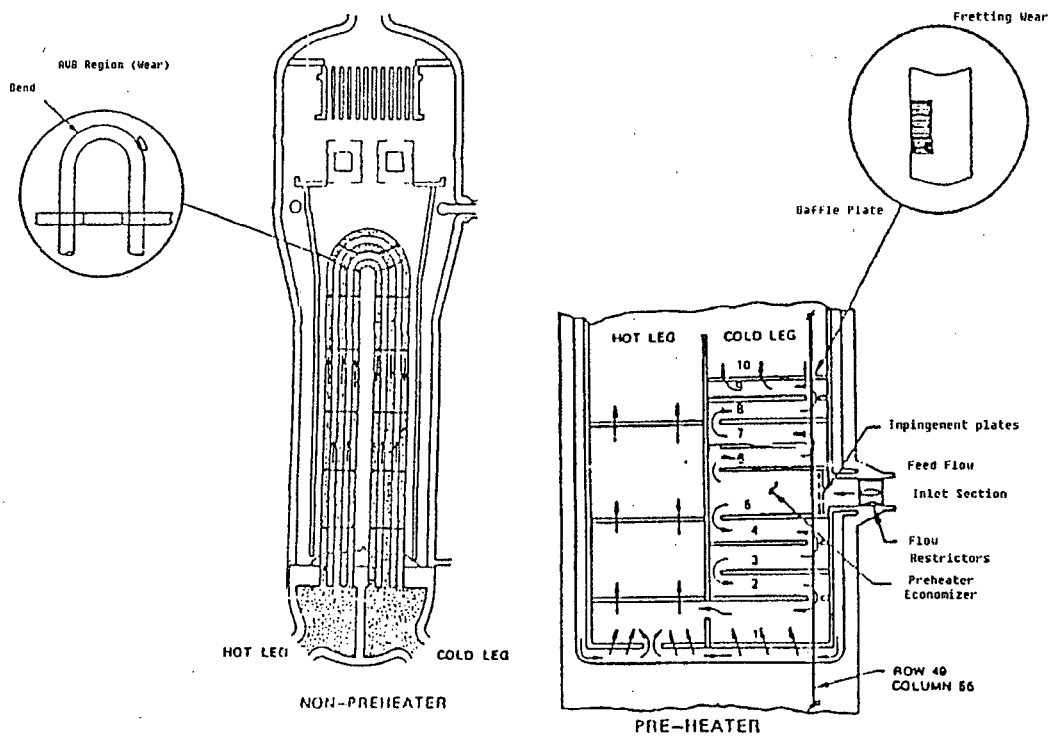


Figure 7-2

8.0 Data Evaluation Personnel and Equipment

8.1.1 The evaluation of eddy current data acquired at WBN-2 must be performed by personnel certified to a minimum of Level II with specific training for the evaluation of eddy current data from non-ferromagnetic steam generator tubing. Additionally, ALL analysts performing degradation analysis must have successfully completed the EPRI Steam Generator Eddy Current Data Analyst Performance Demonstration, thus recognized as a Qualified Data Analyst (QDA).

8.1.2 Each person performing data evaluation shall be certified in accordance with a written practice that has been reviewed and approved by a TVA employee or their representative.

8.1.3 TVA will ensure dual data management systems are used when complex inspections are performed which involve multiple damage mechanisms, multiple locations, and multiple inspection techniques.

8.1.4 TVA's implementation of a Site Specific Performance Demonstration (SSPD) which is utilized to test the analysts and shall adhere to the following:

8.1.4.1 Controls

8.1.4.1.1 The SSPD shall be password protected.

8.1.4.1.2 The password will be known only to TVA personnel or those personnel proctoring the test.

8.1.4.1.3 TVA approved proctors may administer the SSPD at remote sites where password protection shall be maintained.

8.1.4.1.4 Optical disks of the data taken to the sites shall be returned upon completion of the testing.

8.1.4.2 Administration

8.1.4.2.1 The SSPD shall be administered by the TVA Level III or their designee.

8.1.4.2.2 Written guidelines and other information such as ETSS (Examination Technique Sheets) shall be available for review and may be used during the testing.

8.1.4.2.3 There will be a written and a practical portion of the test.

8.1.4.2.4 The TVA Level III will determine which tests will be taken.

8.1.4.2.5 Tests are to be taken independently.

8.1.4.2.6 Systems which use computer assisted analysis must pass the test in the same manner the data would be evaluated during the inspection.

8.1.4.2.7 A minimum of 80% is required on the written portion of the test.

8.1.4.2.8 A minimum score of 80% is required on each practical portion, e.g., bobbin, dented TSP, +Point. This acceptance criterion may be altered for probability of detection (POD) and/or confidence level (CL).

8.1.4.2.9 All personnel analyzing data will be required to take the SSPD.

8.1.4.2.10 One retest is allowed for each failed portion of the test.

8.1.4.3 Maintenance

8.1.4.3.1 The SSPD shall be reviewed prior to each scheduled outage and updated as appropriate to include appropriate elements of the degradation assessment.

8.1.4.3.2 Whenever possible, plant data will be utilized in the SSPD.

8.1.4.4 Personnel Records

8.1.4.4.1 Grading sheet similar to Figure 8-1 shall be utilized to document the SSPD results.

Tennessee Valley Authority Training Attendance Record

Eddy Current Performance Demonstration						
Date Began: _____ Date Ended: _____ Plant: _____ Unit:_____ Outage:_____						
ID#(First letter of last name followed by last 4 digits of SS#)	**Printed Name: First, MI, Last**	**Signature**	**Initials (as you would initial a document)**	**Written Exam (%)**	**Bobbin Exam Scores**	**Rotating Coil Exams**

Figure 8-1

8.1.5 All data analyst, including the independent QDA, shall have successfully passed the SSPD for WBN-2 administered by TVA personnel or their designee. The analysts shall not have been given access to the answers to the SSPD prior to taking it. A minimum-passing grade of 80% for the examination will be required to evaluate WBN-2 eddy current data. Other grading such as probability of detection (POD) with or without confidence levels may be utilized. If the data analyst should fail the initial proficiency examination, the following will take place.

8.1.5.1 The instructor will inform the data analyst of the area he/she is deficient.

8.1.5.2 The data analyst will review the deficient area and re-examine.

8.1.5.3 If the data analyst successfully achieves a passing grade in the re-examination he/she is accepted as being proficient to evaluate WBN-2 eddy current data.

8.1.5.4 If the data analyst does not successfully achieve a passing grade of 80% after re-examination he/she will not be permitted to evaluate WBN-2 eddy current data.

8.1.6 Computerized data screen systems.

8.1.6.1 The computerized data analysis system shall been demonstrated on the applicable EPRI's Automated Analysis performance Demonstration Database (APPD) which validates detection and sizing/characteristics algorithms for each known damage mechanism.

8.1.6.2 Computerized data screening (CDS) is normally used to independently (the other analyst group does not report these) identify dents, mix residual, tube-sheet geometry anomalies, and sludge. It has the other indications to identify as well.

8.1.6.3 All analysts utilizing computerized data screening must meet the requirements of the SSPD in the same manner as those performing manual analysis.

8.1.6.4 Specific criteria must be developed and recorded detailing the parameters of the system to insure analysis consistency and accuracy. These criteria must be capable of detecting those indications necessary to pass the Site Specific Performance Demonstration (SSPD) without human intervention and shall be demonstrated on the SSPD.

8.1.6.5 A copy of all documentation pertaining to the computerized data screening system, including a printout of the sorts established for the system operation, must be turned over to the TVA Level III. Any adjustments or modifications to the system so documented shall be reported to the TVA Level III or his designee.

8.1.6.6 The CDS system shall only be used for modes and techniques it has been qualified.

8.1.6.7 If both teams (primary and secondary) use some form of computer assisted data screening, one of the two systems shall use simple threshold detection with manual analysis for characterization, and the other system shall utilize simple threshold for detection and either rule-based or manual analysis for characterization. If the system(s) differ from this, documentation shall be included which ensures the results are independent from each party.

8.1.6.8 If the same detection and/or characterization algorithms are used by two CDS systems then they are not independent and one of the groups must use a different method (manual analysis) or set of algorithms.

9.0 Data Quality

9.1 Data Quality

9.1.1 It is the responsibility of all personnel involved with the analysis process to identify conditions which inhibit the evaluation of the data. They should be identified in accordance with the guidelines.

9.2 Bobbin Probe

9.2.1 Extraneous test variables which create significant noise such as permeability, copper deposits, non-copper deposits, sludge and denting shall be identified as PVN, CUD, DEP, SLG, and DNT, respectively, in accordance with the guidelines. Other circumstances beyond the scope of the guidelines shall be identified for review by the resolution analysts as LAR and can have additional testing requested with different probes. For example, "RMB" will be used by the Resolution Analyst for diagnostic purposes.

9.3 +Point Probe

9.3.1 Probe stops rotating, data drop-out of 2 or more consecutive scan lines, noise spike of 3 or more which could mask a signal, and permeability are some of the instances where data may be compromised and shall be identified in accordance with the guidelines. As with bobbin, those signals which beyond the scope of the guidelines shall be identified for review by resolution analyst, "LAR" for further disposition. Additional testing may be requested by the resolution Analyst with a magnetically biased probe, "RMB".

10.0 Personnel Responsibilities

10.1 All Analysts

10.1.1 Evaluating eddy current data will be in a manner consistent with the evaluation guideline.

10.1.2 It is the responsibility of each data analyst to perform the mixes in accordance with the appropriate ETSS and ensure that the process channels are created such that the appropriate structure is minimized on the calibration standard. This may necessitate the need to move the artifact on the calibration standard being suppressed, move the conduit to provide a straighter approach or exit from the standard, or invert the orientation of the standard.

10.1.3 If a support structure is missing or not at the correct location this shall be reported immediately to the Senior Analyst. A review of the Operational Experiences and Information details some of the potential problems which can arise from incorrect structures or manufacturing processes which aren't evaluated properly.

10.1.4 When utilizing Computerized Data Screening review indications not identified by CDS. Indications of significant size shall be brought to the attention of the Senior Analyst. This may cause a revision of the CDS sorts and subsequent reanalysis. While this may cause delays it has the potential of preventing mid-cycle problems such as leaking tubes.

10.1.5 Alert the Senior or resolution analysts of any unusual occurrences involving the evaluation of the eddy current data not consistent with the evaluation guideline using the Analyst Concerns Form, Figure 10-5.

10.1.6 Ensure that voltage is set properly, phase is correct, volts/division is correct, appropriate calibration curves are established, and all is stored to recording media.

10.1.7 Verify the proper frequencies and probe speed in accordance with the procedure.

10.1.8 RPC examinations must be scrutinized to ensure the correct location is tested. For example, if testing a single support on the push there should be a pullout of the data providing evidence the correct support was tested.

10.1.9 Adhere to data quality issues, Section 9.0.

10.2 Production Analysts (Primary and Secondary)

10.2.1 When utilizing Computerized Data Screening (CDS), ensure all data submitted on the report is accurate. TVA has experienced past outages in which sorts were not working correctly. It is the analyst's responsibility who is running the Computer Data Screening System to ensure the sorts are running properly. It is unacceptable to submit a report where the sorts are obviously incorrect.

10.2.2 Verify that they are in agreement with the resolution report by conducting a review of the feedback provided by the analyst tracking system. Indications that were called on the initial report and removed by resolution analysts were overcalls. If the analyst disagrees with the resolution of his/her call, then this shall be documented on an Analyst Concern Form, Figure 10-5, or by some other documented fashion. A sample of overcalls shall be reviewed. All missed calls shall be reviewed.

10.2.3 Initial screening of the data shall be performed in accordance with the parameters specified on the ETSS. Additional screening of the data may be performed at the discretion of the analyst. The parameters specified for Data Analysis on the ETSS may be adjusted and/or supplemented to facilitate the set-up of the computer data screening system.

10.3 Resolution Analysts

10.3.1 Reporting Rules for Primary/Secondary Comparison.

10.3.1.1 The analyst reports from all examinations that primary and secondary analysis is performed shall be compared and printed out on comparison sheets or displayed electronically. Any discrepancies between the two reports and certain other conditions resulting from the analysis shall be resolved. Resolution will be done by two resolution analysts, acting as representatives of the Primary and Secondary teams.

10.3.1.2 The comparison report sheet shall be used to document all calls and conditions considered by the resolution team. The final results of the resolution team must be recorded on the comparison report. Any call or condition listed on the comparison report that does not require action by the resolution analyst must be so indicated. The format to be used to document the decisions and/or actions of the resolution analyst on the comparison report as well as the final disposition of the report shall be as directed by the **Senior Analyst** with the concurrence of the TVA Level III.

10.3.1.3 Resolution is required for the following conditions (others may be added as job progresses).

10.3.1.3.1 Any location which differs more than ½ inch between primary and secondary report for the current data Locations comparing bobbin data to RPC data, or current data to historical data for the same indication must be within 1 inch.
****A leaker outage at another utility was attributed to a RPC inspection not covering the proper extent****

10.3.1.3.2 Voltage measurements which differ more than ¼ volt.

10.3.1.3.3 If an alternate repair criteria exists, then a call by either or both analysts which exceeds the criteria for repair or additional testing (e.g., the APC for ODSCC at TSP's requires RPC if bobbin call exceeds a certain voltage).

10.3.1.3.4 No detectable degradation by one analyst versus calls made by another analyst.

10.3.1.3.5 Percent through-wall indications which differ by 10% or more.

10.3.1.3.6 A percent through-wall of ≥20% by one party and a percent through-wall of <20% by the other party.

10.3.1.3.7 A percent through-wall of ≥40% by one party and a percent through-wall of <40% by the other party.

10.3.1.3.8 Extents examined that are not the same.

10.3.1.3.9 Probe identifications that are not the same.

10.3.1.3.10 Calibration times that are not within 10 minutes of each other or exceed 4 hours, if this is being tracked.

10.3.1.3.11 Reporting acronyms that differ.

10.3.1.3.12 Recording channels that differ.

10.3.1.3.13 Repairable indication reported by either party.

10.3.1.3.14 One analyst reports a tube as being analyzed that the other analyst does not analyze (missed tube, RBD or any other reason).

10.3.1.3.15 The reported flaw location is beyond the reported extent of test.

10.3.1.3.16 Use of a reporting acronym not listed on ETSS.

10.3.1.3.17 A bobbin "I" code of magnitude greater than 1 volt which is characterized by an enhanced technique such as RPC as "NDF".

10.3.2 Data Evaluation

10.3.2.1 The resolution analysts shall perform resolution of all reported calls and conditions indicated by the primary/secondary comparison. Each call should be reviewed and resolved.

10.3.2.2 The resolution analysts shall not resolve data if they analyzed primary or secondary of the same tube. If one analyst (primary or secondary) does not analyze a tube, a resolution analyst from the same team but not one doing the resolution may analyze the tube. This must be noted on the compare sheet.

10.3.2.3 If the primary and or secondary analyst reports a degraded tube and a resolution analyst wants to change the call to non-repair, the resolution analyst from each team must agree to the change. If agreement between the resolution analysts cannot be reached, the senior analyst must make the final call, after consulting with the independent QDA and TVA Level III.

10.3.3 The resolution analysts are responsible for the following:

10.3.3.1 Evaluating eddy current data in a manner consistent with the evaluation guideline.

10.3.3.2 Resolving discrepancies between the primary and secondary analysis parties.

10.3.3.3 Ensuring that voltage is set properly, phase is correct, span is correct, calibration curves are established, and all is stored to recording media.

10.3.3.4 Reviewing all flaw indications recorded by RPC testing, performing length and width measurements, verifying correct location, verifying correct maximum voltage, performing depth measurements in some applications, and **ensuring ALL fields are complete and correct.**

10.3.3.5 When sizing indications such as wear with the bobbin probe the senior analyst must be notified if the indicated through wall depth exceeds the deepest wear scar on the calibration standard used to establish the wear depth calibration curve.

10.3.3.6 If sizing using EPRI ETSS 27903.1 for volumetric indications then the setup should be made according to ETSS 27903.1.

10.3.3.7 Reviewing all PLI calls.

10.3.3.8 Use the Analysts Concerns Form, Figure 10-5, to alert the senior analyst of any unusual occurrences involving the evaluation of the eddy current data not consistent with the evaluation guidelines or to discrepancies within the guidelines.

10.3.3.9 The resolution analyst may assume the role of analyst, but cannot resolve data for which he/she analyzed.

10.3.3.10 Alert TVA immediately of all crack-like indications that either extend into a freespan portion of the tube or originate in a freespan portion.

10.3.3.11 Ensure all bobbin indication locations are within 1 inch of historical bobbin indications when appropriate.

10.3.3.12 Ensure all RPC locations are within 1 inch of the original bobbin location when RPC is being used to disposition bobbin calls.

10.3.3.13 Both bobbin and RPC indications (like probes) not within 1 inch of historical indications shall be addressed as a new indication and the previous indication shall be identified as INF. If the signal is clearly the same signal even though it is not within 1 inch the senior analyst shall be notified.

10.3.3.14 Report the RPC LCI calls (Section 13.9).

10.3.3.15 Performing historical reviews of all indications to determine whether there is an active damage mechanism. It will be necessary for both resolution parties to review historical data and concur. **Data must be compared to like (e.g., +Point to +Point) data which was acquired from earliest available data on optical disk.**

10.3.3.16 DSI indications shall be dispositioned utilizing the flow chart in Figure 10-1 and Figure 10-2.

DSI Indications in the Cold Leg

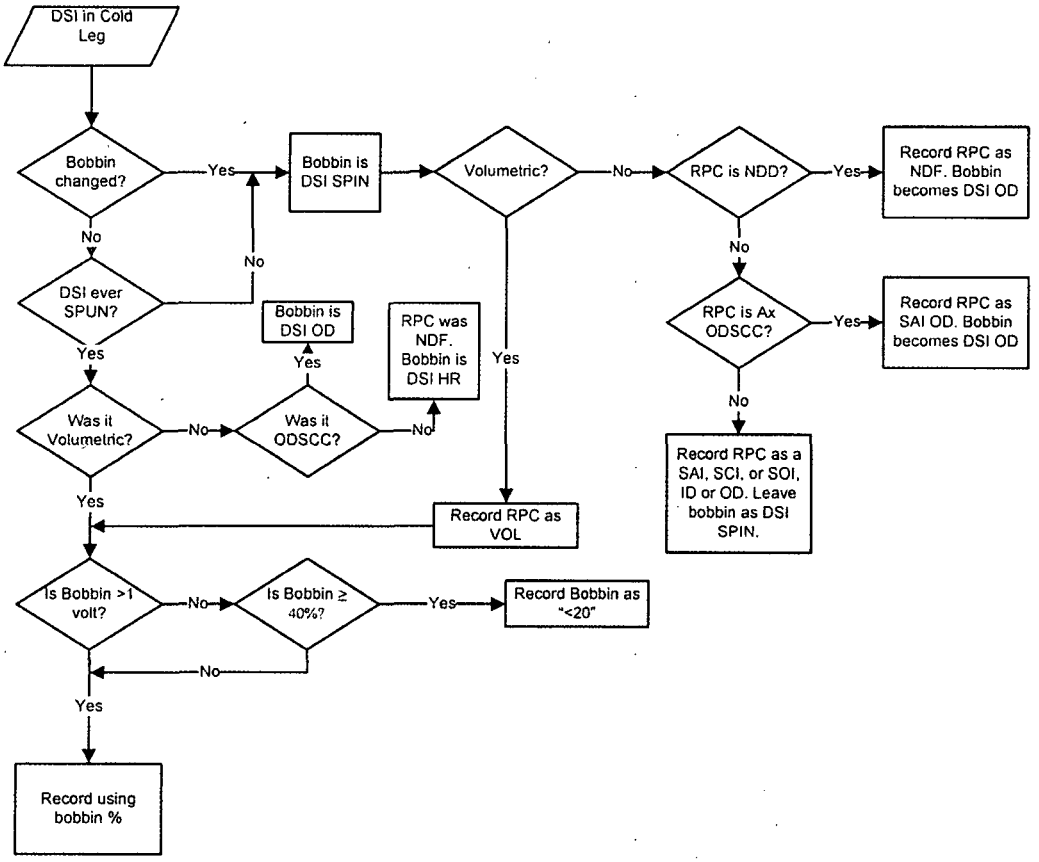


Figure 10-1
Cold Leg DSI Flowchart

DSI Indications in the Hot Leg

After RPC is performed change DSI SPIN to DSI OD if RPC is not PWSCC

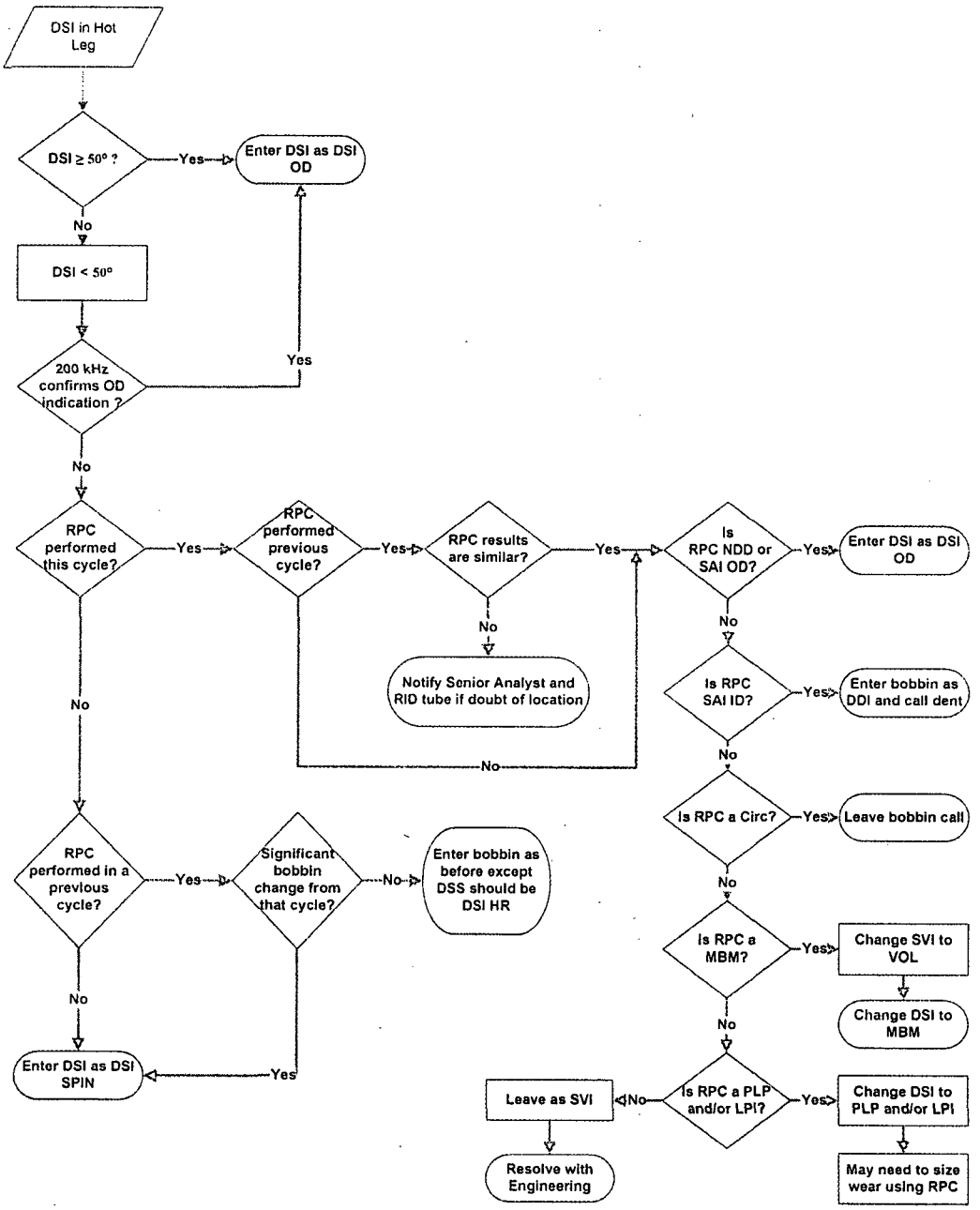


Figure 10-2
Hot Leg DSI Flowchart

10.3.4 Report - When resolution is complete the resolution analysts shall provide a datasheet final report separate from the primary or secondary analyst. The resolution analyst final report shall be transferred to data management. The primary or secondary analyst report may be used as a model, but a separate report shall be issued. The report shall contain the following:

10.3.4.1 The resolution analyst's unique identification for this outage shall be documented in a fashion in which all calls they have made are identified.

10.3.4.2 A code character may be used in the body of the resolution report to indicate if the call is resolved, left as a primary/secondary call or otherwise dispositioned. Other methods may be used with TVA approval.

10.3.4.3 When reviewing crack information the resolution analyst will ensure that the reported crack location is the crack tip furthest from the tube end (highest in elevation).

10.3.4.4 Crack-like indications should have additional information added to the report by the resolution analyst. These are whether the indication is **ID** or **OD** and whether any portion of the indication is outside the support structure, **Y** or **N**. If using Eddynet use the UTIL 2 field for the Y or N and use the channel field for the ARC or LEN line to indicate I for ID or O for OD. Other means for identifying these parameters may be acceptable to TVA.

10.4 Senior Analyst

10.4.1 The senior analyst is responsible for the following:

10.4.1.1 Software revisions (beta versions or patches) shall be sufficiently documented with a verification and validation to provide assurance that the revisions are acceptable for their intended applications. This documentation shall be accomplished with a letter attesting to the adequacy of the software changes. **This letter shall be a part of the examination final report.**

10.4.1.2 Notify the TVA Level III of any depth exceeding the deepest flaw on the calibration standard (wear would be the probable damage).

10.4.1.3 Select Data Cop(s) and Data Quality Analyst(s), if utilized.

10.4.1.4 The senior analyst or their designee shall review the CDS sorts, initial versions and revisions. The review shall be documented on a form similar to Figure 10-6. Revision of CDS sorts requires Senior Analyst or their designee's approval.

10.4.1.5 If sorts are revised the Senior Analyst will determine what data will require reanalysis.

10.4.1.6 Select a person to review all compare sheets or electronic document to verify that all "I" codes identified and not kept by the resolution analysts have at least 2 people review the call (normally done with initials of resolution analysts). Other methods may be used if some form of electronic resolution is utilized.

10.4.1.7 Evaluate eddy current data in a manner consistent with the evaluation guidelines.

10.4.1.8 Modify the evaluation guidelines during the inspection, with concurrence of the TVA Level III, to accommodate new or unanticipated problems or circumstances. The Evaluation Guidelines Change Form, Figure 10-3, shall be used to document modifications to these guidelines and the Evaluation Guidelines Change Acknowledgment Form, Figure 10-4, shall be used to document notification of these changes. It shall be noted that the Evaluation Guidelines Change Form cannot be used as a tool for presenting changes to the eddy current acquisition procedure. Guideline changes may be incorporated as a result of problems with the guidelines identified by the Analyst Concerns Form, Figure 10-5, or review by someone such as data management.

10.4.1.9 Guideline changes shall be provided to all analysts, data management, data cops, steam generator engineering personnel and any person who may be affected by the guideline change. Their signature shall be required on the Evaluation Guidelines Change Acknowledgment Form, Figure 10-4.

10.4.1.10 The senior analyst may also assume the role of resolution analyst or analyst, but cannot resolve data for which he/she analyzed.

10.4.1.11 The senior analyst shall ensure that all wear type indications where the geometry of the indication is questionable are tested with an enhanced technique to verify the flaw geometry.

10.4.1.12 The senior analyst or their designee shall be responsible for the administration and management of an analyst tracking system as described in Section 10.11 of this Guideline.

10.4.1.13 The senior analyst shall ensure that all ASME type calibration standards have a voltage established for normalization to the four flat-bottomed 20% defects using the prime/quarter frequency differential mix.

10.4.1.14 The senior analyst or their designee shall ensure calibration standards are in compliance with these guidelines.

10.4.1.15 The senior analyst shall review all flaw-like indications and permeability indications recorded in Row 1 and 2 U-bends by RPC testing (see section on U-Bend testing).

10.4.1.16 The senior analyst or their designee shall review all INF calls to verify correct tube and location have been tested. Tubes in question shall be retested. These retests could impact an entire data set.

10.4.1.17 The senior analyst or their designee shall review all RPC NDF calls to verify correct tube and location have been tested in which the bobbin "I" code was greater than 1 volt. Tubes in question shall be retested. These retests could impact an entire data set.

10.4.1.18 The senior analyst or their designee (normally, the resolution analyst) shall review all Mix Residual Signals (MRS) which were ≥ 2.00 volts and were not tested with rotating coil technology (either the .080" mid-range pancake or the +Point) to determine if a 1.00 volt ODSCC indication could be masked by the MRS response. Documentation of this review shall be a part of the report transmitted to TVA. The senior analyst will change the MRS to MRI for those indications to be spun. Those which the senior analyst does not feel need to be spun will be evaluated by him as MRS or changed to the appropriate acronym.

10.4.1.19 The senior analyst may change those calls made by the other analysts, resolution or production, with consent of the TVA Level III. These changes shall be documented in the final report as "senior" for Eddynet or some other means distinguishable from normal resolution analysis. In the event the Senior Analyst and the TVA Level III cannot agree the most conservative result will prevail.

10.4.1.20 The senior analyst or their designee shall be responsible for the review of indications which are not within 1 inch of previous indications, but are clearly the same indication.

10.4.1.21 The senior analyst or their designee shall review the +Point TTS data extent to ensure the sludge pile was examined. The tubes in question will be generated by data management. These will come from lists of tubes with sludge piles higher than the scheduled +Point TTS examination. Tubes which were not examined the full extent of the sludge pile will be retested with the +Point the full extent of the sludge pile. If it is agreeable to the TVA Level III the tube(s) in question may be accepted as is due to issues of schedule and/or safety, thus will not be retested.

10.4.1.22 Ensure that the resolution team considers feedback from the primary and secondary analysts which will be provided by the Analyst Concerns Form, Figure 10-5.

10.4.1.23 The senior analyst shall notify the TVA Level III of any support plate ligament crack that exceeds 100° in width or has multiple cracks.

10.4.1.24 Review all DSI and INR indications ≥ 1.5 volts to ensure they are characterized and measured correctly.

10.4.1.25 Review the entire bobbin data for all TSP ODSCC SAI calls in which no bobbin DSI call was made. If no bobbin voltage of the signal can be identified then one will be assigned to the support plate based on the +Point voltage. TVA steam generator engineering will provide this voltage. A "SAE" will go in the utility field indicating the senior analyst agrees there is not a bobbin voltage based on the bobbin eddy current data and that the voltage has been provided by engineering.

10.4.1.26 Review with the TVA Level III all TSP ODSCC indications which have a bobbin voltage less than twice as big as the +Point voltage, have a single macro crack (SAI), have a bobbin growth twice as big as the previous inspection, or have a RPC length of greater than 0.6 inches.

10.4.1.27 Adhere to data quality issues, Section 9.0.

10.4.1.28 The senior analyst or their designee shall ensure that TVA's commitments to the regulation of noise level, music, work hours, shift scheduling, job quality, reading material, and overall factors are communicated to the supervisors on-site and at remote sites. The commitments are as follows:

10.4.1.28.1 Noise such as conversation shall be minimized to avoid distraction of other workers.

10.4.1.28.2 Performance of the job in a safe, professional, and expedient manner is paramount. Any activity which detracts from this will not be allowed.

10.4.1.28.3 Approved music devices may only be used when used with personal headsets and there are no auditory requirements of the job. Any music played may not interfere with the performance of the job by the individual or personnel nearby.

10.4.1.28.4 72 hours per week per person is the maximum amount of time to be worked. This amount may be lengthened on a case-by-case basis with the written approval of TVA.

10.4.1.28.5 Shifts shall be established by the appropriate shift supervisors prior to the start of the job and shall ensure adequate periods of rest for the individual.

10.4.1.28.6 Quality of the job being performed shall not be compromised by schedule constraints.

10.4.1.28.7 Reading materials other than those pertaining to the job are not allowed in the work areas.

10.4.1.29 The senior analyst or their designee shall review all retests due to potential miss-positioning prior to the retests of the tubes in question to verify the tubes are identified incorrectly and will require a retest.

10.4.1.30 The senior analyst shall ensure: 1) loose parts identified by eddy current and/or a secondary side inspection is bounded by RPC, if possible, 2) any loose parts identified by eddy current are transmitted to personnel performing secondary side inspections, if applicable.

10.5 Independent QDA

10.5.1 The independent QDA shall be appointed by TVA and shall not be part of the resolution team. The independent QDA's responsibilities shall include the following:

10.5.1.1 Parameters on the site ETSS shall be compared to parameters on the EPRI qualified ETSS and/or Site Appendix H Qualification. The independent QDA's (IQDA) signature on the site ETSS shall document their review and acceptance of the site ETSS.

10.5.1.2 Qualified NDE techniques shall be reviewed prior to implementation. Concurrence with the technique is necessary. If the technique being employed has undergone an industry peer review in accordance with Supplement H3 of Volume 1 of the EPRI PWR Steam Generator Examination Guidelines the independent QDA review is not necessary.

10.5.1.3 Review 10% of the largest DSI calls which have NDF associated with the RPC test to ensure that the correct structure was tested. The structure at another plant was only tested partially and was not identified by the analyst resulting in a structurally significant indication being left in service. A list of the 10% largest DSIs shall be provided by data management. This list shall be signed by the independent QDA indicating the correct structure was inspected. If the Independent QDA feels a test is questionable then all tests in that calibration group shall be reviewed for correctness. This signed list with any problems identified shall become part of the final report submitted to TVA.

10.5.1.4 The analysis logic used to establish the auto screening process shall be reviewed. CDS sorts, initial versions and revisions, shall be reviewed and approved by at least one IQDA on a form similar to Figure 10-6.

10.5.1.5 Randomly sample the data to ensure that the resolution process was performed properly and the field calls were properly reported.

10.5.1.6 Calls which are requested by the production analyst to be reconsidered (the calls were removed by the resolution analyst and the production analyst still believes they are flaws) shall be reviewed.

10.5.1.7 Inconsistencies or errors with the production or resolution analyst shall be brought to the attention of the TVA Eddy Current Level III. Calls which the Independent QDA and the TVA Level III agree are in error may be changed by the Senior Analyst.

10.5.1.8 Adhere to data quality issues, Section 9.0.

10.6 Data Cop (Acquisition data quality analyst).

10.6.1 The Data Cop(s) shall review data from the acquisition stations throughout the job to ensure data is acceptable and that it is being collected in accordance with the ETSS's.

10.6.2 The Data Cop(s) shall aid in troubleshooting noise problems.

10.7 Data Quality Analyst (DQA)

10.7.1 The DQA shall be responsible for ensuring that techniques being utilized are in compliance with EPRI Appendix H Techniques.

10.7.2 A sample of all tubes acquired shall be compared to EPRI Appendix H techniques for the appropriate area of interest and the tube noise shall be documented. Noise levels exceeding Appendix H techniques may require additional sampling.

10.7.3 Tubes exceeding specified noise levels shall be further evaluated by the DQA and resolution of the noise shall be documented.

10.7.4 If automated data quality software is used and has not been validated and verified (V&V) as to its accuracy, a comparison of the automated results to manual results shall be performed on a sample of the data.

10.8 Quality Assurance (QA) – this is an optional group.

10.8.1 Perform checks of information entered onto the recorded medium by acquisition personnel.

10.8.2 Verify that TVA has approved in writing the acceptance of all personnel performing acquisition or analysis work on site and at remote sites.

10.8.3 QA shall ensure the equipment has appropriate calibration and/or certification documentation (e.g., MIZ-70 or OMNI-200 has calibration paperwork and bobbin probe has certificate of conformance).

10.8.4 QA will compare the probe certificate of conformance with the applicable requirements of Table 10-1

10.8.5 This table is from the EPRI guidelines.

(Copy from EPRI Rev. 7, Table 6-6)

Quality Parameter	Coil Type(s)	Acceptance Criteria
Center Frequency	All coils	The center frequency is within 10% of design.
Dissymmetry	Differential coils	Within ± 10% amplitude difference between the averages of the two lobes of the 100% TW hole.
Coil winding alignment	Rotating and array	≤ 10% secondary lobe on a 100% axial notch.
Coil winding perpendicularity	Plus point coils	160-200 degrees between 100% TW axial and 100% TW circumferential notches.
Probe coil circumferential position	Multiple coil, solid body probes	≤ 10° between nominal and measured circumferential position.
Probe Flux	Bobbin (Non External Reference)	Main lobe ≥90% of total amplitude
Probe coil axial position	Multiple coil, solid body probes	≤ 0.1 inches between nominal and measured axial position.
360° coil coverage	Array coils	Polar plot with measurements taken at < or = 1° increments around the tube of a 60% thru-wall .080" (2mm) long EDM notch artifact oriented in the preferred direction to achieve the highest amplitude response from the sensor. Acceptance being a measure of amplitude crossover at > or = 70%.

Table 10-1

10.9 Data Management

10.9.1 It is the responsibility of data management to determine when all scheduled inspections are complete and provide interim reports of progress towards that end. Data management shall maintain a database of final results for all data evaluated. Data management shall perform the following:

10.9.1.1 Provide a list to the Independent QDA 10% of the largest DSI calls which have NDF associated with the RPC test to ensure that the correct structure was tested. The structure at another plant was only tested partially and was not identified by the analyst resulting in a structurally significant indication being left in service. This list shall be signed by the independent QDA indicating the correct structure was inspected. If the Independent QDA feels a test is questionable then all tests in that calibration group shall be reviewed for correctness. This signed list with any problems identified shall be part of the Westinghouse final report to TVA.

10.9.1.2 Provide lists to the Senior Analysts of +Point indications which are larger in voltage than one half of the bobbin indication, have a single SAI ODSCC at a TSP, have a bobbin growth twice as big as the previous inspection, or have a SAI TSP ODSCC greater than 0.6 inches in length.

10.9.1.3 Provide a list to the senior analyst or their designee of all RPC NDF calls to verify correct tube and location have been tested in which the bobbin "I" code was greater than 1 volt.

10.9.1.4 Provide a list of indications volumetric in nature, such as MBM, which occur in regions of the steam generator where cracking has been identified. These shall be examined using techniques that provide for signal characterization (+Point). For example, a list of all MBMs within one inch of hot leg support plates shall be examined with a probe capable of signal characterization. This list shall be approved by the TVA Steam Generator Manager or their designee.

10.9.1.5 Notify the Senior Analyst with a list of tubes which have a sludge pile on the hot leg which exceeds the scheduled TTS +Point inspection. **Copies of these lists and their resolution should be included in the final report of the inspection.**

10.9.1.6 Notify TVA of ODSCC indications at support plates which extend outside the support plate.

10.9.1.7 Review indication lists to ensure that two different calls on different calibration groups of the same tube are not the same indication. Indications which seem suspicious should be given as a list to the Senior analyst for their disposition.

10.9.1.8 Notify TVA of indications ≥ 40%.

10.9.1.9 Notify TVA of indications with three letter codes ending in "I".

10.9.1.10 Notify TVA of any support plate ligament crack that exceeds 100° in width or has multiple cracks.

10.9.1.11 Notify TVA of locations and reasons for tubes or portions of tubes which weren't inspected.

10.9.1.12 Ensure that entries requiring Senior Analyst review have SA in the appropriate field.

10.9.1.13 Schedule RPC for all % through-wall calls at support plates or preheater wear.

10.9.1.14 All RPC "I" codes have an "I" or an "O" for inside or outside, respectively, in the appropriate field, see section 12.7.2.6 or 13.7.1.6. The senior analyst or their designee shall review all RPC NDF calls to verify correct tube and location have been tested in which the bobbin "I" code was greater than 1 volt.

10.9.1.15 Produce a list of RPC indications and the associated bobbin calls to be reviewed by the Senior Analyst or their designee. These are to ensure that bobbin and RPC do not contradict each other in the final report.

10.10 System Administrator

10.10.1 It is the responsibility of the system administrator(s) to ensure the computer network is working as intended for the scheduled completion of the job. It is their responsibility to notify TVA of impacts to the network which may affect the schedule. Their duties shall include as a minimum:

10.10.1.1 Ensuring the network communication line is functional.

10.10.1.2 Ensure all software being utilized is the correct version, revision, patch, etc., for the job.

10.10.1.3 Establishing organization for the storage of all data and data evaluations while the job progresses (e.g., server identification for Steam Generator 1 raw eddy current data).

10.10.1.4 Ensuring data transfer speed is maintained during the job.

10.10.1.5 Identifying and correcting network problems prior to the start of the job and once the job begins.

10.10.1.6 Transfer of data to storage drives such that data is complete and is verified as being complete with no loss of data. Two copies as a minimum will be required.

10.11 Analyst Tracking System

10.11.1 To assist the production analysts in maintaining and/or improving their performance, feedback will be provided that compares the analyst results to the final results recorded by the resolution analyst. Once per shift, preferably as close to the start of the shift as possible, all production analysts shall review the comparisons pertaining to their work. **All** missed indications and a sample of the overcalls shall be reviewed. The analyst shall document the completion of the review in a traceable fashion such as with the Eddynet Analyst Performance Tracking System (APTS) or when the APTS doesn't document the completion of the review correctly it shall be documented on the "Analyst Review From". Prior to releasing an analyst from a shift, the shift lead shall confirm that the analyst has completed all reviews and are documented either on the APTS or the "Analyst Review Form".

EVALUATION GUIDELINES CHANGE FORM

Plant: WBN Unit 2 Outage Cycle: _____Change Form # _____of ____

REASON FOR CHANGE: _____

_____

_____

_____

_____

_____

TECHNICAL BASIS:_____

_____

_____

_____

_____

_____

_____

_____

AUTHORIZATION:

_____ ____/____/____

SENIOR ANALYST DATE

_____ ____/____/____

TVA LEVEL III DATE

Figure 10-3
Evaluation Guidelines Change Form

EVALUATION DOCUMENT CHANGE ACKNOWLEDGMENT FORM

Plant: WBN Unit 2 Outage Cycle ___ Acknowledgment Form # ___ of ___Brief Description of Change:_____

_____

_____

EFFECTIVE DATE OF CHANGE: _/_____/_____ TIME: _____:_____ am p.m.

	Print Name	Analyst Signature	Date	Time
1)	_____	_____	___/___/___	:_____
2)	_____	_____	___/___/___	:_____
3)	_____	_____	___/___/___	:_____
4)	_____	_____	___/___/___	:_____
5)	_____	_____	___/___/___	:_____
6)	_____	_____	___/___/___	:_____
7)	_____	_____	___/___/___	:_____
8)	_____	_____	___/___/___	:_____
9)	_____	_____	___/___/___	:_____
10)	_____	_____	___/___/___	:_____
11)	_____	_____	___/___/___	:_____
12)	_____	_____	___/___/___	:_____
13)	_____	_____	___/___/___	:_____
14)	_____	_____	___/___/___	:_____
15)	_____	_____	___/___/___	:_____

Figure 10-4
Evaluation Document Change Acknowledgment Form

ANALYST CONCERNS FORM
WATTS BAR UNIT __ - CYCLE ____OUTAGE

Analyst	Date	Description*					
		S/G	Row	Col	Dataset	Location	Dispute Description
		or Paragraph & page number of Guideline					

* If a call then include S/G, Row, Column, Dataset, Location and a description of the dispute, If a Guideline dispute then identify the paragraph(s), page numbers and a description of the dispute.

Figure 10-5
Analyst Concerns Form

WATTS BAR NUCLEAR PLANT

Unit 2

CDS REVIEW FORM

Sort Name & Rev: _____Date: ____/_____/____

The purpose of this form is to document that auto analysis sorts are properly reviewed prior to the beginning of a steam generator inspection and after any revision during the inspection. This form is required to be completed for any inspection using auto-analysis.

Comments:

The following must be reviewed as a minimum:

- Complete tube coverage must exist for detection of degradation.
- Ensure that no non-conservative sort rules exist when compared to the Site Specific Analysts Documents/ETSSs or chart logics.
- Ensure that all bobbin detectable damage mechanisms identified in the DA are properly screened for.

By signing this form, you are concurring that the reviews discussed above have been performed and are satisfactory.

Senior Analyst _____Date____/____/____

Independent QDA _____Date____/____/____

Figure 10-6
CDS Review Form

WATTS BAR NUCLEAR PLANT
Unit 2
ANALYST REVIEW FORM

Cal Group Number	Date	Analyst Name	Analyst Signature	Shift Lead Initials

IQDA Name_____ Signature _____ Date: __/__/___

Figure 10-7
Analyst Review Form

11.0 Data Evaluation-Bobbin

11.1 Frequencies

11.1.1 The frequencies and test parameters used for the bobbin probe examination shall be in accordance with the bobbin probe Examination Technique Specification Sheet.

11.1.2 Changes to the frequency and test parameters require a revision to the ETSS with approval of the TVA Level III or his designee.

11.2 Calibration

11.2.1 Calibration of the prime frequency channels and process channels for bobbin probe data analysis shall be performed in accordance with the ETSS.

11.3 Axial Scale and Location.

11.3.1 The axial scale must be set using Table 5-1 for dimensions.

11.3.2 All indications should be measured such that positive is "UP" with reference to the nearest tube end and support structure. Those indications in the U-bend are measured from the structure closest to the hot leg tube end. Examples would be; between H08 and C14, H08 + x.xx; between H08 and AV1, H08 + x.xx: between AV1 and AV2, AV1 + x.xx, between AV1 and AV4, AV1 + x.xx, between AV2 and AV3, AV2 + x.xx, between AV3 and AV4, AV3 + x.xx; or between AV4 and C14, AV4 + x.xx .

11.3.3 The data should be checked periodically for the correct retraction speed using the parameters specified by the ETSS.

11.3.3.1 On the first tube of each data segment or cal group.

11.3.3.2 On the first tube following a probe change or equipment change.

11.3.3.3 On the last tube of each data segment or cal group.

11.3.3.4 Any time speeds are questionable.

11.3.4 Indication locations shall be identified using the appropriate abbreviations defined in Table 11-1.

11.3.5 Indications at a support structure can have a negative measurement up to 2 inches below center of the support.

11.3.6 The location of indications above a tube support is referenced from the center of the tube support structure.

11.3.7 Indications within the tube-sheet are referenced from the top of tube sheet, not the top of the tube sheet expansion area (use the lowest frequency to locate the top of tube sheet).

11.3.8 Support plates on cold leg vary due to D3 preheater region.

Location Nomenclature for Watts Bar Nuclear Plant Unit 2

NOTATION	DESCRIPTION
HTE	Hot tube end
HTS	Top of tubesheet - hot leg
H01	First support plate/baffle - hot leg
H02	Second support plate - hot leg
H03	Third support plate - hot leg
H04	Fourth support plate - hot leg
H05	Fifth support plate - hot leg
H06	Sixth support plate -hot leg
H07	Seventh support plate - hot leg
H08	Eighth support plate - hot leg
AV1	First AVB above H08 - hot leg
AV2	Second AVB above H08 - hot leg
AV3	Second AVB above C14 - cold leg
AV4	First AVB above C14 - cold leg
C14	Fourteenth support plate - cold leg
C13	Thirteenth support plate - cold leg
C12	Twelfth support plate - cold leg
C11	Eleventh support plate - cold leg
C10	Tenth support plate/preheater - cold leg
C09	Ninth support plate/preheater - cold leg
C08	Eighth support plate - cold leg
C07	Seventh support plate/preheater - cold leg
C06	Sixth support plate/preheater - cold leg
C05	Fifth support plate - cold leg
C04	Fourth support plate/preheater - cold leg
C03	Third support plate/preheater - cold leg
C02	Second support plate - cold leg
C01	First support plate/baffle - cold leg
CTS	Top of tubesheet - cold leg
CTE	Cold tube end

NOTECare should be taken when entering support locations which include a number "0". This should not be entered as the letter "O".

Table 11-1

11.3.9 Distances from the center of the top support on one leg to the center on the other leg are shown below in Table 11-2.

Distance Across U-Bends

Row	Inch	Row	Inch	Row	Inch	Row	Inch	Row	Inch	Row	Inch	Row	Inch
1	11.8	8	35.2	15	58.5	22	81.9	29	105.3	36	128.6	43	152.0
2	15.2	9	38.5	16	61.9	23	85.3	30	108.6	37	132.0	44	155.3
3	18.5	10	41.9	17	65.2	24	88.6	31	112.0	38	135.3	45	158.7
4	21.8	11	45.2	18	68.6	25	91.9	32	115.3	39	138.7	46	162.0
5	25.2	12	48.5	19	71.9	26	95.3	33	118.6	40	142.0	47	165.4
6	28.5	13	51.9	20	75.2	27	98.6	34	122.0	41	145.3	48	168.7
7	31.8	14	55.2	21	78.6	28	101.9	35	125.3	42	148.7	49	172.0

Table 11-2

11.4 Data Analysis

11.4.1 Data quality shall be considered during data evaluation in accordance with the analyst responsibilities of Section 9.0.

11.4.2 All bobbin probe data shall be analyzed by two (2) separate independent analysis (primary and secondary) teams and not as a joint effort.

11.4.3 Initial screening of the data shall be performed in accordance with the parameters specified on the ETSS. Additional screening of the data may be performed at the discretion of the analyst

11.4.4 All indications in the data shall be analyzed per the REPORTING REQUIREMENTS of this section and recorded in the final report for that data set as required. The acronyms that are acceptable for use are listed on the ETSS. All available data shall be utilized to assure the most accurate and complete evaluation of all signals.

11.4.5 Computer data screening may be used for analysis of bobbin probe data. The parameters specified for Data Analysis on the ETSS may be adjusted and/or supplemented to facilitate the set-up of computer data screening system.

11.5 Extent

11.5.1 The first support structure recorded in the data then the last support structure recorded in the data for any given tube is entered in the "EXTENT" column. See Figure 11-1.

SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION	EXTENT
11	21	44						CTEHTE

Figure 11-1

Datasheet Report Entry for Complete Exam

11.5.2 When the recorded data does not contain all of the support structures required for a specific exam, the exam is incomplete. The existing data should be analyzed for flaw-type indications even if it is incomplete. An incomplete examination for a tube containing a flaw is recorded as shown in Figure 11-2. If the data management systems are **not** capable of automatically scheduling a retest it may be necessary to enter a "RIC" line since CTE was the scheduled beginning in this example.

SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION	EXTENT
11	21	44	1.56	78	DSI	P 1	H01 + 0.23	C01HTE
11	21	44			RIC			C01HTE

Figure 11-2

Datasheet Report Entry for Incomplete Exam

11.5.3 AVB's are acceptable as tested extents.

11.6 Reporting Requirements

11.6.1 Flaw-Like Indications

Indications that are flaw-like shall be evaluated regardless of depth or frequency correlation. Similar plant history has shown very small voltage indications with no correlating signals at other frequencies may be true pluggable flaws. Indications, for which the analyst feels there is no specific criterion in this document or for which the analyst is unsure of the correct evaluation, should be recorded as "LAR" (Lead Analyst Review). The resolution analyst must resolve this indication appropriately, with assistance from the senior analyst as required.

11.6.1.1 Free-Span Indications Outside Of Sludge Pile

11.6.1.1.1 Free span indications that are flaw like shall be recorded using the primary differential channel (CH-1) as **DFI** or the 100 kHz Absolute channel (CH-6) as **ADI.**

11.6.1.1.2 The Resolution Analysts shall perform a historical review for all reported free span indications. It will be necessary for both resolution parties to review historical data and concur. Data must be compared to like (e.g., Bobbin to Bobbin) data which was acquired from earliest available data on optical disks.

11.6.1.1.3 During the Baseline examination if the free span indication represents a typical MBM. The resolution analyst may record the indication as a **MBM.**

11.6.1.1.4 At the discretion of the resolution analyst team any 'I' code can be add to the special interest list. The 'I' code shall remain on the report for the indication and the tube shall be scheduled for diagnostic RPC exam.

11.6.1.2 Free-Span Indications in the Sludge Pile Area (Top of Tubesheet). Small voltage indications have been detected in the sludge pile region of the Steam Generators at several PWRs. When detected, these indications (Figure 11-3) may not correlate with other frequencies, but must be evaluated as follows: If the indication is flaw-like on either the primary differential channel (CH-1), the turbo-mix channel (P3 or P4), or the primary differential process channel (P1), the signal must be reported as a **DFI**. Use CH-1 to report, unless affected by structure or deposits, then use P1, P3 or P4.

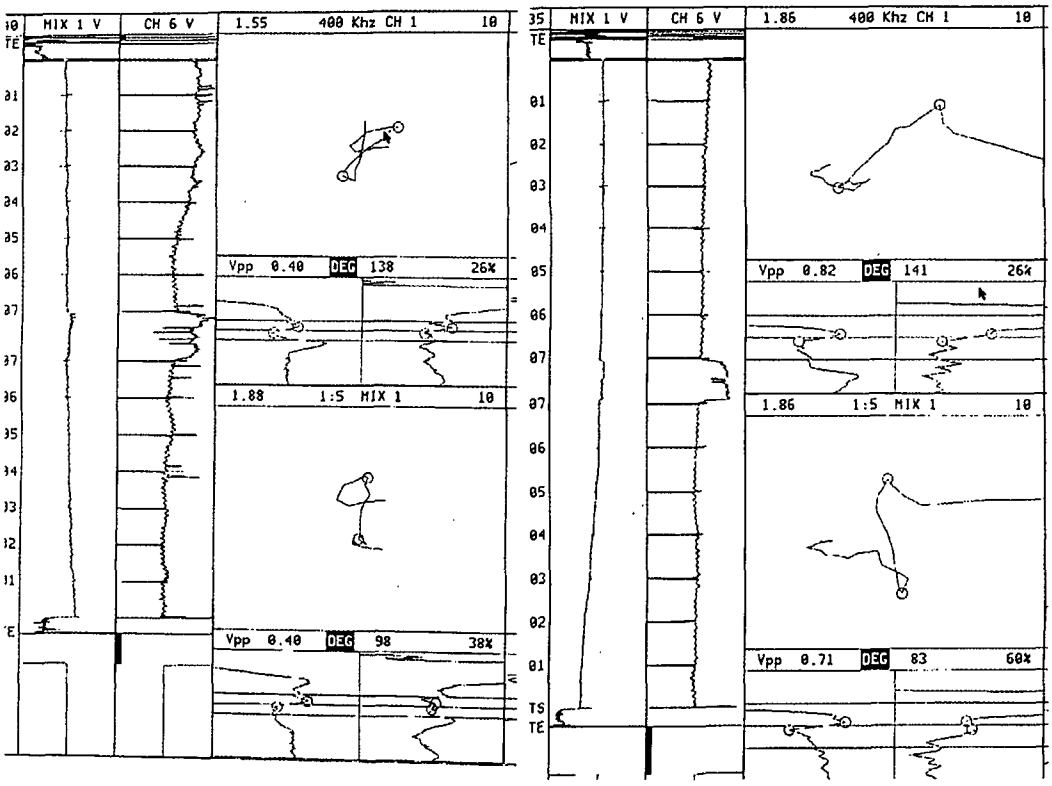


Figure 11-3
Typical Top of Tube Sheet Indications

11.6.1.3 Support Structure Indications

11.6.1.3.1 Support structure indications shall be recorded on a primary process channel, either in the differential (P1) or absolute (P2) mode. Indications where there is **no influence from the denting** should be called **DSI**.

11.6.1.3.2 Examples of signals indicative of ODSCC in non-dented support plates are shown in Figure 11-4.

11.6.1.3.3 Signals indicative of **COLD LEG THINNING** shall be reported on P1 as a DSI by the production analyst. These will be evaluated by resolution in accordance with the flowcharts in Section 8.

11.6.1.3.4 At support structures where there **is a dent**, indications shall be recorded as **DDI** on the detection channel, P1 or P2. The dent (DNT) shall be called from P1.

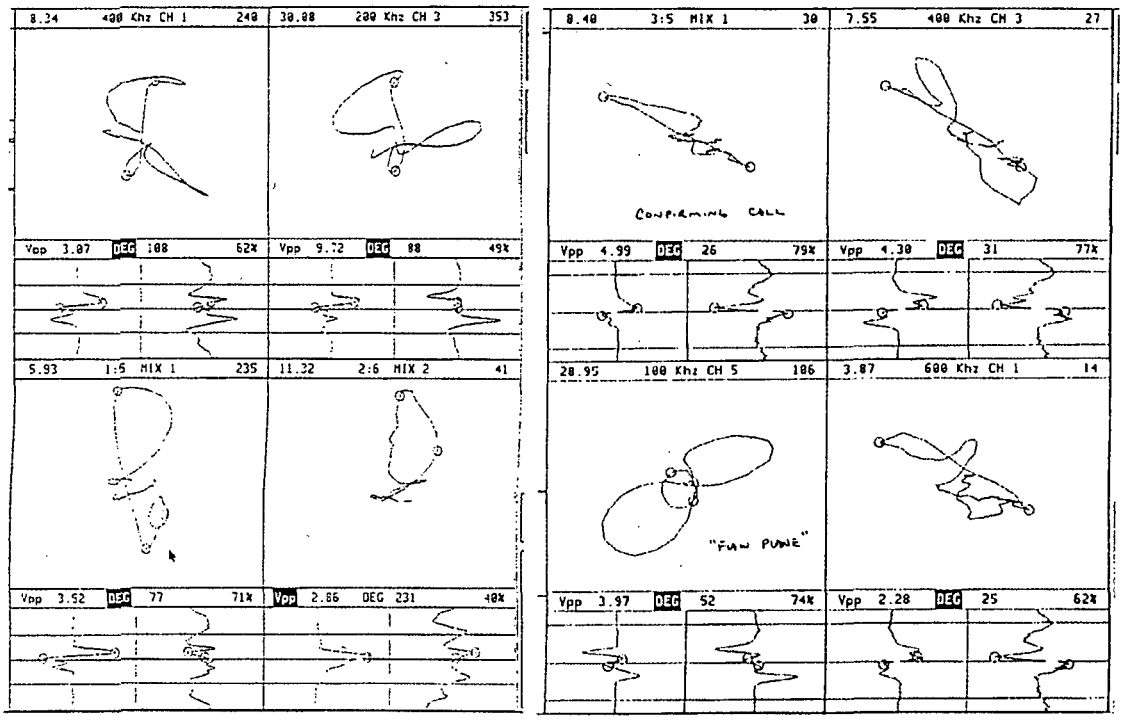


Figure 11-4
ODSCC Signals at Non-dented Support Plates

11.6.1.3.5 Flaw signals indicative of PWSCC are generally associated with a dent. Dented support structures should be screened with the Differential (P1) and Absolute (P2) Process channels, looking for indications on either side of the dent. Examples of indications near dented intersections are shown in Figure 11-5.

NOTE: There have been indications of PWSCC confirmed by +Point probe exam that were best identified by the P2 response of the bobbin probe. Common features to look for using P2 include a more open residual and a sharp transition to the left. Confirmation may be obtained with other absolute channels.

There have been indications of PWSCC at support plates where the only apparent indication is a straight transition line in the ID plane that is only seen on the Differential Process channel (P1).

11.6.1.3.6 Indications at anti-vibration bars (AVBs) shall be reported on P1 as a DSI by the production analyst. These will be evaluated by resolution.

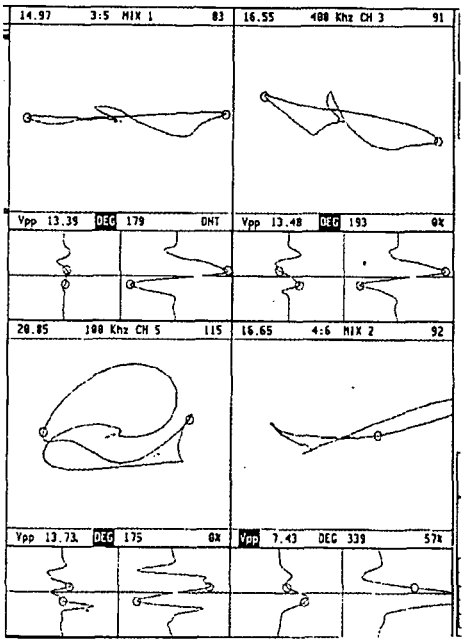


Figure 9.5 Dent Call with possible indication

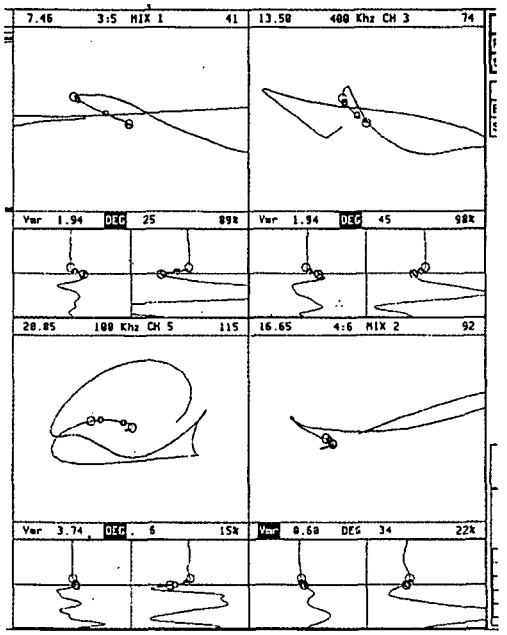


Figure 9.6 Indication near Dent

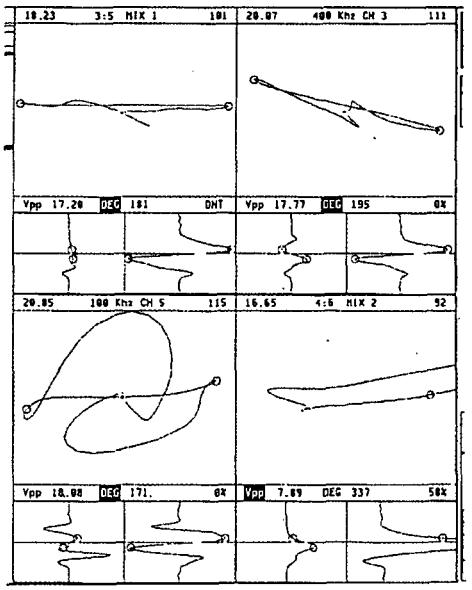


Figure 9.7 Dents with possible Indication

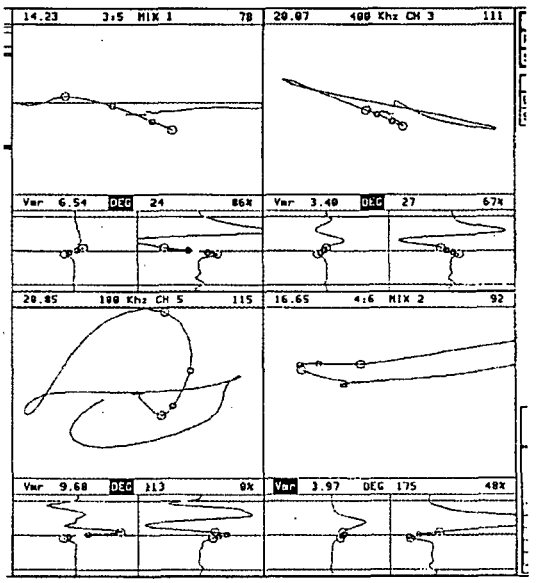


Figure 9.8 Indication near Dent

Figure 11-5

11.6.1.4 Tube Sheet Indications.

11.6.1.4.1 Indications which are recorded below the expansion area in the tube sheet will be reported utilizing the differential process channel (P1) as **DTI** and be located in relation to the top of the tube sheet, i.e., HTS-4.5.

11.6.1.4.2 The top of tubesheet expansion transition areas should be screened on channel P3 for the hot leg or P4 for the cold leg (turbo-mix) for flaw like indications. Valid flaw responses will show evidence of distortion on one or more base frequencies. Report indications as DEI on P1, P3 or P4.

11.6.2 Diagnostic Testing
All bobbin probe exam indications reported as an 'I' code on the resolution analyst final report shall be evaluated further with enhanced techniques or a historical review, comparison and evaluation or dispositioned by an alternate plugging criteria.

11.6.3 Graphic Reporting
Only analysts performing sizing are required to print graphics. As a minimum, for bobbin coil data, the reporting channel and at least one confirming channel will be recorded on the graphic plot. A multiple lissajous/strip chart graphic display may be used as required. A standard format should be established for repeatability and continuity. The senior analyst shall develop this technique in cooperation with the TVA Level III representative.

11.7 Indication Codes for Bobbin

11.7.1 Permeability Variations (**PVN**)
All permeability variations ≥5 volts shall be reported as **PVN** in the percent field using the primary differential channel (CH-1).

11.7.2 Dents/Dings (**DNT/DNG**)
A Dent (**DNT**) is a services induced and a Ding (**DNG**) is a dent like indication present in the baseline examination All dents ≥2 volts at support structures shall be reported as **DNT/DNG** in the percent field using P1. Those dents ≥ 2 volts in the freespan shall be reported as **DNT/DNG** in the percent field using P1. Those dents ≥ 5 volts in the u-bend shall be reported as **DNT/DNG** in the percent field using P1. **Note**: It is recommend to report any dent regardless of voltage.

11.7.3 Possible Loose Parts (PLP)
Possible loose parts are reported as **PLP** in the percent field using the channel which distinguishes the indication most readily. Normally this is the 35 kHz frequency.

11.7.4 Retest with a Loose Parts Standard (**RLP**)
A calibration standard for measuring loose parts damage should be used in conjunction with a probe capable of adequately sizing the indication in question.

11.7.5 Retest with a Magnetically Biased probe (**RMB**)
Permeability indication influence can sometimes be reduced with the use of a magnetically biased probe. This diagnostic test request is made by the resolution analyst. Normally we will be using magnetically biased probes.

11.7.6 Bulges (**BLG**)
Bulges are reported as **BLG** on CH-1. Bulges are areas of the tube where the ID exceeds the nominal tube ID

11.7.7 Over Expansion (**OXP**)
Over Expansions are reported as **OXP** on CH-5. Over Expansions are areas of the tube where the expansion extends above the top of the tubesheet 0.5 inches or more. Voltages greater than 22 volts on CH-2 are used for screening.

11.7.8 Partial Tubesheet Expansion (**PTE**)
Partial Tubesheet Expansions are reported as **PTE** on CH-5. Partial Tubesheet Expansions are areas of the tube where the expansion stops below the top of the tubesheet 0.5 inches or more.

11.7.9 Copper Deposits (**CUD**)
Copper deposits ≥1.6 volts shall be reported as **CUD** in the percent field using CH-1.

11.7.10 Manufacturing Burnish Mark (**MBM**)
MBM will be recorded by the resolution analyst using V_{P-P} on the 135 kHz absolute channel.

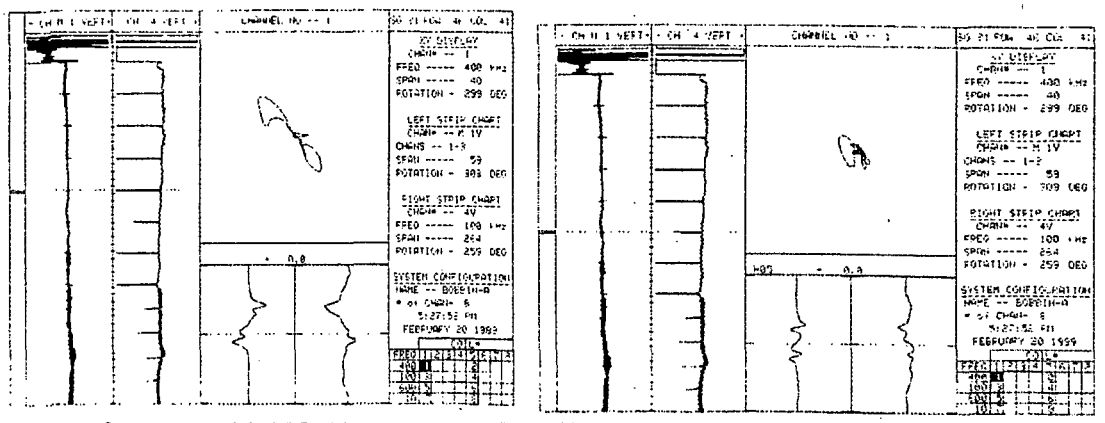
11.7.11 Mix Residual Signals (**MRS**)
MRS will be reported where the support plate suppression mix equals or exceeds 2.00 volts (MRS calls are normally made with an automated screening system).

11.7.12 Previous Bobbin Call (**PBC**)
PBC will be recorded by the analyst for indications identified by another bobbin inspection this outage and are not a PID run. This is to avoid double entries of the same indication when the indication is acquired more than once. PBC shall be entered with the location for each previous flaw-like indication.

11.7.13 Support Plate Cracking (**PLI**)
A cracked support plate shall be recorded as **PLI** using V_{P-P} on the lowest frequency absolute channel (CH-8).

11.7.13.1 Support plate cracking can be determined by diminished amplitude of the support plate signal on the primary differential channel (CH-1). A narrowing of the lobes for the support plate response at 35 kHz differential (CH-7) and/or a narrowing and an upward, counter-clockwise rotation of the support plate response at 35 kHz absolute (CH-8). See Figure 11-6 for clarification.

11.7.13.2 An indication of a cracked support plate identified by bobbin testing shall be further evaluated with RPC probe exam.

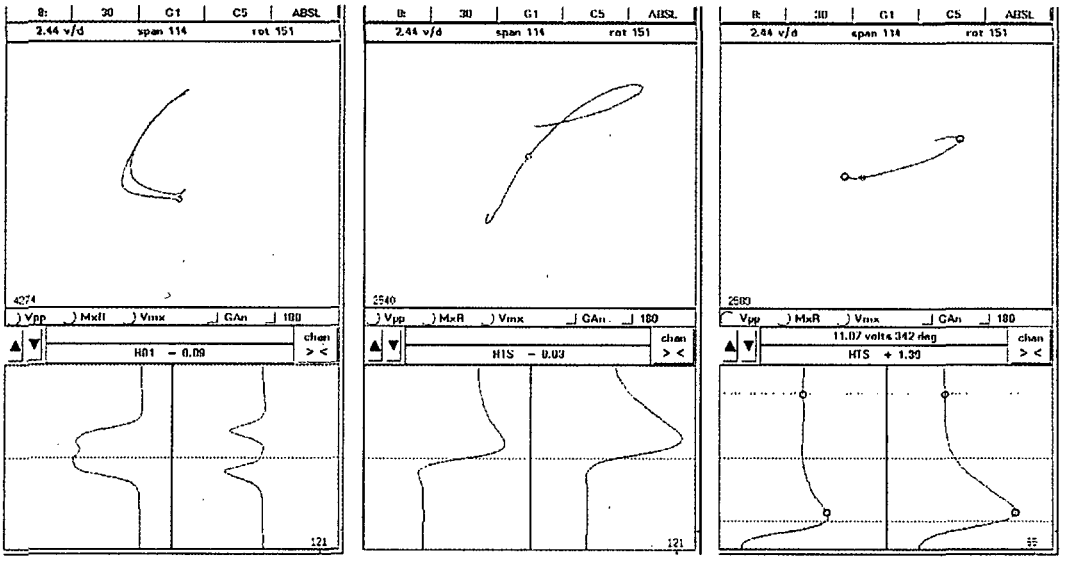


Support with NO Ligament crack (left) and WITH Ligament crack (right)

Figure 11-6

11.7.14 Sludge Height Measurement (SLG)

Sludge height shall be recorded as **SLG** using V_{P-P} on channel 8. **Record sludge where voltage exceeds 5.0 volts.** This criterion may be altered to improve detection. See Figure 11-7



Correct rotation of absolute channel. **Top-of-Tubesheet location (with sludge).** **Correct position for sludge height measurement & voltage.**

Figure 11-7

12.0 Data Evaluation - U-Bend RPC

12.1 Frequencies

12.1.1 The frequencies and test parameters used for the U-Bend RPC examination shall be in accordance with the U-bend RPC probe Examination Technique Specification Sheet. Changes to the frequencies and test parameters require a revision to the ETSS with approval of the TVA Level III or his designee.

12.2 Calibration

12.2.1 Calibration of the prime frequency channels and process channels for U-bend RPC probe data analysis shall be performed in accordance with the U-bend RPC probe ETSS.

12.3 Axial Scale and Location.

12.3.1 The axial scale must be set during system calibration using the as-built dimensions of the calibration standard. For U-bend RPC testing in tubes other than Row 1 or Row 2, the axial location of a test shall be recorded as specified by the test program using the scale from the original calibration, if two support structures cannot be used.

12.3.2 For testing of U-bends the axial scale will be set using the following (the center of H08 to the center of C14). See Table 11-2

12.4 Data Analysis

12.4.1 Data quality shall be considered during data evaluation in accordance with the analyst responsibilities of Section 9.0.

12.4.2 All U-bend RPC data shall be analyzed by two (2) separate independent analysis (primary and secondary) teams and not as a joint effort.

12.4.3 Initial screening of the data shall be performed in accordance with parameters specified on ETSS. Additional screening of the data may be performed at the discretion of the analyst.

12.4.4 All indications in the data shall be analyzed per the REPORTING REQUIREMENTS of Section 12.7, and recorded in the final report for that data set. The acronyms that are acceptable for use are listed on the ETSS. All available data shall be utilized to assure the most accurate and complete evaluation of all signals

12.5 Extent

12.5.1 The required extent of tubing to be examined for a U-bend examination may vary depending on the specific requirements for each exam. This is noted in the extent column of the final report, as shown in Figure 12-1. Be sure to follow the specific extent criteria as required by the test program or as indicated by the senior analyst.

12.5.2 For testing of Row 1 or Row 2 U-bends, the required extent for a complete U-bend examination is from the top tube support to the top tube support on the opposite leg (See Figure 12-1). The extent shall indicate the first support structure recorded and then the last support structure recorded.

SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION	EXTENT
11	2	44						C14H08

Figure 12-1

Datasheet Report Entry for Complete U-Bend exam

12.5.3 If a tube was not tested to the extent or at the location required the data that was acquired should be analyzed for flaw-type indications and the actual extent tested shall be recorded. An incomplete examination is recorded, as shown in Figure 12-2. This example indicates that C14, or upper cold leg support, was not recorded. RIC should be the last entry for that tube. If the data management systems are capable of automatically scheduling a retest it may not be necessary to enter the "RIC" line.

SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION	EXTENT
11	1	14	6.75	140	SAI	3	H08 + 5.9	H08H08
11	1	14			RIC			H08H08

Figure 12-2

Datasheet Report Entry for an Incomplete Exam where, the analyzed portion has an indication.

12.6 Probe and Rotational Speed

12.6.1 Probe scan and rotational speed shall be in accordance with the Scan Parameters specified on the ETSS. Care should be taken to review the strip chart display and confirm that there are no locations where the probe stops rotating (This cannot be done with C-scan. The C-scan will make it appear there is continuous rotation, even if it stops). The data analyst shall verify the correct speeds at the following occasions:

12.6.1.1 On the first tube of each data segment or cal group.

12.6.1.2 On the first tube following a probe change or equipment change.

12.6.1.3 On the last tube of each data segment or cal group.

12.6.1.4 Any time speeds are questionable.

12.7 Reporting Requirements

12.7.1 Indications that are flaw-like shall be evaluated regardless of depth or frequency correlation. Similar plant history has shown very small voltage flaws with non-correlating frequencies may be true pluggable flaws. Indications for which the analyst feels there is no specific criteria in this document or the analyst is unsure of should be noted as "LAR" (Lead Analyst Review). The resolution analyst must resolve this indication appropriately, with assistance from the senior analyst as required.

12.7.2 Row 1 and 2 U-bends have recorded signals indicative of post heat-treatment permeability or material conductivity changes. These indications are a concern due to their influence/ability to mask or distort true flaw indications.

12.7.2.1 U-bend indications will be reported on 300 kHz (normally CH-2 or P2 for axial or circumferential indications, respectively) in accordance with the ETSS. Indications that are volumetric in nature and are not crack like shall be recorded as **SVI.**

12.7.2.2 U-bend indications that have characteristics of permeability variations and exhibit no true flaw-like characteristics are to be reported as PVN in accordance with the next paragraph (12.7.2.3). For the U-bends the criteria for PVN is dependent on the capability of the signal to mask an indication and not on a strict voltage criteria.

12.7.2.3 The voltage of the indications will be measured at the peak signal (largest) for each indication. This will typically be the middle "hit" of the indication. Voltage Peak-to-Peak should be used for the voltage reading. Adjust the window size to minimize noise in the signal (See Figure 12-3). For the production analyst this will also suffice as the location.

12.7.2.4 The location for an indication in the final report will be referenced to the hot leg support plate (H08). The resolution analyst will locate the "hit" furthest from H08 to establish indication location (Figure 12-3) unless it is within 2 inches of C14, and then use C14.

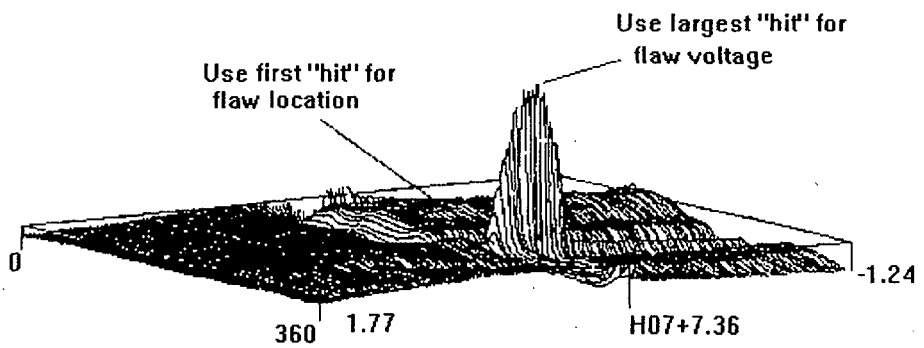


Figure 12-3

12.7.2.5 All reported phase measurements must be within the flaw plane (i.e. 0° to 180°).

12.7.2.6 The resolution analyst will add a second line, if needed, of reported information for an indication to show the indication length or width (axial or circumferential) in a format determined by the vendor and approved by the TVA level III. This line may have **DIM or a ARC or LEN** in the percent column. "I" or "O" for ID or OD, respectively, shall be placed in the "CHN" field of the second line. If multiple flaws (axial or circumferential) are recorded in a given plane, multiple entries for the above information will be required.

12.7.2.7 A measurement of the ligament width between indications shall be recorded with the acronym **LIG** in the % column. **All measurements shall be done and recorded by the Resolution or Sizing Analyst.**

12.7.2.8 Either resolution or sizing analysts shall produce all required graphics. The vendor shall establish the format of the graphics with approval of the TVA Level III. Display filtering may be used; however, the signal response of the calibration standard must be verified to remain within tolerances established in this section. Filter channels are for signal clarification only, and are not to be used for indication recording.

12.7.2.9 In the event the U-Bend rotating probe is utilized to disposition another probe type indication (i.e., bobbin) and there is no detectable degradation at the location in question, "**NDF**" with the location of the indication identified by the previous probe type shall be entered.

12.7.2.10 **PRC** will be recorded by the analyst for indications identified by another rotating coil inspection this outage and it is not a PID run. This is to avoid double entries of the same indication when the indication is acquired more than once. PRC shall be entered with the location for each previous flaw-like indication.

12.7.2.11 **RHF** is a request for a diagnostic test with the use of a high frequency +Point probe. It is made by the resolution analyst.

12.7.2.12 **RMF** is a request for a diagnostic test with the use of a mid range +Point probe. It is made by the resolution analyst.

12.8 U-Bend Sizing

12.8.1 When sizing of a U-bend indication is required, the sizing shall be done by trained sizing personnel in accordance with written instructions.

13.0 Data Evaluation - Straight Body RPC

13.1 Frequencies

13.1.1 The frequencies and test parameters used for the Straight Body RPC examination shall be in accordance with the ETSS. Changes to the frequencies and test parameters require a revision to the ETSS with approval of the TVA Level III or his designee.

13.2 Calibration

13.2.1 Calibration shall be performed in accordance with the ETSS.

13.3 Axial Scale and Location

13.3.1 The axial scale must be set during the system calibration using the as-built dimensions of the calibration standard. Where possible, set the axial scale for each indication on support structures in the tube data that contains the indication.

13.3.2 Production analysts may report the location of the largest hit. The resolution analysts shall report the highest edge or "hit" of the RPC signal from the reference point being used. If the highest edge is below the reference point the location will be a negative number (e.g. H01-0.3).

13.4 Data Analysis

13.4.1 Data quality shall be considered during data evaluation in accordance with the analyst responsibilities of Section 8.

13.4.2 All Straight Body RPC data shall be analyzed by two (2) separate independent analysis (primary and secondary) teams and not as a joint effort.

13.4.3 Initial screening of the data shall be performed in accordance with the parameters specified on the ETSS. Additional screening of the data may be performed at the discretion of the analyst.

13.4.4 All indications in the data shall be analyzed per the REPORTING REQUIREMENTS, and recorded in the final report for that data. The acronyms that are acceptable for use are listed on the ETSS. All available data shall be utilized to assure the most accurate and complete evaluation of all signals.

13.5 Extent

13.5.1 The required extent of tubing to be examined for a complete RPC examination may vary depending on the specific requirements for each exam. This is recorded in the extent column of the final report, as shown in Figure 13-1. Be sure to follow the specific extent criteria as required by the test program or as indicated by the senior analyst.

SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION	EXTENT
11	7	44						HTSHTS
11	7	44						H01H01

Figure 13-1

Datasheet Report Entry for Straight Body examinations

13.5.2 An incomplete examination of tubing is when the data does not contain recordings of the proper tube extent required during the acquisition recording process. The tube should be analyzed for flaw-type indications even if it is incomplete. An incomplete examination is recorded, as shown in Figure 13-2.

SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION	EXTENT
11	21	14	6.75	140	SCI	P 1	HTS - 1.9	HTSHTS
11	21	14			RIC			HTSHTS

Figure 13-2

Datasheet Report Entry for an Incomplete Exam, where the analyzed portion has an indication.

13.5.3 Extent gives the two support structures recorded or gives the single structure twice.

13.6 Probe and Rotational Speed

13.6.1 Probe retraction and rotational speed shall be checked as indicated below using the parameters specified by the ETSS.

13.6.1.1 On the first tube of each data segment or cal group.

13.6.1.2 On the first tube following a probe change or equipment change.

13.6.1.3 On the last tube of each data segment or cal group.

13.6.1.4 Any time speeds are questionable.

13.7 Reporting Requirements

13.7.1 Indications that are flaw-like shall be evaluated regardless of depth or frequency correlation. Similar plant history has shown very small voltage flaws with non-correlating frequencies may be true pluggable flaws. Indications for which the analyst feels there is no specific criterion in this document or the analyst is unsure of should be noted as "LAR" (Lead Analyst Review). The resolution analyst must resolve this indication appropriately, with assistance from the senior analyst as required.

13.7.1.1 Indications will be reported in accordance with the ETSS. Indications that are volumetric in nature and are not crack like shall be recorded as **SVI**.

13.7.1.2 The voltage of the indications will be measured at the peak signal (largest) for each indication. This will typically be the middle "hit" of the indication. Volt P-P shall be used for the voltage reading, adjusting the window size to minimize noise in the signal. For the production analyst this will also suffice as the location.

13.7.1.3 All reported phase measurements must read within the flaw plane (i.e. 0° to 180°).

13.7.1.4 The location for an indication in the final report will be referenced to the support structure. The resolution analyst will locate the "hit" highest in relation to the support structure to establish indication location.

13.7.1.5 The Resolution Analyst shall also report whether the indication is within the support or not (Utility 2 field).

13.7.1.6 The resolution analyst will add a second line of reported information for an indication to show the indication length or width (axial or circumferential) in a format determined by the vendor and approved by the TVA level III. This line may have **DIM or a ARC or LEN** in the percent column. "I" or "O" for ID or OD, respectively, shall be placed in the "CHN" field of the second line. If multiple flaws (axial or circumferential) are recorded in a given plane, multiple entries for the above information will be required. A measurement of the ligament width between indications shall be recorded with the acronym **LIG** in the % column. (All LIG calls should be less than 180 degrees) **All measurements shall be done and recorded by the Resolution or Sizing Analyst.** See Figure Figure 13-3 for a report indicating proper reporting format (Blank lines in report for clarity)

SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION	EXTENT
11	21	14	0.16	98	SVI	4	HTS + 0.03	HTSHTS
11	21	14	0.23	0	LEN	O	HTS + 0.03	HTSHTS
11	21	14	0.51	79	ARC	O	HTS + 0.03	HTSHTS
11	4	9	0.46	38	SAI	4	HTS + 0.01	HTSHTS
11	4	9	0.16	0	LEN	I	HTS + 0.01	HTSHTS
11	4	9	0.26	39	SAI	4	HTS + 0.02	HTSHTS
11	4	9	0.20	0	LEN	I	HTS + 0.02	HTSHTS
11	4	9	1.37	113	LIG	4	HTS + 0.02	HTSHTS
11	12	22	0.11	116	SCI	P1	HTS - 0.02	HTSHTS
11	12	22	0.17	26	ARC	O	HTS - 0.02	HTSHTS
11	12	22	0.17	131	SCI	P1	HTS - 0.03	HTSHTS
11	12	22	0.17	26	ARC	O	HTS - 0.03	HTSHTS
11	12	22	0.09	109	SCI	P1	HTS - 0.04	HTSHTS
11	12	22	0.14	22	ARC	O	HTS - 0.04	HTSHTS

Figure 13-3
Datasheet Report Entry Format

13.7.1.7 Either resolution or sizing analysts shall produce all required graphics. The vendor shall establish the format of the graphics with approval by the TVA level III.

13.7.1.8 In the event the straight body rotating probe is utilized to disposition another probe type indication (i.e., bobbin) and there is no indication found at the location in question, "NDF" with the location of the indication identified by the previous probe type shall be entered.

13.7.1.9 Possible loose parts are reported as PLP in the percent field using the channel which distinguishes the indication most readily.

13.7.1.10 **RMB** is a request for a diagnostic test with the use of a magnetically biased probe. It is made by the resolution analyst.

13.7.1.11 **PRC** will be recorded by the analyst for indications identified by another rotating coil inspection this outage and it is not a PID run. This is to avoid double entries of the same indication when the indication is acquired more than once.

13.8 Sizing

13.8.1 When sizing of a Straight Body RPC probe indication is required, the sizing shall be done by trained sizing personnel in accordance with written instructions.

13.9 Support Plate Cracking (LCI)

13.9.1 Support plate cracking shall be evaluated by the resolution analyst using 100kHz +Point Axial by observing a 'C' Scan plot of the support and determining if there is a single or multiple cracks or if there is a portion of the support plate missing. The Low Frequency channel of the .115" pancake coil can be used to aid in detecting and/or verifying the support plate cracks. The extent of the damage to the support plate shall be identified as follows:

13.9.1.1 If there is only one support plate crack and it is less than 100° in width report the indication as LCI in the % column on the first line of the final report for that indication.

13.9.1.2 If there is more than a single crack at a support or a single crack that exceeds 100°, notify the TVA Level III or his designee. Report each crack as described above.

13.10 Data Evaluation – Array Coil – Intelligent Array Probe

13.11 Frequencies

13.11.1 The frequencies and test parameters used for the Intelligent Array Probe (IAP) examination shall be in accordance with the ETSS. Changes to the frequencies and test parameters require a revision to the ETSS with approval of the TVA Level III or his designee.

13.12 Calibration

13.12.1 Calibration shall be performed in accordance with the ETSS.

13.13 Axial Scale and Location

13.13.1 The axial scale must be set during the system calibration using the as-built dimensions of the calibration standard. Where possible, set the axial scale for each indication on support structures in the tube data that contains the indication.

13.13.2 Production analysts shall report the location of the largest hit. The resolution analysts shall verify location is correct.

13.14 Data Analysis

13.14.1 Data quality shall be considered during data evaluation in accordance with the analyst responsibilities of Section 9.0.

13.14.2 All data shall be analyzed by two (2) separate independent analysis (primary and secondary) teams and not as a joint effort.

13.14.3 Initial screening of the data shall be performed in accordance with the parameters specified on the ETSS. Additional screening of the data may be performed at the discretion of the analyst.

13.14.4 All indications in the data shall be analyzed per the REPORTING REQUIREMENTS, and recorded in the final report for that data. The acronyms that are acceptable for use are listed on the ETSS. All available data shall be utilized to assure the most accurate and complete evaluation of all signals.

13.15 Extent

13.15.1 The required extent of tubing to be examined for a complete IAP examination may vary depending on the specific requirements for each exam. This is recorded in the extent column of the final report, as shown in figure below. Be sure to follow the specific extent criteria as required by the test program or as indicated by the senior analyst.

SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION	EXTENT
11	7	44						H08C14
11	7	45						H08C14

Figure 13-4

Datasheet Report Entry for IAP examinations

13.15.2 An incomplete examination of tubing is when the data does not contain recordings of the proper tube extent required during the acquisition recording process. The tube should be analyzed for flaw-type indications even if it is incomplete. An incomplete examination is recorded, as shown in Figure 13-5. **If the data management systems are capable of automatically scheduling a retest it may not be necessary to enter the "RIC" line.**

SG	ROW	COL	VOLTS	DEG	%	CH#	LOCATION	EXTENT
11	21	14	6.75	140	SCI	P 1	HTS - 1.9	HTSH01
11	21	14			RIC			H08AV4

Figure 13-5

Datasheet Report Entry for an Incomplete Exam where the analyzed portion has an indication

13.15.3 Extent gives the two support structures recorded or gives the single structure twice.

13.16 Probe Speed

13.16.1 The axial scale must be set using Table 5-1 for dimensions, each time an indication is reported within a tube. The scaling should be set using the two support structures that bound the indication.

13.16.2 All indications should be measured such that positive is "UP" with reference to the nearest tube end and support structure. Those indications in the U-bend are measured from the structure closest to the hot leg tube end. Examples would be; between H08 and C14, H08 + x.xx; between H08 and AV1, H08 + x.xx; between AV1 and AV2, AV1 + x.xx, between AV1 and AV4, AV1 + x.xx, between AV2 and AV3, AV2 + x.xx, between AV3 and AV4, AV3 + x.xx; or between AV4 and C14, AV4 + x.xx . Note: Indications within 2 inches of C14 should use C14.

13.16.3 The data should be checked periodically for the correct retraction speed.

13.16.3.1 On the first tube of each data segment or cal group.

13.16.3.2 On the first tube following a probe change or equipment change.

13.16.3.3 On the last tube of each data segment or cal group.

13.16.3.4 Any time speeds are questionable.

13.16.4 Indication locations shall be identified using the appropriate abbreviations defined in Table 11-1.

13.16.5 Indications at a support structure can have a negative measurement up to 2 inches below center of the support.

13.16.6 The location of indications above a tube support is referenced from the center of the tube support structure.

13.16.7 Indications within the tube-sheet are referenced from the top of tube sheet, not the top of the tube sheet expansion area (use the lowest frequency to locate the top of tube sheet).

13.16.8 Probe retraction speed shall be checked as indicated in section 13.6, using the parameters specified by the ETSS.

14.0 Calibration Standard Descriptions – Bobbin and RPC Bobbin

14.1 Bobbin

14.1.1 A single drilled 100% through the wall 0.052" diameter hole for 3/4" tubing.

14.1.2 Four flat bottom holes, 3/16 (0.187) inch diameter, spaced 90 degrees apart in a single plane around the tube circumference, 20% through the wall from the OD.

14.1.3 The depth of the calibration discontinuities, at their center, shall be accurate to within ± 20% of the specified depth or ±0.003 inches, whichever is smaller. All other dimensions shall be accurate to 0.010 inches.

14.1.4 Other requirements will be necessary if utilizing an Alternate Plugging Criteria. These requirements are specified in a separate section of this guideline.

14.2 Rotating Coil

14.2.1 All notch lengths shall be at least 0.375" with a width of 0.005" (+.001",-.002")

14.2.1.1 The following notches will be on the calibration standard as a minimum:

- 100%, axial and circumferential notches.
- 40% ID axial and circumferential notches.
- 40% OD axial and circumferential notches.

14.2.1.2 If depth sizing utilizing fit curves, the following notches may be required for **circumferential indications** (ID and OD notches would only be necessary if sizing both types):

- 60% ID and OD circumferential notches
- 20% ID and OD circumferential notches (40% is used at times in lieu of the 20% or in addition to the 20%)

14.2.1.3 If depth sizing utilizing fit curves, the following notches may be required for **axial indications** (ID and OD notches would only be necessary if sizing both types):

- 60% ID and OD axial notches.
- 40% ID and OD axial notches (40% is used at times in lieu of the 20% or in addition to the 20%)

3. TECHNIQUE SHEETS

- ACQUISITION TECHNIQUE SHEETS (ACTS)
- ANALYSIS TECHNIQUE SHEETS (ANTS)

- **ACQUISITION TECHNIQUE SHEETS (ACTS)**

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-01-10-O	**Revision:**	0
Description:	WBT-OMNI-BOBBIN-55IPS	**Page:**	1 of 3

ACTS Details

Procedure: MRS-SSP-2194-WBT Rev.1
Applicable ETSS: 96004.1, 96005.1, 96012.1, 24013.1, 96042.1, I28411, I28413

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	Bobbin	**Direction:**	Pull
Probe Diameter:	0.610	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	1800	**Speed:**	55
Ext Type:	NONE	**Max Speed:**	60.00
Ext Length:	None	**Min Sampling Rate:**	30 Samples/Inch
Target RPM:	0		
Min RPM:		**Max RPM:**	

Software: ANSER / Westinghouse / Revision approved via. software release letter
Applicability: Full and partial length inspection with Bobbin probe at 55 inches per second.

External Files

Tester Config Filename: WBT-OMNI-BOBBIN-55IPS.CFG
Auto Cal Filename: WBT-BOBBIN.acs
DQM Filename: WBT-BOBBIN.dqv

Probes

Name	Length	Number	Mfr
EC-610-LLMC-110/36-Z	110'	76650	Zetec
EC-610-LLMC-110/36-C	110'	79792	Corestar
SBPF-LLMC-EC-.610-110-36	110'	76678	Zetec
EC-610-LLMC-120/36-C	120'	76419	Corestar

Additional Probe Items

Item	Name	Length	Number	Mfr

Signatures

Westinghouse Service Lead — Date: 2/1/10

TVA Utility Representative — Date: 2/1/2010

Westinghouse NDE Level III — Date: 2-1-2010

Independent QDA — Date: 2-1-10

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-01-10-O **Revision:** 0
Description: WBT-OMNI-BOBBIN-55IPS **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	1	DIFF	550	20	10	11.4
2	5	ABS	550	14	10	11.4
3	1	DIFF	300	20	10	11.4
4	5	ABS	300	14	10	11.4
5	1	DIFF	130	20	10	11.4
6	5	ABS	130	14	10	11.4
7	1	DIFF	35	20	10	11.4
8	5	ABS	35	14	10	11.4

Additional Instructions

1)A message required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	550	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
2	550	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
3	300	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
4	300	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
5	130	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
6	130	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
7	35	DIFF	Support Ring	TSP-Horiz-Left	Down & left first	75% Full Screen
8	35	ABS	Support Ring	270 degrees	Down & left first	50% Full Screen

Additional Acquisition Setup Instructions

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-01-10-O **Revision:** 0
Description: WBT-OMNI-BOBBIN-55IPS **Page:** 3 of 3

Standards

Category	Serial Number	S/G	Leg
ASME/AVB Wear Combo Standard	Z-18307	Any S/G:	Any
ASME / DNT Standard	Z-1588	Any S/G:	Any
ASME / DNT Standard	Z-1590	Any S/G:	Any
ASME / DNT Standard	Z-1591	Any S/G:	Any
ASME / DNT Standard	Z-1631	Any S/G:	Any
ASME / DNT Standard	Z-1632	Any S/G:	Any
ASME / DNT Standard	Z-1633	Any S/G:	Any

Standard Serial Number Comments

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-02-10-O	**Revision:**	0
Description:	WBT-OMNI-BOBBIN-24IPS	**Page:**	1 of 3

ACTS Details

Procedure: MRS-SSP-2194-WBT Rev.1
Applicable ETSS: 96004.1, 96005.1, 96012.1,24013.1, 96042.1, I28411, I28413

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	Bobbin	**Direction:**	Pull
Probe Diameter:	0.610	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	800	**Speed:**	24
Ext Type:	NONE	**Max Speed:**	26.66
Ext Length:	None	**Min Sampling Rate:**	30 Samples/Inch
Target RPM:	0		
Min RPM:		**Max RPM:**	

Software: ANSER / Westinghouse / Revision approved via. software release letter
Applicability: Full and partial length inspection with Bobbin probe at 24 inches per second.

External Files

Tester Config Filename: WBT-OMNI-BOBBIN-24IPS.CFG
Auto Cal Filename: WBT-BOBBIN.acs
DQM Filename: WBT-BOBBIN.dqv

Probes

Name	Length	Number	Mfr
EC-610-LLMC-110/36-Z	110'	76650	Zetec
EC-610-LLMC-110/36-C	110'	79792	Corestar
SBPF-LLMC-EC-.610-110-36	110'	76678	Zetec
EC-610-LLMC-120/36-C	120'	76419	Corestar

Additional Probe Items

Item	Name	Length	Number	Mfr

Signatures

D.A. Michalski 2/1/10
Westinghouse Service Lead — Date

Daniel Adam 2/01/2010
TVA Utility Representative — Date

R Cooper 2-1-2010
Westinghouse NDE Level III — Date

R.S. Mann 2-1-10
Independent QDA — Date

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-02-10-O **Revision:** 0
Description: WBT-OMNI-BOBBIN-24IPS **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	1	DIFF	550	20	10	11.4
2	5	ABS	550	14	10	11.4
3	1	DIFF	300	20	10	11.4
4	5	ABS	300	14	10	11.4
5	1	DIFF	130	20	10	11.4
6	5	ABS	130	14	10	11.4
7	1	DIFF	35	20	10	11.4
8	5	ABS	35	14	10	11.4

Additional Instructions

1)A message required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	550	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
2	550	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
3	300	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
4	300	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
5	130	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
6	130	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
7	35	DIFF	Support Ring	TSP-Horiz-Left	Down & left first	75% Full Screen
8	35	ABS	Support Ring	270 degrees	Down & left first	50% Full Screen

Additional Acquisition Setup Instructions

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-02-10-O **Revision:** 0
Description: WBT-OMNI-BOBBIN-24IPS **Page:** 3 of 3

Standards

Category	Serial Number	S/G	Leg
ASME/AVB Wear Combo Standard	Z-18307	Any S/G:	Any
ASME / DNT Standard	Z-1588	Any S/G:	Any
ASME / DNT Standard	Z-1590	Any S/G:	Any
ASME / DNT Standard	Z-1591	Any S/G:	Any
ASME / DNT Standard	Z-1631	Any S/G:	Any
ASME / DNT Standard	Z-1632	Any S/G:	Any
ASME / DNT Standard	Z-1633	Any S/G:	Any

Standard Serial Number Comments

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-03-10-O	**Revision:**	0
Description:	WBT-OMNI-BOBBIN-24IPS	**Page:**	1 of 3

ACTS Details

Procedure: MRS-SSP-2194-WBT Rev.1

Applicable ETSS: 96004.1, 96005.1, 96012.1,24013.1, 96042.1, I28411, I28413

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	Bobbin	**Direction:**	Pull
Probe Diameter:	0.590	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	800	**Speed:**	24
Ext Type:	NONE	**Max Speed:**	26.66
Ext Length:	None	**Min Sampling Rate:**	30 Samples/Inch
Target RPM:	0		
Min RPM:		**Max RPM:**	

Software: ANSER / Westinghouse / Revision approved via. software release letter

Applicability: Full and partial length inspection with Bobbin probe at 24 inches per second.

External Files

Tester Config Filename: WBT-OMNI-BOBBIN-24IPS.CFG

Auto Cal Filename: WBT-BOBBIN.acs

DQM Filename: WBT-BOBBIN.dqv

Probes

Name	Length	Number	Mfr
EC-590-LLMC-110/36-C	110'	76429	CSI

Additional Probe Items

Item	Name	Length	Number	Mfr

Signatures

R.A. Michalski 2/1/10
Westinghouse Service Lead — Date

David Adams 2/1/2010
TVA Utility Representative — Date

V. Lopez 2-1-2010
Westinghouse NDE Level III — Date

R.S. Warren 2-1-10
Independent QDA — Date

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-03-10-O **Revision:** 0
Description: WBT-OMNI-BOBBIN-24IPS **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	1	DIFF	550	20	10	11.4
2	5	ABS	550	14	10	11.4
3	1	DIFF	300	20	10	11.4
4	5	ABS	300	14	10	11.4
5	1	DIFF	130	20	10	11.4
6	5	ABS	130	14	10	11.4
7	1	DIFF	35	20	10	11.4
8	5	ABS	35	14	10	11.4

Additional Instructions

1)A message required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	550	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
2	550	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
3	300	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
4	300	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
5	130	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
6	130	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
7	35	DIFF	Support Ring	TSP-Horiz-Left	Down & left first	75% Full Screen
8	35	ABS	Support Ring	270 degrees	Down & left first	50% Full Screen

Additional Acquisition Setup Instructions

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-03-10-O **Revision:** 0
Description: WBT-OMNI-BOBBIN-24IPS **Page:** 3 of 3

Standards

Category	Serial Number	S/G	Leg
ASME/AVB Wear Combo Standard	Z-18307	Any S/G:	Any
ASME / DNT Standard	Z-1588	Any S/G:	Any
ASME / DNT Standard	Z-1590	Any S/G:	Any
ASME / DNT Standard	Z-1591	Any S/G:	Any
ASME / DNT Standard	Z-1631	Any S/G:	Any
ASME / DNT Standard	Z-1632	Any S/G:	Any
ASME / DNT Standard	Z-1633	Any S/G:	Any

Standard Serial Number Comments

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-04-10-O	**Revision:**	0
Description:	WBT-3 Coil +PT 1500RPM	**Page:**	1 of 3

ACTS Details

Procedure: MRS-SSP-2194-WBT Rev.1
Applicable ETSS: 21409.1, 21410.1, 20511.1, 20510.1,96703.1, 27903.1

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	RPC	**Direction:**	Either
Probe Diameter:	.610	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	2200	**Speed:**	0.8
Ext Type:	NONE	**Max Speed:**	09
Ext Length:	NONE	**Min Sampling Rate:**	25 per inch Axial, 30 per inch Circ.
Target RPM:	1500		
Min RPM:		**Max RPM:**	

Software: ANSER / Westinghouse / Revision approved via. software release letter
Applicability: Straight section and special interest inspection with 3 Coil RPC probe. (Non -mag bias mid-range Plus Point, .115"pancake, and .080" shielded pancake coils.)

External Files

Tester Config Filename: WBT-OMNI-3COIL-+PT-1500RPM.CFG
Auto Cal Filename: WBT-3CRPC.acs
DQM Filename: WBT-RPC-1500RPM.dqv

Probes

Name	Length	Number	Mfr
+PT-610-MRPC/3C/P115A-PP11A-SP080B52PH(664)ZM001	N/A	77143	Zetec
ZRPS-DH3-E00.610-C01-00G0EA0	N/A	77143	Zetec

Additional Probe Items

Item	Name	Length	Number	Mfr
Motor Unit	9D/610NS/MRPC/52MU(3/8EMI)36P900	83'	76421	Zetec
Motor Unit	SMUS-9DNS-E00.610-0-ABB0000	83'	76421	Zetec

Signatures

2/1/10	Westinghouse Service Lead	2/1/2010	TVA Utility Representative
2-1-2010	Westinghouse NDE Level III	2-1-10	Independent QDA

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-04-10-O **Revision:** 0
Description: WBT-3 Coil +PT 1500RPM **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	7	80H	800	8	10	11.4
2	7	80H	600	8	10	11.4
3	1	115	300	8	10	11.4
4	5	+PT	300	20	10	11.4
5	7	80H	300	8	10	11.4
6	1	115	200	8	10	11.4
7	5	+PT	200	20	10	11.4
8	1	115	100	8	10	11.4
9	4	TRG	100	8	10	11.4
10	5	+PT	100	20	10	11.4
11	1	115	35	8	10	11.4

Additional Instructions

1)A message required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	800	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
2	600	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
3	300	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
4	300	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
5	300	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
6	200	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
7	200	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
8	100	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
9	100	TRG	Trigger Pulse	small pulse horiz.	Large pulse up	50% Full Screen
10	100	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
11	35	115	Support Ring	90 Degrees	TSP Forms Up	50% Full Screen

Additional Acquisition Setup Instructions

When using the MHI Guide Tube Std. the set point for the 35Khz Channel 11 is the 100% Axial Notch at 330 Degrees.

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-04-10-O **Revision:** 0
Description: WBT-3 Coil +PT 1500RPM **Page:** 3 of 3

Standards

Category	Serial Number	S/G	Leg
EPRI EDM Notch Standard	Z-18292	Any S/G:	Any
EPRI EDM Notch Standard	Z-18293	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20435	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20436	Any S/G:	Any
ASME COMBO Standard	Z-20445	Any S/G:	Any

Standard Serial Number Comments

None

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-05-10-O	**Revision:**	0
Description:	WBT-3 Coil +PT 400RPM	**Page:**	1 of 3

ACTS Details

Procedure: MRS-SSP-2194-WBT Rev.1
Applicable ETSS: 21409.1, 21410.1, 20511.1, 20510.1,96703.1, 27903.1

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	RPC	**Direction:**	Either
Probe Diameter:	.610	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	600	**Speed:**	0.2
Ext Type:	NONE	**Max Speed:**	0.25
Ext Length:	NONE	**Min Sampling Rate:**	25 per inch Axial, 30 per inch Circ.
Target RPM:	400		
Min RPM:		**Max RPM:**	

Software: *ANSER / Westinghouse / Revision approved via. software release letter*
Applicability: Straight section and special interest inspection with 3 Coil RPC probe. (Non -mag bias mid-range Plus Point, .115"pancake, and .080" shielded pancake coils.)

External Files

Tester Config Filename: WBT-OMNI-3COIL-+PT-400RPM.CFG
Auto Cal Filename: WBT-3CRPC.acs
DQM Filename: WBT-RPC-400RPM.dqv

Probes

Name	Length	Number	Mfr
+PT-610-MRPC/3C/P115A-PP11A-SP080B52PH(664)ZM001	N/A	77143	Zetec
ZRPS-DH3-E00.610-C01-00G0EA0	N/A	77143	Zetec

Additional Probe Items

Item	Name	Length	Number	Mfr
Motor Unit	9D/610NS/MRPC/52MU(3/8EMI)36P900	83'	76421	Zetec
Motor Unit	SMUS-9DNS-E00.610-0-ABB0000	83'	76421	Zetec

Signatures

D.A. Michalski 2/1/10
Westinghouse Service Lead — Date

Daniel Adam 2/1/2010
TVA Utility Representative — Date

V. Lopez 2-1-2010
Westinghouse NDE Level III — Date

R.S. Mann 2-1-10
Independent QDA — Date

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-05-10-O **Revision:** 0
Description: WBT-3 Coil +PT 400RPM **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	7	80H	800	8	10	11.4
2	7	80H	600	8	10	11.4
3	1	115	300	8	10	11.4
4	5	+PT	300	20	10	11.4
5	7	80H	300	8	10	11.4
6	1	115	200	8	10	11.4
7	5	+PT	200	20	10	11.4
8	1	115	100	8	10	11.4
9	4	TRG	100	8	10	11.4
10	5	+PT	100	20	10	11.4
11	1	115	35	8	10	11.4

Additional Instructions

1)A message required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	800	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
2	600	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
3	300	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
4	300	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
5	300	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
6	200	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
7	200	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
8	100	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
9	100	TRG	Trigger Pulse	small pulse horiz.	Large pulse up	50% Full Screen
10	100	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
11	35	115	Support Ring	90 Degrees	TSP Forms Up	50% Full Screen

Additional Acquisition Setup Instructions

When using the MHI Guide Tube Std. the set point for the 35Khz Channel 11 is the 100% Axial Notch at 330 Degrees.

Standards

Category	Serial Number	S/G	Leg
EPRI EDM Notch Standard	Z-18292	Any S/G:	Any
EPRI EDM Notch Standard	Z-18293	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20435	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20436	Any S/G:	Any
ASME COMBO Standard	Z-20445	Any S/G:	Any

Standard Serial Number Comments

None

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-06-10-O	**Revision:**	0
Description:	WBT-3 Coil +PT 400RPM	**Page:**	1 of 3

ACTS Details

Procedure:	MRS-SSP-2194-WBT Rev.1
Applicable ETSS:	21409.1, 21410.1, 20511.1, 20510.1,96703.1, 27903.1

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	RPC	**Direction:**	Either
Probe Diameter:	.590	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	600	**Speed:**	0.2
Ext Type:	NONE	**Max Speed:**	0.25
Ext Length:	NONE	**Min Sampling Rate:**	25 per inch Axial, 30 per inch Circ.
Target RPM:	400		
Min RPM:		**Max RPM:**	
Software:	ANSER / Westinghouse / Revision approved via. software release letter		
Applicability:	Straight section and special interest inspection with 3 Coil RPC probe. (Non -mag bias mid-range Plus Point, .115"pancake, and .080" shielded pancake coils.)		

External Files

Tester Config Filename:	WBT-OMNI-3COIL-+PT-400RPM.CFG
Auto Cal Filename:	WBT-3CRPC.acs
DQM Filename:	WBT-RPC-400RPM.dqv

Probes

Name	Length	Number	Mfr
+PT-590-MRPC/3C/P115A-PP11A-SP080B52PH(664)ZM001	N/A	77143	Zetec
ZRPS-DH3-E00.590-C01-00G0EA0	N/A	77143	Zetec

Additional Probe Items

Item	Name	Length	Number	Mfr
Motor Unit	9D/610NS/MRPC/52MU(3/8EMI)36P900	83'	76421	Zetec
Motor Unit	SMUS-9DNS-E00.610-0-ABB0000	83'	76421	Zetec

Signatures

D.A. Michalski 2/1/10
Westinghouse Service Lead Date

David Adams 2/1/2010
TVA Utility Representative Date

R. Lopez 2-1-2010
Westinghouse NDE Level III Date

R.S. Mann 2-1-10
Independent QDA Date

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-06-10-O **Revision:** 0
Description: WBT-3 Coil +PT 400RPM **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	7	80H	800	8	10	11.4
2	7	80H	600	8	10	11.4
3	1	115	300	8	10	11.4
4	5	+PT	300	20	10	11.4
5	7	80H	300	8	10	11.4
6	1	115	200	8	10	11.4
7	5	+PT	200	20	10	11.4
8	1	115	100	8	10	11.4
9	4	TRG	100	8	10	11.4
10	5	+PT	100	20	10	11.4
11	1	115	35	8	10	11.4

Additional Instructions

1)A message required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	800	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
2	600	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
3	300	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
4	300	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
5	300	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
6	200	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
7	200	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
8	100	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
9	100	TRG	Trigger Pulse	small pulse horiz.	Large pulse up	50% Full Screen
10	100	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
11	35	115	Support Ring	90 Degrees	TSP Forms Up	50% Full Screen

Additional Acquisition Setup Instructions

When using the MHI Guide Tube Std. the set point for the 35Khz Channel 11 is the 100% Axial Notch at 330 Degrees.

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-06-10-O **Revision:** 0
Description: WBT-3 Coil +PT 400RPM **Page:** 3 of 3

Standards

Category	Serial Number	S/G	Leg
EPRI EDM Notch Standard	Z-18292	Any S/G:	Any
EPRI EDM Notch Standard	Z-18293	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20435	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20436	Any S/G:	Any
ASME COMBO Standard	Z-20445	Any S/G:	Any

Standard Serial Number Comments

None

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-07-10-O	**Revision:**	0
Description:	WBT-3 Coil +PT 400RPM	**Page:**	1 of 3

ACTS Details

Procedure:	MRS-SSP-2194-WBT Rev.1
Applicable ETSS:	21409.1, 21410.1, 20511.1, 20510.1,96703.1, 27903.1

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	RPC	**Direction:**	Either
Probe Diameter:	.610	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	600	**Speed:**	0.2
Ext Type:	NONE	**Max Speed:**	0.25
Ext Length:	NONE	**Min Sampling Rate:**	25 per inch Axial, 30 per inch Circ.
Target RPM:	400		
Min RPM:		**Max RPM:**	
Software:	ANSER / Westinghouse / Revision approved via. software release letter		
Applicability:	Straight section and special interest inspection with 3 Coil RPC probe. (Mag bias mid-range Plus Point, .115"pancake, and .080" shielded pancake coils.) Magnetic Bias		

External Files

Tester Config Filename:	WBT-OMNI-3COIL-+PT-400RPM.CFG
Auto Cal Filename:	WBT-3CRPC.acs
DQM Filename:	WBT-RPC-400RPM.dqv

Probes

Name	Length	Number	Mfr
M/+PT-610-115/36/S80(664)52PH	N/A	79751	Corestar

Additional Probe Items

Item	Name	Length	Number	Mfr
Motor Unit	9D/610NS/MRPC/52MU(3/8EMI)36P900	83'	76421	Zetec
Motor Unit	SMUS-9DNS-E00.610-0-ABB0000	83'	76421	Zetec

Signatures

2/1/10	Westinghouse Service Lead	2/1/2010	TVA Utility Representative
2-1-2010	Westinghouse NDE Level III	2-1-10	Independent QDA

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-07-10-O **Revision:** 0
Description: WBT-3 Coil +PT 400RPM **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	7	80H	800	8	10	11.4
2	7	80H	600	8	10	11.4
3	1	115	300	8	10	11.4
4	5	+PT	300	20	10	11.4
5	7	80H	300	8	10	11.4
6	1	115	200	8	10	11.4
7	5	+PT	200	20	10	11.4
8	1	115	100	8	10	11.4
9	4	TRG	100	8	10	11.4
10	5	+PT	100	20	10	11.4
11	1	115	35	8	10	11.4

Additional Instructions

1)A message required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	800	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
2	600	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
3	300	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
4	300	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
5	300	80H	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% ID Circ
6	200	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
7	200	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
8	100	115	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
9	100	TRG	Trigger Pulse	small pulse horiz.	Large pulse up	50% Full Screen
10	100	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
11	35	115	Support Ring	90 Degrees	TSP Forms Up	50% Full Screen

Additional Acquisition Setup Instructions

When using the MHI Guide Tube Std. the set point for the 35Khz Channel 11 is the 100% Axial Notch at 330 Degrees.

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-07-10-O **Revision:** 0
Description: WBT-3 Coil +PT 400RPM **Page:** 3 of 3

Standards

Category	Serial Number	S/G	Leg
EPRI EDM Notch Standard	Z-18292	Any S/G:	Any
EPRI EDM Notch Standard	Z-18293	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20435	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20436	Any S/G:	Any
ASME COMBO Standard	Z-20445	Any S/G:	Any

Standard Serial Number Comments

None

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-08-10-O	**Revision:**	0
Description:	WBT-Ghent G3/G4-700RPM	**Page:**	1 of 3

ACTS Details

Procedure:	MRS-SSP-2194-WBT Rev.1
Applicable ETSS:	20407.1

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	RPC	**Direction:**	Either
Probe Diameter:	.590	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	1000	**Speed:**	0.4
Ext Type:	NONE	**Max Speed:**	0.45
Ext Length:	NONE	**Min Sampling Rate:**	25 per inch Axial, 30 per inch Circ.
Target RPM:	700		
Min RPM:		**Max RPM:**	
Software:	ANSER / Westinghouse / Revision approved via. software release letter		
Applicability:	Straight section and special interest inspection with a rotating Ghent probe. (G/3 and G/4 coils).		

External Files

Tester Config Filename:	WBT-OMNI-GHENT-700RPM.CFG
Auto Cal Filename:	WBT-GHENT.acs
DQM Filename:	WBT-GHENT-700RPM.dqv

Probes

Name	Length	Number	Mfr
M/RG34-590-MRPC/52PH(.620-.670)	N/A	810-4082-005	Zetec
ZRPS-RPGM-E00.590-CC46E-00G0E00	N/A	10025152	Zetec

Additional Probe Items

Item	Name	Length	Number	Mfr
Motor Unit	9D/610NS/MRPC/52MU(3/8EMI)36P900	83'	76421	Zetec
Motor Unit	SMUS-9DNS-E00.610-0-ABB0000	83'	10022655	Zetec

Signatures

R.A. Muchalski 2/1/10		Daniel Adam 2/1/2010	
Westinghouse Service Lead	Date	TVA Utility Representative	Date
R.L. Logan 2-1-2010		R.S. Moore 2-1-10	
Westinghouse NDE Level III	Date	Independent QDA	Date

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-08-10-O **Revision:** 0
Description: WBT-Ghent G3/G4-700RPM **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	1	AXIAL	400	20	17.40	11.4
2	3	CIRC	400	20	19.30	11.4
3	1	AXIAL	300	20	16.40	11.4
4	3	CIRC	300	20	17.50	11.4
5	1	AXIAL	200	14	20.00	11.4
6	5	TRG	200	8	20.00	11.4
7	3	CIRC	200	14	20.00	11.4
8	1	AXIAL	100	14	20.00	11.4
9	3	CIRC	100	14	20.00	11.4

Additional Instructions

1)A message required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	400	AXIAL	100% Axial Notch	35+/- 5 Degrees	Axial Flaws Up	2-3 SD 40% OD Ax
2	400	CIRC	100% Circ Notch	35+/- 5 Degrees	Circ Flaws Up	2-3 SD 40% OD Circ
3	300	AXIAL	100% Axial Notch	35+/- 5 Degrees	Axial Flaws Up	2-3 SD 40% OD Ax
4	300	CIRC	100% Circ Notch	35+/- 5 Degrees	Circ Flaws Up	2-3 SD 40% OD Circ
5	200	AXIAL	100% Axial Notch	35+/- 5 Degrees	Axial Flaws Up	2-3 SD 40% OD Ax
6	200	TRG	Trigger Pulse	small pulse horiz.	Large pulse up	50% Full Screen
7	200	CIRC	100% Circ Notch	35+/- 5 Degrees	Circ Flaws Up	2-3 SD 40% OD Circ
8	100	AXIAL	100% Axial Notch	35+/- 5 Degrees	Axial Flaws Up	2-3 SD 40% OD Ax
9	100	CIRC	100% Circ Notch	35+/- 5 Degrees	Circ Flaws Up	2-3 SD 40% OD Circ

Additional Acquisition Setup Instructions

None

Standards

Category	Serial Number	S/G	Leg
EPRI EDM Notch Standard	Z18292	Any S/G:	Any
EPRI EDM Notch Standard	Z18293	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20435	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20436	Any S/G:	Any
ASME COMBO Standard	Z-20445	Any S/G:	Any

Standard Serial Number Comments

None

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-09-10-O	**Revision:**	0
Description:	WBT-UB MR +PT(MAG BIAS)1000RPM	**Page:**	1 of 3

ACTS Details

Procedure:	MRS-SSP-2194-WBT Rev.1
Applicable ETSS:	21409.1, 21410.1, 20510.1, 96703.1, 96511.2, 27903.1

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	RPC	**Direction:**	Either
Probe Diameter:	.580	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	1500	**Speed:**	0.5
Ext Type:	NONE	**Max Speed:**	0.55
Ext Length:	NONE	**Min Sampling Rate:**	30 per inch Axial, 30 per inch Circ.
Target RPM:	1000		
Min RPM:		**Max RPM:**	
Software:	ANSER / Westinghouse / Revision approved via. software release letter		
Applicability:	Detection and characterization of ODSCC, PWSCC, wear or volumetric indications in the U-bends. U-Bend examinations except dents.		

External Files

Tester Config Filename:	WBT-OMNI-UB-+PT-1000RPM.CFG
Auto Cal Filename:	WBT-UBEND.acs
DQM Filename:	WBT-UB-1000RPM.dqv

Probes

Name	Length	Number	Mfr
M/+Point-.580-MRPC/FH/PP11A/24IN/52PH(.664)ZM	24"	76896	Zetec
SRPF-FH-E00.580-MPP11A-0FG0EA0	24"	76896	Zetec

Additional Probe Items

Item	Name	Length	Number	Mfr
Probe Head Extension	EXT-580-MRPC/TTS/Shaft/24IN-52/52	24"	76912	Zetec
Probe Head Extension	EXT-580-MRPC/TTS/SHAFT/36IN-52/52	36"	76908	Zetec
Probe Head Extension	EXT-580-MRPC/TTS/SHAFT/60IN-52/52	60"	76904	Zetec
Motor Unit	9D/610NS/MRPC/52MU(3/8EMI)36P900	83'	76421	Zetec
Motor Unit	SMUS-9DNS-E00.610-0-ABB0000	83'	76421	Zetec

Signatures

2/1/10		2/1/2010	
Westinghouse Service Lead	Date	TVA Utility Representative	Date
2-1-2010		2-1-10	
Westinghouse NDE Level III	Date	Independent QDA	Date

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-09-10-O **Revision:** 0
Description: WBT-UB MR +PT(MAG BIAS)1000RPM **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	1	+PT	400	20	10	11.4
2	1	+PT	300	20	10	11.4
3	1	+PT	150	20	10	11.4
4	4	TRG	150	8	10	11.4
5	1	+PT	35	20	10	11.4

Additional Instructions

1)A message id required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	400	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
2	300	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
3	150	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
4	150	TRG	Trigger Pulse	small pulse horiz.	Large pulse up	50% Full Screen
5	35	+PT	Support Ring	TSP Forms Up	TSP Forms Up	50% Full Screen

Additional Acquisition Setup Instructions

When using the MHI Guide Tube Std. the set point for the 35Khz Channel 11 is the 100% Axial Notch at 330 Degrees.

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-09-10-O **Revision:** 0
Description: WBT-UB MR +PT(MAG BIAS)1000RPM **Page:** 3 of 3

Standards

Category	Serial Number	S/G	Leg
EPRI EDM Notch Standard	Z-18292	Any S/G:	Any
EPRI EDM Notch Standard	Z-18293	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20435	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20436	Any S/G:	Any
ASME COMBO Standard	Z-20445	Any S/G:	Any

Standard Serial Number Comments

None

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-09-10-O	**Revision:**	1
Description:	WBT-UB MR +PT(MAG BIAS)1000RPM	**Page:**	1 of 3

ACTS Details

Procedure:	MRS-SSP-2194-WBT Rev.1
Applicable ETSS:	21409.1, 21410.1, 20510.1, 96703.1, 96511.2, 27903.1

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	RPC	**Direction:**	Either
Probe Diameter:	.580	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	1500	**Speed:**	0.5
Ext Type:	NONE	**Max Speed:**	0.55
Ext Length:	NONE	**Min Sampling Rate:**	30 per inch Axial, 30 per inch Circ.
Target RPM:	1000		
Min RPM:		**Max RPM:**	
Software:	ANSER / Westinghouse / Revision approved via. software release letter		
Applicability:	Detection and characterization of ODSCC, PWSCC, wear or volumetric indications in the U-bends. U-Bend examinations except dents.		

External Files

Tester Config Filename:	WBT-OMNI-UB-+PT-1000RPM.CFG
Auto Cal Filename:	WBT-UBEND.acs
DQM Filename:	WBT-UB-1000RPM.dqv

Probes

Name	Length	Number	Mfr
M/+Point-.580-MRPC/FH/PP11A/24IN/52PH(.664)ZM	24"	76896	Zetec
ZRPF-FH-E00.580-MPP11A-0FG0EA0	24"	76896	Zetec

Additional Probe Items

Item	Name	Length	Number	Mfr
Probe Head Extension	EXT-580-MRPC/TTS/Shaft/24IN-52/52	24"	76912	Zetec
Probe Head Extension	EXT-580-MRPC/TTS/SHAFT/36IN-52/52	36"	76908	Zetec
Probe Head Extension	EXT-580-MRPC/TTS/SHAFT/60IN-52/52	60"	76904	Zetec
Motor Unit	9D/610NS/MRPC/52MU(3/8EMI)36P900	83'	76421	Zetec
Motor Unit	SMUS-9DNS-E00.610-0-ABB0000	83'	76421	Zetec

Signatures

R.A. Mikalski	2/3/10	David Adam	2/3/10
Westinghouse Service Lead	Date	TVA Utility Representative	Date
[illegible]	2-3-2010	R.S. [illegible]	2-3-10
Westinghouse NDE Level III	Date	Independent QDA	Date

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-09-10-O **Revision:** 1
Description: WBT-UB MR +PT(MAG BIAS)1000RPM **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	1	+PT	400	20	10	11.4
2	1	+PT	300	20	10	11.4
3	1	+PT	150	20	10	11.4
4	4	TRG	150	8	10	11.4
5	1	+PT	35	20	10	11.4

Additional Instructions

1)A message id required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	400	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
2	300	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
3	150	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
4	150	TRG	Trigger Pulse	small pulse horiz.	Large pulse up	50% Full Screen
5	35	+PT	Support Ring	TSP Forms Up	TSP Forms Up	50% Full Screen

Additional Acquisition Setup Instructions

hen using the MHI Guide Tube Std. the set point for the 35Khz Channel 11 is the 100% Axial Notch at 330 Degrees.

Standards

Category	Serial Number	S/G	Leg
EPRI EDM Notch Standard	Z-18292	Any S/G:	Any
EPRI EDM Notch Standard	Z-18293	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20435	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20436	Any S/G:	Any
ASME COMBO Standard	Z-20445	Any S/G:	Any

Standard Serial Number Comments

None

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-10-10-O	**Revision:**	0
Description:	WBT-UB MR +PT 540RPM	**Page:**	1 of 3

ACTS Details

Procedure: MRS-SSP-2194-WBT Rev.1

Applicable ETSS: 21409.1, 21410.1, 20510.1, 96703.1, 96511.2, 27903.1

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	RPC	**Direction:**	Either
Probe Diameter:	.580,.560	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	900	**Speed:**	0.2
Ext Type:	NONE	**Max Speed:**	0.22
Ext Length:	NONE	**Min Sampling Rate:**	30 per inch Axial, 30 per inch Circ.
Target RPM:	540		
Min RPM:		**Max RPM:**	

Software: ANSER / Westinghouse / Revision approved via. software release letter

Applicability: *Detection and characterization of ODSCC, PWSCC, wear or volumetric indications in the U-bends.* U-Bend examinations including dents.

External Files

Tester Config Filename: WBT-OMNI-UB-+PT-540RPM.CFG

Auto Cal Filename: WBT-UBEND.acs

DQM Filename: WBT-UB-540RPM.dqv

Probes

Name	Length	Number	Mfr
+Point-.580-MRPC/FH/PP11A/24IN/52PH(.664)ZM001	24"	76900	Zetec
+Point-.560-MRPC/FH/PP11A/24IN/52PH(.654)ZM001	24"	76901	Zetec

Additional Probe Items

Item	Name	Length	Number	Mfr
Probe Head Extension	EXT-580-MRPC/TTS/Shaft/24IN-52/52	24"	76912	Zetec
Probe Head Extension	EXT-580-MRPC/TTS/SHAFT/36IN-52/52	36"	76908	Zetec
Probe Head Extension	EXT-580-MRPC/TTS/SHAFT/60IN-52/52	60"	76904	Zetec
Motor Unit	9D/610NS/MRPC/52MU(3/8EMI)36P900	83'	76421	Zetec
Motor Unit	SMUS-9DNS-E00.610-0-ABB0000	83'	76421	Zetec

Signatures

R.H. Mechabelli 2/1/10
Westinghouse Service Lead — Date

Daniel F. Adam 2/1/2010
TVA Utility Representative — Date

2-1-2010
Westinghouse NDE Level III — Date

R.S. Warren 2-1-10
Independent QDA — Date

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-10-10-O **Revision:** 0
Description: WBT-UB MR +PT 540RPM **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	1	+PT	400	20	10	11.4
2	1	+PT	300	20	10	11.4
3	1	+PT	150	20	10	11.4
4	4	TRG	150	8	10	11.4
5	1	+PT	35	20	10	11.4

Additional Instructions

1)A message id required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	400	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
2	300	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
3	150	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
4	150	TRG	Trigger Pulse	small pulse horiz.	Large pulse up	50% Full Screen
5	35	+PT	Support Ring	TSP Forms Up	TSP Forms Up	50% Full Screen

Additional Acquisition Setup Instructions

When using the MHI Guide Tube Std. the set point for the 35Khz Channel 11 is the 100% Axial Notch at 330 Degrees.

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-10-10-O **Revision:** 0
Description: WBT-UB MR +PT 540RPM **Page:** 3 of 3

Standards

Category	Serial Number	S/G	Leg
EPRI EDM Notch Standard	Z-18292	Any S/G:	Any
EPRI EDM Notch Standard	Z-18293	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20435	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20436	Any S/G:	Any
ASME COMBO Standard	Z-20445	Any S/G:	Any

Standard Serial Number Comments

None

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-11-10-O	**Revision:**	0
Description:	WBT-UB MR +PT 540RPM	**Page:**	1 of 3

ACTS Details

Procedure:	MRS-SSP-2194-WBT Rev.1
Applicable ETSS:	21409.1, 21410.1, 20510.1, 96703.1, 96511.2, 27903.1

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	RPC	**Direction:**	Either
Probe Diameter:	.560	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	900	**Speed:**	0.2
Ext Type:	NONE	**Max Speed:**	0.22
Ext Length:	NONE	**Min Sampling Rate:**	30 per inch Axial, 30 per inch Circ.
Target RPM:	540		
Min RPM:		**Max RPM:**	
Software:	ANSER / Westinghouse / Revision approved via. software release letter		
Applicability:	Detection and characterization of ODSCC, PWSCC, wear or volumetric indications in the U-bends. U-Bend examinations including dents.		

External Files

Tester Config Filename:	WBT-OMNI-UB-+PT-540RPM.CFG
Auto Cal Filename:	WBT-UBEND.acs
DQM Filename:	WBT-UB-540RPM.dqv

Probes

Name	Length	Number	Mfr
M/+Point-.560-MRPC/FH/PP11A/24IN/52PH(.654)ZM001	24"	76897	Zetec

Additional Probe Items

Item	Name	Length	Number	Mfr
Probe Head Extension	EXT-580-MRPC/TTS/Shaft/24IN-52/52	24"	76912	Zetec
Probe Head Extension	EXT-580-MRPC/TTS/SHAFT/36IN-52/52	36"	76908	Zetec
Probe Head Extension	EXT-580-MRPC/TTS/SHAFT/60IN-52/52	60"	76904	Zetec
Motor Unit	9D/610NS/MRPC/52MU(3/8EMI)36P900	83'	76421	Zetec
Motor Unit	SMUS-9DNS-E00.610-0-ABB0000	83'	76421	Zetec

Signatures

Westinghouse Service Lead	2/1/10 Date	TVA Utility Representative	2/1/2010 Date
Westinghouse NDE Level III	2-1-2010 Date	Independent QDA	2-1-10 Date

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-11-10-O **Revision:** 0
Description: WBT-UB MR +PT 540RPM **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	1	+PT	400	20	10	11.4
2	1	+PT	300	20	10	11.4
3	1	+PT	150	20	10	11.4
4	4	TRG	150	8	10	11.4
5	1	+PT	35	20	10	11.4

Additional Instructions

1)A message id required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	400	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
2	300	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
3	150	+PT	100% Axial Notch	35+/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
4	150	TRG	Trigger Pulse	small pulse horiz.	Large pulse up	50% Full Screen
5	35	+PT	Support Ring	TSP Forms Up	TSP Forms Up	50% Full Screen

Additional Acquisition Setup Instructions

When using the MHI Guide Tube Std. the set point for the 35Khz Channel 11 is the 100% Axial Notch at 330 Degrees.

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-11-10-O **Revision:** 0
Description: WBT-UB MR +PT 540RPM **Page:** 3 of 3

Standards

Category	Serial Number	S/G	Leg
EPRI EDM Notch Standard	Z-18292	Any S/G:	Any
EPRI EDM Notch Standard	Z-18293	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20435	Any S/G:	Any
MHI EDM Guide Tube Std.	Z-20436	Any S/G:	Any
ASME COMBO Standard	Z-20445	Any S/G:	Any

Standard Serial Number Comments

None

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-12-10-O	**Revision:**	0
Description:	WBT-MHI Array-15IPS	**Page:**	1 of 5

ACTS Details

Procedure:	MRS-SSP-2194-WBT Rev.1
Applicable ETSS:	23514.1,23514.2,23514.3

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	1/26/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	Array	**Direction:**	Either
Probe Diameter:	0.605	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	571	**Speed:**	15
Ext Type:	NONE	**Max Speed:**	16
Ext Length:	NONE	**Min Sampling Rate:**	31 Samples/Inch
Target RPM:	0		
Min RPM:		**Max RPM:**	
Software:	ANSER / Westinghouse / Revision approved via. software release letter		
Applicability:	Detection of Flaws		

External Files

Tester Config Filename:	WBT-OMNI-MHI-15IPS.CFG
Auto Cal Filename:	WBT-MHI-Coil-1.acs
DQM Filename:	WBT-MHI-15IPS.dqv

Probes

Name	Length	Number	Mfr
.605-INTELLIGENT/PROBE(.660)-(3/8)-110/36	110'	802-5010-000	Mitsub

Additional Probe Items

Item	Name	Length	Number	Mfr

Signatures

1/28/10	Westinghouse Service Lead	2/1/2010	TVA Utility Representative
1-28-2010	Westinghouse NDE Level III	2-1-10	Independent QDA

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-12-10-O **Revision:** 0
Description: WBT-MHI Array-15IPS **Page:** 2 of 5

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	1	T-R	400	20.00	4.80	11.4
2	9	T-R	400	20.00	4.80	11.4
3	17	T-R	400	20.00	4.80	11.4
4	5	T-R	400	20.00	4.80	11.4
5	13	T-R	400	20.00	4.80	11.4
6	21	T-R	400	20.00	4.80	11.4
7	2	T-R	400	20.00	4.80	11.4
8	10	T-R	400	20.00	4.80	11.4
9	18	T-R	400	20.00	4.80	11.4
10	6	T-R	400	20.00	4.80	11.4
11	14	T-R	400	20.00	4.80	11.4
12	22	T-R	400	20.00	4.80	11.4
13	3	T-R	400	20.00	4.80	11.4
14	11	T-R	400	20.00	4.80	11.4
15	19	T-R	400	20.00	4.80	11.4
16	7	T-R	400	20.00	4.80	11.4
17	15	T-R	400	20.00	4.80	11.4
18	23	T-R	400	20.00	4.80	11.4
19	4	T-R	400	20.00	4.80	11.4
20	12	T-R	400	20.00	4.80	11.4
21	20	T-R	400	20.00	4.80	11.4
22	8	T-R	400	20.00	4.80	11.4
23	16	T-R	400	20.00	4.80	11.4
24	24	T-R	400	20.00	4.80	11.4
25	1	T-R	300	20.00	4.80	11.4
26	9	T-R	300	20.00	4.80	11.4
27	17	T-R	300	20.00	4.80	11.4
28	5	T-R	300	20.00	4.80	11.4
29	13	T-R	300	20.00	4.80	11.4
30	21	T-R	300	20.00	4.80	11.4
31	2	T-R	300	20.00	4.80	11.4
32	10	T-R	300	20.00	4.80	11.4
33	18	T-R	300	20.00	4.80	11.4
34	6	T-R	300	20.00	4.80	11.4
35	14	T-R	300	20.00	4.80	11.4
36	22	T-R	300	20.00	4.80	11.4
37	3	T-R	300	20.00	4.80	11.4
38	11	T-R	300	20.00	4.80	11.4
39	19	T-R	300	20.00	4.80	11.4
40	7	T-R	300	20.00	4.80	11.4
41	15	T-R	300	20.00	4.80	11.4
42	23	T-R	300	20.00	4.80	11.4
43	4	T-R	300	20.00	4.80	11.4
44	12	T-R	300	20.00	4.80	11.4
45	20	T-R	300	20.00	4.80	11.4
46	8	T-R	300	20.00	4.80	11.4
47	16	T-R	300	20.00	4.80	11.4

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-12-10-O **Revision:** 0
Description: WBT-MHI Array-15IPS **Page:** 3 of 5

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
48	24	T-R	300	20.00	4.80	11.4
49	1	T-R	100	20.00	3.90	11.4
50	9	T-R	100	20.00	3.90	11.4
51	17	T-R	100	20.00	3.90	11.4
52	5	T-R	100	20.00	3.90	11.4
53	13	T-R	100	20.00	3.90	11.4
54	21	T-R	100	20.00	3.90	11.4
55	2	T-R	100	20.00	3.90	11.4
56	10	T-R	100	20.00	3.90	11.4
57	18	T-R	100	20.00	3.90	11.4
58	6	T-R	100	20.00	3.90	11.4
59	14	T-R	100	20.00	3.90	11.4
60	22	T-R	100	20.00	3.90	11.4
61	3	T-R	100	20.00	3.90	11.4
62	11	T-R	100	20.00	3.90	11.4
63	19	T-R	100	20.00	3.90	11.4
64	7	T-R	100	20.00	3.90	11.4
65	15	T-R	100	20.00	3.90	11.4
66	23	T-R	100	20.00	3.90	11.4
67	4	T-R	100	20.00	3.90	11.4
68	12	T-R	100	20.00	3.90	11.4
69	20	T-R	100	20.00	3.90	11.4
70	8	T-R	100	20.00	3.90	11.4
71	16	T-R	100	20.00	3.90	11.4
72	24	T-R	100	20.00	3.90	11.4
73	25	DIFF	550	20.00	10	11.4
74	26	ABS	550	14.00	10	11.4
75	25	DIFF	300	20.00	10	11.4
76	26	ABS	300	14.00	10	11.4
77	25	DIFF	130	20.00	10	11.4
78	26	ABS	130	14.00	10	11.4
79	25	DIFF	35	20.00	10	11.4
80	26	ABS	35	14.00	10	11.4

Additional Instructions

1)A message required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1-24	400	T-R	Dent	190 Deg +/- 5Deg	Horiz	50% OD Groove @ 2 Div
25-48	300	T-R	Dent	190 Deg +/- 5Deg	Horiz	50% OD Groove @ 2 Div
49-72	100	T-R	Dent	190 Deg +/- 5Deg	Horiz	50% OD Groove @ 2 Div
73	400	DIFF	Dent	180 Deg +/- 5Deg	Horiz	50% OD Groove @ 2 Div
74	400	ABS	Dent	180 Deg +/- 5Deg	Horiz	50% OD Groove @ 2 Div
75	300	DIFF	Dent	180 Deg +/- 5Deg	Horiz	50% OD Groove @ 2 Div
76	300	ABS	Dent	180 Deg +/- 5Deg	Horiz	50% OD Groove @ 2 Div
77	200	DIFF	Dent	180 Deg +/- 5Deg	Horiz	50% OD Groove @ 2 Div
78	200	ABS	Dent	180 Deg +/- 5Deg	Horiz	50% OD Groove @ 2 Div
79	30	DIFF	Support Plate	90 Degrees	Down	100% Screen Height
80	30	ABS	Support Plate	270 Degrees	Down	100% Screen Height

Additional Acquisition Setup Instructions

1) 400 kHz Ch 1 thru 24 Dent @ 190 Degrees - 50% OD Groove @ 2 Divisions
2) 300 kHz Ch 25 thru 48 Dent @ 190 Degrees - 50% OD Groove @ 2 Divisions
3) 100 kHz Ch 49 thru 72 Dent @ 190 Degrees - 50% OD Groove @ 2 Divisions
SQN2-MHI-Coil-2.acs

Standards

Category	Serial Number	S/G	Leg
EDM Array Standard	Z-20435	Any S/G:	Any
EDM Array Standard	Z-20436	Any S/G:	Any

Standard Serial Number Comments

None

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#:	WBT-13-10-O	**Revision:**	0
Description:	WBT-OMNI-BOBBIN-24PID	**Page:**	1 of 3

ACTS Details

Procedure: MRS-SSP-2194-WBT Rev.1

Applicable ETSS: 96004.1, 96005.1, 96012.1,24013.1, 96042.1, I28411, I28413

Plant Specifics

Customer:	Tennessee Valley Authority	**Date:**	2/9/2010
Plant Site:	Watts Bar	**Alpha Code:**	WBT
S/G Type:	D3	**Unit:**	2
Tube Material:	Inconel 600 Mill Annealed	**Tube Size:**	0.750" O.D. X 0.043" wall
SG1:	1	**SG3:**	3
SG2:	2	**SG4:**	4

Examination Details

Probe Type:	Bobbin	**Direction:**	Pull
Probe Diameter:	0.610	**Pitch:**	N/A
Tester Type:	Omni200	**Model:**	HP 2.6 Gig or Equivalent
Tester Mfr:	CoreStar	**Format:**	ANSER
Samples/Sec:	800	**Speed:**	24
Ext Type:	NONE	**Max Speed:**	26.66
Ext Length:	None	**Min Sampling Rate:**	30 Samples/Inch
Target RPM:	0		
Min RPM:		**Max RPM:**	

Software: ANSER / Westinghouse / Revision approved via. software release letter

Applicability: Full and partial length inspection with Bobbin probe at 24 inches per second.

External Files

Tester Config Filename: WBT-OMNI-BOBBIN-24PID.CFG

Auto Cal Filename: WBT-BOBBIN.acs

DQM Filename: WBT-BOBBIN.dqv

Probes

Name	Length	Number	Mfr
EC-610-LLMC-110/36-Z	110'	76650	Zetec
EC-610-LLMC-110/36-C	110'	79792	Corestar
SBPF-LLMC-EC-.610-110-36	110'	76678	Zetec
EC-610-LLMC-120/36-C	120'	76419	Corestar

Additional Probe Items

Item	Name	Length	Number	Mfr

Signatures

R.A. Michalski 2/9/10
Westinghouse Service Lead — Date

David T. Adams 2/9/2010
TVA Utility Representative — Date

2-9-2010
Westinghouse NDE Level III — Date

R.S. Warren 2-9-2010
Independent QDA — Date

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-13-10-O **Revision:** 0
Description: WBT-OMNI-BOBBIN-24PID **Page:** 2 of 3

Tester Settings

Channel	Coil No.	Coil Type	Freq (kHz)	Gain	Drive Voltage	FE Gain
1	1	DIFF	550	20	10	11.4
2	5	ABS	550	8	10	11.4
3	1	DIFF	300	20	10	11.4
4	5	ABS	300	8	10	11.4
5	1	DIFF	130	20	10	11.4
6	5	ABS	130	8	10	11.4
7	1	DIFF	35	20	10	11.4
8	5	ABS	35	8	10	11.4

Additional Instructions

1)A message required for restricted tubes.

Acquisition Calibration Parameters

Chan No.	Freq (KHz)	Coil	Reference	Phase	Direction	Span
1	550	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
2	550	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
3	300	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
[illegible]	300	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
[illegible]	130	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
6	130	ABS	100% Drill Hole	32 +/- 5 Degrees	Flaws up first	50% Full Screen
7	35	DIFF	Support Ring	TSP-Horiz-Left	Down & left first	75% Full Screen
8	35	ABS	Support Ring	270 degrees	Down & left first	50% Full Screen

Additional Acquisition Setup Instructions

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: WBT-13-10-O **Revision:** 0
Description: WBT-OMNI-BOBBIN-24PID **Page:** 3 of 3

Standards

Category	Serial Number	S/G	Leg
ASME/AVB Wear Combo Standard	Z-18307	Any S/G:	Any
ASME / DNT Standard	Z-1588	Any S/G:	Any
ASME / DNT Standard	Z-1590	Any S/G:	Any
ASME / DNT Standard	Z-1591	Any S/G:	Any
ASME / DNT Standard	Z-1631	Any S/G:	Any
ASME / DNT Standard	Z-1632	Any S/G:	Any
ASME / DNT Standard	Z-1633	Any S/G:	Any

Standard Serial Number Comments

- **ANALYSIS TECHNIQUE SHEETS (ANTS)**

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ANTS #	WBT-BL-BOBBIN	Desc:	Bobbin	Rev. No 0	Date: 2/1/2010	Page 1 of 5

Procedure: MRS-SSP-2194-WBT Reference ACTS # WBT-01-10-O,WBT-02-10-O,WBT-03-10-O

Instrument: Analysis Station and System Software / Mfg. / Rev.: Westinghouse - ANSER

Model: HP B132 Or equivalent PC Or Unix Bas - Revision approved via software release number

Differential Channels

	Ch. 1	(550 kHz)	Ch. 3	(300 kHz)	Ch. 5	(130 kHz)	Ch. 7	(35 kHz)
Span	100% TWH	Full Scale Indicator @ 2	100% TWH	Full Scale Indicator @ 4	100% TWH	Full Scale Indicator @ 4	Support Plate	Full Scale Indicator @ 6
Phase:	100% TWH	@ 40 degrees +/- 2 Degrees	100% TWH	@ 40 degrees +/- 2 Degrees	100% TWH	@ 40 degrees +/- 2 Degrees	Support Plate	Starting down @ 90 deg.
Cal Std:	ASME/Strap Wear Combo		ASME/Strap Wear Combo		ASME/Strap Wear Combo		ASME/Strap Wear Combo	
Curve:	Mxr Phase 100,60,20-Actuals		Mxr Phase 100,60,20-Actuals		Mxr Phase 100,60,20-Actuals		None Required	
Volts:	4-20% TWH's @4.0 volts		4-20%TWH's@5.5 Volts		4-20% TWH's @4.0 volts		Support Ring @ 6.5 Volts	

Absolute Channels

	Ch. 2	(550 kHz)	Ch. 4	(300 kHz)	Ch. 6	(130 kHz)	Ch. 8	(35 kHz)
Span	100% TWH	Full Scale Indicator @ 4	100% TWH	Full Scale Indicator @ 4	100% TWH	Full Scale Indicator @ 2	Support Plate	Full Scale Indicator @ 10
Phase:	100% TWH	@ 32 degrees +/- 2 degrees	100% TWH	@ 32 degrees +/- 2 degrees	100% TWH	@ 32 degrees +/- 2 degrees	Support Plate	Horz. To Right
Cal Std:	ASME/Strap Wear Combo		ASME/Strap Wear Combo		ASME/Strap Wear Combo		ASME/Strap Wear Combo	
Curve:	None Required		None Required		None Required		None Required	
Volts:	4-20%TWH's@ 2.0 Volts		4-20%TWH's@ 3.0 Volts		4-20%TWH's@ 2.0 Volts		Support Ring @ 8.0 Volts	

Mixes

	P1	550/130 kHz Diff.	P2	300/550/130 kHz Diff.		
Span	100% TWH	2 @ Full Scale Indicator	100% TWH	4 @ Full Scale Indicator		
Phase:	100% TWH	@ 32 degrees +/- 2 degrees	100% TWH	@55 Degrees +/- 5 degrees		
Cal Std:	ASME/Strap Wear Combo		ASME/Strap Wear Combo			
Curve:	Mxr Phase 100,60,20-Actuals		None Required			
Volts:	4-20%TWH's@ 2.75 Volts		4-20%TWH's@ 4.5 Volts			

ADS

	P3	Ch 3 - Avg (3 Point)	P4	(P1) - Avg (3 Point)		
Span	100% TWH	4 @ Full Scale Indicator	100% TWH	2 @ Full Scale Indicator		
Phase:	100% TWH	@ 40 degrees +/- 2 Degrees	100% TWH	@ 32 degrees +/- 2 degrees		
Cal Std:	ASME/Strap Wear Combo		ASME/Strap Wear Combo			
Curve:	None Required		None Required			
Volts:	4-20%TWH's@5.5 Volts		4-20%TWH's@ 2.75 Volts			

Westinghouse NDE Level III / Date 2-1-2010

TVA Utility Representative / Date 2/1/2010

Independent QDA / Date 2-1-10

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS			
ANTS # WBT-BL-BOBBIN	Desc: Bobbin	Rev. No 0	Date: 2/1/2010	Page 2 of 5
Procedure: MRS-SSP-2194-WBT		Reference ACTS # WBT-01-10-O,WBT-02-10-O,WBT-03-10-O		
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number			
Model: HP B132 Or equivalent PC Or Unix Bas				

Additional Setup Requirements

1.) Span settings are initial minimum signal size. Certain conditions may require the span setting to be lower or higher to enhance flaw detection.
2.) Data Screening - Left Strip (Chart Channel P1 Vertical) - Right Strip Chart (Channel 6 Vertical) - Lissajous(P1 for Supports and Sludge Area) (Channel 3 for Freespan) .
3.) P1 is a normal support plate mix using the ASME Standard.
4.) When the 100% TWH is specified, use the 100% TWH closest the 60% Flat Bottom Hole.
5.) Bobbin data will be screened for possible loose parts(PLP's). An additional strip chart (7 and 8) may be added to assist with the screening.
6.)P2 Mix (300Khz/550Khz/130Khz) is for the top of tube sheet on the cold leg side. Save the 100%, 60%, 40%, and 20% flat bottom holes. Suppress the standard support ring and a top of tube sheet expansion on the cold leg side of the S/G.

Data Quality Requirements

1. Verify Acquisition has performed a "Position Verification" at the beginning and end of each cal group.
2. Verify acquisition probe speed, technique configuration, and summary information.
3. Reject data that is unacceptable by using "RBD" reporting acronym.
4. If data is unacceptable use the following Utility Field 2 notation:

QBD	Bad Coil
QDR	Insufficient Data Samples
QEN	Excessive Noise
QET	Incomplete Extent
QFH	Exceeded 4 Hour Calibration
QPN	Excessive Spiking or Parasitic Noise

5. If T-list message states DQM failure with no following DQM pass message, production analysis can accept data by using one of the following Three Letter Codes in the Utility 2 Field:

ADS	Accept Data Spike
AET	Accept Extent Tested
AEC	Accept End of Cal Check
APS	Accept Probe Speed
APV	Accept Position Verification
ASR	Accept Sample Rate
ADF	Accept All Data Failure

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS			
ANTS # WBT-BL-BOBBIN	Desc: Bobbin	Rev. No 0	Date: 2/1/2010	Page 3 of 5
Procedure: MRS-SSP-2194-WBT	Reference ACTS # WBT-01-10-O,WBT-02-10-O,WBT-03-10-O			
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER			
Model: HP B132 Or equivalent PC Or Unix Bas	- Revision approved via software release number			

Summary of Reporting Requirements

Condition	Report Code	Channel	Voltage Threshold	Comment
Percent Indication	%	P5	none	Wear Indcations Reported by Resolution Only
Absolute Drift Indication	ADI	6	None	Step Change in Ch6 Strip Chart Response
Bulge	BLG	1		Equal to or greater than 2 Volts in Freespan
Distorted Dent/Ding Indication	DDI	5/P1	None	Indications in freespan or at supports with dent
Tubesheet Expansion Transition	DEI	P2	None	Indication at tubesheet transition
Deposit	DEP	3	N/A	Deposit which could mask an indication
Differential Freespan Indication	DFI	3	None	Indication not at support structures. Confirmation required on Ch6
Ding	DNG	P1	2 Volts	Freespan and at supports caused by mechanical means
Distorted Support Plate Indication	DSI	P1	None	Indications without an associated dent
Distorted Tubesheet Indication	DTI	P1	None	Indication in tubesheet below the transition
Inside Diameter Chatter	IDC	1	N/A	Record Maximum Voltage and Axial Range
Manufacturing Buff Mark	MBM	6	N/A	Indication must be clearly separable from background noise
Mix Residual Signal	MRS	P1	1.6 Volts	Mix Residual at Support Plates
No Tube Expansion	NTE	2	None	Tube has no expansion
Obstructed Tube	OBS	None Req	N/A	Probe will not pass through Tube
Exapnsion Anomalies	OXP	P1	None	Equal to Greater Than .5 Inches above TTS
Bobbin Indication	PBC	N/A	N/A	Indications Reported on previous Cal
Support Plate Structure Cracking	PLI	8	None	All Indications
Possible Loose Part	PLP	7/8	none	Screen with Ch. 7 or 8
Tube Expansion Anomalies	PTE	2	None	Expansion .5" below the TTS
Permeability Variation	PVN	P1	5 Volts	Can be anywhere P-P Amplitude
Retest Loose Part Std.	RLP	P1	None	Additional Report Entry for LPI's

Additional Reporting Requirements

1.) Upon each PID or final test of a tube which contains I-code, enter the three letter code of TBP (To Be Plugged) to the final report. This will be completed by the Resolutions Analysis.

2.) Acroyms such as SR for Senior Analyst Review may be used in the utility fields for additional information.

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS			
ANTS # WBT-BL-BOBBIN	Desc: Bobbin	Rev. No 0	Date: 2/1/2010	Page 4 of 5
Procedure: MRS-SSP-2194-WBT	Reference ACTS # WBT-01-10-O,WBT-02-10-O,WBT-03-10-O			
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number			
Model: HP B132 Or equivalent PC Or Unix Bas				

Diagram:

Notation	Description	Category
	Blank – No Indication (No Detectable Defect)	I
BRT	Bottom of the Roll Transition (Used for F*)	I
CUD	Copper Deposit	I
DEP	Deposit (Non-Copper)	I
PID	Positive Identification	I
PLG	Plugged	I
PBC	Previous Bobbin Coil call	I
SLG	Sludge Height Measurement	I
RAD	Retest Analyst Discretion	II
RBD	Retest Bad Data	II
RFX	Retest Fixture is Blocking Probe	II
RIC	Retest Tube Examination Incomplete	II
RID	Retest Questionable Tube ID	II
RMB*	Retest with a Magnetically Biased probe	II
RND	Retest No Data	II
RRT	Restricted Tube (retest with smaller probe)	II
RLP	Retest Loose Part Standard for Sizing	II
ADI	Absolute Drift Indication	III
DDI	Distorted Dent Indication	III
DEI	Distorted Expansion Indication	III
DFI	Differential Freespan Indication	III
DSI	Distorted Support Indication	III
DTI	Distorted Tubesheet Indication	III
LPI	Loose Part with Indication	III
NQI	Non-quantifiable Indication	III
ADS*	Absolute Drift Signal	IV
DDS*	Distorted Dent Signal	IV
DES*	Distorted Expansion Signal	IV
DFS*	Differential Freespan Signal	IV
DSS*	Distorted Support Signal	IV
DTS*	Distorted Tubesheet Signal	IV
LPS*	Loose Part with Signal	IV
NQS*	Non-quantifiable Signal	IV
OBS	Obstructed	V
TBP*	To Be Plugged	V

* Called by Resolution Analysts Only

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS				
ANTS # WBT-BL-BOBBIN	Desc: Bobbin	Rev. No 0	Date: 2/1/2010	Page 5 of 5	
Procedure: MRS-SSP-2194-WBT	Reference ACTS # WBT-01-10-O,WBT-02-10-O,WBT-03-10-O				
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number				
Model: HP B132 Or equivalent PC Or Unix Bas					

Diagram:

Notation	Description	Category
BLG	Bulge (equal to greater than 2 volts freespan)	VII
OXP	Over Expansion (0.5 Inches Above TTS)	VII
DNG	Ding (equal to greater than 2 volts)	VII
IDC	Inside Diameter Chatter	VII
INF	Indication Not Found	VII
INR	Indication Not Recordable	VII
LAR	Lead Analyst Review	VII
MBM*	Manufacturing Burnish Mark	VII
MRS	Mix Residual Signal	VII
NTE	No Tubesheet Expansion	VII
PLP	Possible Loose Part	VII
PTE	Partial Tubesheet Expansion	VII
PVN	Permeability Variation	VII

* Called by Resolution Analysts Only

Indication Category:

I - Non-flaw condition with no further action required

II - Retest with the same or smaller diameter probe, as appropriate

III - These "I" codes represent possible flaw signals where no qualified sizing technique is being utilized or does not exist . They require diagnostic testing or evaluation.

IV - These "S" codes are assigned when an indication previously reported as an "I" code receives a diagnostic test which confirms a non-flaw condition.

V - These codes designate a repairable condition or an engineering evaluation

VI - These codes designate incomplete repairs and may require rework depending upon the acceptance criteria

VII- These codes require additional reviews (historical), additional diagnostic sampling or engineering evaluations. MBM is only entered by resolution after historical review.

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ANTS #	WBT-BL-3COIL+PT	Desc:	3 Coil +PT	Rev. No 0	Date: 2/1/2010	Page 1 of 4

Procedure: MRS-SSP-2194-WBT Reference ACTS # WBT-04,05,06,07-10-O

Instrument: Analysis Station and System Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number

Model: HP B132 Or equivalent PC Or Unix Bas

0.115 inch Pancake Coil

	Ch. 3	(300 kHz)	Ch. 6	(200 kHz)	Ch. 8	(100 kHz)	Ch. 11	(35 kHz)
Span	40% OD axial	3 @ Full Scale Indicator	40% OD axial	2.5 @ Full Scale Indicator	40% OD axial	1 @ Full Scale Indicator	100 % Axial	3 @ Full Scale Indicator
Phase:	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees	100 % Axial	@ 324 degrees
Cal Std:	EDM Notch Std		EDM Notch Std		EDM Notch Std		EDM Notch Std	
Curve:	None Required		None Required		None Required		None Required	
Volts:	100% axial notch @ 20.0 volts		100% axial notch @ 13.0 volts		100% axial notch @ 4.0 volts		100% axial notch @ 0.6 volts	

Plus Point - (Axial Flaws Upwards) Trigger(Coil 4)

	Ch. 4	(300 kHz)	Ch. 7	(200 kHz)	Ch. 10	(100 kHz)	Ch. 9	(200 kHz)
Span	40% OD axial	1.4 @ Full Scale Indicator	40% OD axial	2 @ Full Scale Indicator	40% OD axial	1.2 @ Full Scale Indicator	Large Pulse	3 @ Full Scale Indicator
Phase:	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees		Small Pulse Horiz.
Cal Std:	EDM Notch Std		EDM Notch Std		EDM Notch Std		EDM Notch Std	
Curve:	None Required		None Required		None Required		None Required	
Volts:	100% axial notch @ 20.0 volts		100% axial notch @ 25.0 volts		100% axial notch @ 14.0 volts			

Plus Point - (Circ Flaws Upwards)

	P1	(300 kHz)	P2	(200 kHz)	P3	(100 kHz)		
Span	40% OD circ	2 @ Full Scale Indicator	40% OD circ	2 @ Full Scale Indicator	40% OD circ	1.5 @ Full Scale Indicator		
Phase:	40% ID axial	@ 195 degrees +/- 2 degrees	40% ID axial	@ 195 degrees +/- 2 degrees	40% ID axial	@ 195 degrees +/- 2 degrees		
Cal Std:	EDM Notch Std		EDM Notch Std		EDM Notch Std			
Curve:	None Required		None Required		None Required			
Volts:	100% circ notch @ 20.0 volts		100% circ notch @ 25.0 volts		100% circ notch @ 14.0 volts			

0.080 inch Mil HF Pancake

	Ch. 1	(800 kHz)	Ch. 2	(600 kHz)	Ch. 5	(300 kHz)		
Span	40% ID circ	4 @ Full Scale Indicator	40% ID circ	3 @ Full Scale Indicator	40% ID circ	2 @ Full Scale Indicator		
Phase:	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees		
Cal Std:	EDM Notch Std		EDM Notch Std		EDM Notch Std			
Curve:	None Required		None Required		None Required			
Volts:	40% ID axial notch @ 4.0 volts		40% ID axial notch @ 5.5 volts		40% ID axial notch @ 2.0 volts			

Riley Tonser 2-1-2010
Westinghouse NDE Level III / Date

Daniel Adam 2/1/2010
TVA Utility Representative / Date

Independent QDA R.S. Mann / Date 2-1-10

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS			
ANTS # WBT-BL-3COIL+PT	Desc: 3 Coil +PT	Rev. No 0	Date: 2/1/2010	Page 2 of 4
Procedure: MRS-SSP-2194-WBT		Reference ACTS # WBT-04,05,06,07-10-O		
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number			
Model: HP B132 Or equivalent PC Or Unix Bas				

Additional Setup and Screening Requirments

1.) Data Screening - Left Strip Chart (Ch. P1 Vertical) - Right Strip Chart (Ch.11 Vertical) - Lissajous - (Ch. 4)
2.) Volts, Phase and Span to be set using center of notch and using Volts Peak to Peak.
3.) Span settings are initial minimum signal size. Certain conditions may dictate lower or higher settings to enhance flaw detection.
4.) Set axial scale between two landmarks. Scale may be set using the standard if only one in-generator landmark is acquired. If special interest of TSP the support should be used for setting scale.
5.) If the axial scale has to be set on an "RPC" standard, the preferred set points are the 100% TWH and the 100% Axial Notch. The distance between these two points is 8.50".
6.) MHI guide tube standard is 8.0 inches end to end or 2.5" 100% Axial to the 40% OD Axial notch.
7.) Data slew all 3 inspection coils.
8.) The evaluation shall consist of reviewing lissajous, strip chart and C-Scan displays to the extent that all tube wall degradation and other conditions are reported.
9.) All data shall be screened using the 300 kHz plus-point (Ch 4 & P1) as a minimum. All data shall be screened using the C-Scan display, in the area of interest, to increase the visibility of small amplitude indications. Review of additional coils shall be performed as appropriate in order to assure adequate evaluation of the complete data.
10.) Analysts need to be sensitive to dents causing lift-off. If this occurs an indication may be masked. In cases where indications may be masked, the tube should be identified as RBD with a comment as to why.
11.) The HF 080 coil should be utilized to aid in the analysis for PWSCC-type indication and at locations where PWSCC may exist, such as top of tubesheet and support plates.
12.) For detection of indications the 200 kHz may be utilized in addition to or in lieu of the 300 kHz.
13.) As a minimun 25 axial and 30 circumferential samples must be maintained.

Data Quality Requirements

1) Verify Acquisition has performed a "Position Verification" at the beginning and end of each cal group.
2) Verify acquisition probe speed, technique configuration, and summary information.
3) Reject data that is unacceptable by using "RBD" reporting acronym.
4) If data is unacceptable use the following Utility Field 2 notation:

QBD	Bad Coil
QDR	Insufficient Data Samples
QEN	Excessive Noise
QET	Incomplete Extent
QFH	Exceeded 4 Hour Calibration
QPH	Excessive Spiking or Parasitic Noise
QRN	Rotation Stalled and Coil Translated 2 or more scan lines

5) If T-list message states DQM failure with no following DQM pass message, production analysis can accept data by using one of the following Three Letter Codes in the Utility 2 Field:

ADS	Accept Data Spike
AET	Accept Extent Tested
AEC	Accept End of Cal Check
APS	Accept Probe Speed
APV	Accept Position Verification
ASR	Accept Sample Rate
ADF	Accept All Data Failure

6) In order to meet the data quality requirements, the probe head must be changed if the coils fail to detect the following cal standard flaws: +PT coil does not detect 20% OD EDM notches, 115 Pancake coil does not detect the 40% OD notches, 080 Pancake coil does not detect the 20% ID notches.If no 20% OD EDM the 40% OD EDM must be .3 Volts Vertical Max.

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS			
ANTS # WBT-BL-3COIL+PT	Desc: 3 Coil +PT	Rev. No 0	Date: 2/1/2010	Page 3 of 4

Procedure:	MRS-SSP-2194-WBT	Reference ACTS #	WBT-04,05,06,07-10-O
Instrument:	Analysis Station and System	Software / Mfg. / Rev.:	Westinghouse - ANSER - Revision approved via software release number
Model:	HP B132 Or equivalent PC Or Unix Bas		

Summary of Reporting Requirements

Condition	Report Code	Channel	Voltage Threshold	Comment
Geometry Variations	GEO	3/4	None	Tube with Geometry Variations
No Degradation Found	NDF	Any	N/A	Disposition of Bobbin "I" codes. Report at Bobbin Location.
Obstructed Tube	OBS	None Req	N/A	Need message from Operator
Possible Loose Part	PLP	11	none	Screen with Ch. 11
Previous rotating coil call	PRC	3/4	None	Identified on previous RPC Cal
Permeability Variation	PVN	4	N/A	Can be anywhere Report P-P Amplitude
Retest Loose Part Std.	RLP	7	None	Additional Report Entry for SVI's if Indication is caused by Loose Part
Single Axial Indication	SAI	4	None	Max Voltage- VPP. If more than one report each indication.
Single Circumferential Indication	SCI	P1	None	Max Voltage- VPP. If more than one report each indication.
Single Oblique Indication	SOI	4	None	Max Voltage- VPP. If more than one report each indication.
Single Volumetric Indication	SVI	4	None	Non crack-like indication which appears to have volumetric wall loss.
Volumetric Indication	VOL	3/4	None	Non Flaw-like Volumetric Indication
Wear	WAR	3/4	None	Max Voltage- VPP. At structures

Additional Reporting Requirements

1.) If multiple indications are detected they are reported individually as SAI, SCI, SOI or SVI.
2.) All indications of degradation shall be reported, with no minimum voltage threshold. All types of degradation shall be reported with the appropriate characterization code in the %TW column.
3.) Upon each PID of final test of a tube which contains a repairable I-code, enter the three letter code of TBP (To be Plugged) to the final report. No volts, phase or location is required. An extent is required for the data entry. This will be completed by Resolution Analysts.
4.) Special Interest Examination Requirments
   Top of Tube Sheet - +2 inches to -2 inches
   Support Structures - +3 inches to -3 inches from center
   FreeSpan Area (outside+3" to -3" of structure) will test Support to Support
5.) Sizing of Loose Part Wear will be conducted in accordance with EPRI ETSS 21998.1 or 27901 thru 27907
6.) PID will be conducted with a Rev.5 RPC standard.

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS			
ANTS # WBT-BL-3COIL+PT	Desc: 3 Coil +PT	Rev. No 0	Date: 2/1/2010	Page 4 of 4
Procedure: MRS-SSP-2194-WBT	Reference ACTS # WBT-04,05,06,07-10-O			
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number			
Model: HP B132 Or equivalent PC Or Unix Bas				

Diagram:

Acceptable Reporting Acronyms

Notation	Description	Category
	Blank – No Indication (No Detectable Defect)	I
INF	Indication Not Found	I
PID	Positive Identification	I
PLG	Plugged	I
PRC	Previous Rotating Coil call	I
RAD	Retest Analyst Discretion	II
RBD	Retest Bad Data	II
RFX	Retest Fixture is Blocking Probe	II
RIC	Retest Tube Examination Incomplete	II
RID	Retest Questionable Tube ID	II
RMB**	Retest with a Magnetically Biased probe	II
RND	Retest No Data	II
RRT	Restricted Tube (retest with smaller probe)	II
RLP	Retest Loose Part Standard for Sizing	II
OBS	Obstructed	V
SAI	Single Axial Indication	V
SCI	Single Circumferential Indication	V
SOI	Single Oblique Indication	V
SVI	Single Volumetric Indication	V
TBP**	To Be Plugged	V
GEO	Geometry Variation	VII
VOL	Non Flaw Like Volumetric Indication	VII
INR	Indication Not Recordable	VII
LAR	Lead Analyst Review	VII
NDF	No Degradation Found	VII
LIG*	Ligament between cracks	VII
PLP	Possible Loose Part	VII
PVN	Permeability Variation	VII
MBM**	Manufacturing Burnish Mark	VII
ARC and/ or LEN*	Line of report giving dimensions of RPC indication (Eddynet software)	VII

Acronyms such as HR for History Review, SR for Senior Analyst Review, ID for inner diameter, OD for outer diameter, and yes or no for whether it is inside the support structure may be used in the utility fields for additional information.

* Used by sizing analysts only

** Used by resolution analysts only

Indication Category:

I - Non-flaw condition with no further action required

II - Retest with the same or smaller diameter probe, as appropriate

V - These codes designate a repairable condition except when an approve alternate repair criteria is used

VII- These codes require additional reviews (historical), additional diagnostic sampling or engineering evaluations. MBM is only entered by resolution after historical review.

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ANTS #	WBT-BL-U-BEND+PT	Desc:	U-Bend +PT	Rev. No 0	Date: 2/1/2010	Page 1 of 4

Procedure:	MRS-SSP-2194-WBT	Reference ACTS #	WBT-09,10,11-10-O
Instrument:	Analysis Station and System	Software / Mfg. / Rev.:	Westinghouse - ANSER - Revision approved via software release number.
Model:	HP B132 Or equivalent PC Or Unix Bas		

Plus Point (Axial Flaws Upward)

	Ch. 1	(400 kHz)	Ch. 2	(300 kHz)	Ch. 3	(150 kHz)	Ch. 5	(35 kHz)
Span	100 % Axial	1.4 @ Full Scale Indicator	100 % Axial	1.4 @ Full Scale Indicator	100 % Axial	1.2 @ Full Scale Indicator	100 % Axial	3 @ Full Scale Indicator
Phase:	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees	100 % Axial	@ 324 degrees
Cal Std:	EDM Notch Std		EDM Notch Std		EDM Notch Std		EDM Notch Std	
Curve:	None Required		None Required		None Required		None Required	
Volts:	100% axial notch @ 13.0 volts		100% axial notch @ 20.0 volts		100% axial notch @ 17.0 volts		100% axial notch @ 2.0 volts	

Plus Point - (Circ Flaws Upwards) **Trigger(Coil 4)**

	P1	(400 kHz)	P2	(300 kHz)	P3	(150 kHz)	Ch. 4	(150 kHz)
Span	40% ID axial	1.4 @ Full Scale Indicator	40% ID axial	1.4 @ Full Scale Indicator	40% ID axial	1.2 @ Full Scale Indicator	Large Pulse	3 @ Full Scale Indicator
Phase:	40% ID axial	@ 195 degrees +/- 2 degrees	40% ID axial	@ 195 degrees +/- 2 degrees	40% ID axial	@ 195 degrees +/- 2 degrees		Small Pulse Horiz.
Cal Std:	EDM Notch Std		EDM Notch Std		EDM Notch Std		EDM Notch Std	
Curve:	None Required		None Required		None Required		None Required	
Volts:	100% circ notch @ 13.0 volts		100% circ notch @ 20.0 volts		100% circ notch @ 17.0 volts			

Additional Setup Requirements

1) Volts, Phase and Span to be set using center of notch and using Volts Peak to Peak.
2) Span settings are initial minimum signal size. Certain conditions may dictate lower or higher settings to enhance flaw detection.
3) Set axial scale between two landmarks. Scale may be set using the standard if only one in-generator landmark is acquired. For U-bend examine use the top support to top support . See Analysis Guideline for distance information.
4) If the axial scale has to be set on an "RPC" standard, the preferred set points are the 100% TWH and the 100% Axial Notch. The distance between these two points is 8.50".
5) When using the MHI guide tube standards overall length is 8.0" or the center of the 40% OD Axial Notch to the 100% Axial Notch is 2.5".
6) PID will use the Rev5 RPC Standard.

Signatures

Westinghouse NDE Level III	2-1-2010 / Date	TVA Utility Representative	2/1/2010 / Date
Independent QDA	/ Date 2-1-10		

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS			
ANTS # WBT-BL-U-BEND+PT	Desc: U-Bend +PT	Rev. No 0	Date: 2/1/2010	Page 2 of 4
Procedure: MRS-SSP-2194-WBT		Reference ACTS # WBT-09,10,11-10-O		
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER			
Model: HP B132 Or equivalent PC Or Unix Bas	- Revision approved via software release number			

Additional Screening Requirements

1) Data Screening - Left Strip Chart (Ch. P2 Vertical) - Right Strip Chart (Ch. 5 Vertical) - Lissajous - (Ch. 2)
2) The evaluation shall consist of reviewing lissajous, strip chart and C-Scan displays to the extent that all tube wall degradation and other conditions are reported.
3) All data shall be screened using the 300 kHz plus-point (Ch 2 & P2) as a minimum. All data shall be screened using the C-Scan display, in the area of interest, to increase the visibility of small amplitude indications. Review of additional coils shall be performed as appropriate in order to assure adequate evaluation of the complete data.It is imperative that the data be screened with and without the use of a circumferential average filter to aid in the detection of indications. If a circumferential filter had been used at Indian Point 2 the likelihood of detection would have increased.
4) Analysts need to be sensitive to dents causing lift-off. If this occurs an indication may be masked. In cases where indications may be masked, the tube should be identified as RBD with a comment as to why.
5) The ID flaw plane is very close to the horizontal plane. Care should be taken to not mis-intrepret ID indications for geometry.
6) As a minimun 30 axial and 30 circumferential samples must be maintained.

Data Quality Requirements

1) Verify Acquisition has performed a "Position Verification" at the beginning and end of each cal group.
2) Verify acquisition probe speed, technique configuration, and summary information.
3) Reject data that is unacceptable by using "RBD" reporting acronym.
4) If data is unacceptable use the following Utility Field 2 notation:

QBD	Bad Coil
QDR	Insufficient Data Samples
QEN	Excessive Noise
QET	Incomplete Extent
QFH	Exceeded 4 Hour Calibration
QPH	Excessive Spiking or Parasitic Noise
QRN	Rotation Stalled and Coil Translated 2 or more scan lines

5) If T-list message states DQM failure with no following DQM pass message, production analysis can accept data by using one of the following Three Letter Codes in the Utility 2 Field:

ADS	Accept Data Spike
AET	Accept Extent Tested
AEC	Accept End of Cal Check
APS	Accept Probe Speed
APV	Accept Position Verification
ASR	Accept Sample Rate
ADF	Accept All Data Failure

6) In order to meet the data quality requirements, the probe head must be changed if the coils fail to detect the following cal standard flaws: +PT coil does not detect 20% OD EDM notches. If no 20% OD EDM the 40% OD EDM must be .3 Volts Vertical Max.

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS			
ANTS # WBT-BL-U-BEND+PT	Desc: U-Bend +PT	Rev. No 0	Date: 2/1/2010	Page 3 of 4

Procedure: MRS-SSP-2194-WBT	Reference ACTS # WBT-09,10,11-10-O
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number
Model: HP B132 Or equivalent PC Or Unix Bas	

Summary of Reporting Requirements

Condition	Report Code	Channel	Voltage Threshold	Comment
Geometry Variations	GEO	2/P2	None	Tube with Geometry Variations
No Degradation Found	NDF	Any	N/A	Disposition of Bobbin "I" codes. Report at Bobbin Location.
Obstructed Tube	OBS	None Req	N/A	Need message from Operator
Possible Loose Part	PLP	5	none	Screen with Ch. 5
Previous rotating coil call	PRC	None Req	None	Identified on previous RPC Cal
Permeability Variation	PVN	2	None	Can be anywhere. See comment 4
Single Axial Indication	SAI	2	None	Max Voltage- VPP. If more than one report each indication.
Single Circumferential Indication	SCI	P2	None	Max Voltage- VPP. If more than one report each indication.
Single Oblique Indication	SOI	2	None	Max Voltage- VPP. If more than one report each indication.
Single Volumetric Indication	SVI	2	None	Non crack-like indication which appears to have volumetric wall loss.
Volumetric Indication	VOL	2/P2	None	Non Flaw-like Volumetric Indication
Wear	WAR	2	None	Max Voltage- VPP. At structures .

Additional Reporting Requirements

1) If multiple indications are detected they are reported individually as SAI, SCI, SOI or SVI.
2) All indications of degradation shall be reported, with no minimum voltage threshold. All types of degradation shall be reported with the appropriate characterization code in the %TW column.
3) If a PVN indication is detected in Row 1 or 2 it shall be identified (regardless of voltage) in the report of the production analyst and dispositioned by the Senior Analyst.
4) Upon each PID of final test of a tube which contains a repairable I-code, enter the three letter code of TBP (To be Plugged) to the final report. No volts, phase or location is required. An extent is required for the data entry. This will be completed by the Resolution Analysts.
5) Special Interest Examinations Reqiurements
   Top of Tube Sheet - +2 inches to -2 inches
   Support Structures - +3 inches to -3 inches from center.
   Freespan Area (outside +3" to -3 inches of structure) will test Support to Support
8) Sizing of Loose Part Wear will be conducted in accordance with EPRI ETSS 21998.1 or 27901 thru 27907

Diagram:

Acceptable Reporting Acronyms

Notation D	escription	Category
	Blank – No Indication (No Detectable Defect)	I
INF	Indication Not Found	I
PID P	ositive Identification	I
PLG P	lugged	I
PRC	Previous Rotating Coil call	I
RAD	Retest Analyst Discretion	II
RBD	Retest Bad Data	II
RFX	Retest Fixture is Blocking Probe	II
RIC	Retest Tube Examination Incomplete	II
RID	Retest Questionable Tube ID	II
RMB**	Retest with Magnetically Biased Probe	II
RND	Retest No Data	II
RRT	Restricted Tube (retest with smaller probe)	II
RHF	Retest High Frequency	II
RPL	Retest Loose Part Standard	II
OBS Ob	structed	V
SAI	Single Axial Indication	V
SCI	Single Circumferential Indication	V
SOI	Single Oblique Indication	V
SVI	Single Volumetric Indication	V
TBP**	To Be Plugged	V
MBM**	Manufacturing Burnish Mark	VII
INR	Indication Not Recordable	VII
LAR	Lead Analyst Review	VII
NDF	No Degradation Found	VII
LIG*	Ligament between cracks	VII
GEO	Geometry	VII
PVN P	ermeability Variation	VII
PLP	Possible Loose Part	VII
VOL** Vo	lumetric	VII
ARC and/ or LEN*	Line of report giving dimensions of RPC indication (Eddynet software)	VII

Acronyms such as HR for History Review, SR for Senior Analyst Review, ID for inner diameter, OD for outer diameter, and yes or no for whether it is inside the support structure may be used in the utility fields for additional information.

* Used by sizing analysts only

** Used by resolution analysts only

Indication Category:

I - Non-flaw condition with no further action required

II - Retest with the same or smaller diameter probe, as appropriate

V - These codes designate a repairable condition

VII- These codes require additional reviews (historical), additional diagnostic sampling or engineering evaluations. VOL is only entered by resolution after historical review.

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ANTS #	WBT-BL-GHENT	Desc:	Ghent G3/G4	Rev. No 0	Date: 2/1/2010	Page 1 of 4

Procedure: MRS-SSP-2194-WBT Reference ACTS # WBT-08-10-O

Instrument: Analysis Station and System Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number

Model: HP B132 Or equivalent PC Or Unix Bas

	G4 Coil (Axial Sensitive)							
	Ch. 1	(400 kHz)	Ch. 3	(300 kHz)	Ch. 5	(200 kHz)	Ch. 8	(100 kHz)
Span	40% OD axial	@ 2-3 Divisions	40% OD axial	@ 2-3 Divisions	40% OD axial	@ 2-3 Divisions	40% OD axial	@ 2-3 Divisions
Phase:	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID circ	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees
Cal Std:	EDM Notch Std		EDM Notch Std		EDM Notch Std		EDM Notch Std	
Curve:	None Required		None Required		None Required		None Required	
Volts:	Normalize to Ch. 3		100% axial notch @ 20.0 volts		Normalize to Ch. 3		Normalize to Ch. 3	

	G3 Coil (Circ Sensitive)							
	Ch. 2	(400 kHz)	Ch. 4	(300 kHz)	Ch. 6	(200 kHz)	Ch. 9	(100 kHz)
Span	40% OD circ	@ 2-3 Divisions	40% ID circ	@ 2-3 Divisions	40% OD circ	@ 2-3 Divisions	40% OD circ	@ 2-3 Divisions
Phase:	40% ID circ	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID circ	@ 15 degrees +/- 2 degrees	40% ID circ	@ 15 degrees +/- 2 degrees
Cal Std:	EDM Notch Std		EDM Notch Std		EDM Notch Std		EDM Notch Std	
Curve:	None Required		None Required		None Required		None Required	
Volts:	Normalize to Ch .4		100% circ notch @ 20.0 volts		Normalize to Ch .4		Normalize to Ch .4	

	Trigger							
							Ch. 7	(200 kHz)
Span							Large Pulse	@ 50% FSH
Phase:								Small Pulse Horiz.
Cal Std:							EDM Notch Std	
Curve:							None Required	
Volts:							Normalize to Ch.2	

Signatures

Westinghouse NDE Level III — 2-1-2010 / Date

TVA Utility Representative — 2/1/2010 / Date

Independent QDA — R D. [illegible] / Date 2-1-10

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS				
ANTS # WBT-BL-GHENT	Desc: Ghent G3/G4	Rev. No 0	Date: 2/1/2010	Page 2 of 4	
Procedure: MRS-SSP-2194-WBT		Reference ACTS # WBT-08-10-O			
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number				
Model: HP B132 Or equivalent PC Or Unix Bas					

Additional Setup and Screening Requirments

1) Data Screening - Left Strip Chart (Ch. 4 Vertical) - Right Strip Chart (Ch.8 Vertical) - Lissajous - (Ch.3)
2) Volts, Phase and Span to be set using center of notch and using Volts Peak to Peak.
3) Span settings are initial minimum signal size. Certain conditions may dictate lower or higher settings to enhance flaw detection.
4) Set axial scale between two landmarks. Scale may be set using the standard if only one in-generator landmark is acquired. If special interest of TSP the support should be used for setting scale.
5) If the axial scale has to be set on an "RPC" standard, the preferred set points are the 100% TWH and the 100% Axial. Notch. The distance between these two points is 8.50".
6) The evaluation shall consist of reviewing lissajous, strip chart and C-Scan displays to the extent that all tube wall degradation and other conditions are reported.
7) All data shall be screened using the 300 kHz (Ch 3 & 4) as a minimum. All data shall be screened using the C-Scan display, in the area of interest, to increase the visibility of small amplitude indications. Review of additional coils shall be performed as appropriate in order to assure adequate evaluation of the complete data.
8) Analysts need to be sensitive to dents causing lift-off. If this occurs an indication may be masked. In cases where indications may be masked, the tube should be identified as RBD with a comment as to why.
9) As a minimum 25 axial and 30 circumferential samples must be maintained.

Data Quality Requirements

1) Verify Acquisition has performed a "Position Verification" at the beginning and end of each cal group.
2) Verify acquisition probe speed, technique configuration, and summary information.
3) Reject data that is unacceptable by using "RBD" reporting acronym.
4) If data is unacceptable use the following Utility Field 2 notation:

QBD	Bad Coil
QDR	Insufficient Data Samples
QEN	Excessive Noise
QET	Incomplete Extent
QFH	Exceeded 4 Hour Calibration
QPH	Excessive Spiking or Parasitic Noise
QRN	Rotation Stalled and Coil Translated 2 or more scan lines.

5) If T-list message states DQM failure with no following DQM pass message, production analysis can accept data by using one of the following Three Letter Codes in the Utility 2 Field:

ADS	Accept Data Spike
AET	Accept Extent Tested
AEC	Accept End of Cal Check
APS	Accept Probe Speed
APV	Accept Position Verification
ASR	Accept Sample Rate
ADF	Accept All Data Failure

6) In order to meet the data quality requirements, the probe head must be changed if the coils fail to detect the following cal standard flaws: coil does not detect 20% OD EDM notches.

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS			
ANTS # WBT-BL-GHENT	Desc: Ghent G3/G4	Rev. No 0	Date: 2/1/2010	Page 3 of 4
Procedure: MRS-SSP-2194-WBT	Reference ACTS # WBT-08-10-O			
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER			
Model: HP B132 Or equivalent PC Or Unix Bas	- Revision approved via software release number			

Summary of Reporting Requirements

Condition	Report Code	Channel	Voltage Threshold	Comment
Geometry Variations	GEO	3 / 4	None	Tube with Geometry Variations
No Degradation Found	NDF	Any	N/A	Disposition of Bobbin "I" codes. Report at Bobbin Location.
Obstructed Tube	OBS	None Req	N/A	Need message from Operator
Single Axial Indication	SAI	3	None	Max Voltage- VPP. If more than one report each indication.
Single Circumferential Indication	SCI	4	None	Max Voltage- VPP. If more than one report each indication.
Single Oblique Indication	SOI	3	None	Max Voltage- VPP. If more than one report each indication.
Single Volumetric Indication	SVI	3 / 4	None	Non crack-like indication which appears to have volumetric wall loss.
Volumetric Indication	VOL	3 / 4	None	Non Flaw-like Volumetric Indication
Wear	WAR	3 / 4	None	Max Voltage- VPP. At structures.

Additional Reporting Requirements

1) If multiple indications are detected they are reported individually as SAI, SCI, SOI or SVI.
2) All indications of degradation shall be reported, with no minimum voltage threshold. All types of degradation shall be reported with the appropriate characterization code in the %TW column.
3) Upon each PID of final test of a tube which contains a repairable I-code, enter the three letter code of TBP (To be Plugged) to the final report. No volts, phase or location is required. An extent is required for the data entry. This will be completed by the Resoution Analysts.
4) Special Interest Examination Requirements
   Top of Tube Sheet - +2 inches to -2 inches
   Support Structures - +3 inches to -3 inches from the center
   Freespan Area (outside +3 " to -3 " of structure) will be tested Support to Support

Diagram:

Acceptable Reporting Acronyms

Notation	Description	Category
	Blank – No Indication (No Detectable Defect)	I
INF	Indication Not Found	I
PID	Positive Identification	I
PLG	Plugged	I
PRC	Previous Rotating Coil call	I
RAD	Retest Analyst Discretion	II
RBD	Retest Bad Data	II
RFX	Retest Fixture is Blocking Probe	II
RIC	Retest Tube Examination Incomplete	II
RID	Retest Questionable Tube ID	II
RMB**	Retest with a Magnetically Biased probe	II
RND	Retest No Data	II
RRT	Restricted Tube (retest with smaller probe)	II
OBS	Obstructed	V
SAI	Single Axial Indication	V
SCI	Single Circumferential Indication	V
SOI	Single Oblique Indication	V
SVI	Single Volumetric Indication	V
TBP**	To Be Plugged	V
VOL**	Non Flaw Like Volumetric Indication	VII
GEO**	Geometry Indication	VII
INR	Indication Not Recordable	VII
LAR	Lead Analyst Review	VII
NDF	No Degradation Found	VII
LIG*	Ligament between cracks	VII
PLP	Possible Loose Part	VII
PVN	Permeability Variation	VII
MBM**	Manufacturing Burnish Mark	VII
ARC and/ or LEN*	Line of report giving dimensions of RPC indication (Eddynet software)	VII

Acronyms such as HR for History Review, SR for Senior Analyst Review, ID for inner diameter, OD for outer diameter, and yes or no for whether it is inside the support structure may be used in the utility fields for additional information.

* Used by sizing analysts only
** Used by resolution analysts only
Indication Category:
I - Non-flaw condition with no further action required
II - Retest with the same or smaller diameter probe, as appropriate
V - These codes designate a repairable condition except when an approve alternate repair criteria is used
VII- These codes require additional reviews (historical), additional diagnostic sampling or engineering evaluations. MBM is only entered by resolution after historical review.

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ANTS #	WBT-BL-GHENT	Desc:	Ghent G3/G4	Rev. No 1	Date: 2/9/2010	Page 1 of 4

Procedure: MRS-SSP-2194-WBT Reference ACTS # WBT-08-10-O

Instrument:	Analysis Station and System	Software / Mfg. / Rev.:	Westinghouse - ANSER - Revision approved via software release number
Model:	HP B132 Or equivalent PC Or Unix Bas		

	G4 Coil (Axial Sensitive)							
	Ch. 1	(400 kHz)	Ch. 3	(300 kHz)	Ch. 5	(200 kHz)	Ch. 8	(100 kHz)
Span	40% OD axial	@ 2-3 Divisions	40% OD axial	@ 2-3 Divisions	40% OD axial	@ 2-3 Divisions	40% OD axial	@ 2-3 Divisions
Phase:	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID circ	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees
Cal Std:	EDM Notch Std		EDM Notch Std		EDM Notch Std		EDM Notch Std	
Curve:	None Required		None Required		None Required		None Required	
Volts:	Normalize to Ch. 3		100% axial notch @ 20.0 volts		Normalize to Ch. 3		Normalize to Ch. 3	

	G3 Coil (Circ Sensitive)							
	Ch. 2	(400 kHz)	Ch. 4	(300 kHz)	Ch. 7	(200 kHz)	Ch. 9	(100 kHz)
Span	40% OD circ	@ 2-3 Divisions	40% OD circ	@ 2-3 Divisions	40% OD circ	@ 2-3 Divisions	40% OD circ	@ 2-3 Divisions
Phase:	40% ID circ	@ 15 degrees +/- 2 degrees	40% ID axial	@ 15 degrees +/- 2 degrees	40% ID circ	@ 15 degrees +/- 2 degrees	40% ID circ	@ 15 degrees +/- 2 degrees
Cal Std:	EDM Notch Std		EDM Notch Std		EDM Notch Std		EDM Notch Std	
Curve:	None Required		None Required		None Required		None Required	
Volts:	Normalize to Ch .4		100% circ notch @ 20.0 volts		Normalize to Ch .4		Normalize to Ch .4	

	Trigger							
							Ch. 6	(200 kHz)
Span							Large Pulse	@ 50% FSH
Phase:								Small Pulse Horiz.
Cal Std:							EDM Notch Std	
Curve:							None Required	
Volts:							Normalize to Ch.2	

Signatures

[signature]	2-9-2010	[signature]	2/9/2010
Westinghouse NDE Level III	/ Date	TVA Utility Representative	/ Date
[signature]	2-9-2010		
Independent QDA	/ Date		

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS				
^NTS # WBT-BL-GHENT	Desc: Ghent G3/G4	Rev. No 1	Date: 2/9/2010	Page 2 of 4	
ocedure: MRS-SSP-2194-WBT		Reference ACTS # WBT-08-10-O			
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number				
Model: HP B132 Or equivalent PC Or Unix Bas					

Additional Setup and Screening Requirments

1) Data Screening - Left Strip Chart (Ch. 4 Vertical) - Right Strip Chart (Ch.8 Vertical) - Lissajous - (Ch.3)
2) Volts, Phase and Span to be set using center of notch and using Volts Peak to Peak.
3) Span settings are initial minimum signal size. Certain conditions may dictate lower or higher settings to enhance flaw detection.
4) Set axial scale between two landmarks. Scale may be set using the standard if only one in-generator landmark is acquired. If special interest of TSP the support should be used for setting scale.
5) If the axial scale has to be set on an "RPC" standard, the preferred set points are the 100% TWH and the 100% Axial. Notch. The distance between these two points is 8.50".
6) The evaluation shall consist of reviewing lissajous, strip chart and C-Scan displays to the extent that all tube wall degradation and other conditions are reported.
7) All data shall be screened using the 300 kHz (Ch 3 & 4) as a minimum. All data shall be screened using the C-Scan display, in the area of interest, to increase the visibility of small amplitude indications. Review of additional coils shall be performed as appropriate in order to assure adequate evaluation of the complete data.
8) Analysts need to be sensitive to dents causing lift-off. If this occurs an indication may be masked. In cases where indications may be masked, the tube should be identified as RBD with a comment as to why.
9) As a minimum 25 axial and 30 circumferential samples must be maintained.

Data Quality Requirements

1) Verify Acquisition has performed a "Position Verification" at the beginning and end of each cal group.
2) Verify acquisition probe speed, technique configuration, and summary information.
3) Reject data that is unacceptable by using "RBD" reporting acronym.
4) If data is unacceptable use the following Utility Field 2 notation:

QBD	Bad Coil
QDR	Insufficient Data Samples
QEN	Excessive Noise
QET	Incomplete Extent
QFH	Exceeded 4 Hour Calibration
QPH	Excessive Spiking or Parasitic Noise
QRN	Rotation Stalled and Coil Translated 2 or more scan lines.

5) If T-list message states DQM failure with no following DQM pass message, production analysis can accept data by using one of the following Three Letter Codes in the Utility 2 Field:

ADS	Accept Data Spike
AET	Accept Extent Tested
AEC	Accept End of Cal Check
APS	Accept Probe Speed
APV	Accept Position Verification
ASR	Accept Sample Rate
ADF	Accept All Data Failure

6) In order to meet the data quality requirements, the probe head must be changed if the coils fail to detect the following cal standard flaws: coil does not detect 20% OD EDM notches.

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS			
^NTS # WBT-BL-GHENT	Desc: Ghent G3/G4	Rev. No 1	Date: 2/9/2010	Page 3 of 4

.ocedure: MRS-SSP-2194-WBT	Reference ACTS # WBT-08-10-O
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number
Model: HP B132 Or equivalent PC Or Unix Bas	

Summary of Reporting Requirements

Condition	Report Code	Channel	Voltage Threshold	Comment
Geometry Variations	GEO	3 / 4	None	Tube with Geometry Variations
No Degradation Found	NDF	Any	N/A	Disposition of Bobbin "I" codes. Report at Bobbin Location.
Obstructed Tube	OBS	None Req	N/A	Need message from Operator
Single Axial Indication	SAI	3	None	Max Voltage- VPP. If more than one report each indication.
Single Circumferential Indication	SCI	4	None	Max Voltage- VPP. If more than one report each indication.
Single Oblique Indication	SOI	3	None	Max Voltage- VPP. If more than one report each indication.
Single Volumetric Indication	SVI	3 / 4	None	Non crack-like indication which appears to have volumetric wall loss.
Volumetric Indication	VOL	3 / 4	None	Non Flaw-like Volumetric Indication
Wear	WAR	3 / 4	None	Max Voltage- VPP. At structures.

Additional Reporting Requirements

1) If multiple indications are detected they are reported individually as SAI, SCI, SOI or SVI.
2) All indications of degradation shall be reported, with no minimum voltage threshold. All types of degradation shall be reported with the appropriate characterization code in the %TW column.
3) Upon each PID of final test of a tube which contains a repairable I-code, enter the three letter code of TBP (To be Plugged) to the final report. No volts, phase or location is required. An extent is required for the data entry. This will be completed by the Resoution Analysts.
4) Special Interest Examination Requirements
   Top of Tube Sheet - +2 inches to -2 inches
   Support Structures - +3 inches to -3 inches from the center
   Freespan Area (outside +3 " to -3 " of structure) will be tested Support to Support

Diagram:

Acceptable Reporting Acronyms

Notation	Description	Category
	Blank – No Indication (No Detectable Defect)	I
INF	Indication Not Found	I
PID	Positive Identification	I
PLG	Plugged	I
PRC	Previous Rotating Coil call	I
RAD	Retest Analyst Discretion	II
RBD	Retest Bad Data	II
RFX	Retest Fixture is Blocking Probe	II
RIC	Retest Tube Examination Incomplete	II
RID	Retest Questionable Tube ID	II
RMB**	Retest with a Magnetically Biased probe	II
RND	Retest No Data	II
RRT	Restricted Tube (retest with smaller probe)	II
OBS	Obstructed	V
SAI	Single Axial Indication	V
SCI	Single Circumferential Indication	V
SOI	Single Oblique Indication	V
SVI	Single Volumetric Indication	V
TBP**	To Be Plugged	V
VOL**	Non Flaw Like Volumetric Indication	VII
GEO**	Geometry Indication	VII
INR	Indication Not Recordable	VII
LAR	Lead Analyst Review	VII
NDF	No Degradation Found	VII
LIG*	Ligament between cracks	VII
PLP	Possible Loose Part	VII
PVN	Permeability Variation	VII
MBM**	Manufacturing Burnish Mark	VII
ARC and/ or LEN*	Line of report giving dimensions of RPC indication (Eddynet software)	VII

Acronyms such as HR for History Review, SR for Senior Analyst Review, ID for inner diameter, OD for outer diameter, and yes or no for whether it is inside the support structure may be used in the utility fields for additional information.

* Used by sizing analysts only
** Used by resolution analysts only
Indication Category:
I - Non-flaw condition with no further action required
II - Retest with the same or smaller diameter probe, as appropriate
V - These codes designate a repairable condition except when an approve alternate repair criteria is used
VII- These codes require additional reviews (historical), additional diagnostic sampling or engineering evaluations. MBM is only entered by resolution after historical review.

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS				
ANTS # WBT-BL-MHI-IAP	Desc: MHI Array	Rev. No. 0	Date: 1/28/2010	Page 1 of 7	
Procedure: MRS-SSP-2194-WBT		Reference ACTS # WBT-12-10-O			
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number				
Model: HP B132 Or equivalent PC Or Unix Bas					

Channel Setup Array (Axial Flaws Up)

	1 - 24	(400 kHz)	25-48	(300 kHz)	49-72	(100 kHz)	P25-P48	400/100 Sup Mix
Span	50% OD	Groove @ 50% Screen	50% OD	Groove @ 2 Division	50% OD	Groove @ 50% Screen	50% OD	Groove @ 50% Screen
Phase:	Dent	@ 180 Degrees VPP	Dent	@ 180 Degrees VPP	Dent	@ 180 Degrees VPP	Dent	@ 180 Degrees VPP
Cal Std:	EDM Array Standard		EDM Array Standard		EDM Array Standard		EDM Array Standard	
Curve:	None Required		None Required		None Required		None Required	
Volts:	30% Groove 5 Volt VPP		30% Groove 5 Volt VPP		30% Groove 5 Volt VPP		50% Groove 3.5 Volt VPP	

Channel Setup Array (Circ. Flaws Up)

	P1-P24	(300 kHz)	P49-P72	400/100 Sup Mix				
Span	50% OD	Groove @ 50% Screen	50% OD	Groove @ 50% Screen				
Phase:	Dent	@ 2 Degrees VPP		@ 2 Degrees VPP				
Cal Std:	EDM Array Standard		EDM Array Standard					
Curve:	None Required		None Required					
Volts:	30% Groove 5 Volt VPP		50% Groove 3.5 Volt VPP					

Channel Setup Bobbin Differential use WBT-BL-BOBBIN ANTS

Span								
Phase:							Suppor	
Cal Std:								
Curve:								
Volts:								

THIS TEST IS FOR INFORMATIONAL ONLY

Signatures

Westinghouse NDE Level III — 2-1-2010 / Date

Sequoyah Utility Representative — 2/1/2010 / Date

Independent QDA — R S Weaver / Date 2-1-10

Additional Setup and Screening Requirments

Array Freq. Channel Order (Note: 2 rings of 12 coils, Ch 1 and Ch 7 are on separate rings.)

400kHz	1,7,13,19,4,10,16,22,2,8,14,20,5,11,17,23,3,9,15,21,6,12,18, & 24
300kHz	25,31,37,43,28,34,40,46,26,32,38,44,29,35,41,47,27,33,39,45,30,36,42, & 48
100kHz	49,55,61,67,52,58,64,70,50,56,62,68,53,59,65,71,51,57,63,69,54,60,66, & 72

1) These are initial minimum signal size span settings. Certain conditions may dictate lower or higher settings. Verify the 40% ID Axial and 40% ID Circumferential EDM notches are detectable.
2) Verify Acquisition performs a Position Verification at the beginning and the end of each calibration set.
3) Verify Probe speed, Configuration settings and Summary.
4) If using auto analysis additional mixes may be required.
5) Re-Nulling of data may be performed only when in a flaw free section of a cal standard or tube.
6) Circ Avg filter may be used at analyst discretion.
7) Bobbin coils are not required for analysis if probe location can be verified based on array signal response.
8) Data collected without a bobbin absolute reference probe shall not be considered rejectable, however, best effort to setup the bobbin absolute coils is required. Omni 200 does not require reference probes.
10) Screening shall consist of a c-scan plotting 300 kHz with circs up with both Horiz plot ON and OFF in addition to c-scan plotting 300 kHz with axials up. The 24 strip charts for 300 kHz should also be viewed in both horizontal and vertical. Indications of interest shall be furthe evaluated using the Main Eddy Lissajous. The 400/100 kHz Support Plate Mix channels should be used for the evaluation of supports and top of tubesheets.
11) The 4 mil dent should be used for axial coil alignment.
12) Phase rotation of array coils is to be set based on initial excursion of dent signal.
13) Proper array channel phase rotation shall be verified by viewing all frequencies for both raw and process channels using the Multi-Liss display with both the 4 mil dent and 50% OD groove visible.
14) More information about the setup and analysts of the data will be provided in the ANSER ANALYST MHI-PROBE USER MANUAL.

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS				
ANTS # WBT-BL-MHI-IAP	Desc: MHI Array	Rev. No 0	Date: 1/28/2010	Page 3 of 7	
Procedure: MRS-SSP-2194-WBT	Reference ACTS # WBT-12-10-O				
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number				
Model: HP B132 Or equivalent PC Or Unix Bas					

Summary of Reporting Requirements

Condition	Report Code	Channel	Voltage Threshold	Comment
Differential Freespan Indication	DFI	any	None	Indication in the Freespan of the U-Bend
Distorted Support Plate Indication	DSI	any	none	Indications without an associated dent
Lead Analyst Resolution	LAR	any	None	Undefined Signal Response
Permeability Variation	PVN	any	None	Can be anywhere
Retest Anaylst Discretion	RAD	any	None	Can be anywhere

Additional Reporting Requirements

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS				
ANTS # WBT-BL-MHI-IAP	Desc: MHI Array	Rev. No 0	Date: 1/28/2010	Page 4 of 7	
Procedure: MRS-SSP-2194-WBT	Reference ACTS # WBT-12-10-O				
Instrument: Analysis Station and System	Software / Mfg. / Rev.: Westinghouse - ANSER - Revision approved via software release number				
Model: HP B132 Or equivalent PC Or Unix Bas					

Diagram:

Coil Mapping			Group Mapping		
Channels	Coil	Channels	Group Number	Type	Coils
1,25,49,	14	11,35,59,	1	Array	1,3,5,7,9,11,13,15,17,19,21,23
7,31,55,	15	17,41,65,	2	Array	2,4,6,8,10,12,14,16,18,20,22,24
13,37,61,	16	23,47,71,	3	Bobbin	25,26
19,43,67,	17	3,27,51,			
4,28,52,	18	9,33,57,			
10,34,58,	19	15,39,63,			
16,40,64,	20	21,45,69,			
22,46,70,	21	6,30,54,			
2,26,50,	22	12,36,60,			
8,32,56,	23	18,42,66,			
14,38,62,	24	24,48,72,			
20,44,68	25	73,75,77,79			
5,29,53,	26	74,76,78,80			

Acceptable Reporting Acronyms

Notation	Description	Category
	Blank – No Indication (No Detectable Defect)	I
DEP	Deposit (Non-Copper)	I
PID	Positive Identification	I
PLG	Plugged	I
PBC	Previous Bobbin Coil call	I
SLG	Sludge Height Measurement	I
RAD	Retest Analyst Discretion	II
RBD	Retest Bad Data	II
RFX	Retest Fixture is Blocking Probe	II
RIC	Retest Tube Examination Incomplete	II
RID	Retest Questionable Tube ID	II
RMB	Retest with a Magnetically Biased probe	II
RND	Retest No Data	II
RRT	Restricted Tube (retest with smaller probe)	II
RPW	Retest Probe Wear (APC centering)	II
ADI	Absolute Drift Indication	III
CUD	Copper Deposit	III
DDI	Distorted Dent Indication	III
DEI	Distorted Expansion Indication	III
DFI	Differential Freespan Indication	III
DSI	Distorted Support Indication	III
DTI	Distorted Tubesheet Indication	III
LPI	Loose Part with Indication	III
PLI	Plate Ligament Indication	III
ADS*	Absolute Drift Signal	IV
DDS*	Distorted Dent Signal	IV
DES*	Distorted Expansion Signal	IV
DFS*	Differential Freespan Signal	IV
DSS*	Distorted Support Signal	IV
DTS*	Distorted Tubesheet Signal	IV
LPS*	Loose Part with Signal	IV
NQS*	Non-quantifiable Signal	IV
PLS*	Plate Ligament Signal	IV
OBS	Obstructed	V
TBP	To Be Plugged	V

* Called by Resolution Analysts Only

Continued on next page

Notation	Description	Category
NHT	No Heat Treatment	VI
NRE	No Roll Expansion	VI
BLG	Bulge	VII
DNT	Dent	VII
IDC	Inside Diameter Chatter	VII
INF	Indication Not Found	VII
INR	Indication Not Recordable	VII
LAR	Lead Analyst Review	VII
MBM*	Manufacturing Burnish Mark	VII
MRS	Mix Residual Signal	VII
NTE	No Tubesheet Expansion	VII
PLP	Possible Loose Part	VII
PTE	Partial Tubesheet Expansion	VII
PVN	Permeability Variation	VII
SKR	Skip Rolled	VII
UOA	Unusual Outer diameter phase Angle	VII

* Called by Resolution Analysts Only

Indication Category:

I - Non-flaw condition with no further action required

II - Retest with the same or smaller diameter probe, as appropriate

III - These "I" codes represent possible flaw signals where no qualified sizing technique is being utilized or does not exist . They require diagnostic testing or evaluation.

IV - These "S" codes are assigned when an indication previously reported as an "I" code receives a diagnostic test which confirms a non-flaw condition or when a historical review has been performed to compare to the current signal and the signal has not changed. These are calls made by the resolution analysts.

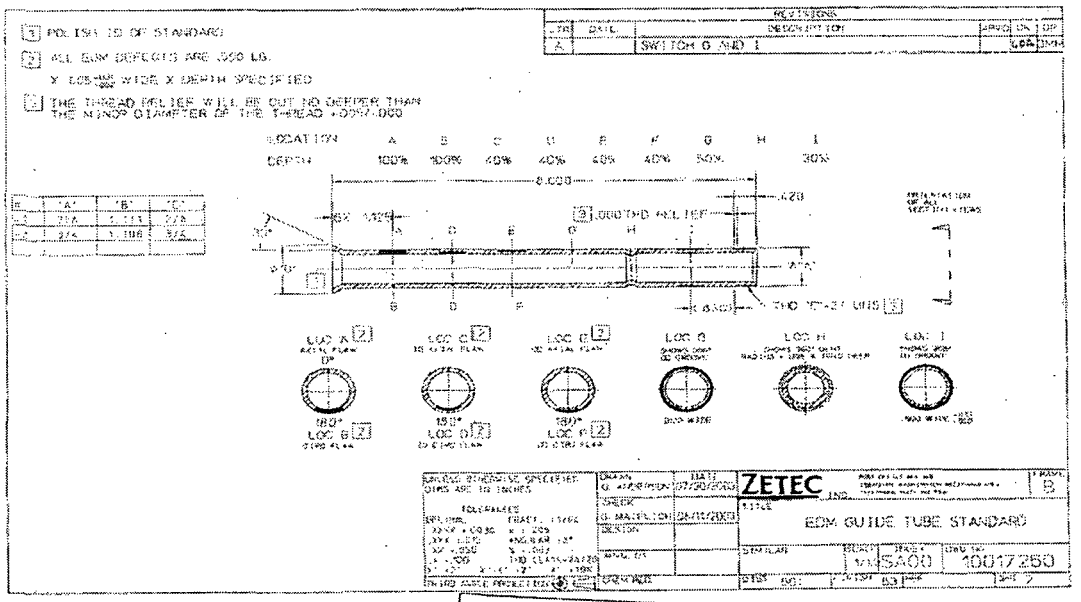
V - These codes designate a repairable condition or an engineering evaluation

VI - These codes designate incomplete repairs and may require rework depending upon the acceptance criteria

VII- These codes require additional reviews (historical), additional diagnostic sampling or engineering evaluations. MBM is only entered by resolution after historical review.

Westinghouse	STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS				
ANTS #	WBT-BL-MHI-IAP	Desc:	MHI Array	Rev. No 0	Date: 1/28/2010	Page 7 of 7
Procedure:	MRS-SSP-2194-WBT	Reference ACTS #	WBT-12-10-O		
Instrument:	Analysis Station and System	Software / Mfg. / Rev.:	Westinghouse - ANSER - Revision approved via software release number		
Model:	HP B132 Or equivalent PC Or Unix Bas				

Diagram:



APPROVED DRAWING

Signature: _____

Date Approved: _____

ZETEC, INC. PROPRIETARY INFORMATION
To be used for manufacturing and inspection purposes only.

TVA Intelligent Probe Array Standards

- 100% axial and circumferential notches
- 40% ID axial and circumferential notches
- 40% OD axial and circumferential notches
- 50% OD 360 deg. groove 0.012" wide
- 4 mil radial dent
- 30% OD circumferential machine groove 0.50" wide
- Possible TSP
- 50% OD 360 deg. groove 0.012" wide
- 4 mil radial dent
- 30% OD spiral groove, 400 degrees, 3/16" wide

4. "MULTIFREQUENCY EDDY CURRENT EXAMINATION OF NON FERROMAGNETIC STEAM GENERATOR TUBING" MRS-SSP-2194-WBT REVISION 1

WESTINGHOUSE PROPRIETARY CLASS 2

Westinghouse

STANDARD INTERNAL REVIEW SHEET

DOCUMENT NUMBER: MRS-SSP-2194-WBT **REVISION NUMBER:** 1

TITLE: Pre-Service Multi-frequency Eddy Current Examination of Non-Ferromagnetic Steam Generator Tubing Tennessee Valley authority – Watts Bar Unit 2

☐ GENERIC

☒ PLANT SPECIFIC
(Plant Identification should be included in title)

☐ OTHER (Specify) _____

MANDATORY REVIEWS	SIGNATURE*	DATE*	COMMENTS
1. **ORIGINATOR** P. Lenz	P. Lenz	1-22-10	
2. **SYSTEM ENGINEERING** D. Lynch ECT Level III	[illegible]	1-22-10	
3. **COMPONENT ENGR. APPROVAL REQUIRED** ☒ **YES** PKL / 1-22-10 **Initial/Date** ☐ **NO Component Engineering Manager/Designee**	R S Wrum	1-22-10	
4. **QUALITY** G. Bloomquist	G S Bloomquist	1-22-10	
5. **COGNIZANT MANAGER** G. Stevens	[illegible]	1-22-10	(1)
OTHER			
6. **OTHER BUSINESS UNIT APPROVAL REQUIRED** ☐ **YES Business Unit**			
☐ **NO Engr. Concurrence**			
7. Table Top Review			Per NS 19.1, Current Revision
8. Document Administrator			
9.			

(1) Approval of the cognizant manager signifies that all reviews have been obtained and all comments resolved.

***Electronically approved records are authenticated in the electronic document management system.**

©2009 Westinghouse Electric Company LLC, All Rights Reserved

Field Change No. 001

Page 1 of 1

PROCEDURE FIELD CHANGE REQUEST

PLANT: Watts Bar Unit 2 CUSTOMER: TVA

PROCEDURE NO: MRS-SSP-2194-WBT REVISION: 01

PROCEDURE TITLE: Pre-Service Multifrequency Eddy Current Examination of Non-Ferromagnetic Tubing

REASON FOR CHANGE:

Change the reference ASME Code Year and Addenda for examination of steam generator tubing at Watts Bar Unit 2.

DETAILS OF CHANGE:

Change the ASME Code Year and Addenda in Paragraph 3.1 as follows:

Change: "1998 Edition of the code (with the year 2000 addenda):

to:

"2001 Edition of the Code (with the year 2003 Addenda)"

SIGNATURE OF CUSTOMER'S APPROVAL/ACKNOWLEDGMENT: [signature] TVA ET Level III 2/2/2010

NAME TITLE DATE

SIGNATURE OF WESTINGHOUSE APPROVAL: [signature] Robert A. Michalski Project Manager 2/02/10

NAME TITLE DATE

*ENGINEERING APPROVAL: X REQUIRED ____ NOT REQUIRED

ENGINEER: [signature] Richard Mauer, NDE Level III

DATE/TIME: February 2, 2010 12:00

*QUALITY APPROVAL:

ENGINEER: [signature] Gary S. Bloomquist

DATE/TIME: February 2, 2010 12:00

*APPROVAL REQUIREMENTS DELINEATED IN NS 19.3.

© 2010 Westinghouse Electric Company LLC, All Rights Reserved

WESTINGHOUSE PROPRIETARY CLASS 2

Westinghouse

Nuclear Services Field Service Procedure

Procedure Number:	Rev:	Plant Site/Plant Alpha:
MRS-SSP-2194-WBT	01	Watts Bar 2/WBT

Title:
Pre-Service Mutifrequency Eddy Current Examination of Non -Ferromagnetic Tubing

Purchase Order:	S/O No.:
NA	NA

Key Words:

Watts Bar Unit 2
February 2010

w/ FCR
001

WESTINGHOUSE ELECTRIC COMPANY LLC
P.O. BOX 355
PITTSBURGH, PA 15230-0355

THIS DOCUMENT IS THE PROPERTY OF AND CONTAINS PROPRIETARY INFORMATION OWNED BY WESTINGHOUSE ELECTRIC COMPANY LLC AND/OR ITS SUBCONTRACTORS AND SUPPLIERS. IT IS TRANSMITTED TO YOU IN CONFIDENCE AND TRUST, AND YOU AGREE TO TREAT THIS DOCUMENT IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE AGREEMENT UNDER WHICH IT WAS PROVIDED TO YOU.

Department Steam Generator Primary Services	**Revision** 01
Originator P. Lenz	**Signature/Date** P. Lenz 1-22-10
Cognizant Manager G. Stevens	**Signature/Date** [signature] 1-22-10 ☒ Check this block to indicate the Standard Internal Review Sheet Form F-3.5.12-3 approvals have been obtained.
Customer	**Required** ____ **Yes** ____ **No** ____ **Date**

©2009 Westinghouse Electric Company LLC, All Rights Reserved

Westinghouse

RECORD OF CHANGES

Document Number: MRS-SSP-2194-WBT **Revision No.:** 01

Title: Pre-Service Multi-Frequency Eddy Current Examination of Non-Ferromagnetic S/G Tubing

CHANGE NUMBER	PARAGRAPH NUMBER	CHANGE DESCRIPTION AND REASON
1	13.2 Note	Deleted per customer comment

F-3-5.12-1 Rev. 0

TABLE OF CONTENTS

Section	Title	Page
	RECORD OF CHANGES	2
	TABLE OF CONTENTS	3
1.0	OVERVIEW	4
2.0	OBJECTIVE	5
3.0	REFERENCES	5-6
4.0	ADMINISTRATIVE REQUIREMENTS	6-7
5.0	PRECAUTIONS AND PREREQUISITES	7-8
6.0	STANDARDS	9-10
7.0	EQUIPMENT	10-11
8.0	EQUIPMENT SETUP	11
9.0	MANIPULATOR POSITION VERIFICATION	12
10.0	ACQUISITION SETUP	12-14
11.0	CALIBRATION / RECALIBRATION REQUIREMENTS	14-17
12.0	EXAMINATION	18-22
13.0	EVALUATION AND REPORTING	22
14.0	RECORDS	23

APPENDICES

Appendix	Title	Page
A	Procedure Acknowledgement Form	24
B	Typical ETSS (Bobbin)	25-27
C	Typical ETSS (MRPC)	28-30
D	Typical ANSER Summary Form	31
E	Anomaly Tracking Sheet (ATS)	32

DATA SHEET

Data Sheet	Title	Page
1	Signature/Initial Log	33

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

1.0 OVERVIEW

1.1 Eddy current examination of steam generator tubing is performed to assess reactor coolant pressure boundary integrity. Based on the assessments of the eddy current data, tubes may be left in service, or taken out of service by plugging.

1.2 The results of these examinations are permanently recorded and can be used for comparison with subsequent inspections.

1.3 The eddy current examination techniques that are employed must be qualified by meeting the requirements specified in Appendix H of Reference 3.4. Reference 3.4 is an industry guideline that provides the methodology for reasonably assuring that specific steam generator tube flaw conditions are detected.

1.4 Specific instrument setups will come from the Examination Technique Specification Sheet (ETSS) issued by the Senior Analyst (or designee) prior to the examination.

> **NOTE**: The ETSS is comprised of two documents: an ACTS (Acquisition Technique Sheet) which is specific to instructions required by acquisition personnel, and an ANTS (Analysis Technique Sheet) which provides instructions for analysis personnel. When "ETSS" is used in this document, it is directing acquisition personnel to the ACTS part of the overall ETSS document.

1.4.1 Definition: The Senior Analyst is the eddy current analyst in charge of the Westinghouse analysis work effort undertaken for the Utility at the site. His eddy current certification must be Level III.

1.4.2 Separate ETSS may be used based on the type of probe, equipment, and the examination performed.

1.5 Westinghouse ANSER data acquisition software will be utilized in the implementation of this procedure.

1.6 The Remote Data Acquisition Unit (RDAU) will have the capability to drive the probe coils and provide sampling rates to meet ASME code, ETSS, and Reference 3.4 requirements.

1.7 This procedure will be used to perform a pre-service eddy current examination to establish the baseline condition of the steam generators. This procedure must be used in concert with other documents reflected in Section 3.0 of this procedure.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

2.0 OBJECTIVE

2.1 The objective of this procedure is to provide information to assist the eddy current equipment operator in the collection of eddy current data, and in the interconnection and setup of eddy current equipment.

2.2 In addition, it depicts the qualifications required of personnel collecting data, precautions and prerequisites that are to be observed, equipment that is to be employed, and practices that are to be followed during testing.

2.3 It is expected that Shift Supervisors and other lead personnel shall provide additional technical support during all these activities.

2.4 This procedure when performed in accordance with the requirements specified herein meets or exceeds applicable ASME Code requirements as well as the guidelines of Reference 3.4.

3.0 REFERENCES

Examination of tubes shall be undertaken in accordance with the following:

3.1 ASME Boiler and Pressure Vessel Code, Section XI, "Rules for Inservice Inspection of Nuclear Power Plant Components"

Watts Bar Unit 2: ~~1998~~ 2001 edition of the code (with the year ~~2000~~ 2003 addenda)

FCR #001 GJB 2/2/10

In addition, the following documents are used extensively in the carrying out of onsite activities during equipment setup and checkout, testing, and in the implementation of the Westinghouse Quality program.

3.2 Westinghouse Quality Management System (QMS), Current Revision

3.3 Westinghouse Level II Policies and Procedures Manual, Current Revision

3.4 EPRI Report, "Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 7

3.5 Pegasys

3.5.1 MRS-GEN-1116, Current Revision, "Pegasys Operating Procedure"
3.5.2 MRS-DFD-1379-PEGASYS-TM, Current Revision, "Pegasys Operator Training"

3.6 Data Quality: MRS-GEN-1127, Current Revision, "Guidelines for Steam Generator Eddy Current Data Quality Requirements"

3.7 Data Management: SGMS 2.2.1 GEN-011, Current Revision, "Steam Generator Data Management"

3.8 Position Verification: MRS-GEN-1240, Current Revision, "Position Verification"

3.9 Probe Data Base: MRS-GEN-1131, Current Revision, "Probe Database User's Manual"

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

3.10 TVA Data Analysis Guideline: Watts Bar Nuclear Plant – Unit 2 Steam Generator Eddy Current Examination Guideline

3.11 Plant Technical Specifications

4.0 ADMINISTRATIVE REQUIREMENTS

4.1 General Requirements:

4.1.1 Nuclear Services personnel shall be certified in accordance with WEC 2.10 (with applicable appendices) contained in Reference 3.3.

4.1.2 If examiners are supplied by the purchaser, the purchaser will be responsible for their certification.

4.1.3 In the event Nuclear Services utilizes a subcontractor, Nuclear Services will be responsible for certification either by examination to the requirements of WEC 2.10 (with applicable appendices) or by auditing and accepting the subcontractor(s) written practice.

4.1.4 In addition to the requirements listed above, all personnel shall meet the additional experience requirements imposed contractually unless specifically waived in writing by TVA.

4.2 Specific Requirements:

4.2.1 **Data Acquisition Personnel**:

4.2.1.1 A Level I may perform specific calibrations and specific tests in accordance with this procedure and record the results.

1) The Level I shall receive the necessary guidance or supervision from a certified ET Level II or III.

4.2.1.2 Personnel performing data acquisition shall have received specific training and shall be qualified in the operation of the equipment, applicable examination techniques, and the recording of examination data.

4.2.1.3 Each eddy current equipment operator is responsible for proper interconnection, setup and collection of eddy current data.

4.2.1.4 It is the responsibility of all personnel to report problems and discrepancies encountered during the course of the inspection.

1) Identification of such concerns shall be documented using an Anomaly Tracking Sheet (ATS) (Appendix E, or similar).
2) ATS's shall be numbered and maintained by the Project Manager.
3) Closeout of ATS's shall occur prior to closeout of the steam generator.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

4.2.2 **Analysis Personnel**:

4.2.2.1 The evaluation of eddy current examinations shall be conducted by analysis personnel qualified to at least ET Level II with specific training for the evaluation of data from non-ferromagnetic steam generator tubing.

1) Analysis personnel shall also be qualified to Appendix G of Reference 3.4 and have passed the Watts Bar site specific performance demonstration (SSPD).

4.2.4 **Procedure Review**: (conducted prior to the beginning of data acquisition)

4.2.4.1 The Project Manager (or designee) shall review this procedure with personnel responsible for the collection of eddy current data and document the review on a "Procedure Acknowledgment Form" (Appendix A).

4.2.4.2 Each eddy current equipment operator shall read this procedure.

4.2.4.3 Each eddy current equipment operator shall sign, noting date and time, a "Procedure Acknowledgment Form" (Appendix A) to reflect that he/she has read and understands the current revision of this procedure.

4.2.5 **Procedure Change Review**: (conducted prior to continuing data acquisition after change approval)

4.2.5.1 The Project Manager (or designee) shall review procedure changes with personnel responsible for the collection of eddy current data and document the review on a "Procedure Acknowledgment Form" (Appendix A).

4.2.5.2 Each eddy current equipment operator shall sign, noting date and time, a "Procedure Acknowledgment Form" (Appendix A) to reflect that he/she has read and understands the current revision of this procedure.

4.2.6 **ETSS Review**:

4.2.6.1 The Project Manager (or designee) shall review all ETSS (and changes thereto) with personnel responsible for the collection of eddy current data.

4.2.6.2 Documentation of the ETSS review shall be made using the "Procedure Acknowledgement Form" (Appendix A). The completed form shall be filed with the Project Manager's copy of the ETSS.

5.0 PRECAUTIONS AND PREREQUISITES

5.1 The steam generator shall be open on the primary side, dried and ventilated, so that the tubesheet and the ID of tubes are dry.

5.2 The target temperature at the tubesheet is 100 degrees Fahrenheit, or less, for optimal equipment functioning.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

5.3 Provisions shall be made for personnel and equipment entry into and exit from the steam generator (i.e.; ladders, scaffolds or staging, platforms, lighting inside and outside the steam generator, breathing air supply, 120 VAC electricity, etc.).

5.4 A communication system shall be set up between the Eddy Current Control Station and the steam generator platform (containment).

5.5 The primary piping nozzle openings shall have been sealed prior to installing ECT equipment in the steam generator.

5.6 Technical changes to this procedure that may affect the quality or interpretability of the inspection data require a review and the approval of an ET Level III and the customer.

5.6.1 The Westinghouse Senior Analyst, Project Manager, and the customer must sign the specific ETSS.

5.7 Verify that the currently approved version of the data acquisition software is installed on each computer to be used to acquire data.

5.7.1 Refer to the release letter provided by the Software Program Manager to obtain the software version that has been approved for use during the current outage.

5.8 Westinghouse Probe Database:

NOTE: The Westinghouse Probe Database must be set up by knowledgeable eddy current data management or acquisition personnel. Refer to Reference 3.9

5.8.1 A probe database will be set up using the probe shipment file(s) and References 3.7 and 3.9.

5.8.1.1 Probe codes, probe names and their respective part numbers will be established using the codes provided in the TVA ACT sheets.

5.9 Only probes authorized by the Project Manager (or designee) and the customer representative shall be brought on site.

5.9.1 Probes for the tubes to be inspected using this procedure must be accompanied by a Certificate of Conformance that indicates the probes meet the requirements of Reference 3.4.

5.10 The Project Manager (or designee) shall independently verify probe type and serial numbers.

5.11 Signature/Initial Log

5.11.1 A Signature/Initial Log (Data Sheet 1 or similar) has been initiated for personnel involved in the execution of this procedure.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

6.0 STANDARDS

NOTE 1: Calibration and reference standards are to be provided by TVA.

NOTE 2: Only calibration and reference standards listed on the ACT Sheets shall be used.

NOTE 3: Calibration standards shall meet or exceed the requirements specified in the applicable code for the plant being inspected and Reference 3.4.

6.1 Calibration and reference standards shall be fabricated from a length of tubing of the same alloy, nominal outside diameter, nominal wall thickness, and heat treatment as tubes in the steam generator.

6.1.1 **Watts Bar Unit 2**: Alloy 600 - 0.750" OD x 0.043" wall thickness

6.2 Calibration standards may contain secondary side features such as carbon steel support rings, copper rings, and other features as needed to provide signals for subsequent multi parameter frequency mixing by the data analyst.

6.3 The ASME calibration standard shall typically contain the following artificial discontinuities (as a minimum), but other designs may be used as required for specific applications:

6.3.1 Single 0.052-inch diameter hole drilled 100% through wall.

6.3.2 Flat bottomed 0.078-inch diameter x 80% through wall from the outer surface

6.3.3 Flat-bottomed 0.109-inch diameter hole, drilled 60% through-wall from the outer surface.

6.3.4 Flat-bottomed 0.187-inch diameter hole, drilled 40% through-wall from the outer surface.

6.3.5 Four flat-bottomed 0.187-inch diameter drill holes, drilled 20% through-wall from the outer surface, spaced 90 degrees apart in a single plane around the tube circumference.

6.3.6 .0625-inch wide 360 degree circumferential groove 20% through wall from the inner surface.

6.3.7 .125-inch wide 360 degree circumferential groove 10% through wall from the outer surface

6.3.8 Simulated support

6.4 Other special calibration standards (when used) shall contain a variety of notches, holes and grooves for calibration of special setups such as rotating probes.

6.4.1 These standards shall be manufactured in accordance with Reference 3.4.

6.5 Other:

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

6.5.1 Standards shall be serialized to ensure that their use can be traced.

6.5.2 As built drawings of all calibration standards shall be available during the examinations.

6.5.3 Mill test reports for calibration standards shall be available during the examinations.

6.6 Documentation shall include an as-built drawing of the calibration standard, a mill test report and serial number.

7.0 EQUIPMENT

7.1 General Information:

7.1.1 Digital multi-frequency, multi-parameter eddy current equipment and techniques shall be qualified in accordance with Appendix H of Reference 3.4.

7.1.2 All eddy current test equipment provided by Nuclear Services shall be certified to be equivalent to, or exceed, the applicable requirements of the applicable ASME code for the plant being inspected.

7.1.3 Nuclear Services may utilize equipment provided by subcontractors that is certified to the above requirements.

7.1.4 Documentation for calibrated equipment items shall be provided to TVA prior to the start of the inspection.

7.2 Typical Equipment:

7.2.1 Hewlett Packard UNIX computer, or equivalent, with hard disk drive

7.2.2 Optical disk drives or other approved storage devices, and media

7.2.3 **Software**:

7.2.3.1 Westinghouse ANSER Data Acquisition System
7.2.3.2 Robotic Manipulator Control System (e.g. Pegasys)

7.2.4 Printers, as appropriate

7.2.5 Remote Data Acquisition Unit (e.g. MIZ-70, TC6700, TC7700, Omni 200)

7.2.6 Eddy Current Test/Reference Probes:

7.2.6.1 Use the approved ETSS to determine the applicable probe type and size for the tests to be undertaken.

> **NOTE**: The ETSS reflects the material from which the steam generator tubing is constructed and its size, test area, etc. In addition, it specifies the RDAU, probe, cabling, slip rings, etc., to be used in data acquisition, and how the equipment is to be configured and calibrated.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

7.2.7 Probe Pusher:

7.2.7.1 Zetec Model 10D, OMNI 200 or equivalent
7.2.7.2 Flexible probe guide material (conduit)

7.2.8 Rotating Probe Coil (RPC) motor unit (with associated probe extensions, if needed)

7.2.9 A calibration standard (hand held or in-line), and, if required, a reference standard

7.2.9.1 Check the ETSS to ensure that the proper standards are being used.

7.2.10 Eddy Current Examination Plan (electronic or on paper)

7.2.11 Eddy Current Examination Sheets (when used)

7.2.12 Video Monitoring Equipment (cameras, monitors, etc)

7.2.13 Independent Verification System (e.g. Vision, Independent Positioning System)

7.2.14 Communication System (A/V communications box, associated headsets, extensions, etc.)

7.2.15 Local Area Network (LAN) cabling and hardware, as required

8.0 EQUIPMENT SETUP

8.1 Satisfy applicable requirements specified in Section 5.0 (Precautions and Prerequisites).

8.2 Calibration Standard Identification (when using dual guide tubes with in-line standards):

8.2.1 **Primary Guide Tube Standard**:

8.2.1.1 Standards connected to the "Primary" guide tube will be color-coded with *blue* tape.
8.2.1.2 The in-line standard will be connected to the guide tube holder so that the support ring (if present) is closest to the tubesheet.

8.2.2 **Secondary Guide Tube Standard**:

8.2.2.1 Standards connected to the "Secondary" guide tube will be color-coded with *yellow* tape.
8.2.2.2 The in-line standard will be connected to the guide tube holder so that the support ring (if present) is farthest from the tubesheet.

8.3 Perform a functional checkout to verify that the eddy current system is operating correctly. This can be achieved by performing a calibration run and reviewing the data.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

9.0 MANIPULATOR POSITION VERIFICATION

NOTE: Refer to Reference 3.8 for specific position verification instructions.

9.1 All Pegasys position verifications shall require a two-person witness. This is normally accomplished by two operators or by the operator and a Westinghouse QC. When the witness is a QC, the operator shall record a message to the acquisition software that the verifier is a QC representative and the individual's initials. If a second operator witnesses the verification then follow Reference 3.8 for further details.

10.0 ACQUISITION SETUP

NOTE 1: Acquisition operators will follow the applicable ETSS for instrument setup.

NOTE 2: Customer approved ETSS shall be used for each type of examination performed.

10.1 Equipment Initialization:

10.1.1 Power up work station, RDAU, and associated containment equipment (probe pusher, etc.)

10.1.2 Select appropriate plant settings.

10.1.3 Make changes to date and time, as necessary. Ensure that time is in the military (24 hour clock) time format.

10.1.4 Log in.

10.2 Test Configuration Setup:

NOTE 1: Appendix B and Appendix C depict the information typically addressed in the ETSS.

NOTE 2: Appendix E of Reference 3.6 presents a Data Flow Chart outlining the information needed and how it is developed. In addition, it depicts the manner in which the ETSS is created along with .cfg, .dqv, .acs, .kaf, and .aux files necessary to implement the Westinghouse Data Quality Management (DQM) program.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

10.2.1 Bring up the **setup** menu.

10.2.1.1 Select the applicable settings for Plant, Generator, Process, Consum, Config, Tester, Manipulator, and Pusher Controller.
10.3.1.1 Save set-up.

10.2.2 In Push Control menu select **options/setup**.

10.2.2.1 Check to ensure that the settings reflected are in agreement with the applicable ETSS.
10.2.2.2 Check to ensure that data is being saved to the correct location.
10.2.2.3 Configure.

10.3 Update Summary and Store to Storage Media:

NOTE 1: The majority of the summary information will be populated from the electronic ETSS. The acquisition operator must review the summary to ensure that all necessary information is provided.

NOTE 2: Appendix D depicts a typical ANSER Summary Form. The summary shall contain the following as a minimum.

a) applicable ETSS and revision level
b) date
c) site (Watts Bar)
d) site alpha (WBT)
e) owner (TVA)
f) unit 2
g) s/g number (1,2, 3 or 4)
h) leg (inlet or outlet) ... from which testing is to be undertaken
i) s/g type (**Unit 2** = D3)
j) tube material (**Unit 2** = Alloy 600)
k) tube size (0.750" OD, 0.043" wall)
l) procedure (MRS-SSP-2194-WBT)
m) acquisition software being used (for example: ANSER_8.4.3_Rev_111)
n) operator name, and operator ECT level (for example: John_Doe_II)
o) calibration standard type(s)
p) calibration standard serial number(s)
q) (for Bobbin Testing) reference standard serial numbers (if used)
r) fixture type (PEGASYS)
s) guide tube designation (Primary or Secondary)
t) primary guide tube reel number
u) secondary guide tube reel number
v) test probe type, size, serial number, length, and manufacturer
w) reference probe type, size, serial number, length, and manufacturer (if used)
x) probe extension(s), serial number(s), length(s), and manufacturer(s)
y) slip ring, serial number, and manufacturer
z) tester (e.g. MIZ_70, TC6700, TC7700, Omni 200), and tester serial number
aa) tester configuration file name
bb) scan direction (push / pull)
cc) sample rate
dd) acquisition speed (inches per second)
ee) configuration info (channel, frequency, span, rotation, coil, coil type), as required

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

11.0 CALIBRATION / RECALIBRATION REQUIREMENTS

11.1 Operator Identification:

11.1.1 The operator **must** sign on with a message at the beginning of each reel.

11.1.1.1 The message will include the operator's full last name, first and middle initial, and level of certification.

11.1.1.2 The operator should also state in this message that this is an initial standard run.

11.1.2 If there is a change of operators at any time during a reel, then:

11.1.2.1 The new operator **must** sign on with a message containing full last name, first and middle initial, and level of certification before continuing to acquire data for that reel.

11.1.2.2 The new operator should also state in this message that this is an operator change.

11.2 Cal Board Initiation:

11.2.1 Open the CalBoard program.

11.2.2 Identify the next reel.

11.2.3 Identify the type of test.

11.3 General Requirements:

11.3.1 Setup for calibration will be undertaken in accordance with direction provided in the ETSS.

11.3.2 Check to ensure that the current steam generator ID is in the ANSER data acquisition window.

11.3.3 The units of storage for which calibrations are undertaken and data is archived are "Reels".

11.3.4 The first record made to a reel should be a message as defined in Section 11.1.1 above.

11.3.4.1 This message should be *recorded twice* as the first record of a reel may not be viewable when the reel is converted from ANSER to Eddynet format for analysis purposes.

11.3.5 The row and column numbers shall be set to "Row 999 Col 999" for all calibration runs.

11.3.6 Typically, whenever a calibration is required, a minimum of two (2) calibration runs are recorded.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

11.3.6.1 The Project Manager, Senior Analyst (or designee), or the customer may direct that more (or less) than two (2) runs be undertaken.
11.3.6.2 Calibration runs should be reviewed to ensure that a minimum of one complete and acceptable recording has been made.
11.3.6.3 In the event the runs are incomplete or unacceptable, e.g. due to probe snap, etc., other calibration runs may be undertaken and recorded.
11.3.6.4 In the event an acceptable recording cannot be made, the Senior Analyst (or designee) shall be consulted for disposition.

11.3.7 Review each data channel and ensure that adequate/expected signal response was achieved.

11.3.7.1 The responses shall be clearly indicated by the instrument and shall be distinguishable from each other as well as probe motion signals.
11.3.7.2 In the event one or more data channel(s) is producing unacceptable results, the cause must be determined and corrected before continuing the calibration.

11.3.8 Probe Speed and MRPC Rotation:

11.3.8.1 Verify that the proper pull/push speed has been input from the ETSS.
11.3.8.2 For MRPC, verify that the proper rotation speed is in accordance with the ETSS.

1) Check to ensure that the proper sample rates correspond with ETSS requirements.

11.4 Calibration Frequency:

NOTE 1:	Reels are to be terminated at the end of each unit of data storage of the recording medium.
NOTE 2:	However, reels may for a variety of reasons require termination before the end of the storage unit recording media.

11.4.1 The data acquisition system shall be calibrated and the standard run recorded when any of the following occur:

11.4.1.1 The beginning of each reel.
11.4.1.2 At the end of each reel.

1) As a prelude to changing a probe, extension cable, adapter cable, slip ring, RDAU, or any other part of the data acquisition system hardware
2) Conclusion of a pre-specified amount of testing

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

> **NOTE**: The data acquisition system hardware does not include the inspection fixture and controllers, monitor, keyboard, mouse, network components, and cables and external disk drives not associated with data recording.)

11.4.1.3 If an ending calibration verification can not be run due to equipment malfunction or other reasons (building evacuations, etc), the operator shall record a message, and a calibration run shall be made after repair/replacement (or reentry).

> **NOTE**: These actions will suffice as a valid ending calibration verification for the reel.

11.4.1.4 In the event a probe (or another component in the test configuration) becomes inoperable during the examination and cannot be used to perform an ending calibration, the operator shall record a message stating the circumstances and end the reel.

> **NOTE**: The data analysts shall determine if any tubes require re-examination.

11.5 Initial Calibration:

11.5.1 Screen configuration should consist of at least one lissajous and two strip charts. Select appropriate monitoring channels as described in the ETSS for the inspections to be undertaken.

11.5.2 Configure the tester by approving the configuration listed in the setup dialog.

11.5.3 In ANSER turn the tester "on" to confirm basic operability of the tester.

11.5.4 In ANSER turn the tester "off".

11.5.4.1 Then, run the probe into the free span above the tubesheet and click on "Omni 200, then balance, null ref, HW null".

11.5.4.2 After balancing is complete, turn the tester back "on".

11.5.5 Using the direction provided by the ETSS, withdraw / push the test probe through the calibration standard at the specified speed until all artificial flaws are displayed.

11.5.5.1 Retrieve standard from storage media to verify proper system operation.

> **NOTE**: This action is required following each standard run.

11.5.5.2 Generally, a calibration sequence will have a minimum of two runs of the standard.

1) The Project Manager, Senior Analyst (or designee), or the customer may direct that more (or less) than two (2) runs be undertake

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

11.5.6 Following the conclusion of the last calibration run, perform the "Do Cal" autocal (ACS) function.

11.5.6.1 Check setup to ensure that settings agree with the ETSS.

11.5.7 Perform a position verification to check robot fixture accuracy, and record applicable message to the acquisition system as per Reference 3.8.

11.5.8 Then, activate the DQM software.

NOTE 1: During testing the DQM software will perform checks to ensure that the following are consistent with the ETSS: sampling rates, withdrawal speed, EPRI Rev. 7 requirements etc.

NOTE 2: There may be circumstances where the DQM software may need to be "turned off". However, this can only be done by the Senior Analyst or designee. A list of effected tubes or calibration groups shall be maintained by the Senior Analyst and included in the records package.

11.5.8.1 Test the first tube.

1) The tube may fail the DQM check due to an inability to recognize a support structure(s).

11.5.8.2 As required, "train" the software to recognize the tube structure (supports, top of tube sheet, etc) applicable to the type testing to be performed.

11.5.8.3 Once the tube passes DQM, testing may begin on the remaining tubes.

11.6 <u>Ending Calibration</u>:

11.6.1 Perform a position verification in accordance with Reference 3.8 to ensure that robotic fixture positioning continues to be accurate and record message to acquisition system.

11.6.2 Perform ending calibration runs.

11.6.2.1 Following the first run, perform "Check Cal" Autocal function to ensure consistency with the last calibration of the initial calibration sequence.

1) If the calibration check fails, re-perform "Do Cal" autocal (ACS) function, or another calibration run.

11.6.2.2 Perform a minimum of two (2) runs unless otherwise directed by the Project Manager, Senior Analyst (or designee), or the customer.

11.6.3 Go to CalBoard and close the open reel.

11.6.4 When a probe (or extension, or slip ring) is taken out of service (either no longer usable or job scope has been completed) update the Westinghouse Probe Database.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

12.0 EXAMINATION

NOTE: When operating in automated acquisition mode, see Reference 3.5 for further instructions.

12.1 Manipulator calibration shall have been performed per Reference 3.8.

12.2 Position verification shall have been performed per Section 9.0.

12.3 Acquisition system shall have been setup per Section 10.0.

12.3.1 The appropriate Etag (Electronic Test Plan) has been selected for calibration and testing. As necessary, see Reference 3.7, Appendix D and Section 4.0 for Etag description.

12.4 The acquisition system shall have been calibrated per Section 11.0.

12.5 The CalBoard shall have been initiated per Section 11.0

12.6 Position the manipulator at the location of the tube to be tested.

12.6.1 Whenever the IPV mismatch warning is displayed a position verification shall be performed. Any type of position related messages including independent position verification messages refer to Reference 3.8.

12.7 Properly identify tube location on the data acquisition system.

12.7.1 If any error in tube identification occurs the operator shall inform supervision and proceed to identify why the tube was mis-encoded (Refer to Reference 3.8).

12.7.1.1 If a manipulator positioning error or verification system problem has occurred, the operator will need to perform a PV before proceeding.

12.7.1.2 Void the mis-encoded tube by entering a message to disregard that entry, and re-examine the area with the correct tube encode.

12.7.1.3 The previously collected tubes (since the last PV) are suspect and may need to be voided as well.

12.7.1.4 If acquiring data in dual guide tube acquisition mode, repeat Steps 12.7.1.2 and 12.7.1.3 for the other reel.

12.8 Insert the probe into the tube to the desire elevation defined by the Etag Inspection Program Plan.

12.9 Activate the probe pusher in the desired scan direction and record on the recording Medium the examination extent specified by the ETSS.

12.9.1 When not working in Auto Acquisition, avoid tardily starting or prematurely Stopping the probe scan to prevent the incomplete recording of the examination event.

12.9.2 See the appropriate operating guidelines for details of operation.

12.10 When rotating examinations are performed on specific locations in a tube, the position of the probe shall be verified by recording probe retraction through the structure of the Remaining tube section.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

NOTE: Recording probe retraction through the complete structure may be omitted for top of tubesheet (TTS) and U-bend testing.

12.10.1 **Scanning Multiple Locations**:

NOTE: One data file shall be created in which multiple supports shall be recorded as the probe is pushed/pulled through the tube so that a positive axial position of support plates inspected is verified.

12.10.1.1 When scanning multiple locations (i.e. supports, free span, top of tubesheet, etc.) in the same tube, record the examination of the first location at the designated scan speed.

1) Use the examination plan to determine the structural locations to be examined and the order of examination. The ETSS will provide the scan speed(s), etc.

12.10.1.2 While continuing to record, move at a faster speed to approximately two (2) inches from the next location to be recorded.

1) Then, record this location at the designated scan speed.

12.10.1.3 Continue in this fashion until all of the locations have been examined.

12.10.1.4 Then while recording, fully retract the probe from the tube.

12.11 The nominal scan speed shall be as defined in the ETSS.

12.11.1 Speed in excess of that defined may be acceptable provided a minimum digitization rate specified by the ETSS is maintained.

12.12 Adequate digitization rates are calculated in the direction of the scan (axially for bobbin, axially and circumferentially for rotating techniques).

NOTE 1: The DQM software will measure the scan speed and digitization rate for each Record.

NOTE 2: For MRPC, DQM software is dependent upon the locating structures. Therefore, it is imperative that the axial scale be set properly during calibration.

12.13 Repeat paragraph 12.6 through 12.13 until an ending calibration is required.

12.14 Perform an ending calibration per Section 11.0.

12.15 Resuming Testing:

12.15.1 Initiate a new summary reflecting the next available reel number.

12.15.2 Open the Calboard with the new reel number.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

12.15.3 Perform an opening calibration sequence per Section 11.0.

12.15.4 Perform position verification per Section 9.0.

12.15.5 Resume testing as specified by the applicable ETSS.

12.16 Other:

12.16.1 Cycling through the channels during data acquisition is recommended to ensure proper operation of coils and frequencies.

12.16.1.1 The DQM software will also provide feedback for the channels that it has been set up to monitor.

12.16.2 Scanning the data being acquired is recommended to detect situations where the equipment may be malfunctioning (signal saturation, excessive noise, spiking, probe snap, etc).

12.16.2.1 Wherever the data quality is questionable, the operator should discuss remedy (probe and/or cable replacement, etc.) with the Shift Supervisor and/or Analysis to avoid the continued collection of data that may be unusable.

1) The DQM software may also provide error messages that must be dispositioned per Reference 3.6.

12.16.3 The data acquisition system has a message capability that enables the operator to record information about the testing.

12.16.3.1 Notations for operator changes, probe changes, position verifications and independent verification of manipulator position require that a message be submitted to the system. Other information should be included as appropriate.

12.16.4 Whenever an in-service probe or other component (probe head, extension, motor unit, etc.) is to be taken out of service (whether good or bad), the operator must:

12.16.4.1 Withdraw the probe into the conduit sufficiently that spring-back into a steam generator tube can not occur.

12.16.4.2 Have the platform worker provide the serial number of the item being taken out of service. The platform worker shall also verify that the component is complete and intact.

12.16.4.3 Verify that the item is the item of record reflected in the summary (as applicable.)

12.16.4.4 Advise the Shift Supervisor immediately if not the item of record in the summary, or if the component is missing any parts. Complete an Anomaly Tracking Sheet (ATS) (Appendix E) to record the event. Enter on ATS log.

12.16.4.5 Update the Westinghouse Probe Database (as applicable.)

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

12.16.5 If a probe head (or other equipment) is lost, either in a tube or in the steam generator bowl:

12.16.5.1 Stop all activities with the affected robot.

12.16.5.2 Immediately notify the Shift Supervisor.

12.16.5.3 Log out the next ATS number on the ATS log. Complete an ATS to log the event.

1) On the ATS, record current time and date, robot position and orientation, last tube inspected, and cal group numbers for the primary and secondary probes. Include the serial number of the probe head (or other missing equipment).
2) Submit ATS to the Project Manager (or designee).

12.16.5.4 Do not resume testing activities until the item is located (not necessarily retrieved) and documented.

1) If the item is <u>not</u> found after a thorough search, the Shift Supervisor may secure customer permission to resume testing. Document permission in the Shift Supervisor's Log.
2) Once item is accounted for, record this information on the Anomaly Tracking Sheet initiated above.
3) When the component is removed from the system, document on the ATS. Closure by serial number should occur if possible. Removal from tubes or the bowl should be witnessed by an independent part (preferably QA or a customer representative).
4) Broken components which are retrieved should be preserved until retrieval of all parts has been determined on the associated ATS.

12.16.5.5 (As required) update the Westinghouse Probe Database to note that the equipment is no longer in service.

12.17 <u>Data Conversion</u>:

12.17.1 In the event ANSER data is to be converted to Eddynet format for analysis purposes the converted data shall exhibit the following characteristics:

<u>NOTE</u>: Generally, system administrator personnel shall be responsible for this conversion process.

Cal Header	SG	SIDE	CAL#
	XXX	H or C	BBB

XX = S/G # (21 or 22)
Inlet = H, Outlet = C
BBB = Rows: (001 thru 999)

Example: Reel #1 from S/G 21 Hot will be SG21HCAL00001

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

12.18 Critical Steps

"CRITICAL STEP"

Prior to performing the step the individuals shall be briefed on the expected results and appropriate HuP tools to use through the critical step evolution, previous lessons learned, and potential harm associated with performing the step incorrectly.

a. Final closeout of the ATS sheets shall be dual verified by the project manager and the Westinghouse QA representative or designee.

b. The data manager lead shall verify all required testing is complete and closed out in data management.

13. 0 EVALUATION AND REPORTING

Data analysis will be conducted utilizing the Watts Bar Unit 2 data analysis guidelines, Reference 3.10. The following procedural requirements must be followed.

13.0 All analysts evaluating data shall have successfully completed the site-specific training program for Watts Bar Unit 2.

13.1 Data shall be evaluated in a manner consistent with the ETSS for the technique being employed.

13.2 Two independent analysts as a minimum shall evaluate all data for degradation.

13.2.1 These evaluations are to be provided to TVA in the final report.

13.3 All evaluated data shall have the results recorded to a storage medium in such a manner that the tube being evaluated is identifiable as to the Plant, Unit, Steam Generator, Tube Number, and the area of the tube examined.

13.4 Data evaluated where indications are identified shall be traceable to Plant, Unit, Steam Generator, Tube Number, data set, and axial location of indication within that tube.

13.4.1 The signal amplitude and the frequency or frequency mix from which the indication was identified, shall be stored as part of the data.

13.5 All indications where wall loss is estimated to be at least 20% through wall based on qualified sizing techniques shall be reported in accordance with those techniques.

13.5.1 Wall loss determined to be less than 20% and clearly discernable from tube noise shall be reported as well.

13.6 All indications of possible service induced tube wall degradation which have no qualified sizing technique shall be reported as an acronym with the last letter being the letter "I".

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

14.0 RECORDS

The records and reports of the examination shall contain as a minimum:

14.1 Two digital recordings of all raw data, results files and calibration setups
14.2 Personnel certifications
14.3 Equipment certifications
14.4 Probe certificates of conformance
14.5 Calibration standard drawings and associated certified material test reports
14.6 Site specific analysis procedure, and changes (if applicable)
14.7 ETSS utilized
14.8 Summaries of eddy current findings
14.9 All procedures used and any revisions
14.10 Signature logs and associated electronic identification
14.11 If an automated analysis is utilized then a copy of the sorts is required
14.12 A copy of a software release letter stating which software and revision level was utilized and that it was acceptable for use
14.13 Copies of site specific training documentation
14.14 Any documentation pertinent to data acquisition, evaluation or data management of the eddy current data
14.15 Tubesheet maps indicating tubes inspected, technique utilized, and extent of examination.
14.16 Tubesheet maps of indications, techniques utilized, location, % wall loss or indication type
14.17 Complete listing of final results in accordance with applicable ASME Code
14.18 Listings of indications by % wall loss or indication type (as required)
14.19 The report of inspection results supplied to the customer will contain the following as a minimum:

14.19.1 All detectable tube wall degradations
14.19.2 All detectable tube dents known to obstruct probe passage
14.19.3 Any detectable loose part indications
14.19.4 Any conditions sufficiently important that the data analyst deems it necessary to inform the customer.

14.20 Listing of calibration groups containing tests undertaken with inoperable channels
14.21 Listing of calibration groups or tube locations where the DQM software is "turned off".
14.22 Listing of tube locations where testing was undertaken where the Vision Tube Location System could not be used.
14.23 Documentation of quality assurance problems in accordance with Westinghouse QA requirements

© 2009 Westinghouse Electric Company LLC, All Rights Reserved.

PROCEDURE
ACKNOWLEDGMENT FORM – Appendix A

Check Applicable Box

REVIEW #: 01

- [x] Initial Procedure Review (prior to beginning acquisition activities)
- [x] Procedure Field Change Review (insert FCR number in the Remarks section below)
- [x] ETSS Review (record the number(s), including revision level, of the ETSS being reviewed in the Remarks section below)
- [ ] Other (describe the purpose of review in the Remarks section below)

REMARKS: • FCR # 001 for change in ASME Code Year
• ETSS (ACTS) WBT-01-10-0 through WBT-12-10-0, all at revision Ø.

EFFECTIVE DATE: 2/2/10

PRINT NAME	OPERATOR SIGNATURE	DATE	TIME
BRENDAN PATTON	Brendan Patton	2-2-10	11:55
WILLIAM J. HINSON	[illegible]	2/2/10	12:03
Robert L Yeneral	[illegible]	2/2/10	12:08
NICOLAS POSEY	[illegible]	2/2/10	12:10
DONALD R SMITH	[illegible]	2/2/10	12:10
Charles F Desprey	Charles Desprey	2/2/10	12:10
THOMAS S DAVENPORT	Thomas Davenport	2/2/10	12:15
Gary S Bloomquist	GS Bloom	2/2/10	12:20
ROBERT A. MICHALSKI	[illegible]	2/2/10	12:25
David L. REIF	[illegible]	02/02/10	19:50
Kenneth W. Thompson	Kenneth W Thompson	02/02/10	19:50
CHRISTOPHER FINK	[illegible]	02/02/10	19:50
William H Gantt	[illegible]	2-2-10	19:50
Lawrence H. Kemp	[illegible]	2-2-10	19:54

[illegible] 2/2/10
Project Manager (or designee) Date

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

PROCEDURE
ACKNOWLEDGMENT FORM – Appendix A

Check Applicable Box

REVIEW #: 01

- [x] Initial Procedure Review (prior to beginning acquisition activities)
- [x] Procedure Field Change Review (insert FCR number in the Remarks section below)
- [x] ETSS Review (record the number(s), including revision level, of the ETSS being reviewed in the Remarks section below)
- [ ] Other (describe the purpose of review in the Remarks section below)

REMARKS: FCR # 001 FOR CHANGE IN ASME CODE YEAR
ETSS (ACTS) WBT-01-10-0 THRU WBT-12-10-0,
ALL AT REVISION 0.

EFFECTIVE DATE: 2/2/10

PRINT NAME	OPERATOR SIGNATURE	DATE	TIME
JEFFREY L. ZIRKELBACH		02/02/10	20:00
DALE K LENZ		02/02/10	2003
MELVIN B RAFFENSPERGER		02-02-10	20:03

R.A. Michalski 2/2/10
Project Manager (or designee) Date

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

PROCEDURE
ACKNOWLEDGMENT FORM – Appendix A

Check Applicable Box

REVIEW #: 02

- [ ] Initial Procedure Review (prior to beginning acquisition activities)
- [ ] Procedure Field Change Review (insert FCR number in the Remarks section below)
- [x] ETSS Review (record the number(s), including revision level, of the ETSS being reviewed in the Remarks section below)
- [ ] Other (describe the purpose of review in the Remarks section below)

REMARKS: ETSS (ACTS) WBT-09-10-0 Rev 1

EFFECTIVE DATE: 2/4/10

PRINT NAME	OPERATOR SIGNATURE	DATE	TIME
Melvin D Raffensperger		2.4.10	00:15
Kenneth W Thompson	Kenneth W Thompson	2-4-10	00:19
JEFFREY L. ZARKELBACH		2-4-10	00:20
CHRISTOPHER A FINK		2.4.10	0020
William H. Gault		2-4-10	0022
David L. Reif		2-4-10	0023
Lawrence A. Kemp		2-4-10	00:27
PAUL K. LENZ		2-4-10	0035
BRENDAN B. PATTON	Brendan B. Patton	2.4.10	1530
DONALD R SMITH		2-4-10	1530
NICOLAS O POSEY		2-4-10	1536
Robert L. Tenerall		2-4-10	1615
Gary S Bloomquist		2-4-10	1620
WILLIAM J. HINSON		2/4/10	16:25

Project Manager (or designee) 2/4/10 Date

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

PROCEDURE
ACKNOWLEDGMENT FORM – Appendix A

Check Applicable Box

REVIEW #: 03

- [ ] Initial Procedure Review (prior to beginning acquisition activities)
- [ ] Procedure Field Change Review (insert FCR number in the Remarks section below)
- [x] ETSS Review (record the number(s), including revision level, of the ETSS being reviewed in the Remarks section below)
- [ ] Other (describe the purpose of review in the Remarks section below)

REMARKS: New ETSS WBT-13-10-0 Rev 0
for bobbin 24" PED.

EFFECTIVE DATE: 2-9-10

PRINT NAME	OPERATOR SIGNATURE	DATE	TIME
Nicolas Posey		2-9-10	1614
Brendan Patton		2-9-10	1615
Robert Yenelak		2-9-10	1620
William J. Hinson		2-9-10	1625
Smith, Donald		2-9-10	1626
Bloomquist Gary J		2-9-10	1630
Paul K. Lenz		2-9-10	1900
Jeffrey L. Zirkelbach		2-9-10	1900
Lawrence A. Kemp		2-9-10	1901
Kenneth W Thompson		2-9-10	1906
Christopher D Fink		2-9-10	1906
David H. Reif		02/09/10	1908
William H. Garnet		2-9-10	1908
Melvin D Raffensberger		2-9-10	1917

R.A. Michalski — Project Manager (or designee)

2/9/10 — Date

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

Typical Examination Technique Specification Sheet – Appendix B

(Bobbin)

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: CPL-01-07 | Rev No: 0 | Description: Bobbin 45 IPS

Acquisition Procedure: HBR-100-011 Rev. 6 | Page 1 of 3

Applicable EPRI ETSS: 96001.1, 96004.2, 96005.2, 96008.1

Plant Specifics

Customer:	Progress Energy	Date:	2/7/2007
Plant Site:	H.E. Robinson	Alpha Code:	CPL
S/G Type:	44F	Unit:	2
Tube Material:	Inconel 600 Thermally Treated	Tube Size:	0.875" O.D. X 0.050" wall

ID AND Side: SG1: A H/C | SG2: B H/C | SG3: C H/C | SG4: H/C

Examination Scope

Applicability:

Full length inspection with Bobbin probe at 48 inches per second Rows 5 and Up.

Eddy Current Tester Type: MIZ70 | Probe Type: Bobbin | Diam(s): 0.72

Tester Manufacturer: Zetec

Software / Mfg / Rev: ANSER / Westinghouse (Revision approved via software release letter)

Part Name	Len	Part Number	Mfr
EC-720-LLMC-110/36[Z]	110'	76650	Zetec
EC-720-LLMC-110/36[C]	110'	79663	CSI

Additional Probe Items

Probe Item:	Nomenclature:	Length:	Part Number:	Mfr:
Slip_Ring	Slip_Ring	N/A	508-2052	Zetec
Reference	EC-680-740 REF 110/36	110'	79658	CSI

Extension Cable

Extension Cable Type: Zetec 36 Pin Universal Low Loss | Length: 75'

Data Recording

Direction:	Pull	Pitch:	N/A
Model:	HF 2.8 Gig or Equivalent	Format:	ANSER

Probe Speed: 48 inch/sec

Max Probe Speed: 48 inch/sec

Min Sampling Rate: 30 Samples/inch

Signatures

X / WestinghouseServiceLead / Date

X / H.B. Robinson Utility Representative/IQDA / Date

X / Westinghouse NDE Level III / Date

X / Secondary Analysis Level III / Date

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

Typical Examination Technique Specification Sheet – Appendix B (Cont'd)

(Bobbin)

Page 2 of 3

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: CPL-01-07 | Rev No: 0 | Description: Bobbin 48 IPS

Acquisition Procedure: HBR-100-011 Rev. 6 | Page 2 of 3

Pre-Configured File Name: CPL-BOBBIN-48-IPS.CFG | Samples Per Second: 1750

TESTER SETTINGS

Channel Parameters

Channel	Coil No.	Coil Type	Freq(kHz)	Gain	Drive Voltage	Fr. EndGain
1	1	DIFF	400	0.5 db	12	32
2	5	ABS	400	4.5 db	12	22
3	1	DIFF	200	0.5 db	12	32
4	5	ABS	200	4.5 db	12	22
5	1	DIFF	100	0.5 db	12	32
6	5	ABS	100	4.5 db	12	22
7	1	DIFF	35	0.5 db	12	32
8	5	ABS	35	4.5 db	12	22

Data Quality Monitoring (DQM) Filename: CPL-Bobbin-48-IPS.dqv

ADDITIONAL INSTRUCTIONS

1) Perform all examinations in accordance with the requirements of the above listed procedure.
2) A message is required for restricted tubes.
3) All operator changes must be reflected in a recorded message.
4) Include ACTS # in Summary.
5) Spans and rotations shall be set to the parameters stated on page 3 of this technique. Alternate settings shall not be used.
6) Data Quality Verification (DQV) software to be utilized used by operators. Parameters set by Lead Analyst. File name to load is CPL-Bobbin-48-IPS.dqv.
7) Enter a message at the beginning of each calibration group indicating that the data is being acquired with either single or dual probes. If dual probes are being used, state which calibration group is the primary probe and which is the secondary probe.
8) Position Verification w/message required at START of Shift with Vision System functioning.
9) Positive Position Verification with message required at beginning and end of Cal and at every operator change.
10) Operator may acquire at slower speeds as directed by shift lead analyst.
11) Operator to set left strip to Channel 1V; Right strip chart 8V; lissajous Channel 5. Other channels on strip chart and lissajous maybe used. Adjustment to span settings as required.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

Typical Examination Technique Specification Sheet – Appendix B (Cont'd)

(Bobbin) Page 3 of 3

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: CPL-01-07 | Rev No: 0 | Description: Bobbin 48 IPS

Acquisition Procedure: HBR-100-011 Rev. 6 | Page 3 of 3

ACQUISITION CALIBRATION PARAMETERS

Chan No.	Freq (KHz)	Coil	CALIBRATION REFERENCE	ROTATION Phase	ROTATION Direction	SpanSetting
1	400	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
2	400	ABS	100% Drill Hole	Noise Horizontal	Flaws up first	5 Screen Divisions
3	200	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
4	200	ABS	100% Drill Hole	Noise Horizontal	Flaws up first	5 Screen Divisions
5	100	DIFF	100% Drill Hole	40 +/-5 Degrees	Flaws down first	75% Full Screen
6	100	ABS	100% Drill Hole	Noise Horizontal	Flaws up first	5 Screen Divisions
7	35	DIFF	Support Ring	90 Degrees	Down & left first	Full Screen
8	35	ABS	Support Ring	0 Degrees	Down & left first	75% Full Screen
P1	400/100 kHz DIFF		100% Drill Hole	30-35 Degrees	Flaws down first	75% Full Screen
P2	400/100 kHz ABS		100% Drill Hole	Noise Horizontal	Flaws up first	5 Screen Divisions

AutoCalSetupFile: CPL-5C85IN.acs

Additional Setup Instructions:

#For Absolute Channels, set phase using Volts Peak to Peak. For Differential Channels set phase using max rate.
#Set Volts on the 4-20% ASME TWH's to 4.00 volts on channel 1 as start of each cal.Data Quality Monitoring file to load is named
#Data Quality Monitoring file to load is named CPL-Bobbin-48-IPS.dqv.

STANDARDS

Category:	Serial Number:	S/G:	Leg:	Guide Tube:
ASME	Z-19807	S/G - C:	Inlet	Primary
ASME	Z-20808	S/G - A:	Inlet	Primary
ASME	Z-20809	S/G - A:	Inlet	Secondary
ASME	Z-20864	S/G - C:	Outlet	Secondary
ASME	Z-20810	S/G - B:	Inlet	Secondary
ASME	Z-20863	S/G - B:	Outlet	Secondary
ASME	Z-20811	S/G - C:	Inlet	Secondary
ASME	Z-8554	S/G - A:	Outlet	Primary
ASME	Z-8555	S/G - B:	Outlet	Primary
ASME	Z-8556	S/G - C:	Outlet	Primary
ASME	Z-19806	S/G - A:	Outlet	Secondary
ASME	Z-19805	S/G - B:	Inlet	Primary
Absolute Reference Standard	RNP-001	S/G - A:	Outlet	Primary
Absolute Reference Standard	RNP-002	S/G - A:	Outlet	Secondary
Absolute Reference Standard	RNP-003	S/G - A:	Inlet	Primary
Absolute Reference Standard	RNP-004	S/G - A:	Inlet	Secondary
Absolute Reference Standard	RNP-005	S/G - B:	Outlet	Primary
Absolute Reference Standard	RNP-006	S/G - B:	Outlet	Secondary
Absolute Reference Standard	RNP-007	S/G - B:	Inlet	Primary
Absolute Reference Standard	RNP-008	S/G - B:	Inlet	Secondary
Absolute Reference Standard	RNP-009	S/G - C:	Outlet	Primary
Absolute Reference Standard	RNP-010	S/G - C:	Outlet	Secondary
Absolute Reference Standard	RNP-011	S/G - C:	Inlet	Primary
Absolute Reference Standard	RNP-012	S/G - C:	Inlet	Secondary
AVB Wear Standard	Z-8552	Any S/G:	Any	Any

Standard Serial Numbers Comments:

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

Typical Examination Technique Specification Sheet – Appendix C

(MRPC)

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: CPL-05-07 | Rev No: 0 | Description: 3 Coil +PT

Acquisition Procedure: HBR-100-011 Rev. 5 | Page 1 of 3

Applicable EPRI ETSS: 21409.1, 21410.1, 20510.1, 20511.1, 21998.1

Plant Specifics

Customer:	Progress Energy	Date:	1/25/2007
Plant Site:	H.B. Robinson	Alpha Code:	CPL
S/G Type:	44F	Unit:	2
Tube Material:	Inconel 600 Thermally Treated	Tube Size:	0.875" O.D. X 0.050" wall

ID AND Side: SG1: A H/C SG2: B H/C SG3: C H/C SG4: H/C

Examination Scope

Applicability:

Top Tubesheet Region and special interest inspection in straight section of tubing with 3 Coil RPC probe. (Mid-range Plus Point, and .115" pancake.

Eddy Current Tester Type: MIZ70 Probe Type: RPC Diam(s): 0.7, 0.72

Tester Manufacturer: Zetec

Software / Mfg / Rev: ANSER / Westinghouse (Revision approved via software release letter)

Part Name	Len	Part Number	Mfr
+PT-720-MRPC/3C/P115A-PP11A-SP080B/52PH(.775)-ZM001	N/A	700-4095-091	Zetec
+PT-700-MRPC/3C/P115A-PP11A-SP080B/52PH(.775)-ZM001	N/A	810-4095-003	Zetec

Additional Probe Items

Probe Item:	Nomenclature:	Length:	Part Number:	Mfr:
Probe_Head_Extension	EXT-680-MRPC/DIFF/SHAFT/36IN/52/52	36"	700-5630-089	Zetec
Probe_Head_Extension	EXT-680-MRPC/DIFF/SHAFT/60IN/52/52	60"	700-5850-088	Zetec
Motor Unit	SDX610NS/MRPC/52MU(3/8EM)36P500	33"	75421	Zetec
Slip_Ring	Slip_Ring_	N/A	508-2052	Zetec
Probe Head Extension	EXT-680-MRPC/TTS/SHAFT/24IN/52/52	24"	700-5620-089	Zetec

Extension Cable

Extension Cable Type: Zetec 36 Pin Universal Low Loss Length: 75'

Data Recording

Direction: Push Pitch: N/A

Model: HP 2.8 Grip or Equivalent Format: ANSER

Probe Speed: 0.8 inch/sec @ 1500 Target RPM

Max Probe Speed: 0.20 inch/sec

Min Sampling Rate: 25 per inch Axial, 30 per inch Circ.

Signatures

X / WestinghouseServiceLead / Date

X / H.B. Robinson Utility Representative/IQDA / Date

X / Westinghouse NDE Level III / Date

X / Secondary Analysis Level III / Date

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

Typical Examination Technique Specification Sheet – Appendix C (Cont'd)

(MRPC)

Page 2 of 3

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: CPL-05-07 | Rev No: 0 | Description: 3 Coil +PT

Acquisition Procedure: HBR-100-011 Rev. 6 | Page 2 of 3

Pre-Configured File Name: CPL-3-COIL-+PT-8IPS.CFG | Samples Per Second: 2500

TESTER SETTINGS

Channel Parameters

Channel	Coil No.	Coil Type	Freq(kHz)	Gain	Drive Voltage	Fr_EndGain
1	1	115	400	0.5 db	12	22
2	5	+PT	400	0.5 db	12	32
3	1	115	300	0.5 db	12	22
4	5	+PT	300	0.5 db	12	32
5	1	115	200	0.5 db	12	22
6	5	+PT	200	0.5 db	12	32
7	1	115	100	0.5 db	12	22
8	4	TRG	100	0.5 db	12	22
9	5	+PT	100	0.5 db	12	32
10	1	115	35	0.5 db	12	22
11	5	+PT	35	0.5 db	12	32

Data Quality Monitoring (DQM) Filename: CPL-3C-1500RPM.dqv

ADDITIONAL INSTRUCTIONS

1) Perform all examinations in accordance with the requirements of the above listed procedure.
2) A message is required for restricted tubes.
3) All operator changes must be reflected in a recorded message.
4) Include ACTS # in Summary.
5) Spans and rotations shall be set to the parameters stated on page 3 of this technique.
6) Data Quality Verification (DQV) software to be utilized used by operators. Parameters set by Lead Analyst. File name to load is CPL-3C-1500RPM.dqv.
7) Enter a message at the beginning of each calibration group indicating that the data is being acquired with either single or dual probes. If dual probes are being used, state which calibration group is the primary probe and which is the secondary probe.
8) Position Verification w/message required at START of Shift with Vision System functioning.
9) Positive Position Verification with message required at beginning and end of Cal and at every operator change.
10) Special Interest examinations shall use DQV file: CPL-3Coil+PT-SI.dqv.

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

Typical Examination Technique Specification Sheet – Appendix C (Cont'd)

(MRPC)

Westinghouse

STEAM GENERATOR EDDY CURRENT INSPECTION
MULTI-FREQUENCY EDDY CURRENT PARAMETERS

ACTS#: CPL-05-07 | Rev No: 0 | Description: 3 Coil - PT

Acquisition Procedure: HBR-100-011 Rev. 6 | Page 3 of 3

ACQUISITION CALIBRATION PARAMETERS

Chan No.	Freq. (KHz)	Coil	CALIBRATION REFERENCE	Phase	ROTATION Direction	Span Setting
1	400	115	100% Axial Notch	25 +/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
2	400	+PT	40% ID Axial	15 +/- 5 Degrees	Flaws up first	1-2 SD 40% OD Ax
3	300	115	100% Axial Notch	25 +/- 5 Degrees	Flaws up first	2-3 SD 40% OD Ax
4	300	+PT	40% ID Axial	15 +/- 5 Degrees	Flaws up first	1-2 SD 40% OD Ax
5	200	115	100% Axial Notch	20 +/-5 Degrees	Flaws up first	2-3 SD 40% OD Ax
6	200	+PT	40% ID Axial	15 +/- 5 Degrees	Flaws up first	1-2 SD 40% OD Ax
7	100	115	100% Axial Notch	20 +/-5 Degrees	Flaws up first	2-3 SD 40% OD Ax
8	100	TRG	Trigger Pulse	small pulse horiz.	Large pulse up	4 Screen Divisions
9	100	+PT	40% ID Axial	15 +/- 5 Degrees	Flaws up first	1-2 SD 40% OD Ax
10	35	115	100% Axial Notch	40 +/-5 Degrees	Flaws up first	1-2 SD 80% OD AX
11	35	+PT	100% Axial Notch	40 +/-5 Degrees	Flaws up first	1-2 SD 80% OD AX

AutoCalsetupFile: CPL-3CRPC.acs

Additional Setup Instructions:

#Data Quality Monitoring file to load is named CPL-3C-1500RPM.dqv.
#Use center of notch for setting phase.

STANDARDS

Category:	Serial Number:	S/G:	Leg:	Guide Tube:
EPRI EDM Notch Standard	Z-20923	S/G - A:	Inlet	Primary
EPRI EDM Notch Standard	Z-20924	S/G - A:	Inlet	Secondary
EPRI EDM Notch Standard	Z-19921	S/G - A:	Outlet	Any
EPRI EDM Notch Standard	Z-20925	S/G - B:	Inlet	Primary
EPRI EDM Notch Standard	Z-20926	S/G - B:	Inlet	Secondary
EPRI EDM Notch Standard	Z-16750	S/G - B:	Outlet	Any
EPRI EDM Notch Standard	Z-20927	S/G - C:	Inlet	Primary
EPRI EDM Notch Standard	Z-20928	S/G - C:	Inlet	Secondary
EPRI EDM Notch Standard	Z-16751	S/G - C:	Outlet	Any
Volumetric Sizing Standard	Z-16930	S/G - A:	Any	Any
Volumetric Sizing Standard	Z-16909	S/G - B:	Any	Any
Volumetric Sizing Standard	Z-16910	S/G - C:	Any	Any

Standard Serial Numbers Comments:

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

Typical ANSER Summary Form – Appendix D

Probe 1 - SummaryWin 8.4 Rev 47 01/20/04 13:47

File

ACTS_Sheet:	CPL-00-001	Rev:	0
Date:	3-29-2004		
Site:	HB_Robinson	Alpha:	CPL
Owner:	Progress_Energy		
Unit:	2	SG:	A
Leg:	INLET	Model/Series:	44F
Tube_Material:	Inconel_600_TT		
Tube_Size:	0.875"_O.D._X_0.050"_wall		
Procedure:	HBR-100-011_Rev._5		
AcquisitionSoftware:	ANSER_8.4.1_Rev_104		
Operator/Level:	John_Doe_III		
Operator/Level:	NA		
STD:	Absolute_Reference_Standard		
STD_S/N:	AB-04-03		
STD:	N/A		
STD_S/N:	N/A		
STD:	N/A		
STD_S/N:	N/A		
ReelNo.:	21	Fixture_Type:	Genesis
ProbeType:	Bobbin		
GuideTubeDesignation:	Primary		
ProbeHD_NewOnReelNo.:	NA		
Prim_GuideTubeReelNo.:	21		
Seco_GuideTubeReelNo.:	22		

TestProbe:	WA-590-RPH-30"	SN:	345123	Len:	110'	Mfr:	R/D_Tech
ProbeItem:	WA-RLLC-110/36	SN:	665787	Len:	110'	Mfr:	R/D_Tech
ProbeItem:	WA-RLLC-110/36	SN:	665789	Len:	110'	Mfr:	R/D_Tech
ProbeItem:	Slip_Ring_1776	SN:	65401	Len:	N/A	Mfr:	Zetec
ProbeItem:	NA	SN:	NA	Len:	NA	Mfr:	NA
RefProbe:	M/A-590-ULC/MR	SN:	524326	Len:	110'	Mfr:	R/D_Tech
RefItem:	WA-RLLC-110/36	SN:	665223	Len:	110'	Mfr:	R/D_Tech

ExtCableType:	Zetec_36_Pin_Universal_Low_Loss	ExtCableLen:	75'
TesterInstrument:	MIZ_70	TesterSN:	102
TesterConfigFile:	CPL-BOBBIN-40-IPS.CFG	ScanDirection:	Pull
SampleRate:	1200	AcquisitionSpeed:	40

Configuration_Information:

Channel:
Frequency:
Span:
Rotation:
Coil:
Coil type:

Additional_Information:

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

ANOMALY TRACKING SHEET – Appendix E

ATS Number: SG- 1, 2, 3, 4

Initiated by _____ Date: _____

Procedure reference for the anomalous condition:

Description of the anomalous condition:

Note: Attach additional sheets if necessary. Label attachments with ATS Number on the top of each page attached.

Project Manager Disposition

[ ] Incident Report Issued (WP 13.2) — IR Number

[ ] Procedure Field Change Request Issued (WP 19.12) — FCR Number

[ ] Equipment Notification Report Issued (WP 19.16) — EOR Number

[ ] Resolution below (Internal Resolution)

None

Description of Internal Resolution:

Note: Attach additional sheets if necessary. Label attachments with ATS Number on the top of each page attached.

Project Manager Signature/Date:

_____

Westinghouse QA Signature/Date:

_____

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

2194 GJB 2/2/10

Data Sheet 1

SIGNATURE/INITIAL

LOG

PRINTED NAME	INITIALS	SIGNATURE
BRENDAN B. PATTON	BBP	Brendan B. Patton
WILLIAM J. HINSON	WJH	
Robert L. YENCIAN	RLY	
NICOLAS O. POSEY	NOP	
DONALD R SMITH	DS	
Charles F Desbouy	CFD	Charles F Desbouy
THOMAS S DAVENPORT	TSD	Thomas S Davenport
Gary S Bloomquist	GSB	GS Bloomquist
ROBERTA. MICHALSKI	RAM	
DAVID L. REIF	DLR	
Kenneth W. Thompson	KT	Kenneth W Thompson
CHRISTOPHER FINK	CF	
WILLIAM H. GANTT	WHG	
Lawrence A. Kemp	LAK	
JEFFREY L. ZIRKELBACH	JLZ	
PAUL K. LENZ	PKL	
MELVIN B. RAFFENSPERGER	MBR	

© 2009 Westinghouse Electric Company LLC, All Rights Reserved

5. "STEAM GENERATOR DATA MANAGEMENT" WITH SIGNED APPENDICES SGM 2.2.1 GEN-011 REVISION 14

- SCAN PLAN REV. 1

F-4.20-3 Rev. 3

WESTINGHOUSE PROPRIETARY CLASS 2

Westinghouse

STANDARD INTERNAL REVIEW SHEET

DOCUMENT NUMBER: SGMS-2.2.1 GEN-011 **REVISION NUMBER:** 14

TITLE: Steam Generator Data Management

☒ GENERIC

☐ PLANT SPECIFIC
(Plant Identification should be included in title)

☐ OTHER (Specify) _____

MANDATORY REVIEWS	SIGNATURE	DATE	COMMENTS
1. ORIGINATOR R. W. Shaifer		9-8-2008	NONE
2. SYSTEM ENGINEERING R. J. Procratsky		9-8-2008	NONE
3. COMPONENT ENGR. APPROVAL REQUIRED ☐ YES Initial/Date 9-8-08 ☒ NO Component Engineering Manager/Designee			
4. QUALITY CHAD HASNCHAM FOR D. K. Rohm		9/8/08	NONE
5. COGNIZANT MANAGER J. A. Divella		9-9-08	(1) NONE
OTHER			
6. OTHER BUSINESS UNIT APPROVAL REQUIRED ☐ YES Business Unit			
☒ NO Engr. Concurrence			
7. Table Top Review		9-8-2008	Per WP-19.10, Rev. 8 NONE
8. Document Administrator S. L. Swiech		9/9/08	
9.			

(1) Approval of the cognizant manager signifies that all reviews have been obtained and all comments resolved.

4187.doc:49

WESTINGHOUSE PROPRIETARY CLASS 2

Westinghouse

Nuclear Services
Field Service Procedure

Procedure Number:	Rev:	Plant Site/Plant Alpha:
SGMS 2.2.1 GEN-011	14	Generic
Title: Steam Generator Data Management		
Purchase Order:	S/O No.:	
Key Words:		

WESTINGHOUSE ELECTRIC COMPANY LLC
P.O. BOX 158
MADISON, PA 15663

THIS DOCUMENT IS THE PROPERTY OF AND CONTAINS PROPRIETARY INFORMATION OWNED BY WESTINGHOUSE ELECTRIC COMPANY LLC AND/OR ITS SUBCONTRACTORS AND SUPPLIERS. IT IS TRANSMITTED TO YOU IN CONFIDENCE AND TRUST, AND YOU AGREE TO TREAT THIS DOCUMENT IN STRICT ACCORDANCE WITH THE TERMS AND CONDITIONS OF THE AGREEMENT UNDER WHICH IT WAS PROVIDED TO YOU.

Department Steam Generator NDE Operations	**Revision** 14
Originator R. W. Shaffer	**Signature/Date** 9/9/c
Cognizant Manager J. A. Divella	**Signature/Date** 9-9-08 ☑ Check this block to indicate the Standard Internal Review Sheet Form F-4.20-3 approvals have been obtained.
Customer	**Required** ____ **Yes** ____ **No** ____ **Date**

TABLE OF CONTENTS

1.0 PURPOSE

2.0 SCOPE

3.0 DEFINITIONS

4.0 REFERENCES

5.0 RESPONSIBILITIES

6.0 GENERAL

7.0 PREREQUISITES

8.0 PRECAUTIONS

9.0 PROCEDURE

10.0 CLOSEOUT

11.0 PROCESS CONTROL SHEETS

12.0 APPENDICES

- 12.1 TYPICAL INSPECTION CRITERIA SUMMARY
- 12.2 TYPICAL REPAIR CRITERIA SUMMARY
- 12.3 TYPICAL CUSTOMER APPROVAL OF BASE SCOPE INSPECTION PLANS
- 12.4.1 TYPICAL STEAM GENERATOR BOBBIN EDDY CURRENT CLOSEOUT CHECKLIST
- 12.4.2 TYPICAL STEAM GENERATOR RPC EDDY CURRENT CLOSEOUT CHECKLIST
- 12.4.3 TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST
- 12.5 TYPICAL DATA MANAGEMENT OPERATOR REVIEW
- 12.6 TYPICAL DATA MANAGEMENT PEER REVIEW
- 12.7 TYPICAL SECONDARY DATA MANAGEMENT PEER REVIEW
- 12.8 TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE
- 12.9 TYPICAL APPENDICES CHANGE NOTICE
- 12.10 TYPICAL SHIFT ACTIVITY CHECKLIST
- 12.11 SPECIAL EVALUATION/TUBE SELECTION CRITERIA
- 12.12 TYPICAL INSPECTION CRITERIA REVIEW QUESTIONS

©2008 Westinghouse Electric Company

1.0 PURPOSE

1.1 The purpose of this procedure is to provide requirements, recommendations, and guidance for data management software operators. This procedure is intended to promote consistency among data management tasks.

2.0 SCOPE

2.1 Inspection plan generation as directed by the utility or authorized designee.

2.2 Entering of data analysis results into the data management database.

2.3 Acquisition task manager file creation and distribution.

2.4 Acquisition and analysis progress tracking and reporting.

2.5 Compilation and presentation of inspection results.

2.6 Closeout of eddy current inspection(s) by boundary, manipulator exclusion areas, zone, leg, and steam generator.

2.7 Repair list generation and associated task manager file creation and distribution, when required.

2.8 Creating and distributing analyst performance feedback as directed, when required.

2.9 Verifying Data Quality Monitoring is conducted in accordance with site specific requirements.

©2008 Westinghouse Electric Company

3.0 DEFINITIONS

NOTES

- See the most current revision of the EPRI Pressurized Water Reactor Steam Generator Examination Guidelines (Ref. 4.2) for additional definitions.
- See the analysis guidelines **or** procedure for applicable three letter analysis reporting codes.

3.1 ACTS – Acquisition Technique Sheet. Specifies parameters required to inspect steam generator tubing with approved techniques and equipment.

3.2 ADS – Automated Data Screening

3.3 ANSER – Advanced Network Sharing of Eddy current Resources; Westinghouse analysis and acquisition software.

3.4 ANTS – Analysis Technique Sheet. Provides the data analysts with criteria to which the eddy current data are evaluated and reported.

3.5 APC, ARC, IPC, and IRC – Alternate and interim plugging and repair criteria. An alternate method of determining plugging and repair requirements, typically based on bobbin coil indication amplitudes, which is correlated with tube burst capability and leakage potential.

3.6 ASCII – American Standard Code for Information Interchange

3.7 CDS – Computer Data Screening

3.8 CURRENT – The data management database name where the results of record for the on-going inspection are stored.

3.9 Defect – An indication that exceeds the repair limit

©2008 Westinghouse Electric Company

3.10 Defective Tube – A tube that contains an indication that exceeds the repair limit.

3.11 Degradation – A reportable indication 20% through-wall or greater or 50% of the repair limit for length based or voltage based criteria.

3.12 Degraded Tube – A tube that contains a reportable indication 20% through-wall or greater or 50% of the repair limit for length based or voltage based criteria.

3.13 DQM – Data quality monitoring.

3.14 DQV – Data quality configuration file.

3.15 Eddy Vision – CoreStar International analysis software.

3.16 EDDYNET – Zetec analysis and acquisition software.

3.17 EIMS – Eddynet Information Management System; Zetec data management software.

3.18 EPRI – Electric Power Research Institute

3.19 ETAG – Acquisition setup configuration file.

3.20 ETSS – Examination Technique Specification Sheet. Specifies parameters required to inspect steam generator tubing with approved techniques and equipment.

3.21 HISTORY – The data management database name where the previous inspection results of record are stored.

3.22 IGA – Inter-Granular Attack, a corrosive attack of grain boundaries in materials with no preferential, stress-related orientation.

3.23 IP – Internet Protocol – A set of standards used to allow computers to communicate through a network.

©2008 Westinghouse Electric Company

3.10 Defective Tube – A tube that contains an indication that exceeds the repair limit.

3.11 Degradation – A reportable indication 20% through-wall or greater or 50% of the repair limit for length based or voltage based criteria.

3.12 Degraded Tube – A tube that contains a reportable indication 20% through-wall or greater or 50% of the repair limit for length based or voltage based criteria.

3.13 DQM – Data quality monitoring.

3.14 DQV – Data quality configuration file.

3.15 Eddy Vision – CoreStar International analysis software.

3.16 EDDYNET – Zetec analysis and acquisition software.

3.17 EIMS – Eddynet Information Management System; Zetec data management software.

3.18 EPRI – Electric Power Research Institute

3.19 ETAG – Acquisition setup configuration file.

3.20 ETSS – Examination Technique Specification Sheet. Specifies parameters required to inspect steam generator tubing with approved techniques and equipment.

3.21 HISTORY – The data management database name where the previous inspection results of record are stored.

3.22 IGA – Inter-Granular Attack, a corrosive attack of grain boundaries in materials with no preferential, stress-related orientation.

3.23 IP – Internet Protocol – A set of standards used to allow computers to communicate through a network.

©2008 Westinghouse Electric Company

3.24 IP Planner – The inspection planning and tracking module of the data management software.

3.25 May – Used to denote permission, neither a requirement nor a recommendation.

3.26 .kaf – Computer generated configuration file that specifies parameters in accordance with the ETSS or ACTS.

3.27 Key file – A row and column listing of tubes in ASCII format usually generated by a query file or tubesheet map symbol dump.

3.28 ODSCC – Outer Diameter Stress Corrosion Cracking, an inter-granular cracking of tubing which is a result of complex interactions between stress, operating environment, and material properties.

3.29 OTHER – The data management database name where the results of production analysis and other not "of record" analysis results are stored.

3.30 Pitting – A localized attack on tubing resulting from non-uniform corrosion rates causing the formation of localized corrosion cells.

3.31 PID – Positive Identification

3.32 PRI or Primary – Primary analysis results and electronic report files. Also of or pertaining to primary analysis in general.

3.33 PWSCC – Primary water stress corrosion cracking, stress and corrosion induced cracking on the primary side of steam generator tubing.

3.34 RES or Resolution – Resolution analysis results and electronic report files. Also of or pertaining to resolution analysis in general.

3.35 SEC or Secondary – Secondary analysis results and electronic report files. Also of or pertaining to secondary analysis in general. May also refer to secondary data management.

©2008 Westinghouse Electric Company

3.36 Shall – Used to denote a requirement.

3.37 Should – Used to denote actions that are recommended, but not mandatory.

3.38 SmartList – A collection of tubesheet maps, queries and/or key files used to compile a single list from multiple sources.

3.39 ST Max – Westinghouse data management software.

3.40 Wear – The loss of tube material caused by the interaction of tubing with its support structure, a loose part, another tube, or other substantial material or component.

4.0 REFERENCES (Latest revision applies unless otherwise stated)

4.1 NSD-RMW-90-070, SG-90-02-026, Steam Generator Information Report, Revision 6, February 1990.

4.2 EPRI Pressurized Water Reactor Steam Generator Examination Guidelines.

4.3 Code of Federal Regulations, 10CFR50.

4.4 Data Management Training Procedure MRS-GEN-1045-TD.

4.5 Analysis guideline or procedure.

4.6 Site degradation assessment, condition monitoring and operational assessment.

4.7 Site Specific technical specifications.

4.8 Site Specific Examination Technique Specification Sheets.

4.9 Site Specific Analysis Technique Sheets.

©2008 Westinghouse Electric Company

4.10 Site Specific Acquisition Technique Sheets.

4.11 Site Specific or generic data quality monitoring guideline or procedure.

4.12 Westinghouse Electric Company Nuclear Services – Field Services Standards of Conduct.

5.0 RESPONSIBILITIES

5.1 Data manager responsibilities

5.1.1 Preparing the database for the inspection and populating the history database with the previous inspection results.

5.1.2 Preparing eddy current inspection programs.

5.1.3 Preparing and obtaining approval for documents and appendices as required by this procedure.

5.1.4 Populating the current database with analysis results, ensuring that those results are reported in accordance with the approved analysis guideline **or** procedure.

5.1.5 Preparing and issuing retest lists based on the current inspection results.

5.1.6 Tracking the current acquisition and analysis progress.

5.1.7 Applying and scheduling scope expansion criteria as directed.

5.1.8 Applying special interest and follow up examination criteria based on inspection results and scheduling and tracking those programs.

5.1.9 Preparing and distributing accurate daily status reports as directed.

©2008 Westinghouse Electric Company

5.1.10 Performing inspection program closeouts, including closeout by entire steam generator, manipulator base plate, exclusion areas, and zones, by steam generator leg, by inspection technique **or** probe type, and by any other specific area, region **or** technique as required.

5.1.11 Preparing repair lists based on inspection results and established criteria and customer requests, when required.

5.1.12 Creating and distributing manipulator task files for eddy current acquisition, tube repairs, retests and other functions as required.

5.2 Lead data analyst responsibilities

5.2.1 Provide the data management team with complete and accurate inspection documentation, which should include, but is not limited to:

5.2.1.1 Examination Technique Specification Sheets.

5.2.1.2 Acquisition Technique Sheets.

5.2.1.3 Analysis Technique Sheets.

5.2.1.4 Analysis guideline **or** procedure.

5.2.1.5 List of personnel expected to perform analysis on the current inspection, including:

5.2.1.5.1 Full name.

5.2.1.5.2 Employer.

5.2.1.5.3 Last four digits of the Social Security number **or** analysis software logon code.

5.2.1.5.4 Eddy current certification level.

©2008 Westinghouse Electric Company

5.2.1.5.5 Function(s) while assigned to the current inspection, such as primary production analysis, crack sizing analysis **or** other analysis functions.

5.2.1.5.6 Shift that the analyst will be assigned.

5.2.1.5.7 Location of analyst, if not assigned to perform functions locally.

5.2.1.6 Data quality monitoring (dqv) files as required.

5.2.1.7 Computer generated acquisition configuration (kaf, aux, cfg, acs) files as required.

5.2.1.8 Types of analysis to be performed, including auto dent, sludge, **or** other ancillary analyses.

5.2.1.9 IP addresses and physical location for all analysis computers to be used during the inspection, including spares.

5.2.1.10 Printer names, types, physical location, IP address and computer attached to, if any.

5.2.1.11 Identify which analysis computers will be used for each analysis task, such as raw server, results server, production analysis, etc.

5.2.1.12 Provide a list of indications, by technique, to be used for analysis performance feedback, when required.

5.2.1.13 Provide a list of previously reported indications and anomalies to be addressed during the current inspection.

5.2.1.14 Review inspection documentation as required.

©2008 Westinghouse Electric Company

5.3 Utility Responsibility

5.3.1 The Code of Federal Regulations, 10CFR50, Appendix B [4], requires each utility to assume responsibility for all those planned and systematic actions, such as inspection, necessary to provide adequate confidence that a structure, system **or** component will perform satisfactorily in service.

5.3.2 The customer **or** customer representative shall approve of all inspection programs and repair work to be conducted and document approval in writing utilizing the appropriate appendix.

5.3.3 Special interest criteria approval is documented with Appendix 12.1

5.3.4 Base scope inspection approval is documented with Appendix 12.3.

5.4 Project Manager Responsibility

5.4.1 Provide the data management team with complete and accurate inspection documentation, which should include, but is not limited to:

5.4.1.1 List of personnel expected to perform data acquisition during the current inspection, including:

5.4.1.1.1 Full name.

5.4.1.1.2 Employer.

5.4.1.1.3 Last four digits of the Social Security number **or** acquisition software logon code.

5.4.1.1.4 Eddy current certification level.

5.4.1.1.5 Shift that the acquisition technician will be assigned.

©2008 Westinghouse Electric Company

5.4.1.2 IP addresses of all acquisition computers to be used during the inspection, including spares.

5.4.1.3 Identify which acquisition computers will be used for each acquisition task, by steam generator and leg, **or** probe database, technical assistance, spare, etc.

5.4.1.4 Printer names, types, IP address and computer attached to, if any.

5.4.1.5 Manufacturer's part number, description and serial numbers of eddy current equipment, including, but not limited to:

5.4.1.5.1 Bobbin coil probe heads.

5.4.1.5.2 Bobbin coil probe shafts and polys.

5.4.1.5.3 Rotating coil and +Point® probe heads.

5.4.1.5.4 Motor units.

5.4.1.5.5 Probe head extensions.

5.4.1.5.6 Slip rings.

5.4.1.5.7 Eddy current testers

5.4.2 The project manager should advise the data management team of the intended inspection sequence by steam generator and leg. Any changes **or** modifications to this sequence should be communicated to the data management team as soon as possible.

©2008 Westinghouse Electric Company

6.0 GENERAL

6.1 Any changes made to the working appendices from this procedure shall be documented utilizing Appendix 12.9, Typical Appendices Change Notice. All data managers performing work on the affected site shall review the changes and sign the acknowledgement form indicating that they have read and understand the change(s). This shall include any revision to Appendix 12.1 **or** 12.2.

6.2 Appendix 12.1 and 12.2 should be utilized to document all criteria as presented in the reference material in Section 4.0.

NOTE

If the utility creates their own Inspection Criteria summary, Westinghouse data management personnel shall compare the Inspection Criteria summary (Appendix 12.1) to the utility Inspection Criteria summary. Any differences discovered shall be resolved with the utility and corrected in the Appendix 12.1 document.

6.3 Appendix 12.8 shall be utilized to address conditions and requests not covered in Appendix 12.1 and 12.2.

6.4 Appendix 12.8 may be used to implement specific application of criteria documented in Appendix 12.1 and 12.2. Site specific criteria may require this and in this case, an Appendix 12.8 shall be created for each specific application of Appendix 12.1 and 12.2 criteria.

6.5 Appendices 12.1, 12.2, 12.4.1, 12.4.2 and 12.4.3 included in this procedure are intended to be utilized as a starting point for the creation of site specific inspection criteria documentation. Not all checks, steps, and verifications will apply to all sites, utilities or inspections. It is the responsibility of the lead data manager to document to the best of their ability all specific criteria that will be applied throughout the inspection. All data managers assigned to perform data management tasks for the current inspection are responsible for correctly implementing documented criteria, checks, steps and verifications. All data managers are encouraged to suggest process improvements, additions **or** deletions of closeout steps, checks, and verifications.

©2008 Westinghouse Electric Company

6.6 Appendix 12.1 and 12.2 may reference other supporting documentation rather than containing the specific parameters and criteria. However, these appendices should contain sufficient detail to preclude the need for data managers to often access the supporting documentation to verify parameters and criteria.

6.7 It is the intent of Appendices 12.1 and 12.2 to create a single source document for analysis reporting criteria, special interest examination scope and criteria, and repair criteria. When properly prepared and verified, these documents should contain all of the pertinent information data management requires to successfully, properly and consistently perform data management functions and activities.

6.8 Appendix 12.3 is used to document customer approval of base scope inspection programs.

6.9 Appendix 12.5 is used to document the review of all reference material and applicable appendices by each data manager assigned to the inspection.

6.10 A peer review shall be performed and documented in Appendix 12.6. The data manager assigned to the inspection with the most field experience other than the lead data manager should perform the peer review. **If** secondary data management is utilized and performs a peer review of the base scope inspection plans as required by Appendix 12.7, **then** this requirement may be waived for the base scope inspection programs ONLY.

6.11 Secondary data management, when utilized, shall perform a peer review and document the review in Appendix 12.7. **If** a primary data management peer review of the base scope inspection plans has been performed as required by Appendix 12.6, **then** this requirement may be waived for the base scope inspection programs ONLY.

6.12 Appendix 12.11 outlines the general selection criteria for additional testing **or** destructive operations that may be performed during the course of an eddy current inspection.

©2008 Westinghouse Electric Company

6.13 Appendix 12.12 shall be used to lead discussion with the customer. These questions are designed to pull out important inspection criteria details that otherwise may go undiscovered. The detailed information discovered through the use of these questions shall be documented in Appendix 12.1 and/or 12.2.

NOTE

Every effort should be made to deliver any appendix document that requires review and approval signatures to the reviewing personnel with enough time for them to perform a meaningful review. This is especially applicable to Appendix 12.1.

7.0 PREREQUISITES

7.1 The data management computer(s) shall have the approved version of the data management software installed. This shall be verified against the software release letter issued by Westinghouse to the project manager. The software version can be found under the ST Menu, Info, About Menu.

7.2 Data managers performing data management tasks shall be trained and qualified in accordance with Reference 4.4, Data Management Training Procedure MRS-GEN-1045-TD, current revision.

8.0 PRECAUTIONS

8.1 Dangerous voltages and electrical currents may be present inside data management equipment. Maintenance and repairs shall be conducted by properly trained and qualified personnel only.

8.2 Human performance factors should be reviewed prior to and during the inspection to raise the awareness of the potential for outside influences to affect the performance of personnel performing data management operations.

8.3 Set all auxiliary history inspection data sets to inspection dates ending in "02" or higher. Example: 2004/09/02 TS Profile. Use the redate function in the Histify program.

©2008 Westinghouse Electric Company

8.4 Assure that Outage ID Names are filled in for all historic inspection data sets loaded in the History database. This is accomplished by editing the Inspection Dates table (Main menu – Config ~ Database Prep ~ First Time Inspection ~ Inspection Dates).

9.0 PROCEDURE

NOTES

- This is a reference use procedure.
- Inspection scope and criteria should be defined in the site specific technical specification, degradation assessment, condition monitoring, and operational assessment.
- Reference the EPRI Pressurized Water Reactor Steam Generator Examination Guidelines for recommended minimal inspection criteria.

9.1 Database Preparation

9.1.1 Sites that have previous Westinghouse data management software databases

9.1.1.1 The most recent database for the steam generator(s) to be inspected should be restored from magnetic tape or other archived media to the data management computer.

9.1.1.2 When the database restore is complete, the database shall have the administrative lock removed by executing the UnlockAdminLock.exe file in the D:\ST\X directory and then selecting the appropriate database.

9.1.1.3 Using the UTILS floating menu, perform the following:

9.1.1.3.1 Update database compatibility.

9.1.1.3.2 Update database tables.

©2008 Westinghouse Electric Company

9.1.1.3.2 Run Global Location Sorting.

9.1.2 Sites that have no previous Westinghouse data management software databases.

9.1.2.1 The utility shall be contacted and a request submitted for a compatible file of the previous inspection results for the steam generator(s) to be inspected. The Westinghouse data management software is capable of loading data in various formats, including, but not limited to:

9.1.2.1.1 Eddynet IMS data management system (EIMS).

9.1.2.1.2 Tuban and Tuban2 data management systems.

9.1.2.1.3 ISIS data management system

9.1.2.1.4 FDMS Framatome Data Management System.

9.1.2.1.5 ASCII files with consistent fixed width formats.

9.1.2.1.6 Comma delimited ASCII files.

©2008 Westinghouse Electric Company

9.2 Inspection Planning

NOTES

- Inspection plan tubesheet maps used to populate inspection plans shall be located in the \IPLANS\MAPS directory on each database. No other maps or files shall be present in this directory.
- Queries (RCF files) used to populate inspection plans shall be located in the \IPLANS\QUERIES directory on each database. No other files shall be present in this directory
- SRID files used to populate inspection plans shall be located in the \IPLANS\SRIDS directory on each database. No other files shall be present in this directory.

9.2.1 The inspection program scope shall be specified and approved by the utility, customer, customer representative **or** designee.

9.2.2 The lead data manager should compile supporting documents in a single binder for all data managers to reference. This may include:

9.2.2.1 Scope of Examination Summary. This may be a scope letter **or** other document that formally specifies examination scope.

9.2.2.2 ETSS

9.2.2.3 ANTS

9.2.2.4 ACTS

9.2.2.5 Degradation Assessment

9.2.3 Each inspection plan shall, at a minimum, require the following parameters to be met to satisfy plan completion:

9.2.3.1 Probe type

©2008 Westinghouse Electric Company

9.2.3.2 Probe diameter(s)

9.2.3.3 Valid data results

9.2.3.4 Extent of inspection conducted

9.2.4 Most base scope inspection programs should be map based plans. Query generated base scope inspections may be used as required, provided that the data being queried is static, such as a previous inspection.

9.2.5 Query files shall be written to return indications that are required to be inspected in accordance with Appendix 12.1.

9.2.5.1 These query files shall be independently verified by a qualified data manager.

9.2.5.2 Query files used for scheduling examinations in accordance with Appendix 12.1 **or** 12.8 should be verified by running the query on a database that is known to contain indications **or** conditions that meet the query criteria. Examples of ways to perform this verification are:

9.2.5.2.1 Query a previous inspection (history) database.

CAUTION

If procedure step 9.2.5.2.2 is utilized for query verification, care must be taken to ensure that the test data is deleted from the current database prior to loading actual eddy current inspection results.

9.2.5.2.2 Create a "mock" analysis report that contains indications **or** conditions that meet the query criteria and load said report into the current database.

©2008 Westinghouse Electric Company

9.2.6 Special Interest Inspection Plans

NOTE

- When Secondary data management is utilized, any special interest tests issued should be reconciled between the two data management systems prior to being issued to acquisition.

9.2.6.1 Typically, query files should be used to generate special interest inspection programs.

9.2.6.2 Queries used for scheduling special interest inspection programs should be verified using the actions outlined in Section 9.2.5.2.

9.2.7 Positive Identification (PID) Inspection Plans

NOTE

- When Secondary data management is utilized, any PID tests issued should be reconciled between the two data management systems prior to being issued to acquisition.

9.2.7.1 The data manager loading the PID plan should verify that the plan being loaded is selected for PID.

9.2.7.2 For PID of bobbin coil indications, a subsequent examination of the indication location is usually sufficient to perform the PID.

9.2.7.3 PID of rotating coil **or** +Point® indication may require a subsequent examination with the same technique used to initially identify the indication.

9.2.7.4 Some utilities allow the confirmation of a bobbin coil indication by rotating coil **or** +Point® to constitute a positive identification. The customer should document this contingency if implemented.

©2008 Westinghouse Electric Company

9.2.8 Tube Support Plate Alternate Plugging Criteria.

9.2.8.1 The Degradation Assessment should contain the information required to properly implement APC/ARC/IPC/IRC criteria. At sites that implement these alternate repair methods, the specifics of the criteria should be captured in appendices 12.1, 12.2, and 12.3 as appropriate.

9.2.8.2 Westinghouse or site engineering may require additional files and other computer generated output to support the implementation of these types of alternate criteria. The lead data manager should communicate with the cognizant party to determine what additional files and output, if any, will be required.

9.2.9 Tubesheet Alternate Plugging criteria.

9.2.9.1 The Degradation Assessment should contain the information required to properly implement alternate tubesheet plugging criteria, such as F*, B* and W*. At sites that implement these alternate repair methods, the specifics of the criteria should be captured in appendices 12.1, 12.2, and 12.3 as appropriate.

9.3 Tube Repair Chronology

9.3.1 Tube repair chronology tubesheet maps shall be verified by the lead data manager and shall have an independent verification performed. When available, the tube repair chronology should be compared against site provided documentation. Subsequent verifications need not be performed after the initial verification has been completed. All repairs performed during the current inspection shall be indicated on the tube repair chronology tubesheet map and independently verified.

©2008 Westinghouse Electric Company

9.3.2 The chronological tubesheet map of all tube repairs and modifications shall be maintained for each steam generator. The repairs and modifications to be noted should include, but not be limited to:

9.3.2.1 Mechanical plugs.

9.3.2.2 Weld plugs.

9.3.2.3 Roll plugs.

9.3.2.4 Thimble plugs.

9.3.2.5 Plug in plug (PIP).

9.3.2.6 Plug a plug (PAP).

9.3.2.7 Sentinel plugs.

9.3.2.8 Stabilizers.

9.3.2.9 Stakes.

9.3.2.10 Dampeners.

9.3.2.11 Tubesheet sleeves, elevated and full depth.

9.3.2.12 Support plate sleeves.

9.3.2.13 Tube expansions in baffle support plate preheater sections.

9.3.2.14 Tube expansions at support plates for tube locking.

9.3.2.15 Tube pulls.

9.3.2.16 Implant tube material.

©2008 Westinghouse Electric Company

9.4 Scope Expansions

9.4.1 Typical Inspection Results Categories

9.4.1.1 Category C-1

9.4.1.1.1 Less than 5% of total tubes inspected are degraded tubes and none of the inspected tubes are defective.

9.4.1.2 Category C-2

9.4.1.2.1 Between 5% and 10% of the total tubes inspected are degraded tubes, **or** one **or** more tubes, but not more than 1% of the total tubes inspected, are defective.

9.4.1.3 Category C-3

9.4.1.3.1 More than 10% of the total tubes inspected are degraded tubes **or** more than 1% of the inspected tubes are defective.

9.4.1.4 In all inspections, previously degraded tubes must exhibit significant growth (>10%) further wall penetrations **or** growth greater than 25% of the repair limit to be included in the above percentage calculations.

9.4.2 All inspection scope expansions should be in accordance with site specific technical specification requirements and EPRI PWR Steam Generator Examination Guidelines. The utility has the ultimate responsibility for ensuring all required expansions are conducted in accordance with these documents.

9.4.3 Scope expansion criteria should be determined prior to the commencement of eddy current inspections whenever possible and documented in Appendix 12.1.

©2008 Westinghouse Electric Company

9.5 Data Entry

NOTES

- Manual entry of database records is strictly prohibited.
- Manual manipulation of entered database records is strictly prohibited.

9.5.1 Analysis results should be entered into the database as soon as possible.

9.5.2 Data should be entered into the database only when primary versus secondary resolutions are complete.

9.5.3 The primary, secondary, and any other ancillary analysis report files shall be transferred to the data management computer and the records contained therein shall be entered into the OTHER database after resolutions have been performed.

9.5.4 Resolution report records are the only records that are normally loaded into the CURRENT database. The lead data manager may elect to load other results into the CURRENT database at their discretion.

9.5.5 Transferring analysis results

9.5.5.1 Resolution analysts will typically provide hard copies of the primary Vs. secondary comparison results to the data management team.

9.5.5.2 The data manager shall transfer the primary, secondary, and resolution report files to the data management computer.

9.5.5.3 The resolution report shall be automatically screened for accuracy with respect to analysis reporting criteria as defined in Appendix 12.1 using QA Queries.

©2008 Westinghouse Electric Company

9.5.5.4 The resolution report shall be automatically screened to ensure that historical indications are being addressed as required.

9.5.5.5 The resolution report records should be verified against the comparison results hard copy for accuracy. The Resolution Check tool should be used to verify that the results indicated on the comparison hard copy are reflected in the resolution report.

9.5.5.6 **If** errors are detected in steps 9.5.5.3 through 9.5.5.5 **then** the resolution analyst should be provided with a complete list of all errors discovered.

9.5.5.7 When batch loading analysis reports, it is permissible to load data records into the database provided that any errors detected in steps 9.5.5.3 through 9.5.5.5 are promptly corrected by the resolution analysts. The corrected report(s) should then be reloaded into the database.

9.5.5.8 When no errors are detected in the resolution report, it should be entered into the CURRENT database.

9.5.5.9 The data management operator shall review the database entry log for any problems encountered during the loading process. All problems encountered shall be investigated and resolved.

9.5.5.10 The data management operator should verify the probe type and diameter entered in the data center against the data set summary.

©2008 Westinghouse Electric Company

9.5.5.11 **If** discrepancies are noted between the probe type and/or probe diameter of the probe listed in the summary when compared to that entered in the DataCenter **then** the following actions should be taken:

9.5.5.11.1 **If** the discrepancy is due to a possible acquisition technician error, **then** the acquisition shift supervisor shall be notified immediately for resolution of the discrepancy. This would occur if the test type as indicated on the cal board is of a certain type and the probe expected in the summary is dissimilar to that indicated, **or** of a type of probe not capable of performing the specified technique.

9.5.5.11.2 The data management operator should use the update probe serial numbers tool located in the data center to populate the serial number fields in the data center. Any serial number present in a cal summary that is not present in the appropriate serial number table shall be researched against provided serial number lists. **If** the serial number cannot be located in the provided documentation, **then** the eddy current acquisition shift supervisor shall be notified immediately.

©2008 Westinghouse Electric Company

9.6 Data Quality

9.6.1 EPRI guidelines require that data quality be monitored to improve accuracy in detecting and sizing tube degradation and to identify retest conditions during the acquisition process.

CAUTION

Override comments and indications are global in effect for all DQM test types. DO NOT create more than one override comment and one override indication code. Multiple override comments and indications serve no purpose since they are all the same in effect.

9.6.2 Data management should verify that the required quality checks are being conducted during the acquisition process. These quality checks are specified by the data quality configuration files (dqv) provided by the lead analyst.

9.6.3 Data quality verification should be conducted by using the data management software tools for the following:

9.6.3.1 Data quality checks have been performed for all data of record.

9.6.3.2 The data quality checks, as specified by the data quality configuration files, are being performed. These checks may include:

9.6.3.2.1 ESP – Encoder Speed Check
9.6.3.2.2 ETS – Presence of EC Channel Signals Check
9.6.3.2.3 EXT – Extent of Test Check
9.6.3.2.4 IF0 – IPV OFF, Manual Tube ID Encode
9.6.3.2.5 IF1 – Vision Tube ID Disagrees with Robot
9.6.3.2.6 IF2 – Robot Tube ID In Question
9.6.3.2.7 IF3 – Operator Override of Operation Lockout
9.6.3.2.8 IP1 - Manual Tube ID Encode – Two Operators Verify Position

©2008 Westinghouse Electric Company

9.6.3.2.9 IP2 – Vision OFF – Operator Verifies Robot Tube ID
9.6.3.2.10 IP3 – Vision ON Robot Agrees – Normal PASS Condition
9.6.3.2.11 LOC – Bad Auto Locate Check
9.6.3.2.12 RPC – Several RPC Checks (Axial, Circ Speed, Trigger, RPM)
9.6.3.2.13 SAT – Saturation Check
9.6.3.2.14 SNR – Signal to Noise Ratio Check
9.6.3.2.15 SPD – Axial Speed Check
9.6.3.2.16 SPK – Spiking Check
9.6.3.2.17 TID – Tube Finger Print Check (Tubesheet)

9.6.4 Data valid in the CURRENT database with an override comment **or** indication and a DQM fail is accepted as a DQM pass.

9.6.5 Data valid in the CURRENT database with no override comment **or** indication and a DQM fail shall be addressed by a resolution analyst.

9.6.6 The verification will match the tests based on the cal set tube list index value. All other tube list indexes for the same leg, row and column in either the CURRENT **or** OTHER database will be ignored. Example: **If** there is a DQM fail for tube list index 5 and the resolution analysis results are reported from the same row and column tube list index 6 that has a pass, **then** the DQM fail on tube list index 5 is ignored.

9.7 Reporting

9.7.1 The content and deliverable times of reports shall be agreed upon between the customer, project manager, and lead data manager.

9.7.2 It is recommended that the reports contain only necessary and pertinent information and are of infrequent intervals to prevent significant disruption in the data management processing flow.

9.7.3 Typical shift report items may include, but are not limited to:

©2008 Westinghouse Electric Company

9.7.3.1 Eddy current production line chart by leg and technique.

9.7.3.2 Inspection summary spreadsheet, which should include all scheduled inspection scopes by leg and technique, as well as an inspection total.

9.7.3.3 Listing of pertinent indications.

9.7.3.4 Listing of potential repairable indications.

9.7.4 Care should be taken to avoid mistakes in the shift report. The data manager generating the report should review it against the previous report and check for obvious inaccuracies. A second data manager should review the shift report for completeness and accuracy. Data managers performing shift report tasks should allow enough time prior to the time the report is due to recover from unforeseen problems, such as typographical errors and equipment malfunctions.

9.7.5 The acquisition status maps should be used to obtain acquired test numbers for single entry inspection techniques such as bobbin and top of tubesheet rotating coil tests.

9.7.6 The data center count should be used to obtain acquired test numbers for multiple entry inspection techniques such as freespan and support plate rotating coil tests.

9.7.7 No information regarding the inspection shall be released to any individual other than those directed by the utility **or** designee, project manager, **or** lead analyst. Inspection results shall not be discussed with individuals who do not have a "need to know." Inspection results should not be discussed outside of the workplace with any individual.

9.7.8 As required, data management will transfer Microsoft Access databases to support Westinghouse Engineering.

©2008 Westinghouse Electric Company

9.7.8.1 Use the File Distribution Agent to create and transfer the database.

9.7.8.2 A query file shall be created that shall return all data of record for inclusion in the transfer file.

9.7.8.3 The file naming convention shall be: PlantAlpha_SG#_MonthYear_Alldat_DateTime.mdb. For example, AEP_21_0404_ALLDAT_0407040800.mdb.

9.8 Retest List Generation

NOTE

- When Secondary data management is utilized, any retest list issued should be reconciled between the two data management systems prior to being issued to acquisition.

9.8.1 When requested by acquisition **or** when required, the data management operator should perform the following steps to identify any tubes missed **or** in a retest condition:

9.8.1.1 Using the dialog under Reports-Eval:

9.8.1.1.1 Run Eval for the affected plan **or** zone. This program provides a tubesheet map and a text file of inspection plan status in relation to loaded resolution analysis results. When a test program is complete as loaded into Iplans, the tubesheet map will indicate completed examinations with a green ∩ symbol. Other symbols that may appear on the tubesheet map are:

9.8.1.1.1.1 Blue X – no test conducted for this tube and program.

9.8.1.1.1.2 Red R – tube has a retest condition.

©2008 Westinghouse Electric Company

9.8.1.1.1.3 Magenta M – tube is complete on one **or** more programs, but is a retest **or** no test has been conducted for one **or** more other programs.

9.8.1.1.2 Run RETESTS for the affected plan **or** zone. Provides a list of tubes that are in a retest condition for a given inspection plan. View the output for the presence of tubes with retest conditions.

9.8.1.1.3 Run MISSED for the affected plan **or** zone. This program queries the Iplans database and identifies scheduled tests for each tube in the program, then searches those tubes for the presence of ANY data for that inspection plan in the main database. Provides a list. View the output for the presence of tubes in the inspection plan **or** zone that have no test results.

9.8.1.1.4 If no missed tubes **or** tubes with retest conditions are identified, the closeout process for the affected plan **or** zone shall be initiated.

9.8.1.1.5 When ROSA, Pegasys, or GENESIS manipulators are utilized, any retest list issued shall have a task manager file created and transferred to the appropriate acquisition computer.

9.8.1.1.6 Any printed retest list **or** tubesheet map shall include the ETAG to be used to perform the acquisition of the retest data.

9.9 Shift Activities

9.9.1 A shift by shift check of various database conditions should be conducted whenever possible.

9.9.2 Appendix 12.10 should be created to outline the actions to be performed each shift.

©2008 Westinghouse Electric Company

9.9.3 A log shall be created and maintained to communicate problems encountered or suggestions for improvement of the data management software to the software engineer. Entries in this log should include:

9.9.3.1 Name or initials of person reporting the problem or suggestion.

9.9.3.2 Detailed description of the problem or suggestion.

9.9.3.3 If the topic is a software problem, the person reporting the problem should offer one or more suggestions to eliminate or work around the problem encountered.

9.9.4 The software log shall be delivered to the system engineer as soon as possible following the completion of the inspection.

9.9.5 A log shall be maintained to communicate pertinent information from shift to shift. This log is an official document and entries in it should be job related, concise, and to the point. The use of this log to relay non-inspection related information is discouraged.

9.9.6 A lessons learned document should be created to capture issues that arise during the inspection that could affect future inspections at the site or other sites. The document should be easily accessible by all data managers assigned to the inspection by having a shortcut on the desktop to the document.

©2008 Westinghouse Electric Company

10.0 CLOSEOUT

*****CRITICAL STEP*****

1. **Consider any final revision items to the Closeout Checklist: Expansions, Special Tests, Special Analysis, Loose Parts, etc.**
2. **Appendix 12.6 Peer Review of Closeout Checklist is complete**
3. **Use S.T.A.R. (Stop, Think, Act, Review)**

10.1 Inspection Closeout

10.1.1 At a minimum, the closeout checklist should contain the following tasks from the Inspection Plan Floating Closeout Menu.

10.1.1.1 Verify DB Vs. Network. This program compares the data entered into the database against the report files on the analysis results server. Any discrepancies shall be investigated and resolved. This program normally returns a "no problems found" message.

10.1.1.2 ASCII Verify. This program compares the gqa (Global QA, the data management software module name for the Verify DB Vs. Network program) files transferred from the server in step 10.1.1.1 to the resolution reports stored on the data management software computer. Any discrepancies shall be investigated and resolved. Normally, no discrepancies are identified.

10.1.1.3 Scrub database. This program cross checks plan assignments versus probe types, probe sizes and test extents. This program normally returns a "Scrub Complete" message.

©2008 Westinghouse Electric Company

10.1.1.4 Eval. This program provides a tubesheet map and a text file of inspection plan status in relation to analysis. When a test program is complete as loaded into Iplans, the tubesheet map will indicate completed exams with a green ∩ symbol. Other symbols that may appear are:

10.1.1.4.1 Blue X – no test conducted for this tube and program.

10.1.1.4.2 Red R – tube has a retest condition.

10.1.1.4.3 Magenta M – tube is complete on one **or** more programs, but is a retest **or** no test has been conducted for one **or** more other programs.

10.1.1.4.4 Missed tubes. This program queries the Iplans database and identifies scheduled tests for each tube in the program, then searches those tubes for the presence of ANY data for that inspection plan in the main database. Provides a list.

10.1.1.4.5 Retest Report. Provides a list of tubes that are in a retest condition for a given inspection plan.

10.1.1.5 Map Test Extents By Plan. This program queries the current database for valid test extents and provides an ASCII file output and tubesheet maps representing the completed valid data test extents in relation to inspection plans. Can also be used with OTHER and HISTORY databases.

10.1.1.6 Map Test Extents By Probe. This program queries the current database for valid test extents and provides an ASCII file output and tubesheet maps representing the completed valid data test extents in relation to probe size and type. Can also be used with OTHER and HISTORY databases.

©2008 Westinghouse Electric Company

10.1.1.7 History Matching. This program compares the current database against a defined set of historical indication records to ensure that these historical indications are addressed during the current inspection.

10.1.1.8 QA Current. This program runs the core database checks and any QA Queries that are in the QA query queue. Any problems identified shall be investigated and resolved.

10.1.1.9 IsSpun. This program utilizes either user settings **or** a defined query file to compare indication types **or** codes versus specific test requirements, usually a probe, technique type and extent of examination.

10.1.1.9.1 The closeout check list shall be specific in the usage of this software tool.

10.1.1.9.2 Query files are required for use with IsSpun. These query files should be verified by using the steps recommended in Section 9.2.5.2. These query files shall be verified by the data manager performing the IsSpun task.

10.1.1.9.3 Additional usage of the IsSpun program is encouraged, and data managers are also encouraged to provide additional input to the lead data manager for consideration of incorporating the idea into the formal closeout check list.

10.1.1.10 Tube By Tube Location/Extent Codes. Queries the database and returns structures reported in tubes that are defined as not having the reported structure. Provides a list. Normally no structures are returned.

10.1.1.11 Checks Menu

©2008 Westinghouse Electric Company

10.1.1.11.1 Plan Zero. This program identifies inspections completed but not scheduled for the current inspection.

10.1.1.11.2 IND and LOCN ???. This program identifies indications and locations not supported by the database tables. These errors usually occur in the primary and secondary analysis reports. Any errors discovered in the resolution reports **or** the current database shall be investigated and resolved.

10.1.1.11.3 Plugs. Normally not used. Verifies that all plugged tubes have a database record of "PLG".

10.1.1.11.4 NoOp. This program is populated with tubes that share a certain peculiarity **or** condition. Possible uses of this program are tubes to be In-Situ tested, pulled **or** other non-eddy current processes.

10.1.1.11.5 List Manager. Used to identify zones, tubes of particular interest and many other uses. Users may select from the following categories to enhance understanding of the list type:

10.1.1.11.5.1 Information

10.1.1.11.5.2 Warning!

10.1.1.11.5.3 STOP WORK

10.1.1.11.6 Cals Not Of Record In Data Center. Verifies that no data marked as not of record in the Data Center resides in the database.

10.1.1.11.7 Multiple Probes For Same Cal. This program produces a list of any cals that contain conflicting probe types **or** sizes.

©2008 Westinghouse Electric Company

10.1.1.11.8 Completed Test For Restriction **or** Incomplete Codes. This program verifies that invalid **or** incomplete analysis code types do not satisfy an inspection program.

10.1.1.11.9 DIM/ARC/LEN Missing Or Order. This program looks for dimension records for rotating probe types that are missing **or** erroneous in order when required.

10.1.1.11.10 Util Comments. Checks the analysis report type selected for comments in the utility fields and verifies that a conversion exists in the comments table in the database to convert the utility field code to a plain text comment.

10.1.1.11.11 Dupe Call Check. Scans the user selected indications and identifies those that are in close proximately to each other in one or more of the following user defined fields as possible duplicate calls.

10.1.1.11.11.1 Volts

10.1.1.11.11.2 Degrees

10.1.1.11.11.3 Inch

10.1.1.12 Analysis Cross Check. This tool checks for the presence of results in an ancillary analysis type when compared to the "of record" type. Several user definable criteria are available to the user including:

10.1.1.12.1 Master Type

10.1.1.12.2 Matching Type

10.1.1.12.3 Matching Indications

©2008 Westinghouse Electric Company

10.1.1.12.4 Match Extents

10.1.1.12.5 Match Tubes

10.1.1.12.6 Match Index

10.1.1.12.9 Match Indications

10.1.2 Universal Matching (UMatch)

10.1.2.1 This software module compares the results of two query files **or** collection of query files and identifies indications that are returned in both (Matched) and indications returned only in the master query (Not Matched).

10.1.2.2 Indications can be matched based on generic settings used for those configured for history matching, **or** can be set to require exact matching on one **or** more of the following fields:

10.1.2.2.1 Volts
10.1.2.2.2 Degrees
10.1.2.2.3 Indication
10.1.2.2.4 Channel
10.1.2.2.5 Location
10.1.2.2.6 Inch1
10.1.2.2.7 Inch2
10.1.2.2.8 Begin Test
10.1.2.2.9 End Test

10.1.2.3 Any query used for UMatch should be verified using the steps outlined in Section 9.2.5.2. Queries should be verified by each data manager utilizing the queries.

©2008 Westinghouse Electric Company

10.1.2.4 Umatch configuration files (yum's) may be stored on the database drive for use by all data managers. These configuration files should be verified at least once during the inspection and re-verified when used for inspection closeouts.

10.1.3 Verification of Appendix 12.8 Requirements

10.1.3.1 During closeout, all Appendix 12.8 documents shall be reviewed to ensure the requirements set forth in the documents have been satisfied.

10.1.4 Secondary Data Management

10.1.4.1 When secondary data management is utilized, the two databases should be compared to ensure that both systems contain the same results. Two methods may be used to perform this comparison:

10.1.4.1.1 An ASCII file comparison, such as the EIMS vs Westinghouse data management software tool. This is the preferred method.

10.1.4.1.2 An indication count comparison may be used to check database consistency. It should be noted that this method does not check indication locations, and is not a totally accurate verification. The same number of indications in both databases does not mean they are the same indications. This type of check can be assumed to be reasonably accurate.

©2008 Westinghouse Electric Company

10.2 Repair Closeout

*****CRITICAL STEP*****

1. **Appendix 12.2 is complete.**
2. **Use S.T.A.R. (Stop, Think, Act, Review).**
3. **Verify repair lists with customer or secondary data management generated repair lists.**

CAUTIONS

- **Any tube in-situ pressure tested shall be repaired unless engineering evaluation allows the tube to remain in service.**
- **Any tube or location that is not tested in accordance with the inspection plan should be considered a repair candidate.**

10.2.1 All repair lists shall have written and signed customer approval prior to the start of any repair work.

CAUTIONS

Westinghouse data management is responsible to verify that no Eddy Current tests remain incomplete for tubes to be repaired (removed from service). This verification check shall be performed prior to issuing ST Max repair lists and/or repair Task Files. Westinghouse Shift Supervision shall be informed as to the results of this verification. Should a customer wish to repair tubes (remove from service) prior to the completion of all Eddy Current tests in the tubes, the Repair Directive Appendix on this procedure (12.8) shall be used to document the customers intentions.

10.2.2 Westinghouse data management will normally submit a repair list for approval by the utility.

10.2.3 Repair lists shall be created from map and query files. A SmartList shall be created for tube repair candidates. Appendix 12.2 and 12.8 shall be referred to when creating query and map files.

©2008 Westinghouse Electric Company

10.2.4 If a secondary data management system is present during the inspection, both the primary and secondary data management teams may prepare a repair list for each steam generator and compare the lists. Any discrepancies noted shall be resolved and agreed upon.

10.2.5 Upon completion of plugging, the project manager shall provide a complete listing of plug type and heat number installed by steam generator, leg, and location, typically by row and column number.

10.2.6 An independent verification of repairs conducted as indicated on the tube repair chronology tubesheet map shall be performed after the final map is created following the inspection.

10.2.7 Repair list generation.

10.2.7.1 The repair criteria shall be documented in Appendix 12.2 and 12.8, as required.

10.2.7.2 The data management repair criteria summary (Appendix 12.2) shall contain:

10.2.7.2.1 General repair criteria. Any criteria that can be applied to multiple techniques **or** is a "blanket" criteria, such as tubes In-Situ pressure tested.

10.2.7.2.2 Bobbin coil repair criteria

10.2.7.2.3 Rotating coil and +Point® repair criteria

10.2.8 When utilized for conditions not specified in Appendix 12.1 **or** 12.2, Appendix 12.8 shall include, at a minimum, the following information:

10.2.8.1 Tube numbers to be inspected **or** repaired, as applicable

10.2.8.2 Tube location(s) to be inspected **or** repaired, as applicable.

©2008 Westinghouse Electric Company

10.2.8.3 Technique to be used for the inspection, including probe type and diameter, ACTS **or** ETSS, ETAG, and extent of examination, or type and material to be used for repair.

10.2.9 Tube Plugging Parameter Files

10.2.9.1 In order for the data management software to store the plugging parameter files, the following prerequisites must be met:

10.2.9.1.1 A qualified data manager is on site.

10.2.9.1.2 The network connection between the data management and acquisition computers must be present and both computers must be active.

10.2.9.1.3 The plugging data files are located in the /home/outage/'alpha'/MP (where 'alpha' is the site alpha) subdirectory on each acquisition computer used for tube repairs. All files should be transferred utilizing CuteFTP in ASCII mode to the...\MPData directory for each database for which repairs **or** plugging occurred.

©2008 Westinghouse Electric Company

10.3 Post Outage Inspection Reporting

NOTE

The following activities are not required to be completed for eddy current inspections to be closed out and complete.

10.3.1 The contents of the inspection report shall be agreed upon by the customer, project manager, lead analyst and lead data manager. The lead data manager should request this information prior to the beginning of the inspection and verify the contents promptly upon completion of the inspection. Customers and project managers are often more busy at the completion of the inspection than prior to the inspection.

10.3.2 All query, tubesheet map, Adobe Acrobat, MS Word, MS Excel and ASCII report files that are created for the inspection report shall be stored in the /FINALRPT subdirectory.

10.3.3 An inspection report may contain, but is not limited to:

10.3.3.1 Inspection summary.
10.3.3.2 Inspection progress line charts.
10.3.3.3 Inspection program tubesheet maps.
10.3.3.4 As tested tubesheet maps by program.
10.3.3.5 Listing of all pertinent indications.
10.3.3.6 Listing of results for tubes tested for special interest.
10.3.3.7 Listing of all repairable indications.
10.3.3.8 Completed procedure appendices.
10.3.3.9 Tube repair chronology tubesheet map.

10.4 As required, Westinghouse data management shall provide a transfer file containing the outage results for transfer into a customer operated database. These transfer files should be maintained in the CUSTXMIT subdirectory on the database drive.

©2008 Westinghouse Electric Company

10.5 The lead data manager shall backup all databases to an alternate archival quality media such as CD-R, CD-RW, **or** other removable archival quality media, in addition to the magnetic tape media normally used to back up data management database files.

10.6 When access to the data management database server is available, the data management lead is required to archive each steam generator database and transfer archived files to the appropriate location on the database server.

11.0 PROCESS CONTROL SHEETS

Not Applicable

12.0 APPENDICES

12.1 TYPICAL INSPECTION CRITERIA SUMMARY
12.2 TYPICAL REPAIR CRITERIA SUMMARY
12.3 TYPICAL CUSTOMER APPROVAL OF BASE SCOPE INSPECTION PLANS
12.4.1 TYPICAL STEAM GENERATOR BOBBIN EDDY CURRENT CLOSEOUT CHECKLIST
12.4.2 TYPICAL STEAM GENERATOR RPC EDDY CURRENT CLOSEOUT CHECKLIST
12.4.3 TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST
12.5 TYPICAL DATA MANAGEMENT OPERATOR REVIEW
12.6 TYPICAL DATA MANAGEMENT PEER REVIEW
12.7 TYPICAL SECONDARY DATA MANAGEMENT PEER REVIEW
12.8 TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE
12.9 TYPICAL APPENDICES CHANGE NOTICE
12.10 TYPICAL SHIFT ACTIVITY CHECKLIST
12.11 SPECIAL EVALUATION/TUBE SELECTION CRITERIA
12.12 TYPICAL INSPECTION CRITERIA REVIEW QUESTIONS

©2008 Westinghouse Electric Company

APPENDIX 12.1
TYPICAL INSPECTION CRITERIA SUMMARY

Site: Watts Bar Unit 2 Baseline

Revision: 1 Date: Friday, February 05, 2010

Steam Generator Information: Model: D3 Tubes: 4674 OD: 0.750" Wall Thickness: 0.043"
TSP Thickness: 0.750" Baffle Thickness: 0.750" Tubesheet Thickness: 21.03"

Specifics

Westinghouse Model D3 steam generator with mill annealed Inconel 600 ¾" OD, 0.043" wall tubing with full depth hard rolled tubesheet expansions. See the analysis guidelines or procedure for a detailed description of the SG's.

Analysis Reporting Criteria

Bobbin Channel 1 – BLG and IDC
Bobbin Channel 2 – NTE, and PTE
Bobbin Channel 3 – DEP and DFI
Bobbin Channel 5 or P1 - DDI
Bobbin Channel 6 – ADI and MBM
Bobbin Channel 7 or 8 – PLP
Bobbin Channel 8 - PLI
Bobbin Channel P1 – DSI, DTI, DNG, MRS, PVN, OXP and RLP
Bobbin Channel P2 - DEI
Bobbin Channel P5 – AVB Wear (PCT @ AVB)
+Point Channel 7 – RLP
+Point Channel P1 – SCI
+Point Channel 4 – SAI, SOI, SVI and PVN
+Point Channel 3 or 4 – GEO, PRC, VOL and WAR
+Point Channel 11 – PLP
U-Bend +Point Channel 2 – SAI, SOI, SVI, WAR and PVN
U-Bend +Point Channel P2 – SCI
U-Bend +Point Channel P2 or 2 – GEO, and VOL
U-Bend +Point Channel 5 – PLP
Ghent Channel 3 – SAI, and SOI
Ghent Channel 4 – SCI
Ghent Channel 3 or 4 – GEO, SVI, WAR and VOL

Special Interest Examination Criteria

Spin all Bobbin I-Codes.
Spin all PTE's, OXP's and NTE's
Spin all Bobbin PLP's and Box In any RPC PLP.
Spin all Bobbin PVN and RMB with Mag Bias +Point probe. RMB may only be called by Reso analysts, and tube must be retested with Mag Bias probe.
Spin all DNG >= 2 Volts at support structures and >= 5 Volts in the Freespan Area.

©2008 Westinghouse Electric Company

APPENDIX 12.1
TYPICAL INSPECTION CRITERIA SUMMARY

Special Interest Examination Criteria (Cont.)

Any tube identified by TVA Tube Integrity, TVA Level III or Westinghouse Level III
This special interest program is a deviation from the original contract but has been agreed upon by all parties involved.

Other Criteria or Pertinent Information

- +PT calls should be reported within +/- 0.5 inches of the target indication.
- +PT indications should fall between 0 and 180 degrees.
- All +PT indications must have ID or OD reported by the Reso team as listed in the guidelines.
- +PT tests for Bobbin indications that do not confirm should be addressed as NDF with the location of target indication.
- PBC should be used on duplicate Bobbin runs to prevent multiple calls from different cals for the same indication(s). Use PRC in the same manner for multiple +PT runs. PBC and PRC require indication locations to be listed to address prior indications with the location of the target indications.
- Locations of calls will be referenced in the up direction from a structure except it is allowed to call up to –2.0 inches below a structure. This is true except that all +PT indications in the tubesheet will be referenced HTS or CTS minus.
- Bobbin indications that require +PT special interest tests that are further away from a structure +/- 3" will be spun from TSP to TSP. TSP point tests will be +/- 3". Top of Tubesheet tests will be +2/-2".
- PID calls must be addressed with the exact location of the target indication.
- TVA may have the Senior, Lead or Reso analysts add TBP code to certain tubes.
- All +PT PID tests are to be acquired using the Rev 5 EPRI EDM standard.

©2008 Westinghouse Electric Company

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented inspection summary accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 102/05/2010

Westinghouse Level III Signature/Date 102-5-2010

Customer or Customer Representative Signature/Date Daniel Adam 12/5/2010

Project Manager Signature/Date 2/5/10

©2008 Westinghouse Electric Company

APPENDIX 12.2
TYPICAL REPAIR CRITERIA SUMMARY

Site: Watts Bar Unit 2 Baseline

Revision: 0 Date: Tuesday, February 2, 2010

General Repair Criteria

Any percent indication >= 40%

Any tube or location In-situ pressure tested

Any tube not tested to the required extent

Any tube identified as TBP (to be plugged)

Bobbin Repair Criteria

Percent >= 40 %

Bobbin I code not tested with RPC

Rotating Coil/+Point® Repair Criteria

All Axial Cracks

Any Circ crack

Any Oblique crack

SVI calls at the Discretion of TVA

Percent >= 40%

Other Repair Criteria

Any indication, location, or condition requested by TVA in writing

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented repair criteria accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/02/2010

Westinghouse Level III Signature/Date 12-2-2010

Customer or Customer Representative Signature/Date Daniel Adams 12/2/2010

Project Manager Signature/Date R.A. Michalski 2/2/2010

©2008 Westinghouse Electric Company

APPENDIX 12.3
TYPICAL CUSTOMER APPROVAL OF BASE SCOPE INSPECTION PLANS

Date: Tuesday, February 02, 2010
Site: Watts Bar Unit 2
Outage: Baseline
Owner: TVA
Outage Date: February 2010

Bobbin Coil Inspection(s):

1. Inspect all open installed tubing from tube end in one leg to tube end in the opposite leg except for Rows 1 through 4.
2. Rows 1 through 4 shall be tested top support plate through tube end in both legs.
3. See attached tubesheet maps.

+Point®/Rotating Coil Inspection(s):

1. Inspect 100% of the open installed tubes at the hot leg tubesheet +/- 2".
2. Inspect 100% of the open installed tubes in the Ubend region of Rows 1 – 4.
3. See attached tubesheet maps.

Other:

None.

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented base scope inspection plans accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/02/2010

Westinghouse Level III Signature/Date 12-2-2010

Customer or Customer Representative Signature/Date 12/2/2010

Project Manager Signature/Date 2/2/2010

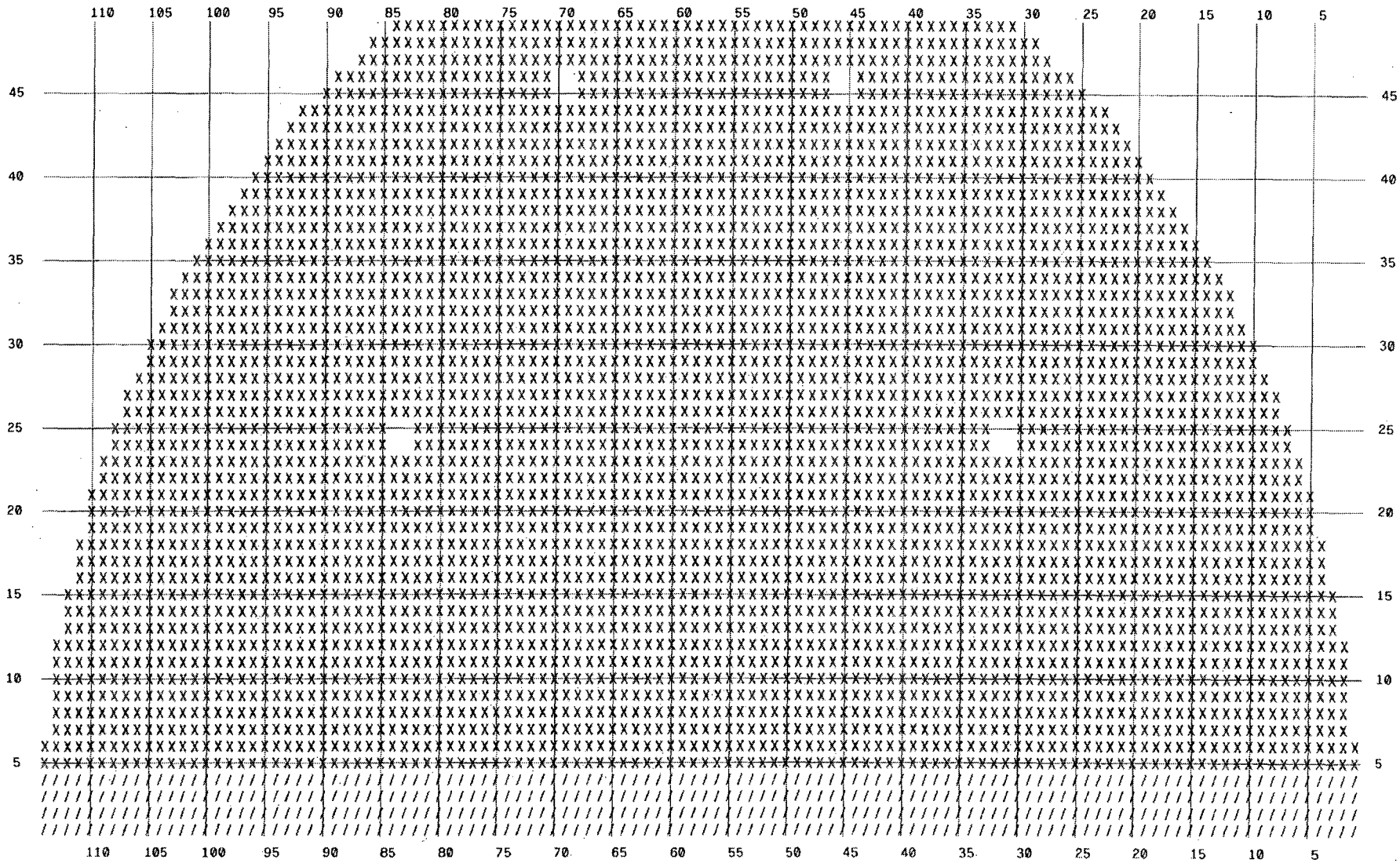
©2008 Westinghouse Electric Company

SG - 1 CL 610 BOBBIN PROGRAM

Watts Bar Baseline WBT D3

/ 456 TEST C14-CTE

X 4218 TEST HTE-CTE

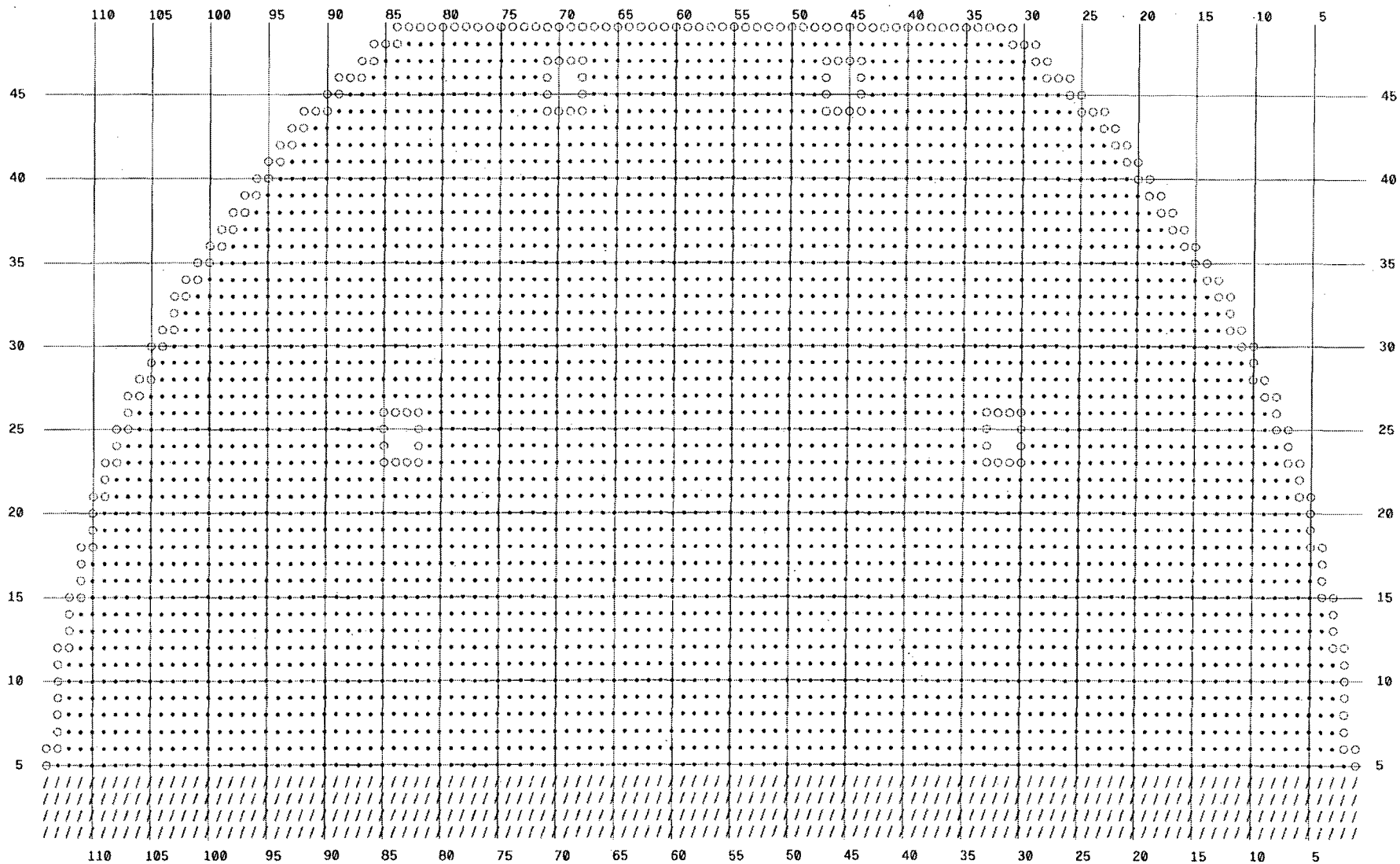


Westinghouse Electric Company LLC - ST Max 02/02/2010 09:46:32

SG - 1 HL 610 BOBBIN PROGRAM

Watts Bar Baseline WBT D3

/ 456 TEST H08-HTE

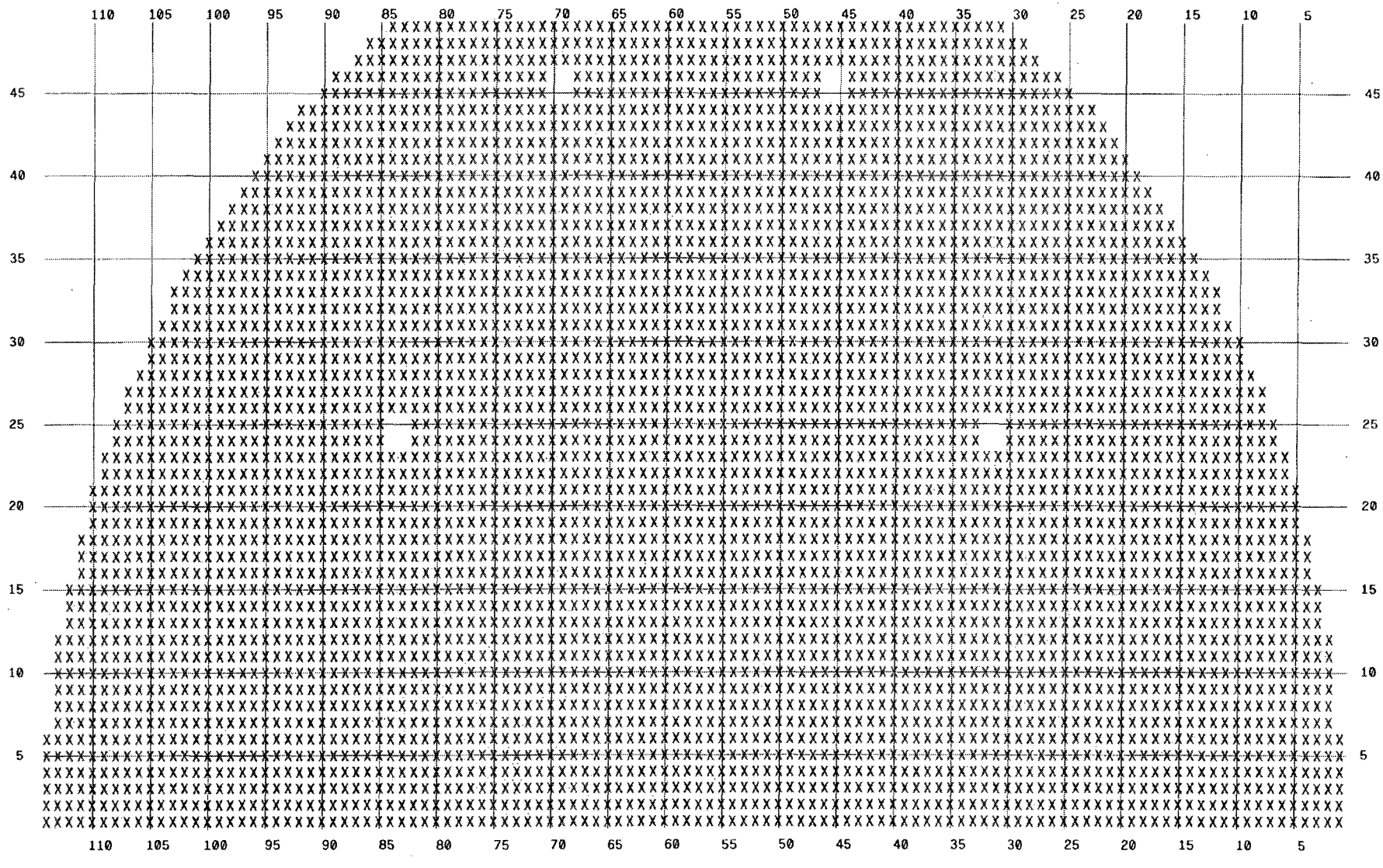


Westinghouse Electric Company LLC - ST Max 02/02/2010 09:46:27

SG - 1 HL 610 PLUS POINT TTS PROGRAM

Watts Bar Baseline WBT D3

X 4674 TEST HTS+/- 2"

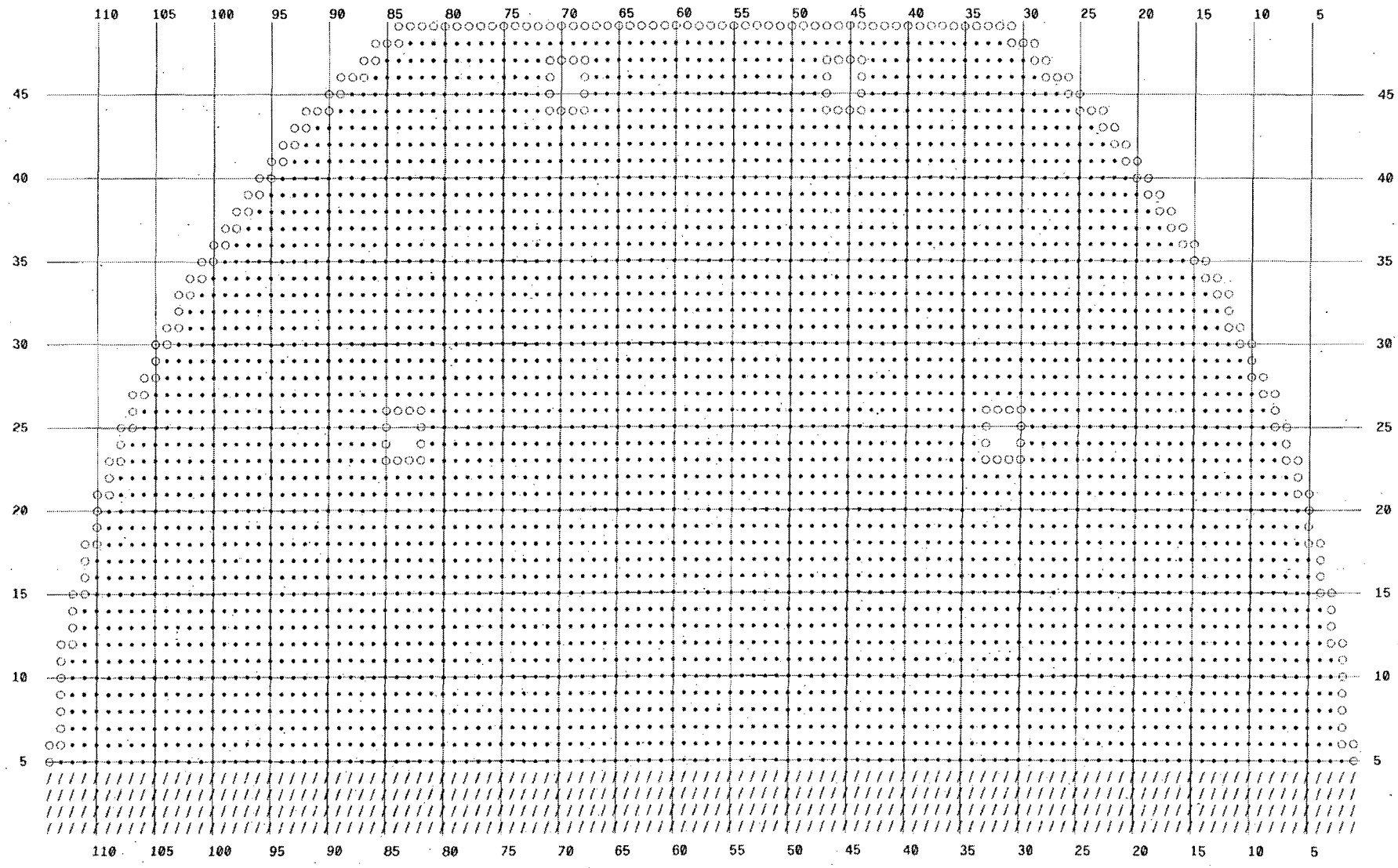


Westinghouse Electric Company LLC - ST Max 02/02/2010 09:46:21

SG - 1 LOW ROW 580 UBEND PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

/ 456 TEST H08-C14



Westinghouse Electric Company LLC - ST Max 02/02/2010 09:46:14

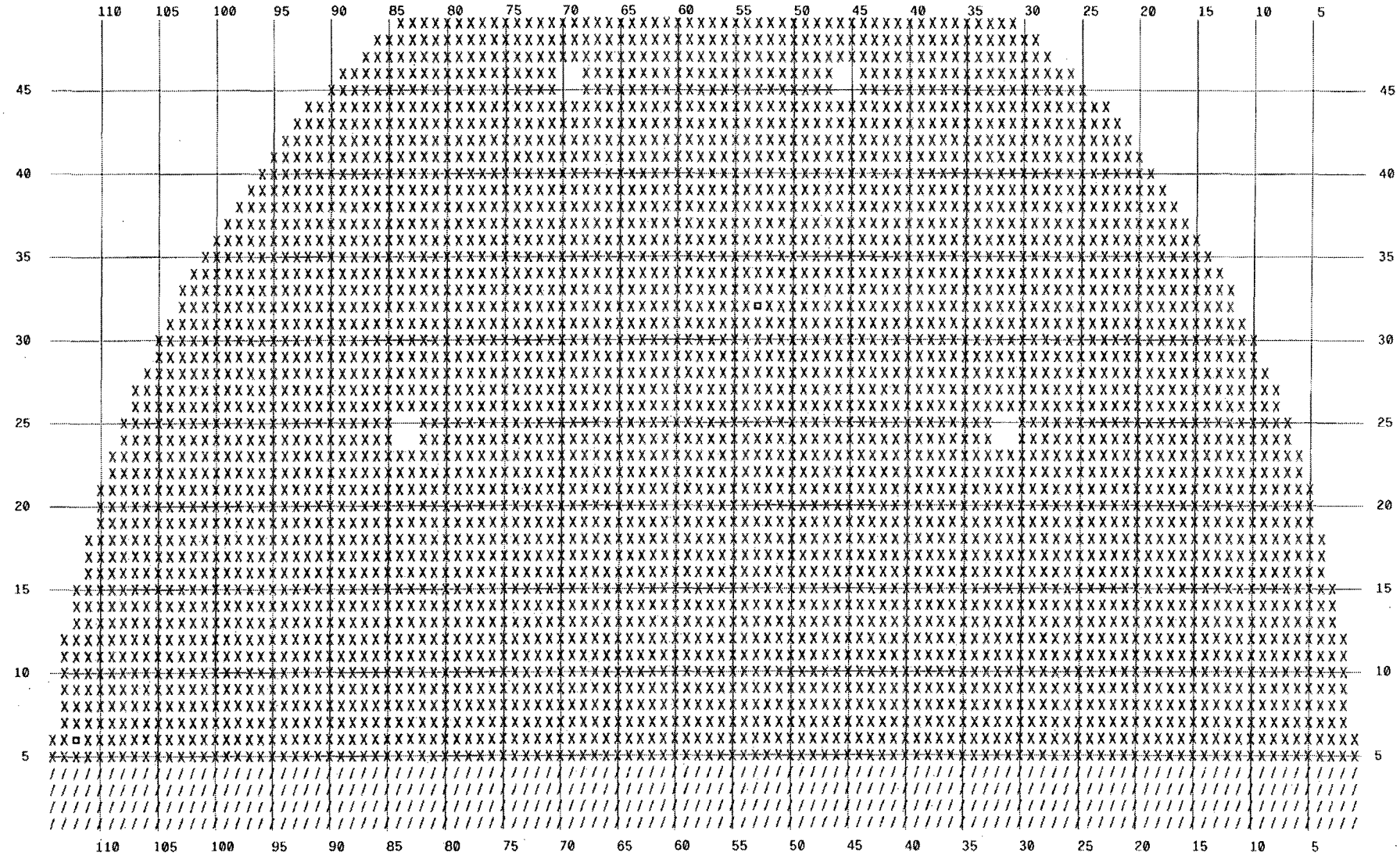
SG - 2 CL 610 BOBBIN PROGRAM

Watts Bar Baseline WBT D3

/ 456 TEST C14-CTE

X 4216 TEST HTE-CTE

▫ 2 PLUGGED TUBE



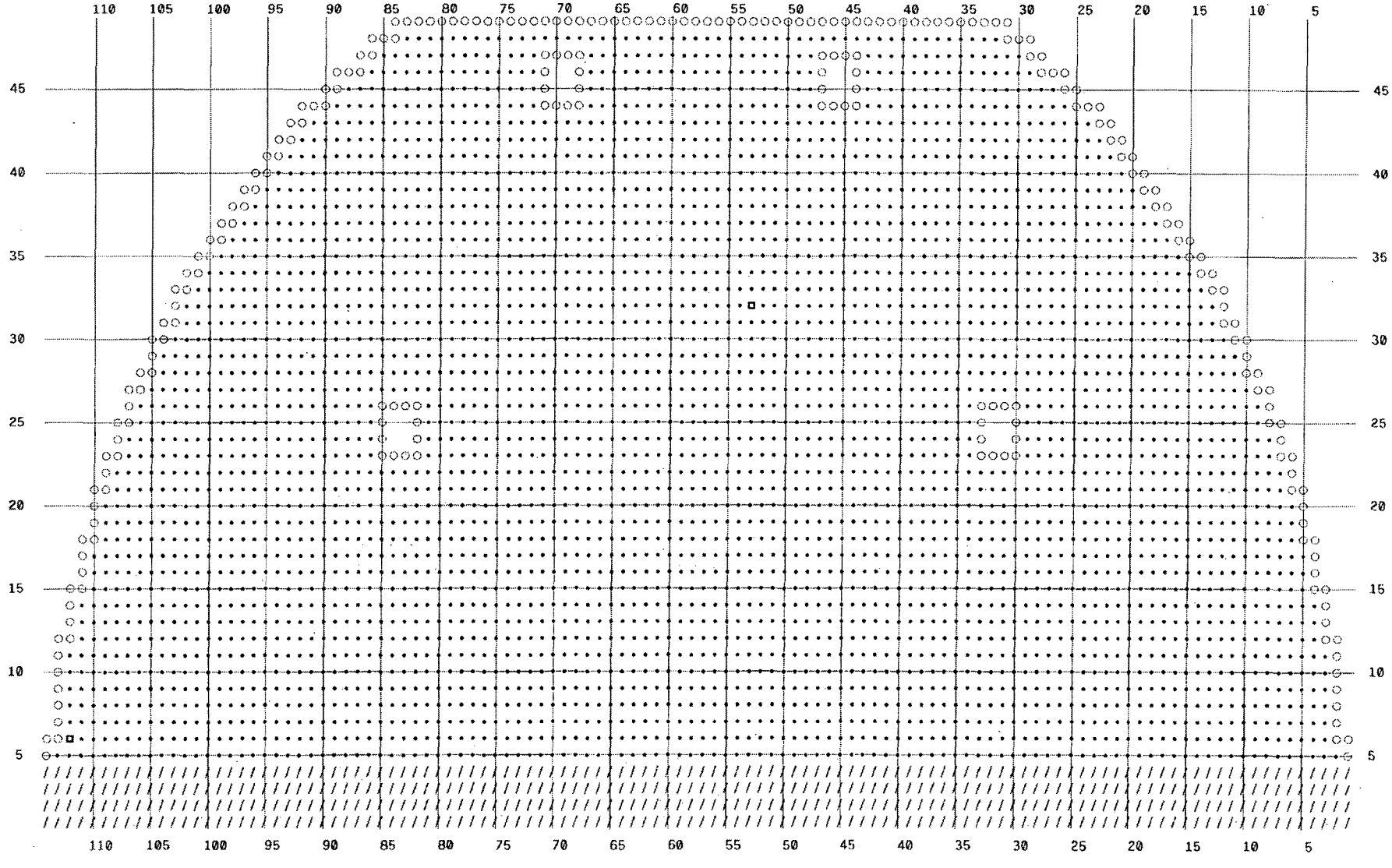
Westinghouse Electric Company LLC - ST Max 02/02/2010 09:47:28

SG - 2 HL 610 BOBBIN PROGRAM

Watts Bar Baseline WBT D3

/ 456 TEST H08-HTE

▫ 2 PLUGGED TUBE



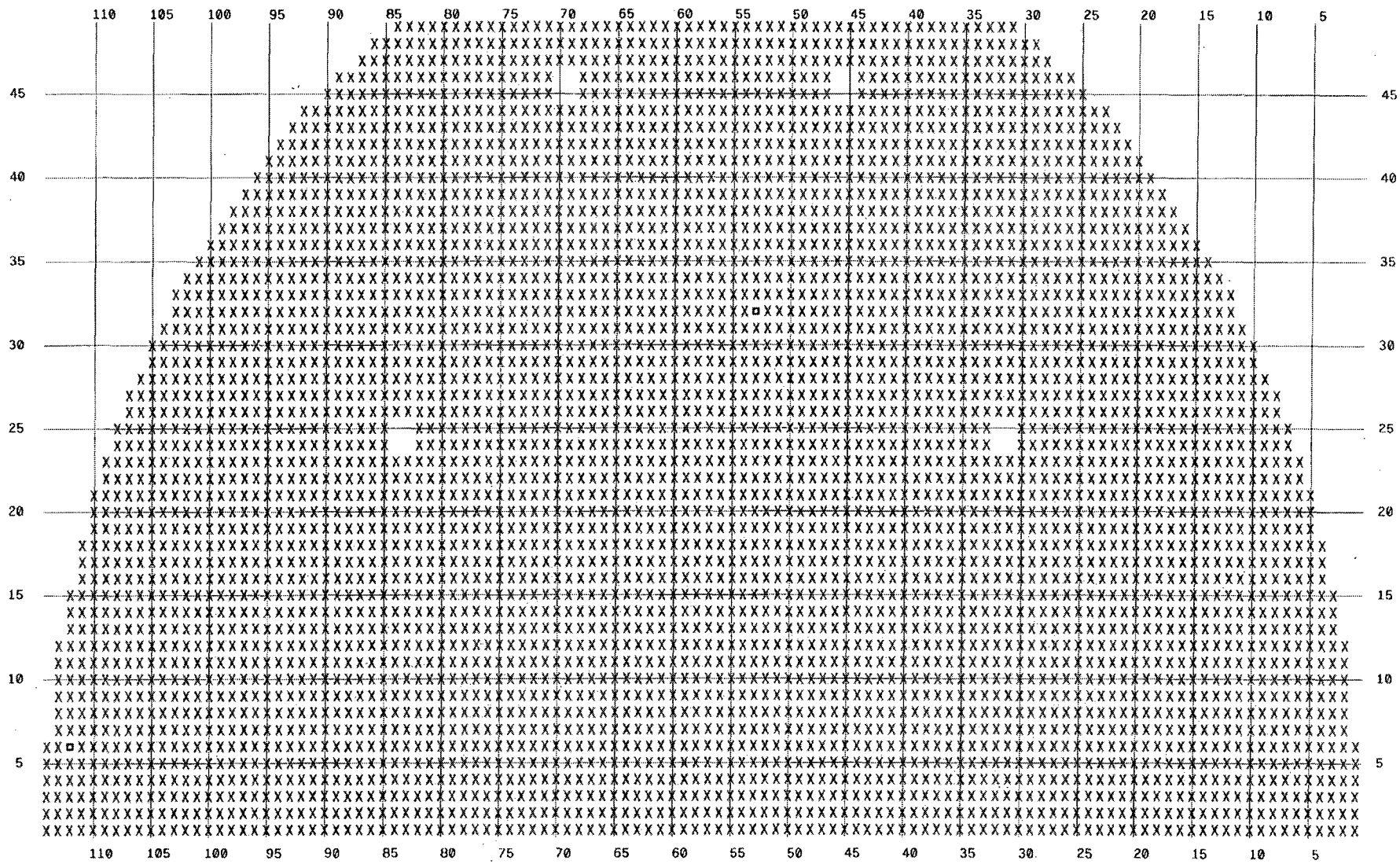
Weslinghouse Electric Company LLC - ST Max 02/02/2010 09:47:23

SG - 2 HL 610 PLUS POINT TTS PROGRAM

Watts Bar Baseline WBT D3

X 4672 TEST HTS+/- 2"

▫ 2 PLUGGED TUBE



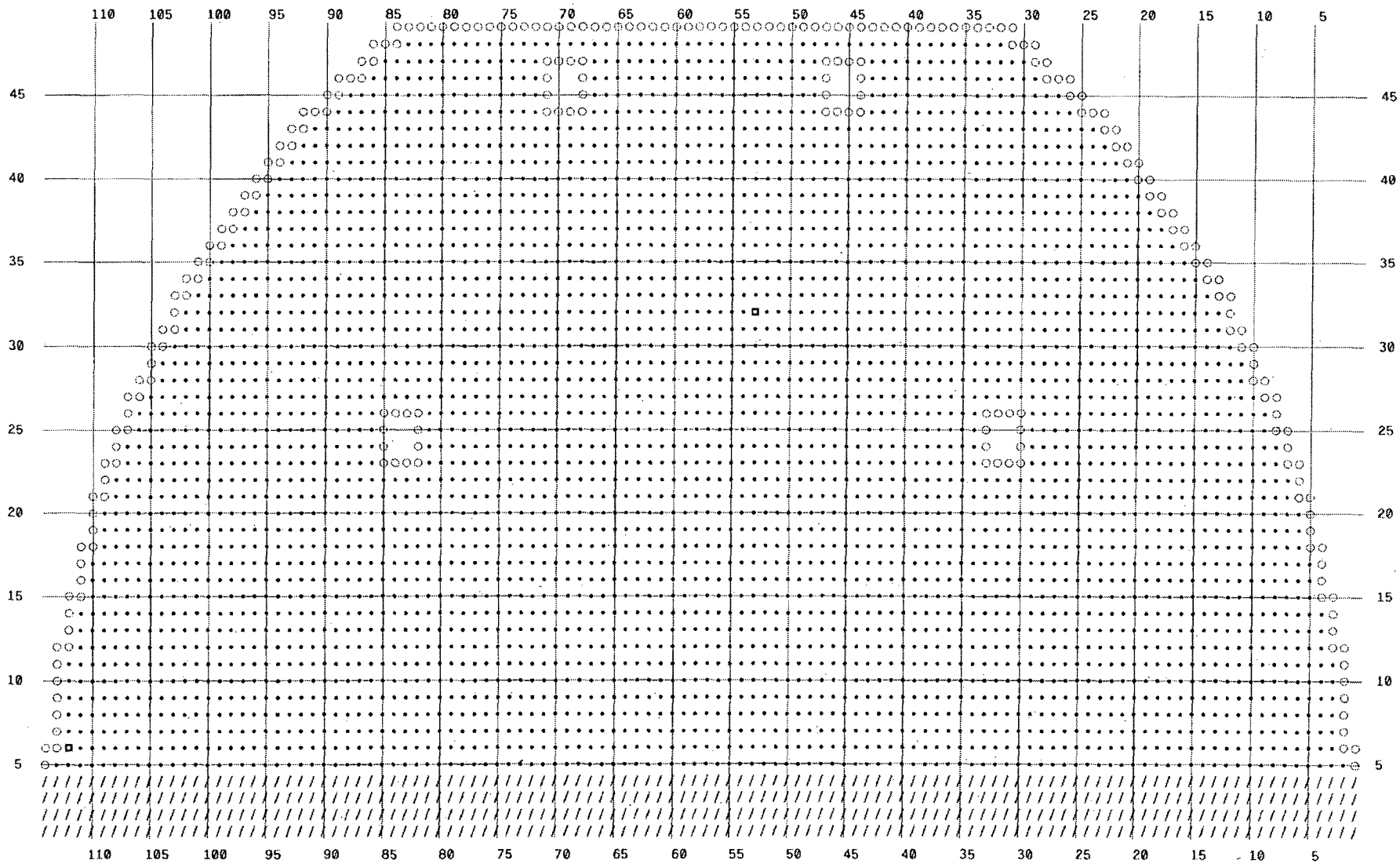
Westinghouse Electric Company LLC - ST Max 02/02/2010 09:47:19

SG - 2 LOW ROW 580 UBEND PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

/ 456 TEST H08-C14

▫ 2 PLUGGED TUBE



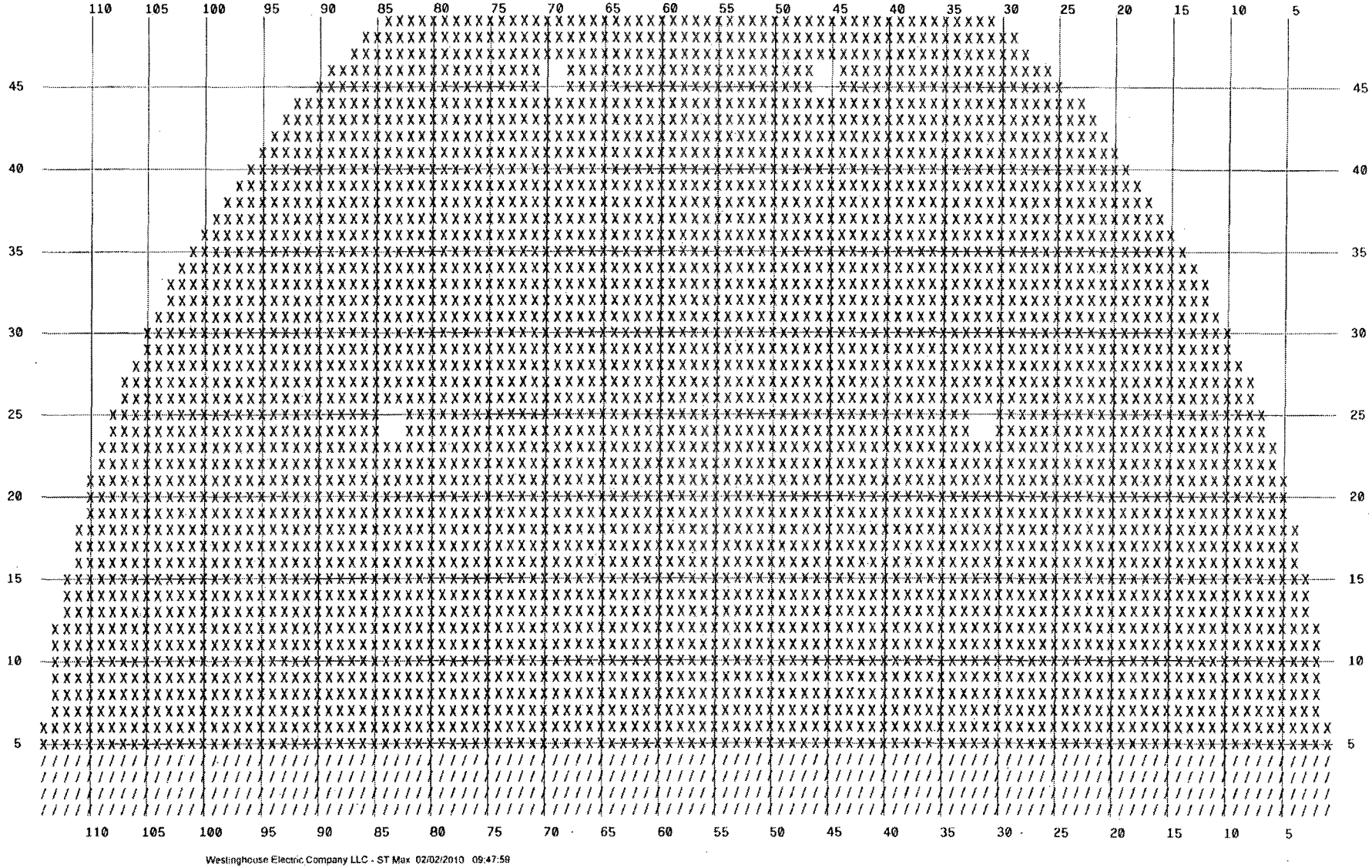
Westinghouse Electric Company LLC - ST Max 02/02/2010 09:47:14

SG - 3 CL 610 BOBBIN PROGRAM

Watts Bar Baseline WBT D3

/ 456 TEST C14-CTE

X 4218 TEST HTE-CTE

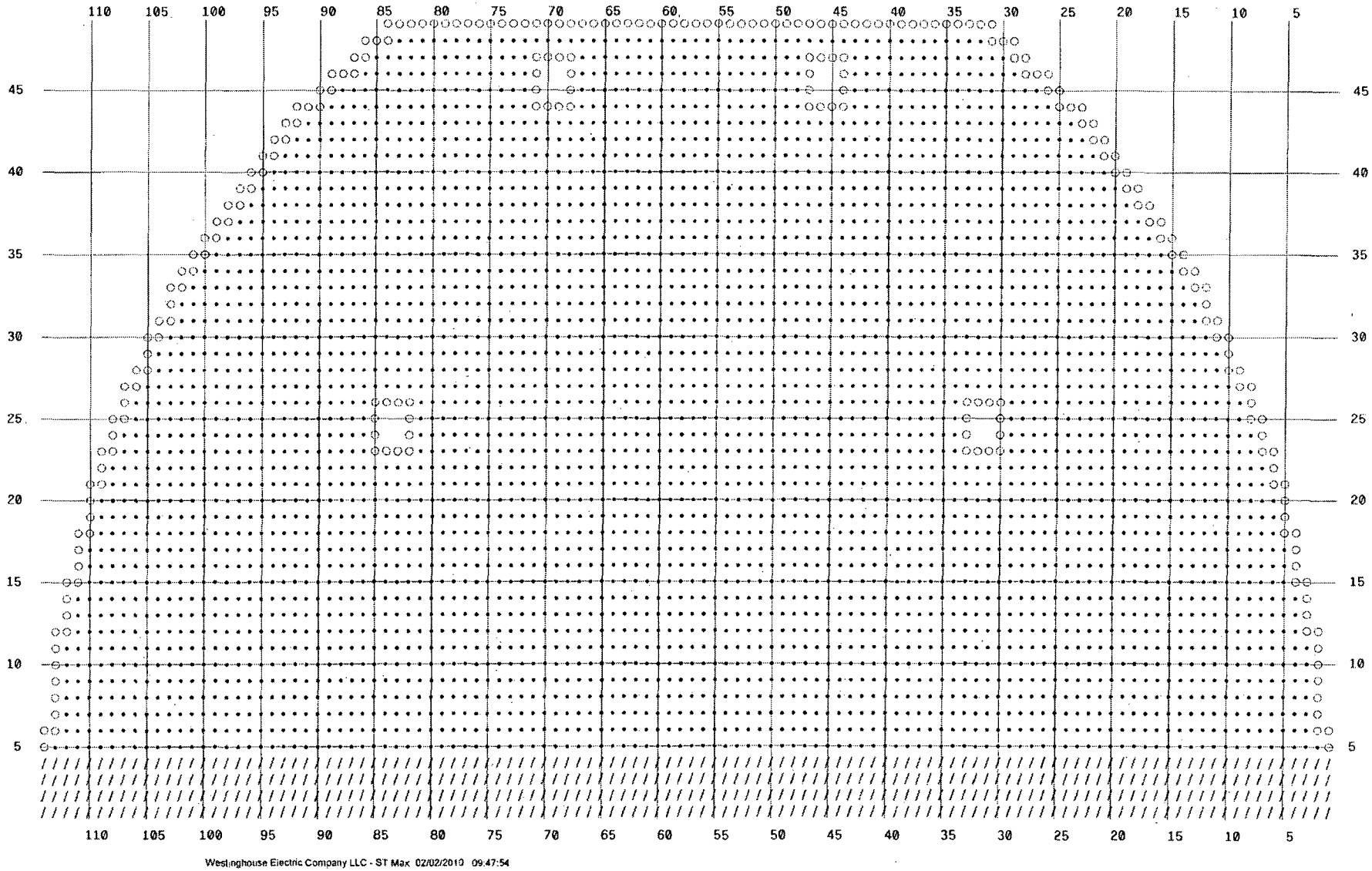


Westinghouse Electric Company LLC - ST Max 02/02/2010 09:47:58

SG - 3 HL 610 BOBBIN PROGRAM

Watts Bar Baseline WBT D3

/ 456 TEST H08-HTE

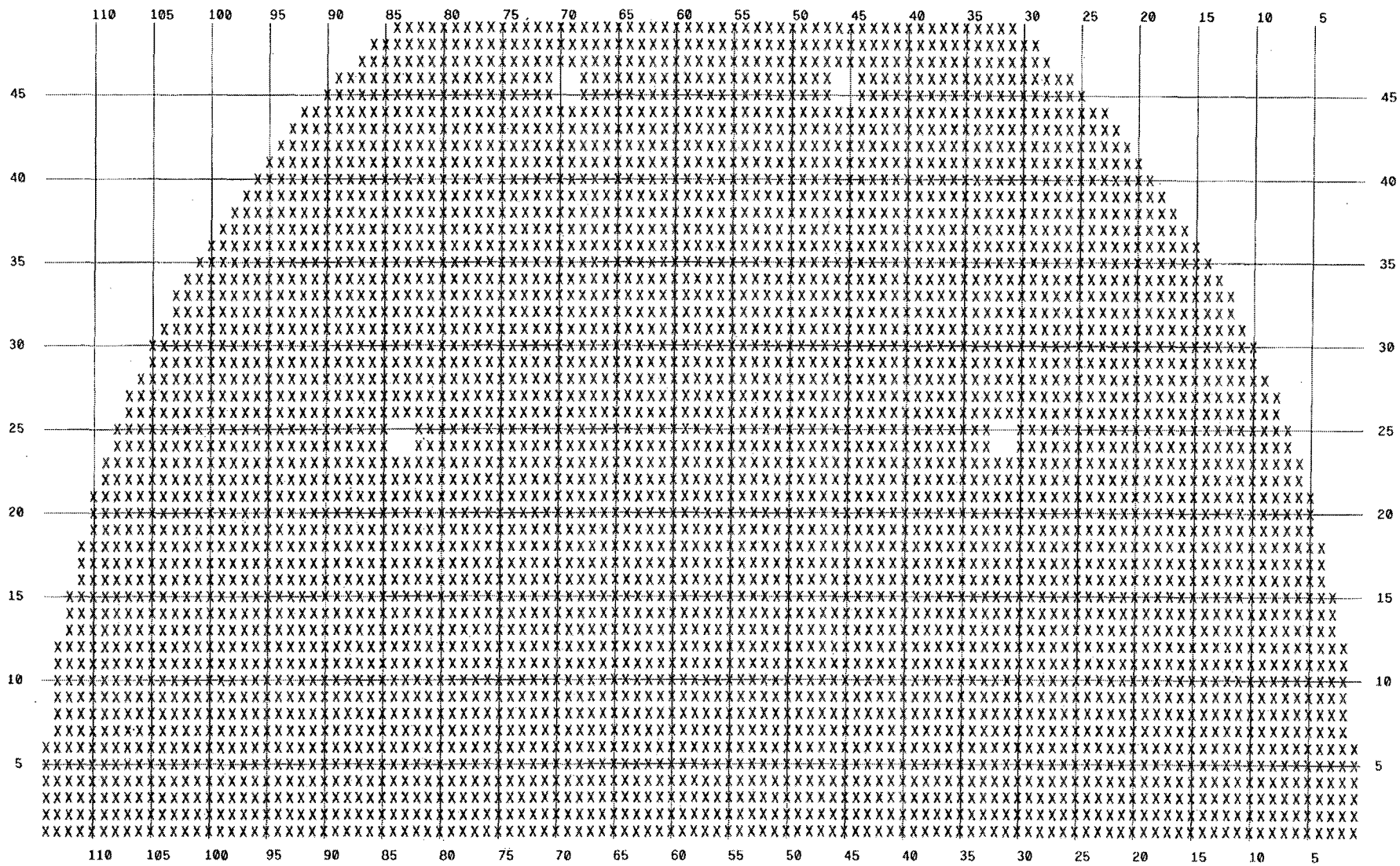


Westinghouse Electric Company LLC - ST Max 02/02/2010 09:47:54

SG - 3 HL 610 PLUS POINT TTS PROGRAM

Watts Bar Baseline WBT D3

X 4674 TEST HTS+/- 2"

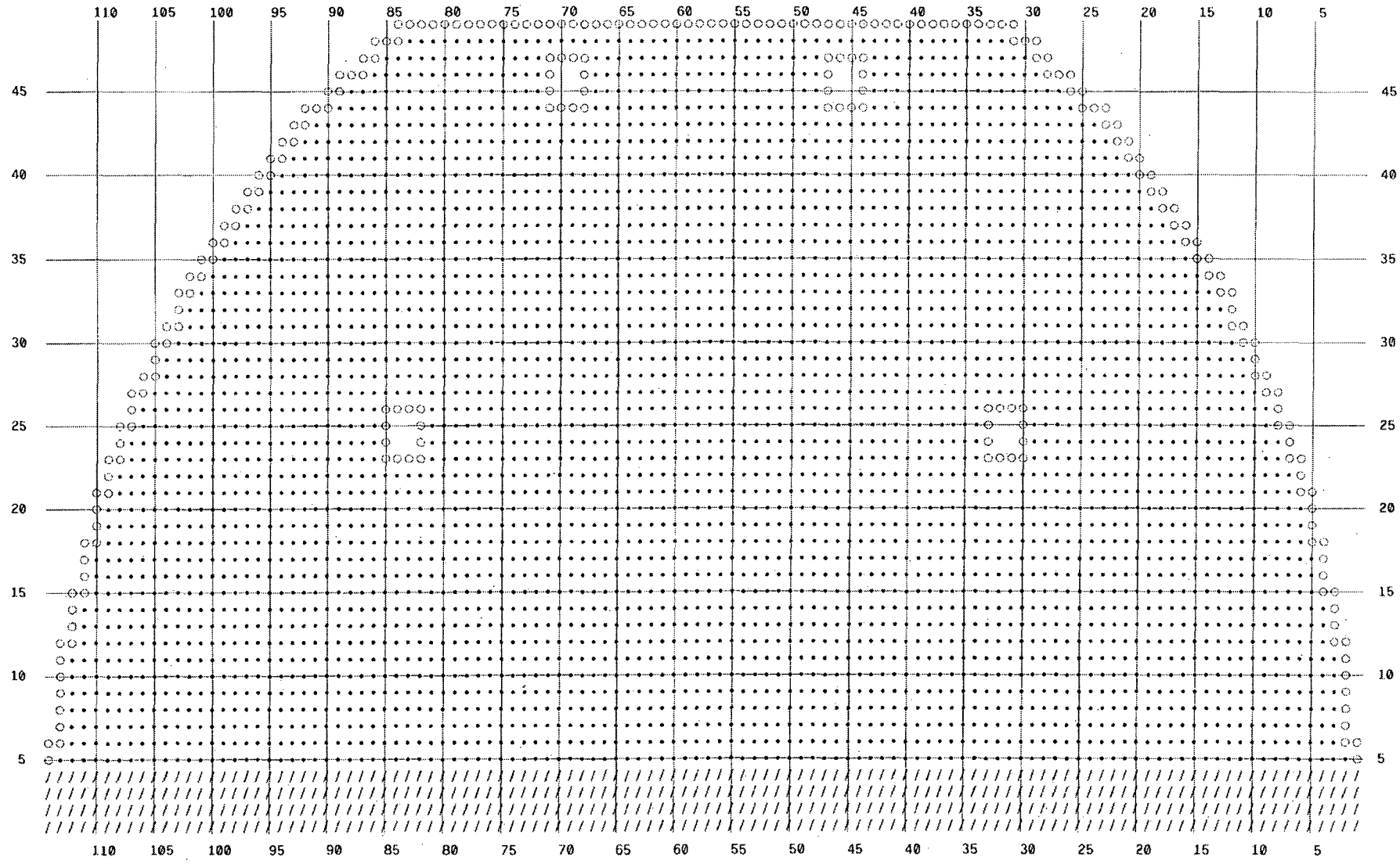


Westinghouse Electric Company LLC - ST Max 02/02/2010 09:47:50

SG - 3 LOW ROW 580 UBEND PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

/ 456 TEST H08-C14



Westinghouse Electric Company LLC - ST Max 02/02/2010 09:47:45

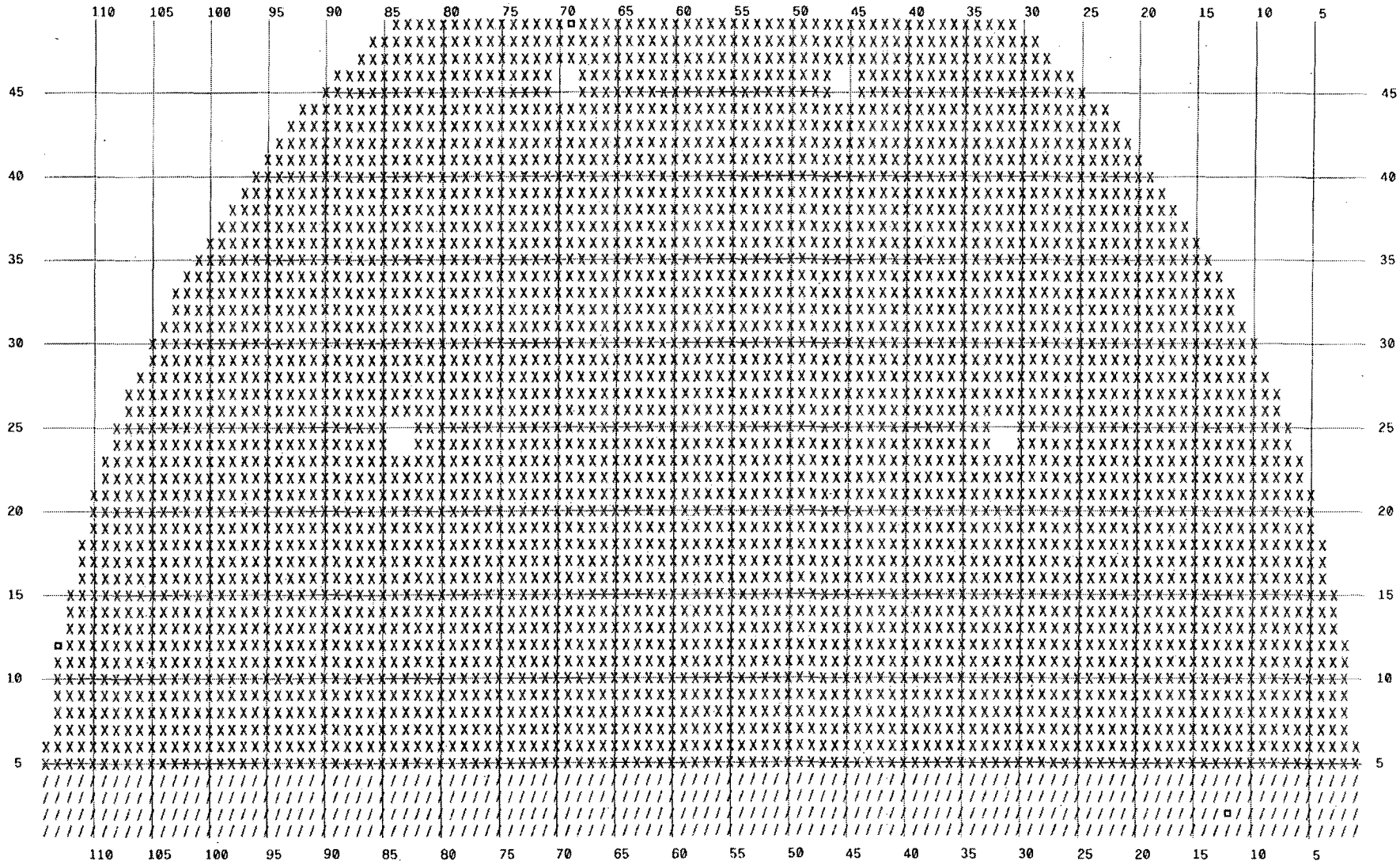
SG - 4 CL 610 BOBBIN PROGRAM

Watts Bar Baseline WBT D3

/ 455 TEST C14-CTE

X 4216 TEST HTE-CTE

▫ 3 PLUGGED TUBE



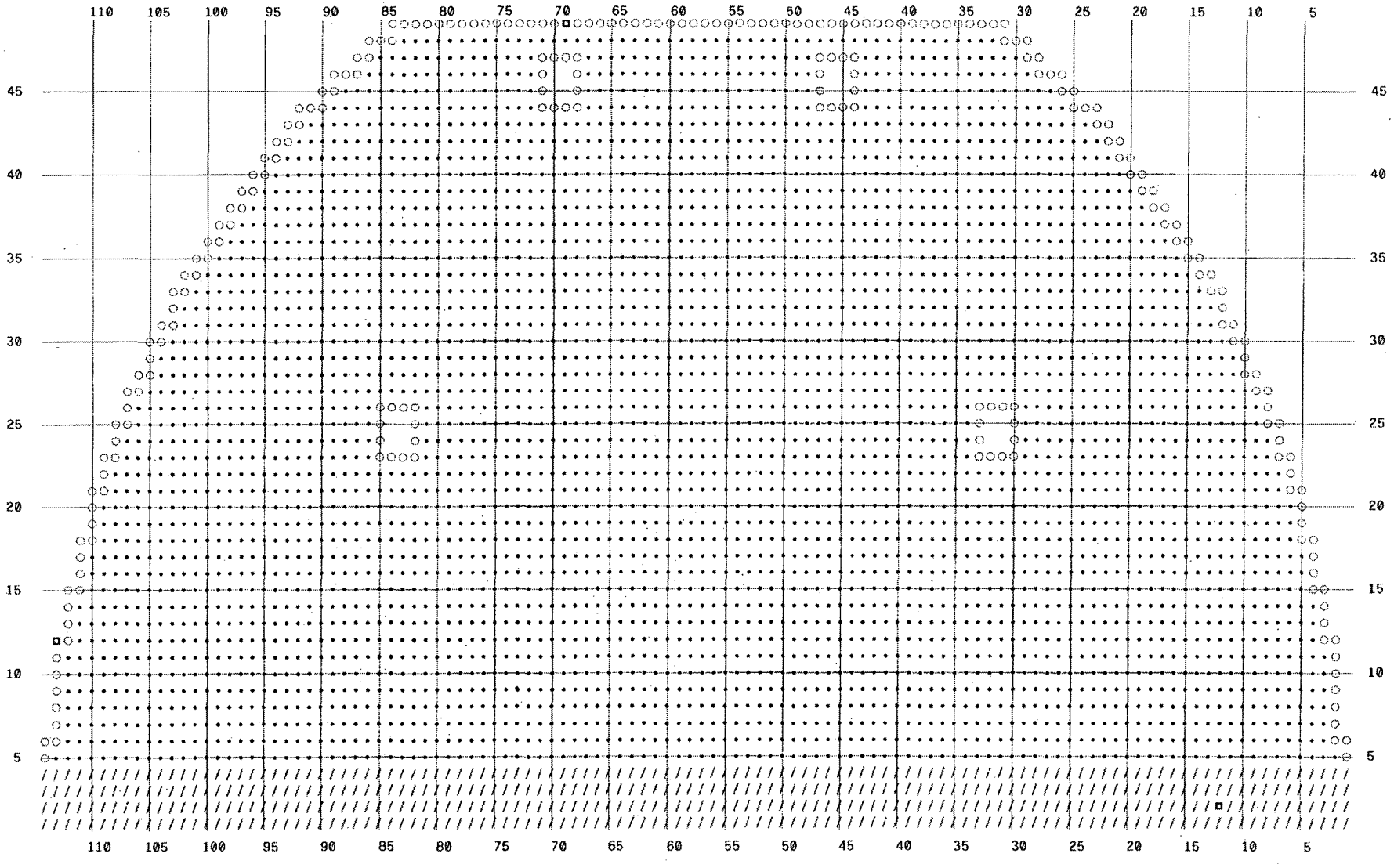
Westinghouse Electric Company LLC - ST Max 02/02/2010 09:45:28

SG - 4 HL 610 BOBBIN PROGRAM

Watts Bar Baseline WBT D3

/ 455 TEST H08-HTE

▫ 3 PLUGGED TUBE



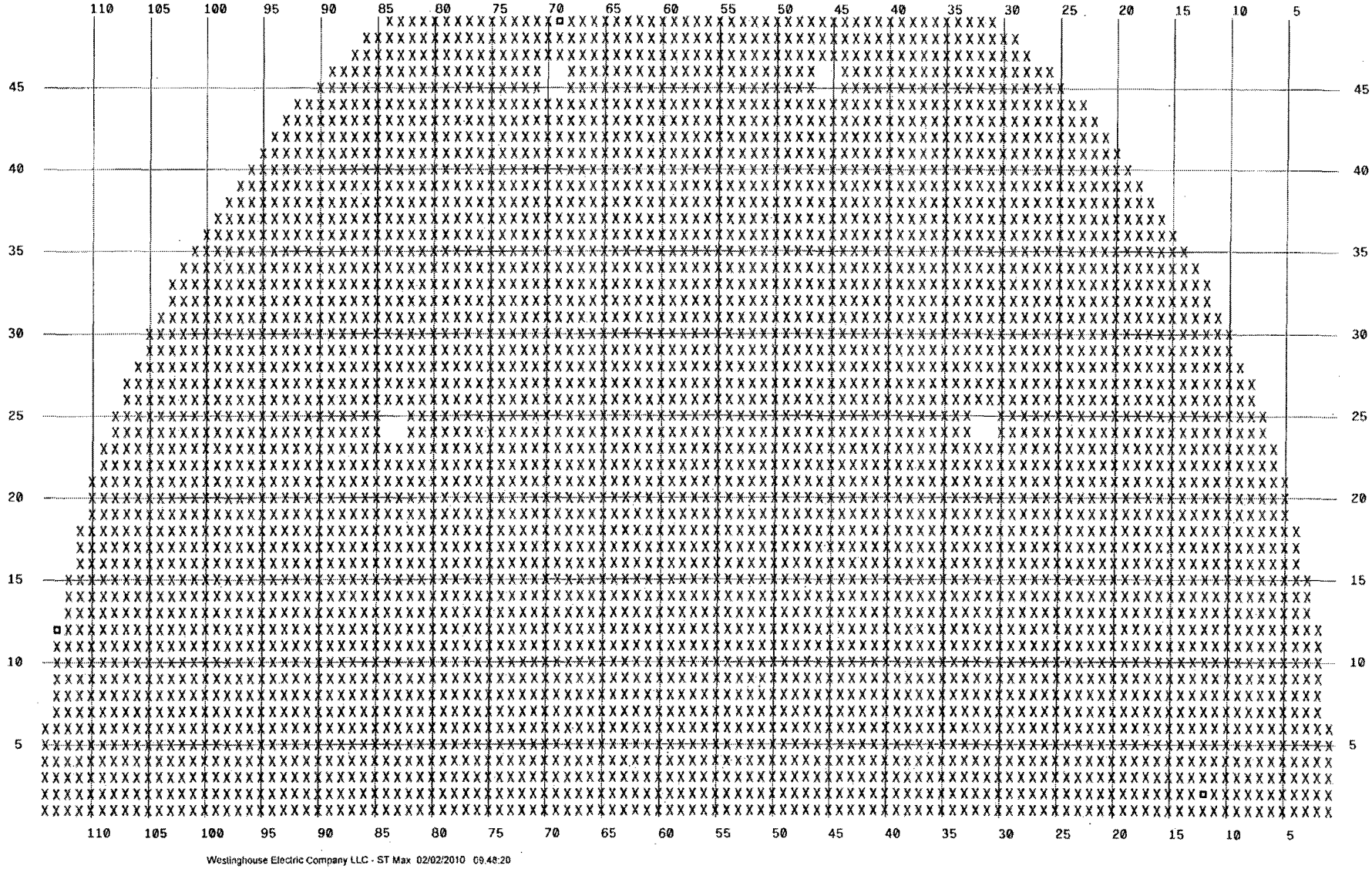
Westinghouse Electric Company LLC - ST Max 02/02/2010 09:48:24

SG - 4 HL 610 PLUS POINT TTS PROGRAM

Watts Bar Baseline WBT D3

X 4671 TEST HTS+/- 2"

▫ 3 PLUGGED TUBE



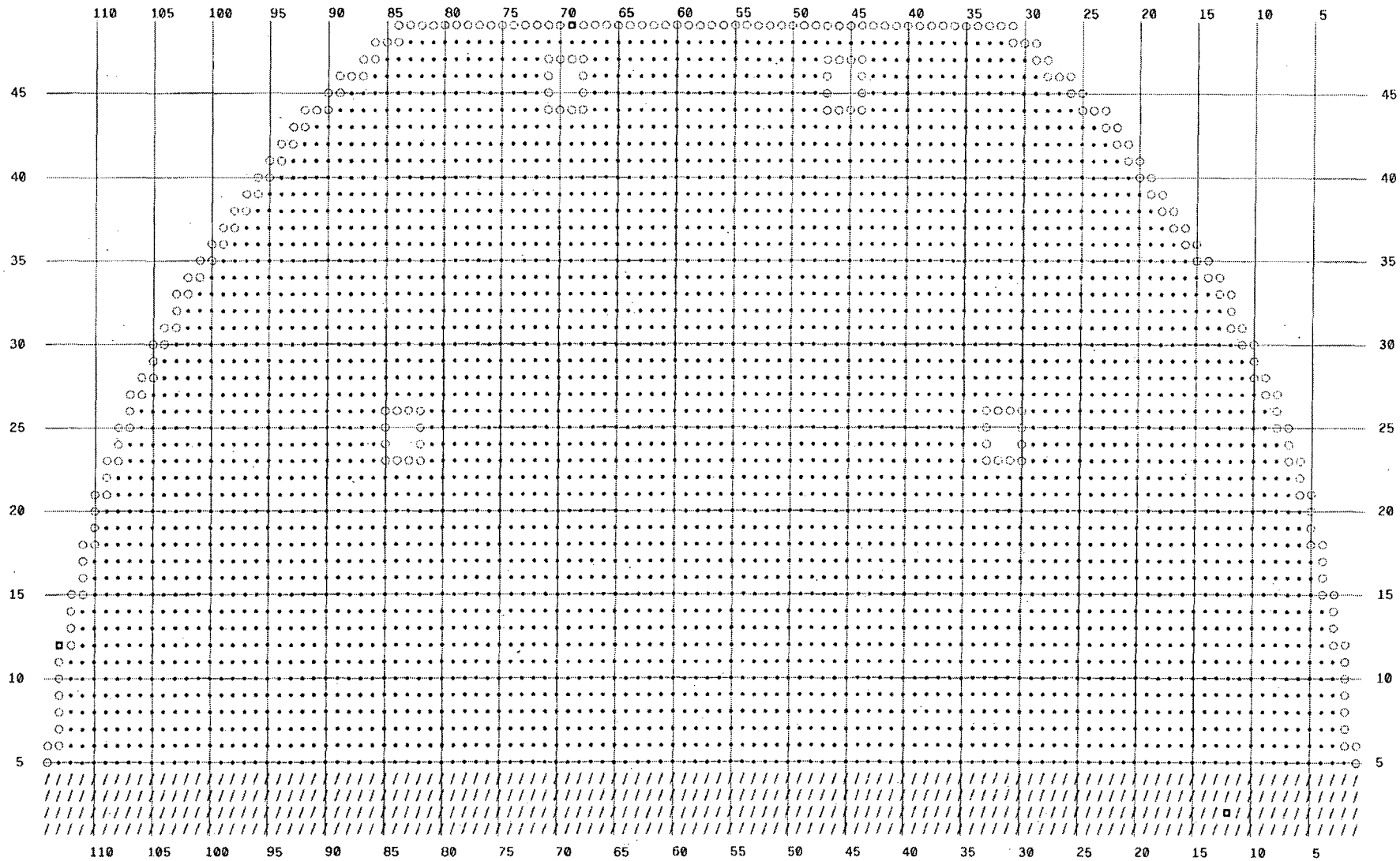
Westinghouse Electric Company LLC - ST Max 02/02/2010 09:48:20

SG - 4 LOW ROW 580 UBEND PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

/ 455 TEST H08-C14

▫ 3 PLUGGED TUBE



Westinghouse Electric Company LLC - ST Max 02/02/2010 09:48:15

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

Site: Watts Bar Unit 2 **Outage:** Baseline **Date:** Feb 12, 2010

All Eddy Current, Revision 0 **, Steam Generator** 1

Item	Data Manager	Program	Date/Time	Comments/Findings
1. Verify Database Vs. Network	RSC		02/12 1730	Complete
2. ASCII File Differencing	RSC		02/12 1730	Complete
3. Scrub Database	RSC		02/12 1730	Done
4. Progress Maps	RSC		02/12 1730	Complete
5. Missed Tubes	RSC		02/12 1730	NONE
6. Retest Report	RSC		02/12 1730	NONE
7. Map Test Extents By Plan	RSC		02/12 1736	OK
8. Map Test Extents By Probe	RSC		02/12 1737	OK
9. History Matching	NA		NA	NA
10. QA Current	RSC		02/12 1732	OK
11. IsTested For Bobbin "I" Codes	RSC		02/12 1735	All tested
12. PVN Tested With Mag Bias +Point Probe	RSC		02/12 1735	See Appendix 12.1 Special Interest Criteria with Ghent

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

All Eddy Current, Revision 0, Steam Generator ~~B~~ I RSC 02/12/2010

Item	Data Manager	Program	Date/Time	Comments/Findings
13. IsTested Bobbin PLP	RSC		02/12 1740	PLP review & complete
14. . IsTested PCT>= 40% PID	RSC		02/12 1741	All tested
15. IsTested DNT GTE 2 Volts & GTE 2 Volts PS	RSC		02/12 1743	All tested
16. IsTested Bobbin OXP, PTE, NTE 7.8	RSC		02/12 1744	all tested
17. IsTested For +Point "I" Codes PID	RSC		02/12 1745	NONE
18. PLP/LPI Encompassed With +Point Inspections	RSC		02/12 1746	No Bobbin Review Completed
19. PBC Has Previous Bobbin Call	RSC		02/12 1744	All OK
20. PRC Has Previous +Point Call	RSC		02/12 1747	All OK
21. All Appendix 12.8 Testing Complete	RSC		02/12 1748	OK
22. DB Summary For All IND's in DB				
23. DB Distribution All Inds All Locs				N.
24. Verify No LAR Exists In Database	RSC		02/12 1748	NONE
25. All Cals Have DQM Report	RSC		02/12 1753	OK
26. All Cals Have Final Calibration Check	RSC		02/12 1753	OK
27. Verify DQM Data Vs. Current Database	RSC		02/12 1753	OK 1 checked OK 1 unnecessary OK

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

All Eddy Current, Revision 0, Steam Generator ~~B~~ I RSC 02/12/2010

Item	Data Manager	Program	Date/Time	Comments/Findings
28. Plan Zero Check	RSC		02/12 1752	OK
29. IND And LOCN ??? Check	RSC		02/12 1754	NONE
30. NoOp Check	RSC		02/12 1754	NONE
31. List Manager	RSC		02/12 1754	NONE
32. Cals Not 'Of Rec'	RSC		02/12 1755	NONE
33. Multiple Tests Per Probe Check	RSC		02/12 1755	NONE
34. Completed Test For Restricted or Incomplete Extent	RSC		02/12 1756	NONE
35. Utility Field Comments Encoded Check	RSC		02/12 1757	OK
36. IQDA Review Complete	R.M.		02/12 1810	
37. Senior Analyst Review Complete	[illegible]		02/12 1810	
38. TVA Level III Review Complete	[illegible]		02/12/2010	None
39. Final Verify Database Vs. Network	NB		02/12/10 1954	None
END				

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

Site: Watts Bar Unit 2 **Outage:** Baseline **Date:** Feb 18, 2010

All Eddy Current, Revision 0 **, Steam Generator** 2

Item	Data Manager	Program	Date/Time	Comments/Findings
1. Verify Database Vs. Network	NB		23:28 2/18/10	OK
2. ASCII File Differencing	NB		23:28 2/18/10	OK
3. Scrub Database	NB		23:29 2/18/10	OK
4. Progress Maps	NB		2329 2/18/10	OK
5. Missed Tubes	NB		2329 2/18/10	OK
6. Retest Report	NB		2329 2/18/10	OK
7. Map Test Extents By Plan	NB		2330 2/18/10	OK
8. Map Test Extents By Probe	NB		2330 2/18/10	OK
9. History Matching	N/A			
10. QA Current	NB		2333 2/18/10	OK See SVI printout
11. IsTested For Bobbin "I" Codes	NB		2210 2/18/10	Complete
12. PVN Tested With Mag Bias +Point Probe	NB		2210 2/18/10	See Appendix 12.1 Special Interest Criteria with Ghent

also see 12.8 rev14

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

All Eddy Current, Revision 0, Steam Generator 2

Item	Data Manager	Program	Date/Time	Comments/Findings
13. IsTested Bobbin PLP	NB		2224 2/18/10	PLP Review & Complete
14. . IsTested PCT>= 40% PID	NB		2210 2/18/10	Complete
15. IsTested DNT GTE 2 Volts	NB		2210 2/18/10	Complet except TBP See 12.8 Rev 14
16. IsTested Bobbin OXP, PTE, NTE	NB		2210 2/18/10	Complete
17. IsTested For +Point "I" Codes PID	NB		2210 2/18/10	Complete
18. PLP/LPI Encompassed With +Point Inspections	NB		2227 2/18/10	Complete as per 12.8 Rev 14
19. PBC Has Previous Bobbin Call	NB		2222 2/18/10	OK
20. PRC Has Previous +Point Call	NB		2222 2/18/10	OK
21. All Appendix 12.8 Testing Complete	NB		2222 2/18/10	OK
22. DB Summary For All IND's in DB	NB		2236 2/18/10	OK
23. DB Distribution All Inds All Locs	NB		2236 2/18/10	OK
24. Verify No LAR Exists In Database	NB		2223 2/18/10	OK
25. All Cals Have DQM Report	NB		2223 2/18/10	OK
26. All Cals Have Final Calibration Check	NB		2223 2/18/10	OK
27. Verify DQM Data Vs. Current Database	NB		2225 2/18/10	See DQM verify page

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

All Eddy Current, Revision 0, Steam Generator 2

Item	Data Manager	Program	Date/Time	Comments/Findings
28. Plan Zero Check	NB	2215 2/18/10		3 tests OK
29. IND And LOCN ??? Check	NB	2215 2/18/10		OK
30. NoOp Check	NB	2215 2/18/10		None
31. List Manager	NB	2216 2/18/10		None
32. Cals Not 'Of Rec'	NB	2216 2/18/10		None
33. Multiple Tests Per Probe Check	NB	2216 2/18/10		None
34. Completed Test For Restricted or Incomplete Extent	NB	2216 2/18/10		None
35. Utility Field Comments Encoded Check	NB	2216 2/18/10		OK
36. IQDA Review Complete	R.M.	0803 2/19/10		
37. Senior Analyst Review Complete	[illegible]	0800 2-19-2010		
38. TVA Level III Review Complete	[illegible]	0803 2/19/2010		OK
39. Final Verify Database Vs. Network				
END				

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

Site: Watts Bar Unit 2 Outage: Baseline Date: Feb 24, 2010

All Eddy Current, Revision 0, Steam Generator 3

Item	Data Manager	Program	Date/Time	Comments/Findings
1. Verify Database Vs. Network	NB		0536 2-24-10	OK
2. ASCII File Differencing	NB		0536 2-24-10	OK
3. Scrub Database	NB		0537 2-24-10	OK
4. Progress Maps	NB		0538 2-24-10	2 Rerecks → TBP after lead review
5. Missed Tubes	NB		0538 2-24-10	None
6. Retest Report	NB		0538 2-24-10	2 Rerecks → TBP after lead review
7. Map Test Extents By Plan	NB		0539 2-24-10	OK
8. Map Test Extents By Probe	NB		0542 2-24-10	OK
9. History Matching	N/A			
10. QA Current	NB		0544 2-24-10	OK
11. IsTested For Bobbin "I" Codes	NB		0532 2-24-10	Complete
12. PVN Tested With Mag Bias +Point Probe	NB		0531 2-24-10	See Appendix 12.1 Special Interest Criteria With Ghent See 12.8 rev14

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

All Eddy Current, Revision 0, Steam Generator 3

Item	Data Manager	Program	Date/Time	Comments/Findings
13. IsTested Bobbin PLP	NB		0455 2-24-10	PLP Review & Complete
14. . IsTested PCT>= 40% PID	NB		0455 2-24-10	Complete
15. IsTested DNT GTE 2 Volts	NB		0455 2-24-10	Complete
16. IsTested Bobbin OXP, PTE, NTE	NB		0455 2-24-10	Complete
17. IsTested For +Point "I" Codes PID	NB		0455 2-24-10	NONE
18. PLP/LPI Encompassed With +Point Inspections	NB		0510 2-24-10	Complete as per 12.8 rev 14
19. PBC Has Previous Bobbin Call	NB		0510 2-24-10	None
20. PRC Has Previous +Point Call	NB		0510 2-24-10	OK
21. All Appendix 12.8 Testing Complete	NB		0515 2-24-10	OK
22. DB Summary For All IND's in DB	NB		0546 2-24-10	OK
23. DB Distribution All Inds All Locs	NB		0547 2-24-10	OK
24. Verify No LAR Exists In Database	NB		0548 2-24-10	LAR left for lead review 847C8B
25. All Cals Have DQM Report	NB		0549 2-24-10	OK
26. All Cals Have Final Calibration Check	NB		0550 2-24-10	OK
27. Verify DQM Data Vs. Current Database	NB		0550 2-24-10	OK

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

All Eddy Current, Revision 0, Steam Generator 3

Item	Data Manager	Program	Date/Time	Comments/Findings
28. Plan Zero Check	NB		0552 2-24-10	OK
29. IND And LOCN ??? Check	NB		0552 2-24-10	OK
30. NoOp Check	NB		0552 2-24-10	NONE
31. List Manager	NB		0552 2-24-10	NONE
32. Cals Not 'Of Rec'	NB		0552 2-24-10	OK
33. Multiple Tests Per Probe Check	NB		0552 2-24-10	OK
34. Completed Test For Restricted or Incomplete Extent	NB		0552 2-24-10	2 Tubes → TB Pattern lead Review
35. Utility Field Comments Encoded Check	NB		0552 2-24-10	OK
36. IQDA Review Complete				
37. Senior Analyst Review Complete				
38. TVA Level III Review Complete				
39. Final Verify Database Vs. Network				
END				

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

Site: Watts Bar Unit 2 Outage: Baseline Date: Feb 07, 2010

All Eddy Current, Revision 0, Steam Generator 4

Item	Data Manager	Program	Date/Time	Comments/Findings
1. Verify Database Vs. Network	N B		2/7/10 0146	OK
2. ASCII File Differencing	N B		2/7/10 0147	OK
3. Scrub Database	N B		2/7/10 0147	OK
4. Progress Maps	N B		2/7/10 0148	OK - 100% ALL PLANS
5. Missed Tubes	N B		2/7/10 0149	NO MISSED TUBES
6. Retest Report	N B		2/7/10 0149	NO Retests on plans R2C90 has a retest code, but test is not needed
7. Map Test Extents By Plan	N B		2/7/10 0150	OK
8. Map Test Extents By Probe	N B		2/7/10 0152	OK
9. History Matching	N B			N/A No History
10. QA Current	N B		2/7/10 0152	OK
11. IsTested For Bobbin "I" Codes	N B		2/7/10 0155	OK
12. PVN Tested With Mag Bias +Point Probe	N B		2/7/10 0155	See Appendix 12.1 Special Interest Criteria OK

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

All Eddy Current, Revision 0, Steam Generator 4

Item	Data Manager	Program	Date/Time	Comments/Findings
13. IsTested Bobbin PLP	NB	~~2/7/10 0155~~ NB 2/7/10	2/7/10 0155	PCT Indications Above 06C OK
14. . IsTested PCT>= 40% PID	NB		2/7/10 0155	OK
15. IsTested DNT GTE 2 Volts	NB		2/7/10 0155	
16. IsTested Bobbin OXP, PTE, NTE	NB		2/7/10 0155	OK
17. IsTested For +Point "I" Codes PID	NB		2/7/10 0155	OK
18. PLP/LPI Encompassed With +Point Inspections	NB		2/7/10 0158	OK
19. PBC Has Previous Bobbin Call	NB		2/7/10 0159	OK
20. PRC Has Previous +Point Call	NB		2/7/10 0159	NONE
21. All Appendix 12.8 Testing Complete	NB		2/7/10 0159	Done
22. DB Summary For All IND's in DB	NB		2/7/10 0200	OK
23. DB Distribution All Inds All Locs	NB		2/7/10 0200	OK
24. Verify No LAR Exists In Database	NB		2/7/10 0200	OK
25. All Cals Have DQM Report	NB		2/7/10 0201	OK
26. All Cals Have Final Calibration Check	NB		2/7/10 0202	CAL 11H Failed Last calibration check
27. Verify DQM Data Vs. Current Database	NB		2/7/10 0205	OK

©2008 Westinghouse Electric Company

APPENDIX 12.4.3
TYPICAL STEAM GENERATOR ALL EDDY CURRENT CLOSEOUT CHECKLIST

All Eddy Current, Revision 0, Steam Generator 4

Item	Data Manager	Program	Date/Time	Comments/Findings
28. Plan Zero Check	NB		2/7/10 0206	R2 C40 has PVN, was tested with best probe available. AB Test was RAD
29. IND And LOCN ??? Check	NB		2/7/10 0202	OK
30. NoOp Check	NB		2/7/10 0208	None
31. List Manager	NB		2/7/10 0208	None
32. Cals Not 'Of Rec'	NB		2/7/10 0208	OK
33. Multiple Tests Per Probe Check	NB		2/7/10 0208	OK
34. Completed Test For Restricted or Incomplete Extent	NB		2/7/10 0209	OK
35. Utility Field Comments Encoded Check	NB		2/7/10 0210	OK
36. IQDA Review Complete	R.M.		2-8-10 1230	OK
37. Senior Analyst Review Complete	[illegible]		2/8/10 1238	
38. TVA Level III Review Complete	[illegible]		2/8/2010 1235	OK
39. Final Verify Database Vs. Network	RSC		2/8/2010 1235	OK
END				

©2008 Westinghouse Electric Company

APPENDIX 12.5
TYPICAL DATA MANAGEMENT OPERATOR REVIEW

Date: Friday, January 29, 2010
Site: Watts Bar Unit 2
Outage: Baseline
Owner: TVA
Outage Date: February 2010

By signing below, I acknowledge that I have read and understand the following documents: SGMS 2.2.1 GEN-011 Revision 14 Appendices 12.1, 12.2, 12.3, 12.4.3, the analysis guideline or procedure and the site specific degradation assessment.

Lead Data Manager Signature/Date _____ 1/02/02/2010
Rich Callender

Data Manager Signature/Date _____ 1/2/3/2010
Nicolas Bhai

©2008 Westinghouse Electric Company

APPENDIX 12.6
TYPICAL DATA MANAGEMENT PEER REVIEW

Date: Friday, January 29, 2010
Site: Watts Bar Unit 2
Outage: Baseline
Owner: TVA
Outage Date: February 2010

The independent peer review shall consist of the following, at a minimum:

12.6.1 A thorough review of all essential inspection documentation, such as the site specific degradation assessment, analysis procedure or guidelines, acquisition technique sheets, and other pertinent documentation used in the development of the inspection plans.

12.6.2 Independent verification of appendices 12.1, 12.2, 12.3, 12.4.3, and 12.10.

12.6.3 Independent verification of base scope inspection plans to include:

12.6.3.1 Verification of 100% inspection plans to ensure all available indications, tubes and/or locations are included in the sample.

12.6.3.2 Independent verification of any inspection scope sampled at less than 100% to ensure that indications, tubes and/or locations excluded from the current sample (such as indications, tubes and/or locations previously inspected during specific prior inspections) are not scheduled for the current inspection.

12.6.3.3 Identify any current inspection plan that is dependent upon accurate sampling from previous inspection data sets. Verify that the previous sampling is accurate. Example: Customer states that with the current inspection, 100% of low row u-bends will be complete for this EFPM period. Verify that the tubes already tested in the EFPM plus the tubes to be tested this time equals 100% of the population.

12.6.4 Verification of all queries used to ensure analysis reporting requirements as set forth in appendix 12.1.

12.6.5 Verification of all queries, SRID files and tubesheet maps used to populate base scope inspection plans.

12.6.6 Verification that the loaded base scope inspection plans are traceable to the verified sources in 12.6.5.

12.6.7 Verification of all queries, SRID files and tubesheet maps used to populate special interest and PID inspection plans.

12.6.8 Verification that the loaded special interest and PID inspection plans are traceable to the verified sources in 12.6.7.

Independent Peer Reviewer Signature/Date _____ / 2/3/10
Nicolas Bhai

©2008 Westinghouse Electric Company

APPENDIX 12.7
TYPICAL SECONDARY DATA MANAGEMENT PEER REVIEW

Date: Friday, January 29, 2010
Site: Watts Bar Unit 2
Outage: Baseline
Owner: TVA
Outage Date: February 2010

The secondary data management peer review shall consist of the following, at a minimum:

12.7.1 A thorough review of all essential inspection documentation, such as the site specific degradation assessment, analysis procedure or guidelines, acquisition technique sheets, and other pertinent documentation used in the development of the inspection plans.

12.7.2 Independent verification of base scope inspection plans to include:

12.7.2.1 Verification of 100% inspection plans to ensure all available indications, tubes and/or locations are included in the sample.

12.7.2.2 Independent verification of any inspection scope sampled at less than 100% to ensure that indications, tubes and/or locations excluded from the current sample (such as indications, tubes and/or locations previously inspected during specific prior inspections) are not scheduled for the current inspection.

12.7.2.3 Identify any current inspection plan that is dependent upon accurate sampling from previous inspection data sets. Verify that the previous sampling is accurate. Example: Customer states that with the current inspection, 100% of low row u-bends will be complete for this EFPM period. Verify that the tubes already tested in the EFPM plus the tubes to be tested this time equals 100% of the population.

Secondary Data Management Reviewer Signature/Date _____ / _____

Non Applicable

©2008 Westinghouse Electric Company

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 0 Date: Friday, February 5, 2010

Steam Generator All Leg All

Page 1 of 1

Additional Special Interest Examinations

Spin all MBM calls that are within .75 inches of a DNG call.
Spin all DNG calls at support structures +/- 1" that are >= 2 Volts.
Spin all DNG calls in the Freespan (greater than +/- 1" from a support structure) that are >= 5 Volts.
Spin all PTE, NTE and OXP calls. 7.7"
Spin all PVN and RMB calls with a Mag Bias +Point probe.
Spin all Bobbin I-codes.
Spin all Bobbin PLP calls. Box In any RPC PLP at the location of the target PLP.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 03/05/2010

Westinghouse Level III Signature/Date 12-5-2010

Customer or Customer Representative Signature/Date Daniel Adam 12/5/2010

Project Manager Signature/Date 2/5/10

©2008 Westinghouse Electric Company

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 1 Date: Saturday, February 6, 2010

Steam Generator 4 Leg All

Page 1 of 1

Additional Special Interest Examinations

Change in the criteria for testing OXP to test only the calls >= .70 inches above the Top of Tubesheet.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/06/2010

Westinghouse Level III Signature/Date 12-6-2010

Customer or Customer Representative Signature/Date 12-8-2010

Project Manager Signature/Date 2/6/10

©2008 Westinghouse Electric Company

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 2 Date: Saturday, February 6, 2010

Steam Generator 4 Leg Cold

Page 1 of 1

Additional Special Interest Examinations

Add 36 tubes to test from C05 -2 inches thru C06 +2" for box in of PLP calls from +PT.

See Map for tubes.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/06/2010

Westinghouse Level III Signature/Date 12-6-2010

Customer or Customer Representative Signature/Date 12/8/2010

Project Manager Signature/Date 2/6/10

©2008 Westinghouse Electric Company

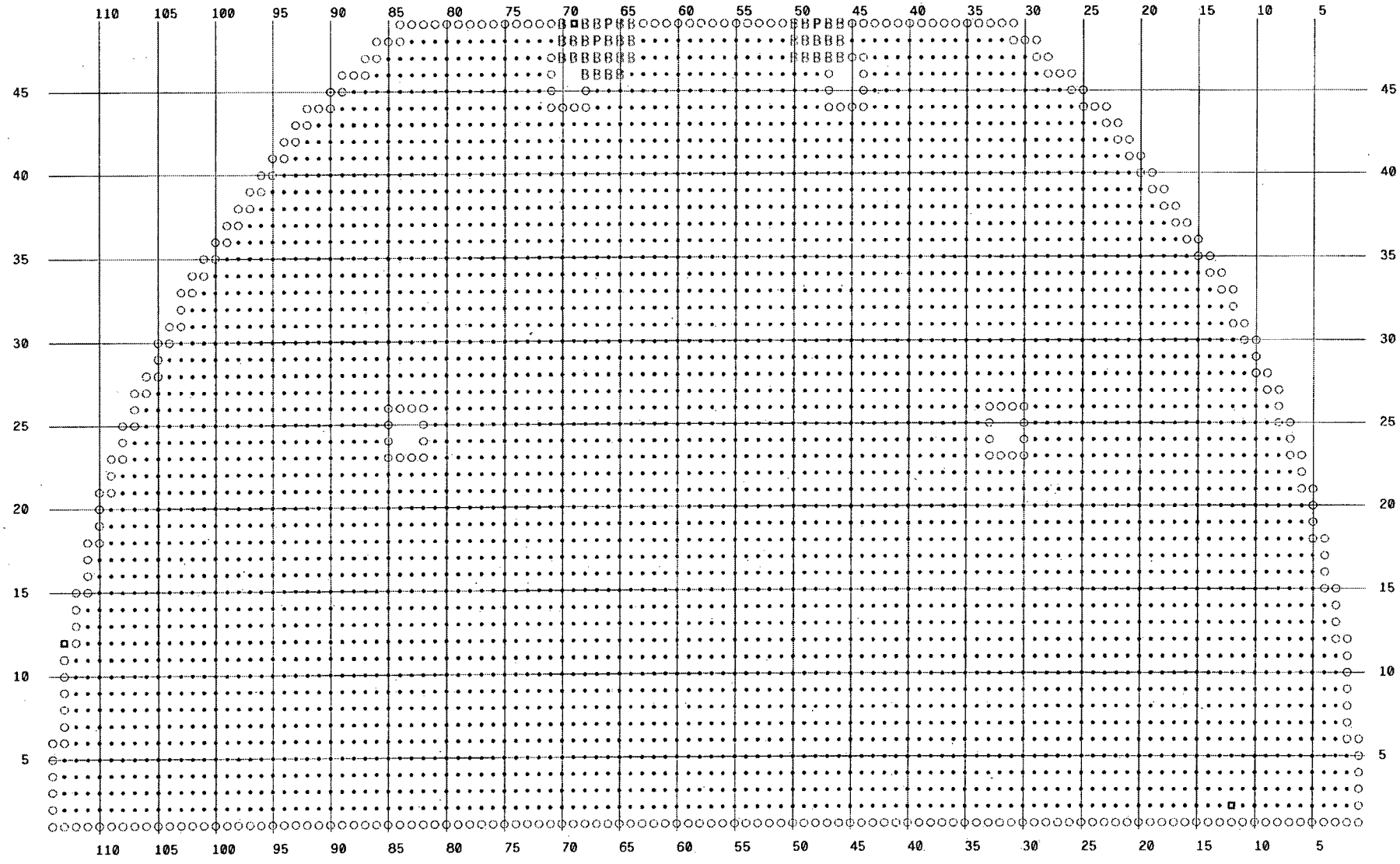
SG - 4 PLP AT C05 TO BOX IN

Watts Bar Baseline WBT D3

P 3 TUBE WITH PLP AT C05 +

B 36 TEST C05-2" - C06+2"

▫ 3 PLUGGED TUBE



Westinghouse Electric Company LLC - ST Max 02/06/2010 18:08:00

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 3 Date: Saturday, February 6, 2010

Steam Generator 4 Leg Cold

Page 1 of 1

Additional Special Interest Examinations

Add 3 tests in tubes to determine tube to tube proximity.

See Map for tubes and test extents.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/06/2010

Westinghouse Level III Signature/Date 12-6-2010

Customer or Customer Representative Signature/Date 12/8/2010

Project Manager Signature/Date 2/6/10

©2008 Westinghouse Electric Company

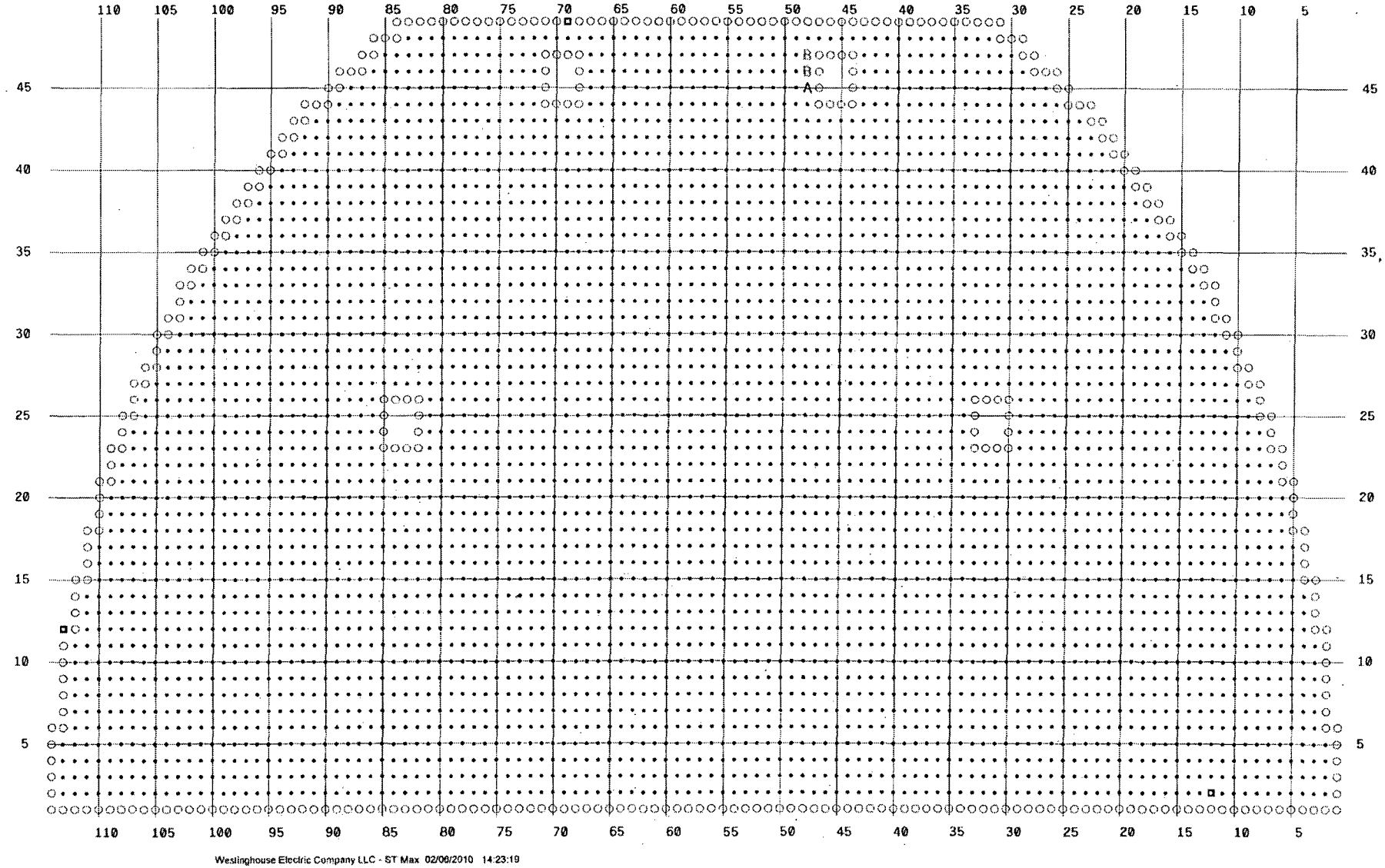
SG - 4 PROXIMITY TUBES TO PLUS POINT

Watts Bar Baseline WBT D3

A 1 TEST C13-C14

B 2 TEST UB C14-AV4

◘ 3 PLUGGED TUBE



Westinghouse Electric Company LLC - ST Max 02/08/2010 14:23:19

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 4 Date: Saturday, February 6, 2010

Steam Generator 4 Leg Cold

Page 1 of 1

Additional Special Interest Examinations

Add 5 tests in tubes for clarification of PVN signal identified with a Mag Bias +Pt probe.

See List for tubes and test extents. Test with Ghent 3/4 probe.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/06/2010

Westinghouse Level III Signature/Date 12-6-2010

Customer or Customer Representative Signature/Date 12-8-2010

Project Manager Signature/Date 2/6/10

©2008 Westinghouse Electric Company

PVN MAG BIAS +PT CALLS TO TEST WITH GHENT PROBE - ETAG 8

SG - 4 WBT 02/06/2010 18:04:31

Row	Col	T	Z	[Begin Test]		[End Test]	
16	71	M		C13	-2.0	C14	+2.0
20	79	M		C12	-2.0	C13	+2.0
26	80	M		C12	-2.0	C13	+2.0
24	97	M		C11	-2.0	C12	+2.0
25	101	M		C13	-3.0	C13	+3.0

Total Test Records = 5

End - ST Max

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 45 Date: Saturday, February 6, 2010

Steam Generator 4 Leg Cold

Page 1 of 1

Additional Special Interest Examinations

Add 1 test in tube for clarification of PVN signal identified with a Mag Bias +Pt probe.

See List for tubes and test extents.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date [illegible] / 2/7/10

Westinghouse Level III Signature/Date Gary Terrill / 2/7/10

Customer or Customer Representative Signature/Date Daniel [illegible] / 2/8/2010

Project Manager Signature/Date R.A. Michalski 2/8/10

©2008 Westinghouse Electric Company

ETAG 8 MISSED GHENT TEST - ETAG 8

SG - 4 WBT 02/06/2010 20:46:34

Row	Col	T	Z	[Begin Test]	[End Test]
17	64	N	C07 -3.0	C07 +3.0	

Total Test Records = 1

End - ST Max

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 26 Date: Saturday, February 6, 2010

Steam Generator 4 Leg Cold

Page 1 of 1

Additional Special Interest Examinations

Add 3 tubes to test from C05 -2 inches thru C06 +2 inches for box in of PLP calls from +PT.

See Map for tubes.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date [illegible] 12/7/2010

Westinghouse Level III Signature/Date Gary Turner 12/7/2010

Customer or Customer Representative Signature/Date Donald Adam 12/8/2010

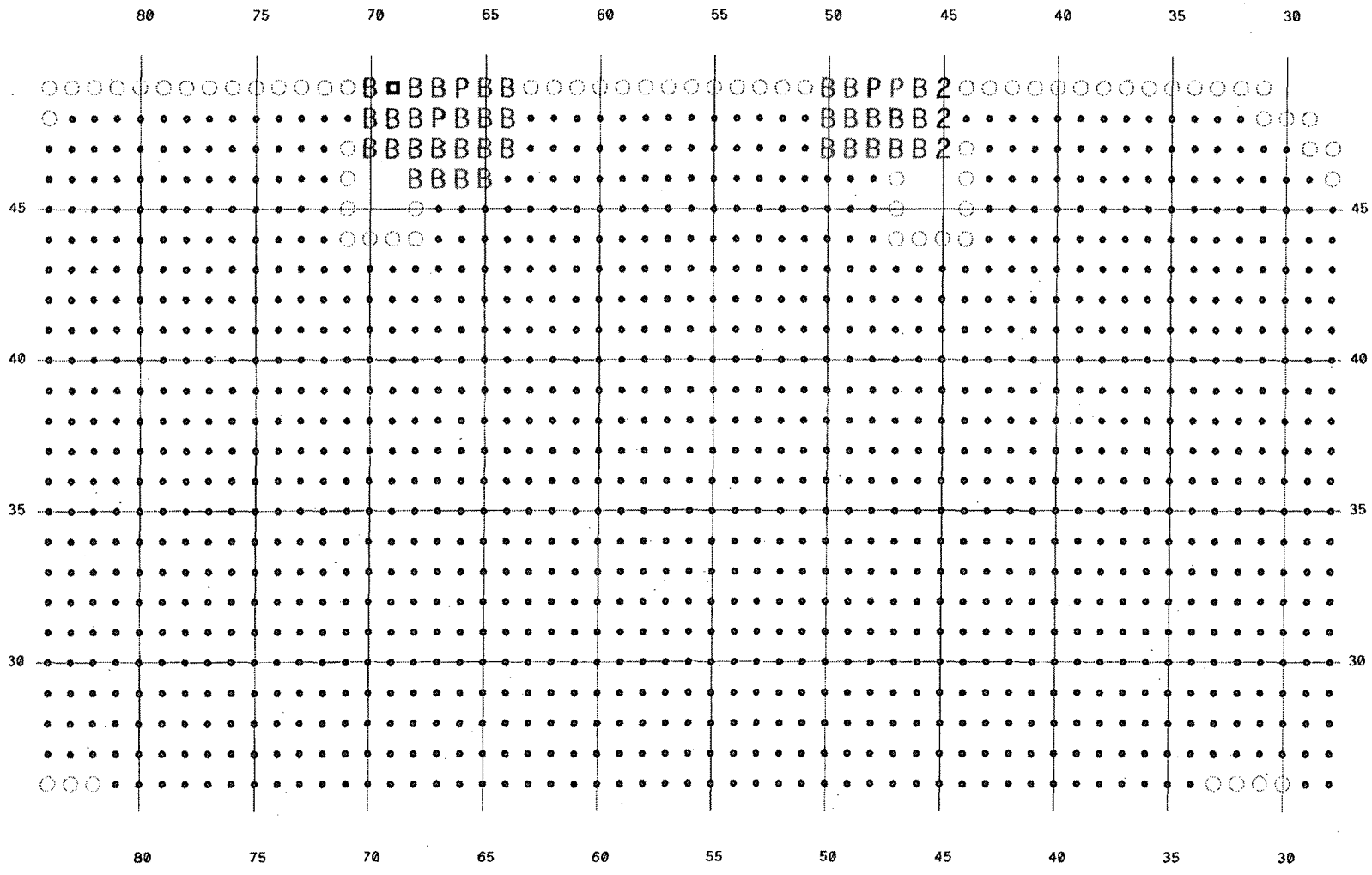
Project Manager Signature/Date R.A. Michalski 2/8/10

©2008 Westinghouse Electric Company

PLP Indications Showing Second Round of Bounding Tubes

Watts Bar Baseline WBT D3

- ▫ 1 PLUGGED TUBE
- P 1 Tubes TUBE WITH PLP AT C05 + Second Bound
- 2 3 TEST C05-2" - C06+2" Second Bound
- B 35 TEST C05-2" - C06+2" First Bound
- P 3 TUBE WITH PLP AT C05 + First Bound



Westinghouse Electric Company LLC - ST Max 02/07/2010 . 02:22:47

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 7 Date: Thursday, February 11, 2010

Steam Generator 1 Leg All

Page 1 of 1

Additional Special Interest Examinations

Change in the criteria for testing OXP to test only the calls >= .80 inches above the Top of Tubesheet.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/11/2010

Westinghouse Level III Signature/Date 12-11-2010

Customer or Customer Representative Signature/Date 12/11/2010

Project Manager Signature/Date 2-11-2010

©2008 Westinghouse Electric Company

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 8 Date: Thursday, February 11, 2010

Steam Generator 4 Leg All

Page 1 of 1

Additional Special Interest Examinations

Add all tubes with PVN signal in the freespan to be inspected with the Ghent probe.

See List for tubes and test extents.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/11/2010

Westinghouse Level III Signature/Date 12-11-2010

Customer or Customer Representative Signature/Date 12/11/2010

Project Manager Signature/Date 2/11/2010

©2008 Westinghouse Electric Company

SG - 1 ALL FREESPAN PVN TO TEST WITH GHENT PROBE

Watts Bar 2 Baseline WBT 20100201 02/11/2010 08:38:41

ROW	COL	VOLTS	DEG	IND	PER	CHN	LOCN	INCH1	INCH2	BEGT	ENDT	PDIA	PTYPE	CAL	L
9	13	5.75	14	PVN		P1	C11	11.62		HTE	CTE	.610	NBAZC	20	C
3	18	14.68	14	PVN		P1	C12	7.86		C14	CTE	.610	NBAZC	1	C
5	25	8.48	12	PVN		P1	C11	36.83		HTE	CTE	.610	NBAZC	17	C
17	26	7.99	12	PVN		P1	C13	5.95		HTE	CTE	.610	NBAZC	28	C
27	27	10.00	11	PVN		P1	C13	14.66		HTE	CTE	.610	NBAZC	22	C
17	30	13.51	13	PVN		P1	C13	21.31		HTE	CTE	.610	NBAZC	27	C
49	32	9.66	9	PVN		P1	C11	.67		HTE	CTE	.610	NBAZC	21	C
5	35	9.48	12	PVN		P1	C12	3.77		HTE	CTE	.610	NBAZC	17	C
20	37	2.67	13	PVN		4	C01	8.13		C01	C02	.610	NPSNM	33	C
7	38	5.75	14	PVN		P1	H07	27.61		HTE	CTE	.610	NBAZC	19	C
6	40	6.15	16	PVN		P1	H07	5.56		HTE	CTE	.610	NBAZC	20	C
6	40	10.72	19	PVN		P1	H07	8.56		HTE	CTE	.610	NBAZC	20	C
1	43	5.07	12	PVN		P1	C12	30.42		C14	CTE	.610	NBAZC	1	C
45	54	6.93	15	PVN		P1	C11	-.56		HTE	CTE	.610	NBAZC	25	C
49	61	9.30	13	PVN		P1	H04	28.41		HTE	CTE	.610	NBAZC	15	C
49	61	10.97	19	PVN		P1	H05	39.98		HTE	CTE	.610	NBAZC	15	C
49	61	12.67	18	PVN		P1	H06	8.12		HTE	CTE	.610	NBAZC	15	C
49	61	8.48	17	PVN		P1	H07	26.53		HTE	CTE	.610	NBAZC	15	C
44	68	5.18	5	PVN		P1	C12	38.41		HTE	CTE	.610	NBAZC	15	C
6	69	37.92	12	PVN		P1	C13	41.90		HTE	CTE	.610	NBAZC	6	C
2	70	19.58	12	PVN		P1	H06	-1.65		H08	HTE	.610	NBAZC	4	H
3	77	14.05	11	PVN		P1	H05	18.19		H08	HTE	.610	NBAZC	3	H
1	81	9.27	10	PVN		P1	H05	36.96		H08	HTE	.610	NBAZC	3	H
6	83	6.52	12	PVN		P1	H07	28.70		HTE	CTE	.610	NBAZC	8	C
26	89	5.92	11	PVN		P1	H04	31.83		HTE	CTE	.610	NBAZC	11	C
3	93	8.43	10	PVN		P1	H06	4.34		H08	HTE	.610	NBAZC	3	H
23	95	8.95	17	PVN		P1	H06	2.02		HTE	CTE	.610	NBAZC	12	C
1	97	5.55	10	PVN		P1	H07	11.56		H08	HTE	.610	NBAZC	3	H
21	103	5.01	18	PVN		P1	H05	29.70		HTE	CTE	.610	NBAZC	12	C
24	103	8.89	9	PVN		P1	H06	19.95		HTE	CTE	.610	NBAZC	11	C
5	104	6.70	11	PVN		P1	H06	23.76		HTE	CTE	.610	NBAZC	7	C
20	104	7.58	10	PVN		P1	H07	3.11		HTE	CTE	.610	NBAZC	11	C
ROW	COL	VOLTS	DEG	IND	PER	CHN	LOCN	INCH1	INCH2	BEGT	ENDT	PDIA	PTYPE	CAL	L

Tubes: 28 Records: 32

ST Max

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 9 Date: Thursday, February 11, 2010

Steam Generator 1 Leg Hot

Page 1 of 1

Additional Special Interest Examinations

Add 18 tubes to test from H03 +/-3 inches for box in of PLP calls from +PT.

See Map for tubes.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 12/11/2010

Westinghouse Level III Signature/Date 12-11-2010

Customer or Customer Representative Signature/Date 12/11/2010

Project Manager Signature/Date 2-11-2010

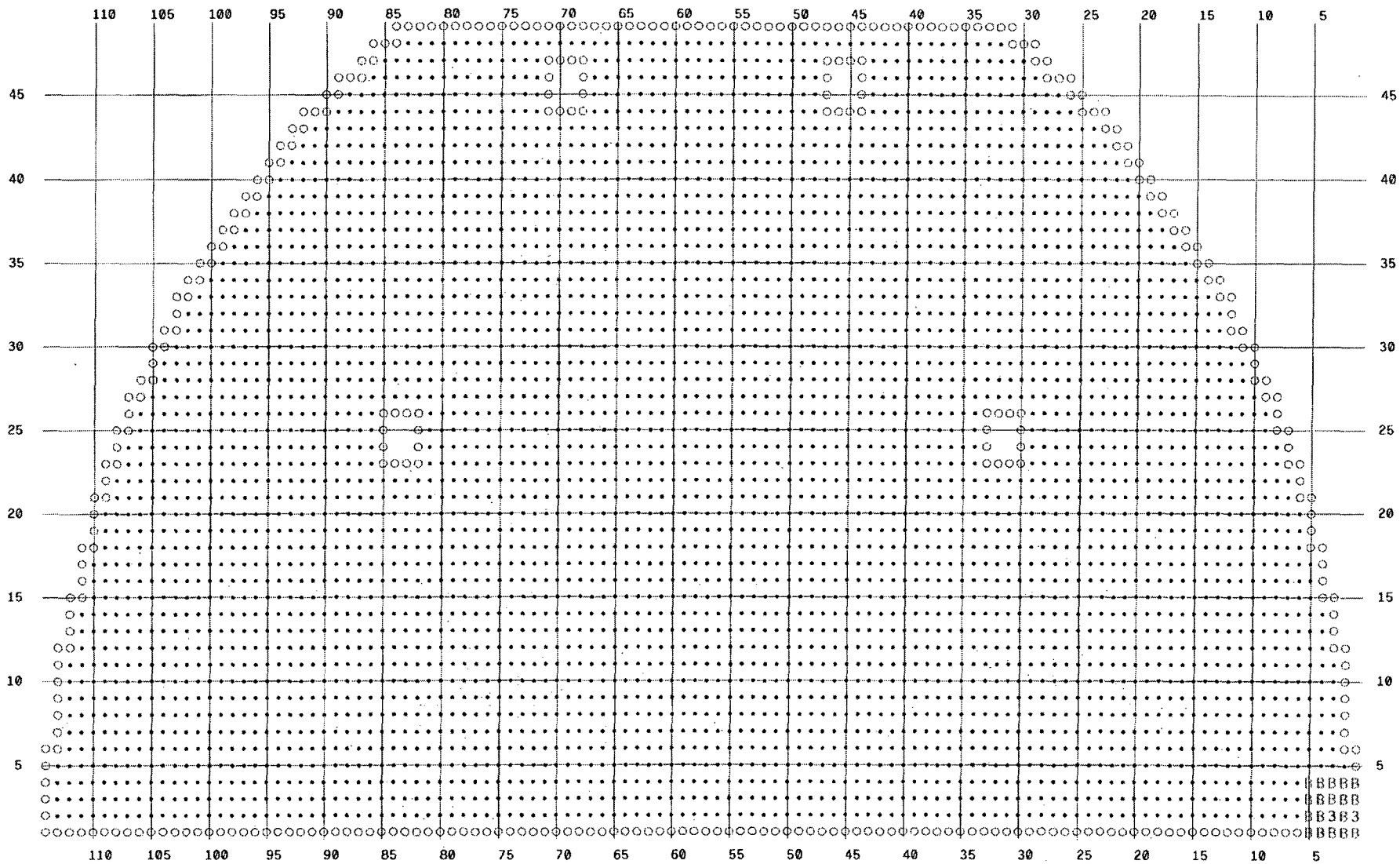
©2008 Westinghouse Electric Company

SG - 1 PLP AT H03 TO BOXIN

Watts Bar Baseline WBT D3

B 18 TEST H03 +/-3"

3 2 PLP AT H03



Westinghouse Electric Company LLC - ST Max 02/11/2010 14:33:56

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 10 Date: Thursday, February 11, 2010

Steam Generator 1 Leg Cold

Page 1 of 1

Additional Special Interest Examinations

Add 29 tubes to test from C01 -2 inches to C02 +2 inches for box in of PLP calls from +PT.
See Map for tubes.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date	12-12-10
Westinghouse Level III Signature/Date	12-12-10
Customer or Customer Representative Signature/Date	12/12/2010
Project Manager Signature/Date	

©2008 Westinghouse Electric Company

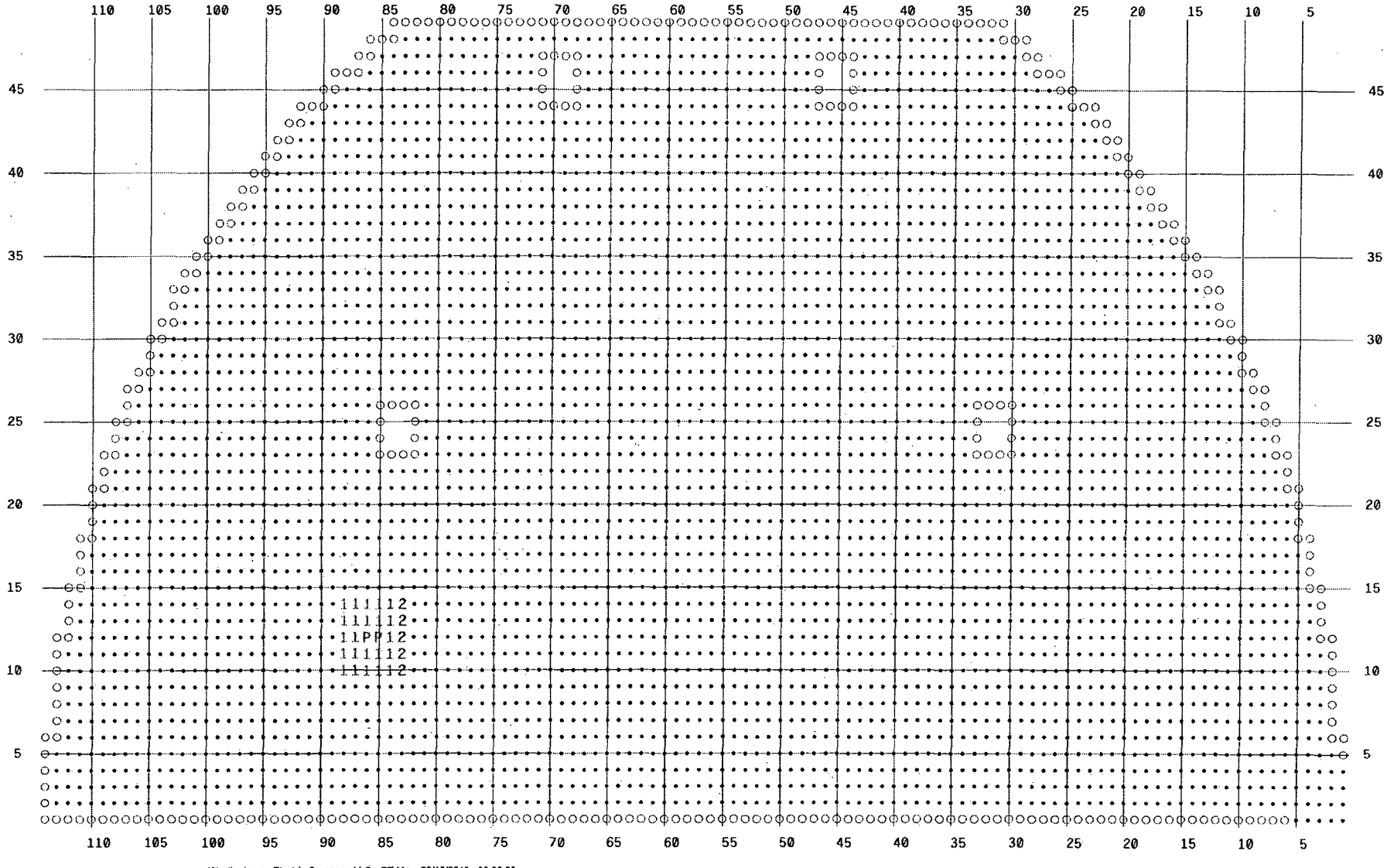
SG - 1 PLP AT C01 TO BOX IN

Watts Bar Baseline WBT D3

1 23 TEST C01 -2 TO C02 +2

2 5 TEST C01 -2 TO C02 +2

P 2 PLP AT C01 TO C02



Westinghouse Electric Company LLC - ST Max 02/12/2010 02:25:25

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 11 Date: Friday, February 12, 2010

Steam Generator 1 Leg Hot

Page 1 of 1

Additional Special Interest Examinations

Add 11 tubes to test from H02 -2 inches to H03 +2 inches for box in of PLP calls from +PT.
See Map for tubes.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date	12-12-10
Westinghouse Level III Signature/Date	12-12-10
Customer or Customer Representative Signature/Date	12/12/2010
Project Manager Signature/Date	/

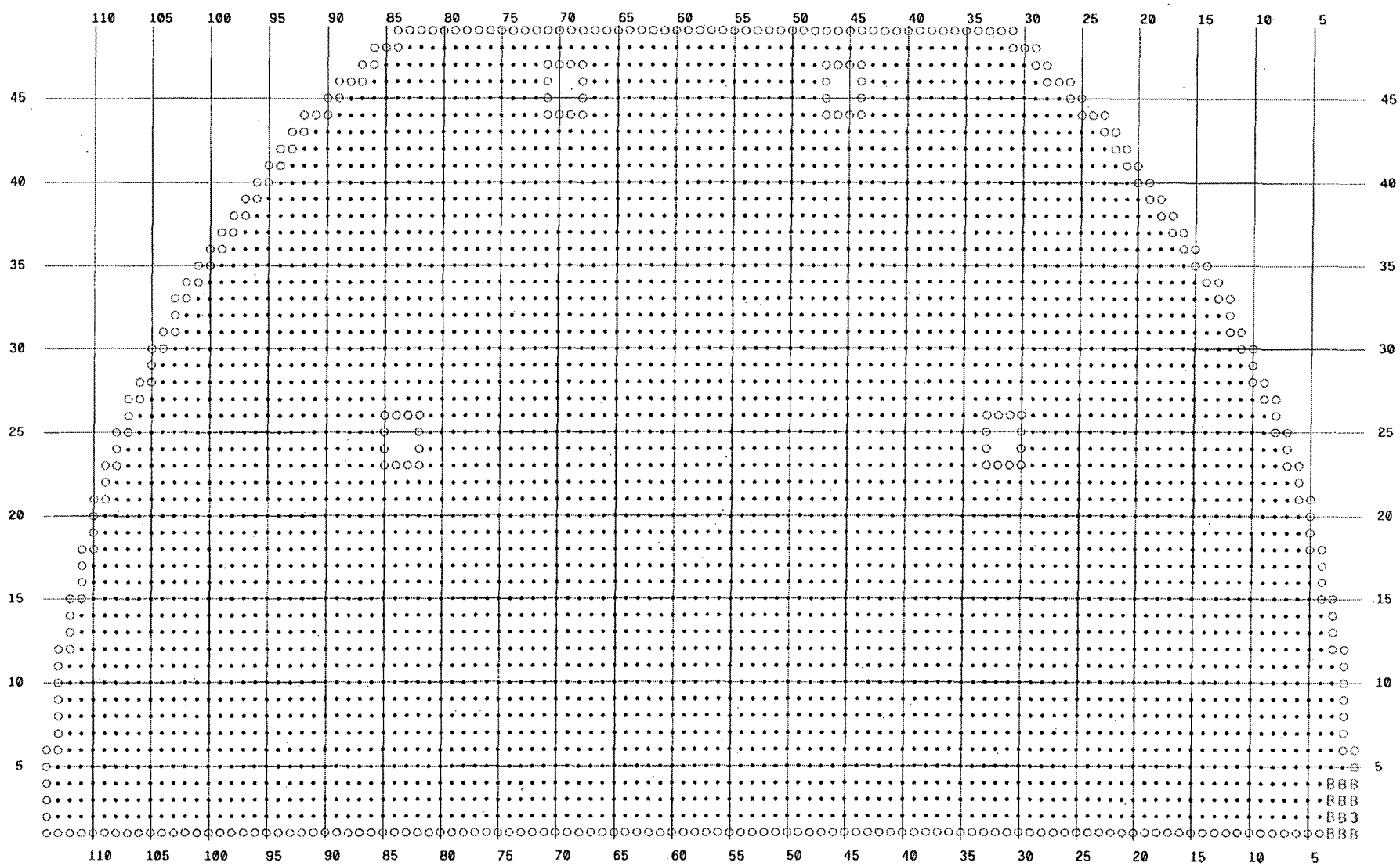
©2008 Westinghouse Electric Company

SG - 1 PLP AT H02 TO H03 TO BOXIN

Watts Bar Baseline WBT D3

B 11 TEST H02 -2 TO H03 +2

3 1 PLP AT H03 -3.17



Westinghouse Electric Company LLC - ST Max 02/12/2010 02:37:42

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 12 Date: Friday, February 12, 2010

Steam Generator 1 Leg Hot

Page 1 of 1

Additional Special Interest Examinations

Add 2 tests in tubes to determine tube to tube proximity.

See Map for tubes and test extents.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

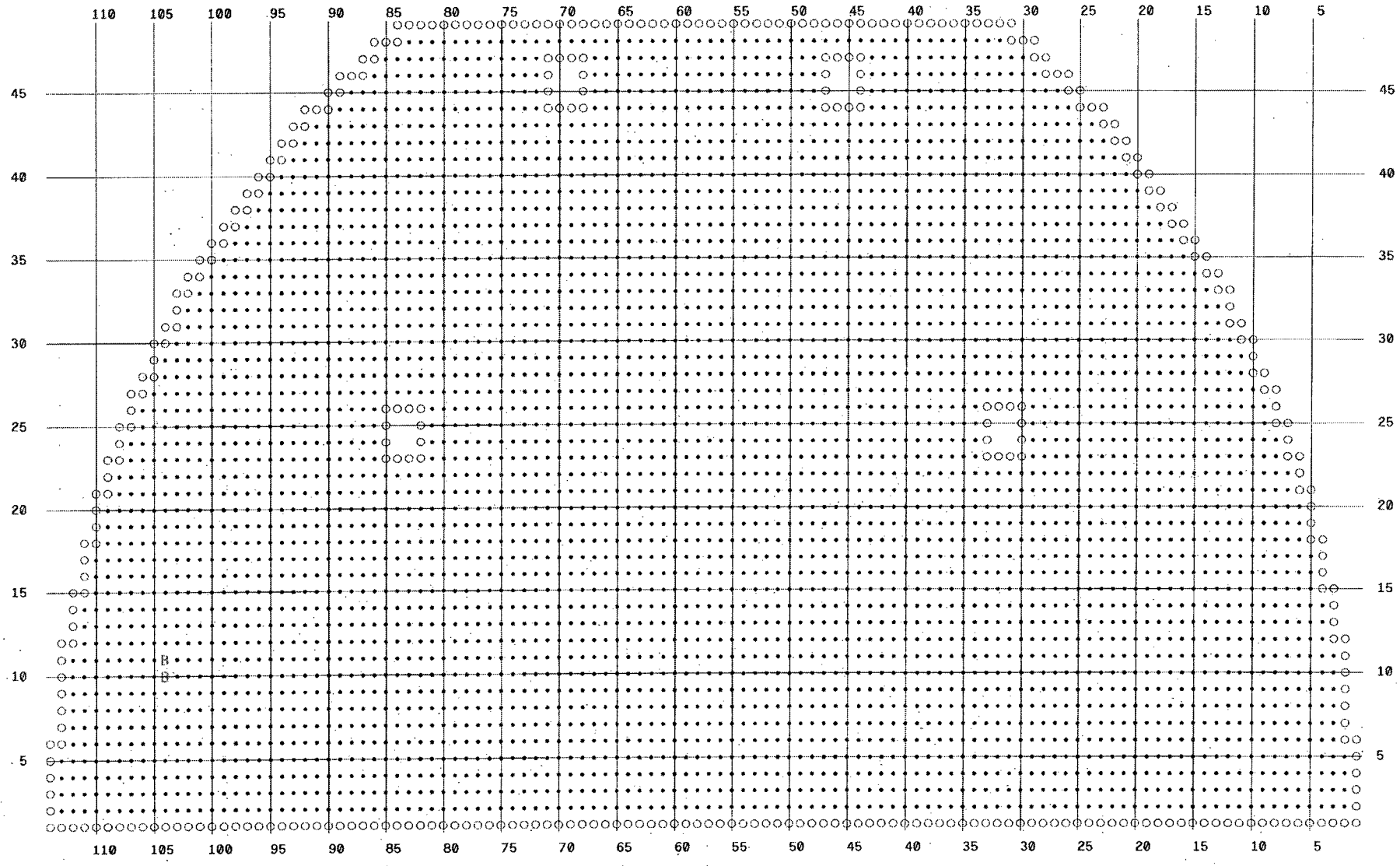
Westinghouse Data Management Signature/Date	12-12-10
Westinghouse Level III Signature/Date	12-12-10
Customer or Customer Representative Signature/Date	2/12/2010
Project Manager Signature/Date	

©2008 Westinghouse Electric Company

SG - 1 PROXIMITY TUBES TO PLUS POINT

Watts Bar Baseline WBT D3

B 2 TEST H08-C14



Westinghouse Electric Company LLC - ST Max 02/12/2010 03:19:47

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 13 Date: Friday, February 12, 2010

Steam Generator 1 Leg Hot

Page 1 of 1

Additional Special Interest Examinations

Add tubes to test from H01-3 thru H02 +3 inches and H02 -2 thru H03 +2 inches to box in PLP calls from +PT.

See Map and list for tubes and extents.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/12/2010

Westinghouse Level III Signature/Date 12-12-2010

Customer or Customer Representative Signature/Date 12/12/2010

Project Manager Signature/Date /

©2008 Westinghouse Electric Company

SG - 1 PLP AT H02 TO H03 TO BOXIN

REV 3

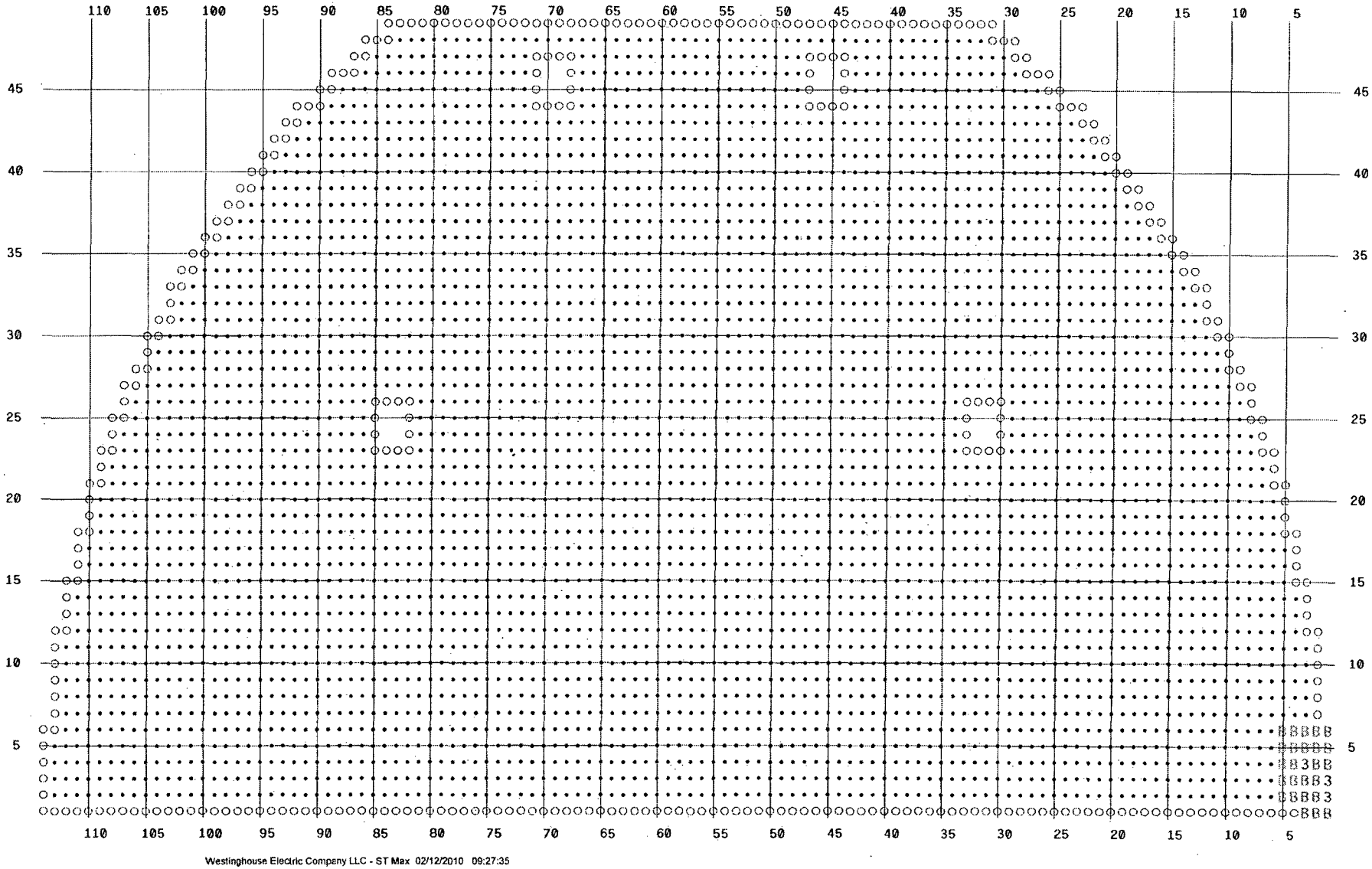
Watts Bar Baseline WBT D3

B 9 TEST H02 -2 TO H03 +2

3 1 PLP AT H03 -3.17

3 2 PLP AT H02 +

B 16 TEST H02 -2 TO H03 +2



Westinghouse Electric Company LLC - ST Max 02/12/2010 09:27:35

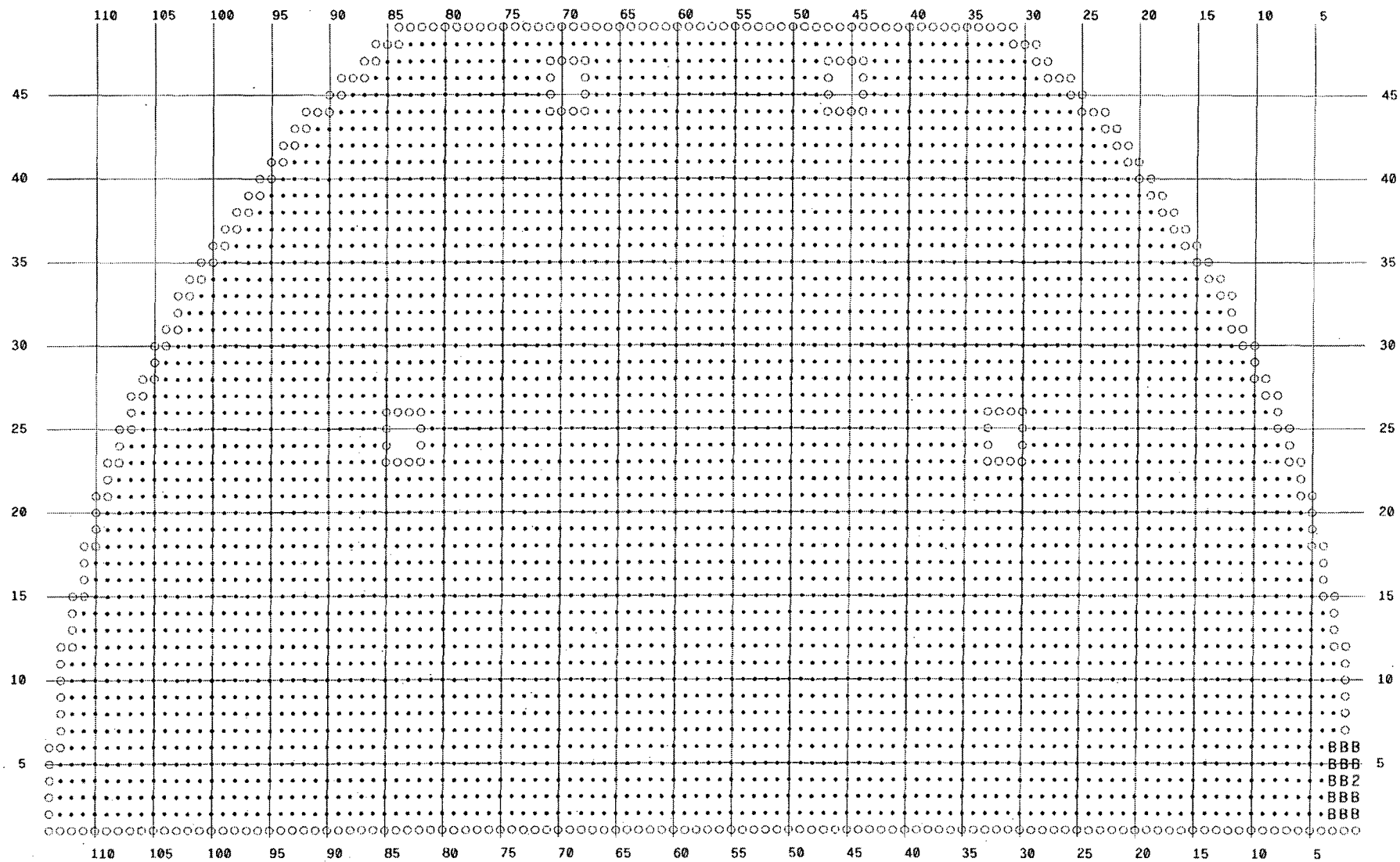
SG - 1 PLP AT H01 TO H02 TO BOXIN

REV 4

Watts Bar Baseline WBT D3

2 1 PLP - H02 -

B 14 TEST H01 -2 TO H02 +2



Westinghouse Electric Company LLC - ST Max 02/12/2010 09:30:54

HOT LEG STRAIGHT PLP BOX IN PLUS POINT SI - ETAG 5

SG - 1 WBT 02/12/2010 09:39:07

Row	Col	T	Z	[Begin Test]		[End Test]	
2	1	M		H01	-2.0	H02	+2.0
3	1	M		H01	-2.0	H02	+2.0
5	1	M		H01	-2.0	H03	+2.0
6	1	M		H01	-2.0	H03	+2.0
2	2	M		H01	-2.0	H02	+2.0
3	2	M		H01	-2.0	H02	+2.0
4	2	M		H01	-2.0	H02	+2.0
5	2	M		H01	-2.0	H03	+2.0
6	2	M		H01	-2.0	H03	+2.0
2	3	M		H01	-2.0	H02	+2.0
3	3	M		H01	-2.0	H02	+2.0
4	3	M		H01	-2.0	H02	+2.0
5	3	M		H01	-2.0	H03	+2.0
6	3	M		H01	-2.0	H03	+2.0
2	4	M		H02	-2.0	H03	+2.0
3	4	M		H02	-2.0	H03	+2.0
4	4	M		H02	-2.0	H03	+2.0
5	4	M		H02	-2.0	H03	+2.0
6	4	M		H02	-2.0	H03	+2.0
2	5	M		H02	-2.0	H03	+2.0
3	5	M		H02	-2.0	H03	+2.0
4	5	M		H02	-2.0	H03	+2.0
5	5	M		H02	-2.0	H03	+2.0
6	5	M		H02	-2.0	H03	+2.0

Total Test Records = 24

End - ST Max

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 14 Date: Tuesday, February 16, 2010

Steam Generator 2 Leg All

Page 1 of 1

Additional Special Interest Examinations

Change the criteria for testing CL OXP calls to any >=1.0 inches above the top of tubesheet.
Remove all CL DNG calls >=2 and <5 Volts at TSP +/- 1 inch from the special interest program.
We will only be required to bound a PLP call if it is in a area that Bobbin cannot detect it. We will then box in the RPC PLP call by 2 tubes at the location of the indication.
Proximity calls will be evaluated on a case by case basis for special interest examination.
All RPC PVN calls at HTS will be inspected with Mag Bias Plus Point. All Bobbin PVN calls will be inspected with the R3/4 Ghent probe.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/16/2010

Westinghouse Level III Signature/Date 12-16-2010

Customer or Customer Representative Signature/Date 12/16/2010

Project Manager Signature/Date 2/16/2010

©2008 Westinghouse Electric Company

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 15 Date: Friday, February 18, 2010

Steam Generator 2 Leg Cold

Page 1 of 1

Additional Special Interest Examinations

Add 12 tubes to test from C08 +/- 3 inches to box in PLP calls from +PT that were not detectable from Bobbin.

See Map and list for tubes and extents.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 02/18/2010

Westinghouse Level III Signature/Date 12-18-2010

Customer or Customer Representative Signature/Date 12/18/2010

Project Manager Signature/Date 2/18/2010

©2008 Westinghouse Electric Company

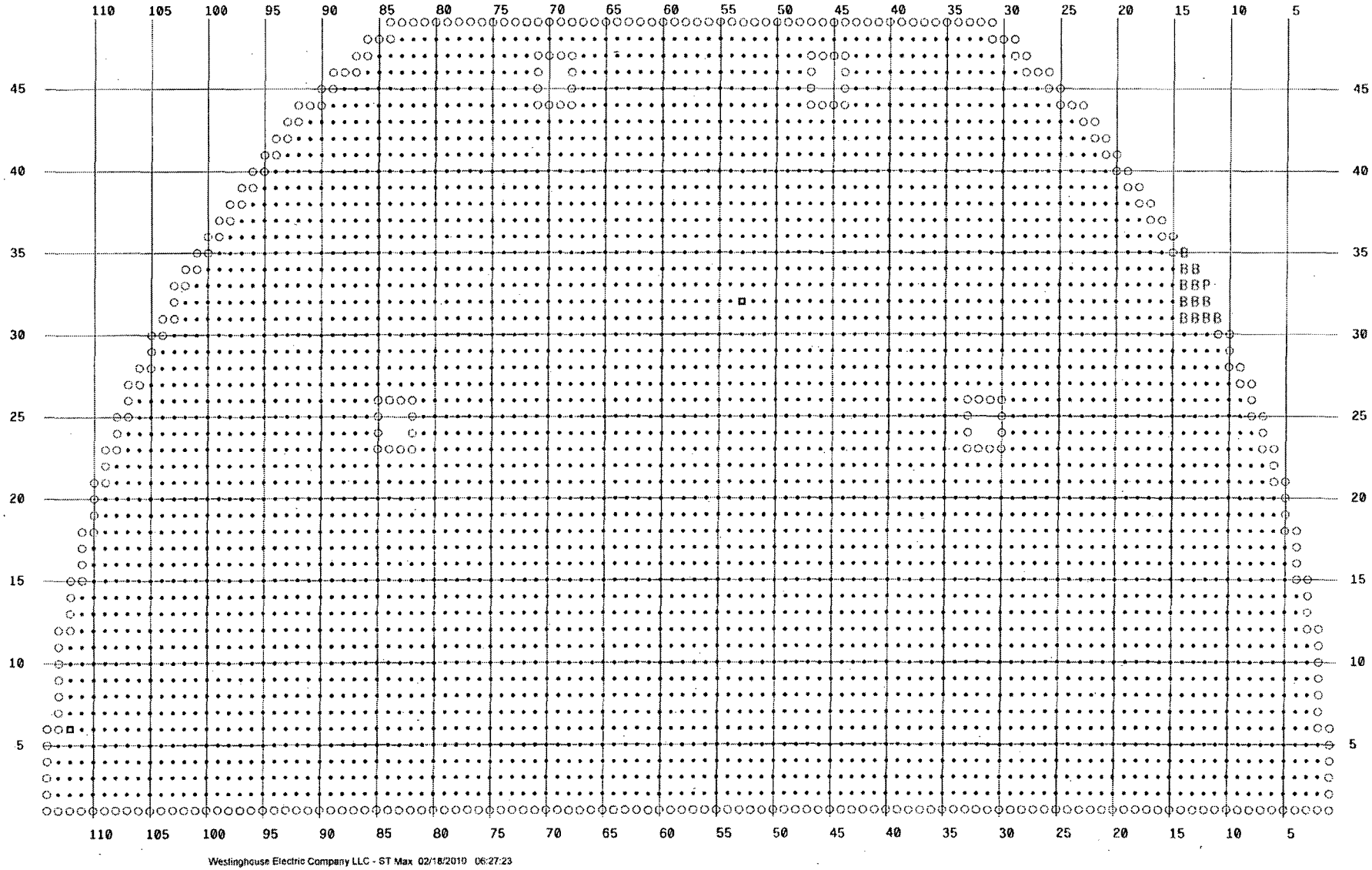
SG - 2 PLP AT C08 TO BOX IN

Watts Bar Baseline WBT D3

▫ 2 PLUGGED TUBE

P 1 PLP AT C08

B 12 TEST C08 +/-3



Westinghouse Electric Company LLC - ST Max 02/18/2010 06:27:23

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 16 Date: Saturday, February 27, 2010

Steam Generator ALL Leg BOTH

Page 1 of 1

Additional Special Interest Examinations

This directive is to spin all bobbin PLP calls not tested with RPC and to also boxin by two the calls with Plus Point probe. We will also test the area identified by EC that showed PLP indications in the area of the SG modification. These test will be performed with Plus Point utilizing ETSS WBT-04-10-O.

See Map for tubes and extents to test.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 12/27/2010

Westinghouse Level III Signature/Date 12-27-2010

Customer or Customer Representative Signature/Date 12-27-2010

Project Manager Signature/Date 2-27/2010

©2008 Westinghouse Electric Company

SG - 1 HOT LEG PLP PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

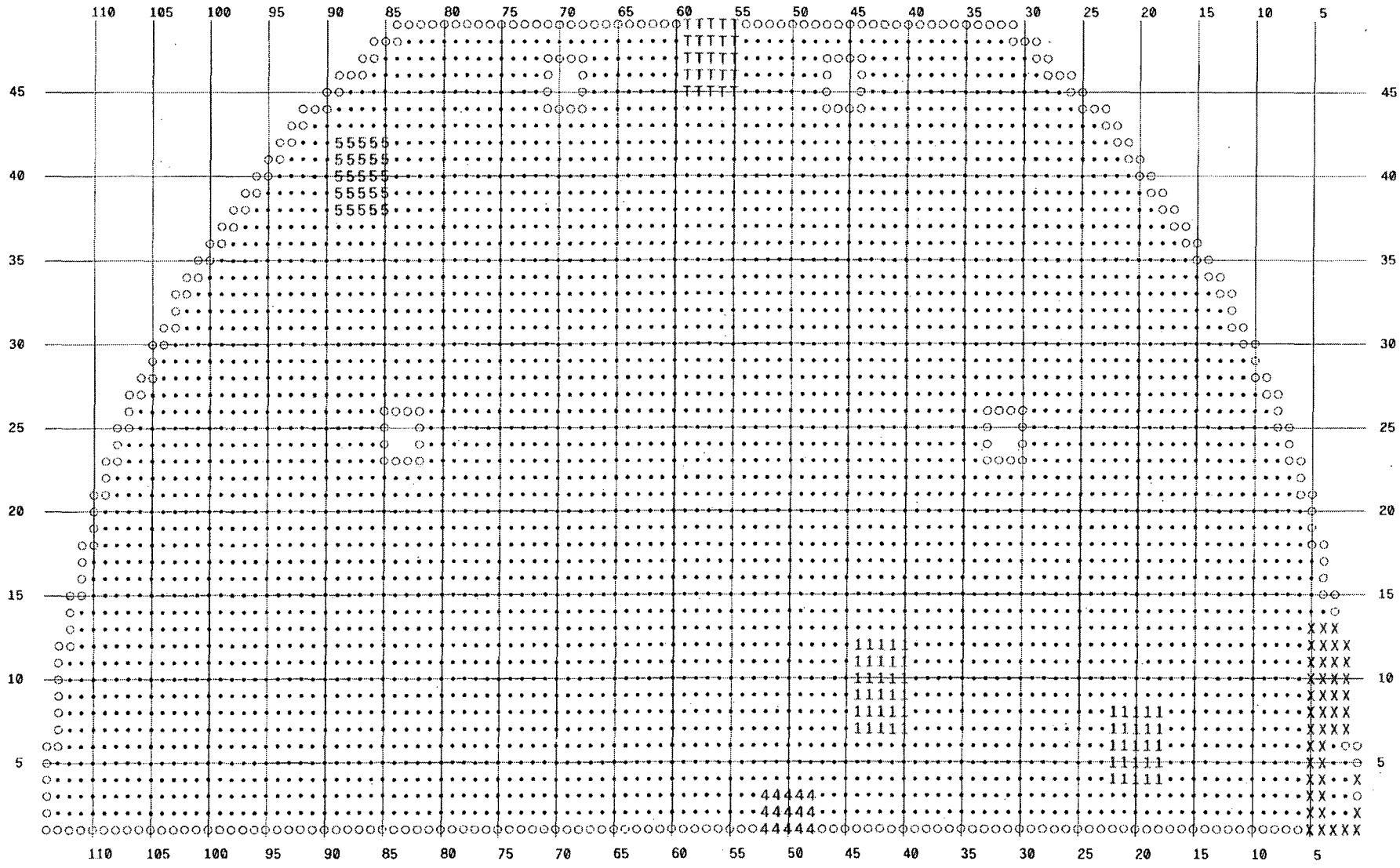
X 44 TEST HTS -2" THRU H03 +2"

T 25 TEST HTS -2" THRU H01 +2"

1 55 TEST H01 -2" THRU H02 +2"

4 15 TEST H04 -2" THRU H05 +2"

5 25 TEST H05 +/-3"



Westinghouse Electric Company LLC - ST Max 02/27/2010 08:23:05

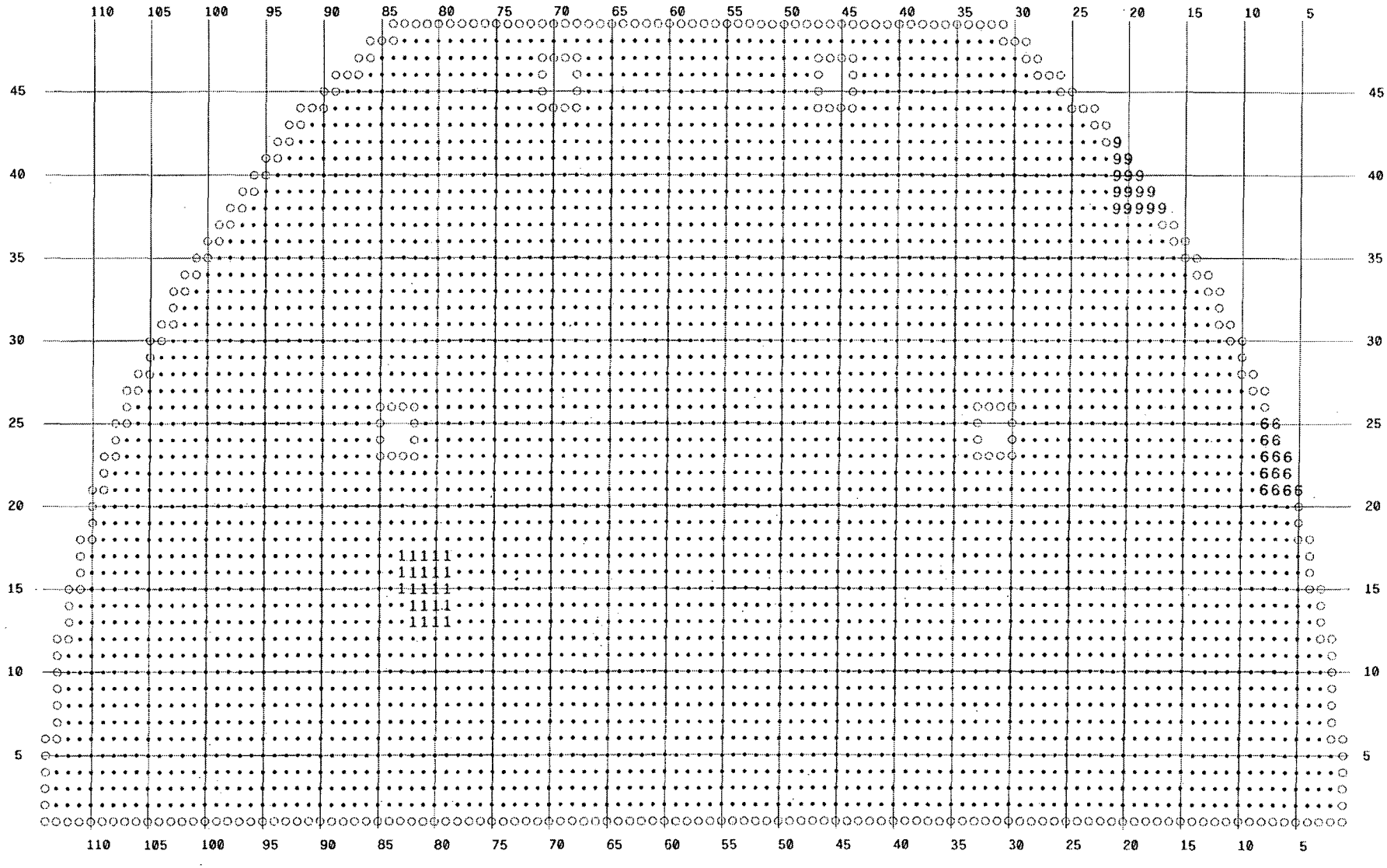
SG - 1 COLD LEG PLP PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

1 23 TEST C01 -2" THRU C02 +2"

6 14 TEST C06 -2" THRU C07 +2"

9 15 TEST C09 -2" THRU C10 +2"



Westinghouse Electric Company LLC - ST Max 02/27/2010 08:23:08

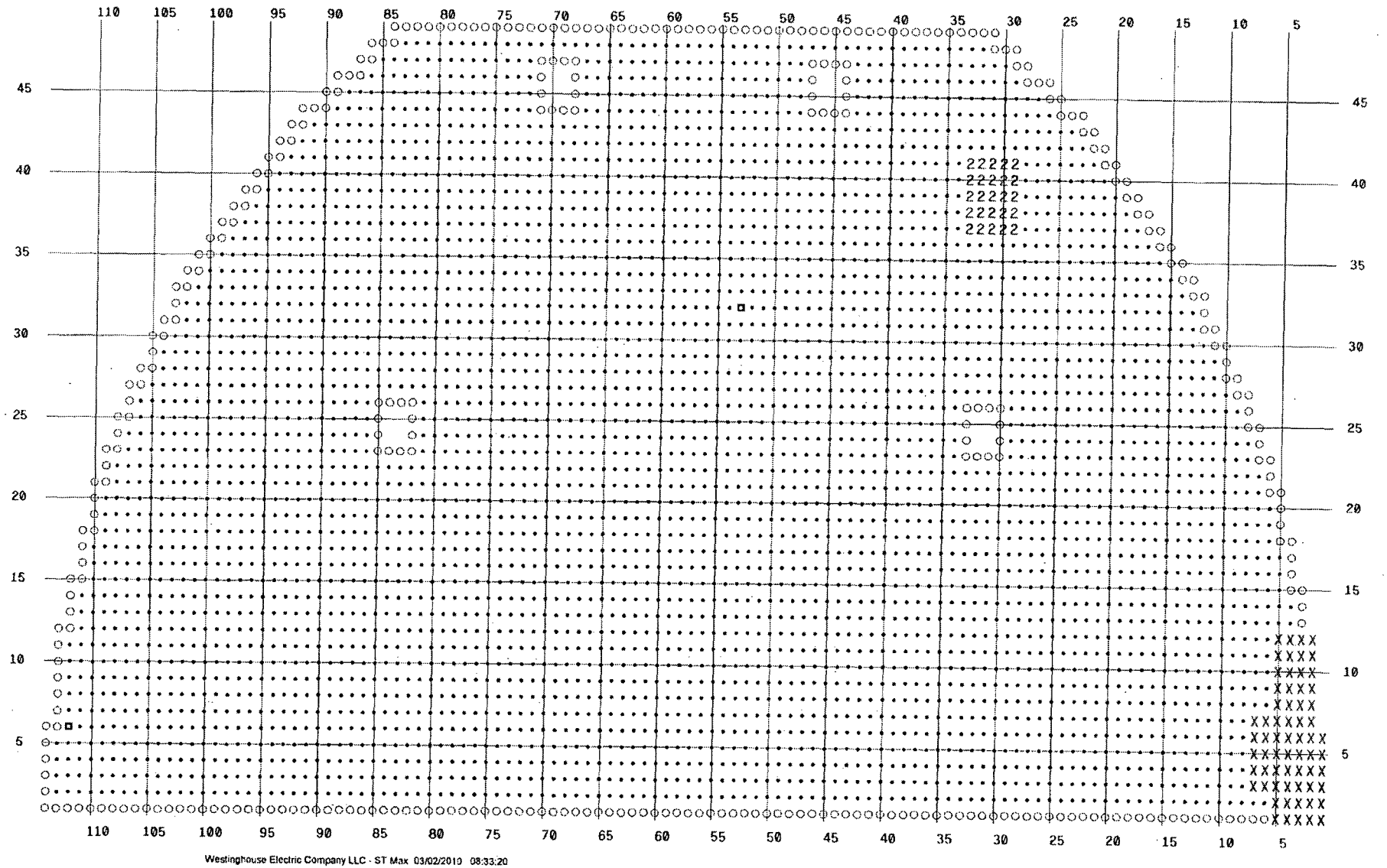
SG - 2 HOT LEG PLP PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

X 64 TEST HTS -2" THRU H03 +2"

2 25 TEST H02 -2" THRU H03 +2"

□ 2 PLUGGED TUBE



Westinghouse Electric Company LLC - ST Max 03/02/2010 08:33:20

SG - 2 COLD LEG PLP PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

1 14 TEST C01 -2" THRU C02 +2"

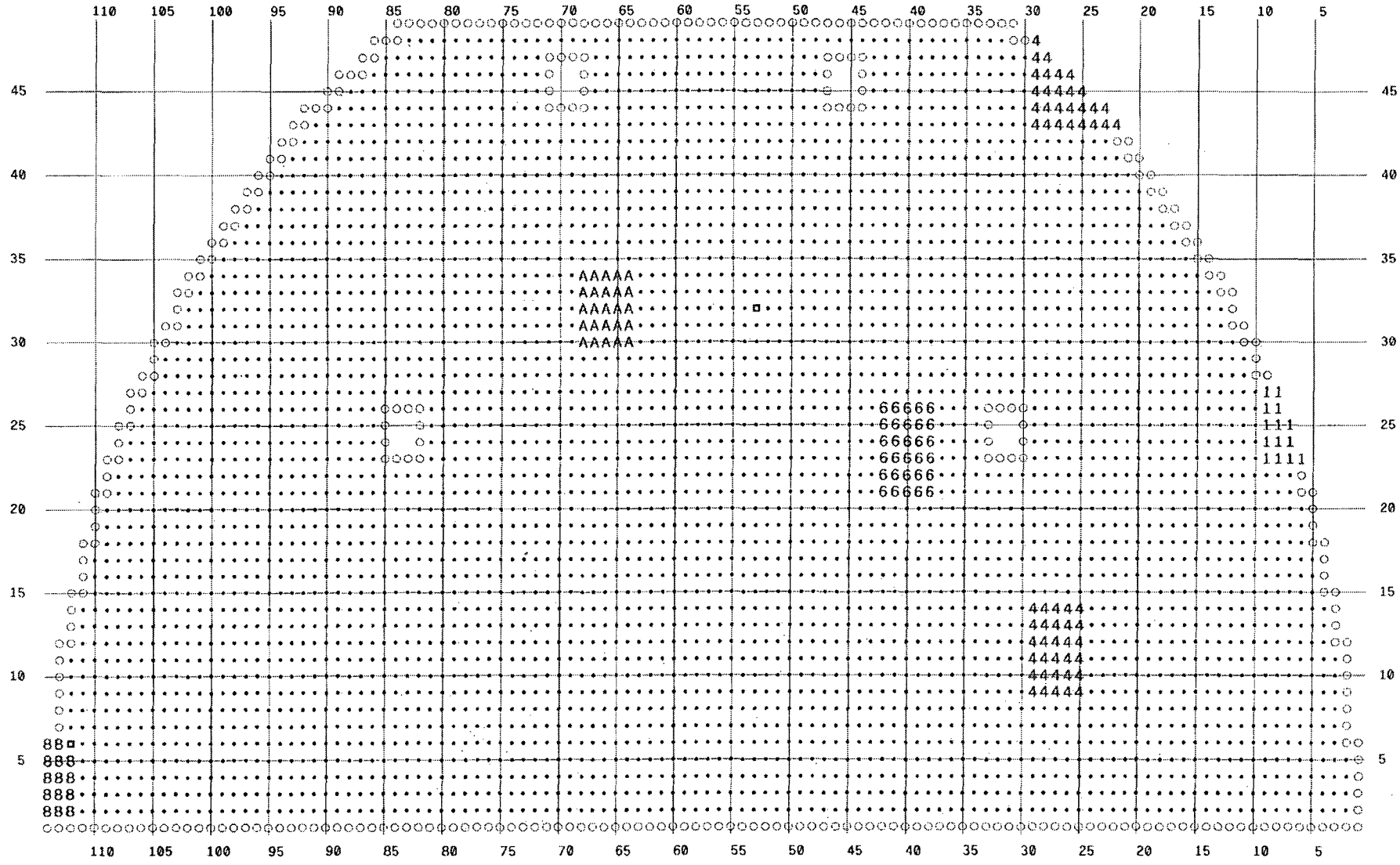
4 57 TEST C04 -2" THRU C05 +2"

6 30 TEST C06 -2" THRU C07 +2"

8 14 TEST C08 -2" THRU C09 +2"

A 25 TEST C11 -2" THRU C12 +2"

□ 2 PLUGGED TUBE

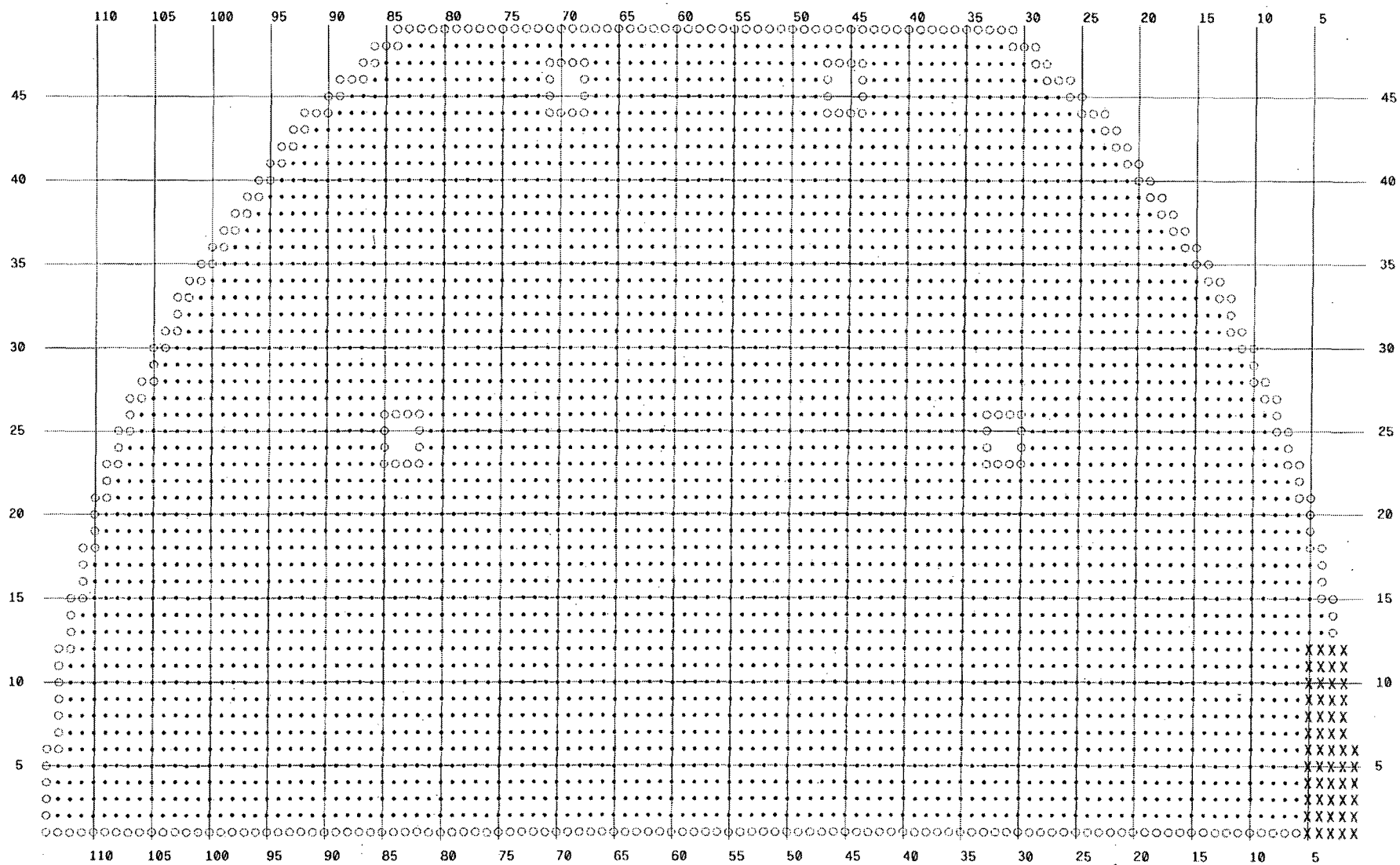


Westinghouse Electric Company LLC - ST Max 02/27/2010 08:23:24

SG - 3 HOT LEG PLP PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

X 54 TEST HTS -2" THRU H03 +2"



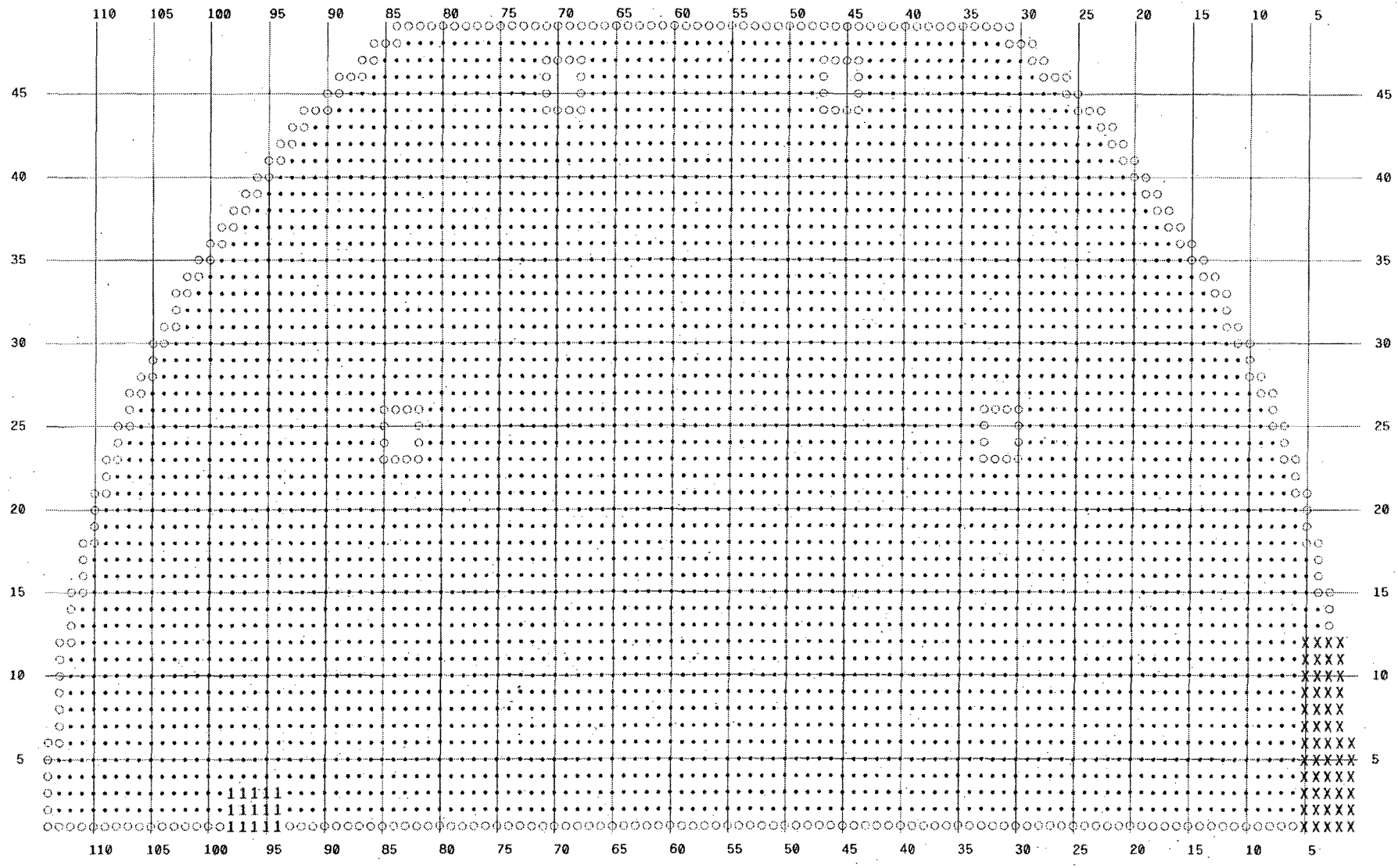
Westinghouse Electric Company LLC - ST Max 02/27/2010 08:23:35

SG - 3 COLD LEG PLP PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

X 54 TEST CTS -2" THRU C03 +2"

1 15 TEST C01 -2" THRU C02 +2"



Westinghouse Electric Company LLC - ST Max 02/27/2010 08:23:40

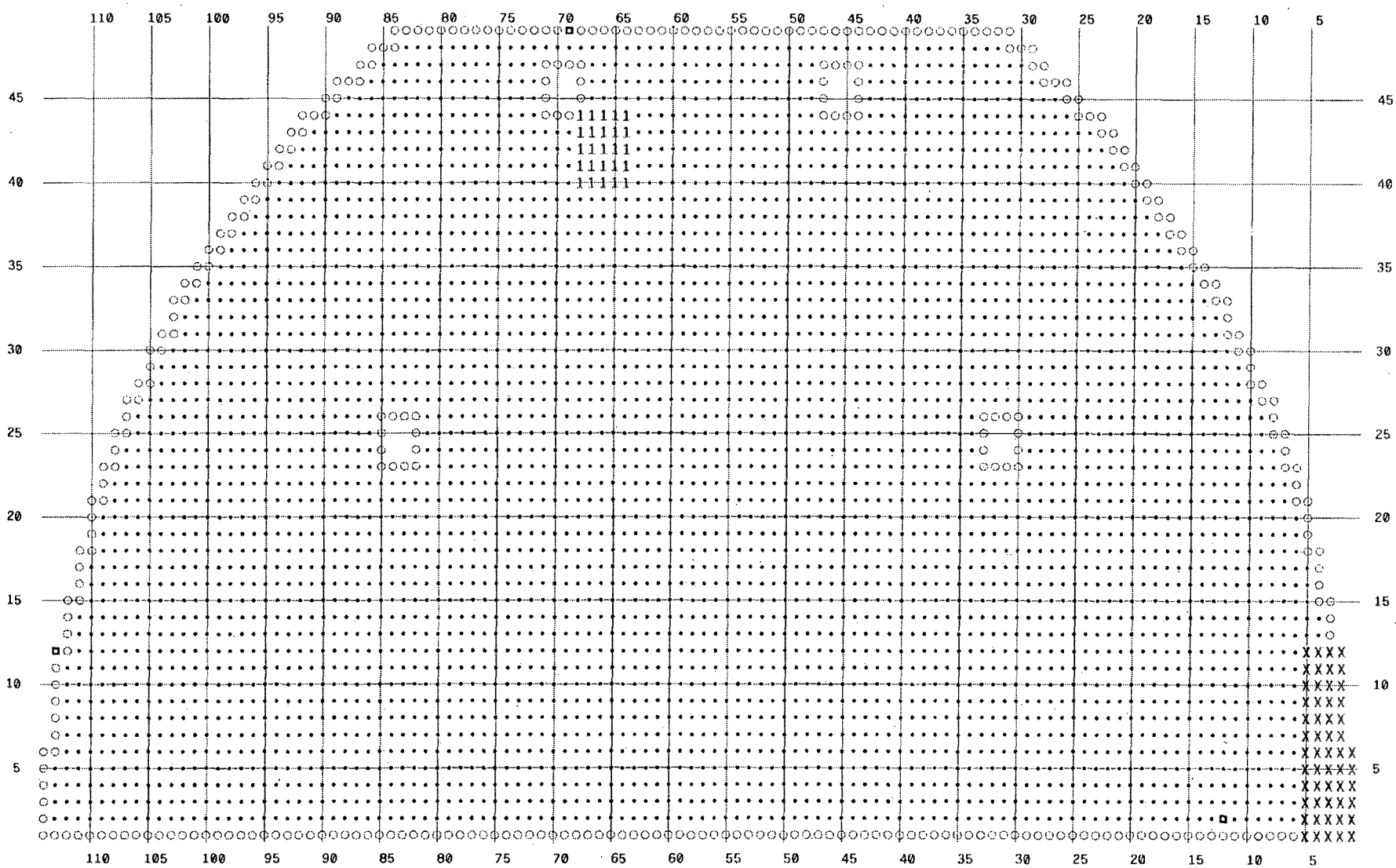
SG - 4 HOT LEG PLP PLUS POINT PROGRAM

Watts Bar Baseline WBT D3

X 54 TEST HTS -2" THRU H03 +2"

1 25 TEST H01 -2" THRU H02 +3"

□ 3 PLUGGED TUBE



Westinghouse Electric Company LLC - ST Max 02/27/2010 08:23:52

SG - 4 COLD LEG PLP PLUS POINT PROGRAM

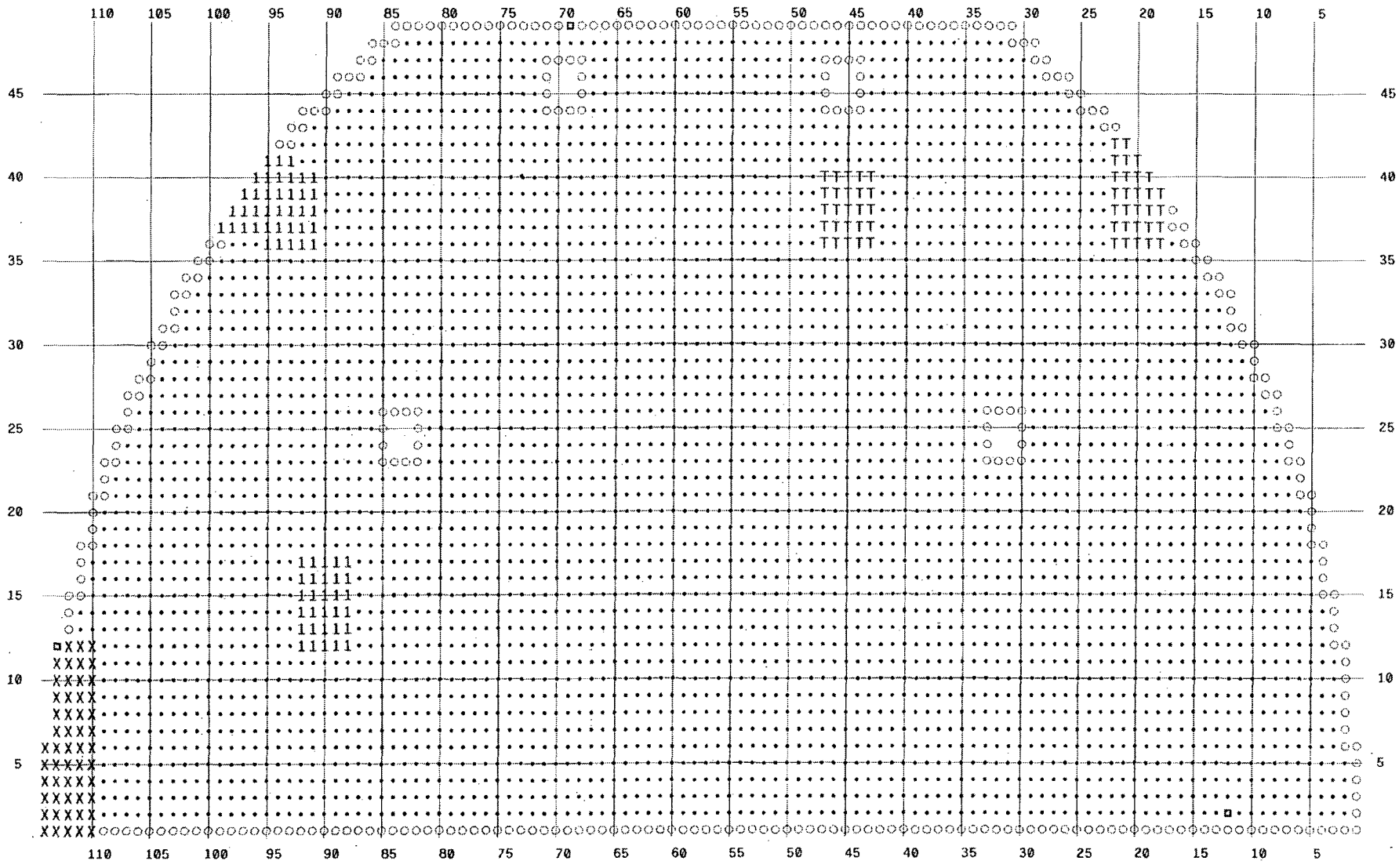
Watts Bar Baseline WBT D3

X 53 TEST CTS -2" THRU C03 +2"

T 54 TEST CTS -2" THRU C01 +2"

1 68 TEST C01 -2" THRU C02 +2"

▫ 3 PLUGGED TUBE



Westinghouse Electric Company LLC - ST Max 02/27/2010 08:23:56

APPENDIX 12.8
TYPICAL SPECIAL INTEREST OR REPAIR DIRECTIVE

Site: Watts Bar Unit 2 Baseline

Revision: 17 Date: Saturday, February 27, 2010

Steam Generator 3 Leg BOTH

Page 1 of 1

Additional Special Interest Examinations

This directive is to bound all PLP calls from Appendix 12.5 Rev 16 by two tubes with Plus Point probe. These tests will be performed with Plus Point utilizing ETSS WBT-04-10-O.

See Map for tubes and extents to test.

Additional Repair Work

None

CRITICAL QUALITY NOTE

Signing this document means that you have reviewed it in detail and concur that the documented special interest or repair directive accurately and completely satisfies the requirements in effect for this inspection. Be aware that incorrect information in this document may result in incorrect setup of the eddy current data management system. This in turn may cause steam generator eddy current inspection and repair to fail to meet all requirements.

Westinghouse Data Management Signature/Date 12/27/2010

Westinghouse Level III Signature/Date 12-27-2010

Customer or Customer Representative Signature/Date 12/27/2010

Project Manager Signature/Date 2/27/2010

©2008 Westinghouse Electric Company

SG - 3 HOT LEG PLP PLUS POINT PROGRAM

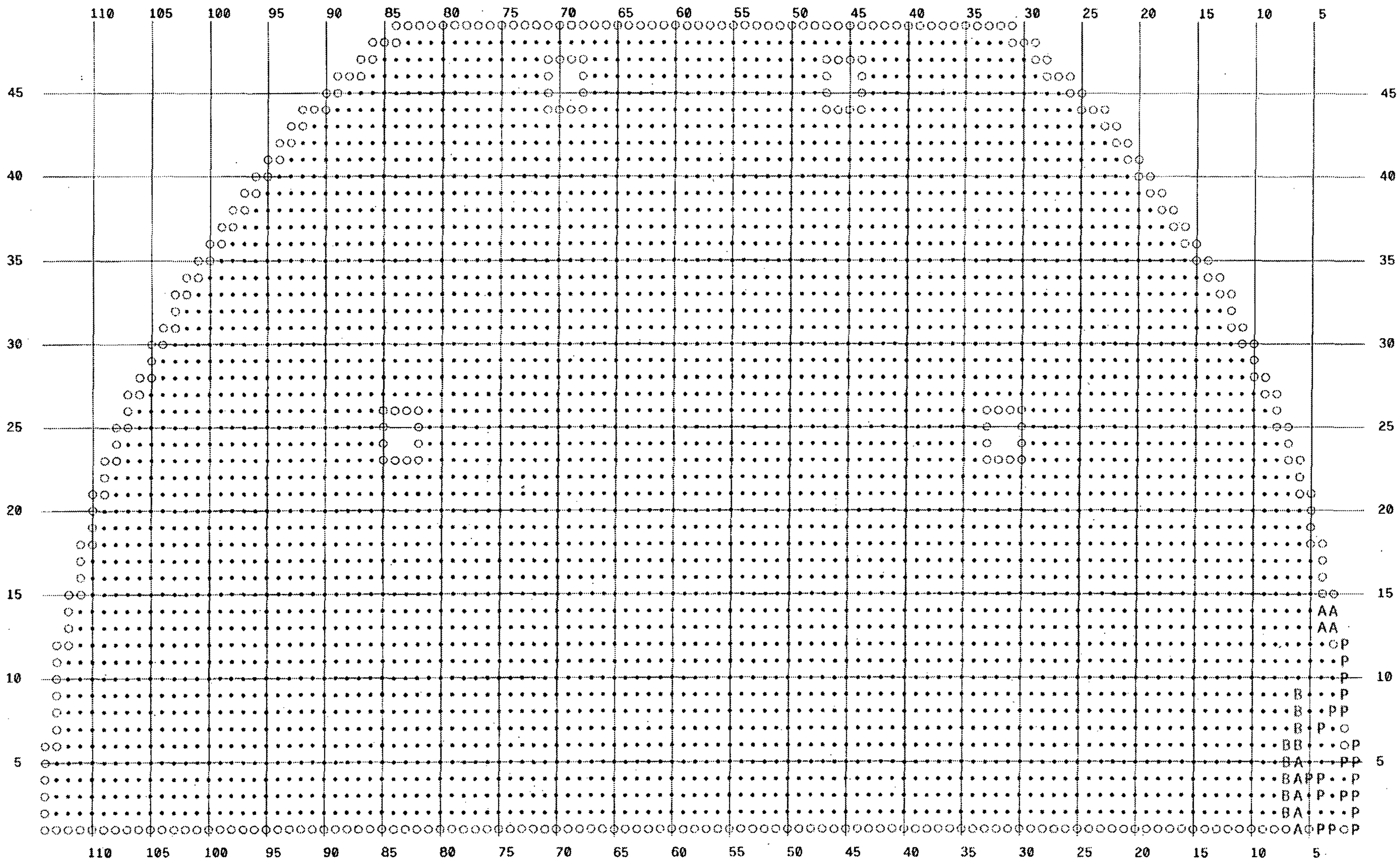
REV 1

Watts Bar Baseline WBT D3

A 9 BOUND AT H01 & H02 +/-3"

B 9 BOUND AT H01 +/-3"

P 20 Tubes with PLP Indications to Bound



Westinghouse Electric Company LLC - ST Max 02/27/2010 14:07:32

SG - 3 COLD LEG PLP PLUS POINT PROGRAM

REV 1

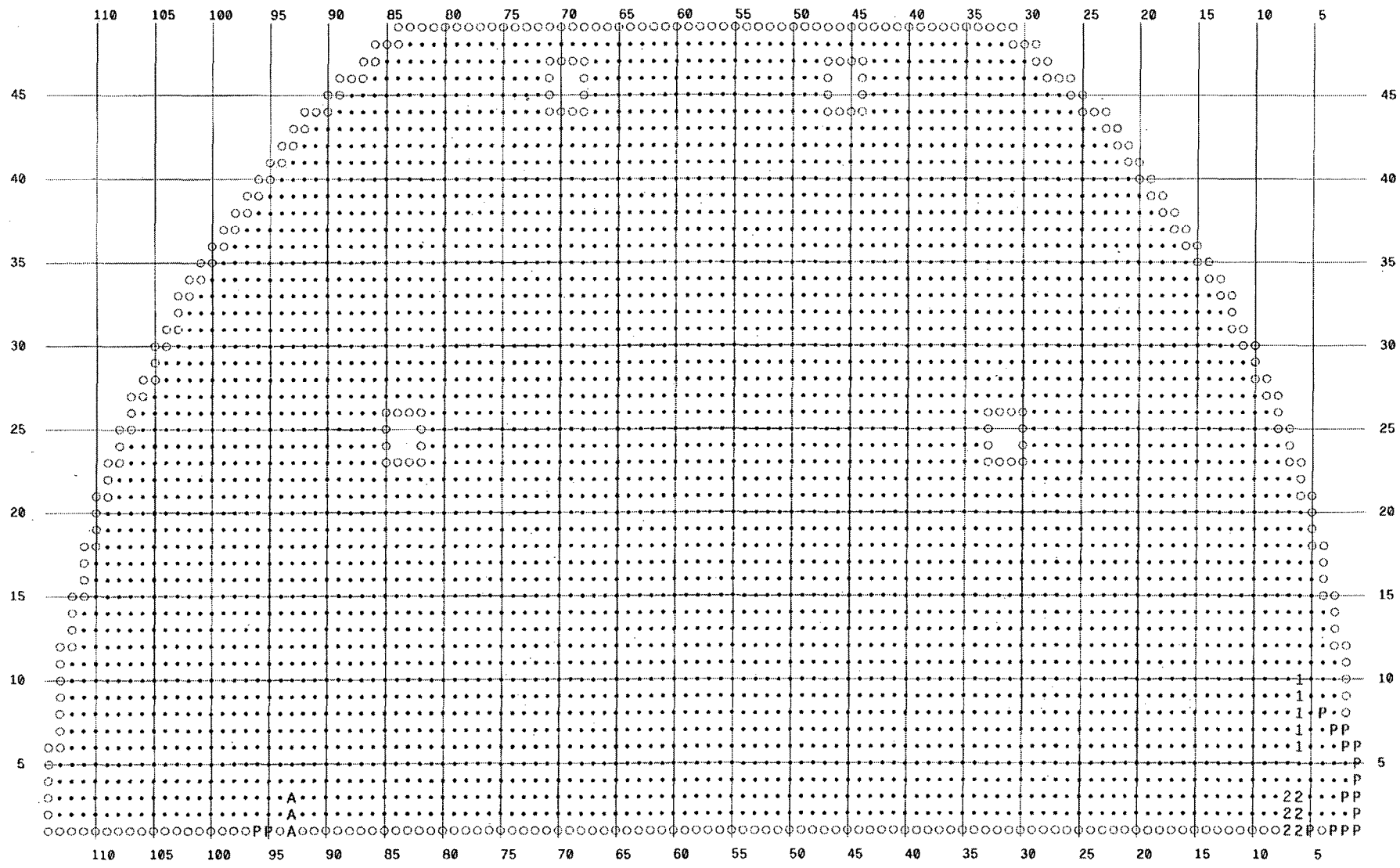
Watts Bar Baseline WBT D3

P 16 Tubes with PLP Indications to Bound

1 5 BOUND C01 +/-3"

A 3 BOUND C01 -2" THRU C02 +2"

2 6 BOUND C02 +/-3"



Westinghouse Electric Company LLC - ST Max 02/27/2010 13:55:47

APPENDIX 12.9
TYPICAL APPENDICES CHANGE NOTICE

CHANGE #:

DESCRIPTION OF CHANGE:

1.

2.

EFFECTIVE DATE:

Print Name	Signature	Date	Time
Rich Callender			
Nicolas Bhai			

©2008 Westinghouse Electric Company

APPENDIX 12.10
TYPICAL SHIFT ACTIVITY CHECKLIST

Site: Watts Bar Unit 2 Baseline

Revision: 0 Date: Friday, January 29, 2010

Shift: Day Date: 02/01/2010

Data Manager: _____

Steam Generator D

12.10.1 DB Net Verify for RES

12.10.2 Scrub Database.

12.10.3 QA Current DB.

12.10.4 Summary for all inds in DB – look for unusual/unexpected indications.

12.10.5 Data Quality:
- 12.10.5.1 Check for missing DQM reports.
- 12.10.5.2 Verify DQM data.
- 12.10.5.3 Verify DQM calibration checks

12.10.6 Map multiple acquired tests by probe (Data Center) – send fixes for PBC or PRC.

12.10.7 Daily Quality Query Queue:

- 12.10.8.1 PBC has previous bobbin call
- 12.10.8.2 PRC has previous RPC call
- 12.10.8.3 Check PVN locations.

©2008 Westinghouse Electric Company

APPENDIX 12.10
TYPICAL SHIFT ACTIVITY CHECKLIST

12.10.8 IPLANS scheduling:

12.10.9.1 Load Query/SRID Plans.
12.10.9.2 +Point TS indications scheduled for PID.

12.10.9 Floating Closeout Tools:

12.10.10.1 Plan Zero.
12.10.10.2 Multi Probe Cals.
12.10.10.3 Completed RST.
12.10.10.4 Utility Field Comments.

12.10.10 Shift report.

12.10.11 Backup to external hard drive.

12.10.12 Compact all databases.

©2008 Westinghouse Electric Company

APPENDIX 12.11
SPECIAL EVALUATION / TUBE SELECTION CRITERIA

12.11.1 Tube Pull Selection Priorities

12.11.1.1 As recommended by condition monitoring and operational assessments. Assure all tube pull tubes are plugged, and have no other repair history. (TP, SLV, Stuck object)

12.11.1.2 Data management is required to investigate history of all available data for tube pull candidate tubes to assure no tubepull or 100% TW indications exist. This effort is to prevent secondary to primary water leakage.

12.11.1.3 As a precaution for de-plugging, any plug removal candidate should be verified against an alternate means such as a customer supplied list or report. The tube list should be verified for prior tube pull, stabilized, or In-Situ tested.

12.11.2 In-Situ Leak Test Priorities

12.11.2.1 As recommended by condition monitoring and operational assessments. Data management must assure that all In-Situ pressure tested tubes are repaired.

©2008 Westinghouse Electric Company

APPENDIX 12.12

TYPICAL INSPECTION CRITERIA REVIEW QUESTIONS

Purpose

Discuss these topics in detail with your customer, lead analyst, and steam generator engineer to discover undocumented inspection criteria.

12.12.1 Review the definition of Hot Leg, Cold Leg, and U-Bend/Square Bend areas by specific location and inch for each area.

12.12.1.1 When testing Hot Leg Dents > 5 volts, what does Hot Leg mean? Does it mean top Support + 0"? Tangent Point? Some other value?

12.12.2 Review all uses of ">" vs. ">=" and "<" vs. "<=" in the inspection criteria.

12.12.3 Review the definition of "new" indications if used in documentation for this inspection.

12.12.3.1 When testing "new" indications > 5 volts, what exactly does "new" mean? Does it mean there was no previous indication at that location ever, or does it mean a previous indication moved to a different voltage category (e.g., was <=5 volts, and is now >5 volts)?

12.12.4 Review the definition of "previous indications" if used in documentation for this inspection

12.12.4.1 Does "previous" imply indications from the most recent past inspection or does some other prior inspection data set apply for this inspection?

12.12.5 Review Base Inspection Plan categories, sample percentages, and quantities. Bobbin by Extent, Low-Row U-Bend RPC, Top-of-Tubesheet (with upper and lower test extents specified)

12.12.5.1 Specifically review any Base Inspection Plans that have been sampled previously and must reach 100% by the end of this inspection.

12.12.5.2 Review in detail the actual process steps ST Max uses to achieve the required Base Inspection Plan samples. Explain how "sampling without replacement" (not testing the same tubes twice) is achieved.

©2008 Westinghouse Electric Company

APPENDIX 12.12

TYPICAL INSPECTION CRITERIA REVIEW QUESTIONS

12.12.6 Review Special Interest Inspection Plans by Degradation Mechanism category, sample percentages, and quantities.

12.12.6.1 Specifically review any Special Interest Inspection Plans that have been sampled previously and must reach 100% by the end of this inspection.

12.12.6.2 Review in detail the actual process steps ST Max uses to achieve the required Special Interest Inspection Plan samples. Explain how "sampling without replacement" (not testing the same indications twice) is achieved.

12.12.7 Review each Degradation Mechanism to be partially sampled, review where the base population is to be drawn from? Is it the current data from this inspection, the most recent prior inspection, a combination of current/historical inspections, etc?

12.12.7.1 Review in detail the actual process steps ST Max uses to achieve the required indication samples. Explain how "sampling without replacement" (not testing the same indications twice) is achieved.

12.12.8 Have inspections been skipped in the past or are inspections going to be skipped in the future? If so, review how this affects any EFPM sampling percentages required to be complete by the end of this inspection?

12.12.9 Review the inspection data set (date and outage name) that represents the start of the current EFPM period? Where in the EFPM period is the inspection we are about to perform? What is the outage date and outage name of the end of the EFPM period?

12.12.10 Review the selection criteria for samples? For example, when testing dents and dings, should the selection for RPC be based on:

12.12.10.1 highest voltage?

12.12.10.2 dents and dings not tested within the current EFPM period?

12.12.10.3 tubes or areas of tubes with high concentrations of dents and dings for areas of interest or schedule efficiency?

©2008 Westinghouse Electric Company

APPENDIX 12.12
TYPICAL INSPECTION CRITERIA REVIEW QUESTIONS

12.12.11 Review the designated matching tolerance for indication locations for Bobbin indications? For RPC indications? Is there a different matching tolerance for "at structure" vs. "freespan" indications?

12.12.12 Review criteria for RPC Special Interest and PID test extents

12.12.12.1 How far away from the edges of a support structure can an indication be located and still be considered "at" that structure?

12.12.12.2 What is the indication location range criteria to cause an RPC test of a single Support? Example: Indications within +/- .625" of the centerline of the supports will be tested +/- 2" (02H +/- 2")

12.12.12.3 What is the indication range criteria to cause an RPC test between two supports? Example: Indications outside +/- .625" of the centerline of a support will be tested to the next support. (02H -2" to 03H +2")

12.12.13 Review MRPC indication extent coverage criteria. Is there a minimum value that MRPC tests must extend beyond indications or is it fine that there is enough data that the signal returns to null on both sides of the indication location.

12.12.14 Review rules for loose parts (PLP) testing and bounding. Do we bound PLPs called from bobbin data or do we wait until MRPC confirms the bobbin call? What is the bounding pattern? Is data management authorized to issue MRPC bounding tests without customer review/approval of each individual case

©2008 Westinghouse Electric Company

- **SCAN PLAN REV. 1**

T03 100203 002

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0

STEAM GENERATOR TUBING EXAMINATION

BASELINE PRE-SERVICE INSPECTION SCAN PLAN

REVISION 1

Prepared By:	William David James SG Specialist	02/02/10 Date
Approved By:	Clayton B. Webb SG Program Manager	02/02/10 Date
	Daniel Fokam TVA ET Level III	2/02/2010 Date
	Clayton Webb for Doug Helms Watts Bar Unit 2 Specialist	02/02/10 Date

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SCAN PLAN REVISION LOG

Rev.	Description
0	Initial Issue.
1	Added statement in nomenclature section allowing RPC or array probe examination of the ubend as an acceptable method of fulfilling the full length bobbin exam extent when performed in conjunction with straight leg bobbin.

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SCAN PLAN NOTES

1. The TVA ECT Level III shall approve all probes prior to their use. The steam generator specialist and TVA Level III shall be notified prior to a smaller than 0.610 diameter bobbin coil being utilized in the straight leg portions (hot and cold).

   The specific probe size and type used in the examination of a particular type is indicated by the data set name, where the following list of data sets and corresponding probes are used:

Data Set	Probe Type
BOBBIN FL	.570, .590, .610 bobbin
U-BEND	.580 U-Bend +Point rotating coil
TTS HL	+Point rotating coil

2. Typical frequencies used for the bobbin coil examinations are 550/300/130/35 kHz. Typical frequencies for the 3-coil and +Point coil: the .115 mid-range pancake coil are 300/200/100/35 kHz, the .080 high frequency pancake coil are 800/600/300 kHz, and the +Point coil are 300/200/100 kHz. Typical frequencies for the single mid-range U-Bend +Point coil are 400/300/150/35 kHz. The TVA ECT Level III shall be contacted prior to using other frequencies.

3. Revisions to this scan plan shall be approved by the TVA ECT Level III, the Steam Generator Engineer, and SG Program Manager. The ANII shall be provided any revisions to this scan plan.

4. Multiple examinations, conducted from either leg, with combined extents equal to or greater than the specified examination extent may be utilized without a revision to the scan plan.

5. All applicable calibration standards shall meet the requirements of the EPRI Pressurized Water Reactor Steam Generator Examination Gidelines: Rev.7 and shall meet or exceed ASME code requirements. Others may be used with the written approval of the TVA ET Level III.

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

NOMENCLATURE

Scan plan information for the unit 2 cycle 0 Baseline Pre-Service inspection at WBN is being provided in both summary table and graphical format. See Table 1 attached for specific examination quantities in all replacement steam generators. Each of the four replacement steam generators graphical tube maps has been placed in a separate section in order to provide ease of reference. The following information is submitted to define the work scope breakdown used by the computerized tracking system.

Definitions:

BOBBIN FL:	100% of non-plugged tubes in all four generators will be tested full length using a bobbin coil probe.
TTS HL:	100% of non-plugged tubes in all four generators will be tested using +Point examination at the hot leg tubesheet expansion transition region.
U-BEND:	100% of non-plugged tubes in rows 1, 2, 3, and 4 in all four generators have been selected for U-Bend +Point examination.

The inner radius U-bends (row 6 and under) may create an inability to adequately perform a single full-length bobbin coil examination with the larger diameter probes.

Rotating coil or array probe examination of the U-bend region may be used in conjunction with Bobbin coil examination of the straight legs to fulfill the full length bobbin examination requirements.

The number of individual examinations that are to be performed in each steam generator is given in Table 1 and is graphically depicted in the tubesheet maps attached.

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

Location Nomenclature for WBN U2

Notation	Description
HTE	Tube end - hot leg
HTS	Top of tubesheet - hot leg
H01	First support plate - hot leg
H02	Second support plate - hot leg
H03	Third support plate - hot leg
H04	Fourth support plate - hot leg
H05	Fifth support plate - hot leg
H06	Sixth support plate - hot leg
H07	Seventh support plate - hot leg
H08	Eighth support plate - hot leg
AV1	First anti-vibration bar above H07
AV2	Second anti-vibration bar above H07
AV3	Second anti-vibration bar above C14
AV4	First anti-vibration bar above C14
C14	Fourteenth support plate - cold leg
C13	Thirteenth support plate - cold leg
C12	Twelfth support plate - cold leg
C11	Eleventh support plate - cold leg
C10	Tenth support plate - cold leg
C09	Nineth support plate - cold leg
C08	Eighth support plate - cold leg
C07	Seventh support plate - cold leg
C06	Sixth support plate - cold leg
C05	Fifth support plate - cold leg
C04	Fourth support plate - cold leg
C03	Third support plate - cold leg
C02	Second support plate - cold leg
C01	First flow distribution baffle support plate - cold leg
CTS	Top of tubesheet - cold leg
CTE	Tube end - cold leg

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

TABLE 1

DATASET	EXTENT	TECHNIQUE	RSG-1	RSG-2[1]	RSG-3	RSG-4[2]
BOBBIN FL	HTE-CTE	BOBBIN	4674	4672	4674	4671
TTS HL	HTS+2/-2	+Point	4674	4672	4674	4671
U-BEND	C14-H08	+Point	456	456	456	455

Notes:

1. Mechanical plug at SG-2 Row 32 Col 53 (hot and cold leg) installed prior to baseline pre-service inspection. Weld plug at SG-2 Row 6 Col 112 (hot and cold leg) installed during fabrication.
2. Mechanical plug at SG-4 Row 2 Col 12 (hot and cold leg) installed prior to baseline pre-service inspection. Weld plug at SG-4 Row 12 Col 113 and Row 49 Col 69 (hot and cold leg) installed during fabrication.

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

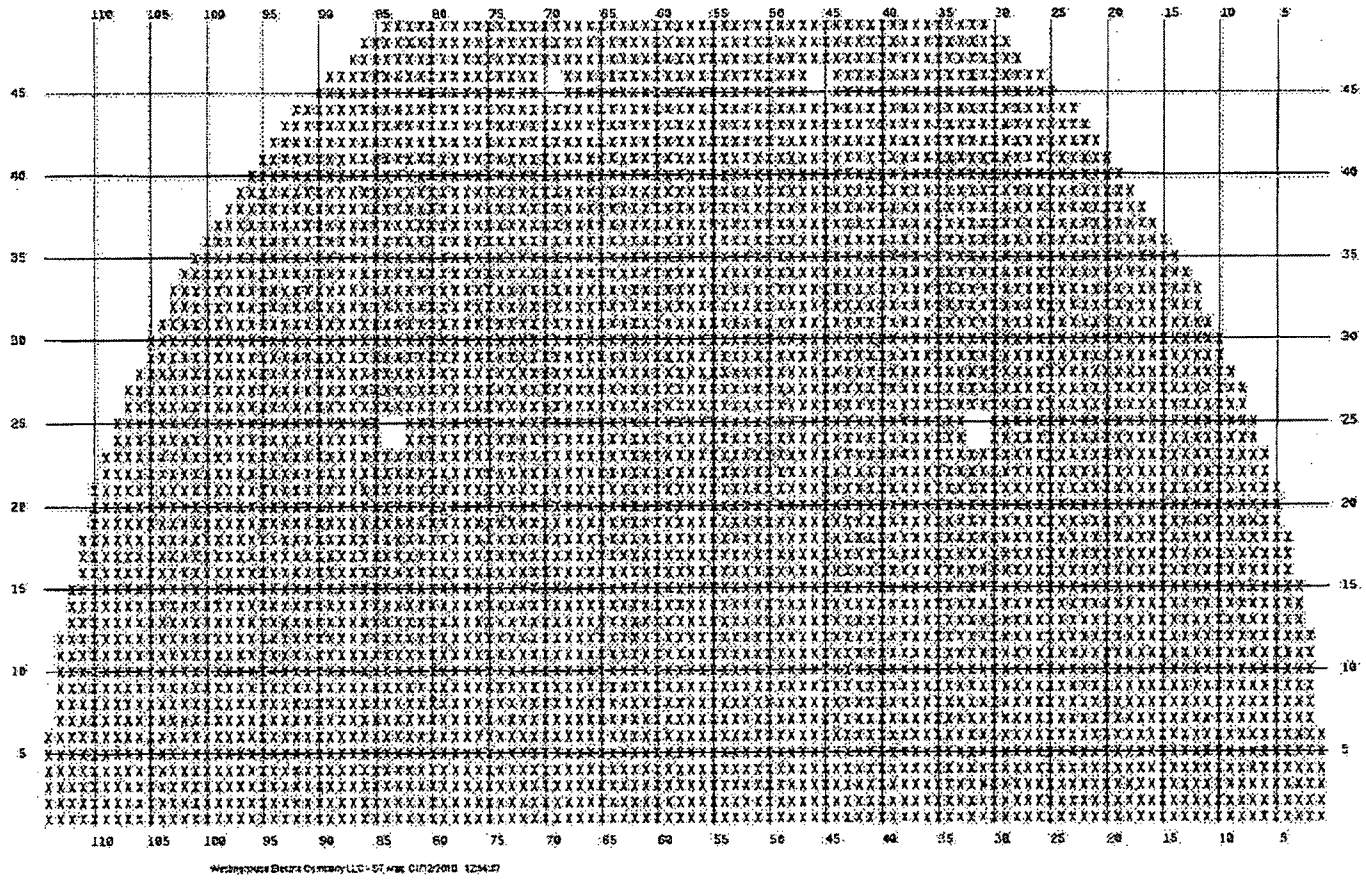
SG-1

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 1
Full Length Bobbin
Watts Bar W2C0 PSI

X 4674 Full Length Bobbin - 100%
CTE-HTE



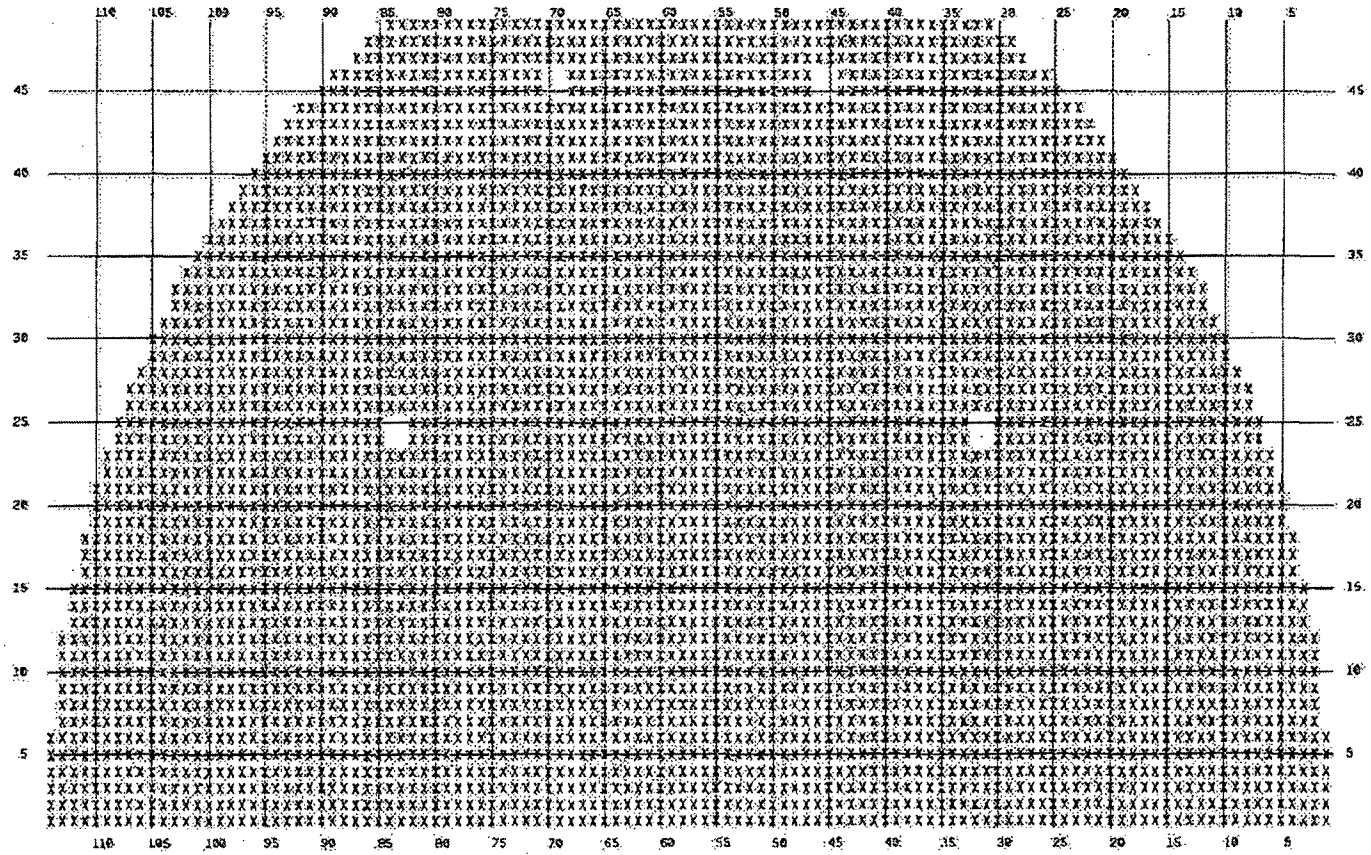
Westinghouse Electric Company LLC - ST Ariel 01/02/2010 12:34:27

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 1
HL TTS +Point
Watts Bar W2C0 PSI

X 4674 HL TTS +Point - 100% HTS+2/-2



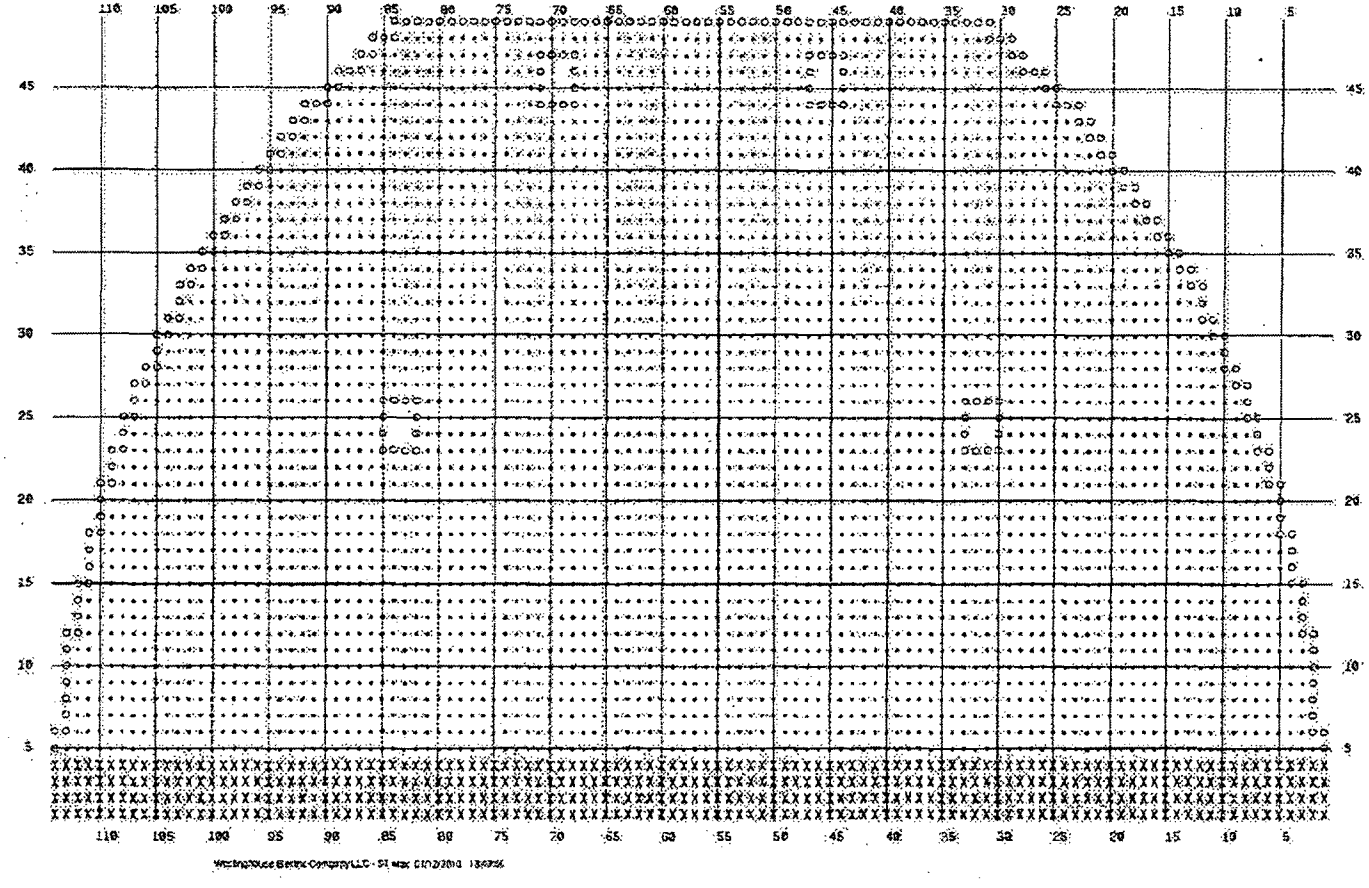
Westinghouse Electric Company LLC - ST, exp 01/12/2010 19:14:47

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 1
U-Bend PP
Watts Bar W200 PSI

X 456 U-Bend +Point - 100% C14-H08
Rows 1 thru 4



WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG-2

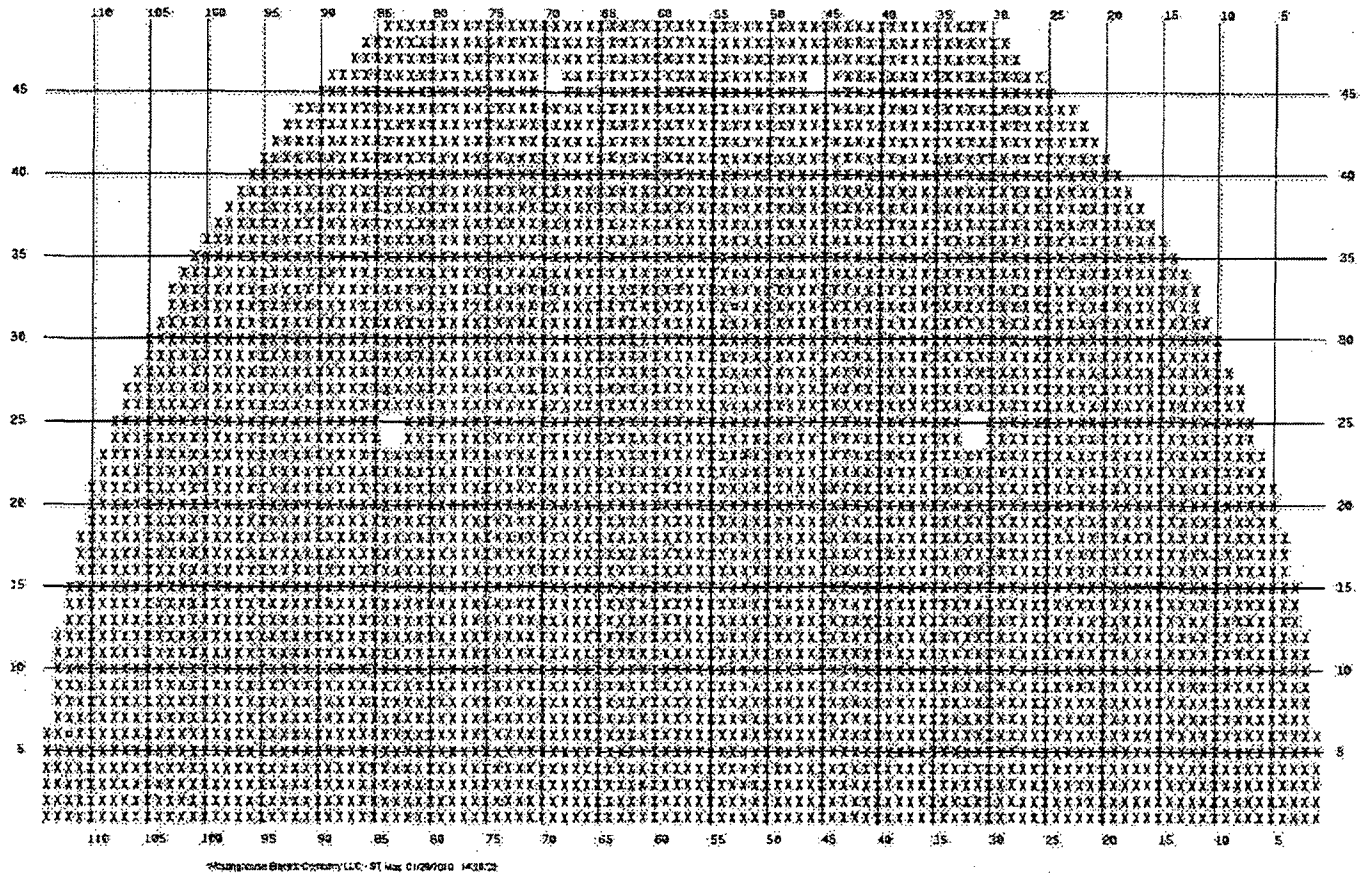
WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 2
Full Length Bobbin
Watts Bar W2C0 PSI

X 4672 Full Length Bobbin - 100%
CTE-HTE

2 Plugged Tube



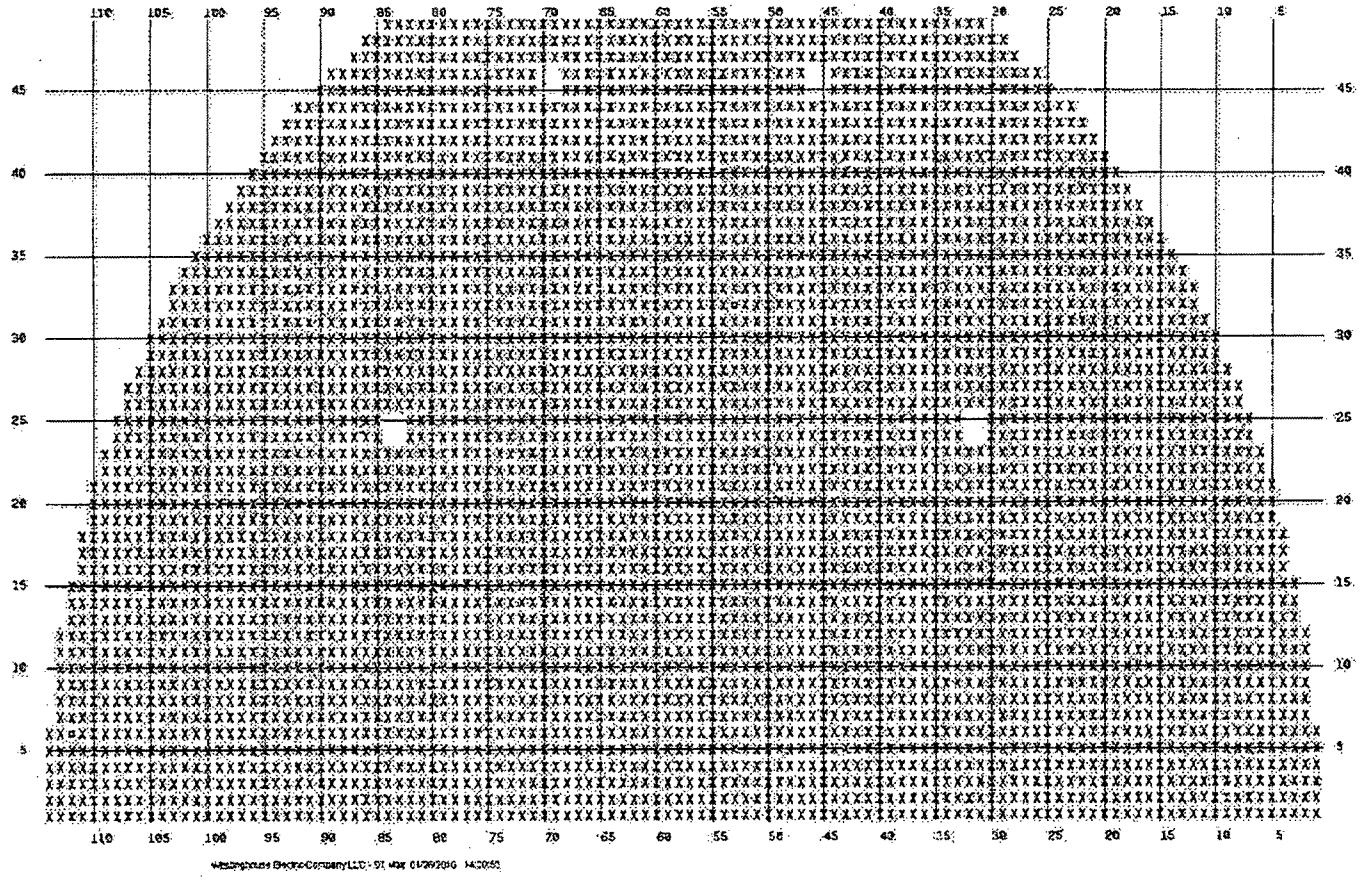
WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 2
HL TTS +Point
Watts Bar W2C0 PSI

X 4672 HL TTS +Point - 100% HTS+2/-2.

▫ 2 Plugged Tube



Westinghouse Electric Company LLC - 01 May 01/29/2010 14:20:55

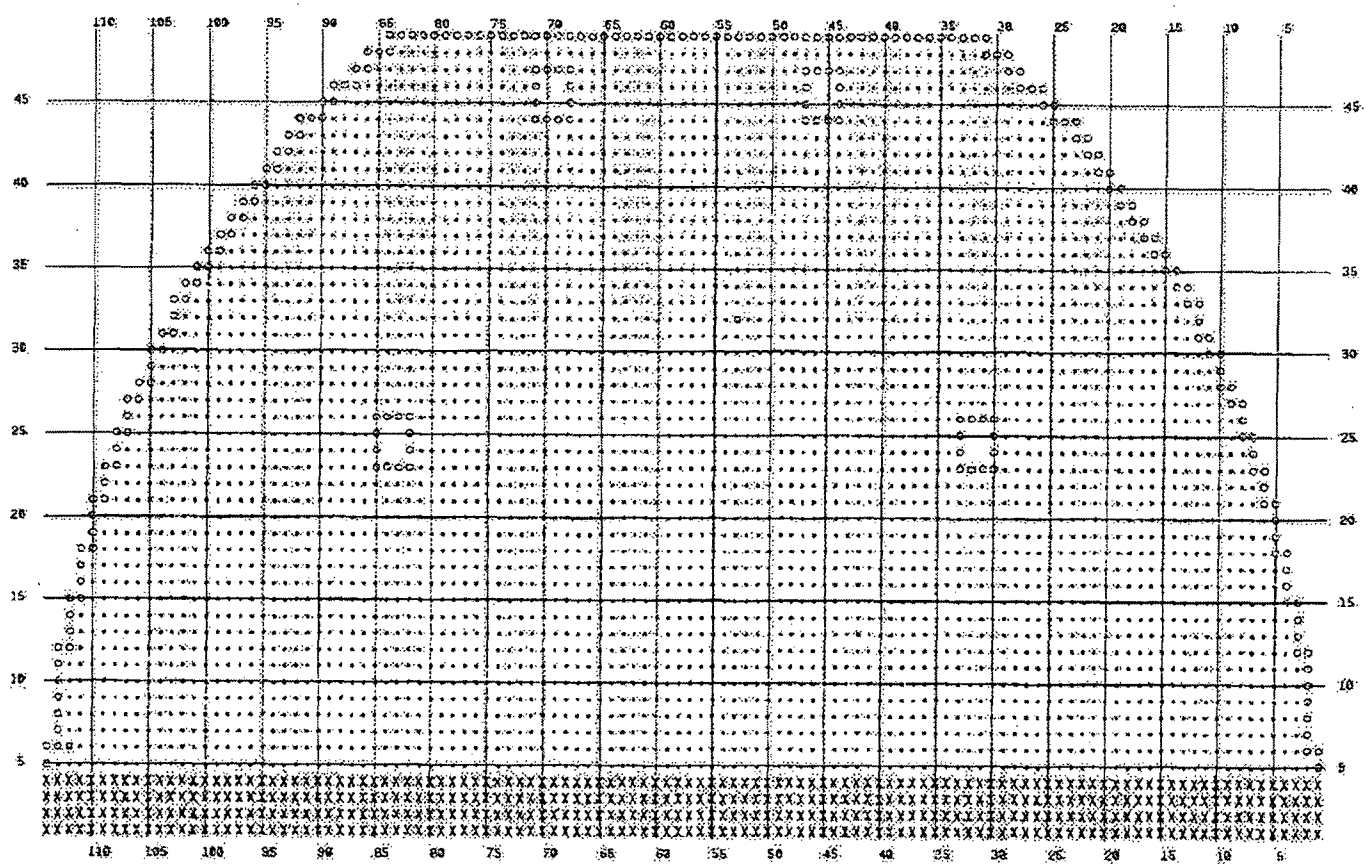
WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 2
U-Bend +Point
Watts Bar W2C0 PSI

X 456 U-Bend +Point - 1001 C14-H08
Rows 1 thru 4

o 2 Plugged Tube



WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

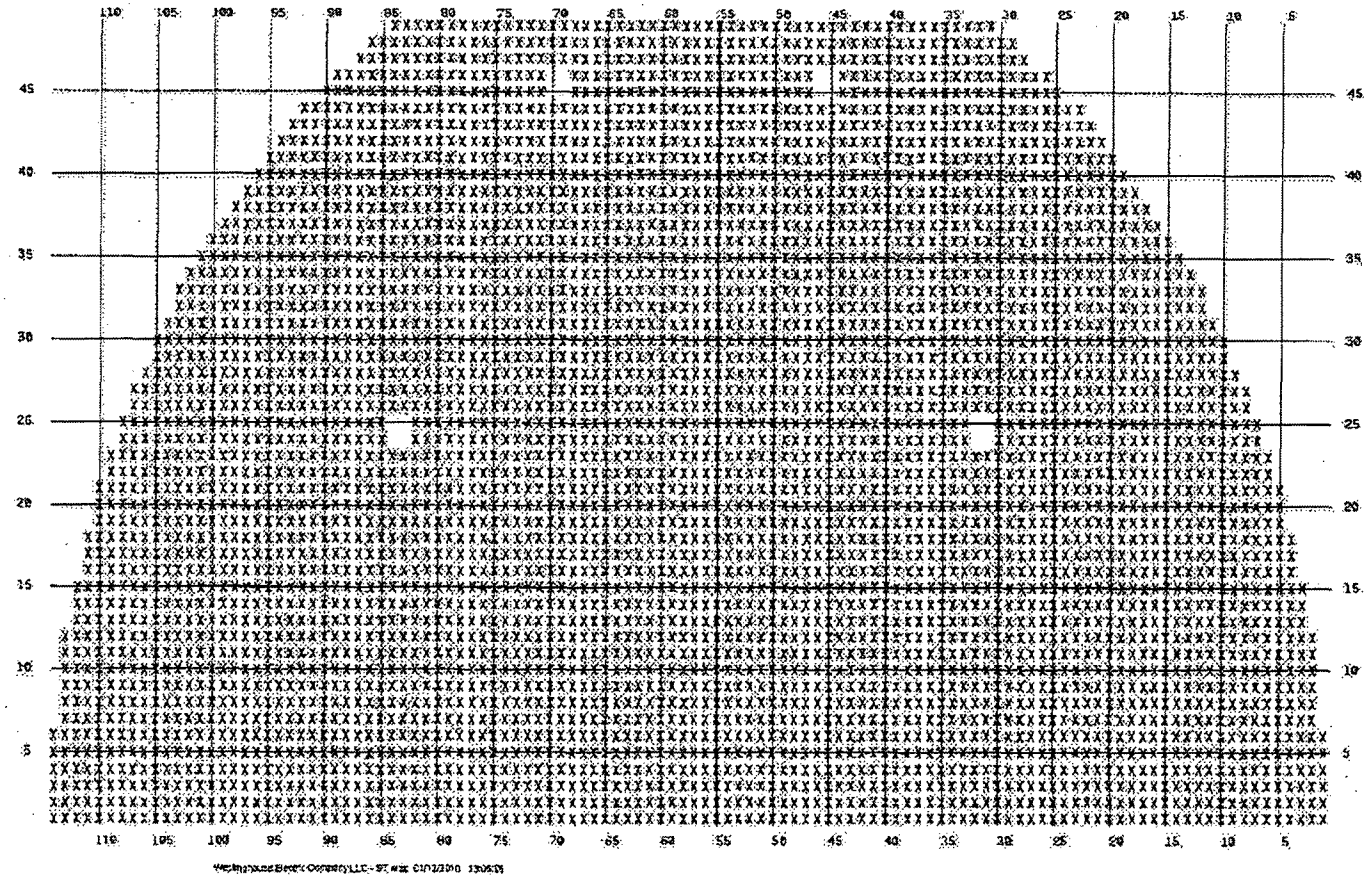
SG-3

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 3
Full Length Bobbin
Watts Bar W2C0 PSI

X 4674 Full Length Bobbin - 100%
CTE-HTE

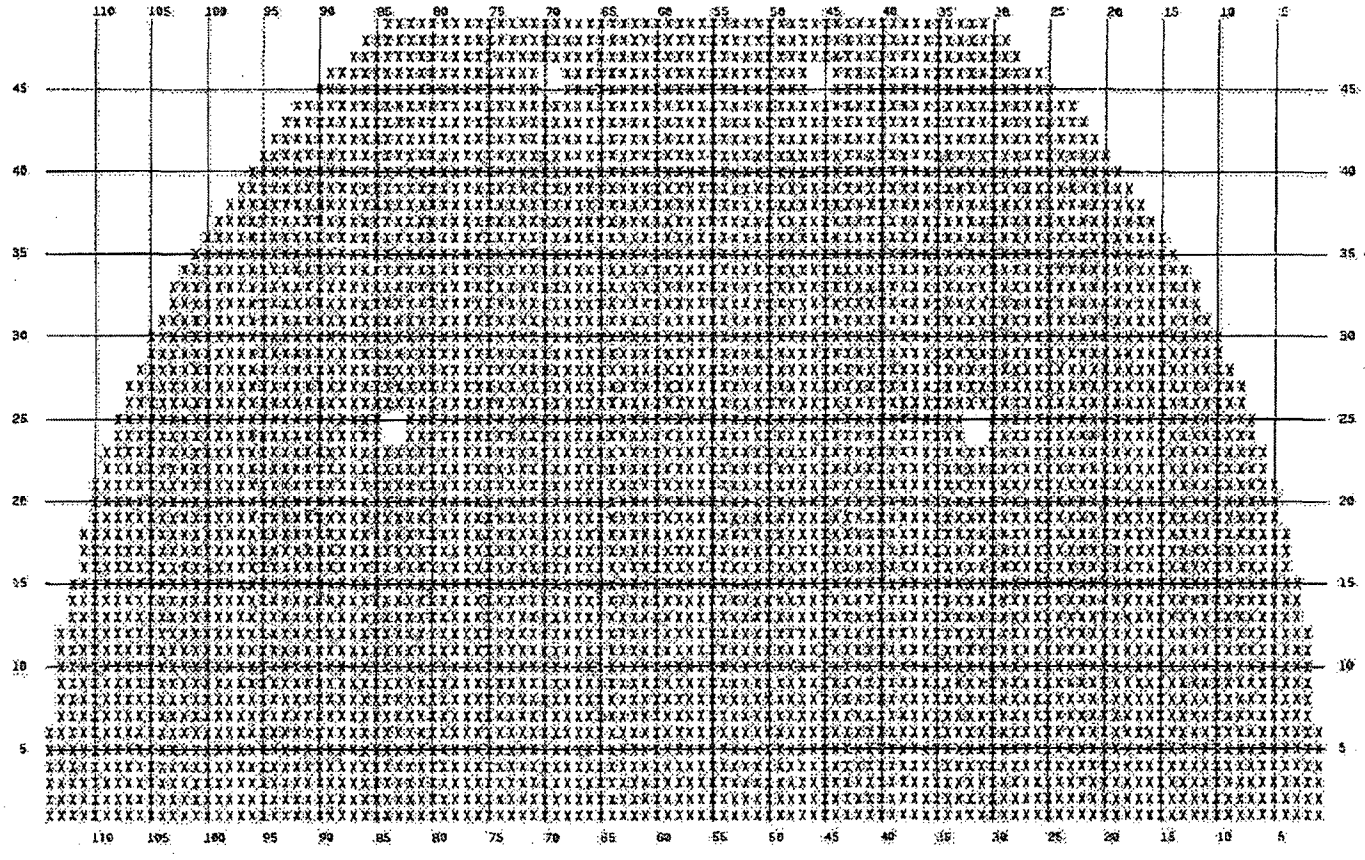


WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 3
HL TTS +Point
Watts Bar W2C0 PSI

X 4674 HL TTS +Point - 100% HTS+2/-2

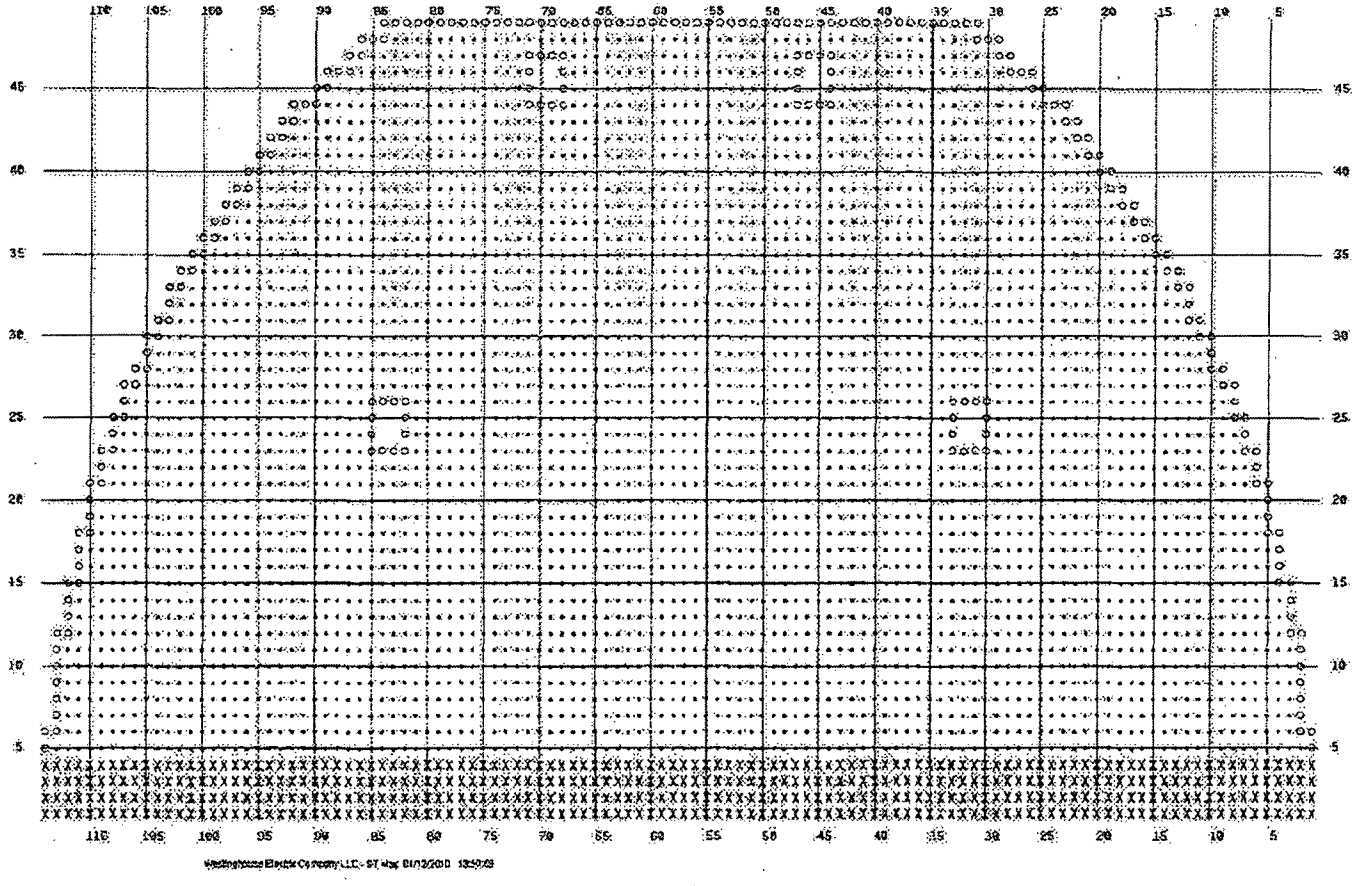


WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 3
U-Bend +Point
Watts Bar W2C0 PSI

X 456 U-Bend +Point - 100% C14-H08
Rows 1 thru 4



Westinghouse Electric Company LLC - ST Hot 01/12/2000 12:50:03

WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG-4

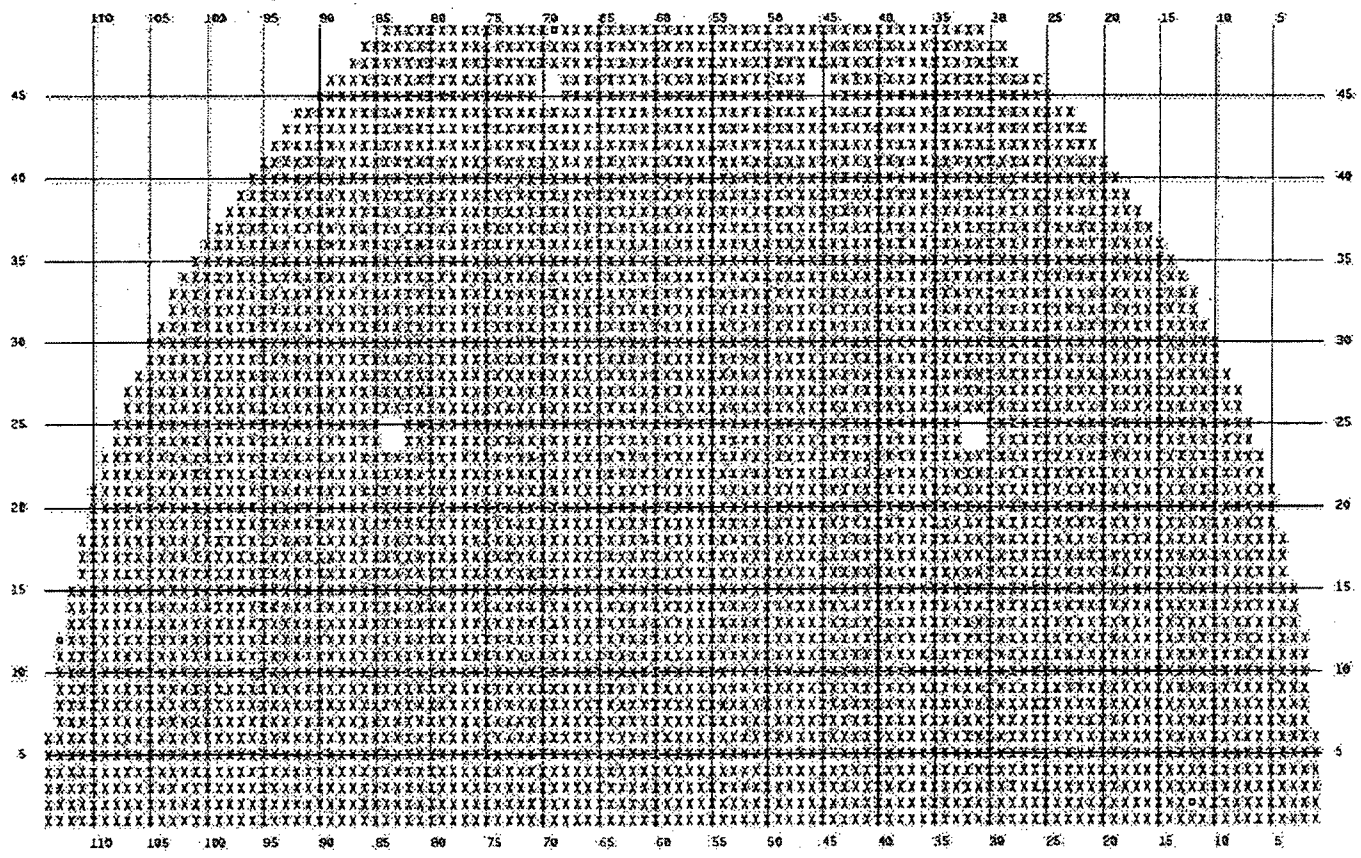
WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 4
Full Length Bobbin
Watts Bar W2C0 PSI

X 4671 Full Length Bobbin - 100%
CTE-HTE

□ 3 Plugged Tube



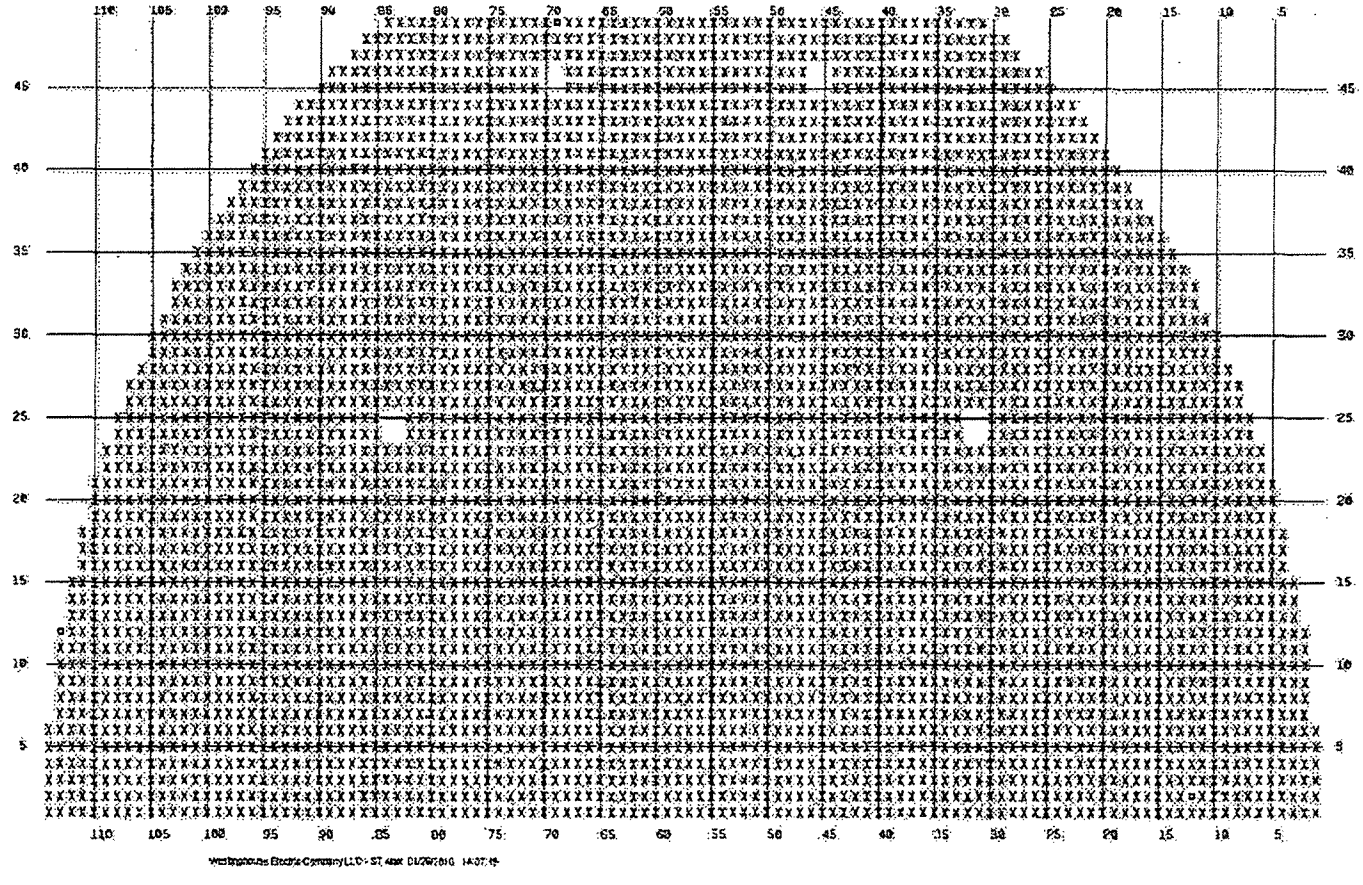
WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 4
HL TTS +Point
Watts Bar W2C0 PSI

X #671 HL TTS +Point - 100% HTS+2/-2

▫ 3 Plugged Tube



Westinghouse Electric Company LLC - ST.exe 01/29/2010 14:07:15

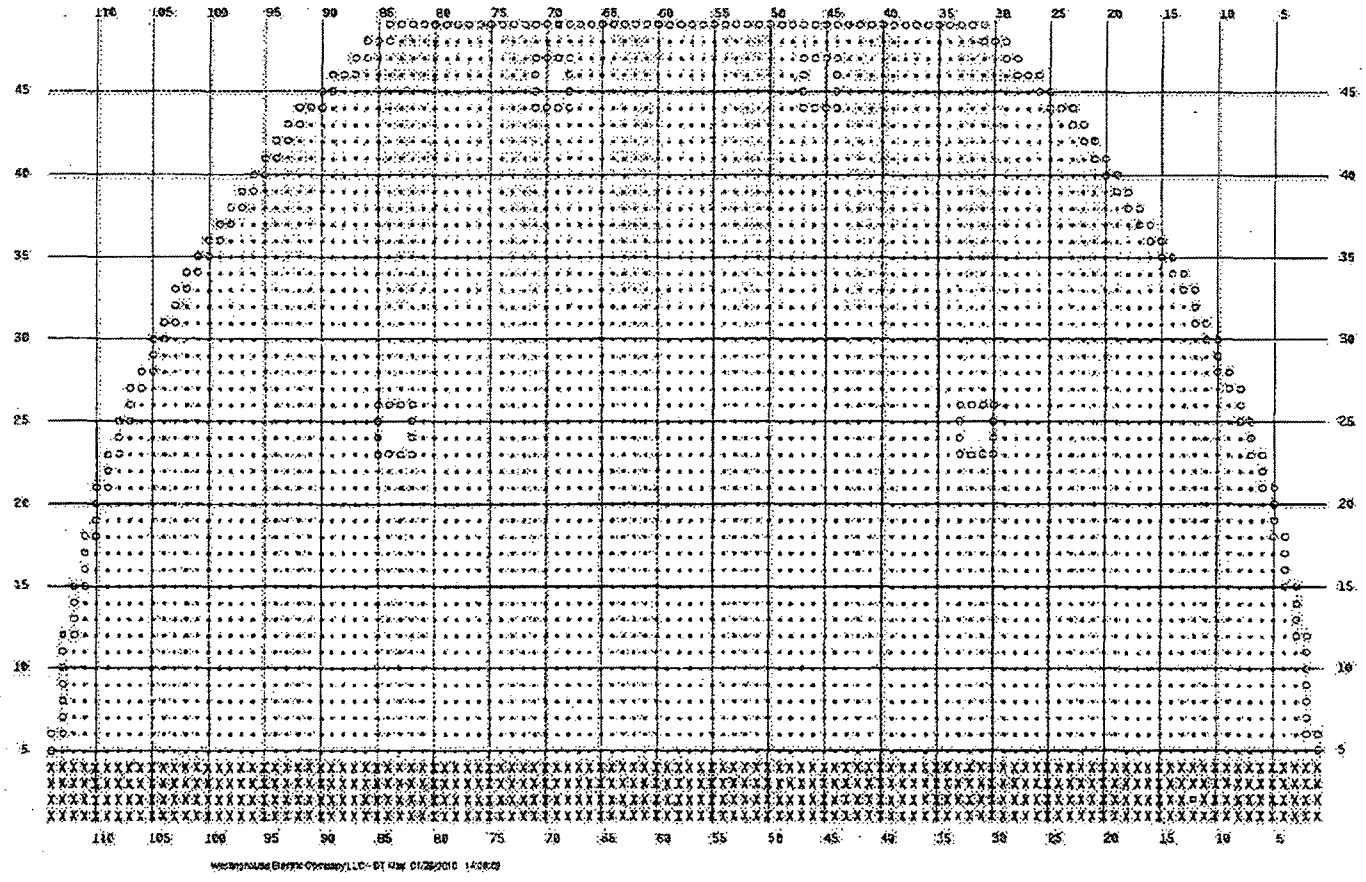
WATTS BAR NUCLEAR PLANT

UNIT 2 CYCLE 0 BASELINE PRE-SERVICE INSPECTION

SG - 4
U-Bend +Point
Watts Bar W2C0 PSI

X 455 U-Bend +Point + 100% CI4-H08
Rows 1 thru 4

▫ 3 Plugged Tube



6. COMPUTER DATA SCREENING SORTS (ADS)

WATTS BAR NUCLEAR PLANT

Unit 2

CDS REVIEW FORM

Sort Name & Rev: WBT_BL_2010_Rev0 **Date:** 1/29/2010

The purpose of this form is to document that auto analysis sorts are properly reviewed prior to the beginning of a steam generator inspection and after any revision during the inspection. This form is required to be completed for any inspection using auto-analysis.

Comments:

The following must be reviewed as a minimum:

- Complete tube coverage must exist for detection of degradation.
- Ensure that no non-conservative sort rules exist when compared to the Site Specific Analysts Documents/ETSSs or chart logics.
- Ensure that all bobbin detectable damage mechanisms identified in the DA are properly screened for.

By signing this form, you are concurring that the reviews discussed above have been performed and are satisfactory.

Senior Analyst _____ Date 2/1/2010

Independent QDA _____ Date 2/2/2010

Figure 10-6
CDS Review Form

LOGIN: cds
NAME:
COMPANY: cds
ADDRESS:
CITY, STATE:

	Started	Finished
Written Exam:	0	0

WRITTEN EXAM

NO RECORDS

PRACTICAL EXAM

cds_01-29-2010_10:52 (WBN2_BL_ADS.cfg) INCLUSIVE

DAMAGE MECHANISM #	01	02	03	
TRUTH FLAWS	008	012	005	00025
STUDENT FLAWS	008	012	005	00025
STUDENT POD	0.800	0.820	0.800	0.910
STUDENT CL	0.832	0.908	0.673	0.906
RMSE SIZING				0.00
RMSE VOLTS				0.00
ORIENTATION				0.00
NDD OVERCALLS	00018	00003	00006	00027
FLAWED OVERCALLS	00004	00004	00003	00011

CATEGORY 1: TSH_FLAW

Report code : DTI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Vert	0.50	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTE +2.50	HTS +0.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Volts	>= 0.75	<= 1000.00	yes
Same pnts	P1	n/a		Angle	>= 35	<= 150	yes
Same pnts	3	n/a		Angle	>= 30	<= 170	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DTI

CATEGORY 2: HL_DFI

Report code : DFI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P3	Vpos	0.05	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTS +0.25	H08 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	49	not	Volts	>= 2.50	<= 1000.00	no
T vect PP	3	n/a		Volts	>= 0.30	<= 1000.00	yes
Same pnts	3	n/a		Angle	>= 30	<= 135	yes
T vect MR	3	n/a		Angle	>= 30	<= 135	no
Equal Less	5	n/a		Angle	>= 0	<= 180	no

Report line -> Volts ch: 3 | Angle ch: 3 | Flaw% ch: DFI

CATEGORY 3: HL_MBM

Report code : MBM
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
6	Vpos	0.20	0	20	12	

SEARCH TYPE	FROM	TO
Between	HTS +0.25	H08 -2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	51	not	Volts	>= 2.50	<= 1000.00	no
T vect PP	6	n/a		Volts	>= 0.50	<= 1000.00	yes
Same pnts	6	n/a		Angle	>= 30	<= 90	yes
Same pnts	4	n/a		Angle	>= 30	<= 130	no
Volts pp	3	105		Angle	>= 10	<= 170	no

Report line -> Volts ch: 6 | Angle ch: 6 | Flaw% ch: MBM

CATEGORY 4: HL_DSI

Report code : DSI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Vpos	0.10	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTS +0.00	H08 +2.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	49		Volts	>= 2.50	<= 1000.00	no
T vect PP	P1	n/a		Angle	>= 20	<= 128	yes
Same pnts	P1	n/a		Volts	>= 0.10	<= 1000.00	yes
T vect PP	1	n/a		Angle	>= 20	<= 150	no
Same pnts	3	n/a		Angle	>= 20	<= 140	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DSI

CATEGORY 5: HL_NTE

Report code : NTE
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 200
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
5	Horz	1.50	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTS -0.50	HTS +0.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	2	30		Angle	>= 0	<= 359	yes
Same pnts	2	n/a	not	Volts	>= 10.00	<= 1000.00	yes

Report line -> Volts ch: 2 | Angle ch: 2 | Flaw% ch: NTE

CATEGORY 6: HL_DNG

Report code : DNG
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hpos	0.80	0	10	1	

SEARCH TYPE	FROM	TO
Between	HTS +0.50	H08 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vector	P1	n/a		Angle	>= 160	<= 200	no
T vect PP	P1	n/a		Angle	>= 160	<= 200	yes
Same pnts	P1	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	1	n/a		Angle	>= 150	<= 210	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DNG

CATEGORY 7: HL_PVN

Report code : PVN
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	4.50	0	8	2	

SEARCH TYPE	FROM	TO
Between	HTS +0.25	H08 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 8	<= 40	yes
Same pnts	P1	n/a		Volts	>= 5.00	<= 1000.00	yes
Volts pp	7	21	not	Volts	>= 1.00	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: PVN

CATEGORY 8: HL_PLP

Report code : PLP
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
7	Vpos	0.10	0	10	3	

SEARCH TYPE	FROM	TO
Freespan	HTS +0.10	H08 -4.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	103	not	Volts	>= 5.00	<= 1000.00	no
Volts pp	8	89		Volts	>= 0.70	<= 5.00	yes
Same pnts	8	n/a		Angle	>= 0	<= 10	yes
Same pnts	8	n/a		Angle	>= 350	<= 359	no
Same pnts	8	n/a		Angle	>= 170	<= 190	no

Report line -> Volts ch: 8 | Angle ch: 8 | Flaw% ch: PLP

CATEGORY 10: HL_PTE

Report code : PTE
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
2	Horz	10.00	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTE +2.00	HTS -0.25

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	2	n/a		Volts	>= 60.00	<= 1000.00	yes
Same pnts	2	n/a	not	Angle	>= 20	<= 160	yes
Same pnts	2	n/a	not	Angle	>= 200	<= 340	no

Report line -> Volts ch: 2 | Angle ch: 2 | Flaw% ch: PTE

CATEGORY 11: TSC_FLAW

Report code : DTI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Vert	0.50	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTE +2.50	CTS +0.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Volts	>= 0.75	<= 1000.00	yes
Same pnts	P1	n/a		Angle	>= 35	<= 150	yes
Same pnts	3	n/a		Angle	>= 30	<= 170	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DTI

CATEGORY 12: CL_DFI

Report code : DFI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P3	Vpos	0.05	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTS +0.25	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	49	not	Volts	>= 2.50	<= 1000.00	no
T vect PP	3	n/a		Volts	>= 0.30	<= 1000.00	yes
Same pnts	3	n/a		Angle	>= 30	<= 135	yes
T vect MR	3	n/a		Angle	>= 30	<= 135	no
Equal Less	5	n/a		Angle	>= 0	<= 180	no

Report line -> Volts ch: 3 | Angle ch: 3 | Flaw% ch: DFI

CATEGORY 13: CL_MBM

Report code : MBM
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
6	Vpos	0.20	0	20	12	

SEARCH TYPE	FROM	TO
Between	CTS +0.25	C14 -2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	51	not	Volts	>= 2.50	<= 1000.00	no
T vect PP	6	n/a		Volts	>= 0.50	<= 1000.00	yes
Same pnts	6	n/a		Angle	>= 30	<= 90	yes
Same pnts	4	n/a		Angle	>= 30	<= 130	no
Volts pp	3	105		Angle	>= 10	<= 170	no

Report line -> Volts ch: 6 | Angle ch: 6 | Flaw% ch: MBM

CATEGORY 14: CL_DSI

Report code : DSI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Vpos	0.10	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTS +5.00	C14 +2.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	49		Volts	>= 2.50	<= 1000.00	no
T vect PP	P1	n/a		Angle	>= 20	<= 128	yes
Same pnts	P1	n/a		Volts	>= 0.10	<= 1000.00	yes
T vect PP	1	n/a		Angle	>= 20	<= 150	no
Same pnts	3	n/a		Angle	>= 20	<= 140	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DSI

CATEGORY 15: CL_NTE

Report code : NTE
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 100
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
5	Horz	1.50	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTS -0.50	CTS +0.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	2	31		Angle	>= 0	<= 359	yes
Same pnts	2	n/a	not	Volts	>= 10.00	<= 1000.00	yes

Report line -> Volts ch: 2 | Angle ch: 2 | Flaw% ch: NTE

CATEGORY 16: CL_DNG

Report code : DNG
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hpos	0.80	0	10	1	

SEARCH TYPE	FROM	TO
Between	CTS +0.50	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vector	P1	n/a		Angle	>= 160	<= 200	no
T vect PP	P1	n/a		Angle	>= 160	<= 200	yes
Same pnts	P1	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	1	n/a		Angle	>= 150	<= 210	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DNG

CATEGORY 17: CL_PVN

Report code : PVN
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	4.50	0	8	2	

SEARCH TYPE	FROM	TO
Between	CTS +0.25	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 8	<= 40	yes
Same pnts	P1	n/a		Volts	>= 5.00	<= 1000.00	yes
Volts pp	7	21	not	Volts	>= 1.00	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: PVN

CATEGORY 18: CL-PLP

Report code : PLP
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
7	Vpos	0.10	0	10	3	

SEARCH TYPE	FROM	TO
Freespan	CTS +0.10	C14 -4.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	103	not	Volts	>= 5.00	<= 1000.00	no
Volts pp	8	89		Volts	>= 0.70	<= 5.00	yes
Same pnts	8	n/a		Angle	>= 0	<= 10	yes
Same pnts	8	n/a		Angle	>= 350	<= 359	no
Same pnts	8	n/a		Angle	>= 170	<= 190	no

Report line -> Volts ch: 8 | Angle ch: 8 | Flaw% ch: PLP

CATEGORY 19: CL_DEI

Report code : DEI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P2	Vpos	1.00	0	14	2	

SEARCH TYPE	FROM	TO
Between	CTS -1.00	CTS +1.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P2	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	P2	n/a		Angle	>= 40	<= 120	yes

Report line -> Volts ch: P2 | Angle ch: P2 | Flaw% ch: DEI

CATEGORY 20: CL_PTE

Report code : PTE
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
2	Horz	10.00	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTE +2.00	CTS -0.25

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	2	n/a		Volts	>= 60.00	<= 1000.00	yes
Same pnts	2	n/a	not	Angle	>= 20	<= 160	yes
Same pnts	2	n/a	not	Angle	>= 200	<= 340	no

Report line -> Volts ch: 2 | Angle ch: 2 | Flaw% ch: PTE

CATEGORY 21: UBEND_DSI

Report code : DSI
Center call : YES
Qualify call: NO
Use VM angle: YES
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Vpos	0.10	0	10	2	

SEARCH TYPE	FROM	TO
Between	H08 +2.00	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	81		Volts	>= 0.40	<= 1000.00	no
T vect PP	P1	n/a		Angle	>= 35	<= 140	yes
Same pnts	P1	n/a		Volts	>= 0.10	<= 1000.00	yes
Same pnts	1	n/a		Volts	>= 0.20	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DSI

CATEGORY 22: UBEND_DFI

Report code : DFI
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P3	Vpos	0.05	0	10	2	

SEARCH TYPE	FROM	TO
Between	H08 +1.50	C14 +1.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	81	not	Volts	>= 0.40	<= 1000.00	no
T vect PP	3	n/a		Volts	>= 0.30	<= 1000.00	yes
Same pnts	3	n/a		Angle	>= 35	<= 135	yes

Report line -> Volts ch: 3 | Angle ch: 3 | Flaw% ch: DFI

CATEGORY 23: UBEND_MBM

Report code : MBM
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
6	Vpos	0.20	0	20	12	

SEARCH TYPE	FROM	TO
Between	H08 -2.00	C14 -2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	6	n/a		Volts	>= 0.50	<= 1000.00	yes
Same pnts	6	n/a		Angle	>= 30	<= 90	yes
Same pnts	4	n/a		Angle	>= 30	<= 130	no
Volts pp	3	105		Angle	>= 10	<= 170	no

Report line -> Volts ch: 6 | Angle ch: 6 | Flaw% ch: MBM

CATEGORY 24: UBEND_PVN

Report code : PVN
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	4.60	0	8	2	

SEARCH TYPE	FROM	TO
Between	H08 +2.00	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 8	<= 40	yes
Same pnts	P1	n/a		Volts	>= 5.00	<= 1000.00	yes
T vect PP	7	n/a	not	Volts	>= 1.00	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: PVN

CATEGORY 26: UBEND_DNG

Report code : DNG
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hpos	0.80	0	10	1	

SEARCH TYPE	FROM	TO
Between	H08 +2.00	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	41		Volts	>= 1.00	<= 1000.00	no
T vector	P1	n/a		Angle	>= 160	<= 200	no
T vect PP	P1	n/a		Angle	>= 160	<= 200	yes
Same pnts	P1	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	1	n/a		Angle	>= 150	<= 210	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DNG

CATEGORY 27: HL_OXP

Report code : OXP
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Horz	5.00	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTS +0.50	HTS +5.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Volts	>= 20.00	<= 1000.00	yes
Same pnts	P1	n/a	not	Angle	>= 20	<= 160	yes
Same pnts	P1	n/a	not	Angle	>= 200	<= 340	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: OXP

CATEGORY 28: CL_OXP

Report code : OXP
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Horz	5.00	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTS +0.50	CTS +5.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Volts	>= 20.00	<= 1000.00	yes
Same pnts	P1	n/a	not	Angle	>= 20	<= 160	yes
Same pnts	P1	n/a	not	Angle	>= 200	<= 340	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: OXP

PLANT: CDS S/G: A LEG: IGNORE CAL: 1 Database: reports/DISK_CDS_001A_02IA/REEL.001/REPORT.SEC

LINE	SG	ROW	COL	VOLTS	DEG	IND	PCT	CH	FL1	+111111	FL2	+222222	BEG	END	BEG_OFF	END_OFF	UTIL_1	UTIL_2	ANLYST	TYPE	IDX	CRKLN	CRKWD	ARC	O
1	20	34	54	2.67	184	DNG		P	1	H05	-0.26			HTE	CTE				CDS	SEC	10				
2	20	34	54	0.54	89	DFI			3	C10	+9.47			HTE	CTE				CDS	SEC	10				
3	20	34	68	1.38	60	MBM			6	CTS	+1.98			HTE	CTE				CDS	SEC	11				
4	20	34	68	4.55	99	DFI			3	CTS	+1.64			HTE	CTE				CDS	SEC	11				
5	20	39	70	240.2	182	PTE			2	HTE	-0.50			HTE	CTS				CDS	SEC	12				
6	20	34	69	0.45	92	DFI			3	H08	-1.23			HTE	CTE				CDS	SEC	13				
7	20	34	59	1.55	100	DFI			3	HTS	+1.13			HTE	CTE				CDS	SEC	14				
8	20	34	59	2.25	178	DNG		P	1	C13	-0.62			HTE	CTE				CDS	SEC	14				
9	20	39	68	0.58	78	DFI			3	H04	+22.40			HTE	CTE				CDS	SEC	15				
10	20	34	60	0.58	82	DFI			3	C01	+5.82			HTE	CTE				CDS	SEC	16				
11	20	39	58											HTE	CTE				CDS	SEC	17				
12	20	39	61											HTE	CTE				CDS	SEC	18				
13	20	39	63	0.51	107	DFI			3	C02	+3.40			HTE	CTE				CDS	SEC	19				
14	20	35	54	0.74	76	MBM			6	H06	+10.88			HTE	CTE				CDS	SEC	20				
15	20	35	54	0.75	122	DFI			3	H06	+11.38			HTE	CTE				CDS	SEC	20				
16	20	36	55	0.47	135	DFI			3	H05	+36.29			HTE	CTE				CDS	SEC	21				
17	20	36	69	2.58	175	DNG		P	1	H05	+31.70			HTE	CTE				CDS	SEC	22				
18	20	36	69	0.77	82	MBM			6	H08	+119.21			HTE	CTE				CDS	SEC	22				
19	20	39	65	1.75	144	DTI		P	1	CTE	+12.41			HTE	CTE				CDS	SEC	23				
20	20	34	56	1.94	62	MBM			6	H06	+37.77			HTE	CTE				CDS	SEC	24				
21	20	34	56	5.42	103	DFI			3	H06	+38.19			HTE	CTE				CDS	SEC	24				

SIGNATURE _____ DATE: 01/29/10 TIME: 1059 PAGE 1/1

PLANT: CDS S/G: A LEG: IGNORE CAL: 2 Database: reports/DISK_CDS_001A_02IA/REEL.002/REPORT.SEC

LINE	SG	ROW	COL	VOLTS	DEG	IND	PCT	CH	FL1	+111111	FL2	+222222	BEG	END	BEG_OFF	END_OFF	UTIL_1	UTIL_2	ANLYST	TYPE	IDX	CRKLN	CRKWD	ARC	O
1	20	36	63										HTE	CTE					CDS	SEC	10				
2	20	36	61	2.14	174	DNG		P	1	C14	-0.71		HTE	CTE					CDS	SEC	11				
3	20	36	61	3.73	179	DNG		P	1	C14	-1.27		HTE	CTE					CDS	SEC	11				
4	20	36	61	2.31	177	DNG		P	1	C14	-1.69		HTE	CTE					CDS	SEC	11				
5	20	36	61	3.05	177	DNG		P	1	C13	+41.78		HTE	CTE					CDS	SEC	11				
6	20	36	61	2.15	176	DNG		P	1	C13	+41.43		HTE	CTE					CDS	SEC	11				
7	20	36	61	5.13	92	DEI		P	2	CTS	+0.23		HTE	CTE					CDS	SEC	11				
8	20	32	55	1.11	39	DTI		P	1	HTE	+18.57		HTE	CTE					CDS	SEC	12				
9	20	32	55	3.51	179	DNG		P	1	C13	+40.61		HTE	CTE					CDS	SEC	12				
10	20	32	55	4.35	81	DET		P	2	CTS	+0.06		HTE	CTE					CDS	SEC	12				
11	20	37	61	3.65	177	DNG		P	1	H04	+10.75		HTE	CTE					CDS	SEC	13				
12	20	37	61	2.00	176	DNG		P	1	H04	+12.20		HTE	CTE					CDS	SEC	13				
13	20	37	61	2.58	168	DNG		P	1	C01	-1.55		HTE	CTE					CDS	SEC	13				

SIGNATURE _____ DATE: 01/29/10 TIME: 1059 PAGE 1/1

PLANT: CDS S/G: A LEG: IGNORE CAL: 3 Database: reports/DISK_CDS_001A_02IA/REEL.003/REPORT.SEC

LINE	SG	ROW	COL	VOLTS	DEG	IND	PCT	CH	FL1	+111111	FL2	+222222	BEG	END	BEG_OFF	END_OFF	UTIL_1	UTIL_2	ANLYST	TYPE	IDX	CRKLN	CRKWD	ARC	O
1	20	34	67	0.66	110	DSI		P	1	H08	+93.60			HTE	CTE				CDS	SEC	10				
2	20	34	67	0.51	74	DFI			3	C14	+1.60			HTE	CTE				CDS	SEC	10				
3	20	37	60											HTE	CTE				CDS	SEC	11				
4	20	32	56	0.21	45	DSI		P	1	C03	-0.12			HTE	CTE				CDS	SEC	12				
5	20	32	56	0.33	34	DFI			3	C02	+3.39			HTE	CTE				CDS	SEC	12				
6	20	39	66	0.36	33	DFI			3	C07	+1.52			HTE	CTE				CDS	SEC	13				
7	20	37	56	0.27	113	DSI		P	1	H08	+74.08			HTE	CTE				CDS	SEC	14				
8	20	36	65											HTE	CTE				CDS	SEC	15				
9	20	34	61	4.47	83	DSI		P	1	H04	-0.06			HTE	CTE				CDS	SEC	16				
10	20	34	61	0.27	29	DSI		P	1	H06	+0.09			HTE	CTE				CDS	SEC	16				
11	20	36	60											HTE	CTE				CDS	SEC	17				
12	20	36	62											HTE	CTE				CDS	SEC	18				
13	20	36	67	0.30	35	DSI		P	1	H08	+76.25			HTE	CTE				CDS	SEC	19				
14	20	37	57											HTE	CTE				CDS	SEC	20				
15	20	36	58											HTE	CTE				CDS	SEC	21				
16	20	37	58											HTE	CTE				CDS	SEC	22				
17	20	39	67											HTE	CTE				CDS	SEC	23				
18	20	36	56	4.62	171	DNG		P	1	H08	+1.29			HTE	CTE				CDS	SEC	24				
19	20	34	65	1.65	37	DSI		P	1	H08	+30.76			HTE	CTE				CDS	SEC	25				
20	20	39	64											HTE	CTE				CDS	SEC	26				
21	20	37	65	182.0	161	PTE			2	HTE	-0.79			HTE	CTS				CDS	SEC	27				
22	20	37	65	227.2	179	PTE			2	HTE	-0.50			HTE	CTS				CDS	SEC	27				
23	20	37	65	72.75	175	PTE			2	HTS	+0.03			HTE	CTS				CDS	SEC	27				
24	20	37	65	2.23	166	DNG		P	1	H04	+40.64			HTE	CTS				CDS	SEC	27				
25	20	37	65	66.87	357	PTE			2	CTS	-0.09			HTE	CTS				CDS	SEC	27				
26	20	36	64											HTE	CTE				CDS	SEC	28				
27	20	32	58											HTE	CTE				CDS	SEC	29				
28	20	37	63											HTE	CTE				CDS	SEC	30				
29	20	36	68	2.15	178	DNG		P	1	HTS	+1.09			HTE	CTE				CDS	SEC	31				
30	20	37	64	0.32	42	DFI			3	H08	+51.34			HTE	CTE				CDS	SEC	32				
31	20	39	60											HTE	CTE				CDS	SEC	33				
32	20	39	55											HTE	CTE				CDS	SEC	34				
33	20	34	57	1.84	39	MBM			6	H08	+29.03			HTE	CTE				CDS	SEC	35				
34	20	34	57	6.17	91	DSI		P	1	H08	+29.50			HTE	CTE				CDS	SEC	35				
35	20	37	67											HTE	CTE				CDS	SEC	36				
36	20	37	62	0.12	35	DSI		P	1	C06	+0.88			HTE	CTE				CDS	SEC	37				
37	20	36	57	0.22	104	DSI		P	1	H08	+52.40			HTE	CTE				CDS	SEC	38				
38	20	32	68											HTE	CTE				CDS	SEC	39				

SIGNATURE _____ DATE: 01/29/10 TIME: 1059 PAGE 1/2

PLANT: CDS S/G: A LEG: IGNORE CAL: 3 Database: reports/DISK_CDS_001A_02IA/REEL.003/REPORT.SEC

LINE	SG	ROW	COL	VOLTS	DEG	IND	PCT	CH	FL1	+111111	FL2	+222222	BEG	END	BEG_OFF	END_OFF	UTIL_1	UTIL_2	ANLYST	TYPE	IDX	CRKLN	CRKWD	ARC	O
39	20	32	57										HTE	CTE					CDS	SEC	40				
40	20	32	66										HTE	CTE					CDS	SEC	41				
41	20	32	54	0.75	49	DTI		P	1	HTE	+9.57		HTE	CTE					CDS	SEC	42				
42	20	36	59										HTE	CTE					CDS	SEC	43				
43	20	37	59										HTE	CTE					CDS	SEC	44				
44	20	39	62										HTE	CTE					CDS	SEC	45				
45	20	39	59										HTE	CTE					CDS	SEC	46				
46	20	32	69										HTE	CTE					CDS	SEC	47				
47	20	39	56										HTE	CTE					CDS	SEC	48				
48	20	34	62	0.69	66	DSI		P	1	H02	-0.09		HTE	CTE					CDS	SEC	49				
49	20	34	62	2.32	185	DNG		P	1	H05	-1.47		HTE	CTE					CDS	SEC	49				
50	20	34	62	0.52	118	DFI			3	C07	+5.98		HTE	CTE					CDS	SEC	49				
51	20	39	69										HTE	CTE					CDS	SEC	50				
52	20	34	70	0.64	52	DSI		P	1	H08	+52.23		HTE	CTE					CDS	SEC	51				
53	20	34	70	0.45	65	DSI		P	1	C11	-0.06		HTE	CTE					CDS	SEC	51				
54	20	34	70	0.19	108	DSI		P	1	C07	-0.09		HTE	CTE					CDS	SEC	51				
55	20	36	66										HTE	CTE					CDS	SEC	52				
56	20	34	58	1.27	125	DSI		P	1	H08	+94.50		HTE	CTE					CDS	SEC	53				
57	20	37	66										HTE	CTE					CDS	SEC	54				
58	20	36	54	4.83	171	DNG		P	1	H08	+1.34		HTE	CTE					CDS	SEC	55				
59	20	36	54	2.55	45	DTI		P	1	CTE	+13.36		HTE	CTE					CDS	SEC	55				
60	20	32	67										HTE	CTE					CDS	SEC	56				

SIGNATURE _____ DATE: 01/29/10 TIME: 1059

CATEGORY 1: TSH_FLAW

Report code : DTI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Vert	0.50	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTE +1.50	HTS +0.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Volts	>= 0.75	<= 1000.00	yes
Same pnts	P1	n/a		Angle	>= 35	<= 150	yes
Same pnts	3	n/a		Angle	>= 30	<= 170	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DTI

CATEGORY 2: HL_DFI

Report code : DFI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P3	Vpos	0.05	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTS +0.25	H08 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	49	not	Volts	>= 2.50	<= 1000.00	no
T vect PP	3	n/a		Volts	>= 0.30	<= 1000.00	yes
Same pnts	3	n/a		Angle	>= 30	<= 135	yes
T vect MR	3	n/a		Angle	>= 30	<= 135	no
Equal Less	5	n/a		Angle	>= 0	<= 180	no

Report line -> Volts ch: 3 | Angle ch: 3 | Flaw% ch: DFI

CATEGORY 3: HL_MBM

Report code : MBM
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
6	Vpos	0.20	0	20	12	

SEARCH TYPE	FROM	TO
Between	HTS +0.25	H08 -2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	51	not	Volts	>= 2.50	<= 1000.00	no
T vect PP	6	n/a		Volts	>= 0.50	<= 1000.00	yes
Same pnts	6	n/a		Angle	>= 30	<= 90	yes
Same pnts	4	n/a		Angle	>= 30	<= 130	no
Volts pp	3	105		Angle	>= 10	<= 170	no

Report line -> Volts ch: 6 | Angle ch: 6 | Flaw% ch: MBM

CATEGORY 4: HL_DSI

Report code : DSI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Vpos	0.10	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTS +5.00	H08 +2.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	49		Volts	>= 2.50	<= 1000.00	no
T vect PP	P1	n/a		Angle	>= 20	<= 128	yes
Same pnts	P1	n/a		Volts	>= 0.10	<= 1000.00	yes
T vect PP	1	n/a		Angle	>= 20	<= 150	no
Same pnts	3	n/a		Angle	>= 20	<= 140	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DSI

CATEGORY 5: HL_NTE

Report code : NTE
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 200
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
5	Horz	1.50	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTS -0.50	HTS +0.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	2	30		Angle	>= 0	<= 359	yes
Same pnts	2	n/a	not	Volts	>= 10.00	<= 1000.00	yes

Report line -> Volts ch: 2 | Angle ch: 2 | Flaw% ch: NTE

CATEGORY 6: HL_DNG

Report code : DNG
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hpos	0.80	0	10	1	

SEARCH TYPE	FROM	TO
Between	HTS +0.50	H08 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vector	P1	n/a		Angle	>= 160	<= 200	no
T vect PP	P1	n/a		Angle	>= 160	<= 200	yes
Same pnts	P1	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	1	n/a		Angle	>= 150	<= 210	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DNG

CATEGORY 7: HL_PVN

Report code : PVN
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	4.50	0	8	2	

SEARCH TYPE	FROM	TO
Between	HTS +0.25	H08 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 8	<= 40	yes
Same pnts	P1	n/a		Volts	>= 5.00	<= 1000.00	yes
Volts pp	7	21	not	Volts	>= 1.00	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: PVN

CATEGORY 8: HL_PLP

Report code : PLP
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
7	Vpos	0.10	0	10	3	

SEARCH TYPE	FROM	TO
Freespan	HTS +0.10	H08 -4.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	103	not	Volts	>= 5.00	<= 1000.00	no
Volts pp	8	89		Volts	>= 0.70	<= 5.00	yes
Same pnts	8	n/a		Angle	>= 0	<= 10	yes
Same pnts	8	n/a		Angle	>= 350	<= 359	no
Same pnts	8	n/a		Angle	>= 170	<= 190	no

Report line -> Volts ch: 8 | Angle ch: 8 | Flaw% ch: PLP

CATEGORY 10: HL_PTE

Report code : PTE
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
2	Horz	10.00	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTE +2.00	HTS -0.25

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE		FROM		TO	RPT
T vect PP	2	n/a		Volts	>=	60.00	<=	1000.00	yes
Same pnts	2	n/a	not	Angle	>=	20	<=	160	yes
Same pnts	2	n/a	not	Angle	>=	200	<=	340	no

Report line -> Volts ch: 2 | Angle ch: 2 | Flaw% ch: PTE

CATEGORY 11: TSC_FLAW

Report code : DTI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Vert	0.50	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTE +1.50	CTS +0.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE		FROM		TO	RPT
T vect PP	P1	n/a		Volts	>=	0.75	<=	1000.00	yes
Same pnts	P1	n/a		Angle	>=	35	<=	150	yes
Same pnts	3	n/a		Angle	>=	30	<=	170	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DTI

CATEGORY 12: CL_DFI

Report code : DFI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P3	Vpos	0.05	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTS +0.25	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	49	not	Volts	>= 2.50	<= 1000.00	no
T vect PP	3	n/a		Volts	>= 0.30	<= 1000.00	yes
Same pnts	3	n/a		Angle	>= 30	<= 135	yes
T vect MR	3	n/a		Angle	>= 30	<= 135	no
Equal Less	5	n/a		Angle	>= 0	<= 180	no

Report line -> Volts ch: 3 | Angle ch: 3 | Flaw% ch: DFI

CATEGORY 13: CL_MBM

Report code : MBM
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
6	Vpos	0.20	0	20	12	

SEARCH TYPE	FROM	TO
Between	CTS +0.25	C14 -2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	51	not	Volts	>= 2.50	<= 1000.00	no
T vect PP	6	n/a		Volts	>= 0.50	<= 1000.00	yes
Same pnts	6	n/a		Angle	>= 30	<= 90	yes
Same pnts	4	n/a		Angle	>= 30	<= 130	no
Volts pp	3	105		Angle	>= 10	<= 170	no

Report line -> Volts ch: 6 | Angle ch: 6 | Flaw% ch: MBM

CATEGORY 14: CL_DSI

Report code : DSI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Vpos	0.10	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTS +5.00	C14 +2.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	49		Volts	>= 2.50	<= 1000.00	no
T vect PP	P1	n/a		Angle	>= 20	<= 128	yes
Same pnts	P1	n/a		Volts	>= 0.10	<= 1000.00	yes
T vect PP	1	n/a		Angle	>= 20	<= 150	no
Same pnts	3	n/a		Angle	>= 20	<= 140	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DSI

CATEGORY 15: CL_NTE

Report code : NTE
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 100
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
5	Horz	1.50	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTS -0.50	CTS +0.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	2	31		Angle	>= 0	<= 359	yes
Same pnts	2	n/a	not	Volts	>= 10.00	<= 1000.00	yes

Report line -> Volts ch: 2 | Angle ch: 2 | Flaw% ch: NTE

CATEGORY 16: CL_DNG

Report code : DNG
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hpos	0.80	0	10	1	

SEARCH TYPE	FROM	TO
Between	CTS +0.50	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vector	P1	n/a		Angle	>= 160	<= 200	no
T vect PP	P1	n/a		Angle	>= 160	<= 200	yes
Same pnts	P1	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	1	n/a		Angle	>= 150	<= 210	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DNG

CATEGORY 17: CL_PVN

Report code : PVN
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	4.50	0	8	2	

SEARCH TYPE	FROM	TO
Between	CTS +0.25	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 8	<= 40	yes
Same pnts	P1	n/a		Volts	>= 5.00	<= 1000.00	yes
Volts pp	7	21	not	Volts	>= 1.00	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: PVN

CATEGORY 18: CL-PLP

Report code : PLP
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
7	Vpos	0.10	0	10	3	

SEARCH TYPE	FROM	TO
Freespan	CTS +0.10	C14 -4.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	103	not	Volts	>= 5.00	<= 1000.00	no
Volts pp	8	89		Volts	>= 0.70	<= 5.00	yes
Same pnts	8	n/a		Angle	>= 0	<= 10	yes
Same pnts	8	n/a		Angle	>= 350	<= 359	no
Same pnts	8	n/a		Angle	>= 170	<= 190	no

Report line -> Volts ch: 8 | Angle ch: 8 | Flaw% ch: PLP

CATEGORY 19: CL_DEI

Report code : DEI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P2	Vpos	1.00	0	14	2	

SEARCH TYPE	FROM	TO
Between	CTS -1.00	CTS +1.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P2	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	P2	n/a		Angle	>= 40	<= 120	yes

Report line -> Volts ch: P2 | Angle ch: P2 | Flaw% ch: DEI

CATEGORY 20: CL_PTE

Report code : PTE
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
2	Horz	10.00	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTE +2.00	CTS -0.25

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	2	n/a		Volts	>= 60.00	<= 1000.00	yes
Same pnts	2	n/a	not	Angle	>= 20	<= 160	yes
Same pnts	2	n/a	not	Angle	>= 200	<= 340	no

Report line -> Volts ch: 2 | Angle ch: 2 | Flaw% ch: PTE

CATEGORY 21: UBEND_DSI

Report code : DSI
Center call : YES
Qualify call: NO
Use VM angle: YES
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Vpos	0.10	0	10	2	

SEARCH TYPE	FROM	TO
Between	H08 +2.00	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	81		Volts	>= 0.40	<= 1000.00	no
T vect PP	P1	n/a		Angle	>= 35	<= 140	yes
Same pnts	P1	n/a		Volts	>= 0.10	<= 1000.00	yes
Same pnts	1	n/a		Volts	>= 0.20	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DSI

CATEGORY 22: UBEND_DFI

Report code : DFI
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P3	Vpos	0.05	0	10	2	

SEARCH TYPE	FROM	TO
Between	H08 +1.50	C14 +1.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	81	not	Volts	>= 0.40	<= 1000.00	no
T vect PP	3	n/a		Volts	>= 0.30	<= 1000.00	yes
Same pnts	3	n/a		Angle	>= 35	<= 135	yes

Report line -> Volts ch: 3 | Angle ch: 3 | Flaw% ch: DFI

CATEGORY 23: UBEND_MBM

Report code : MBM
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
6	Vpos	0.20	0	20	12	

SEARCH TYPE	FROM	TO
Between	H08 -2.00	C14 -2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	6	n/a		Volts	>= 0.50	<= 1000.00	yes
Same pnts	6	n/a		Angle	>= 30	<= 90	yes
Same pnts	4	n/a		Angle	>= 30	<= 130	no
Volts pp	3	105		Angle	>= 10	<= 170	no

Report line -> Volts ch: 6 | Angle ch: 6 | Flaw% ch: MBM

CATEGORY 24: UBEND_PVN

Report code : PVN
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	4.60	0	8	2	

SEARCH TYPE	FROM	TO
Between	H08 +2.00	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 8	<= 40	yes
Same pnts	P1	n/a		Volts	>= 5.00	<= 1000.00	yes
T vect PP	7	n/a	not	Volts	>= 1.00	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: PVN

CATEGORY 26: UBEND_DNG

Report code : DNG
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hpos	0.80	0	10	1	

SEARCH TYPE	FROM	TO
Between	H08 +2.00	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	7	41		Volts	>= 1.00	<= 1000.00	no
T vector	P1	n/a		Angle	>= 160	<= 200	no
T vect PP	P1	n/a		Angle	>= 160	<= 200	yes
Same pnts	P1	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	1	n/a		Angle	>= 150	<= 210	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DNG

CATEGORY 27: HL_OXP

Report code : OXP
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Horz	5.00	0	10	2	

SEARCH TYPE	FROM	TO
Between	HTS +0.50	HTS +5.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Volts	>= 20.00	<= 1000.00	yes
Same pnts	P1	n/a	not	Angle	>= 20	<= 160	yes
Same pnts	P1	n/a	not	Angle	>= 200	<= 340	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: OXP

CATEGORY 28: CL_OXP

Report code : OXP
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Horz	5.00	0	10	2	

SEARCH TYPE	FROM	TO
Between	CTS +0.50	CTS +5.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Volts	>= 20.00	<= 1000.00	yes
Same pnts	P1	n/a	not	Angle	>= 20	<= 160	yes
Same pnts	P1	n/a	not	Angle	>= 200	<= 340	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: OXP

WATTS BAR NUCLEAR PLANT

Unit 2

CDS REVIEW FORM

Sort Name & Rev: WBT_BL_2010_Rev 1 **Date:** 2/10/2010

The purpose of this form is to document that auto analysis sorts are properly reviewed prior to the beginning of a steam generator inspection and after any revision during the inspection. This form is required to be completed for any inspection using auto-analysis.

Comments: This Rev. was for U-Bend Alert. - Reporting of DNGS. -

The following must be reviewed as a minimum:

- Complete tube coverage must exist for detection of degradation.
- * Ensure that no non-conservative sort rules exist when compared to the Site Specific Analysts Documents/ETSSs or chart logics.
- Ensure that all bobbin detectable damage mechanisms identified in the DA are properly screened for.

By signing this form, you are concurring that the reviews discussed above have been performed and are satisfactory.

Senior Analyst [signature] Date 2/10/2010

Independent QDA [signature] Date 2/10/2010

Figure 10-6
CDS Review Form

* There is a 2" gap on ding coverage between H8 +2" to 3.99" and C14 +2 to 3.99". To eliminate false calls at bend tangents

CATEGORY 16: CL_DNG

ort code : DNG
ter call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hpos	0.80	0	10	1	

SEARCH TYPE	FROM	TO
Between	CTS +0.50	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vector	P1	n/a		Angle	>= 160	<= 200	no
T vect PP	P1	n/a		Angle	>= 160	<= 200	yes
Same pnts	P1	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	1	n/a		Angle	>= 150	<= 210	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: DNG

CATEGORY 17: CL_PVN

Report code : PVN
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	4.50	0	8	2	

SEARCH TYPE	FROM	TO
Between	CTS +0.25	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 8	<= 40	yes
Same pnts	P1	n/a		Volts	>= 5.00	<= 1000.00	yes
Volts pp	7	21	not	Volts	>= 1.00	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: PVN

WATTS BAR NUCLEAR PLANT

Unit 2

CDS REVIEW FORM

Sort Name & Rev: WBT_BL_2010_Rev. 2 **Date:** 2/12/2010

The purpose of this form is to document that auto analysis sorts are properly reviewed prior to the beginning of a steam generator inspection and after any revision during the inspection. This form is required to be completed for any inspection using auto-analysis.

Comments: Changed PLP Sort for Hot and Cold Leg. Change Reporting Channel to 7.

The following must be reviewed as a minimum:

- Complete tube coverage must exist for detection of degradation.
- Ensure that no non-conservative sort rules exist when compared to the Site Specific Analysts Documents/ETSSs or chart logics.
- Ensure that all bobbin detectable damage mechanisms identified in the DA are properly screened for.

By signing this form, you are concurring that the reviews discussed above have been performed and are satisfactory.

Senior Analyst _____ Date 2/12/2010

Independent QDA _____ Date 2/12/2010

Figure 10-6
CDS Review Form

CATEGORY 7: HL_PVN

Report code : PVN
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	4.50	0	8	2	

SEARCH TYPE	FROM	TO
Between	HTS +0.25	H08 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 8	<= 40	yes
Same pnts	P1	n/a		Volts	>= 5.00	<= 1000.00	yes
Volts pp	7	21	not	Volts	>= 1.00	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: PVN

CATEGORY 8: HL_PLP

Report code : PLP
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
7	Vpos	0.10	0	10	3	

SEARCH TYPE	FROM	TO
Freespan	HTS +0.10	H08 -4.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	103	not	Volts	>= 5.00	<= 1000.00	no
Volts pp	7	33		Volts	>= 0.25	<= 20.00	yes
Same pnts	7	n/a		Angle	>= 25	<= 70	yes

Report line -> Volts ch: 7 | Angle ch: 7 | Flaw% ch: PLP

CATEGORY 18: CL-PLP

Report code : PLP
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
7	Vpos	0.10	0	10	3	

SEARCH TYPE	FROM	TO
Freespan	CTS +0.10	C14 -4.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	103	not	Volts	>= 5.00	<= 1000.00	no
Volts pp	7	33		Volts	>= 0.25	<= 20.00	yes
Same pnts	7	n/a		Angle	>= 25	<= 70	yes

Report line -> Volts ch: 7 | Angle ch: 7 | Flaw% ch: PLP

CATEGORY 19: CL_DEI

Report code : DEI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P2	Vpos	1.00	0	14	2	

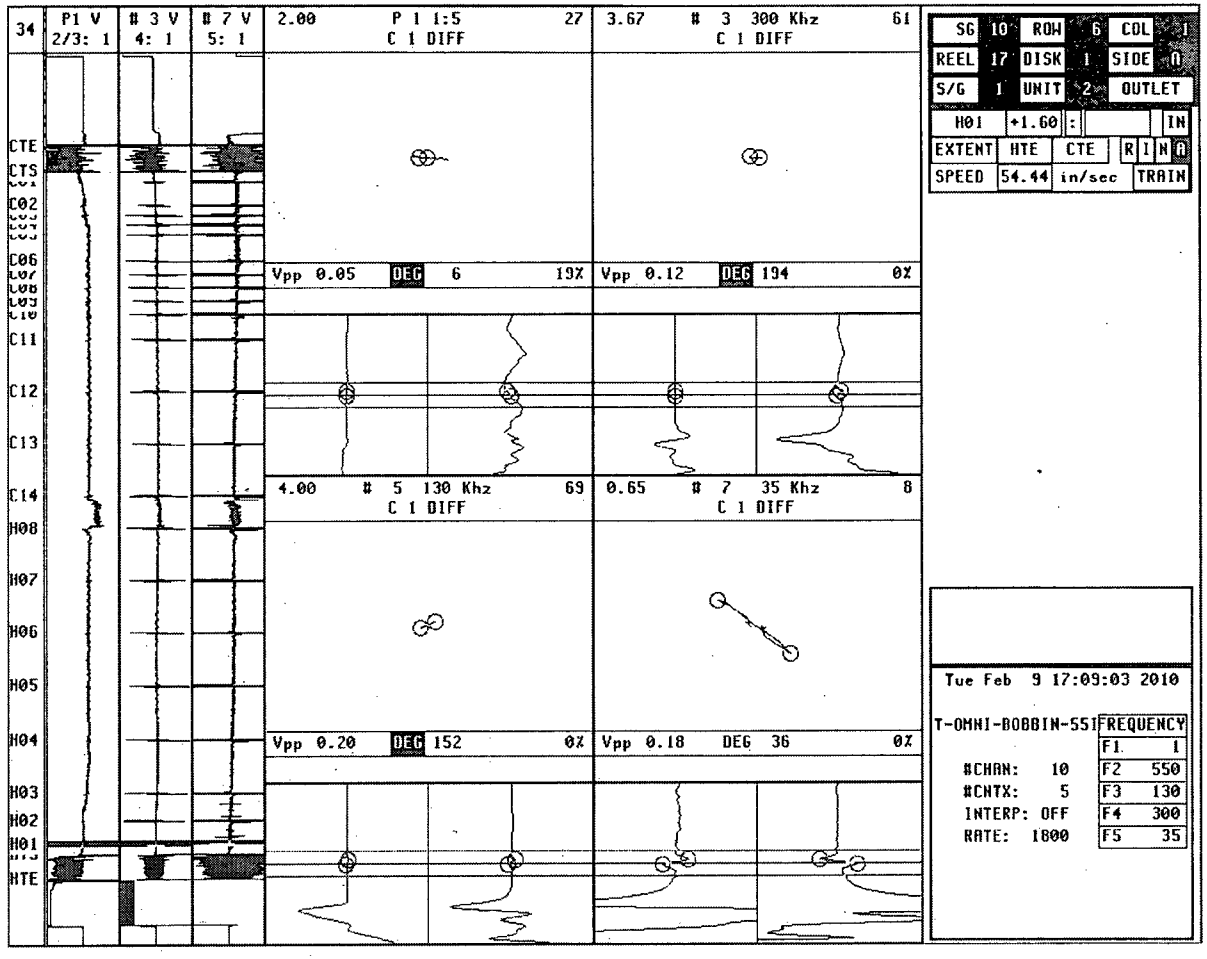
SEARCH TYPE	FROM	TO
Between	CTS -1.00	CTS +1.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P2	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	P2	n/a		Angle	>= 40	<= 120	yes

Report line -> Volts ch: P2 | Angle ch: P2 | Flaw% ch: DEI

WBT

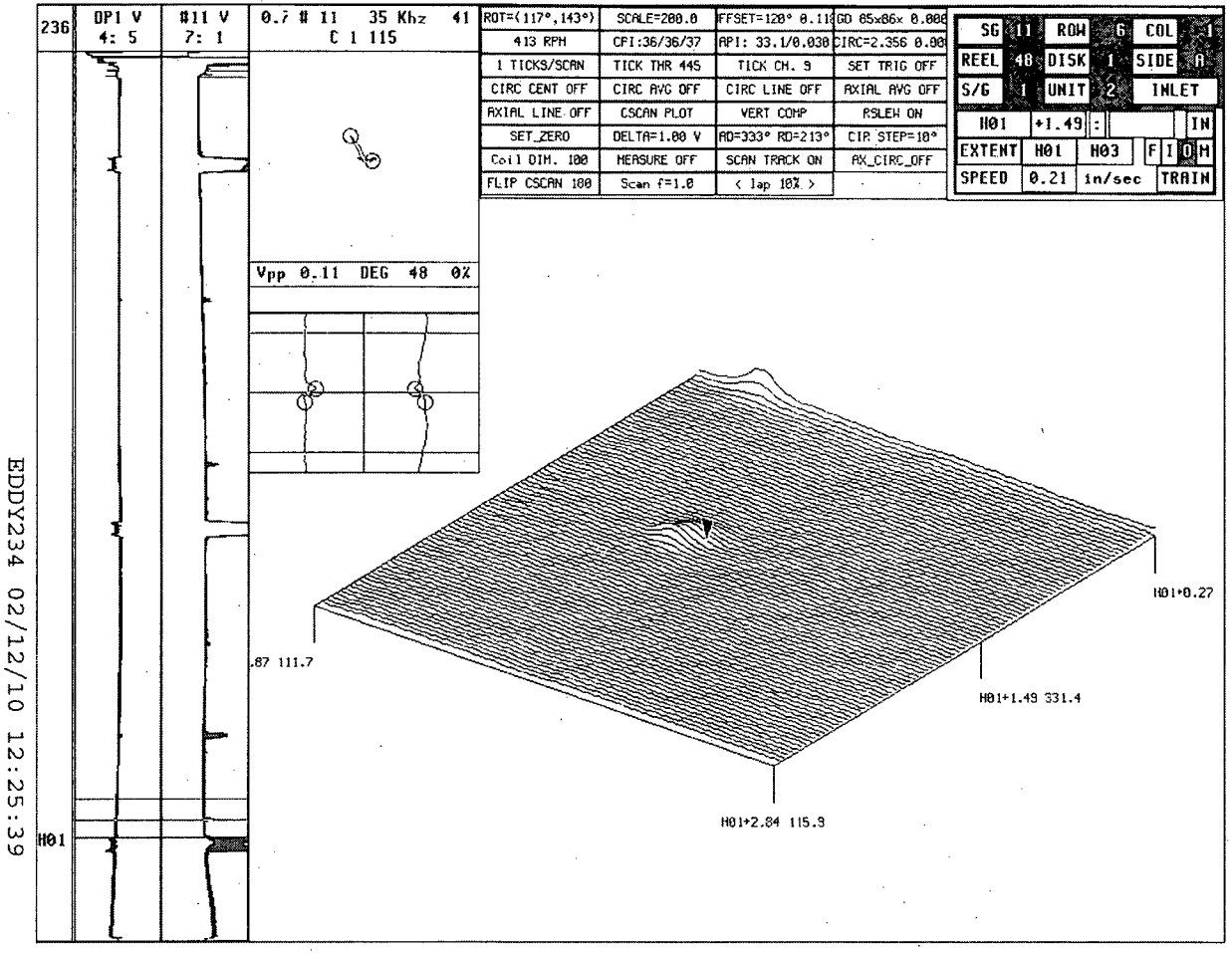
2/9/2010 OUTLET UNIT: 2 SG: 1 CAL: 17 RES



EDDY234 02/12/10 12:26:17

WBT

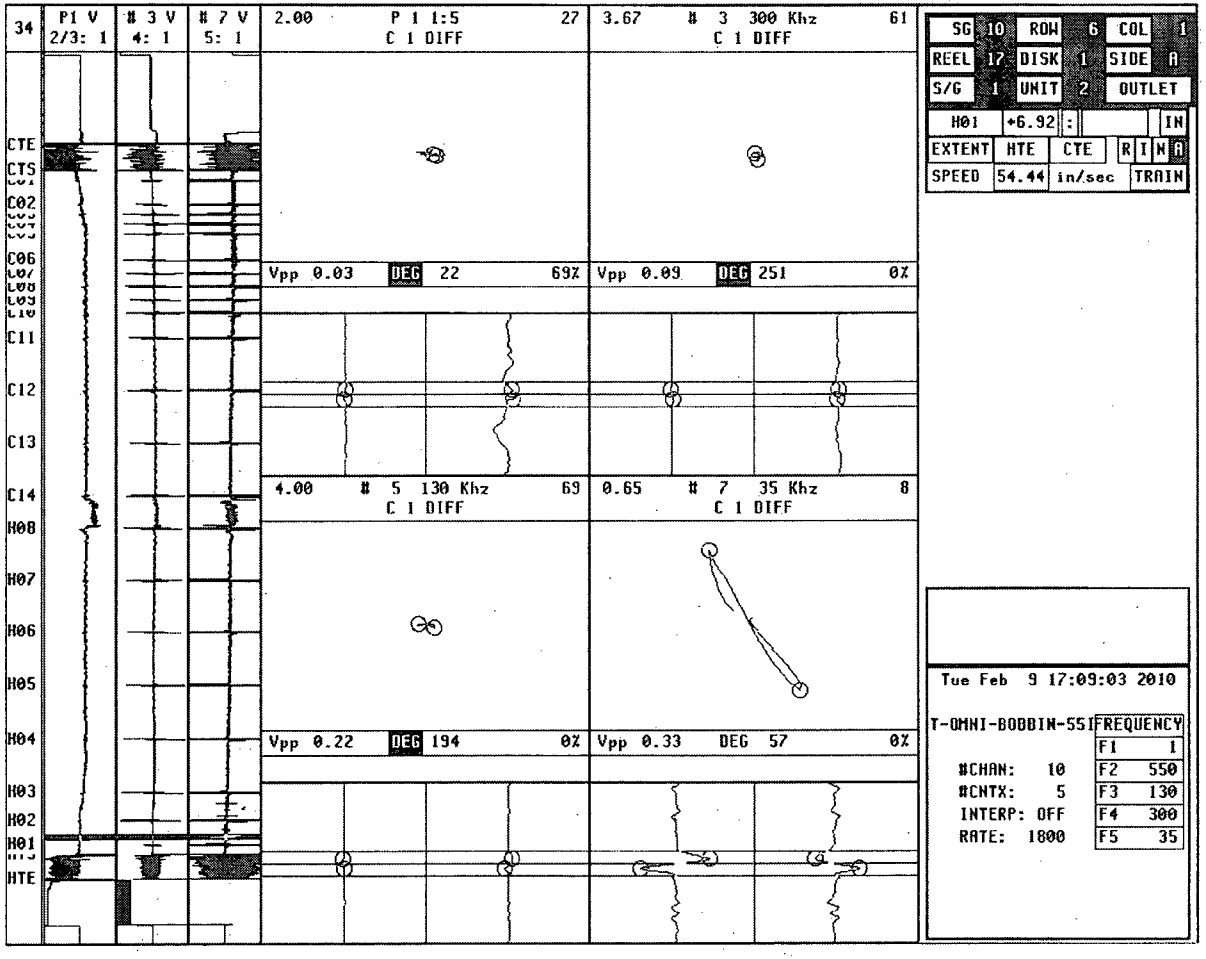
2/12/2010 INLET UNIT: 2 SG: 1 CAL: 48 RES



EDDY234 02/12/10 12:25:39

WBT

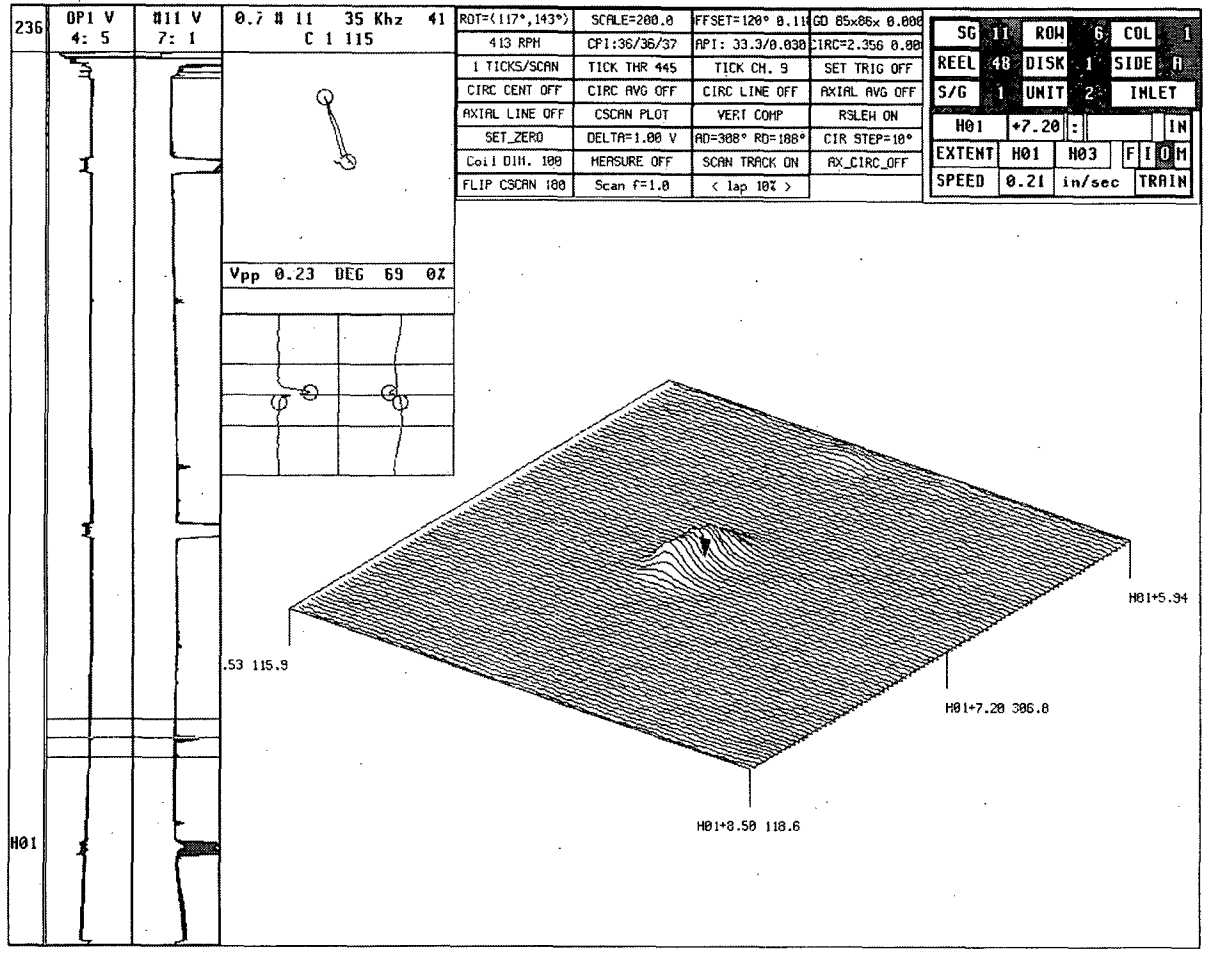
2/9/2010 OUTLET UNIT: 2 SG: 1 CAL: 17 RES



EDDY234 02/12/10 12:27:04

WBT

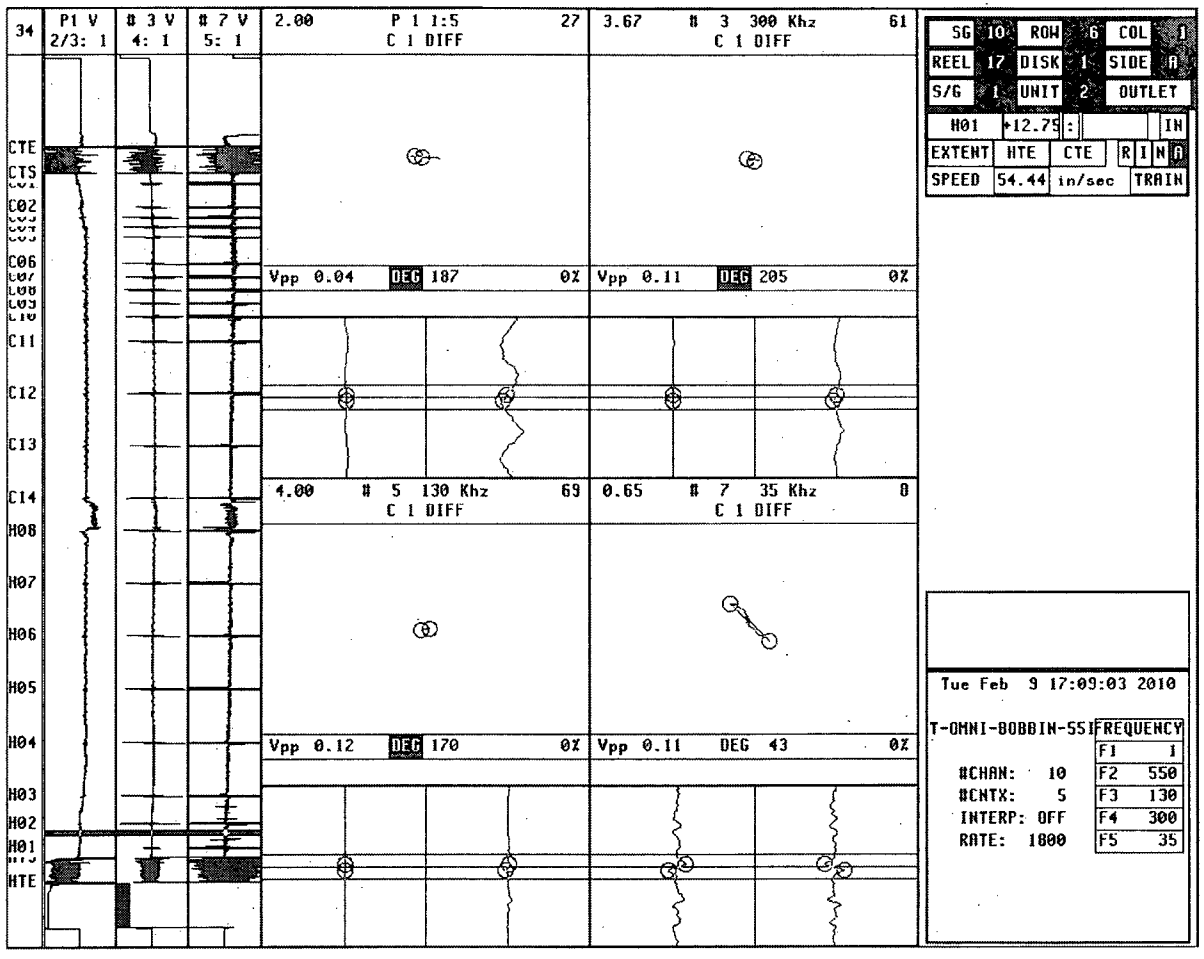
2/12/2010 INLET UNIT: 2 SG: 1 CAL: 48 RES



EDDY234 02/12/10 12:27:00

WBT

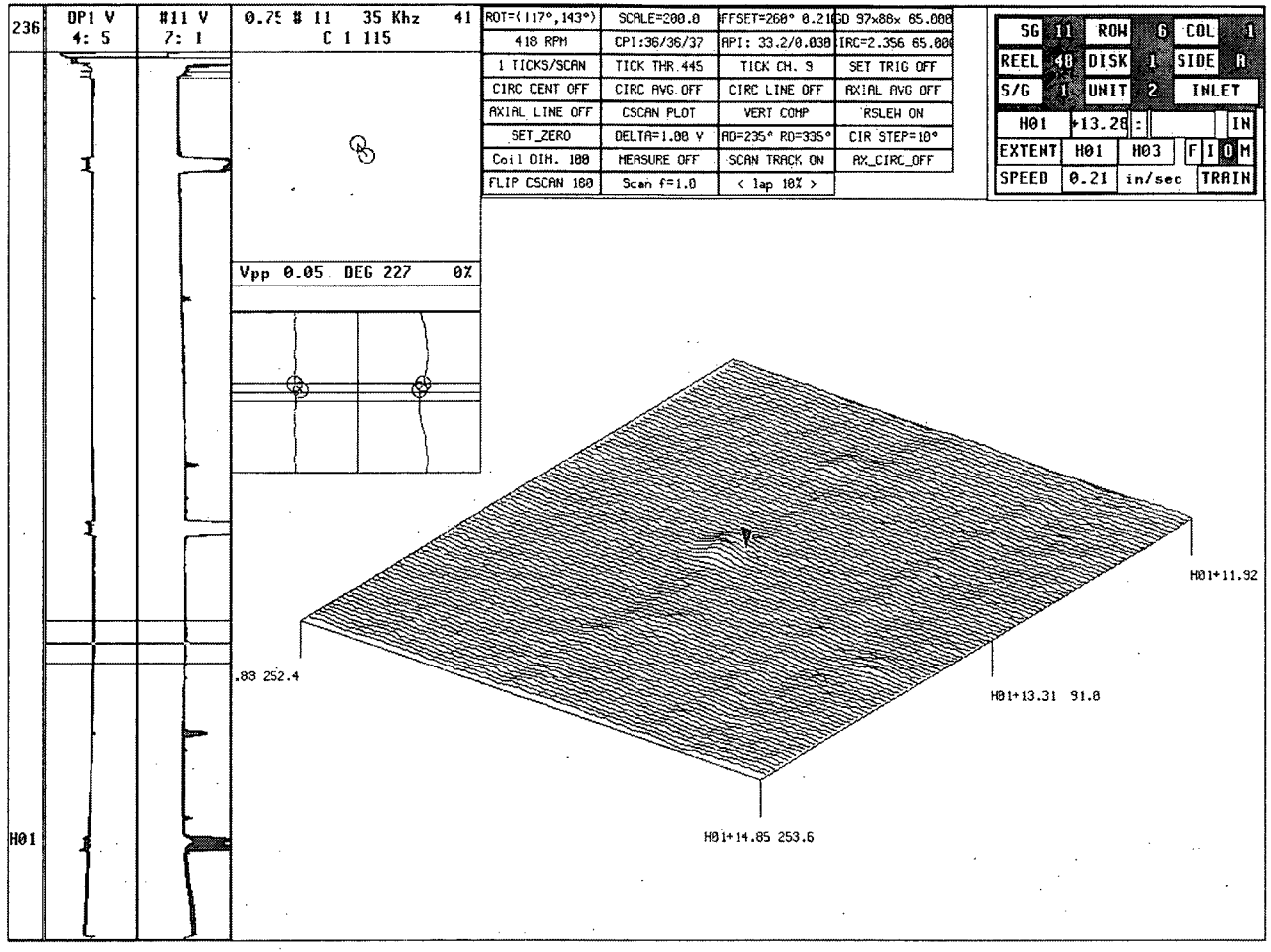
2/9/2010 OUTLET UNIT: 2 SG: 1 CAL: 17 RES



EDDY234 02/12/10 12:28:03

WBT

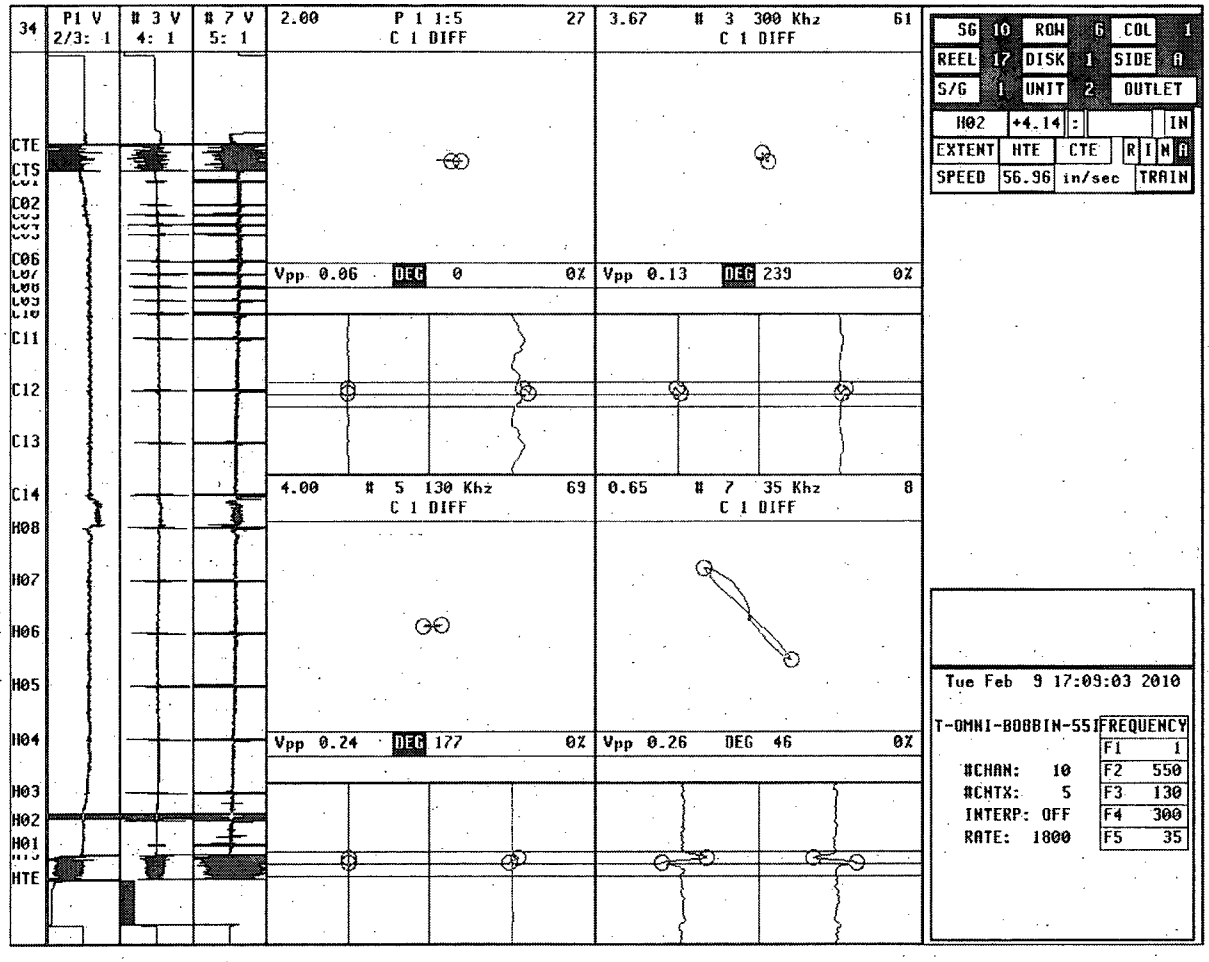
2/12/2010 INLET UNIT: 2 SG: 1 CAL: 48 RES



EDDY234 02/12/10 12:28:00

WBT

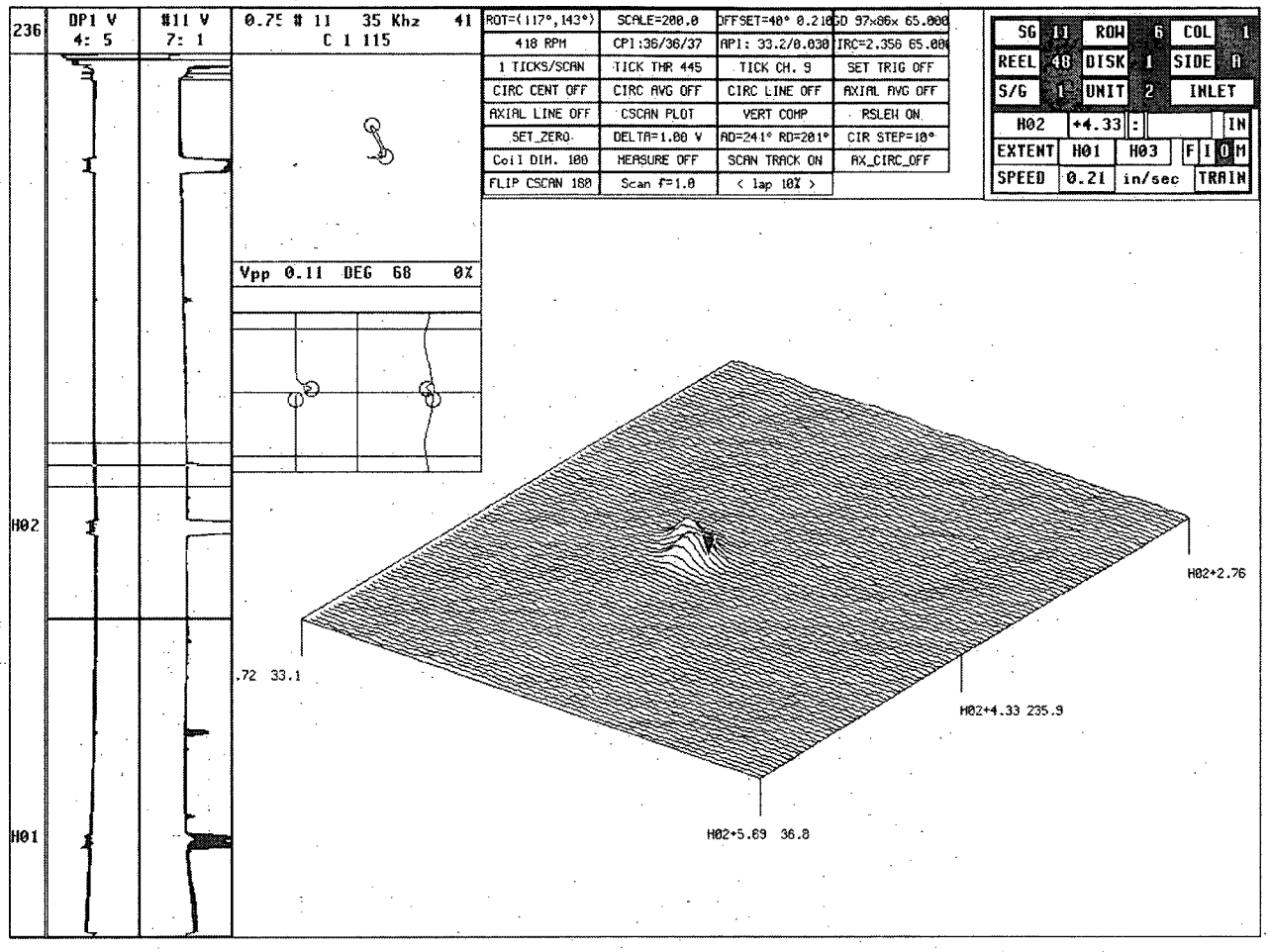
2/9/2010 OUTLET UNIT: 2 SG: 1 CAL: 17 RES



EDDY234 02/12/10 12:28:36

WBT

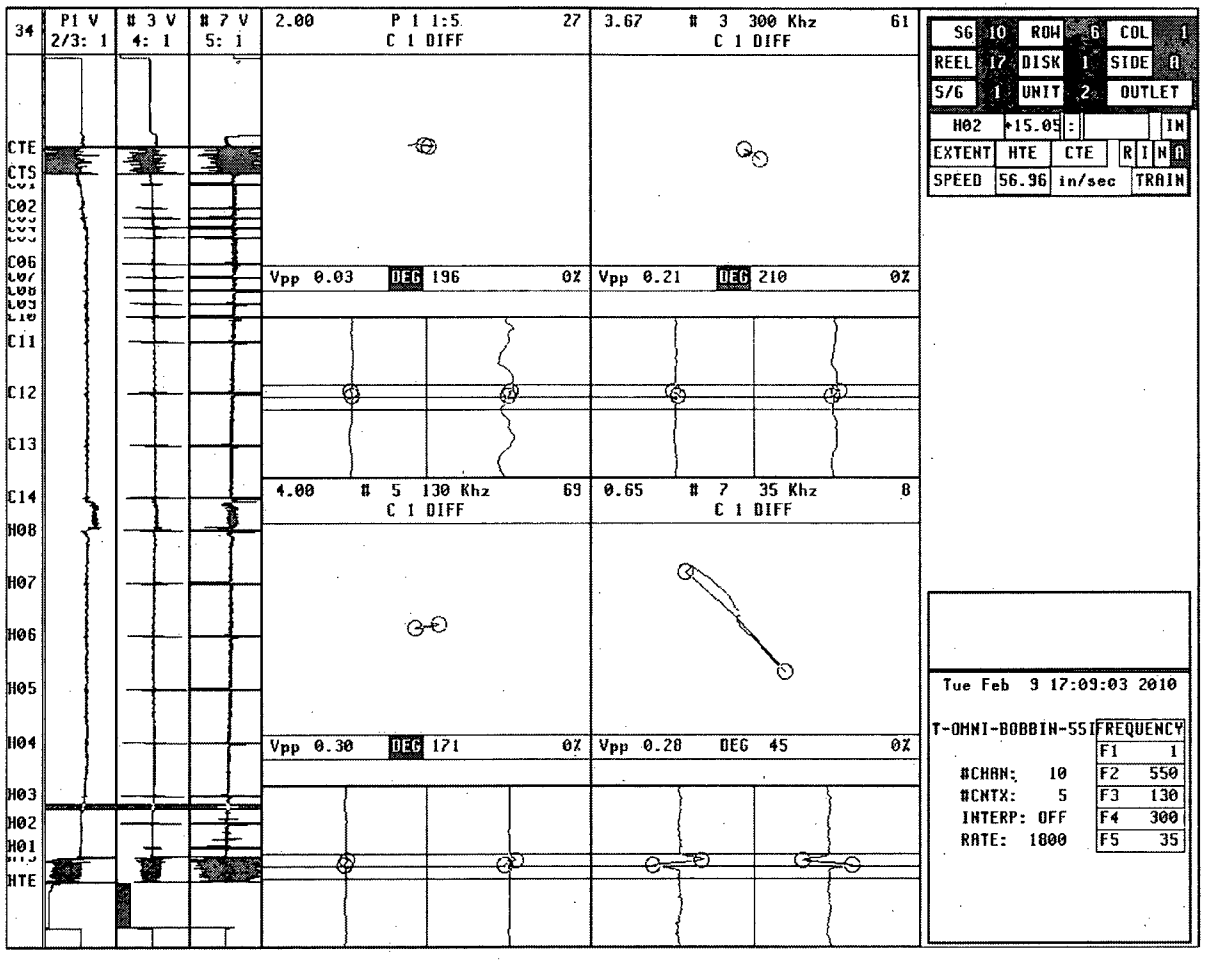
2/12/2010 INLET UNIT: 2 SG: 1 CAL: 48 RES



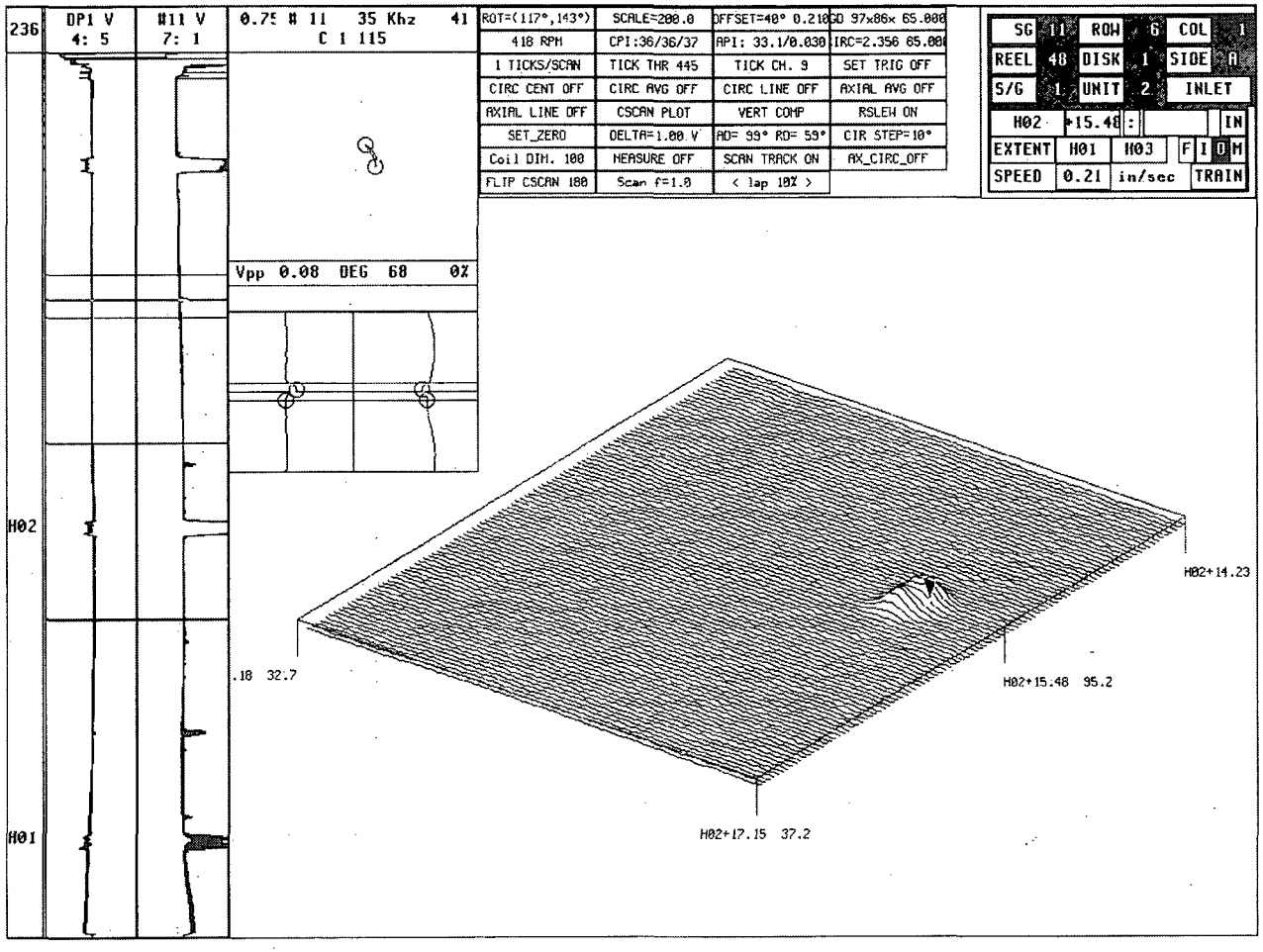
EDDY234 02/12/10 12:28:39

WBT

2/9/2010 OUTLET UNIT: 2 SG: 1 CAL: 17 RES



EDDY234 02/12/10 12:29:10



EDDY234 02/12/10 12:29:13

WATTS BAR NUCLEAR PLANT

Unit 2

CDS REVIEW FORM

Sort Name & Rev: WBT_B2_2010_Rev 3 **Date:** 2/13/2010

The purpose of this form is to document that auto analysis sorts are properly reviewed prior to the beginning of a steam generator inspection and after any revision during the inspection. This form is required to be completed for any inspection using auto-analysis.

Comments: Change PLP Sort - Hot Leg and Cold Leg. Open Phase Angle for Reporting ON Channel 7 - Also put PI qualifying Channel.

The following must be reviewed as a minimum:

- Complete tube coverage must exist for detection of degradation.
- Ensure that no non-conservative sort rules exist when compared to the Site Specific Analysts Documents/ETSSs or chart logics.
- Ensure that all bobbin detectable damage mechanisms identified in the DA are properly screened for.

By signing this form, you are concurring that the reviews discussed above have been performed and are satisfactory.

Senior Analyst _____ Date 2/13/2010

Independent QDA _____ Date 2/13/2010

Figure 10-6
CDS Review Form

CATEGORY 7: HL_PVN

Report code : PVN
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	4.50	0	8	2	

SEARCH TYPE	FROM	TO
Between	HTS +0.25	H08 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 8	<= 40	yes
Same pnts	P1	n/a		Volts	>= 5.00	<= 1000.00	yes
Volts pp	7	21	not	Volts	>= 1.00	<= 1000.00	no

Report line -> Volts ch: P1 | Angle ch: P1 | Flaw% ch: PVN

CATEGORY 8: HL_PLP

Report code : PLP
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
7	Vpos	0.10	0	10	3	

SEARCH TYPE	FROM	TO
Freespan	HTS +0.10	H08 -4.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	103	not	Volts	>= 2.00	<= 1000.00	no
Volts pp	7	33		Volts	>= 0.25	<= 1000.00	yes
Same pnts	7	n/a		Angle	>= 0	<= 359	yes
Same pnts	P1	n/a	not	Volts	>= 2.00	<= 1000.00	no

Report line -> Volts ch: 7 | Angle ch: 7 | Flaw% ch: PLP

CATEGORY 18: CL-PLP

Report code : PLP
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 20
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
7	Vpos	0.10	0	10	3	

SEARCH TYPE	FROM	TO
Freespan	CTS +0.10	C14 -4.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
Volts pp	8	103	not	Volts	>= 2.00	<= 1000.00	no
Volts pp	7	33		Volts	>= 0.25	<= 1000.00	yes
Same pnts	7	n/a		Angle	>= 0	<= 359	yes
Same pnts	P1	n/a	not	Volts	>= 2.00	<= 1000.00	no

Report line -> Volts ch: 7 | Angle ch: 7 | Flaw% ch: PLP

CATEGORY 19: CL_DEI

Report code : DEI
Center call : NO
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P2	Vpos	1.00	0	14	2	

SEARCH TYPE	FROM	TO
Between	CTS -1.00	CTS +1.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P2	n/a		Volts	>= 2.00	<= 1000.00	yes
Same pnts	P2	n/a		Angle	>= 40	<= 120	yes

Report line -> Volts ch: P2 | Angle ch: P2 | Flaw% ch: DEI

WATTS BAR NUCLEAR PLANT

Unit 2

CDS REVIEW FORM

Sort Name & Rev: WBT_BL_2010_Rev.4 **Date:** 2/18/2010

The purpose of this form is to document that auto analysis sorts are properly reviewed prior to the beginning of a steam generator inspection and after any revision during the inspection. This form is required to be completed for any inspection using auto-analysis.

Comments:

The following must be reviewed as a minimum:

- Complete tube coverage must exist for detection of degradation.
- Ensure that no non-conservative sort rules exist when compared to the Site Specific Analysts Documents/ETSSs or chart logics.
- Ensure that all bobbin detectable damage mechanisms identified in the DA are properly screened for.

By signing this form, you are concurring that the reviews discussed above have been performed and are satisfactory.

Senior Analyst _____ Date 2/18/2010

Independent QDA _____ Date 2/18/2010

Figure 10-6
CDS Review Form

CATEGORY 29: HL_ID_DFI

Report code : DFI
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 4
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	0.50	0	8	2	

SEARCH TYPE	FROM	TO
Between	HTS +0.25	H08 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 12	<= 40	no
Same pnts	P1	n/a		Volts	>= 0.50	<= 1000.00	no
Same pnts	5	n/a		Angle	>= 12	<= 40	no
T vect PP	3	n/a		Angle	>= 12	<= 40	yes
Same pnts	3	n/a		Volts	>= 0.75	<= 1000.00	yes

Report line -> Volts ch: 3 | Angle ch: 3 | Flaw% ch: DFI

CATEGORY 30: CL_ID_DFI

Report code : DFI
Center call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 5
Take picture: NO
Picture type: F1
Save results: REPORT 1

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	0.50	0	8	2	

SEARCH TYPE	FROM	TO
Between	CTS +0.25	C14 +2.00

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 12	<= 40	no
Same pnts	P1	n/a		Volts	>= 0.50	<= 1000.00	no
Same pnts	5	n/a		Angle	>= 12	<= 40	no
T vect PP	3	n/a		Angle	>= 12	<= 40	yes
Same pnts	3	n/a		Volts	>= 0.75	<= 1000.00	yes

Report line -> Volts ch: 3 | Angle ch: 3 | Flaw% ch: DFI

CATEGORY 39: UBEND_ID_DFI

Report code : DFI
Filter call : YES
Qualify call: NO
Use VM angle: NO
Proxy: YES >= 6
Take picture: NO
Picture type: F1
Save results: REPORT 1 & 2

E_CHAN	E_COMP	E_SIZE	E_ROT	E_VEC	E_WTH	E_FILT
P4	Hneg	0.50	0	8	2	

SEARCH TYPE	FROM	TO
Between	H08 +1.50	C14 +1.50

MEASUREMENT	CHAN	WIN	LOGIC	COMPARE	FROM	TO	RPT
T vect PP	P1	n/a		Angle	>= 12	<= 40	no
Same pnts	P1	n/a		Volts	>= 0.50	<= 1000.00	no
Same pnts	5	n/a		Angle	>= 12	<= 40	no
T vect PP	3	n/a		Angle	>= 12	<= 40	yes
Same pnts	3	n/a		Volts	>= 1.00	<= 1000.00	yes

Report line -> Volts ch: 3 | Angle ch: 3 | Flaw% ch: DFI

7. CALIBRATION STANDARD INFORMATION

- CALIBRATION STANDARD DRAWINGS
- MATERIAL CERTIFICATIONS

Eddy Current Testing
Calibration Standards

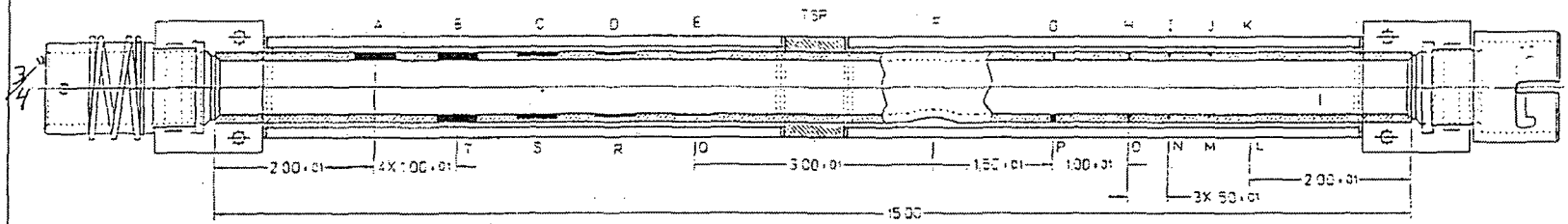
Calibration Standard	Serial Number
EDM Notch Standard	Z-18292
EDM Notch Standard	Z-18293
EDM Guide Tube Standard	Z-20435
EDM Guide Tube Standard	Z-20436
ASME / AVB Calibration Standard	Z-18307
Combination ASME / Dent Standard	Z-1591
Combination ASME / Dent Standard	Z-1632
Combination ASME / Dent Standard	Z-1633
Tubesheet Profile Standard	TS-001-93
Tubesheet Profile Standard	TS-002-93
Tube Proximity Standard	Z-7097

Westinghouse

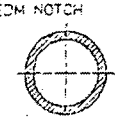
NOTE
ALL AXIAL AND CIRC EDM NOTCHES ARE .500±.003 LONG
DEPTH ±.001, WIDTH .005±.001
ALL AXIAL AND CIRC LOCATIONS ±.010

REVISIONS					
LTR	DATE	DESCRIPTION	APVD	CK	DR
A	7/31/00	CORRECTED ERROR, .082 WAS .087			TO

LOCATION	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
PHYSICALLY MEAS DEPTH	THRU	.0322	.0246	.0162	.0083	.0025	THRU	.0315	.0246	.0159	.0082	.0078	.0157	.0244	.0318	THRU	.0081	.0161	.0239	.0321
DEPTH IN % OF WALL	100%	80%	61%	40%	20%	6%	100%	78%	61%	39%	20%	19%	39%	60%	79%	100%	20%	40%	59%	79%

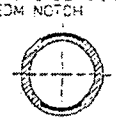


LOC A THRU E
SHOWS O.D. AXIAL EDM NOTCH

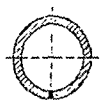


LOC O THRU T
SHOWS I.D. AXIAL EDM NOTCH

LOC G THRU K
SHOWS O.D. CIRC EDM NOTCH

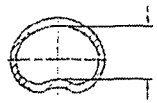


LOC L THRU Q
SHOWS I.D. CIRC EDM NOTCH



LOC P
SHOWS 100% @ .052±.003 HOLE

LOC F



SHOWS A SINGLE POINT DENT

MATERIAL INCONEL 600
AVERAGE MEAS. WALL THK .0405
NOMINAL WALL THK .043
HEAT LOT NO. NX0881 Customer Supplied
TEST PROD USED NA
SERIAL NO. Z-18292
P.O. NO 20003209
REL NO Req# 9412-00-189
QUALITY REL NO. NA
DATE MFG 8/23/2000
Q.A. INSP Steve Johnson
CUSTOMER Westinghouse CE Nuclear
RECORDED NA
PROBE USED NA
REVIEWED BY Nancy Nash

NOTE:

UNLESS OTHERWISE SPECIFIED DIMS ARE IN INCHES

TOLERANCES
DECIMAL .XXXX ±.0030, .XXX ±.015, .XX ±.050, .X ±.100, X° ±2°
FRACT ±1/64, X ±.005, ANGULAR ±2°, % ±.003, THD CLASS 2A/2B, X' ±2', X'-X" ±2', X' ±10%
FINISH 63 DIST 501

DRAWN K. CEDAR	DATE 07/27/2000	ZETEC INC. POST OFFICE BOX 148 REDMOND, WASHINGTON 98052-0148 U.S.A. TELEPHONE (425) 883-3376	
CHECK G. MATELION	07/27/2000	TITLE EDM NOTCH STD. W/SINGLE POINT DENT	
DESIGN N. NASH	07/27/2000	SIMILAR	INDEX SP21 / DWG NO 10009279 / FRAME C
APVD QA C. LONGTOP	07/27/2000	SCALE 1/1	REFERENCE 10009278 / SHT 1 OF 2

Special Metals Division
425 McCartney St
Arnprior, Ont.
K7S 3H6
Tel 1-613-623-6501

norande

CERTIFIED MATERIAL TEST REPORT

No.: CB28-NX0881

CUSTOMER: Combustion Engineering Inc
Address: Chattanooga, Tennessee
P.O. No.: 47-80350
Contract: 75274 (TVA II)
M.O. No.: 0178

Material: Ni-Cr-Fe Alloy Tubing
Heat Treated Condition: Annealed
Specification: ASME SB-163 and C-E P.O. 47-80550 and modified by C-E P.S. N-P43B2(h) with Addendum 2(a); 3(a) and 4(a) and supplements
Size: .750" O.D. x .042" Avg. Wall

MATERIAL HEAT NO.: NX0881
SMD HEAT TREATMENT NO.: CB28

CHEMICAL ANALYSIS:

	C	Mn	Fe	S	Si	Cu	Ni	Cr	Al	Ti	Mg	Co	P	B
Heat	.03	.26	9.47	.001	.15	.30	74.87	14.92	.25	.21	.011	.03	.010	.003
Hollow		.21	9.22	<.003	.12	.27	75.50	14.77	.18	.15	.007	.03	.010	.002
Product	.03													

MECHANICAL PROPERTIES:

Tensile Strength	Yield Strength (0.2% offset)	Elongation (in 2")
104,000 psi	44,000 psi	40%

INTERGRANULAR ATTACK		ASTM GRAIN SIZE		DIMENSIONS	SURFACE ROUGHNESS
First Tube	Last Tube	First Tube	Last Tube		
<.001"	<.001"	8 - 8-1/2	8 - 8-1/2	Acceptable	Acceptable

All tubes were tested in accordance with the following NORANDA Procedures:

Flare Test: QIP 018 Rev. 2
Ultrasonic Examination (Flaw, O.D., Wall): QIP 001 Rev. 3 App. B, QIP 002 Rev. 3 App. QIP 003 Rev. 4 App. B

O.D. Eddy Current: QIP 004 Rev. 3 App. B
I.D. Eddy Current: QIP 015 Rev. 3

REMARKS: In accordance with Customer's P.O., hydrostatic testing was not performed.

This is to certify that, to the best of my knowledge and belief, the contents of this Report are correct and accurate and all test results are in compliance with the material specifications and other requirements as specified by the Customer, except as stated hereon.

Date: March 28, 1979

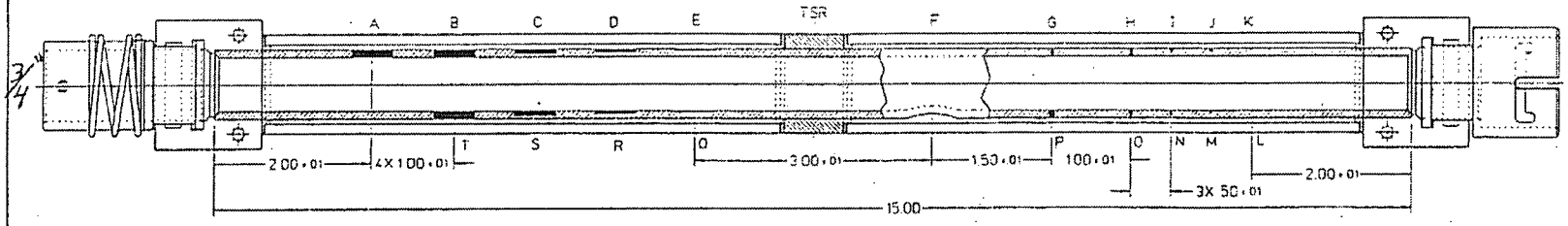
Manager, Quality Assurance

NQD-QS-031

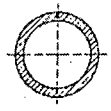
NOTE
ALL AXIAL AND CIRC EDM NOTCHES ARE 500±.003 LONG
DEPTH ±.001 WIDTH .005±.001
ALL AXIAL AND CIRC LOCATIONS ±.010

REVISIONS					
LTR	DATE	DESCRIPTION	APVD	CK	DR
A	7/31/00	CORRECTED ERROR, .052 WAS .057			

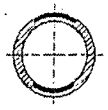
LOCATION	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
PHYSICALLY MEAS DEPTH	THRU	.0324	.0243	.0160	.0084	.0025	THRU	.0316	.0243	.0161	.0080	.0080	.0157	.0243	.0321	THRU	.0082	.0162	.0244	.0317
DEPTH IN % OF WALL	100%	80%	60%	40%	21%	6%	100%	78%	60%	40%	20%	20%	39%	60%	79%	100%	20%	40%	60%	78%

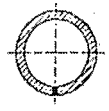


LOC A THRU E
SHOWS O.D. AXIAL EDM NOTCH

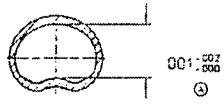


LOC G THRU K
SHOWS O.D. CIRC EDM NOTCH





LOC F



SHOWS A SINGLE POINT DENT

LOC O THRU T
SHOWS I.D. AXIAL EDM NOTCH

LOC. L THRU O
SHOWS I.D. CIRC EDM NOTCH

LOC. P
SHOWS 100% Ø.052±.003 HOLE

MATERIAL INCONEL 600
AVERAGE MEAS. WALL THK. .0405
NOMINAL WALL THK. .043
HEAT LOT NO. NX0881 CUSTOMER SUPPLIED
TEST FREQ USED NA
SERIAL NO. Z-18293
P.O. NO. 20003209
REL NO. Req# 9412-00-189
QUALITY REL. NO. NA
DATE MFG 8/23/2000
Q.A. INSP. Steve Johnson
CUSTOMER WESTINGHOUSE CE NUCLEAR
RECORDED NA
PROBE USED NA
REVIEWED BY Nikolay Popov

NOTE

UNLESS OTHERWISE SPECIFIED DIMS ARE IN INCHES TOLERANCES DECIMAL .XXXX ±.0030 .XXX ±.015 .XX ±.050 .X ±.100 FRACT ±1/64 # ±.005 ANGULAR ±3° % ±.002 THD CLASS-2A/2B X° ±2° X'-X" ±2' X" ±10%	DRAWN K ZEGKE	DATE 07/27/2000	ZETEC INC.
	CHECK G MATELICH	07/27/2000	TITLE EDM NOTCH STD W/SINGLE POINT DENT
	DESIGN N NASH	07/27/2000	SIMILAR
FINISH 63	APVD GA C LOVETOT	07/27/2000	INDEX SP21 / DWG NO 10009279 / FRAME C
			SCALE 1/1 / REFERENCE 10009278 / SHT 1 OF 2

Special Metals Division
425 McCartney St
Kingston, Ont.
K7S 3H6
Tel 1-613-623-6501

noranda

CERTIFIED MATERIAL TEST REPORT

No.: CB28-NX0881

CUSTOMER: Combustion Engineering Inc
Address: Chattanooga, Tennessee
P.O. No.: 47-80350
Contract: 75274 (TVA II)
M.O. No.: 0178

Material: Ni-Cr-Fe Alloy Tubing
Heat Treated Condition: Annealed
Specification: ASME SB-163 and C-E P.O. 47-80350 and modified by C-E P.S. N-P43B2(h) with Addendum 2(a); 3(a) and 4(a) and supplements
Size: .750" O.D. x .042" Avg. Wall
SMD HEAT TREATMENT NO.: CB28

MATERIAL HEAT NO.: NX0881

CHEMICAL ANALYSIS:

	C	Mn	Fe	S	Si	Cu	Ni	Cr	Al	Ti	Mg	Co	P	B
Heat	.03	.26	9.47	.001	.15	.30	74.87	14.92	.25	.21	.011	.03	.010	.003
Hollow		.21	9.22	<.003	.12	.27	75.50	14.77	.18	.15	.007	.03	.010	.002
Product	.03													

MECHANICAL PROPERTIES:

Tensile Strength	Yield Strength (0.2% offset)	Elongation (in 2")
104,000 psi	44,000 psi	40%

INTERGRANULAR ATTACK		ASTM GRAIN SIZE		DIMENSIONS	SURFACE ROUGHNESS
First Tube	Last Tube	First Tube	Last Tube		
<.001"	<.001"	8 - 8-1/2	8 - 8-1/2	Acceptable	Acceptable

All tubes were tested in accordance with the following NORANDA Procedures:

Flare Test: QIP 018 Rev. 2
Ultrasonic Examination (Flaw, O.D., Wall): QIP 001 Rev. 3 App. B, QIP 002 Rev. 3 App. QIP 003 Rev. 4 App. B

O.D. Eddy Current: QIP 004 Rev. 3 App. B
I.D. Eddy Current: QIP 015 Rev. 3

REMARKS: In accordance with Customer's P.O., hydrostatic testing was not performed.

This is to certify that, to the best of my knowledge and belief, the contents of this Report are correct and accurate and all test results are in compliance with the material specifications and other requirements as specified by the Customer, except as stated hereon.

Date: March 28, 1979

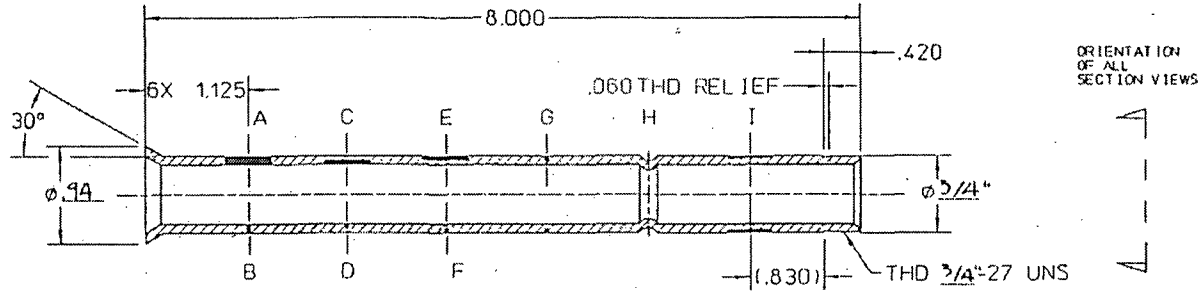
Manager, Quality Assurance

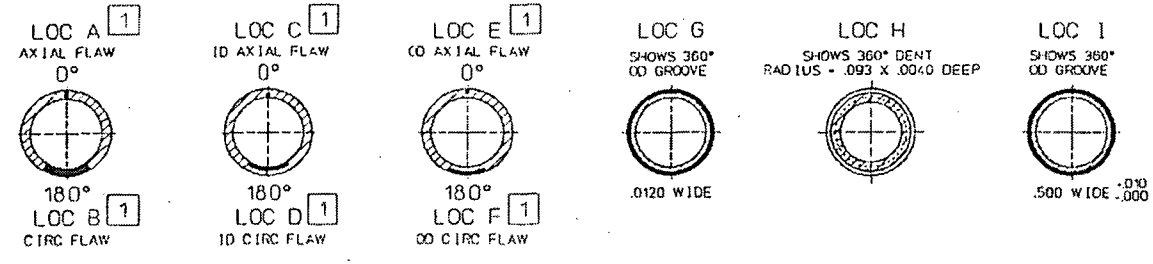
SMD-QS-051

[1] ALL EDM DEFECTS ARE .500 LG.
X .005 $^{+.001}_{-.002}$ WIDE X DEPTH SPECIFIED

REVISIONS					
LTR	DATE	DESCRIPTION	APVD	CK	DR
A	8-19-2007	SWITCH G AND I	SM	GDD	GMM

LOCATION	A	B	C	D	E	F	G	H	I
PHYSICALLY MEAS. DEPTH	THRU	THRU	.0170	.0180	.0150	.0165	.0205	.0038	.0125
DEPTH IN % OF WALL	100%	100%	41%	44%	44%	40%	50%	NA	30%





MATERIAL INCONEL 600
AVERAGE MEAS. WALL THK. .041
NOMINAL WALL THK. .043
HEAT LOT NO. NX0915
TEST FREQ. USED NA
SERIAL NO. Z-20435
P.O. NO. 4500117820
REL. NO. NA
QUALITY REL. NO. NA
DATE MFG. 9-17-03
Q.A. INSP. Dwight Fuch
CUSTOMER WESTINGHOUSE ELECTRIC CO
RECORDED NA
PROBE USED NA
REVIEWED BY Steve Johnson

NOTE:

UNLESS OTHERWISE SPECIFIED DIMS ARE IN INCHES

TOLERANCES
DECIMAL .XXXX ±.0030 .XXX ±.015 .XX ±.050 .X ±.100 X° ±2° X°-X' ±2° X' ±10%
FRACT. ±1/64 ∠ ±.005 ANGULAR ±3° % ±.003 THD CLASS 2A/2B

THIRD ANGLE PROJECTION

DRAWN	G. ANDERSON	07/30/2003
CHECK	G. MATELICH	08/14/2003
DESIGN		
APVD. QA	S. Johnson	8-19-2007
CHEM REQ.		

ZETEC INC. POST OFFICE BOX 140 ISSAQUAH, WASHINGTON 98027-0140 U.S.A. TELEPHONE (425) 392-5316

FRAME B

TITLE: EDM GUIDE TUBE STANDARD

SIMILAR	SCALE	INDEX	DWG NO
	NTS	SA00	10017260

DIST 501 | FINISH 63 | REF. | SHT 1 OF 2

ZETEC

TEST CERTIFICATE

Date: August 18, 1998

Material: Inconel 600 seamless annealed

Heat No.	Description
NX0915	3/4" Dia. X .043 wall thickness

CHEMICAL ANALYSIS

C	Si	Mn	P	S	Ni	Cr	Mo	Al	Zn
.035	.12	.24		.002	76.27	14.66			
Pb	**B**	**Ca**	**Cd**	**Co**	**Cu**	**Fe**	**Nb**	**Ti**	**Other**
					.11	7.96			

TENSILE PROPERTIES

Yield Strength	Ultimate Strength PSI	% Elongation	Hardness
47,350	92,730	48.00	

Expansion	Flattening	Hydrostatic	Surface	Flaring	SPEC
		OK		OK	ASTM B163-96

We certify that the above data is as furnished by the producing mill or supplier.

Zetec, Inc.

Steph H. von Trebe Date: 8/18/98

Excellence Worldwide

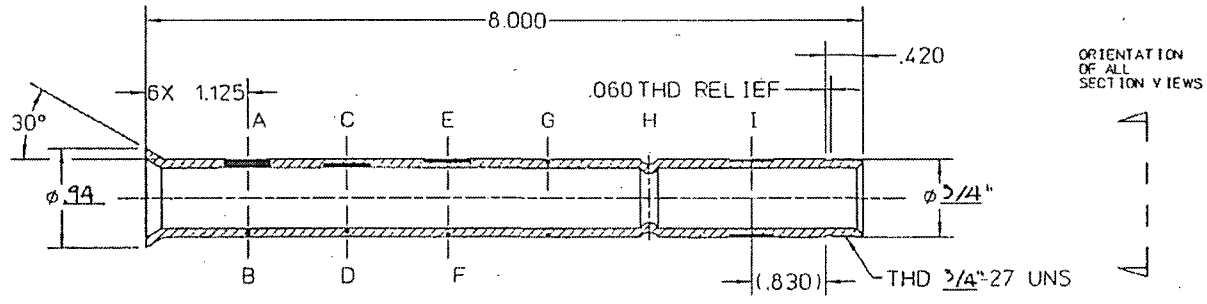
Zetec, Inc.
1370 NW Mall Street, PO Box 140
Issaquah WA 98027-0140 USA
Phone +(1) 425-392-5316 Fax +(1) 425-392-2086
www.zetec.com

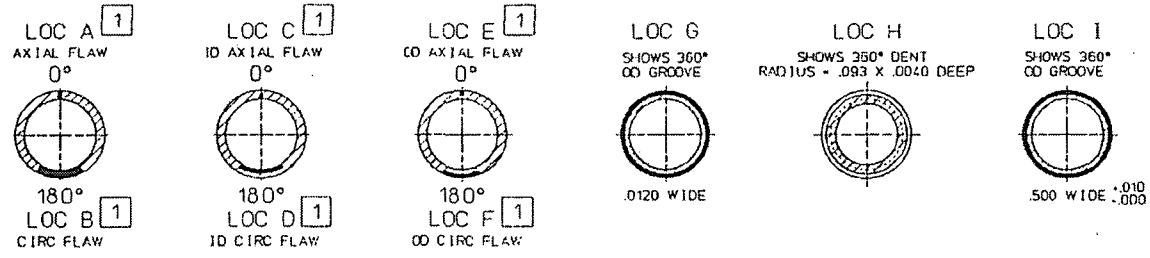
[1] ALL EDM DEFECTS ARE .500 LG.

X .005 $^{+.001}_{-.002}$ WIDE X DEPTH SPECIFIED

REVISIONS					
LTR	DATE	DESCRIPTION	APVD	CK	DR
A	8-19-2007	SWITCH G AND I	SJ	GDA	GMM

LOCATION	A	B	C	D	E	F	G	H	I
PHYSICALLY MEAS. DEPTH	THRU	THRU	.0160	.0185	.0175	.0165	.0200	.0043	.0120
DEPTH IN % OF WALL	100%	100%	39%	45%	43%	40%	49%	NA	29%





MATERIAL INCONEL 600
AVERAGE MEAS. WALL THK. .041
NOMINAL WALL THK. .043
HEAT LOT NO. NX0915
TEST FREQ. USED NA
SERIAL NO. Z-20436
P.O. NO. 4500117820
REL. NO. NA
QUALITY REL. NO. NA
DATE MFG. 9-12-03
Q.A. INSP. Dwight Fuson
CUSTOMER WESTINGHOUSE ELECTRIC CO
RECORDED NA
PROBE USED NA
REVIEWED BY Steve Johnson

NOTE:

UNLESS OTHERWISE SPECIFIED DIMS ARE IN INCHES

TOLERANCES

DECIMAL	FRACT. ±1/64
.XXXX ±.0030	∡ ±.005
.XXX ±.015	ANGULAR ±3°
.XX ±.050	% ±.003
.X ±.100	THD CLASS=2A/2B
X° ±2° X°-X' ±2° X' ±10%	

THIRD ANGLE PROJECTION

DRAWN G. ANDERSON	DATE 07/30/2003	ZETEC INC. POST OFF ICE BOX 140 ISSAQUAH, WASHINGTON 98027-0140 U.S.A. TELEPHONE (425) 392-5316
CHECK G. MATELICH	08/14/2003	FRAME B
DESIGN		TITLE EDM GUIDE TUBE STANDARD
APVD. QA S. Johnson	8-19-2007	SIMILAR / SCALE NTS / INDEX SA00 / DWG NO 10017260
CHEM REQ.		DIST 501 / FINISH 63 / REF. / SHT 1 OF 2

ZETEC

TEST CERTIFICATE

Date: August 18, 1998

Material: Inconel 600 seamless annealed

Heat No.	Description
NX0915	3/4" Dia. X .043 wall thickness

CHEMICAL ANALYSIS

C	Si	Mn	P	S	Ni	Cr	Mo	Al	Zn
.035	.12	.24		.002	76.27	14.66			
Pb	**B**	**Ca**	**Cd**	**Co**	**Cu**	**Fe**	**Nb**	**Ti**	**Other**
					.11	7.96			

TENSILE PROPERTIES

Yield Strength	Ultimate Strength PSI	% Elongation	Hardness
47,350	92,730	48.00	

Expansion	Flattening	Hydrostatic	Surface	Flaring	SPEC
		OK		OK	ASTM B163-96

We certify that the above data is as furnished by the producing mill or supplier.

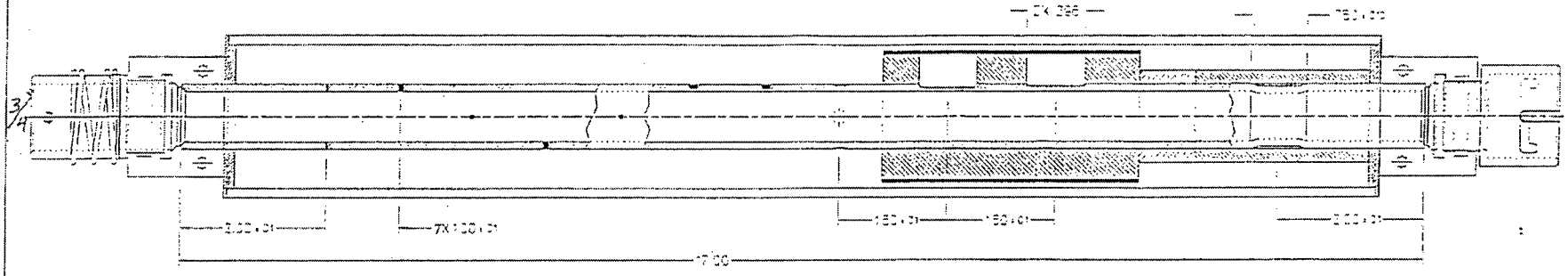
Zetec, Inc.

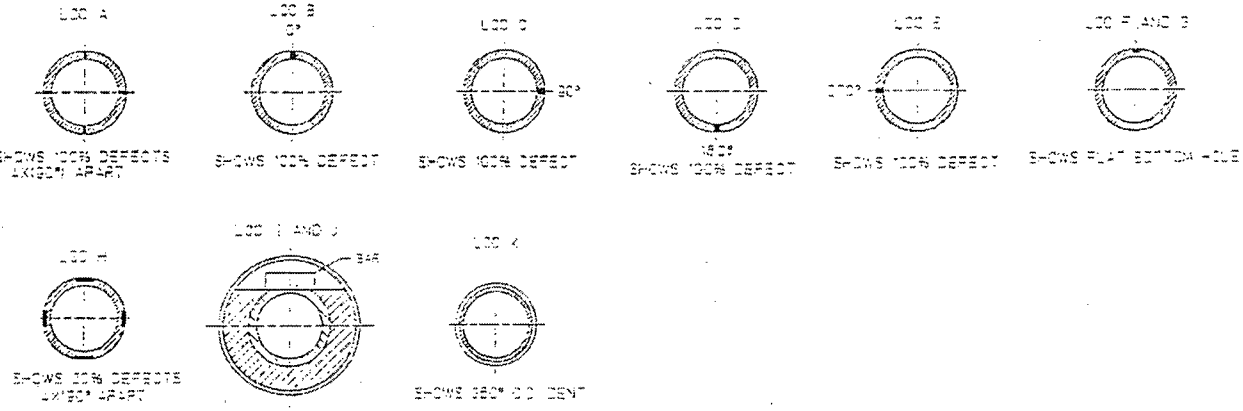
Steph H. von Tuche Date: 8/18/98

Excellence Worldwide

Zetec, Inc.
1370 NW Mall Street, PO Box 140
Issaquah WA 98027-0140 USA
Phone +(1) 425-392-5316 Fax +(1) 425-392-2066
www.zetec.com

LOCATION	A	B	C	D	E	F	G	H	I	J	K
PHYSICALLY MEAS DEPTH	THRU	THRU	THRU	THRU	THRU	.0245	.0170	.0080	.0210	.0130	.0015
DEPTH IN % OF WALL	100%	100%	100%	100%	100%	60%	42%	20%	52%	32%	4%
ET PHASE ANGLE MEAS	49°	40°	41°	43°	43°	106°	129°	152°			
DIA OF DEFECT (.003 ADD)	.032	.032	.032	.032	.032	THRU	3/16	3/16			





MATERIAL INCONEL 600
AVERAGE MEAS WALL THK .0405
NOMINAL WALL THK .043
HEAT LOT NO NX0851 CUSTOMER SUPPLIED
TEST FREQ USED 550 KHZ
SERIAL NO Z-18307
P O NO 20003209
REL NO Req# 9412-00-189
QUALITY REL NO NA
DATE MFG 8/27/2000
QA INSP [illegible]
CUSTOMER Westinghouse Co Nuclear Power
RECORDED Disc #1 Directory #1
PROBE USED A.650-LC/HF #29112
REVIEWED BY [illegible]

NOTE
AVB BAR MATERIAL
INCONEL 600
LAB# 12742

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES
DECIMAL .XXX ±.030 .XX ±.015 .X ±.060
FRACT ±1/64
ANGULAR ±1°
FINISH 63 MAT'L 501

DRAWN K. DEWE DATE 07.27.2000
CHECK [illegible] 7/27/00
DESIGN [illegible] 7/27/00
APPROVED [illegible] 7/27/00

ZETEC
TITLE ASME/AVB CALIBRATION STANDARD
SIZE SP24 DWG NO 10009281 FRAME C
SCALE 1/1 REFERENCE 10009280 SHT 1 OF 2

Special Metals Division
425 McCartney St
Arnprior, Ont.
K7S 3H6
Tel 1-613-623-6501

norandc

CERTIFIED MATERIAL TEST REPORT

No.: CB28-NX0881

CUSTOMER: Combustion Engineering Inc
Address: Chattanooga, Tennessee
P.O. No.: 47-80350
Contract: 75274 (TVA II)
M.O. No.: 0178

Material: Ni-Cr-Fe Alloy Tubing
Heat Treated Condition: Annealed
Specification: ASME SB-163 and C-E P.O. 47-80350 and modified by C-E P.S. N-P43B2(h) with Addendum 2(a); 3(a) and 4(a) and supplements
Size: .750" O.D. x .042" Avg. Wall
SMD HEAT TREATMENT NO.: CB28

MATERIAL HEAT NO.: NX0881

CHEMICAL ANALYSIS:

	C	Mn	Fe	S	Si	Cu	Ni	Cr	Al	Ti	Mg	Co	P	B
Heat	.03	.26	9.47	.001	.15	.30	74.87	14.92	.25	.21	.011	.03	.010	.003
Hollow		.21	9.22	<.003	.12	.27	75.50	14.77	.18	.15	.007	.03	.010	.002
Product	.03													

MECHANICAL PROPERTIES:

Tensile Strength	Yield Strength (0.2% offset)	Elongation (in 2")
104,000 psi	44,000 psi	40%

INTERGRANULAR ATTACK		ASTM GRAIN SIZE		DIMENSIONS	SURFACE ROUGHNESS
First Tube	Last Tube	First Tube	Last Tube		
<.001"	<.001"	8 - 8-1/2	8 - 8-1/2	Acceptable	Acceptable

All tubes were tested in accordance with the following NORANDA Procedures:

Flare Test: QIP 018 Rev. 2
Ultrasonic Examination (Flaw, O.D., Wall): QIP 001 Rev. 3 App. B, QIP 002 Rev. 3 App. QIP 003 Rev. 4 App. B
O.D. Eddy Current: QIP 004 Rev. 3 App. B
I.D. Eddy Current: QIP 015 Rev. 3

REMARKS: In accordance with Customer's P.O., hydrostatic testing was not performed.

This is to certify that, to the best of my knowledge and belief, the contents of this Report are correct and accurate and all test results are in compliance with the material specifications and other requirements as specified by the Customer, except as stated hereon.

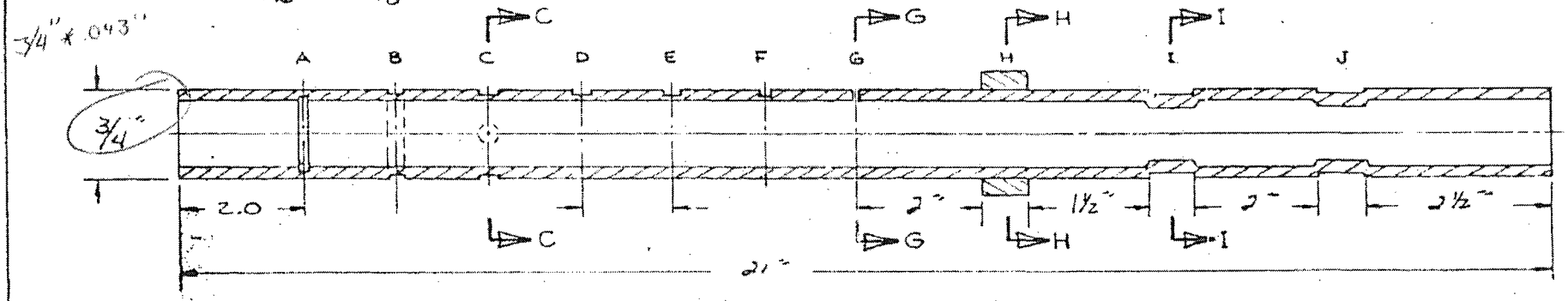
Date: March 28, 1979

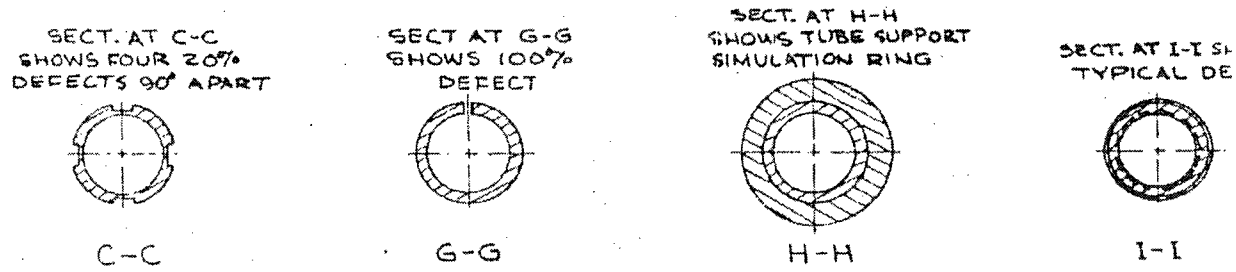
Manager, Quality Assurance

NMD-QS-631

LOCATION	A	B	C	D	E	F	G	H	I	J
		.0035"	.0085	.0185"	.027"	.0365" measured				
		.00587"	.00835"	.0176"	.026"	.03612"	calculated			
PHYSICALLY MEAS. DEPTH IN % OF WALL LOSS	20½%	9%	19½%	41%	60½%	84%	100%		.009" INCHES	.0035" INCHES
E.T. PHASE ANGLE MEASUREMENT	5°	151°	155°	142°	101°	69°	38°			
DIA. OF DEFECT	I.D. GROOVE 1/16 WIDE	O.D. GROOVE 1/8 WIDE	3/16	3/16	7/64	5/64	.052"			

DATE	BY	REVISION RECORD





MATERIAL INCONEL 600
NOMINAL WALL THK. .043"
HEAT LOT NO. 1748
TEST FREQ. USED 550 KHZ
SERIAL NO. Z-1591
P.O. NO. 83PTB-93940302
REL. NO. N/A
QUALITY REL. NO. N/A
DATE MFG. 9-16-83
E.T. TECHNICIAN M. Timm
CUSTOMER TVA
RECORDED ON REEL NO. 22 / I

INCONE O/D

	JEB	Recision Inspected

TOLERANCES
DIMENSIONS IN INCHES
XXXX ± .003
XXX ± .010
XX ± .030

ZETEC

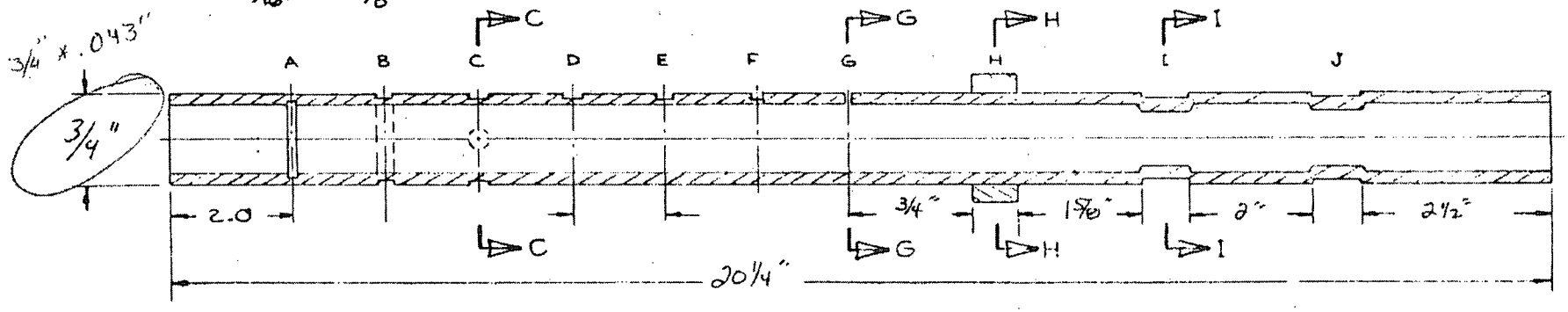
COMBINATION ASME/2 DENT
STD. ASSY WITH TUBE SUPT

WESTINGHOUSE SPECIAL METALS DIVISION
WESTRO ALLOY 600T MATERIAL CERTIFICATION

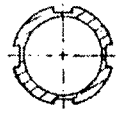
(W) Order Number T10-00731 Customer Order No. 0607 MT It. Nos. 1,2

r	C	Mn	Fe	S	Si	Cu	Ni	Cr	Al	Ti	Co	P	B	Ultimate Strength PSI	Yield Strength PSI	% Elong.	Rb Hardness
.019	.047	.26	9.00	.001	.18	.28	74.49	15.74	.24	.23	.04	.008	.005	96,000 (Item 1	55,000 .875" O.D.)	34.0	88
.748	.032	.25	8.75	.001	.19	.27	75.36	15.15	.21	.16	.03	.008	.004	109,000 (Item 2	59,000 .750" O.D.)	37.0	87

	A	B	C	D	E	F	G	H	I	J
PHYSICAL MEAS. DEPTH.	.009"	.0037"	.008"	.0168"	.0257"	.03	THRU		.0095"	.0035"
DEPTH IN % OF WALL	21	8½	19	39½	60½	80½	100			
E.T. PHASE ANGLE MEASUREMENT	6°	145°	152°	132°	106°	80°	41°			
DIA. OF DEFECT	I.D. GROOVE 1/16 WIDE	O.D. GROOVE 1/8 WIDE	3/16	3/16	7/64	5/64	.052"			

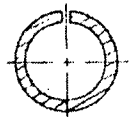


SECT. AT C-C SHOWS FOUR 20% DEFECTS 90° APART



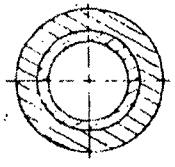
C-C

SECT AT G-G SHOWS 100% DEFECT



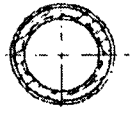
G-G

SECT. AT H-H SHOWS TUBE SUPPORT SIMULATION RING



H-H

SECT. AT I-I SHOWS TYPICAL DENT



I-I

MATERIAL INCONEL 600
NOMINAL WALL THK. .043"
HEAT LOT NO. 5923
TEST FREQ. USED 550KHz
SERIAL NO. Z-1632
P.O. NO. REF. NO. J8-940322
REL. NO. NA
QUALITY REL. NO. N/A
DATE MFG. 11-11-83
E.T. TECHNICIAN M. TIMM
CUSTOMER TVA
RECORDED ON REEL NO. 22 SIDE 2

	DCB	Receiver Inspected

TOLERANCES
DIMENSIONS INCHES
XXXX ± .005
XXX ± .010
XX ± .030
SCALE NONE
DATE 12-5-82

ZETEC

COMBINATION ASME/Z DENT STD. ASSY WITH TUBE SUPT

2-4

NO CERT.

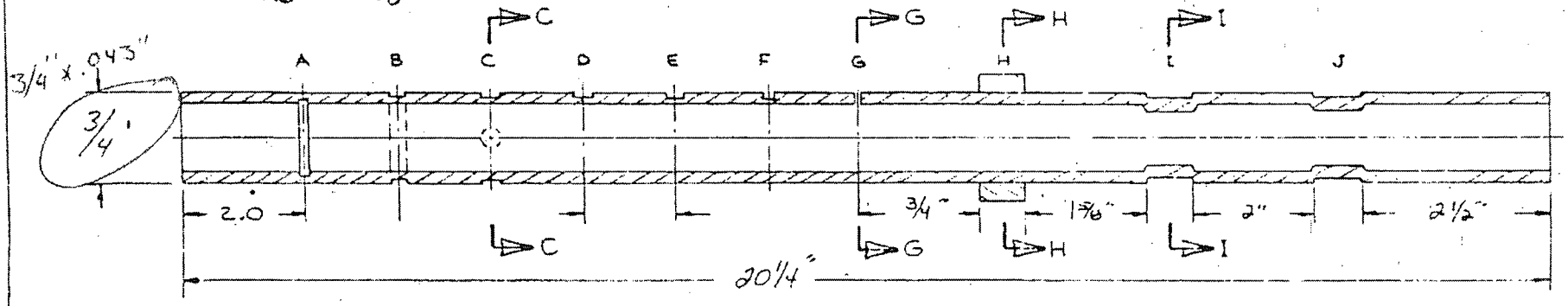
05/23/75 WESTPO ALLOY TUBING TEST RESULTS FOR [illegible] T12-00346 ITEM 02

HEAT NO.	CHEMICAL TEST BY HUNTINGTON ALLOY C	MN	FE	S	SI	CU	NI	CR	AL	TI	CO	PHYSICAL TESTS BY SMD YIELD	TENSILE	EL.	RA	NO. REF
5494	.01	.19	8.22	.006	.10	.30	76.05	14.80	.12	.19	.05	52,000	95,000	43.0	78	13
5875	.03	.29	7.29	.004	.21	.18	75.84	16.14	.20	.25	.03	58,000	102,000	42.5	83	6
5923	.03	.32	7.89	.007	.09	.20	76.14	15.30	.24	.25	.03	59,000	106,000	39.0	87	6
6577	.04	.35	9.21	.006	.12	.23	74.88	15.16	.19	.31	.06	50,000	100,000	40.5	81	7

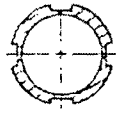
END OF LISTING.

~~Cover letter filed under Vol II #6462~~

LOCATION	A	B	C	D	E	F	G	H	I	J
PHYS. MEAS. (DEPTH)	.0085"	.0047"	.0077"	.0165"	.0255"	.0	THRU		.010"	.0045"
DEPTH IN % OF WALL	20%	11%	18%	39%	60%	80.5%	100%			
E.T. PHASE ANGLE MEASUREMENT	4°	157°	155°	133°	106°	79°	40°			
DIA. OF DEFECT	I.D. GROOVE 1/16 WIDE	O.D. GROOVE 1/8 WIDE	3/16	3/16	7/64	5/64	.052"			

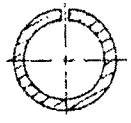


SECT. AT C-C SHOWS FOUR 20% DEFECTS 90° APART



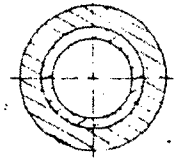
C-C

SECT AT G-G SHOWS 100% DEFECT



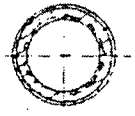
G-G

SECT. AT H-H SHOWS TUBE SUPPORT SIMULATION RING



H-H

SECT. AT I-I SHOW TYPICAL DENT



I-I

MATERIAL INCONEL 600
NOMINAL WALL THK. .043"
HEAT LOT NO. 1748
TEST FREQ. USED 550 KHz
SERIAL NO. Z-1633
P.O. NO. REF. NO. JB-940322
REL. NO. N/A
QUALITY REL. NO. N/A
DATE MFG. 11-11-83
E.T. TECHNICIAN M. TIMM
CUSTOMER TVA
RECORDED ON REEL NO. 22 SIDE 2

JCB	Receipt Inspected	

TOLERANCES
DIMENSIONS IN INCHES
XXX ± .005
XX ± .010
X ± .030

ZETEC

COMBINATION ASME/2 DENT
STD. ASSY WITH TUBE SUPT

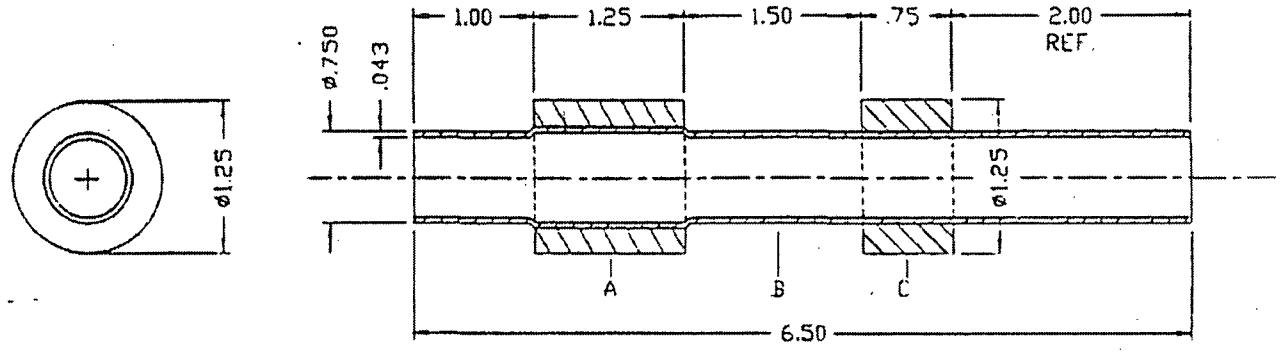
SCALE NONE | DATE 2-6-82 | DRAWING NUMBER 2-4

WESTINGHOUSE SPECIAL METALS DIVISION
WESTRO ALLOY 600T MATERIAL CERTIFICATION

(W) Order Number T10-00731 Customer Order No. 0607 MT It. Nos. 1,2

Heat	C	Mn	Fe	S	Si	Cu	Ni	Cr	Al	Ti	Co	P	B	Ultimate Strength PSI	Yield Strength PSI	% Elong.	Rb Hardness
1019	.047	.26	9.00	.001	.18	.28	74.49	15.74	.24	.23	.04	.008	.005	96,000 (Item 1	55,000 .875" O.D.)	34.0	88
1748	.032	.25	8.75	.001	.19	.27	75.36	15.15	.21	.16	.03	.008	.004	109,000 (Item 2	59,000 .750" O.D.)	37.0	87

LOCATION	A	B	C
PHYSICALLY MEASURED TUBE ID:	.680	.664	.664
PHYSICALLY MEASURED TUBE SUPPORT ID:	.765	N/A	.765



NOTES:
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

MATERIAL: INCONEL 600
SPECIFICATION: SB-163
SERIAL NO.: TS-001-93
HEAT NO.: NX9836
TUBESHEET MATERIAL: CARBON STEEL
HEAT NO.: 14333
CHARACTERIZATION FREQ.: 550KHZ
AVG. WALL THICKNESS: .043
NOM. WALL THICKNESS: .043
WORK ORDER NO.: 141776

REVISION
IT. CHANGE

Receipt Inspected JEB

(TSAOH93)

THIS DRAWING AND ALL INFORMATION THEREON IS THE PROPERTY OF WESTINGHOUSE ELECTRIC CORP. AND IS PROPRIETARY AND MUST NOT BE MADE PUBLIC OR COPIED UNLESS AUTHORIZED BY THEM. THIS DRAWING TO BE RETURNED UPON REQUEST.

LIMITS UNLESS OTHERWISE NOTED
DECIMAL ± PLS ± .01
ANGULAR ± 1/2°
STD. FINISH 125
REMOVE SHARP EDGES
SCALE 1:1

TITLE TUBESHEET PROFILE STANDARD (AS BUILT)

DFTG. AJF 2/9/93
ENGRG. MDL 2/9/93
QA N/A
MFG N/A
APPD BY 2-9-93

ECHORAM PRODUCTS GROUP

CUST APPR.
DWG. NO TS-A-001-93
REV. 0
SH 1 OF 1

Westinghouse
Electric Corporation

Specialty Metals Plant

RD #4 Box 333
Blairsville Pennsylvania 15717 9904

TS-001-93

CUSTOMER	(W) Elec. Corp. N.E.S.	CUSTOMER ORDER NO.	MN-58324-M
(W) ORDER NO.	T10-01002	DRAWING NO.	N/A
TYPE OF MATERIAL	Westro Alloy 600T		
QUANTITY			
MATERIAL SPECIFICATION	Item 1 .750" O.D. x .043" Wall x 10' Lgths.		
	Mill Annealed Inconel 600 SB163		
BOX IDENTITY			

MATERIAL TESTS:

Flare Test:	On each end of each tube - satisfactory.
Ultrasonic:	Tested to a .500" long axial notch x .040" wide x .004" deep OD and ID using a bidirectional test for axial flaws.
Eddy Current:	Tested to an EDM OD hole .03" diameter x .03" deep and a .500" long transverse notch x .040" wide x .004" deep OD and ID.
Tensile Hardness:	Results attached.
Chemistry:	Results attached.

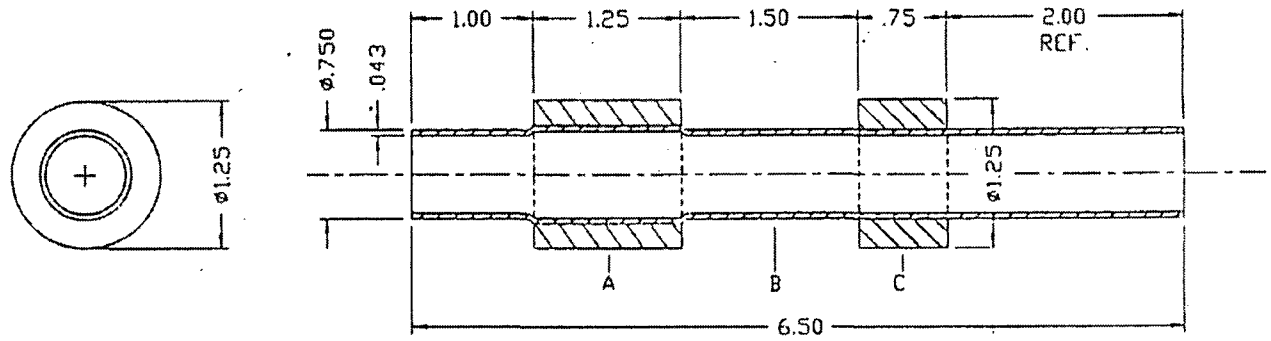
This is to certify that to the best of our knowledge and belief, and based on actual inspection and/or tests, the above described parts are in accordance with drawing and/or specifications, and were manufactured in accordance with a documented quality program meeting the requirements of NCA-3800.

Attachments

J. L. Hranica JRB
J. L. Hranica, Manager
Quality Engrineering & Labs.

6/20/81
Date

LOCATION	A	B	C
PHYSICALLY MEASURED TUBE ID:	.681	.664	.664
PHYSICALLY MEASURED TUBE SUPPORT ID:	.765	N/A	.765



NOTES:
ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

MATERIAL: INCONEL 600
SPECIFICATION: SB-163
SERIAL NO.: TS-002-93
HEAT NO.: NX9836
TUBESHEET MATERIAL: CARBON STEEL
HEAT NO.: 14333
CHARACTERIZATION FREQ.: 550KHZ
AVG. WALL THICKNESS: .043
NOM. WALL THICKNESS: .043
WORK ORDER NO.: 141776

REVISION | IT. | CHANGE

Receipt Inspected JEB

(TSA002993)

THIS DRAWING AND ALL INFORMATION THEREON IS THE PROPERTY OF WESTINGHOUSE ELECTRIC CORP. AND IS PROPRIETARY AND MUST NOT BE MADE PUBLIC OR COPIED UNLESS AUTHORIZED BY THEM. THIS DRAWING TO BE RETURNED UPON REQUEST.

LIMITS UNLESS OTHERWISE NOTED
DECIMAL ± FLS ± .01
ANGULAR ± 1/2°
STD. FINISH 63 √
REMOVE SHARP EDGES
SCALE 1:1

TITLE TUBESHEET PROFILE STANDARD (AS BUILT)

DFTG AJF 2/9/93
ENGRG 2/9/93
QA N/A
MFG N/A
APPR BY 2/9/93

ECHORAM PRODUCTS GROUP

CUST APPR
DWG. NO. TS-A-002-93
REV. 0
SH 1 OF 1

Westinghouse
Electric Corporation

TS-002-93

Specialty Metals Plant
RD #4 Box 333
Blairsville Pennsylvania 15717 5904

CUSTOMER	(W) Elec. Corp. N.E.S.	CUSTOMER ORDER NO.	MN-58324-M
(W) ORDER NO.	T10-01002	DRAWING NO.	N/A
TYPE OF MATERIAL	Westro Alloy 600T		
QUANTITY			
MATERIAL SPECIFICATION	Item 1 .750" O.D. x .043" Wall x 10' Lgths.		
	Mill Annealed Inconel 600 SB163		
BOX IDENTITY			

MATERIAL TESTS:

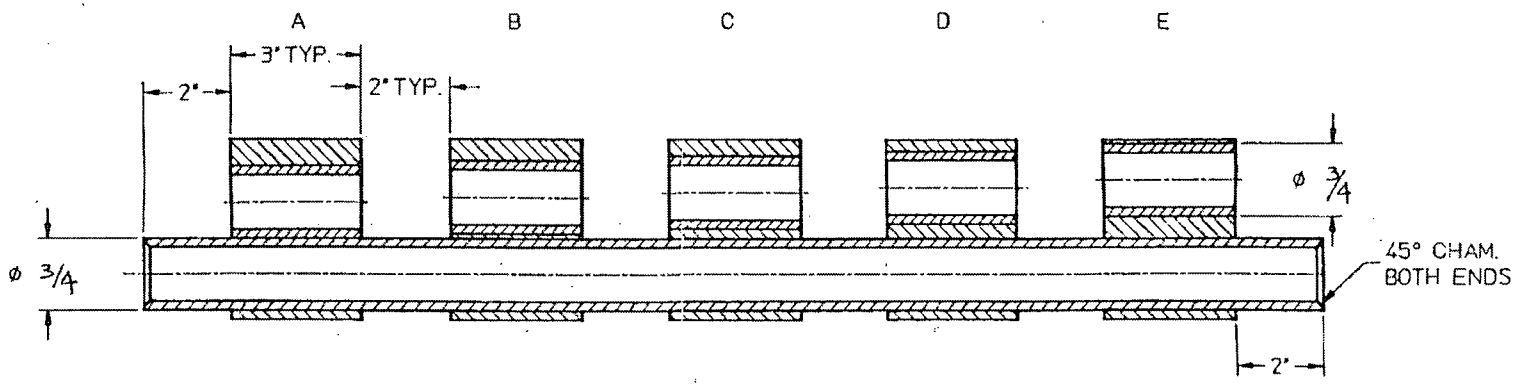
Flare Test:	On each end of each tube - satisfactory.
Ultrasonic:	Tested to a .500" long axial notch x .040" wide x .004" deep OD and ID using a bidirectional test for axial flaws.
Eddy Current:	Tested to an EDM OD hole .03" diameter x .03" deep and a .500" long transverse notch x .040" wide x .004" deep OD and ID.
Tensile Hardness:	Results attached.
Chemistry:	Results attached.

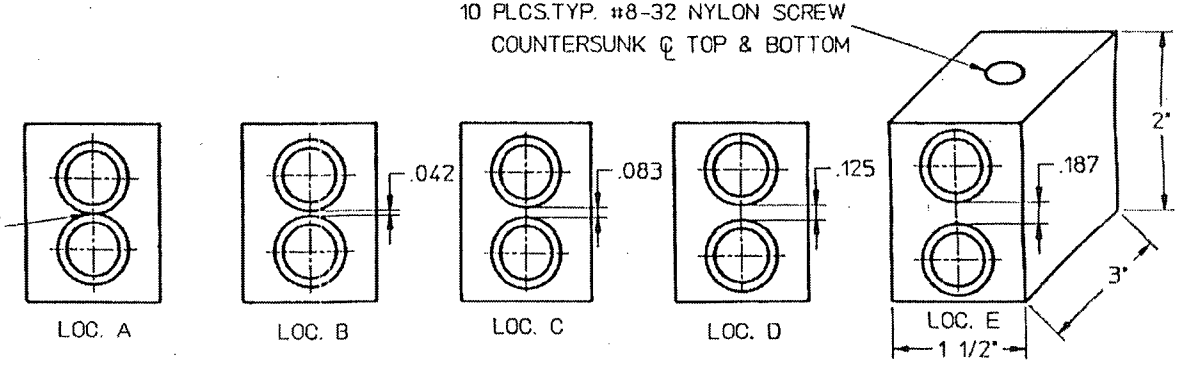
This is to certify that to the best of our knowledge and belief, and based on actual inspection and/or tests, the above described parts are in accordance with drawing and/or specifications, and were manufactured in accordance with a documented quality program meeting the requiarements of NCA-3800.

Attachments

J. L. Hranica RB — 6/20/84
J. L. Hranica, Manager — Date
Quality Engrineering & Labs.

REVISIONS					
LTR	DATE	DESCRIPTION	APVD	CK	DR





MATERIAL INCONEL 600
AVERAGE MEAS. WALL THK. .043
NOMINAL WALL THK. .043
HEAT LOT NO. 72045
TEST FREQ. USED 550 KHZ
SERIAL NO. Z-7097
P.O. NO. 83N-LF-38067A
REL. NO. RD#109660
QUALITY REL. NO. NA
DATE MFG. 9.15.89
E.T. TECHNICIAN [illegible]
CUSTOMER TENNESSEE VALLEY AUTH.
RECORDED NA
PROBE USED NA
APVD. BY [illegible]

NOTE:
Receipt Inspected: JEB

UNL. OTHERWISE SPECIFIED DIM. ARE IN INCHES TOLERANCES	DRAWN K.ZEGKE	DATE 9/12/89	ZETEC INC. P.O. BOX 140 ISSAQUAH, WASHINGTON 98027 U.S.A. TELEPHONE 206 392-6316
DECIMAL FRACT.+/- .XXX+/-.005 .XX+/-.010 .X+/-.030 ∠ +/- ANGULAR+/- 3°	CHECK [illegible]	9/12/89	TITLE TUBE PROXIMITY STANDARD D#1156-1-A #0905
	DESIGN		DWG NO 2-4394
FINISH	APVD. QA [illegible]	9/15/89	SCALE NONE REL.DATE 9/15/89 SHT 1 OF 1

1370 N.W. Mall, P.O. Box 140, Issaquah, WA 98027-0140 (206) 392-5316 , Telex 15 2592

TEST CERTIFICATE

DATE: March 31, 1988

MATERIAL: Inconel Alloy 600 Cold Drawn Annealed Seamless Tubing · ASME SB-163

HEAT NO.	DESCRIPTION
72045	3/4" OD x .043 AW

CHEMICAL ANALYSIS

C	SI	MN	P	S	NI	CR	MO	AL	ZN
.017	.27	.26		.004	75.51	15.70			
PB	**B**	**CA**	**CD**	**CO**	**CU**	**FE**	**NB**	**TI**	**OTHER**
					.06	7.70			

TENSILE PROPERTIES

YIELD STRENGTH PSI	ULTIMATE STRENGTH PSI	% ELONGATION in 2"	Rb Hardness
41000	89900		72

MECHANICAL TESTS

HARDNESS	FLATTENING	HYDROSTATIC	SURFACE	CORROSION	SPEC
		OK 1000psi			ASME SB-163

We certify that the above data is as furnished by the producing mill or supplier.

ZETEC, INC.

Quality Assurance Manager

MAR 3 1 1988

Date

WP/0157F

8. WBN-2 USE OF APPENDIX H QUALIFIED TECHNIQUES

Watts Bar Nuclear Power Plant Unit 2
Use of Appendix H and I Qualified Techniques
WBN-U2C0 Baseline Examination Rev. 0

February 2010

Tennessee Valley Authority

Prepared by: _____ Date: 2/24/2010
Daniel P. Folsom, TVA Level III

Reviewed by: _____ Date: 2-24-2010
Westinghouse Level III

This letter is to document the eddy current techniques being utilized during the Watts Bar Unit 2 Baseline Steam Generator inspection are qualified to or can be shown to be equivalent to techniques qualified by EPRI in accordance with Appendix H and I of the EPRI, "Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 7" (PWRSGEG Rev.7). The essential variables of the Watts Bar Examination Technique Specification Sheets were compared to the EPRI Examination Technique Specification Sheets (ETSS) according to PWRSGEG Rev.7 to ensure that they were equivalent or within specified limits.

Section 6.2.4 of the PWRSGEG Rev. 7, requires a documented review of the qualified tubing essential variables (e.g., denting, deposits, tube geometry changes, the signal characteristics) to ensure the application is consistent with site steam generator conditions. Noise levels from the EPRI qualification datasets will be compared to the noise levels of the actual steam generator tubing during the eddy current inspection. This comparison is to determine if the POD's specified in the EPRI qualification datasets could be used and actual tube pulls from plants with similar steam generators could be compared to the in-generator degradation mechanisms detected at Watts Bar Unit 2 for similarity in voltage and signal-to-noise characteristics.

PARAMETERS

The eddy current testing parameters to be used at Watts Bar Unit 2 are as follows:

Materials:

Mill Annealed Alloyed 600, 0.750" OD x 0.043" Wall

Testers:

CoreStar OMNI-200

Probes:

Bobbin Probe Description

EC-610-LLMC-110/36-C (CORESTAR)

EC-610-LLMC-110/36-Z (ZETEC)

EC-590-LLMC-110/36-C (CORESTAR)

EC-610-LLMC-120/36-C (CORESTAR)

SBPF-LLMC-EC-.610-110-36 (ZETEC)

MRPC 3 coil Probe Description

+PT-610-MRPC/3C/P115A-PP11A/SP080B52PH (664) ZM001

M/+PT-610-115-36-S080 (664) 52PH

+PT-590-MRPC/3C/P115A-PP11A-SP080B52PH (664) ZM001

ZRPS-DH3-E00.610-C01-00G0EA0

ZRPS-DH3-E00.590-C01-00G0EA0

Ghent RG34 Probe Description

ZRPS-RPGM-E00.590-CC46E-00G0E00

M/RG34-590-MRPC/52PH (.620-.670)

MRPC U-Bend Probe Description

M/+Point-580-MPRC/FH/PP11A/24IN/52PH (.664) ZM

M/+Point-560-MPRC/PH/PP11A/24IN/52PH (.664) ZM001

SRPF-FH-E00.580-MPP11A-0FG0EA0

+Point-.580-MPRC/FH/PP11A/24IN/52PH

+Point-.560-MPRC/FH//PP11A/24IN/52PH

Array Probe

.605 INTELLIGENT/PROBE (.660)-(3/8)-110/36

Frequencies:

Bobbin 550 kHz, 300 kHz, 130 kHz, 35 kHz

3 Coil +PT RPC and .115 Pancake 300kHz, 200 kHz, 100 kHz, and 35 kHz on .115 Pancake for locator channel, Shielded .080 HF pancake 800 kHz, 600 kHz, 300 kHz

Mid frequency U-Bend + PT 400 kHz, 300 kHz, 150 kHz, 35 kHz

Array probe 400 kHz, 300 kHz, 100 kHz

Ghent G3/G4 400 kHz, 300 kHz, 200 kHz, 100 kHz

Eddy Current Techniques

A technique is a category within a NDE method that describes the examination system, inspection requirements and detection capabilities for specific flaw types in sufficient detail to ensure consistent implementation with adequate confidence. Each technique undergoes a site validation review. This document provides discussion and documentation of two basic types of technique qualification: the industry qualification and the site-specific validation.

An industry qualification is defined as one which meets the requirements of industry accepted practice for qualifying NDE techniques. Appendix H of the EPRI PWR Steam Generator Examination Guidelines (often referred to as Rev. 7) describes the performance demonstration requirements for eddy current techniques used as the basis for determination of technique validation.

A site validation is defined as one which meets the requirements for implementation at a specific plant based on additional consideration for tubing characteristics, expected damage mechanisms, operational assessment and inspection strategies. This document endeavors to show the techniques referenced within are site validated by way of comparison with industry techniques. These comparisons are performed and reviewed by TVA's Level III qualified data analyst and then independently review by the TVA's Steam Generator Manager.

Each of the site-validated techniques implements the recommendations of Rev. 7 relating to calibration standards, voltage normalization on the reporting channel, scanning procedures, sample rates, and data evaluation methodologies. Rev. 7 defines the essential variables for eddy current examination techniques. These variables were used as the basis for determining equivalence to the industry qualifications. A comparison of each technique was made using these variables and a matrix was developed which records the essentials of both the industry qualifications and the site-validation are referenced herein.

The EPRI Appendix H and I eddy current techniques to be used at TVA Watts Bar Unit 2 were reviewed to determine their applicability to the site conditions. A review of the pulled tube data samples and lab samples used to support these qualifications was performed. This data will be used to assess the noise level in the WBN-2 steam generator baseline inspection.

Damage Mechanisms/Location per Steam Generator Degradation Assessment:

Relevant Future Potential Damage Mechanisms

- TTS PWSCC / ODSCC Axial and Circumferential
- Free Span ≤ 5 volt Dents ODSCC Axial
- Volumetric Loose Part Indications
- AVB Wear
- Pitting (This damage mechanism has the potential of being active due to the extensive layup)
- Dented TSP ≤ 2 volts PWSCC Axial
- TSP Wear
- U-Bend PWSCC Axial and Circ
- Free Span PWSCC Axial associated with dings
- Dented TSP 2 Volts ODSCC Axial
- Free Span and Sludge Pile ODSCC Axial

EXAMINATION TECHNIQUES

Table 1 – Cross Reference of EPRI's ETSSs to WBN-2 Cycle 0 site ETSSs

Degradation Mechanism	EPRI Technique	Probe Type	Site ETSS(s)
Free Span ≤ 5 volts Dents ODSCC Axial	24013.1	Bobbin	WBT-01-10-O, WBT-02-10-O, WBT-BL-BOBBIN
AVB Wear	96004.1	Bobbin	
Pitting	96005.1	Bobbin	
Dented TSP ≤ 2 volt PWSCC Axial	96012.1	Bobbin	
TSP Wear	96042.1	Bobbin	
PWSCC at dented TSP	96012.1	Bobbin	
Free Span & Sludge Pile ODSCC Axial	1-28413	Bobbin	
TTS PWSCC Circ	20510.1	+PT	WBT-03-10-O, WBT-04-10-O, WBT-05-10-O, WBT-06-10-O, WBT-07-10-O, WBT-09-10-O, WBT-10-10-O, WBT-11-10-O, WBT-BL-3COIL+PT, WBT-BL-U-BEND+PT
TTS PWSCC Axial	20511.1	+PT	
TTS/TSP ODSCC Axial	21409.1	+PT	
TTS ODSCC Circ	21410.1	+PT	
Volumetric Indications	27903.1, 21998.1	+PT	
U-Bend PWSCC	96511.2	+PT	
TSP PWSCC Axial	96703.1	+PT	
PWSCC in Low row U-bend, axial and circumferential	23514.1, 23514.2, 23514.3	Intelligent array	WBT-12-10-O, WBT-BL-MHI-IAP
Permeability Indications	20407.1 20407.2	Ghent RG 3-4	WBT-08-10-O, WBT-BL-GHENT

Table 1

REFERENCES

The following reference documentation is to provide evidence that the techniques, with the above parameters, are qualified to Appendix H as published by EPRI or shown to be equivalent and/or qualified in separate testing.

Reference A: ETSS on EPRIQ website

- This document contains the base qualifications for common, but not every, coil/cable/tester/tube configurations. Typical configurations utilized 0-50 feet of probe extension and various length of Zetec probes.

Reference B: Westinghouse, "Documentation of Appendix H Compliance and Equivalency" DDM-96-009 Revision 0

- This report documents additional testing performed by Westinghouse to verify the equivalence of the following items which were not performed by EPRI or others:
- Miz-18A, Miz-30 and TC6700 testers given minimum setup parameters.
- Zetec low loss and Westinghouse probe extension.
- Bobbin probe lengths from 0 to 110 feet
- Probe extension lengths from 0 to 110 feet
- This report also documents the Westinghouse qualification of the Cecco, 0.115 Mid-range (MR) Pancake, 0.080 High Frequency (HF) Pancake, 0.080 Mid Range (MR) Pancake, +Point, Axially and Circumferentially wound coils in configuration whether they were qualified by EPRI or not.
- Note: This document was used by permission of Westinghouse.

Reference C: Westinghouse Reports, "EPRI Appendix H Qualification of High Speed Bobbin and RPC Eddy Current Data", STD-DP-1995-7351/STD-DP-1995-7381

- This report documents the qualification of bobbin speeds up to 48" inches per sec and RPC at speeds up to .8 inches per sec
- Note: This document was used by permission of Westinghouse.

Reference D: Westinghouse Reports, WEC002.DOC "Eddy Current low row U-Bend Examination" Non Magnetic Bias and Magnetic Bias

- This report documents the equivalency qualification, performed Westinghouse, of the Non-Magnetic Bias and Magnetic Bias U-Bend probe to the Appendix H qualification. Speeds of up to 300RPM and .2 IPS were used.

Reference E: Westinghouse Document # STD-DP-1994-7222 "Qualification Data Package for Appendix H Equivalency".

- This report documents equivalency and detectability of bobbin probes with fill factor from 0.77 and above.
- Note: This document was used by permission of Westinghouse.

Reference F: MRS-TRC-1501, "Study of Eddy Current Signal Responses on OD EDM Notches with the Plus Point Coil PP11 VS Plus Point Coil PP14".

- Demonstrates the equivalency of the PP11 and PP14 coils.

Reference G: "Watts Bar Nuclear Plant Preservice Degradation Assessments for Unit 2 Original Steam Generators".

Reference H, EPRI "Pressurized Water Reactor Steam Generator Examination Guidelines: Revision 7".

- Appendix H of this document provides performance demonstration requirements for eddy current examination techniques and equipment.

Reference I, Zetec Report "Equivalency Qualification Report for Zetec Intelligent Probes.

- This report compares the Intelligent Probe to the Plus Point Probe.

Reference J, "Site- Specific Evaluation for TVA of Eddy Current Tester Equivalency of CoreStar OMNI-200 to Zetec MIZ-70" Report No. MRS-TRC-1860 by Westinghouse Electric Co.

Reference K, MRS-TRC-1132, "Westinghouse Qualification Report for the U-Bend +Point Probe"

- This report documents the qualification of high speed U-Bend +Point testing and shows equivalent detectability and noise levels between 0.1"/sec at 180 RPM and 0.5"/sec at 900 RPM.

Tube Size and Frequencies

As stated in paragraph 8.3 of the Ref. B documents, the equivalency of testing performed by bobbin for various tube sizes and wall thickness are compensated for by changing test frequencies to account for varying thickness, and by changing probe sizes to account for different diameters of tubing.

This is referred to as "scaling". Eddy current test frequencies used for a given material are typically scaled with respect to the wall thickness. The drop off in current density scales with the depth of penetration for a given frequency. The standard depth of penetration is defined as the point where the current density in a material drops off to approximately 37% of the near surface value.

A simple way to determine whether or not the current densities are equivalent to that of the ETSS for a given application is to compare the depth of penetration of the applied frequencies as a fraction of the nominal wall thickness. EPRI PWR Steam Generator Examination Guidelines, Revision 7 Section H.4.1.2 requires the relative OD current densities to be within 10% of the qualified frequency's relative OD current density to be equivalent.

Table 2 shows the relative current densities for the EPRI Appendix H frequencies and techniques along with the relative current densities for the test frequencies of the techniques that will be used during WBN U2R0. All of the techniques used for Watts Bar Unit 2 are within the 10% required current density except where otherwise noted. Based on these tables, an equivalency, between the Appendix H and Appendix I frequencies and the Watts Bar 2 frequencies are established.

Formulas Used For Current Density

Standard Depth of Penetration = $\delta = 1.98 \sqrt{(\rho/f)}$

ρ = Resistivity in micro Ω cm = 101.4 for Inconel 600 and 114.8 for Inconel 690

f = frequency in hertz

Relative Current Density = $100 \times e^{-(t/\delta)}$ where:

t = tube wall thickness in inches

δ = Standard Depth of Penetration

EPRI ETSS RELATIVE CURRENT DENSITY					
Bobbin Techniques					
EPRI ETSS	Frequency (kHz)	Wall Thickness (inches)	Relative OD Current Density (% of ID Density)	Corresponding Frequency Recorded @ WBN 2	Watts Bar 2 Relative OD Current Density (% of ID Density)
24013.1	130	0.043	0.460	130	0.460
96004.1	400/100	0.049	0.211/0.460	550/130	0.202/0.459
96005.1	600/200	0.043	0.188/0.381	550/130	0.202/0.459
96012.1	400/100	0.050	0.205/0.452	550/130	0.202/0.459
96042.1	550/130	0.043	0.202/0.459	550/130	0.202/0.459
1-28411	550/130	0.043	0.202/0.459	550/130	0.202/0.459
1-28413	530/130	0.043	0.202/0.459	550/130	0.202/0.459
RPC Techniques					
20510.1	300	0.043	0.306	300	0.306
20511.1	300	0.043	0.306	300	0.306
21409.1	300	0.043	0.306	300	0.306
21410.1	300	0.043	0.306	300	0.306
21998.1	300	0.043	0.306	300	0.306
27903.1	300	0.043	0.306	300	0.306
96511.2	300	0.049	0.260	300	0.306
96703.1	300	0.043	0.306	300	0.306
Intelligent Array Probe					
23514.1	400	0.049	0.211	300	0.306
23514.2	300	0.049	0.260	300	0.306
23514.3	200	0.049	0.333	300	0.306
Ghent Probe					
20407.1	400	0.043	0.255	300	0.306
20407.2	270	0.043	0.279	300	0.306

Table 2

Table 2 shows the relative current densities for the primary test frequencies of the Site-ETSS and for the EPRI Appendix H and I frequencies and techniques. This table shows that the frequencies to be used during WBN U2R0 are within 10% of the qualified frequencies with the exception of ETSS 96005.1 and 96511.2 and therefore can be considered equivalent per "PWR Steam Generator Examination Guidelines Revision 7". For ETSS 96005.1 and 96511.2 a comparison of the data from the ETSS and the standards that will be used for the baseline inspection was performed and can be considered equivalent.

Testers

The tester to be used for the Baseline (WBN U2R0) inspection is the CoreStar OMNI-200. As documented in References B, O and V the OMNI-200 performance is equivalent to or exceeds all testers that where used in the Appendix H and I qualifications.

High Speed Testing

The high speed testing documented in Reference C shows, that bobbin speeds up to 48 inches per second have acceptable detestability as long as the minimum digitization rate of 30 samples per axial inch are met or exceed. All of the referenced RPC EPRI ETSSs state that, "Speed changes are allowed provided that the min sample rate is met." Reference C shows that RPC speeds up to 0.8 inches per second and 1200 RPM have acceptable detect-ability, as long as the minimum digitization rate of 30 samples per inch circumferentially, and 25 samples axially are met or exceeded. The bobbin and RPC probe inspection speeds that will be used during WBN U2C0 are within these requirements.

Fill Factor

During the Watts Unit 2 outage every effort will be taken to use .610 probes, 84.4% fill factor, for the full length bobbin test (excluding the U-bends of rows 1 thru 4). If however, it is not possible to use the .610, the .590 probe with a fill factor of 79.0% is qualified for detection purposes by Reference E, which shows equivalency to Appendix H for Bobbin probes with fill factor of 0.77 and greater.

Software

For the Watts Bar Unit 2 Cycle 0 inspection, Westinghouse will be utilizing ANSER software for all data Acquisition, Primary, Secondary, and Resolution Data Analysis. Westinghouse (ANSER) software utilizes the UNIX operating system on HP computers. The system is designed to process raw eddy current data. Included in the system are software programs for creating suppression mixes and filters. The raw data channels of the data are the same for both systems. To date, the systems have been utilized in EPRI Appendix H and I qualification and the EPRI QDA program. For the purpose of comparing EPRI Appendix H & I and site essential variables, the system is considered to be equivalent to what was utilized in the EPRI ETSS.

Bobbin Probe

In Reference B, Paragraph 6.3 the LLMC Westinghouse probe and the Zetec MULC probe performed in an equivalent manner. All combinations of probe and probe extensions (varying from 0 to 120 feet) varied less than 10% of the measured voltages > 0.2 Vpp.

Based on the tester, probe and cabling equivalencies discussed above and in Reference B, the following EPRI ETSS #'s qualifications apply: SEE NEXT PAGE

Bobbin Probe Essential Variables for EPRI ETSS VS Site-ETSS

The following equipment variables are documented as being equivalent.

Instrument: The OMNI-200 being used for the inspection meets or exceed signal to noise ratio in the EPRI qualified ETSS. (Ref. B and J)

Probe Size and Type: The probes being used for the inspection are equivalent to the EPRI qualified ETSS. (Ref. B and E)

Analog cable type and length: OMNI-200 does not utilize an extension cable for acquisition of data. The tester is mounted inside the probe take-up drum assembly.

Frequencies: The frequencies equivalents are documented in Table 2.

Drive Voltages and Gains: The equivalent drive voltages are documented in the reference documentation. (Ref. B and J)

Coil excitation modes: Bobbin coil for EPRI and Site ETSS use "Differential" and "Absolute" modes.

Acquisition calibration setup: None stated in the EPRI ETSS. Site ETSS Differential channels 100% through wall hole at 40 degrees and 75% of full screen height, flaw going down first. Absolute channels set the 100% through wall hole at 32 degrees at 50% full screen height, flaw up first.

Digitizing Rate: 30 digitized data points per inch are the minimum requirements per EPRI and Site ETSS.

Essential Variables VS ETSS	Damage mechanism	Method of Calibration	Data Review Requirements	Reporting Requirements
96004.1	Wear detection and sizing at TSP, AVB, and Vertical, and Diagonal Straps	400/100 kHz Abs. or Diff. Mix 40% TW wear scar @ 40% FSH, probe motion horizon. Flaws up first, Amp, 5 volts Vmx on 40% or 50% wear scar.	Display Prime/Quarter Mix in Lissajous, and one of the strip chart channels with the vertical component selected.	550/130 kHz Absolute Mix,
96005.1	Pitting in the presence of copper.	400/100 kHz Diff Mix 100% THW @ 50% FSH, probe motion horizon., Flaws down first, Phase Curve 100%, 60%, 20% 20% FBHs holes set Prime Freq. @ 4 volts, save and store to all channels.	None Stated	400/100 kHz Different Mix,
96012.1	Axial PWSCC at dented drilled TSP. Where dents are < 2 volts	400/100 kHz Mix 100% @ 50% FSH probe motion horizon. ~32 deg. Flaws down first, Phase Curve 100%, 60%, 20%, 20% FBHs to 2.75 volts on Mix 1	Display Prime/Quarter Mix and Quarter prime Abs in the strip charts with the vertical component selected. Diff. Prime/Quarter Mix in the lissajous Display Prime/Quarter Mix and 100 kHz Abs in the strip charts with the vertical component selected. Diff. 400/100 kHz Mix in the lissajous	400/100 kHz Different Mix, or Absolute Mix
24013.1	ODSCC in the freespan , including at dings ≤ 5 volts	100 kHz Diff 100% THW @ 50% FSH, @ 27 degrees., Flaws down first, Phase Curve 100%, 60%, 20% 20% FBHs holes set Prime Freq. @ 4 volts, save and store to all		100 kHz Different
96042.1	Detection of loose part volumetric wear indications in freespan area (loose part not present).	100% TWH 35 deg Mxr and at 50% screen height. Volts set the 4x20 at 2.75 volts Vpp.		400/100 kHz Different Mix
128411	Detection of axial ODSCC within drilled tube support structures wit or without dents ≤ 2.0 volts.	Initial span setting FPH at 75% screen height, process channel set 4x20% FBH at 2.75 Vpp, each raw channels set 4x20% FBH at 4.0 Vpp.	After initial span setup, adjust span to 0.2 v/d. Its critical that volts are set prior to performing this step. Screen the F2 differential and process channels (P1).	200 kHz Different or 400/100 kHz Different Mix
128413	Detection of axial ODSCC within freespan (Excluding U-Bend) with or without dents ≤ 2.0 volts.			
WBT-01-10-O, WBT-02-10-O, WBT-BL-BOBBIN	See list above.	Diff. 100% TWH @ 40 deg. @ 75% FSH, flaws down first. Curves Phase 100, 60, 20% Abs. 100% TWH @ 32 deg @ 2 divisions, flaws up first Curve 0, 30, 50%	400/100 kHz Diff. Mix and 100 kHz ABS in strip charts and 400/100 kHz Mix in lissajous	See site analysis techniques.

Table 3

Rotating Probe

All of the following coils were tested by Westinghouse (Reference B, DDM-006-009) on a variety of samples which contain ID and OD EDM notches in straight lengths, expansion transitions, and dents (both symmetric and asymmetric) at frequencies of 600, 500, 400, 300, 200 and 100 kHz. Additionally, all three testers (MIZ-18, MIZ-30 and TC6700) were used in each of the tests. The acceptance criteria used was a POD ≥ 0.80 @ 90% confidence.

80 Mil HF Pancake

Paragraph 6.4.3 in Reference B documents the POD's for ID and OD indications that were calculated at 90% confidence individually for all test frequencies and for various actual depth ranges for various extension and testers combinations using binomial distribution. See Reference B, Table 6-5 and Appendix G for a more complete breakdown.

115 Mil Pancake

Paragraph 6.4.2 in Reference B documents the POD's for ID and OD indications that were calculated at 90% confidence individually for all test frequencies and for various actual depth ranges for various extension and testers combinations using binomial distribution. See Reference B, Table 6-4 and Appendix F for a more complete breakdown.

Plus Point Coil

Paragraph 6.4.6 in Reference B documents the POD's for ID and OD indications that were calculated at 90% confidence individually for all test frequencies and for various actual depth ranges for various extension and testers combinations using binomial distribution. See Reference B, Table 6-8 in Appendix I of Ref. H for a more complete breakdown. Also Reference D documents the equivalency performed on the low row U-Bend Plus Point Probe (Non-Magnetic Bias and Magnetic Bias).

The following table is a breakdown of acceptance frequency ranges of the various RPC test coils to be utilized at Watts Bar Unit 2:

Frequency Range to Meet Acceptance Criteria of a POD ≥ 0.80 @ 90% confidence.		
Coil Type	OD Indications	ID Indications
80 Mil HF Pancake	600 kHz - 300 kHz	800 kHz – 600 kHz
115 Mil Pancake	400 kHz – 100 kHz	400 kHz – 100 kHz
Plus Point	400 kHz – 100 kHz	400 kHz – 100 kHz

Table 4

EPRI RPC Qualifications

In addition to the above Westinghouse testing and based on the tester, probe and cabling equivalencies discussed above and in Reference B, the following Rotating Probe qualifications performed by EPRI (Reference A) also apply: See Next Pages.

All RPC Probe Essential Variables for EPRI ETSS VS Site-ETSS

The following equipment variables are documented as being equivalent.

Instrument: The OMNI-200 being used for the inspection meets or exceed signal to noise ratio in the EPRI qualified ETSS. (Ref. B)

Probe Size and Type: The probes being used for the inspection are equivalent to the EPRI qualified ETSS. (Ref. F)

Analog cable type and length: OMNI-200 does not utilize an extension cable for acquisition of data. The tester is mounted inside the probe take-up drum assembly.

Frequencies: The frequencies equivalents are documented in Table 2.

Drive Voltages and Gains: The equivalent drive voltages are documented in the reference documentation. (Ref. B and J)

Coil excitation modes: +PT probe for EPRI and Site ETSS use "Differential".

Acquisition calibration setup: None stated in the EPRI ETSS. Site ETSS Differential channels 100% through wall hole at 40 degrees and 75% of full screen height, flaw going down first. Absolute channels set the 100% through wall hole at 32 degrees at 50% full screen height, flaw up first.

Digitizing Rate: 30 samples/inch circumferentially and 25 axial for except for U-bend exam, 30 samples axial for U-bends.

Essential Variables VS ETSS	Damage mechanism	Method of Calibration	Data Review Requirements	Reporting Requirements
20510.1	TTS PWSCC Circ	Set the reporting channel to 40% ID Circ Notch @ 15 deg, 40% ID Circ Notch @ 5 Div., 20 volts on 100% circ notch. 40% ID Axial Notch @ 15 deg, 40% ID Axial Notch @ 5 Div., 20 volts on 100% Axial notch.	Monitor the strip chart and scroll the region of interest while viewing the lissajous. Terrain plots the raw and process channels in the area of interest.	Detect and report using 300 kHz
20511.1	TTS PWSCC Axial			Detect and report using 300 kHz
21409.1	TTS/TSP ODSCC Axial			Detect and report using 300 kHz
21410.1	Freespan ≤ 5 volt dents ODSCC Axial			Detect and report using 300 kHz
21998.1, 27903.1	Volumetric Indications			Detect and report using 300 kHz
96511.2	U-Bend PWSCC			Detect and report using 300 kHz
96703.1	TSP PWSCC Axial			Detect and report using 300 kHz
WBT-03-10-O, WBT-04-10-O, WBT-05-10-O, WBT-06-10-O, WBT-07-10-O, WBT-09-10-O, WBT-10-10-O, WBT-11-10-O, WBT-BL-3COIL+PT, WBT-BL-U-BEND+PT	See list above.	See site analysis techniques.	See site analysis techniques.	See site analysis techniques.

Table 5

Intelligent Array Probe Essential Variables for EPRI ETSS VS Site-ETSS

The following equipment variables are documented as being equivalent.

Instrument: The OMNI-200 being used for the inspection meets or exceed signal to noise ratio in the EPRI qualified ETSS. (Ref. B and J)

Probe Size and Type: The probes being used for the inspection are equivalent to the EPRI qualified ETSS.

Analog cable type and length: OMNI-200 does not utilize an extension cable for acquisition of data. The tester is mounted inside the probe take-up drum assembly.

Frequencies: The frequencies equivalents are documented in Table 2.

Drive Voltages and Gains: The equivalent drive voltages are documented in the reference documentation. (Ref. B and J)

Coil excitation modes: Bobbin coil for EPRI and Site ETSS use "Differential" and "Absolute" modes. Intelligent probe for EPRI and Site ETSS use "Tx/Rx" modes.

Acquisition calibration setup: None stated in the EPRI ETSS. Site ETSS Differential channels 100% through wall hole at 40 degrees and 75% of full screen height, flaw going down first. Absolute channels set the 100% through wall hole at 32 degrees at 50% full screen height, flaw up first.

Digitizing Rate: 30 digitized data points per inch are the minimum requirements per EPRI and Site ETSS.

Essential Variables VS ETSS	Damage mechanism	Method of Calibration	Data Review Requirements	Reporting Requirements
23514.1	Detection of axial and circumferential PWSCC in low row U-Bend	Phase rotation is set on either the expansion or radial dent so that it is horizontal. Raw channel so the OD axial flaw go up to the right and process channels are rotated 180.deg. so that the circ. flaws go up and to the right. 30% 360 degree OD groove set to 1 volt.	Terrain plots the raw channels and process channels in the area of interest. Additional displays such as 24 Lissajous, 24 strip charts and main Eddynet screen may be used for enhanced interrogation of the signals of interest. Analysis the complete area of interest.	Detect and report using 400 kHz
23514.2				Detect and report using 300 kHz
23514.3				Detect and report using 200 kHz
WBT-12-10-O, WBT-BL-MHI-IAP	See list above.	Phase rotation is set on either the expansion or radial dent so that it is horizontal. Raw channel so the OD axial flaws go up to the right and process channels are rotated 180.deg. so that the circ. flaws go down. 30% 360 degree OD groove set to 5 volt.	Terrain plots the raw channels and process channels in the area of interest. Additional displays such as 24 Lissajous, 24 strip charts and main Eddynet screen may be used for enhanced interrogation of the signals of interest.	Detect and report using 300 kHz
Appendix H Equivalency	Equivalent	Equivalent	Equivalent	Equivalent

Table 6

Ghent Probe Essential Variables for EPRI ETSS VS Site-ETSS

The following equipment variables are documented as being equivalent.

Instrument: The OMNI-200 being used for the inspection meets or exceed signal to noise ratio in the EPRI qualified ETSS.

Probe Size and Type: The probes being used for the inspection are equivalent to the EPRI qualified ETSS.

Analog cable type and length: OMNI-200 does not utilize an extension cable for acquisition of data. The tester is mounted inside the probe take-up drum assembly.

Frequencies: The frequencies equivalents are documented in Table 2.

Drive Voltages and Gains: The equivalent drive voltages are documented in the reference documentation.

Coil excitation modes: Ghent probe for EPRI and Site ETSS use "Differential" and "Absolute" modes.

Acquisition calibration setup: None stated in the EPRI ETSS. Site ETSS Differential channels 100% through wall hole at 40 degrees and 75% of full screen height, flaw going down first. Absolute channels set the 100% through wall hole at 32 degrees at 50% full screen height, flaw up first.

Digitizing Rate: 30 samples/inch circumferentially and 25 axial.

Essential Variables VS ETSS	Damage mechanism	Method of Calibration	Data Review Requirements	Reporting Requirements
20407.1 or 20407.2	Detection of Axial ODSCC at support structures, free span, sludge pile and tube sheet crevice.	40% ID Circ Notch @ 15 deg, 40% ID Circ Notch @ 5 Div., 20 volts on 100% circ notch.	Screen the 400kHz (0.043 wall) / 270kHz (0.043) circumferential sensitive coil for circ indication and axial sensitive coil axial indication. Verify the indication using remaining frequencies.	Detect and report using 400 kHz/270 kHz
WBT-08-10-O, WBT-BL-GHENT	See list above.	40% ID Circ Notch @ 15 deg, 40% ID Circ Notch @ 5 Div., 20 volts on 100% circ notch.	Screen the 300 kHz (0.043) circumferential sensitive coil for circ indication and axial sensitive coil axial indication. Verify the indication using remaining frequencies.	See Analysis technique sheet.
Appendix H Equivalency	Equivalent	Equivalent	Equivalent	Equivalent

Table 7

EPRI Pancake Coil ETSSs

The three coil MRPC probe that will be used during Watts Bar Unit 2 Cycle 0 outage contains two pancake coils in addition to the +PT coil. The two additional coils are a 115 Mil MR Pancake coil and an 80 Mil shielded HF coil. The 115 Mil pancake coil has four relevant techniques that supplement the preceding +PT qualifications. In all case the 115 Mil coil will be driven in an equivalent mode to the pancake ETSS 21401.1, 21402.1, 21403.1, and 21404.1, but a detail review will not be performed since this is not considered the coil of record.

Data Review

A review was completed on the EPRI Appendix H ETSS qualification datasets. Specifically, the study was performed to set a guideline to monitor the noise during the WBN-2 Steam Generator baseline inspection.

Rotating Probe

EPRI noise data measurement the 300 kHz is set to 20 volts on the 100% axial flaw with the 40% axial notch set to 40 degrees. This the same voltage setting used for the 300 kHz at WBN-2. The rotating probe noise measurement was made at least one rotation from the edge of the indication. The window size for these measurements was set to one rotation using the trigger channel.

ETSS 21410.1
This technique is qualified for the detection of circumferential Outer Diameter Stress Corrosion Cracking (ODSCC) at expansion transitions.

- Maximum 0.95 Vpp, 0.51 Vvm; Minimum 0.19 Vpp, 0.10 Vvm; Average 0.40 Vpp 0.20 Vvm

ETSS 20511.1
This technique is qualified for the detection of axial Primary Water Stress Corrosion Cracking (PWSCC) at expansion transition.

- Maximum 2.14 Vpp, 0.69 Vvm; Minimum 0.53 Vpp, 0.11 Vvm; Average 1.24 Vpp 0.44 Vvm

ETSS 20510.1
This technique is qualified for the detection of circumferential Primary Water Stress Corrosion Cracking (PWSCC) at expansion transition.

- Maximum 2.31 Vpp, 1.09 Vvm; Minimum 0.35 Vpp, 0.29 Vvm; Average 1.18 Vpp 0.64 Vvm

ETSS 21409.1
This technique is qualified for the detection of Axial Outer Diameter Stress Corrosion Cracking (ODSCC) at support structures, freespan regions, sludge pile, and tube sheet crevice.

- Maximum 1.95 Vpp, 1.77 Vvm; Minimum 0.15 Vpp, 0.09 Vvm; Average 0.56 Vpp 0.44 Vvm

ETSS 21998.1
This technique applies to the detection of volumetric indications and depth sizing within the freespan area. Performance idiocies are provided for probability of detection (POD) and maximum depth for the 300 kHz. Any indication with wall loss over 0.25" in axial length, using the analysis guidelines set forth, will have a conservative measurement.

- Maximum 1.31 Vpp, 0.59 Vvm; Minimum 0.25 Vpp, 0.19 Vvm; Average 0.98 Vpp 0.44 Vvm

ETSS 27903.1
This technique applies to the detection of "Tapered Football Shaped" volumetric indications and depth sizing within in the freespan area, loose part not present. Performance indices are provided for probability of detection (POD) and maximum depth for 300 kHz.

- Maximum 1.21 Vpp, 0.49 Vvm; Minimum 0.35 Vpp, 0.29 Vvm; Average 0.88 Vpp 0.64 Vvm

Rotating Probe Coil U-Bend Noise

When testing low row U-Bends, high levels of noise could in certain case influence the ability to detect ID indications. The volts peak to peak (Vpp) and volts vertical maximum (Vvm) were recorded at the apex of each tube for EPRI ETSS. The window size for these measurements was set to one rotation using the trigger channel.

ETSS 96511.2
This technique is qualified for the detection of circumferential and axial PWSCC in low row B-Bend regions.

- Maximum 1.81 Vpp, 0.67 Vvm; Minimum 0.63 Vpp, 0.16 Vvm; Average 1.04 Vpp 0.33 Vvm

Bobbin Probe

ETSS I28411
This technique applies to the detection of axial ODSCC within drilled Tube Support Structures with or without dents ≤ 2.0 volts. Appendix I techniques are part of the total system performance

ETSS I28413
This technique applies to the detection of axial ODSCC within freespan (Excluding U-Bend), sludge pile region and broached support structures with or without dents ≤ 2.0 Vpp.

ETSS 24013.1
Detection of Outer Diameter Stress Corrosion Cracking (ODSCC) in the freespan, including at dings of ≤ 5.0 volts. This technique is not qualified for sizing.

- Maximum 1.20 Vpp, 0.16 Vvm; Minimum 0.19 Vpp, 0.07 Vvm; Average 0.91 Vpp 0.14 Vvm

ETSS 96004.1
Wear at tube support, anti-vibration bars, vertical and diagonal straps. This technique is limited to the type and quantity of degradation. The qualification was performed using applicable standards for the damage mechanism. No attempt was made to calibrate for single sided wear and evaluate other modes such as double sided wear. Calibrations were made established for each structures mode of degradation.
The 200/100 kHz absolute mix residual signal was considered noise for these location. Measurements are Volt vertical maximum (Vvm). The window size includes only the mix residual.

- Maximum 0.98 Vpp, 0.37 Vvm; Minimum 0.37 Vpp, 0.07 Vvm; Average 0.69 Vpp 0.13 Vvm

ETSS 96005.1
Pitting detection in the presence of copper.

- Maximum 1.81 Vpp, 0.69 Vvm; Minimum 0.69 Vpp, 0.21 Vvm; Average 1.08 Vpp 0.36 Vvm

ETSS 96012.1
This bobbin probe technique meets the requirements for detection of axial Primary Water Stress Corrosion Cracking (PWSCC) at dented (< 2 volts with 4x20% ASME holes set at 2.75 Vpp) drilled tube support plate intersections. The <2 volt criteria was a consensus value determined by the peer review team based on the number of data points in the area of interest. This technique meets the requirements of Appendix H using both differential (Mix1) and absolute (Mix-2) mix channels (Prime/Quarter Prime).

- Maximum 1.45 Vpp, 0.49 Vvm; Minimum 0.38 Vpp, 0.05 Vvm; Average 0.79 Vpp 0.20 Vvm

ETSS 96042.1
This technique is used for detection and sizing of Wear at Drilled Tube Supports. This technique is limited to the type and morphology of degradation.

- Maximum 1.49 Vpp, 0.73 Vvm; Minimum 0.77 Vpp, 0.21 Vvm; Average 1.20 Vpp 0.48 Vvm

Summary

The prototypical review of in-generator signals to Appendix H data verified that the in-generator signals to noise characteristics is similar to that of the data used in Appendix H qualifications and tube pulls from similar type of steam generators. The essential variable comparison shows that the site 'as-used techniques essential variables are equivalent to the EPRI Appendix H 'as qualified' technique essential variables for all active, relevant and potential damage mechanisms.

Based on equivalencies stated within this letter, the eddy current techniques planned to be utilized at Watts Bar Unit 2 cycle 0 outage can be considered "Site Validated" as defined in Section 6.2.4 of Reference H for all active, relevant and potential damage mechanisms.

If there are any questions, I can be reached via email at dpfolsom@tva.gov or by phone at (423) 843-4150 or cell phone (423) 593-0839.

Daniel P. Folsom

NDE, Specialist (Eddy Current Level III)

Tennessee Valley Authority

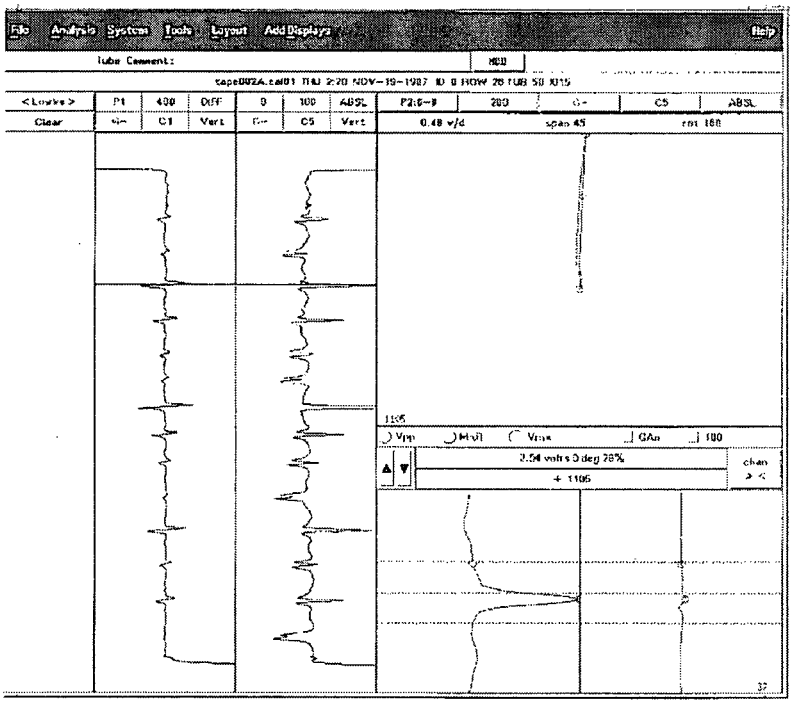


Figure 2A
Appendix H AVB Wear samples.

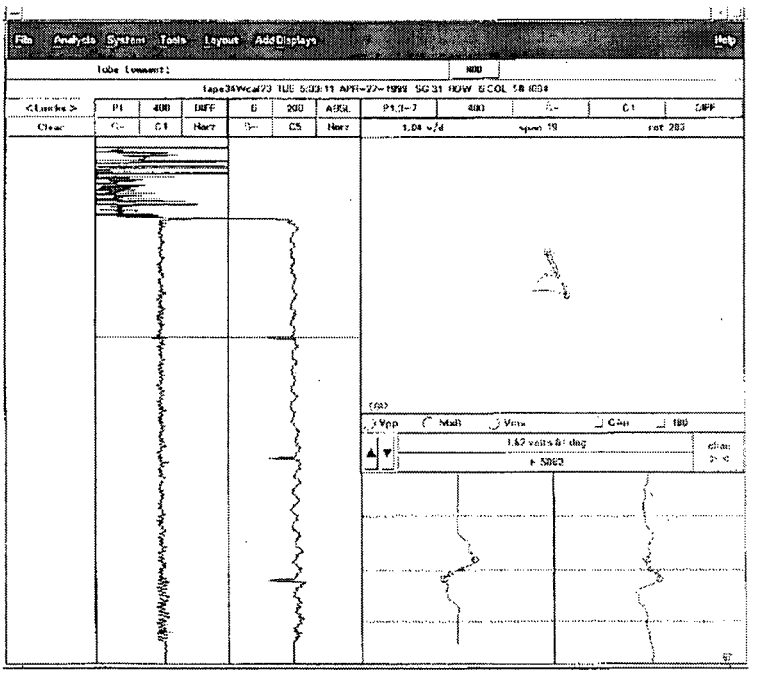


Figure 3A
SQN-1 Tube pulled in EPRI ETSS Axial ODSCC

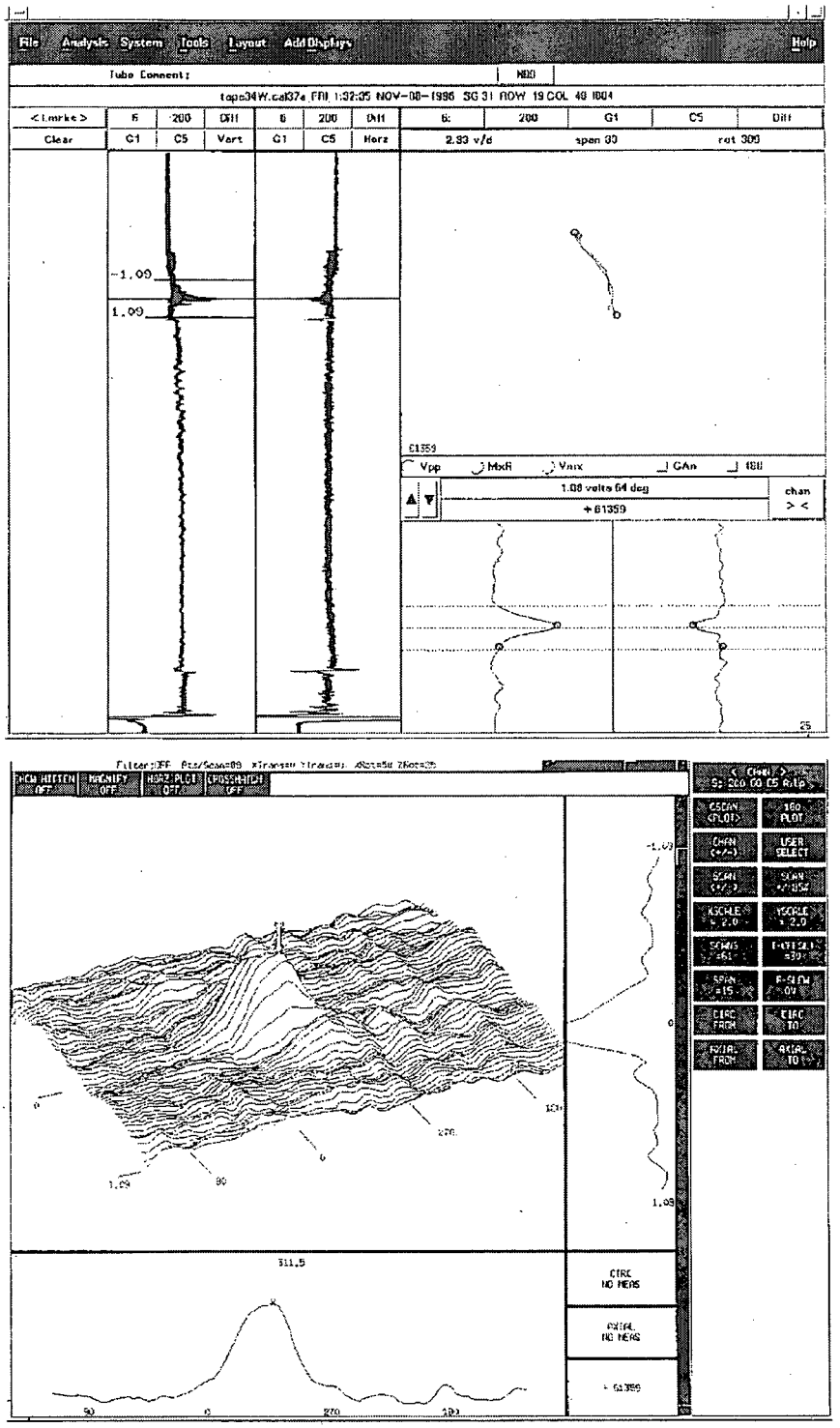


Figure 4A
ETSS Axial ODSCC in sludge pile Zion Unit.

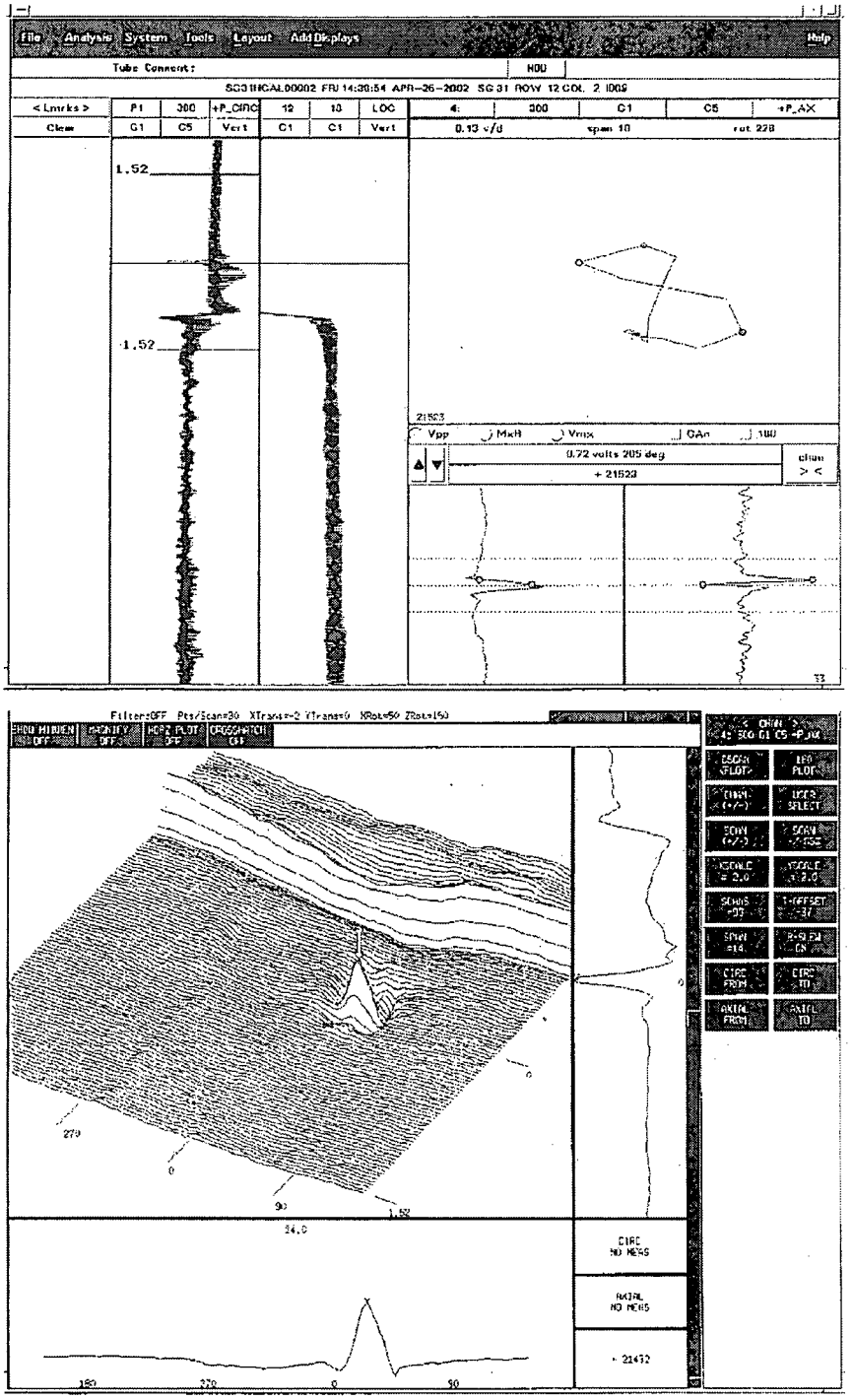


Figure 4B
Axial ODSCC in Sludge Pile SQN-1.

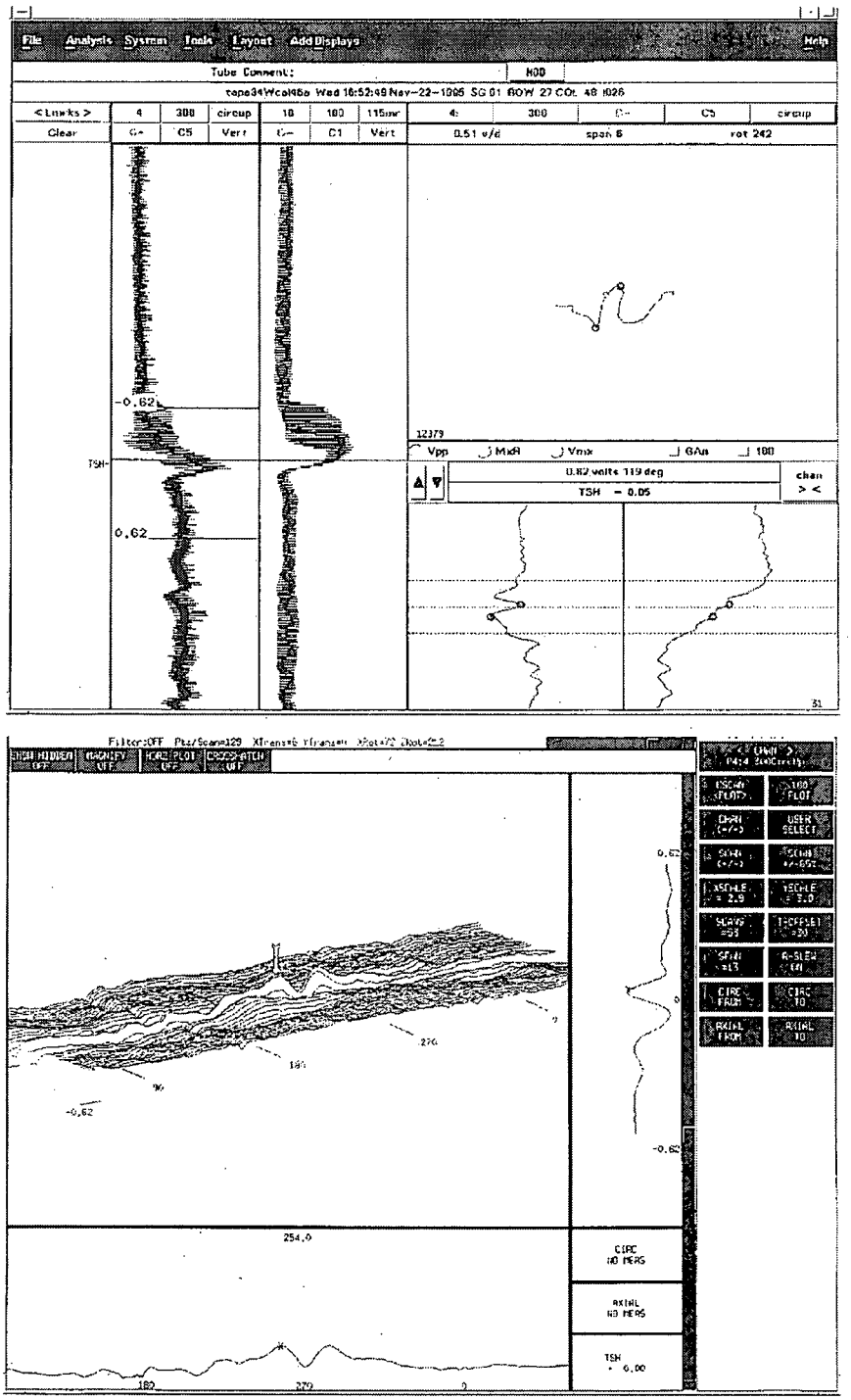


Figure 5A
Plus Point field data from Byron 1 tube pull which confirmed by metallography as Circumferential ODSS (77% max depth) at the top of tubesheet hot leg transition.

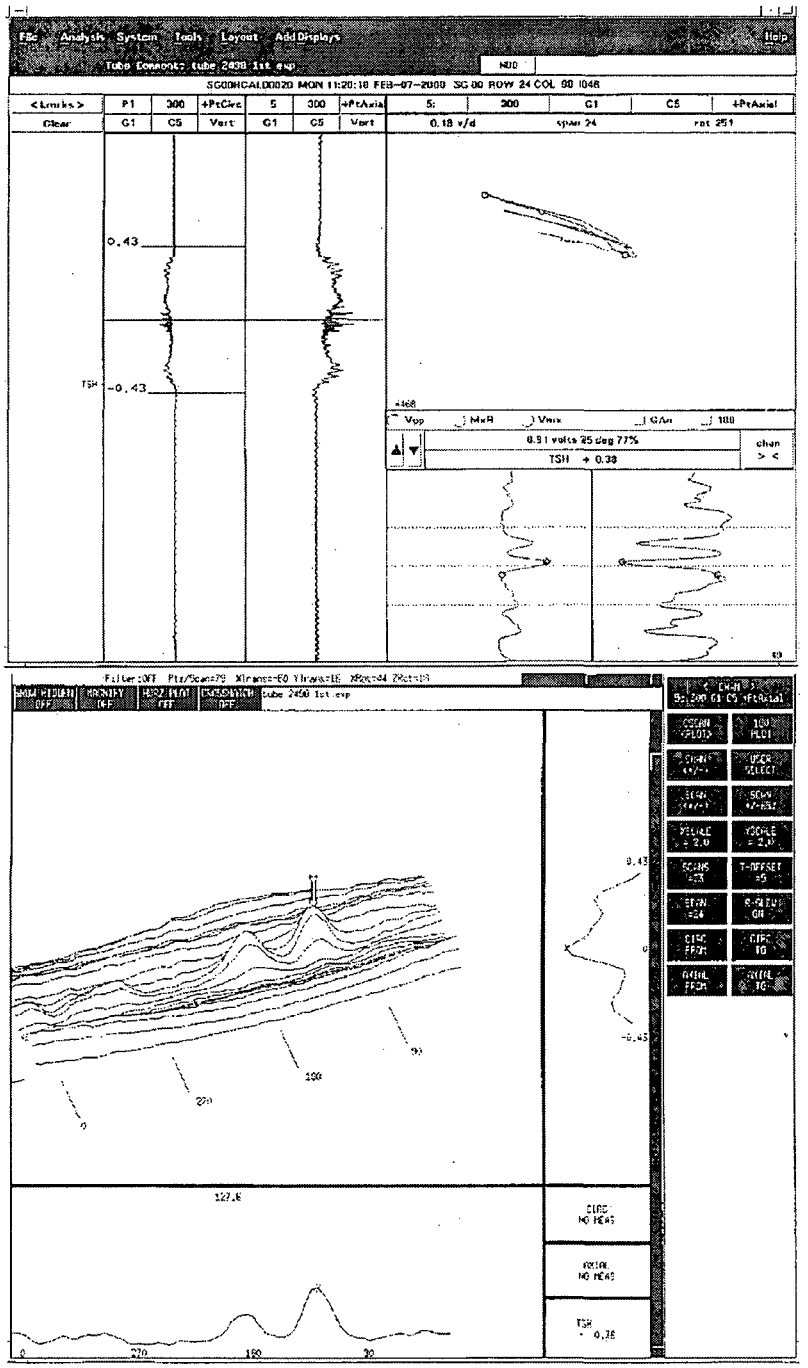


Figure 6A
Plus Point field data from EPRI Lab sample used to support the Appendix H Technique Qualification.

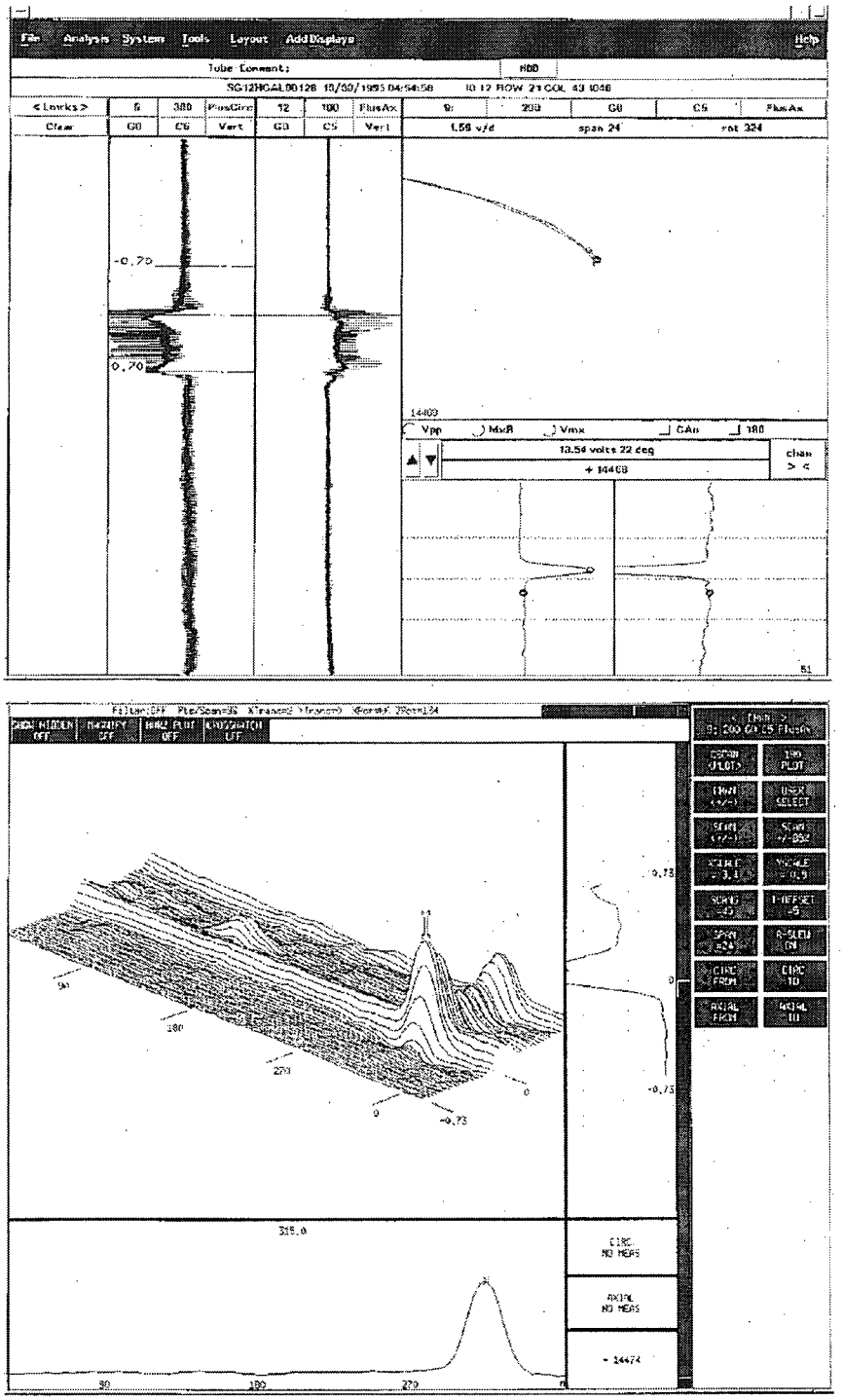


Figure 7A
Plus Point data from Diablo 1 of Axial PWSCC at a dented tube support plate used to support the Appendix H qualification.

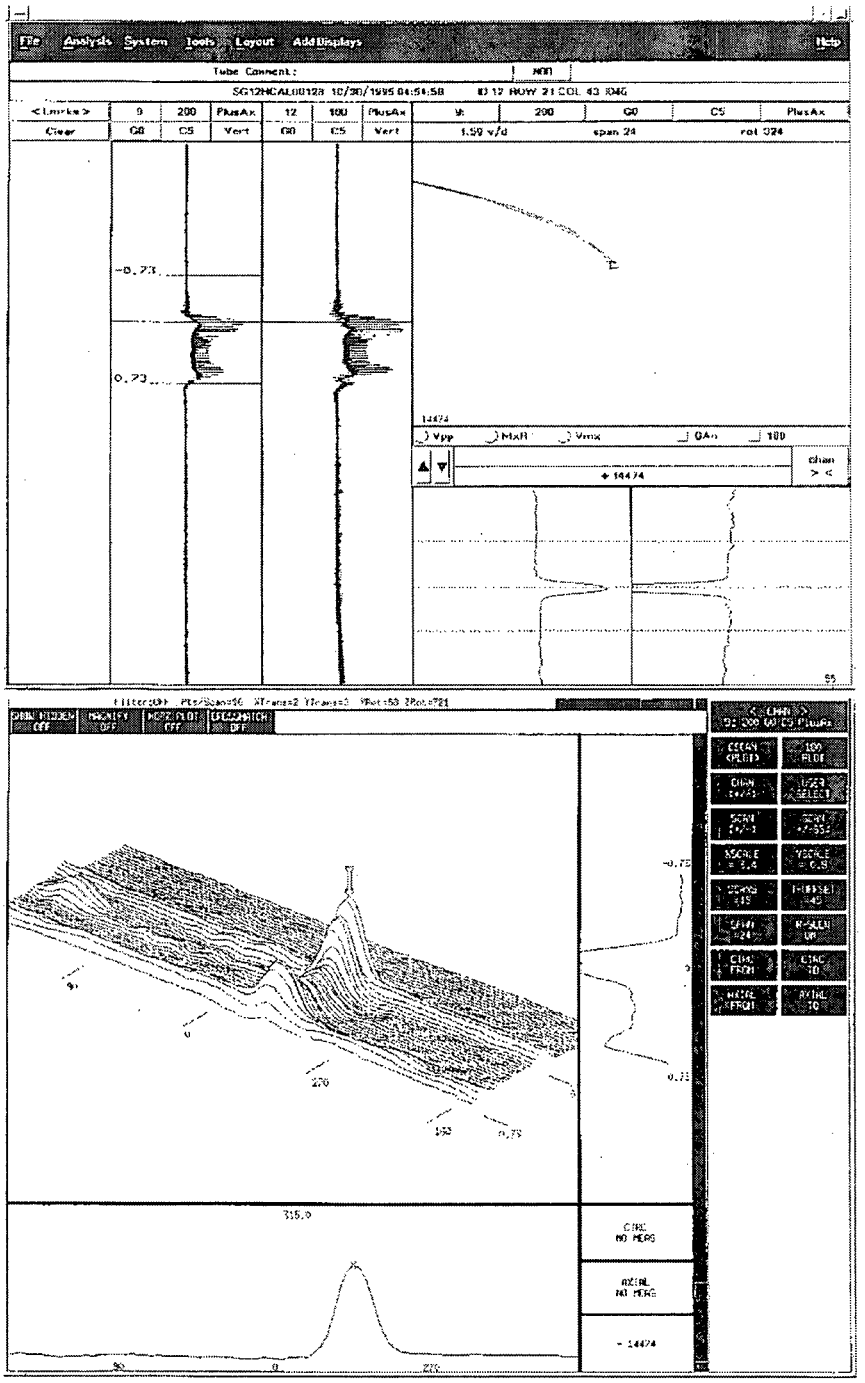


Figure 8
Plus Point data from Lab sample of Axial ODSCC at a dent used to support the EPRI Appendix H qualification.

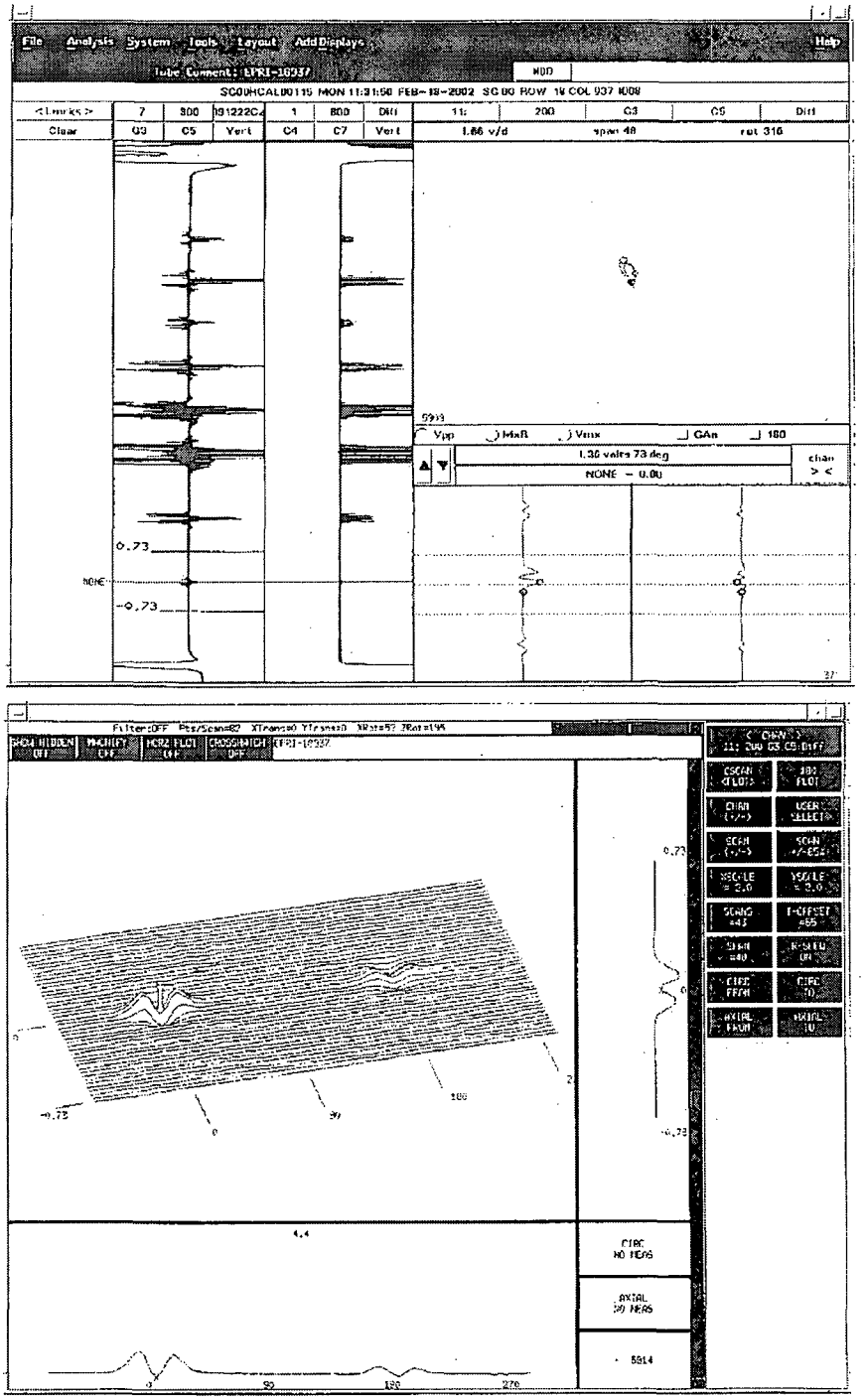


Figure 9A
Lab sample data of a freespan volumetric signal from EPRI Appendix H qualification.

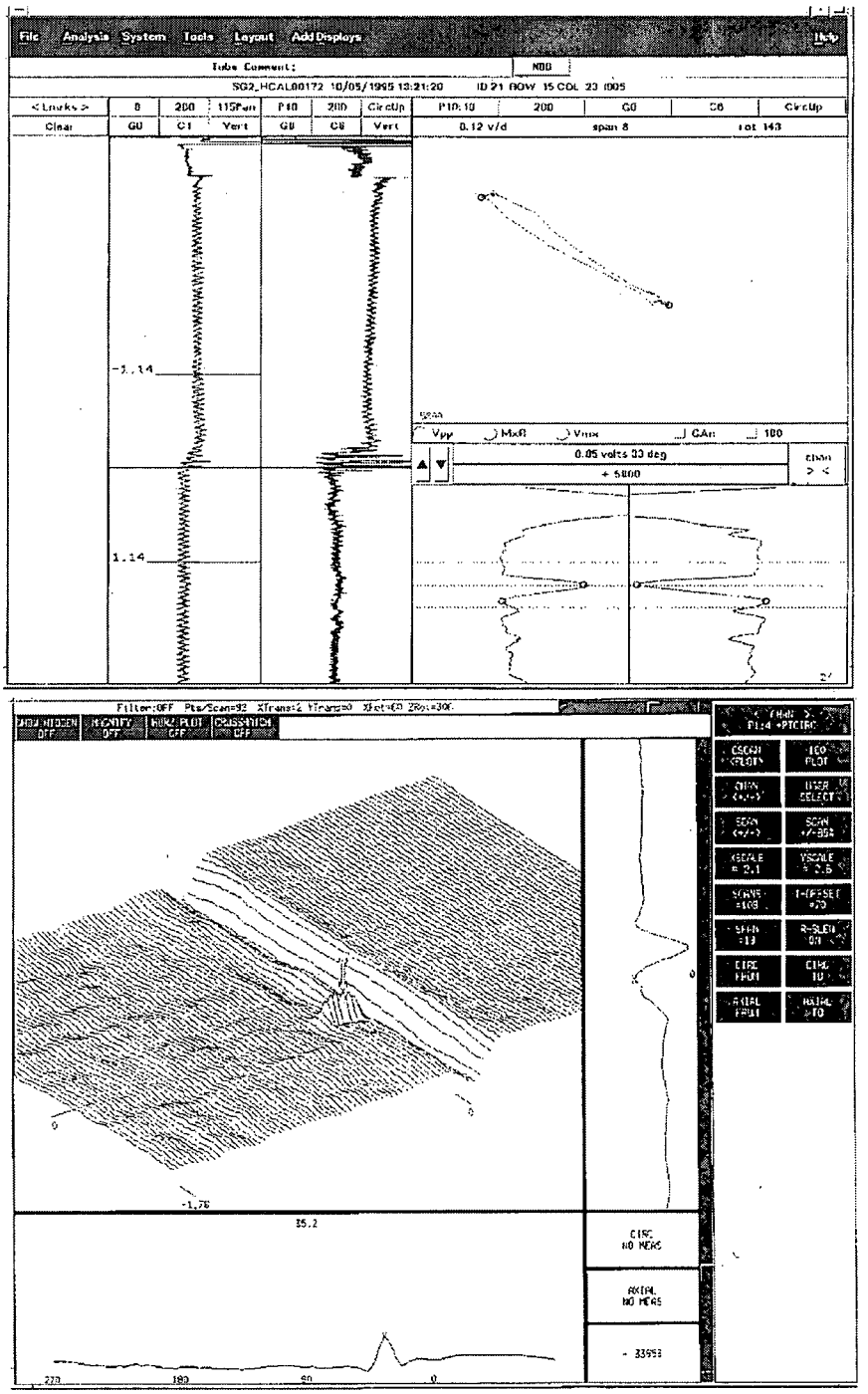


Figure 10A
Plus Point data from Sequoyah 1 of circumferential PWSCC at the top of tubesheet used to support the EPRI Appendix H qualification.

9. LIST OF TUBES FOR PLUGGING

PLUG LIST - STEAM GENERATOR 1

INTERIM HOT AND COLD LEG

WBN Unit 2 W2C0

SG	*ROW*	*COL*	*RESOLUTION*	*Type/Length/Comments*
1	1	7	PLUG-Preventive	
1	1	48	PLUG-Preventive	
1	1	84	PLUG-Preventive	
1	2	5	PLUG-Preventive	
1	2	28	PLUG-Preventive	
1	12	9	PLUG-Preventive	
1	28	83	PLUG	
1	29	73	PLUG-Preventive	
1	34	87	PLUG	
1	36	24	PLUG-Preventive	
1	36	25	PLUG-Preventive	
1	37	24	PLUG-Preventive	
1	38	24	PLUG-Preventive	
1	38	72	PLUG-Preventive	
1	39	24	PLUG-Preventive	
1	40	24	PLUG-Preventive	

Total tubes: 16

William David James 03/03/10

Approved By

03/03/10

Verified By

PLUG LIST - STEAM GENERATOR 2

INTERIM HOT AND COLD LEG

WBN Unit 2 W2C0

SG	*ROW*	*COL*	*RESOLUTION*	*Type/Length/Comments*
2	2	75	PLUG-Preventive	
2	3	96	PLUG-Preventive	
2	5	104	PLUG	
2	6	98	PLUG-Preventive	
2	12	72	PLUG-Preventive	
2	25	28	PLUG	
2	27	31	PLUG	
2	27	58	PLUG-Preventive	
2	32	53	DEPLUG/PLUG	
2	41	70	PLUG-Preventive	
2	46	49	PLUG-Preventive	

Total tubes: 11

William David James 03/03/10

Approved By

03/03/10

Verified By

PLUG LIST - STEAM GENERATOR 3

INTERIM HOT AND COLD LEG

WBN Unit 2 W2C0

SG	*ROW*	*COL*	*RESOLUTION*	*Type/Length/Comments*
3	2	111	PLUG-Preventive	
3	19	54	PLUG-Preventive	
3	40	42	PLUG-Preventive	

Total tubes: 3

William David James 03/03/10

Approved By

03/03/10

Verified By

PLUG LIST - STEAM GENERATOR 4

INTERIM HOT AND COLD LEG

WBN Unit 2 W2C0

SG	*ROW*	*COL*	*RESOLUTION*	*Type/Length/Comments*
4	1	60	PLUG-Preventive	
4	2	12	DEPLUG/PLUG	
4	13	28	PLUG-Preventive	
4	45	48	PLUG-Preventive	
4	46	48	PLUG-Preventive	
4	47	48	PLUG-Preventive	

Total tubes: 6

William David James 03/03/10

Approved By

03/03/10

Verified By