From: (b)(6)
To: Murphy, Emmett
Cc: Anchondo, Isaac
Subject: SONGS SG Update
Date: Tuesday, February 21, 2012 4:25:35 PM

Emmett - I have been uploading the daily SG status to CERTREC. Let me know if there is any other information you are interested in receiving. I also have video DVDs for the U2 E089 secondary inspection there are 3 DVDs and about 11 hours of inspection. Nothing unusual was noted. I can send them to you if you want. We don't want them to be part of the public record.

(b)(6)
Inspections Manager
Nuclear Regulatory Affairs
San Onofre Nuclear Generating Station
(b)(6)

D/19
33

D/19

From: (b)(6)
To: Anchondo, Isaac
Cc: (b)(6) Murphy, Emmett (b)(6) Kulesa, Gloria; Warnick, Johnson, Andrew Greg; Werner, Greg; Reynoso, John; Karwoski, Kenneth (b)(6) Markley, Michael; (b)(6) Hall, Randy (b)(6) (b)(6) Lantz, Ryan
Subject: RE: Agenda for SONGS 2/24 SG phone call
Date: Friday, February 24, 2012 9:48:38 AM

Isaac,
Thank you for your response. We will not be able to address all your questions in the call scheduled for today in any detail, however we will provide the high level schedule and can plan future calls to go into more detail.

(b)(6)
Manager, Plant Licensing
San Onofre Nuclear Generating Station
(b)(6)

From: "Anchondo, Isaac" <Isaac.Anchondo@nrc.gov>
To: (b)(6) "Markley, Michael" <Michael.Markley@nrc.gov>
Cc: "Murphy, Emmett" <Emmett.Murphy@nrc.gov>, "Lantz, Ryan" <Ryan.Lantz@nrc.gov>, "Werner, Greg" <Greg.Werner@nrc.gov>, "Warnick, Greg" <Greg.Warnick@nrc.gov>, "Reynoso, John" <John.Reynoso@nrc.gov>, "Johnson, Andrew" <Andrew.Johnson@nrc.gov>, "Markley, Michael" <Michael.Markley@nrc.gov>, "Hall, Randy" <Randy.Hall@nrc.gov>, "Karwoski, Kenneth" <Kenneth.Karwoski@nrc.gov>, "Kulesa, Gloria" <Gloria.Kulesa@nrc.gov> (b)(6)
(b)(6)
(b)(6)
Date: 02/24/2012 07:23 AM
Subject: RE: Agenda for SONGS 2/24 SG phone call

Morning (b)(6)

I have a couple of other topics that I would like to cover if possible.

- Can we briefly discuss the progress on the root cause evaluation for both Unit 2 and Unit 3?
- Per the Status Report dated February 23, Expansion 4 was forecast to be completed yesterday. If completed, can we go over your findings.
- Discuss the approach/progress of the industry expert team.
- High level outlook of the schedule for both Units moving forward.

Thanks,
Isaac Anchondo
Reactor Inspector
RIV/DRS/PSB2

D/20

35

D/20

817.200.1152

From: (b)(6)
Sent: Thursday, February 23, 2012 8:22 PM
To: Markley, Michael
Cc: Murphy, Emmett; Lantz, Ryan; Werner, Greg; Warnick, Greg; Reynoso, John; Anchondo, Isaac; Johnson, Andrew; Markley, Michael; Hall, Randy; (b)(6) Karwoski, Kenneth; Kulesa, Gloria; (b)(6)
(b)(6)
Subject: Agenda for SONGS 2/24 SG phone call

Mike,
I understand that both Randy and Kaly are out of the office on Friday. I would like to propose the following Agenda for the call with the Region and NRR Friday 2/24/12 at 1200 EST.

AGENDA

1. Introductions: (b)(6)
2. Review Agenda: (b)(6)
3. Outage Status (b)(6)
4. Discuss Questions (b)(6)
(b)(6)

a. Provide tube by tube listing of maximum depth and length for freespan and TSP indications.
b. Provide depth vs. length profiles for some of the most limiting freespan (including leaker) and TSP indications. Provide the corresponding yield and ultimate strength of the respective tubes. (At least five profiles for each freespan and TSP would be desirable.)
c. Provide plan for selecting tubes for in-situ testing.
d. Provide drawing of TSP broached trefoil holes. Include dimensions and associated tolerances.
e. Compare/contrast sizing method for freespan flaws with those used last fall for tube to tube wear at TMI and ANO-1.

5. Review Action Items (b)(6)

If you would like to make additions to the Agenda we can accommodate that during the call after the introductions Thank You,

(b)(6)
Manager, Plant Licensing
San Onofre Nuclear Generating Station
(b)(6)
(b)(6)

From: "Kalyanam, Kaly" <Kaly.Kalyanam@nrc.gov>
To: (b)(6)

Cc: "Murphy, Emmett" <Emmett.Murphy@nrc.gov>, "Karwoski, Kenneth" <Kenneth.Karwoski@nrc.gov>, "Kulesa, Gloria" <Gloria.Kulesa@nrc.gov>, "Hall, Randy" <Randy.Hall@nrc.gov>
Date: 02/23/2012 01:56 PM
Subject: RE: SONGS Steam Generator Drawings for 2/24 phone call

(b)(6)

I am not aware of any specific agenda other than providing the schedule.

You already have the 5 questions from Emmett, and forwarded by Isaac.

I hope to join the call from home tomorrow. Please contact Mike Markley for anything you may need.

Thanks

Kaly

From: (b)(6)
Sent: Thursday, February 23, 2012 4:50 PM
To: Kalyanam, Kaly
Cc: Murphy, Emmett; Karwoski, Kenneth; Kulesa, Gloria; Hall, Randy
Subject: SONGS Steam Generator Drawings for 2/24 phone call

Kaly,
Do you have an agenda for tomorrow's meeting? Are you just looking for schedule information and responses from Emmett's questions that were relayed to us from Isaac?

The drawings requested for question #4 was sent earlier today and we expect to some preliminary information on question number 1 for our call tomorrow. We do not have answers to all the questions below, but will have status and an estimated date when we will have the rest of the requested information.

Questions provided by Isaac Anchondo:
1. Provide tube by tube listing of maximum depth and length for freespan and TSP indications.
2. Provide depth vs. length profiles for some of the most limiting freespan (including leaker) and TSP indications. Provide the corresponding yield and ultimate strength of the respective tubes. (At least five profiles for each freespan and TSP would be desirable.)
3. Provide plan for selecting tubes for in-situ testing.
4. Provide drawing of TSP broached trefoil holes. Include dimensions and associated tolerances.
5. Compare/contrast sizing method for freespan flaws with those used last fall for tube to tube wear at TMI and ANO-1.

Thank you.

(b)(6)
Manager, Plant Licensing

San Onofre Nuclear Generating Station

(b)(6)

From: Anchondo, Isaac
To: "nrc@songs.sce.com"
Subject: RE: NN 201854749 SONGS PLI
Date: Monday, February 27, 2012 3:12:00 PM

Thanks!

-----Original Message-----
From: nrc@songs.sce.com [mailto:nrc@songs.sce.com]
Sent: Monday, February 27, 2012 3:06 PM
To: Anchondo, Isaac
Subject: NN 201854749 SONGS PLI

Issac,
as requested.

JR

SONGS Resident Inspector

-----"Reynoso, John" <John.Reynoso@nrc.gov> wrote: -----

To: "nrc@sce.com" <nrc@sce.com>
From: "Reynoso, John" <John.Reynoso@nrc.gov>
Date: 02/27/2012 12:49PM
Subject: FW: NN 201854749

From: Anchondo, Isaac
Sent: Monday, February 27, 2012 11:51 AM
To: Reynoso, John; Warnick, Greg
Subject: NN 201854749

Afternoon,

As mentioned in the voice message I left, if possible can you guys provide me with a copy of NN 201854749. This is the NN that documents the retrieval of the lose part in the SG in Unit 2.

Let me know if you guys have any questions.

Thanks,
Isaac

(See attached file: NN 201854749 attachment.docx)(See attached file: nn 201854749 recovered loose part 2E088.pdf)

P/21

From: nrc@songs.sce.com
To: Anchondo, Isaac
Subject: NN 201854749 SONGS PLI
Date: Monday, February 27, 2012 3:07:19 PM
Attachments: NN 201854749 attachment.docx
nn 201854749 recovered loose part 2E088.pdf

Issac,
as requested.

JR

SONGS Resident Inspector

-----"Reynoso, John" <John.Reynoso@nrc.gov> wrote: -----

To: "nrc@sce.com" <nrc@sce.com>
From: "Reynoso, John" <John.Reynoso@nrc.gov>
Date: 02/27/2012 12:49PM
Subject: FW: NN 201854749

From: Anchondo, Isaac
Sent: Monday, February 27, 2012 11:51 AM
To: Reynoso, John; Warnick, Greg
Subject: NN 201854749

Afternoon,

As mentioned in the voice message I left, if possible can you guys provide me with a copy of NN 201854749. This is the NN that documents the retrieval of the lose part in the SG in Unit 2.

Let me know if you guys have any questions.

Thanks,
Isaac

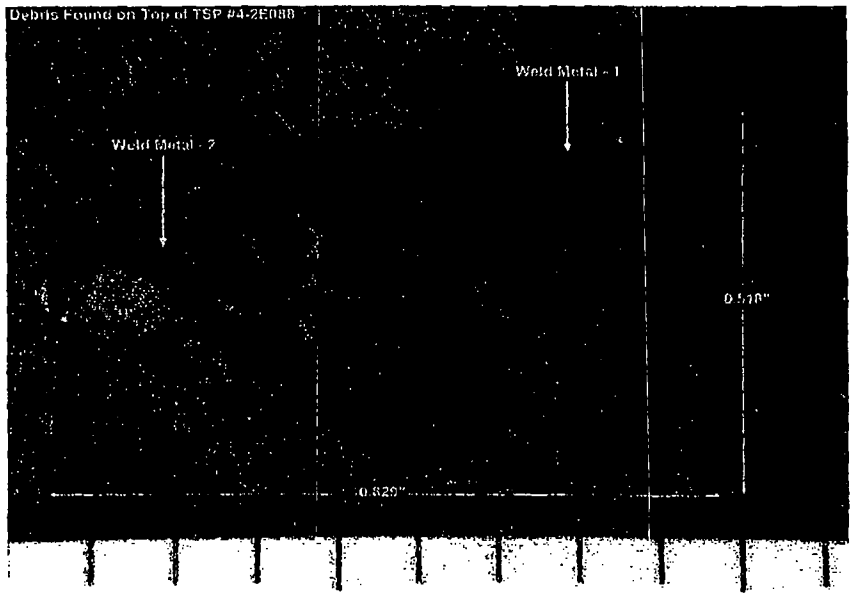
(See attached file: NN 201854749 attachment.docx)(See attached file: nn 201854749 recovered loose part 2E088.pdf)

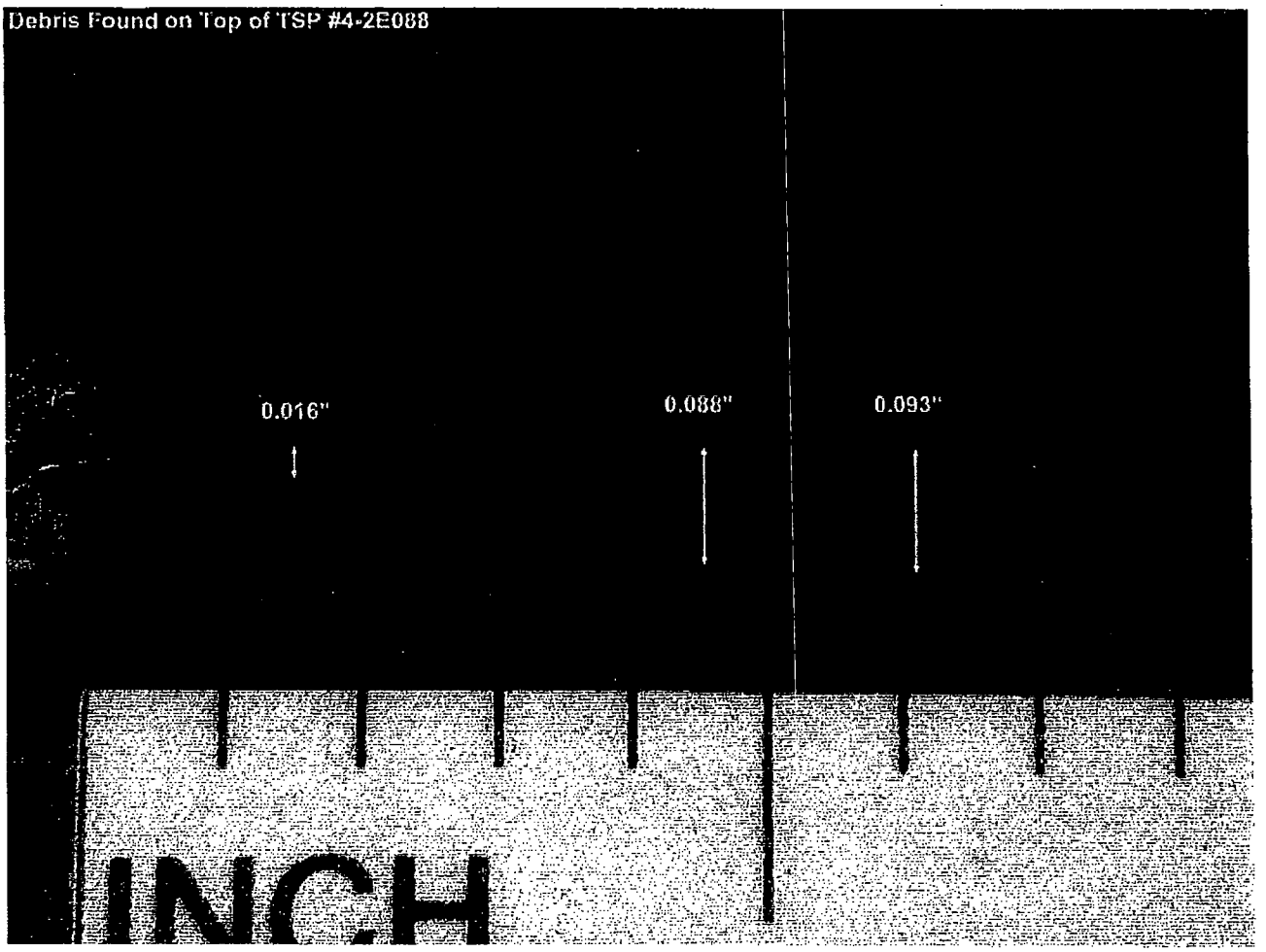
Debris Analysis:

The debris was photographed and the overall dimensions were measured. The debris was examined under optical microscope. Scanning Electron Microscope (SEM) and Energy Dispersive X Ray Spectroscopy (EDS) were also performed on surfaces of the debris (top and bottom surfaces) after acetone cleaning. Thereafter, a longitudinal cross section was prepared through the midsection of the debris. The cross section was examined in the as etched condition to reveal the micro structure. EDS analysis was performed on the core of the debris for comparison to the EDS performed on both of the surfaces. Micro-hardness measurements were also performed on the cross section.

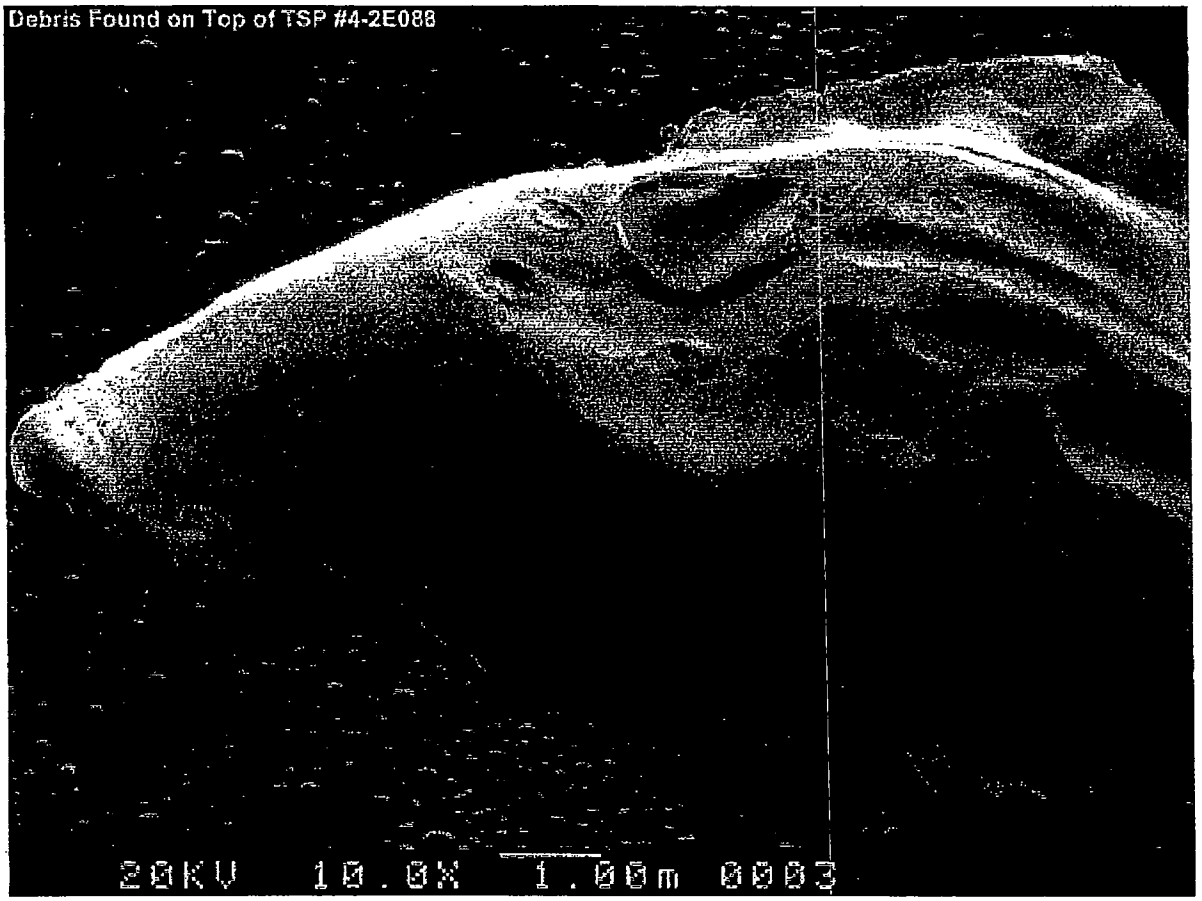
Results:

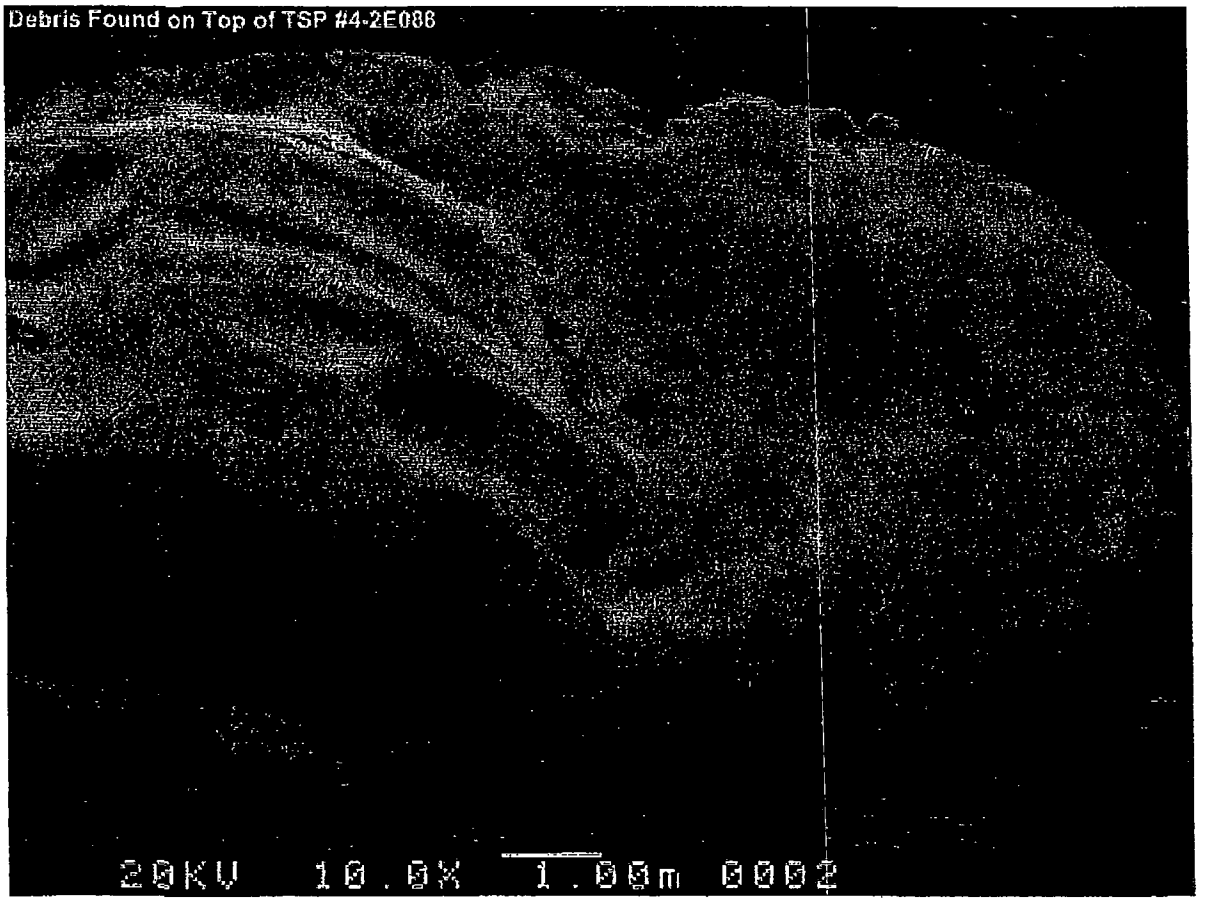
The overall appearance and dimensions of the debris are illustrated in two next photographs.



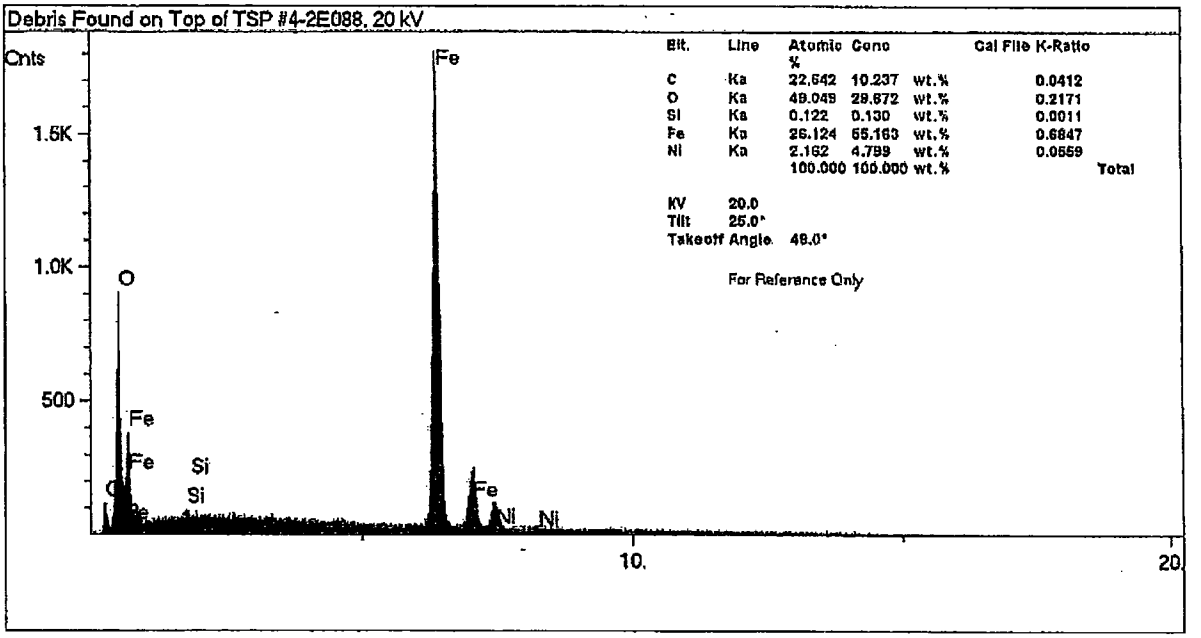


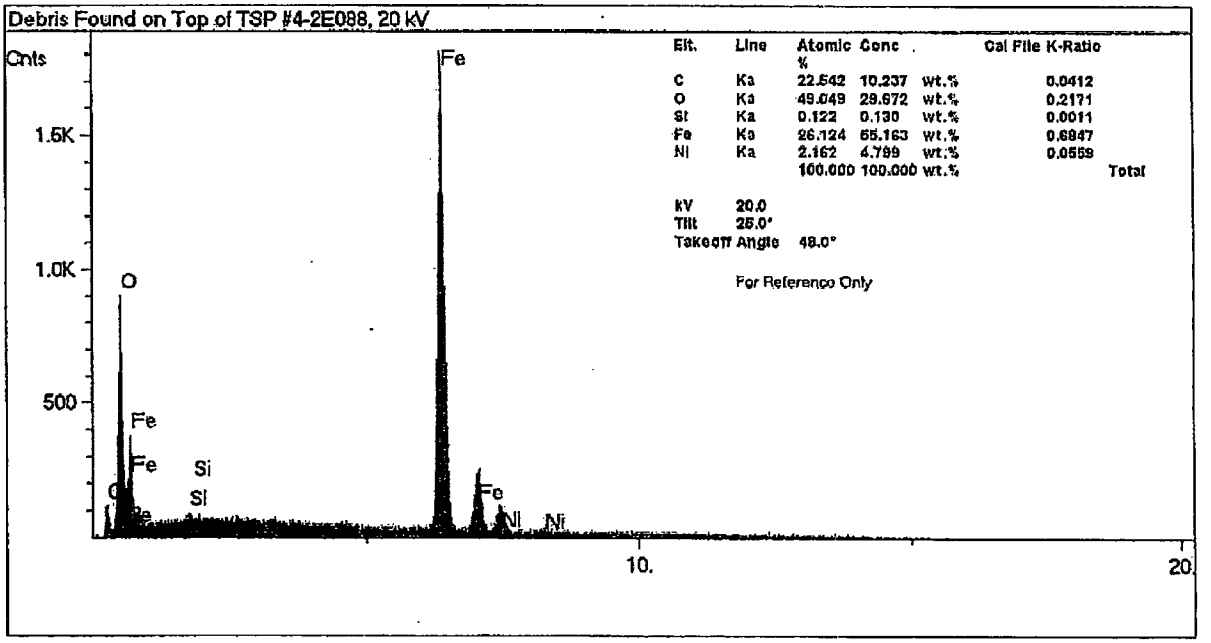
The optical microscope examination revealed the debris as a weld metal of which a portion (identified in the photos as Weld Metal #1) had flowed into a crevice and a rounded portion (identified as Weld Metal #2). The nominal thickness of the Weld Metal #1 was measured as 0.016" and it tapers down at the extremities. The rounded section, which contained surface voids had a nominal thickness of 0.088". The next set of SEM photos show the surface details of the debris illustrating voids and mechanical rubbing.


Debris Found on Top of TSP #4-2E088
20KV 10.0K 1.00m 0003



A representative EDS analysis results of the debris surfaces, the flat side (i.e. bottom side of the SEM photos shown above) as well as that of top the surface are shown in the next two EDS spectra, respectively. Both EDS spectra revealed, in addition to iron base alloy weld as the major constituent, the presence of nickel.



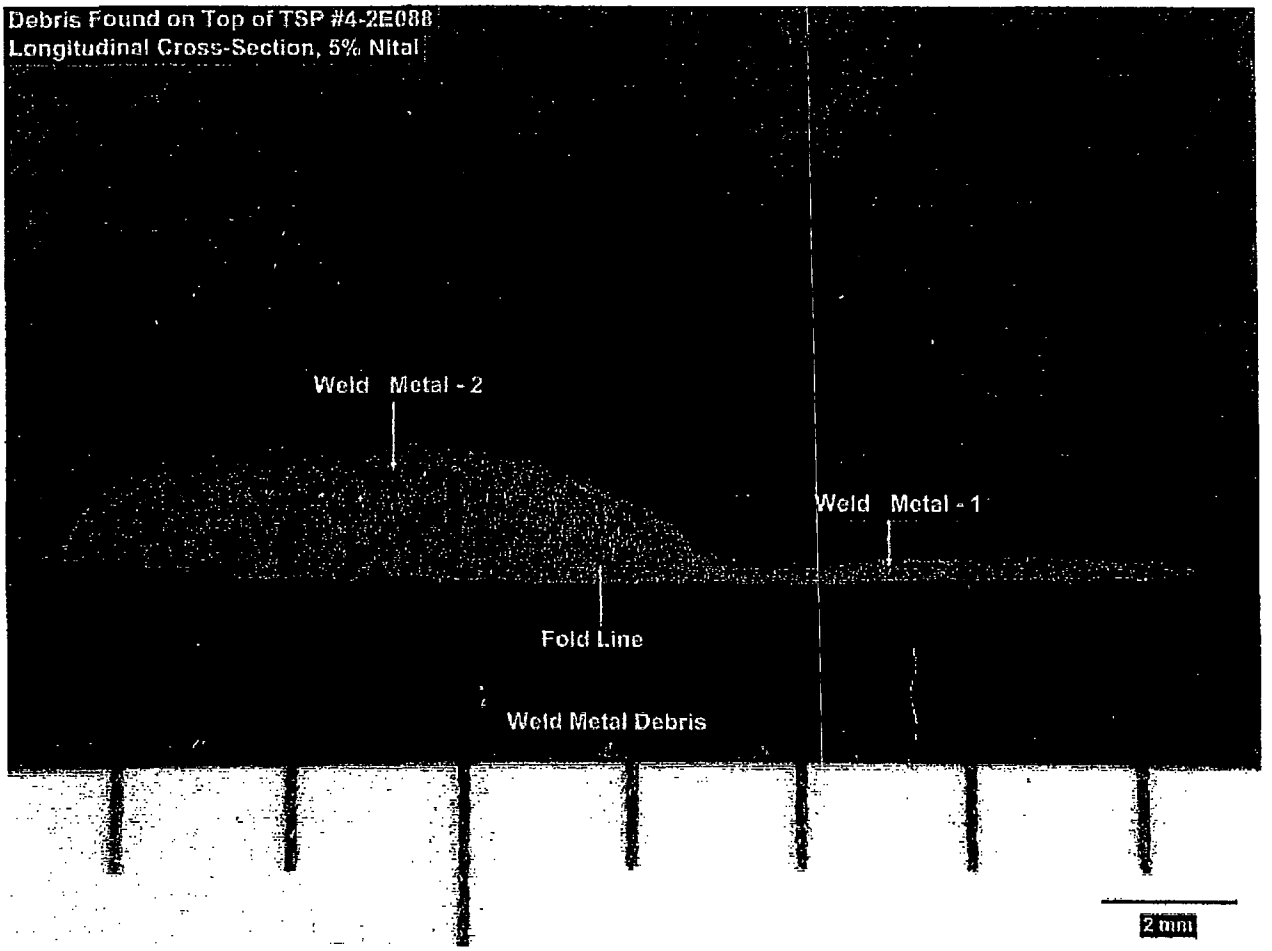


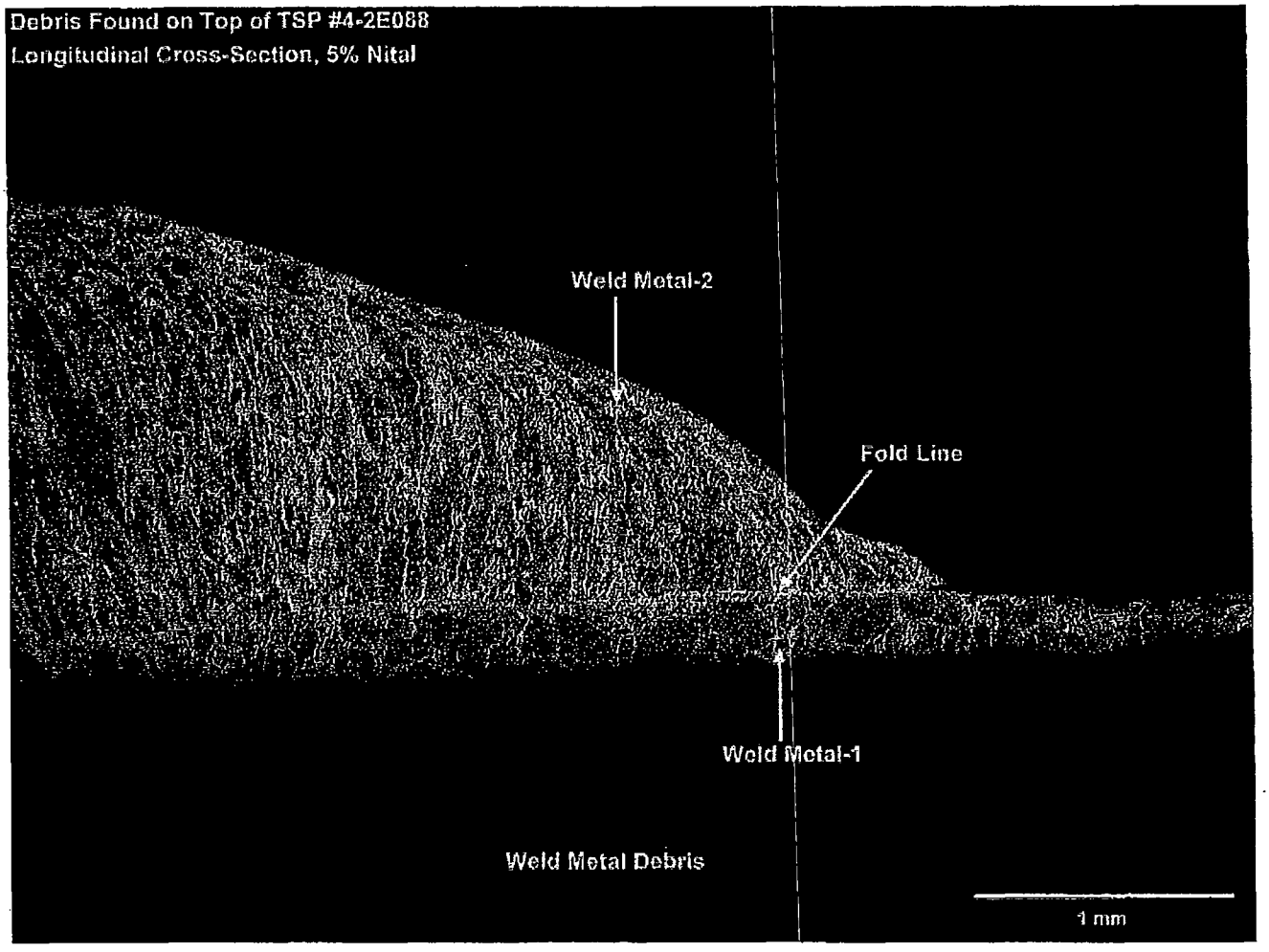
The longitudinal cross section of the debris revealed the following:

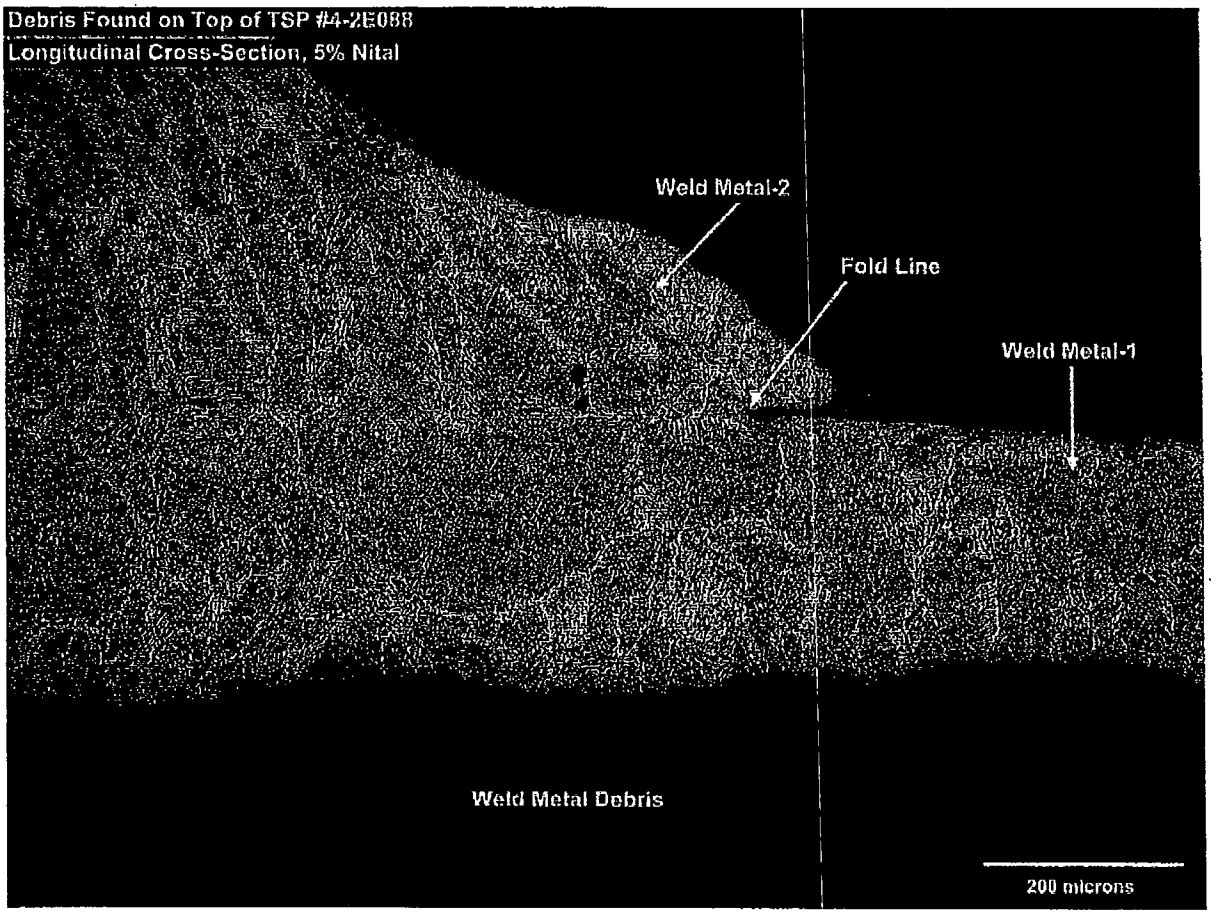
1) the weld metal #1 and weld metal #2 have the same micro structure and same composition and metallurgically joined at the end of the fold point.

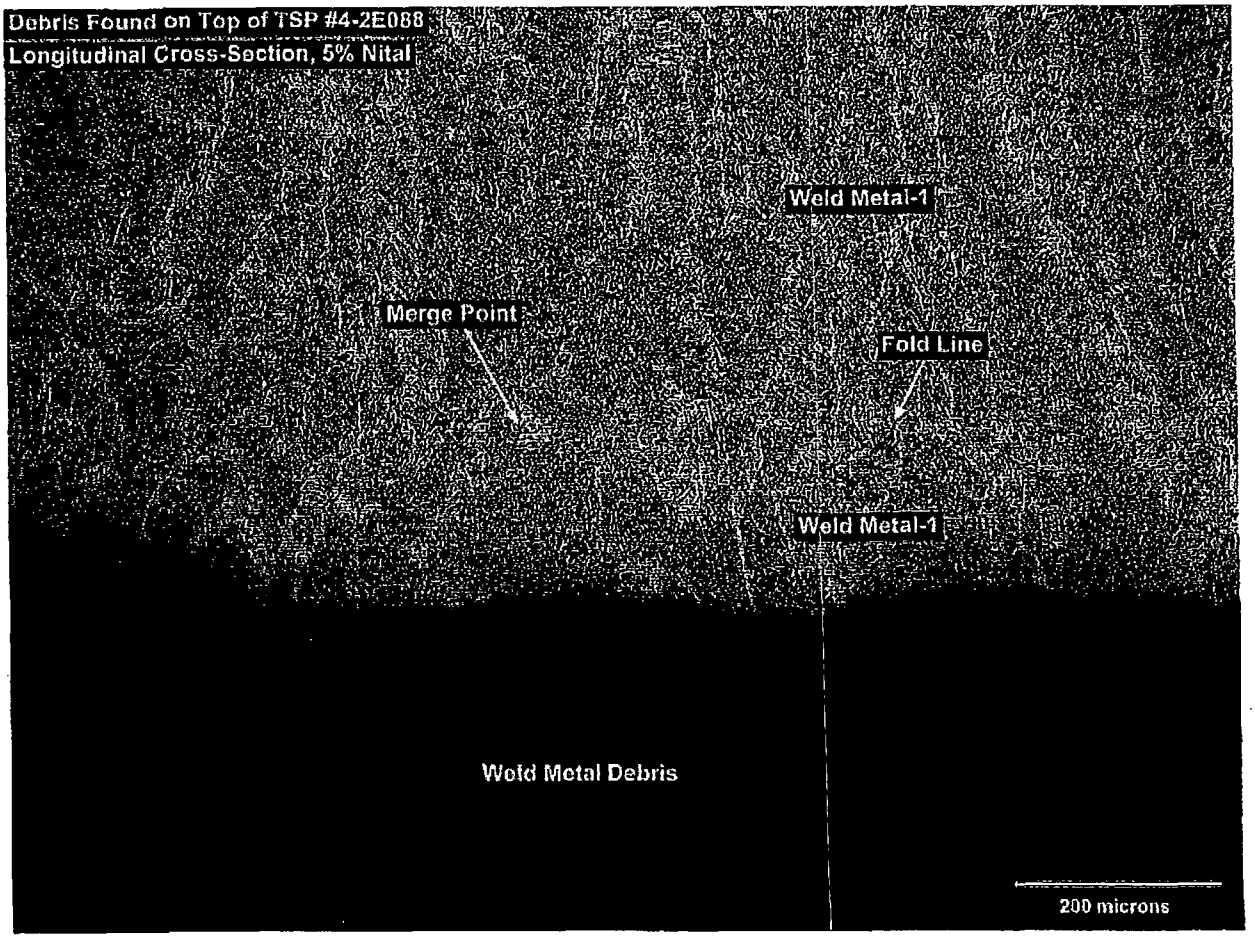
2) the weld metal #1 and weld metal #2 originated from the same weld melt. A portion of the melt had flowed into a crevice (thin section #1) and a rounded section remained on the flat surface (thick section #2). At a later point, the thin section was folded onto the thick section mechanically.

See the photos below illustration the above mentioned observations.

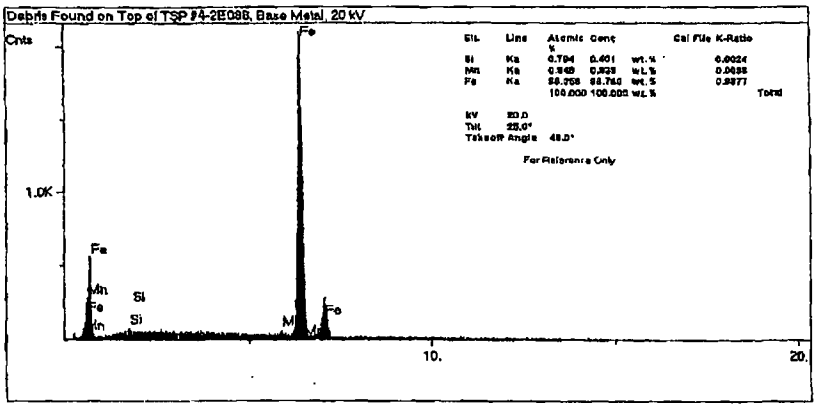



Debris Found on Top of TSP #4-2E088
Longitudinal Cross-Section, 5% Nital
Weld Metal-2
Fold Line
Weld Metal-1
Weld Metal Debris
1 mm


Debris Found on Top of TSP #4-2E088
Longitudinal Cross-Section, 5% Nital
Weld Metal-2
Fold Line
Weld Metal-1
Weld Metal Debris
200 microns



EDS analysis results of the core of the debris is shown below illustrating the absence of any nickel in the weld metal suggesting the flowed weld metal #1 came in contact with a nickel base material. See the EDS spectrum below of the core of the welds.



The micro-hardness of the weld metal #1 and weld metal #2 was measured as 221 Vickers (HRB 97 equivalent) and 230 Vickers (HRB 98 equivalent), respectively.

Summary and Conclusion:

The analysis identified the debris as excess weld metal part of which had flowed into a crevice slightly wider than 0.016". The flowed weld metal came in contact with nickel base material based on the presence of nickel on the surface of the debris as revealed by EDS findings. The weld metal itself is made of low alloy steel, as revealed by EDS.

(b)(6)

2/15/12

Unit 2 System Status: ATCO NOCO
User Status: CRTD STA ACRC

SONGS

Notification: NN 201854749

Description: Recovered Loose Part (Not Eqpt Related)
Created on: 02/13/2012 Reported By: (b)(6) Identified By: SONGS
Responsible: (b)(6)
Priority: 4 Medium Required Start: 04/02/2012 18:03 End: 07/30/2012 18:03
Order No: Code:
Task Exists? [Y]

Func.Loc.: S2.STGS.S21301ME088 STEAM GENERATOR 2 (N) SECONDARY SIDE
Equipment:
Assembly:
Quality Class: I
Location: Containment Room: 106 Elevation: 030 Column: 4413.6
Planner Group: Maint Machinist
WorkCenter: P_PM Project Management
Plant: 1000 SONGS
Reliability Classification: CRITICAL-A

ARC Review Status: C Completed Feedback Req'd? []
M Rule: Sig Level: 2 Moderate Impact to the Station/Personnel

Breakdown [] Malfunction Start: Breakdown Duration: H
End:

Description:

02/13/2012 17:41:36 (b)(6)

1. Problem description
This is not equipment related. Found and retrieved loose part in 2E-088 under order 800589923. Puprose of this notification is to investigate source of loose part.

2. Impact or consequence
None. Loose part was retrieved under 800589923.

3. Describe what happened
Upon inspection of 2E-088 secondary side a loose part was found and retrieved at tube support plate number four in accordance with order 800589923.

4. Immediate actions taken
Loose part retained for investigation.

5. Extent of Condition (as applicable)
No other loose parts were identified upon inspection of both Unit 2 Steam Generators.

SONGS

Notification: NN 201854749
Description: Recovered Loose Part (Not Eqpt Related)

Description Continued:

6. Cause (if known)
Unkown

7. Recommended Actions
Complete metallurgic evaluation of loose part to determine material characteristics.

---------- (b)(6) ----------

Additions to ~7. Recommended Actions~:
Conduct evaluation of the source of the part based on location, size, metallurgic input, steam generator design, FOSAR data, pre-service eddy current data and other input as required.

---------- (b)(6) ----------

Additions to ~ARC Review Comments~:
DCE assigned. Criterion: FME event due to foreign material found in system (DCRC) (b)(6)
02/16/2012 12:45:09
Debris has been removed. Falls out of the OD program scope.

SONGS

Task Summary

Notification: NN 201854749

Func.Loc.: S2.STGS.S21301ME088 STEAM GENERATOR 2 (N) SECONDARY SIDE
Location: Containment **Room:** 106 **Elevation:** 030 **Column:** 4413.6

Task No.: 0001
Code Group: N-SPT General Support Record
Short Text: Analyze Loose Part
Task Code: ST04 SPT Complete
WorkCenter: EM EMF Fluid Processing
Responsible: (b)(6)

EX 6

Task No.: 0002
Code Group: N-OEOUT OE Outgoing Evaluation
Short Text: Outgoing OE - Loose Part in S/G
Task Code: 0010 Assign to SME
WorkCenter: P_PM Project Management
Responsible: (b)(6)

EX 6

Notification: NN 201854749

Func.Loc.: S2.STGS.S21301ME088 STEAM GENERATOR 2 (N) SECONDARY SIDE

Part:	Damage:
Cause:	Activity:
Part:	Damage:
Cause:	Activity:
Part:	Damage:
Cause:	Activity:
Part:	Damage:
Cause:	Activity:

SONGS

Notification: NN 201854749

Func.Loc.: S2.STGS.S21301ME088 STEAM GENERATOR 2 (N) SECONDARY SIDE
Location: Containment **Room:** 106 **Elevation:**030 **Column:** 4413.6

Task Details:

Task No.: 0001

Code Group: N-SPT General Support Record
Short Text: Analyze Loose Part
Task Code: ST04 SPT Complete
WorkCenter: EM_EMF Fluid Processing
Responsible: (b)(6)
Status: TSCO
Planned Start: 02/21/2012 08:06
Planned End: 07/03/2012
Complete: 02/21/2012 08:06

Task Long Text:

SONGS

Notification: NN 201854749

Fund.Loc.: S2.STGS.S21301ME088 STEAM GENERATOR 2 (N) SECONDARY SIDE
Location: Containment **Room:** 106 **Elevation:** 030 **Column:** 4413.6

Task Details:

Task No.: 0002
Code Group: N-OEOUT OE Outgoing Evaluation
Short Text: Outgoing OE - Loose Part in S/G
Task Code: CO10 Assign to SME
WorkCenter: P_PM Project Management
Responsible: (b)(6)
Status: TSCO
Planned Start: 02/27/2012 12:31
Planned End: 03/13/2012
Complete: 02/27/2012 12:31

Task Long Text:

201854749 - 2

OE-OUT EVAL, ACE: FME W/MRULE
N-OEOUT OE Outgoing Evaluation

OUTGOING OE
Background:
Upon inspection of steam generator 2E-088 secondary side<(>,<)> a loose part was found and retrieved at tube support plate number four in accordance with order 800589923.

Briefly summarize the significant aspects of the event/problem/lesson learned that might be beneficial to share with the industry.

A. Is this information worthy of sharing with the Nuclear industry?
(Refer to SO23-XV-40, Attachment 7 for criteria)
Yes: ___ No: X___

If Yes, then use the following form to draft the Outgoing OE report:
//sos2/data3/HUvideos/PI/OE/Forms/XV-40 Att 09.doc

B. Submit draft to the OE Coordinator for processing.

C. Document Nuclear Network OE number prior to closing this task.

,,OE#: [OE#####]
,,Posted on [Date]

Notification: NN 201854749
Description: Recovered Loose Part (Not Eqpt Related)

Evaluated by [Name] [Date]

Peer Checked by [Name] [Date]

Title:
[Title with station and unit in parentheses (e.g., San Onofre 3). Briefly describe the event in a few words. Do not use acronyms. If a Preliminary Report, precede title with "Preliminary - ". If an update report, precede title with "(Update to OExxxxx) - ".]

Abstract:
[Briefly summarize the event or condition with information that is of interest. Include the three essential elements; what went wrong, the consequences, and the primary cause. Limit the abstract to a few sentences.]

Event Date:
mm/dd/yyyy [Date that the undesired condition occurred/first discovered]

Station Name/Unit Number:
San Onofre Unit 2 [or Unit 3]

Significance/Importance:
[State; Consequential, Near-miss, or Nonconsequential]

Lessons Learned for the Industry:
[Describe what the station learned from the event--in other words, the reason the station is sharing the event. This section should specifically describe the barriers that were in place to protect against the event and how those barriers broke down or describe the barriers that were not in place.]

Applicability:
[List station work groups (or departments) that should review the operating experience for applicability and action.] Most common groups are shown below:

Description:
[Provide information to describe what happened--the facts only--in

sufficient detail to be of use to the reader. Do not repeat the abstract. The sequence of events and their cause/effect should be included as appropriate.]

Causes:
[Briefly describe the immediate causes, contributing causes, and when known, the root causes.]

Corrective Actions:
[List corrective actions to provide additional insight into the causes and contributors to the event and to identify the areas that should be strengthened.]

Previous Industry OE/CE:
[List previous industry OE reports that would be helpful to others. Include the OE report number and title.]

Equipment Information:
NSSS/A-E: Combustion Engineering/Bechtel
Reactor Type: PWR
Affected System:
Component Manufacturer:
Component Model Number:
Component Part Number:
Component Type: (for counterfeit or substandard parts or components)
Component Vendor/Supplier/Distributor: (for counterfeit or substandard parts or components)

Information Contact:
Name:
Title:
Telephone:
E-mail:

Corrective Action Program Documents:
[Provide the document number (CR number) or reference to internal station corrective action reports.]

Attachments (Pictures, Root Cause, and so forth):
[Enter file names, if any. Or enter "None" if none.]

Notification: NN 201854749

Description: Recovered Loose Part (Not Eqpt Related)

This NN is being closed to RCE 201843216. No Outgoing OE required.

From: Anchondo, Isaac
To: (b)(6)
Subject: RE: SG secondary inspection videos
Date: Wednesday, February 29, 2012 9:16:00 AM

Morning (b)(6)

I think the summary package of the wear indications via pictures will be better than the DVDs at this time. If you can please make that package available as soon as it's ready would be of great help.

Also, could you upload the revision to the degradation assessment into IMS. I thought it was there but only the original DA was included.

Thanks,
Isaac

From: (b)(6)
Sent: Tuesday, February 28, 2012 6:14 PM
To: Murphy, Emmett; Anchondo, Isaac
Subject: SG secondary inspection videos

(b)(5)

(b)(6)
Inspections Manager
Nuclear Regulatory Affairs
San Onofre Nuclear Generating Station
(b)(6)

D/22
38

From: (b)(6)
To: Reynoso, John
Cc: Warnick, Greg; Anchondo, Isaac
Subject: SONGS CMOA Presentation
Date: Wednesday, February 29, 2012 9:56:31 AM
Attachments: SONGS CMOA Presentation 2.29.12.pdf

See attached, call if you have any questions.

(b)(6)
NRA Manager
(b)(6)
Work: (b)(6)
Mobile: (b)(6)
(b)(6)

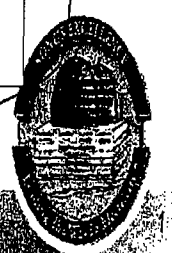
Ex 6

D/23
39

D/23

Unit 2 Steam Generator Status Review

(b)(4)



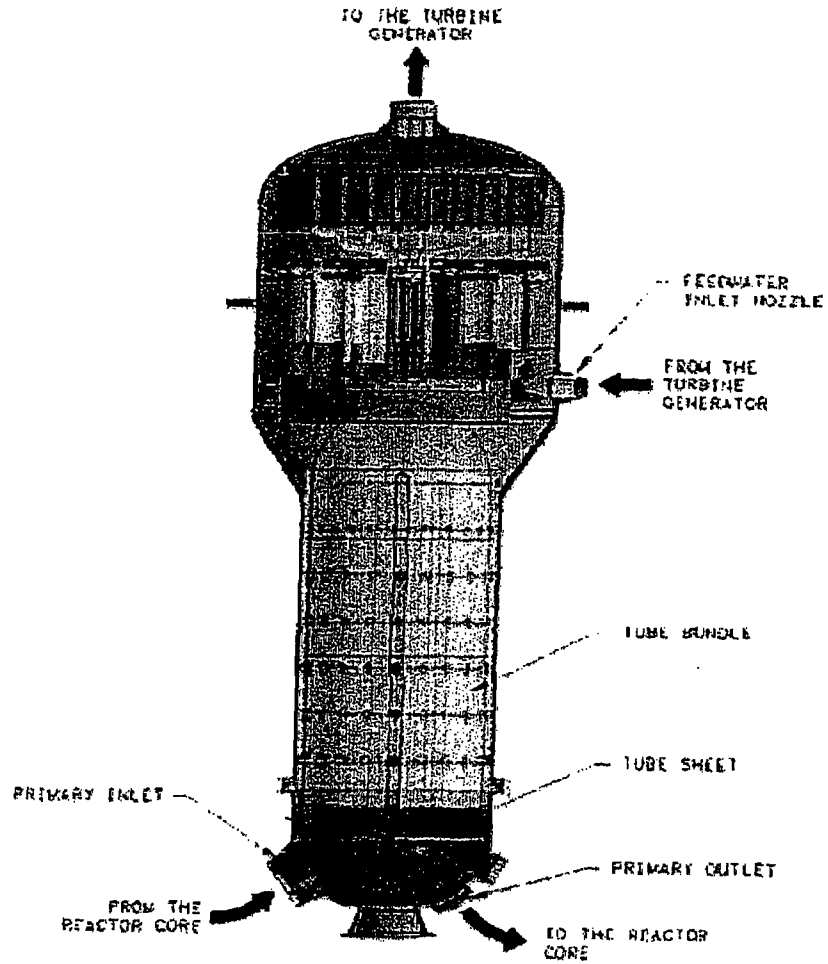
Background

- September 2004 Replacement Steam Generators (RSG) Awarded to Mitsubishi Heavy Industries (MHI)
- Unit 2 RSG delivered to Site in Spring 2009
- RSGs Installed in Fall Outage 2009
- Tube Material Inconel-690 Thermally Treated (690TT)
- Tube Manufacturer Sumitomo Heavy Industries
- Largest Steam Generators Built by MHI

Basic Design Features

- Each SG has 9,727 tubes
- U Bend design
- Seven tube support plates above tube sheet
- Six sets of v-shaped anti-vibration bars (AVBs)
- AVBs separate each row of tubes
- AVBs are welded at top of SG to 12 retaining bars
- Two sets of 12 retainer bars
- Thirteen bridges span the retaining bars
- AVBs, retaining bars, retainer bars, and bridges provide the structural support for upper bundle (U bend region)
- Free float design – tube bundle is not attached to SG shell
- Design Temperature Secondary Side – 650 F

SONGS RSGs



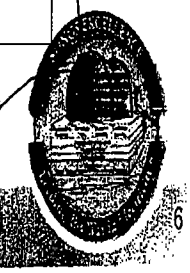
SONGS Steam Generator

SONGS RSGs

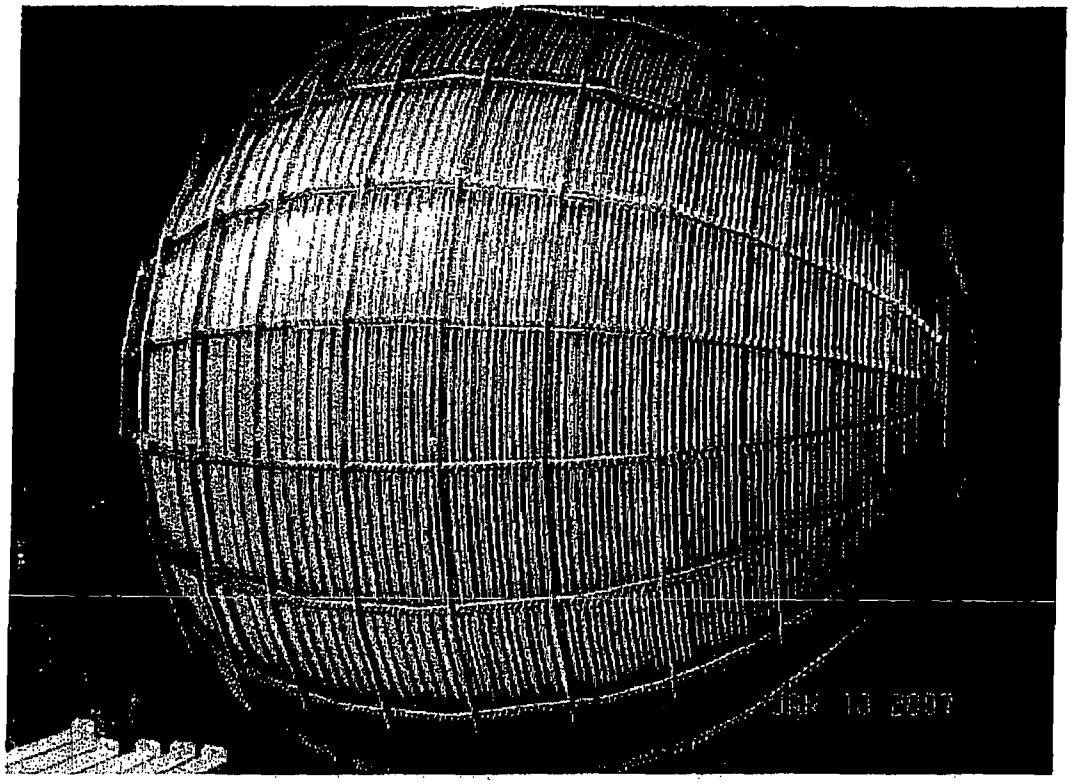
(b)(4)

SONGS RSGs

(b)(4)



SONGS RSGs



SONGS RSGs

(b)(4)

Initial Refueling Cycle Inspection Plan

- In service time ~ 627 days
- 100% Bobbin Eddy Current Testing (ECT)
- Sludge Lance
- Foreign Object Search and Retrieval (FOSAR)
- ECT and FOSAR required by Technical Specifications referring to EPRI guidance
- Sludge lance per industry practice

MHI SG Design Experience

- US
  - SONGS
  - Ft. Calhoun
- Belgium
  - 4 Units
- Japan
  - 17 Units
- Total Number of SGs Supplied - 64
- SONGS largest SG designed and built by MHI

US Industry Information

- 46 Units in US with 690TT tubing
- 43/46 conducted first In Service Inspection (SONGS/Crystal River remaining)
- First ISI performed 1990 – 2011
- CE NSSS 690 TT RSGs – 460 tubes plugged for wear

RSG Wear History

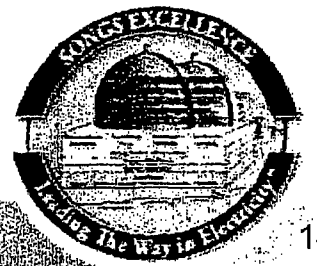
(b)(4)

Ex 4

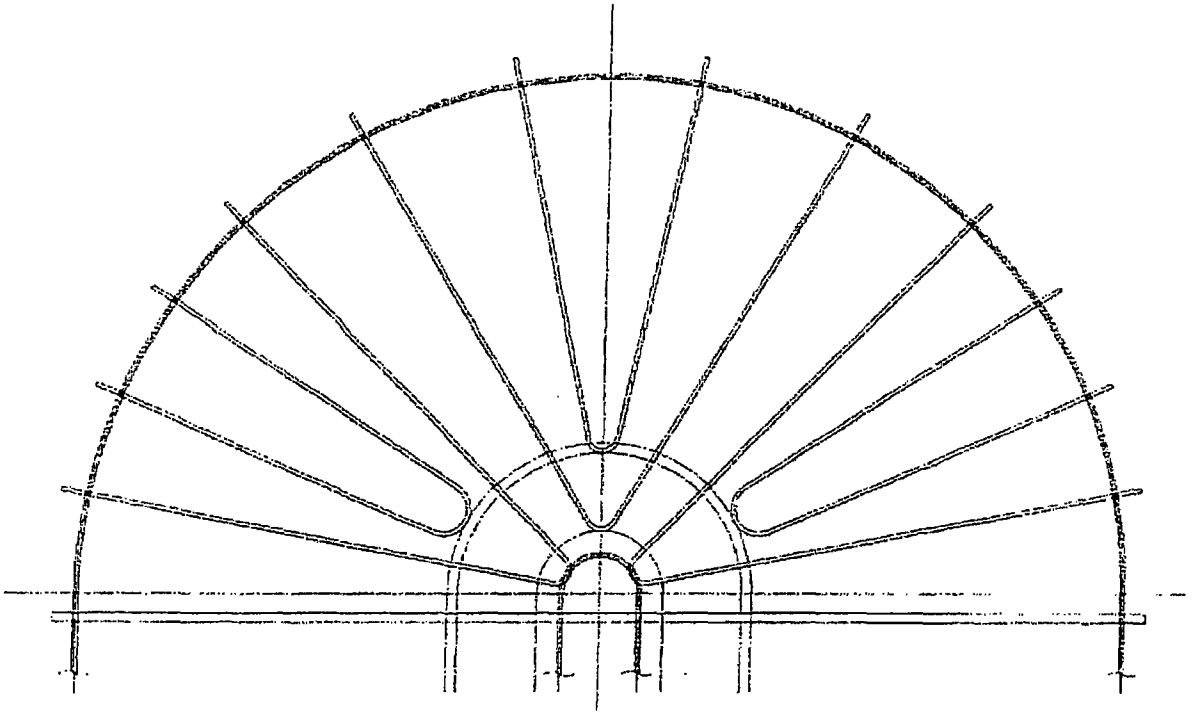
RSG Wear History

(b)(4)

Unit 2 Inspection
Anti-Vibration Bar



Anti-Vibration Bar (AVB)



AVB Wear Summary

	SG 88		SG 89		Total	
	Tubes	Indications	Tubes	Indications	Tubes	Indications
Detected	595	1757	804	2591	1399	4348
Plugged/ Stabilized	4	4	0	0	4	4
Returned to Service	591	1732	804	2591	1395	4323

SCE-SONGS Unit 2 - REPL
AVB Wear

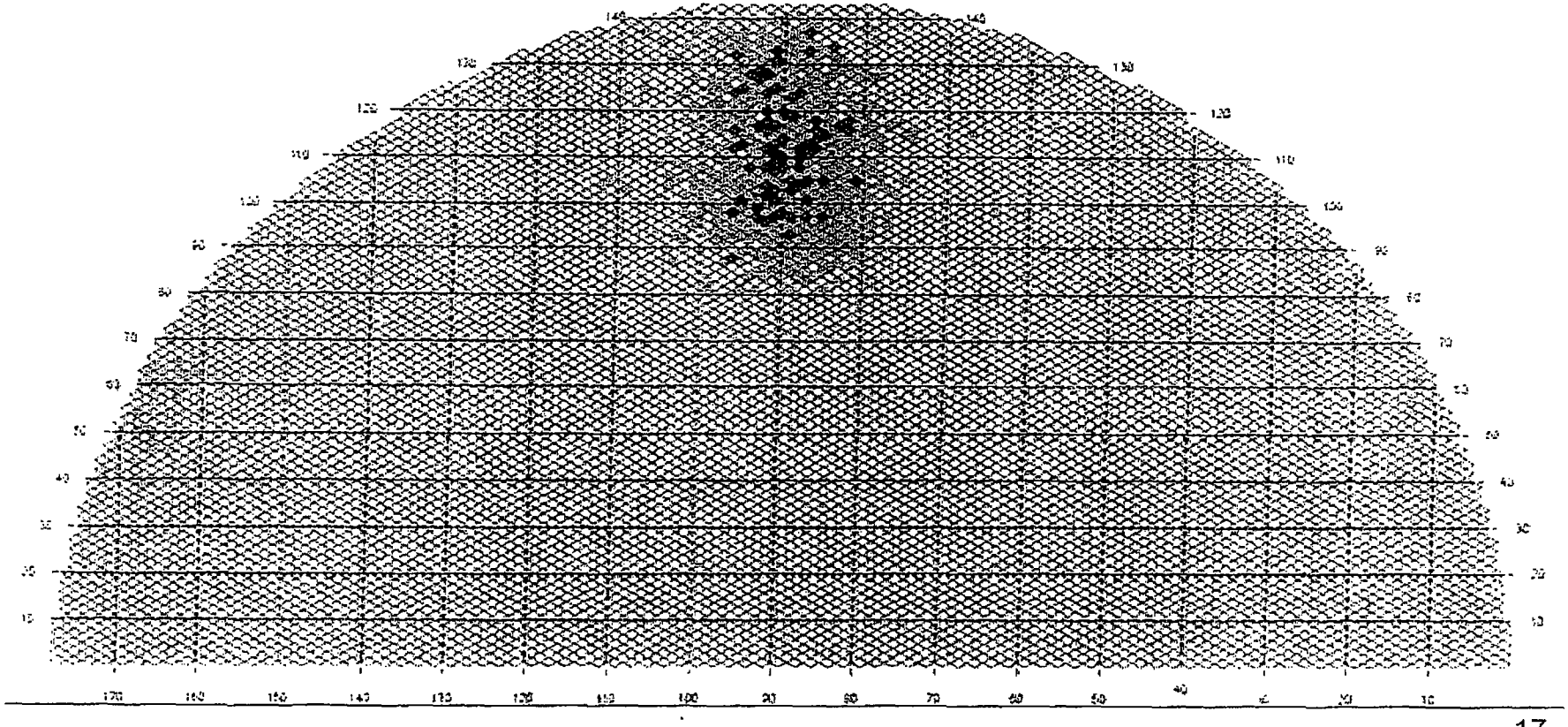
GROUP	TUBES
20-34% T.W.D.	72

SIG 69 Rep
COLD
PRIMARY FACE

TOTAL TUBES 9727
SELECTED TUBES 595
OUT OF SERVICE (#) NA

SCALE 0.088571 X
Sun Feb 19 21:00:04 2012

MANWAY



SCE-SONGS Unit 2 - REPL
AVB Wear

GROUP	TUBES
≥35% TWD	0
20-34% TWD	0

SCALE 0.066573 X
Sun Feb 19 21:04:06 2012

S/G 89 Repl
COLD
PRIMARY FACE

TOTAL TUBES 9727
SELECTED TUBES 804
OUT OF SERVICE (#) NA

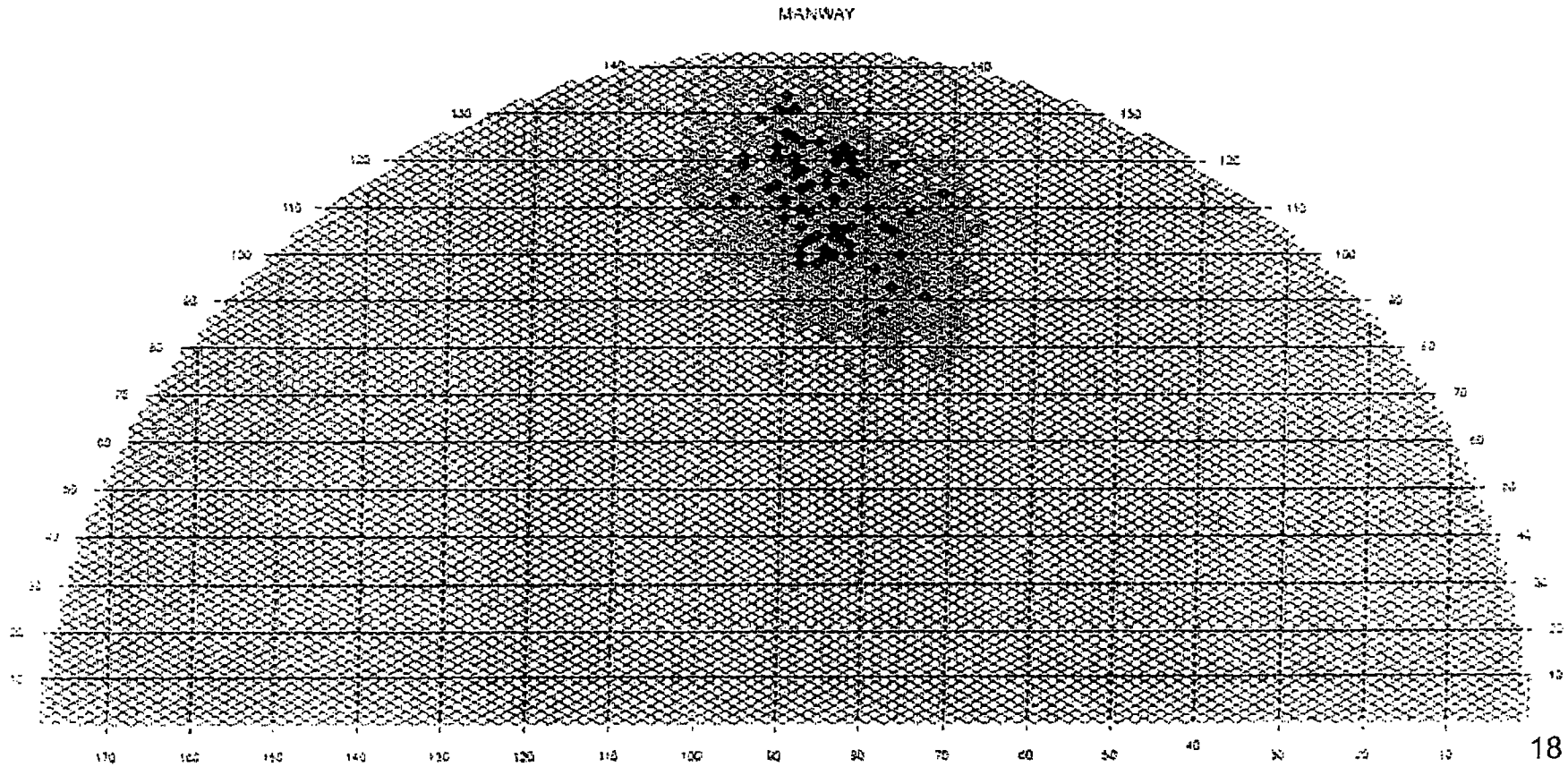


Figure 5-10: SG88 AVB Wear Depth Distribution

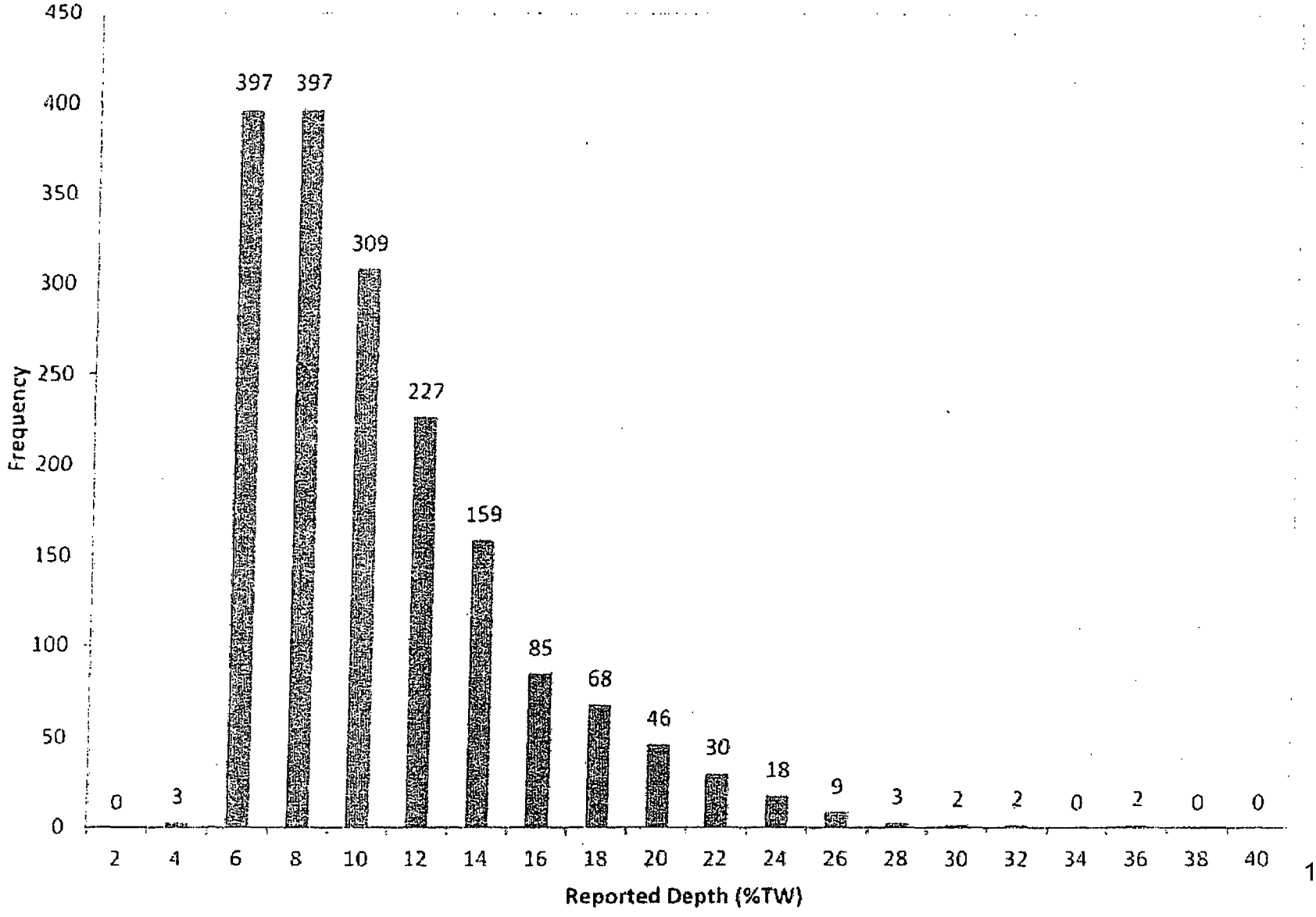
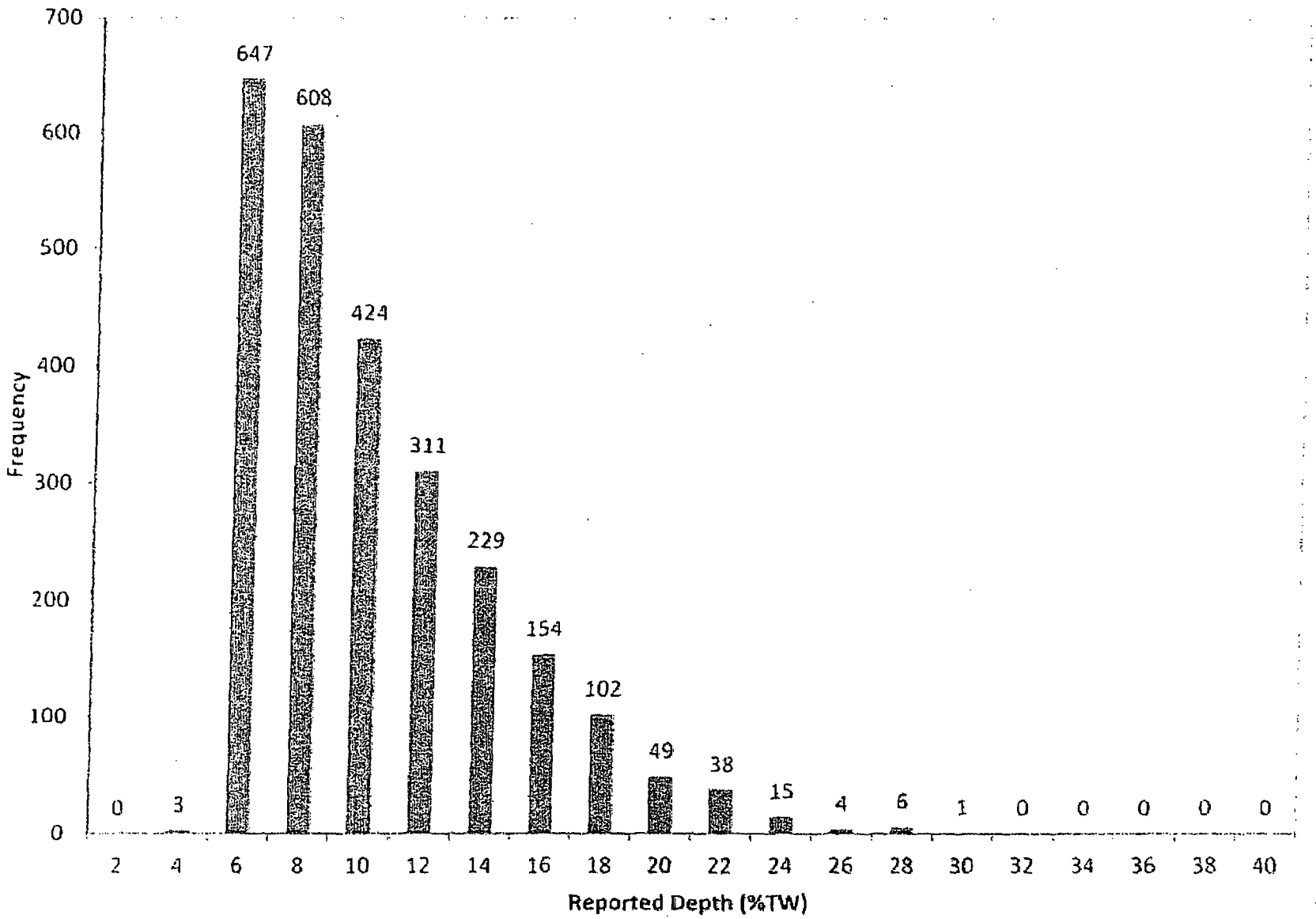


Figure 5-11: SG89 AVB Wear Depth Distribution



AVB Wear Conclusion

(b)(4)

- Unit 2 wear on the same order as Unit 2 RSGs
- Although wear at AVBs is not unexpected the number of wear indications is larger than anticipated
- Tubes plugged is consistent with industry OE for CE NSSS RSGs

Ex 4

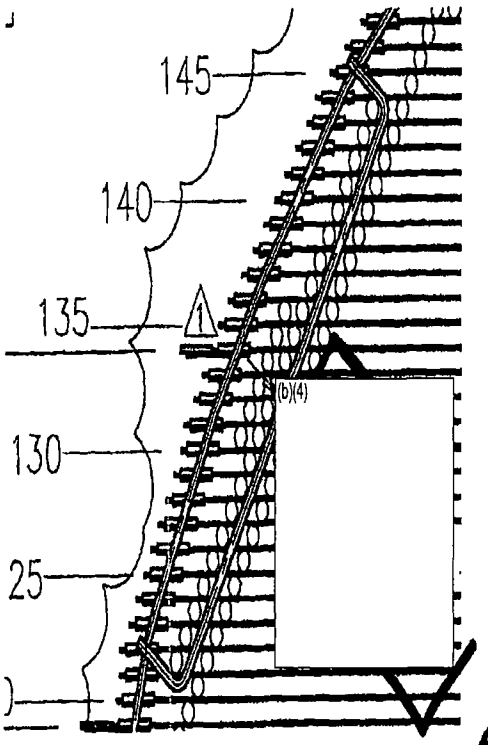
Unit 2 Inspection
Retainer Bar

Retainer Bar (RB)

- Each SG has two sets of 12 retainer bars

Bar	Dimensions	Tubes Inside	Tubes Outside
SONGS Small	(b)(4)	23	24
SONGS Large		23	24
Nearest Plant		12	13

Retainer Bar



2E-088 Retainer Bar Wear

(b)(4)

2E-089 Retainer Bar Wear

(b)(4)

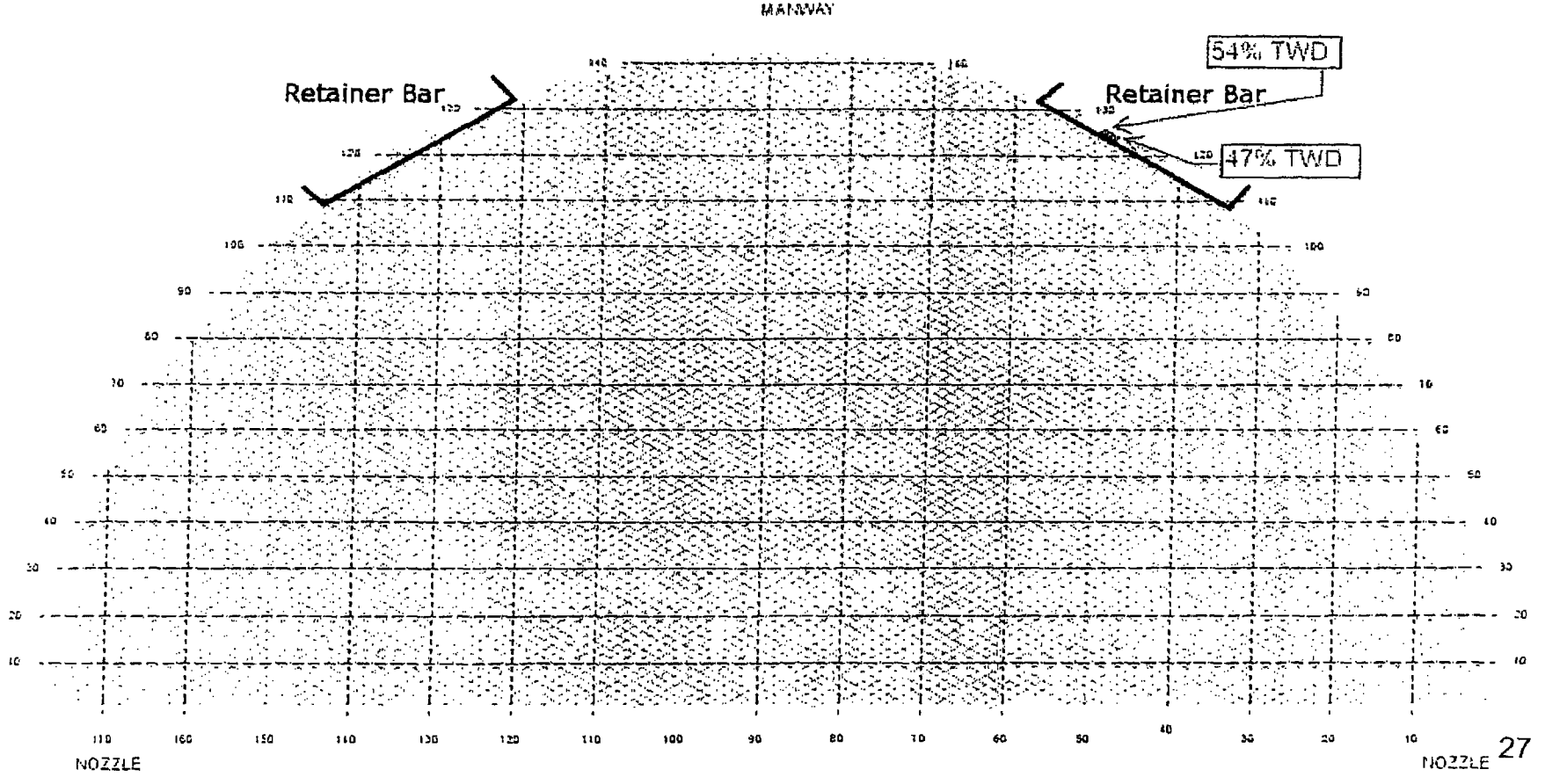
SONGS Unit 2
SG88 Retainer Bar Wear Indications

GROUP TUBES

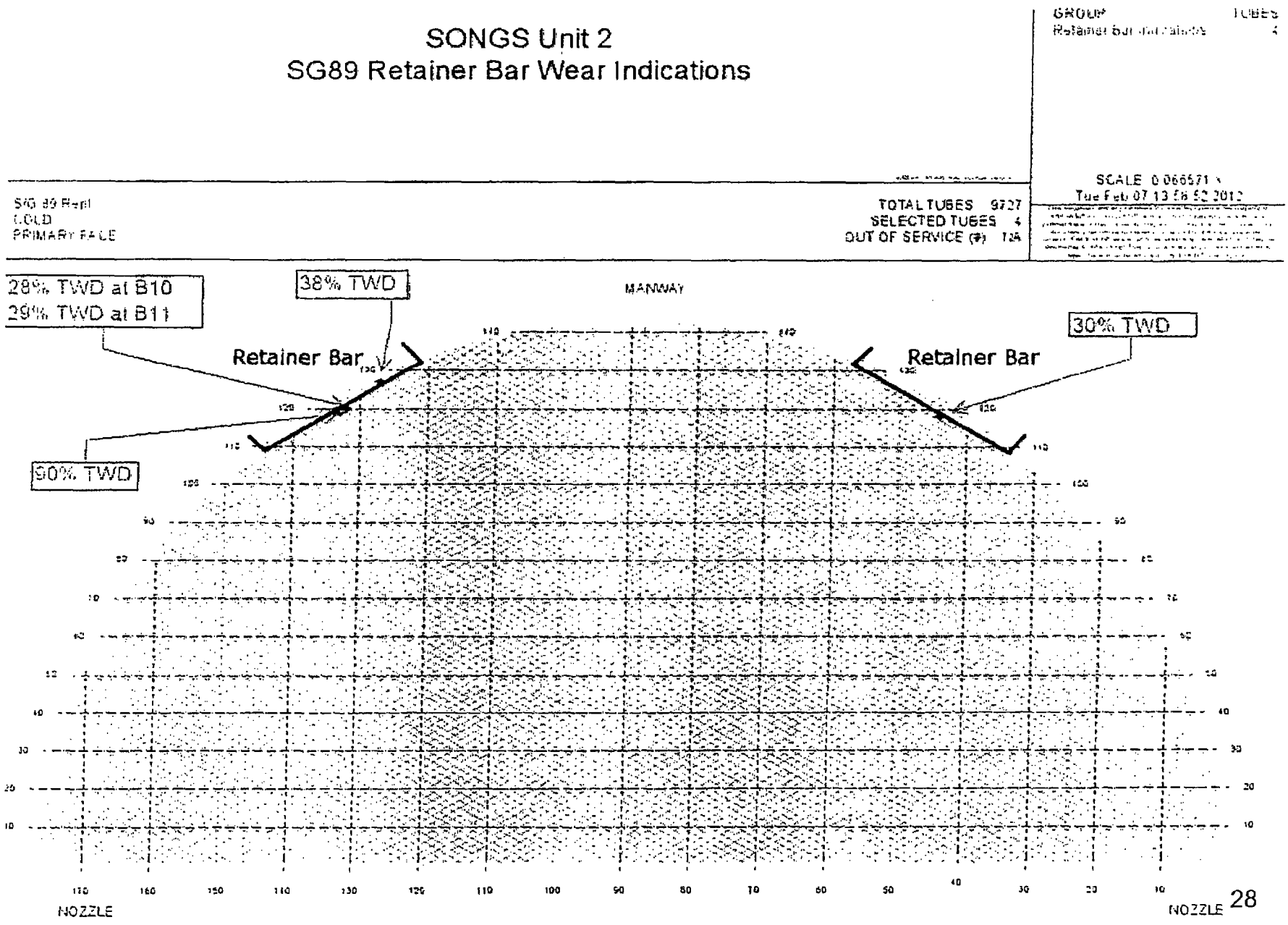
SCALE 0.068571 x
Tue Feb 07 13:51:03 2012

SG #8 Repl
COLD
PRIMARY FACE

TOTAL TUBES 9727
SELECTED TUBES 2
OUT OF SERVICE (#) NA



SONGS Unit 2
SG89 Retainer Bar Wear Indications



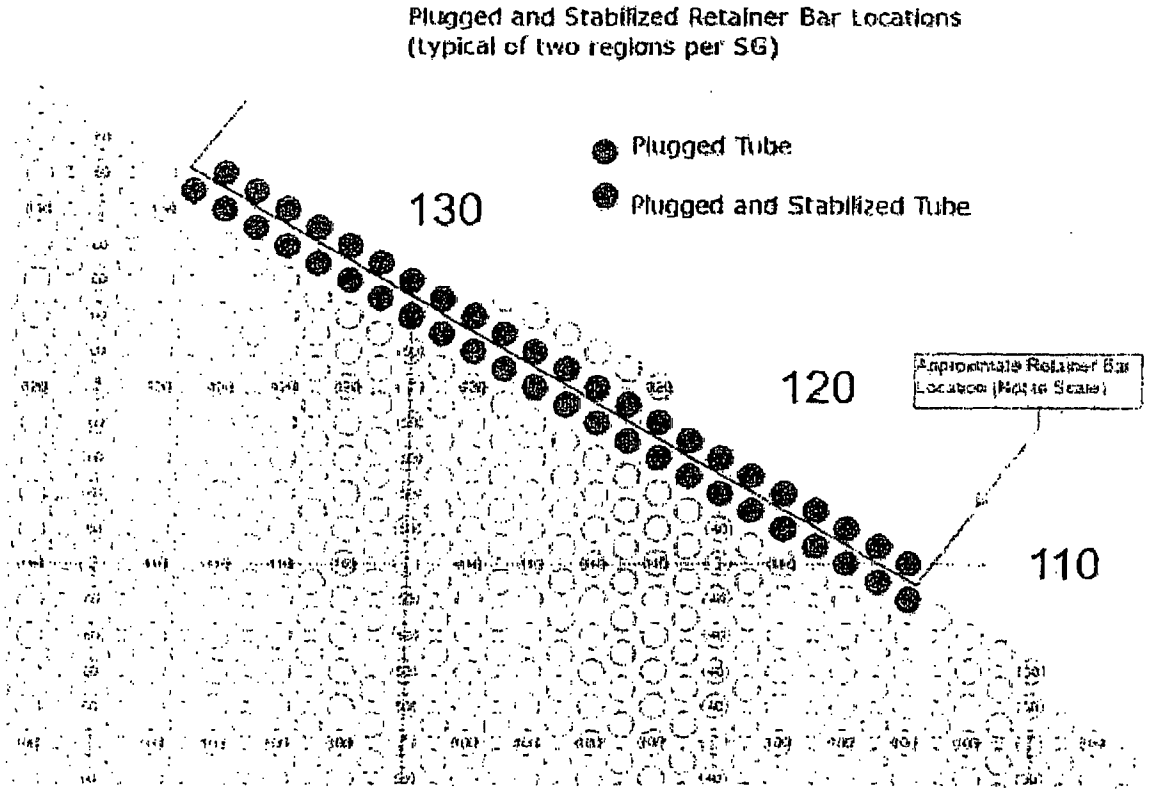
Retainer Bar Wear Summary

	SG 88		SG 89		Total	
	Tubes	Indications	Tubes	Indications	Tubes	Indications
Detected	2	2	4	5	6	7
Plugged	2	2	4	5	6	7
Returned to Service	0	0	0	0	0	0

Retainer Bar Repairs

- All tubes adjacent to retainer bars were plugged
- Prior to plugging, all tubes with retainer bar wear indications were stabilized with U-bend cable stabilizers
- Tubes at each end and in the center of the retainer bars were stabilized (refer to attached sketch)
- Augmented stabilization provides additional material volume to resist continued wear and added assurance in-service tubes will not be challenged

Retainer Bar Wear – Structural Integrity Operational Assessment



RB Wear Conclusion

- RB wear unique – Design Issue
- RB wear extent of condition limited to 94 tubes per SG
- Wear caused by oscillation of thin RB against 6 tubes
- Monitor repairs at next inspection
  - Details of monitoring plan are in development

Unit 2 Inspection
Tube-to-Tube
Support Plate Locations

Tube Support Plate (TSP)

- There are 7 tube support plates in each SG
- Provides structural support to tube bundle in straight section of tubing

Tube Support Plate

(b)(4)

TSP Wear Summary

	SG 88		SG 89		Total	
	Tubes	Indications	Tubes	Indications	Tubes	Indications
Detected	180	225	119	139	299	364
Plugged	0	0	0	0	0	0
Returned to Service	180	225	117	137	297	362

Figure 5-3: SG88 TSP Wear – Hot Leg

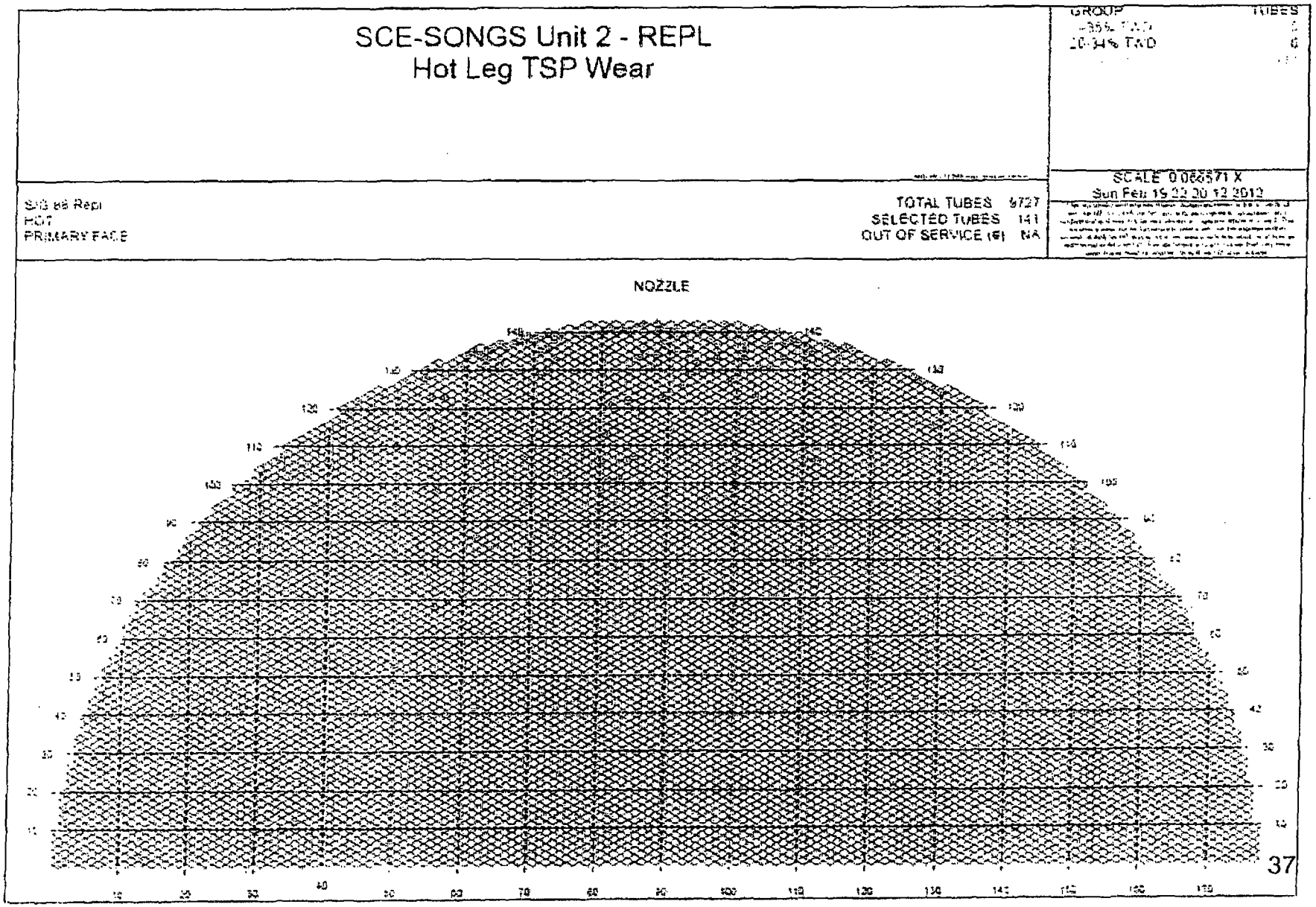


Figure 5-5: SG89 TSP Wear – Hot Leg

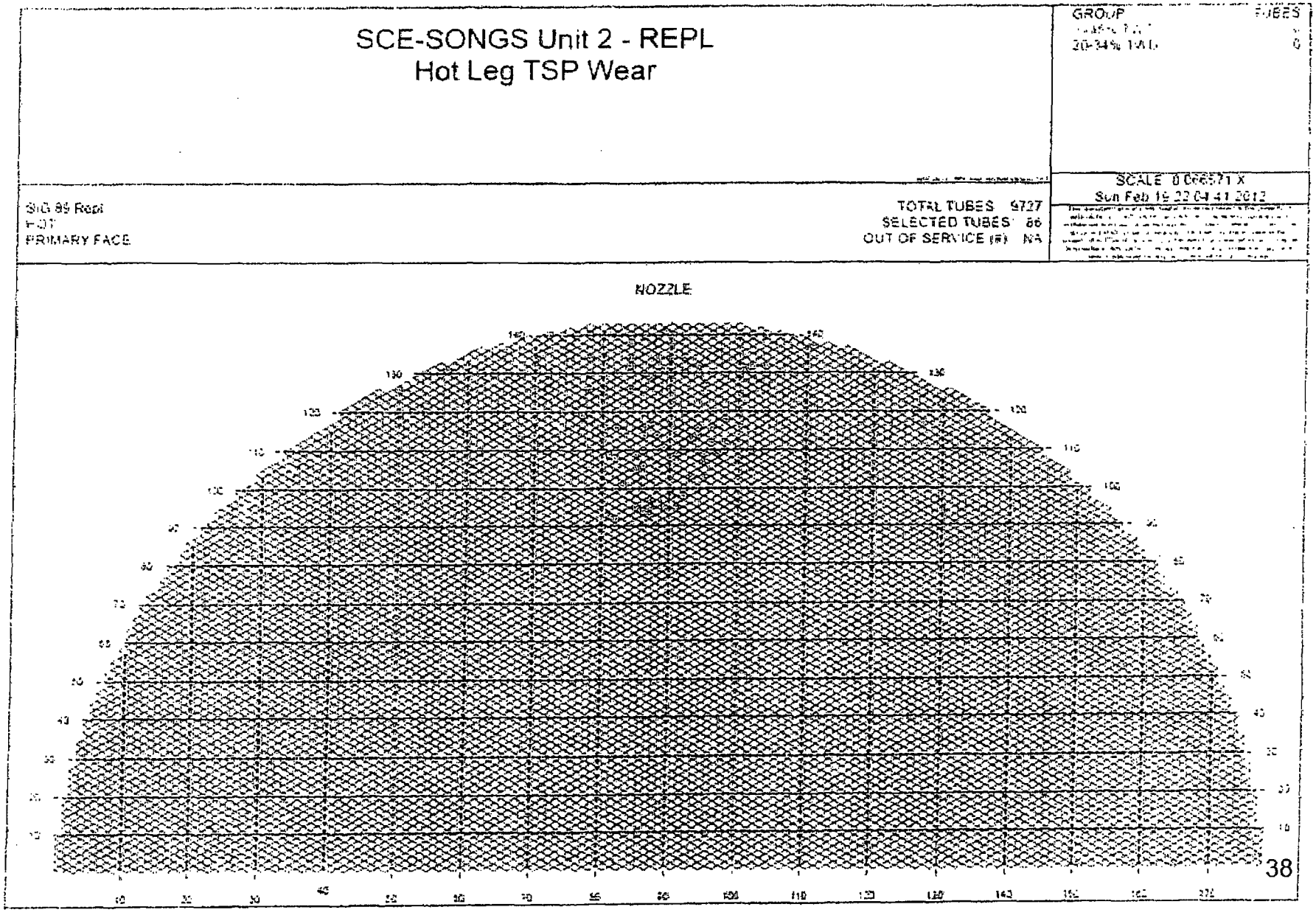


Figure 5-4: SG88 TSP Wear – Cold Leg

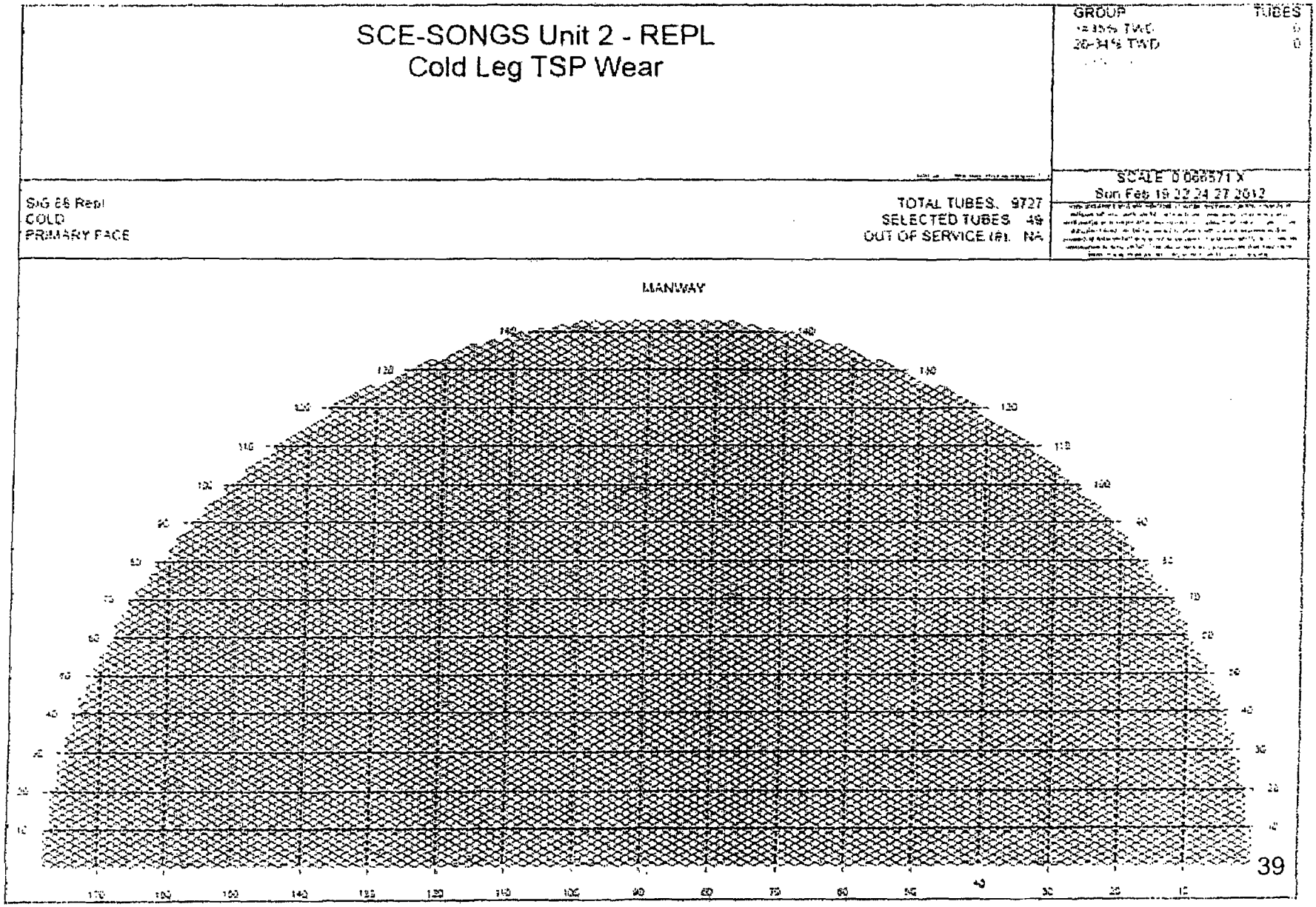


Figure 5-6: SG89 TSP Wear – Cold Leg

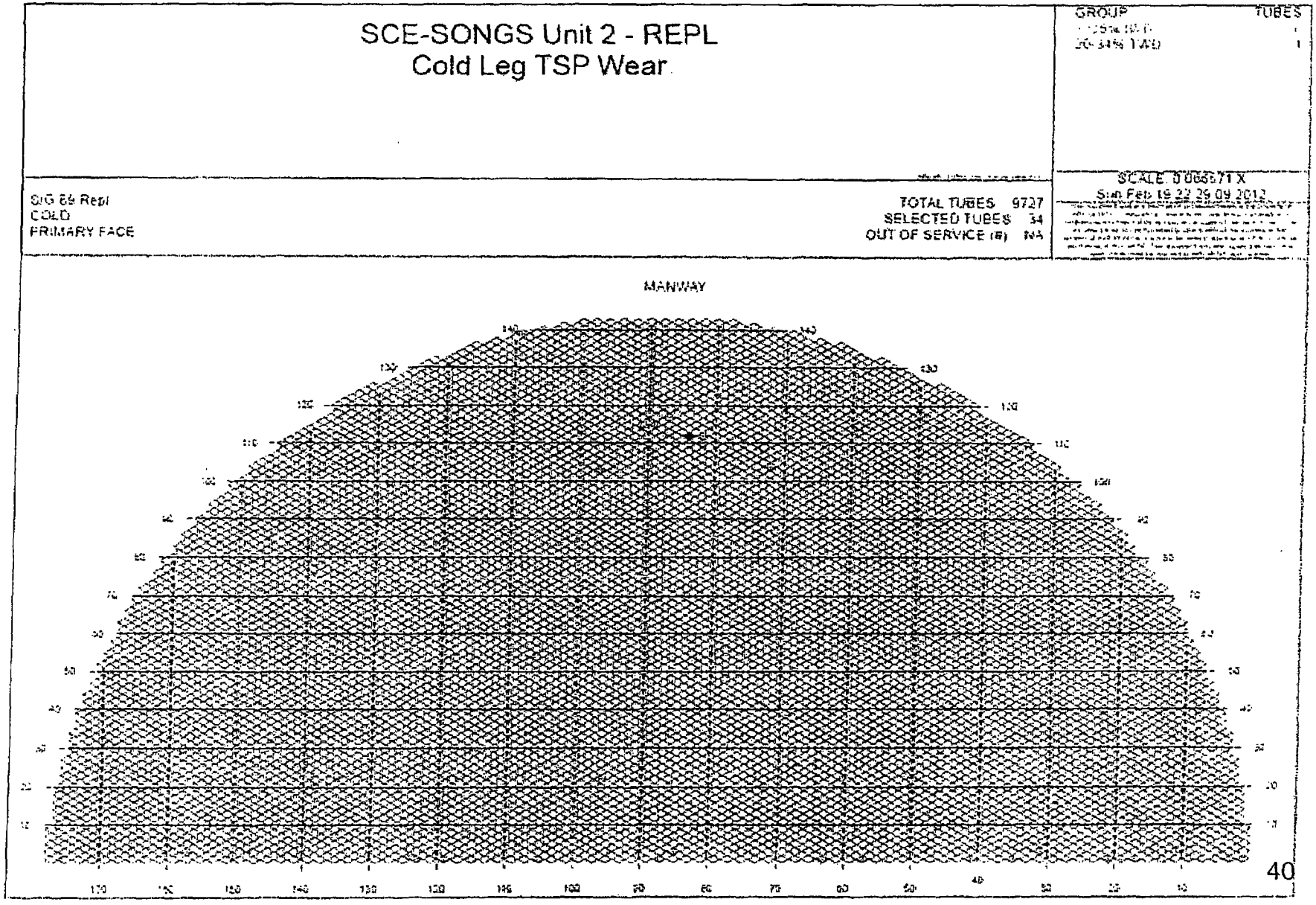


Figure 5-12: SG88 TSP Wear Depth Distribution

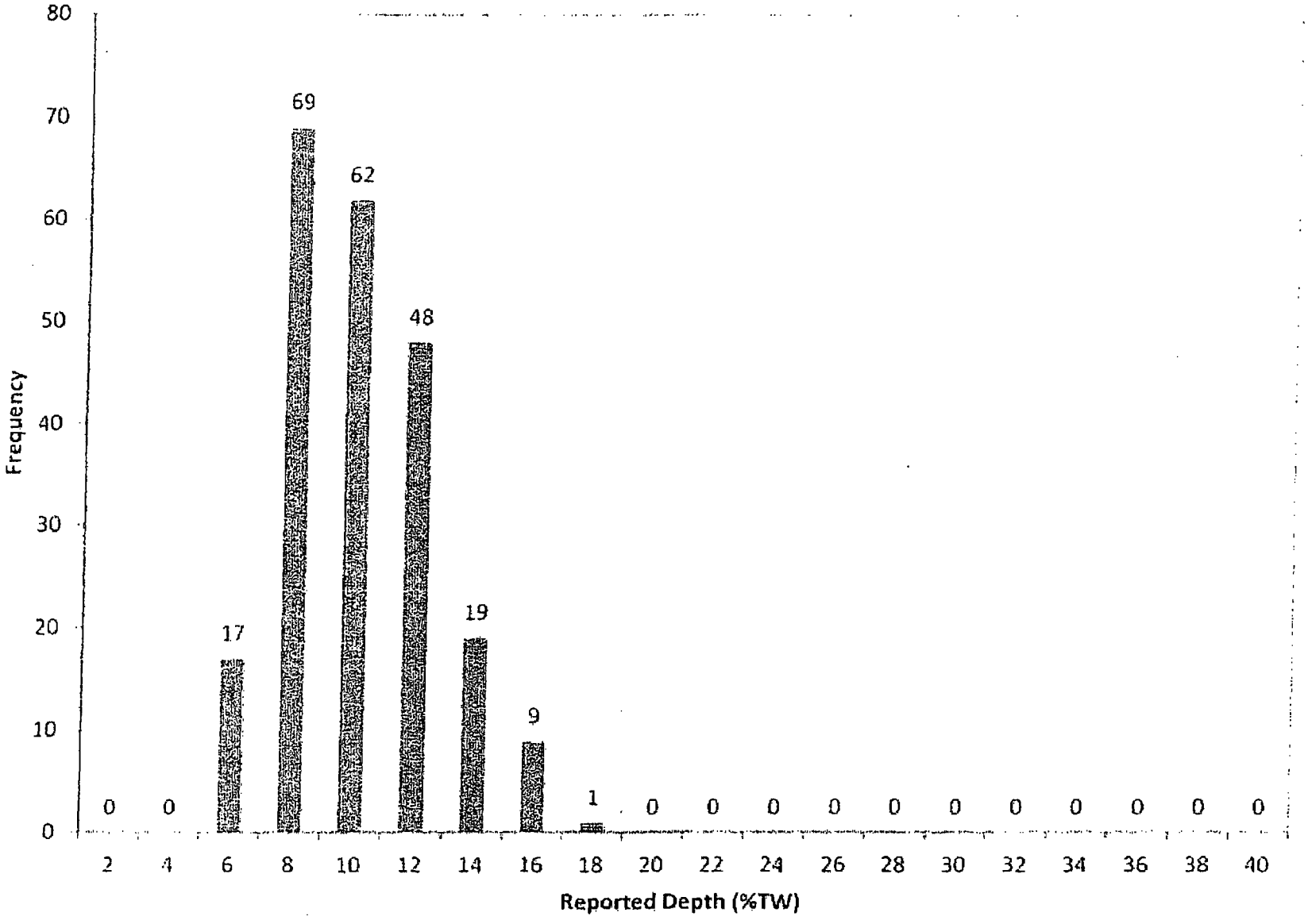
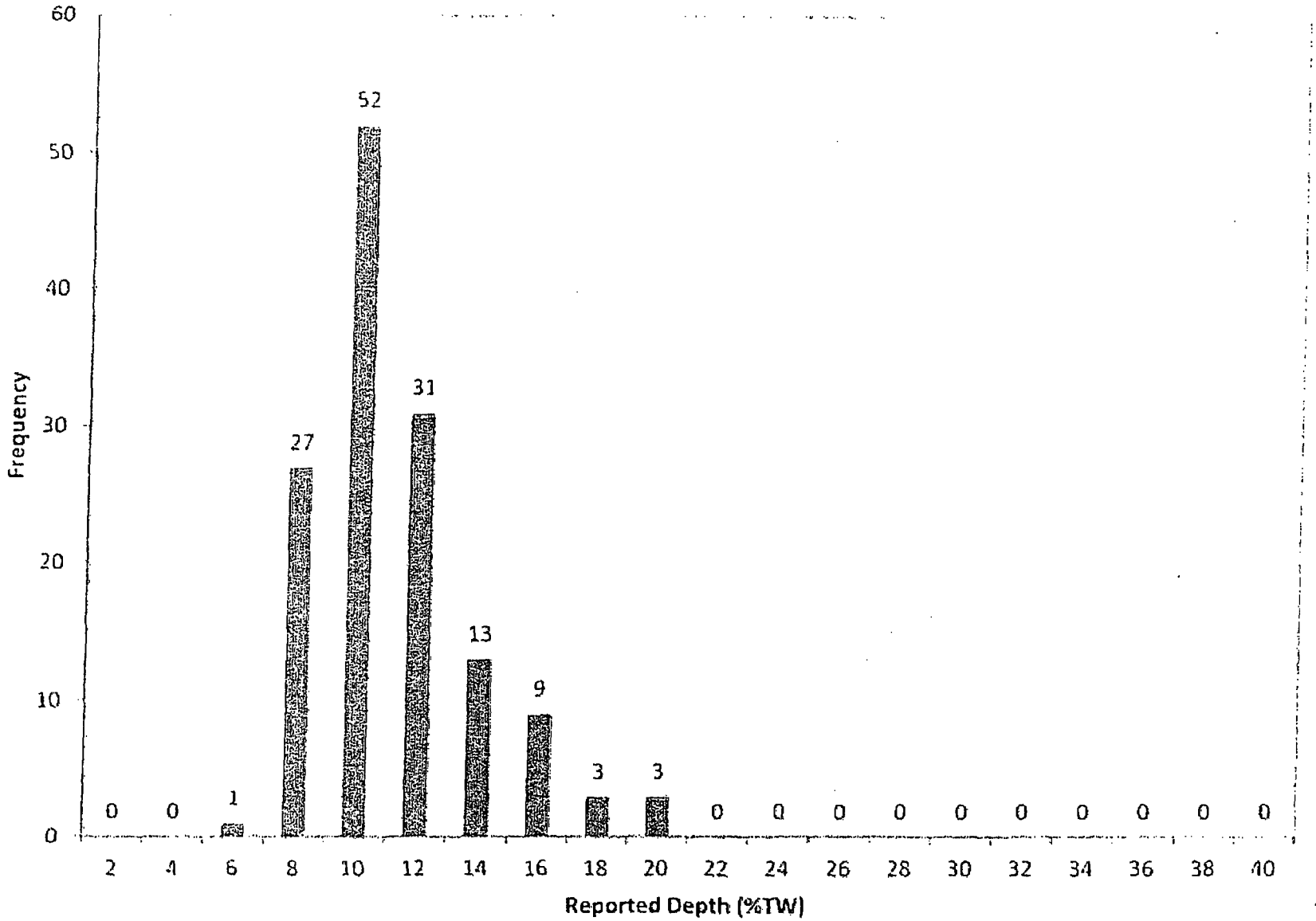


Figure 5-13: SG89 TSP Wear Depth Distribution



TSP Wear Conclusions

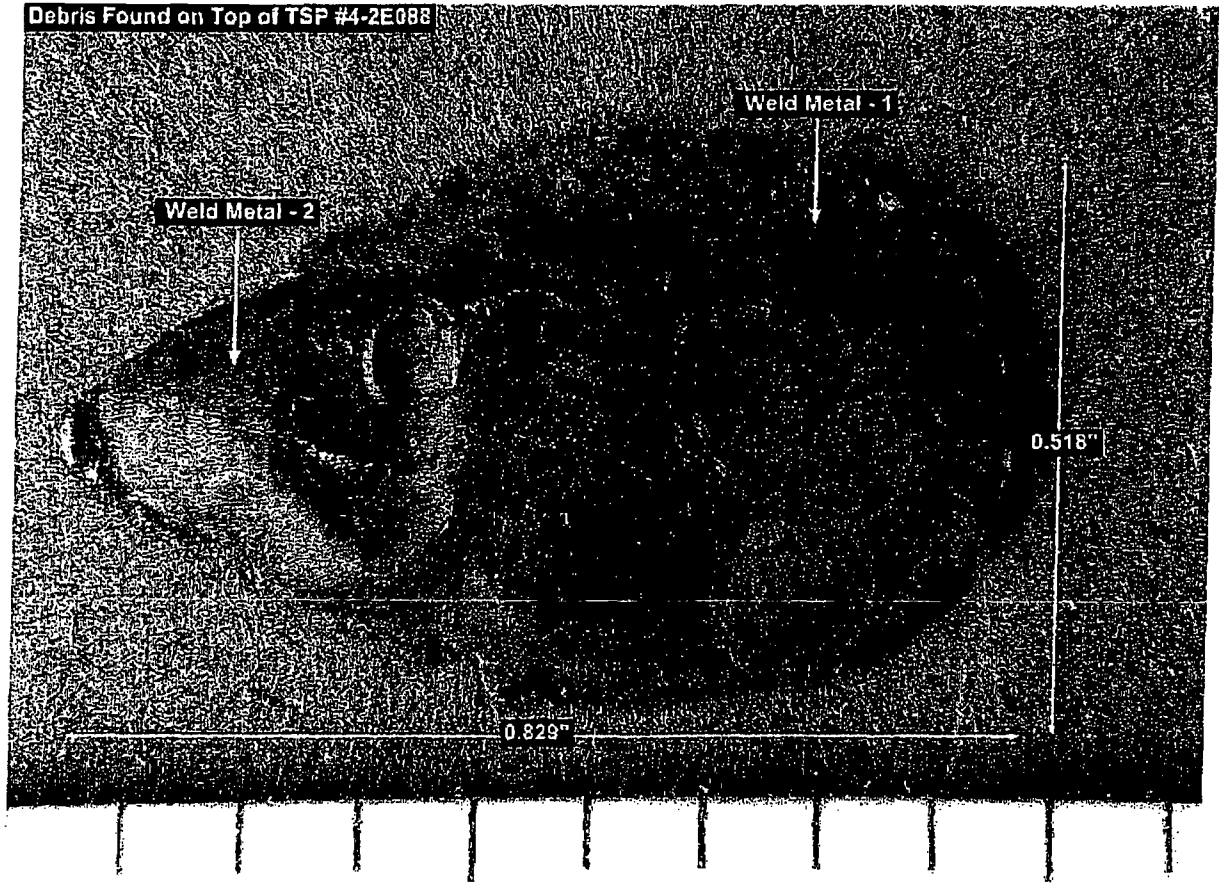
- Unit 2 wear is more extensive than seen in other CE NSSS 690 TT RSGs
- No tubes required plugging
- Will require monitoring in future inspections

Unit 2 Loose Part

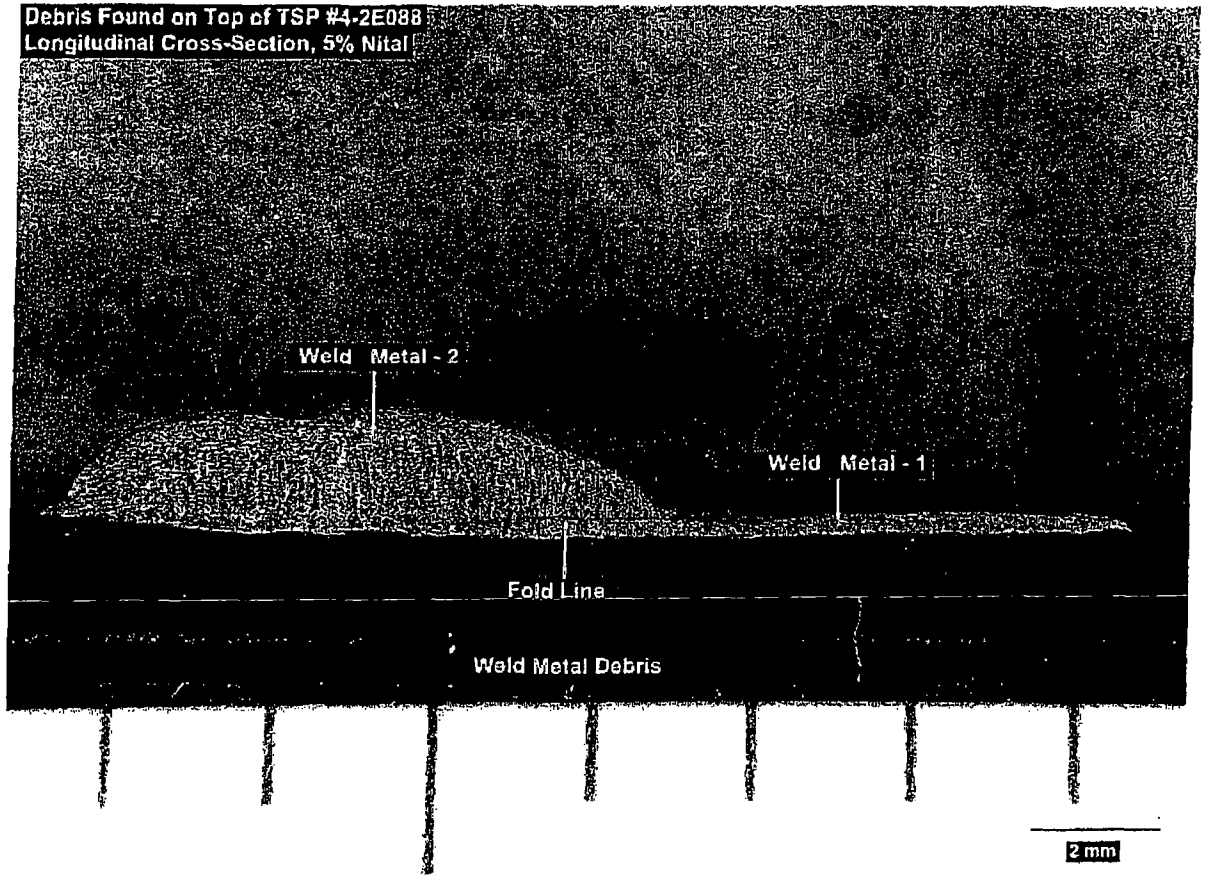
Loose Part

- One loose part found in Unit 2
- SG 2E-088 just above TSP 4
- Removed (recovered)
- Identified as weld material
- Fabrication – too large to pass through feedwater nozzles
- Adjacent tube wear now suspended and below plugging criteria (2 Tubes)
- Still investigating source from fabrication process

Loose Part


Debris Found on Top of TSP #4-2E088
Weld Metal - 1
Weld Metal - 2
0.518"
0.829"

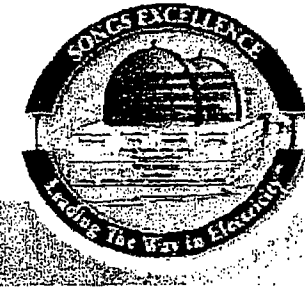
Loose Part


Debris Found on Top of TSP #4-2E088
Longitudinal Cross-Section, 5% Nital
Weld Metal - 2
Weld Metal - 1
Fold Line
Weld Metal Debris
2 mm

Loose Part Conclusion

- No other parts detected by ECT or by FOSAR at the Top of Tubesheet (TTS)
- Peripheral tubes examined at TTS using rotating probes – no indications
- Conclusion - No loose parts remain in U2 SG's

Unit 2
Condition Monitoring



Condition Monitoring

- "Backward looking" to confirm adequate SG integrity was maintained during previous cycle

Condition Monitoring - Performance Criteria

- Structural – maintain integrity over full range of normal operating conditions and DBA's. Safety factor of 3 against burst under normal steady state full power conditions. Safety factor of 1.4 against burst under DBA primary to secondary pressure differentials.
- Accident Induced Leakage – not to exceed primary to secondary accident induced leakage rate for any DBA, other than SGTR. Limit is 0.5 gpm per SG.
- Operational Leakage – primary-to-secondary leakage through any one SG is limited to 150 gpd (0.104 gpm) per LCO 3.4.13

Condition Monitoring Process

- Each detected degradation mechanism must meet the structural and leakage performance criteria
- Demonstrated either operationally, analytically or, when required, by in-situ pressure testing
  - Operationally
    - Via plant leakage detection systems and procedures
  - Analytically
    - Each indication is assessed for key characteristics and compared with an analytically developed Condition Monitoring limit
      - Circumferential extent
      - Axial length
      - Through-wall depth
  - In-situ Pressure Testing
    - Used when-ever flaw does not meet analytical criteria

Condition Monitoring Process

- For a tube with degradation to remain in-service
  - Measure degradation using a qualified ECT sizing technique
    - Without a qualified technique, plug on detection
    - For Unit 2, all degradation was measured using qualified techniques
  - Determine the degradation is acceptable for continued operation

AVB & TSP Wear – Structural Integrity Assessment (Analytical)

- Used maximum detected wear depth:

  AVB – 35% TSP – 20%

- Each flaw size adjusted for measurement uncertainty (increased by 10%)
- AVB flaws assumed to be double-sided
- TSP flaws assumed to be at all three land contacts
- Bounding lengths conservatively assumed
- Resulting flaws compared to CM structural limits with satisfactory results

Retainer Bar Wear – Structural Integrity Assessment (In-Situ)

- Retainer Bar Wear
  - Analytical Assessment
    - Used similar methodology as for AVB & TSP wear
  - One tube R119 C133 with a volumetric flaw near B02
    - Beyond CM structural limit curve
    - Required In-Situ Pressure Test
    - In Situ Pressure test performed satisfactorily
      - Verified all three performance criteria were satisfied
  - Remaining flaws satisfied analytical assessment

Foreign Object Wear – Structural Integrity Assessment (Analytical)

- Two tubes with wear from the object
- Analytical Assessment
  - Used similar methodology as for AVB & TSP wear
- Resulting flaws compared to CM structural limits with satisfactory results
- Since the object was removed and the flaws were below the plugging limit (35%) these tubes were left in service

AVB and TSP Wear – Accident Leakage Assessment (Analytical)

- Since these flaws satisfied the structural criteria of 4290 psi, the accident leakage criteria of 2560 psi was demonstrated by that evaluation

Retainer Bar Wear – Accident Leakage Assessment (In-Situ)

- Bounded by the tube with the largest wear flaw which was confirmed by In-Situ Pressure Testing
- Thus all tubes with retainer bar wear satisfied accident leakage criteria

Foreign Object Wear – Accident Leakage Assessment (Analytical)

- Two tubes with wear from the object
- Analytical Assessment
  - Pop-through of flaw leading to leakage assessed after adjusting for ECT sizing uncertainties and material strength
- Resulting flaws compared to CM pop-through limit with satisfactory results

Condition Monitoring Conclusion

- "This condition monitoring assessment has evaluated all SG tube degradation detected during the 2C17 outage against the three SONGS technical specification criteria. Through a combination of eddy current inspection, analytical evaluation, in-situ pressure testing, and operational leakage monitoring it has been determined that the three performance criteria: 1) structural integrity, 2) accident induced leakage integrity, and 3) operational leakage integrity, were satisfied during the operating period prior to the 2C17 outage."

Unit 2
Operational Assessment

Operational Assessment

- Purpose
  - "In addition to the CM assessment, an operational assessment (OA) must also be performed to ensure that the steam generator tubing will meet the technical specification performance criteria throughout the upcoming operating cycle. The OA projects and evaluates postulated steam generator tube degradation mechanisms, including those currently and previously existing in the subject SGs."

Operational Assessment Process

- Each tube is assessed to determine if it can remain in service
- Deterministic or Probabilistic approaches may be used
- With the large number of TSP and AVB flaws the Probabilistic approach was used
  - "… the projected worst case degraded tube for each existing degradation mechanism must meet the limiting structural performance parameter with a 95% probability and a 50% confidence*."

*50% confidence means the best estimate standard deviation for each uncertainty is used.

AVB and TSP Wear – Structural Integrity Probabilistic Operational Assessment

- Key inputs
  - Population of flaws
  - Growth rate distribution for next cycle
  - ECT uncertainty
  - Estimate of newly initiated flaws
- Probabilistic tool "grows" each flaw left in service and adds in the "new" flaws
- Worst case flaw is compared with structural criteria
- Process is repeated thousands of times to determine probability of burst

AVB and TSP Wear – Structural Integrity Probabilistic Operational Assessment

- Growth Rates
  - Assumed that flaws will continue to grow at rates displayed during 1st cycle of operation
  - No credit for reduction in rate as the tube to support gap increases
  - Credit for increasing wear contact area was taken
  - Factor of 1.25 applied to provide allowance for uncertainty associated with potential effect of planned RCS temperature increase
    - Note this factor is not intended to account for Unit 3 tube to tube wear

AVB and TSP Wear – Structural Integrity Probabilistic Operational Assessment

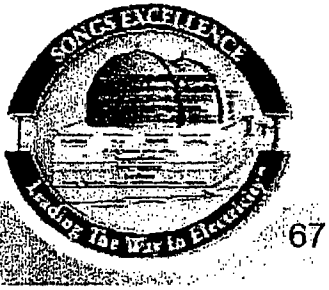
- Results

Flaw	SG 88	SG 89
AVB Wear	0.972	0.970
TSP Wear	0.999	0.999
Wear Combined	0.971	0.969

- Acceptance Criteria 0.95
- Conclusion - criteria satisfied for one cycle of operation until next inspection (assumed to be 575 EFPD compared with 627 EFPD for the prior cycle)

Retainer Bar Wear – Structural Integrity Operational Assessment

- Affected tubes removed from service
- Retainer bar vibration mitigated
- Conclusion – reasonable assurance retainer bar wear will not challenge structural performance criteria over the next cycle



Foreign Object Wear – Operational Assessment

- Two tubes with wear from the object
- Since the object was removed and the flaws were below the plugging limit (35%) these tubes were left in service
- No capacity for the degradation to progress during future operation
- No other foreign objects or foreign object wear flaws identified during ECT or visual examinations
- Conclusion – reasonable assurance foreign objects will not cause structural or leakage performance criteria to be exceeded prior to the next examination

Leakage Integrity – Operational Assessment

- From EPRI SGMP Guidelines the onset of pop-through leakage for Unit 2 degradation is coincident with burst
- Conclusion - since none of the degradation mechanisms are projected to exceed structural performance criteria there is reasonable assurance that neither operational not accident-induced leakage performance criteria will be exceeded

Secondary Side Internals – Operational Assessment

- Retainer Bar condition has been remediated
- No secondary side internals degradation was identified during visual inspections
- ECT confirmed secondary side tube support structures are in place
- Foreign object found is a welding process remnant and not indicative of degradation of secondary side internals or welds
- Conclusion – reasonable assurance that performance criteria will not be exceeded

Preliminary Operational Assessment Summary

- For degradation mechanisms identified in Unit 2, the preliminary assessment concludes there is reasonable assurance the performance criteria will be satisfied through the next operating cycle
- The assessment is not complete and review continues for:
  - Susceptibility of Unit 2 to the emergent tube to tube thinning mechanism in Unit 3
  - Review of the Thot increase

Impact of Unit 3 Inspection Results

Evaluation and Review Expertise

- Onsite Teams
  - Engineering Team
    - S/G Program Manager
    - Ex-S/G Program Manager
    - Sr. Engineers with RSG responsibilities
    - Ex-Program Specialists
    - Contracted expertise including Ex-V.P. of Engineering
  - MHI Team
    - (b)(6) General Manager Nuclear Design Dept.
    - (b)(6) Acting General Manager R & D
    - Additional Onsite support
    - Analytical teams in Kobe
  - AREVA Engineering Support
    - (b)(6) on St. Lucie Cause Evaluation)
    - (b)(6)
    - Onsite and Lynchburg
  - MPR consultant
    - (b)(6) Ex-NRC and on St. Lucie Cause Evaluation)

Evaluation and Review Expertise

- Offsite Teams
  - Chairman of EPRI S/G committee
  - INPO S/G Engineer
  - APS (3, including ECT Level III)
  - B & W (Canada)
  - Framatome (France)

Comparison with Unit 3

Degradation Type	Unit 2	Unit 3
Foreign Object	1 object from fabrication	None
AVB Wear	2 tubes >= 35%	2 tubes >= 35%
TSP Wear	0 tubes > 20%	346 tubes >= 35%
Retainer Bar Wear	6 tubes largest 90%	4 tubes largest 46%
Tube to Tube Wear	None	326 tubes
Operating Interval	1.7 EFPY	0.9 EFPY

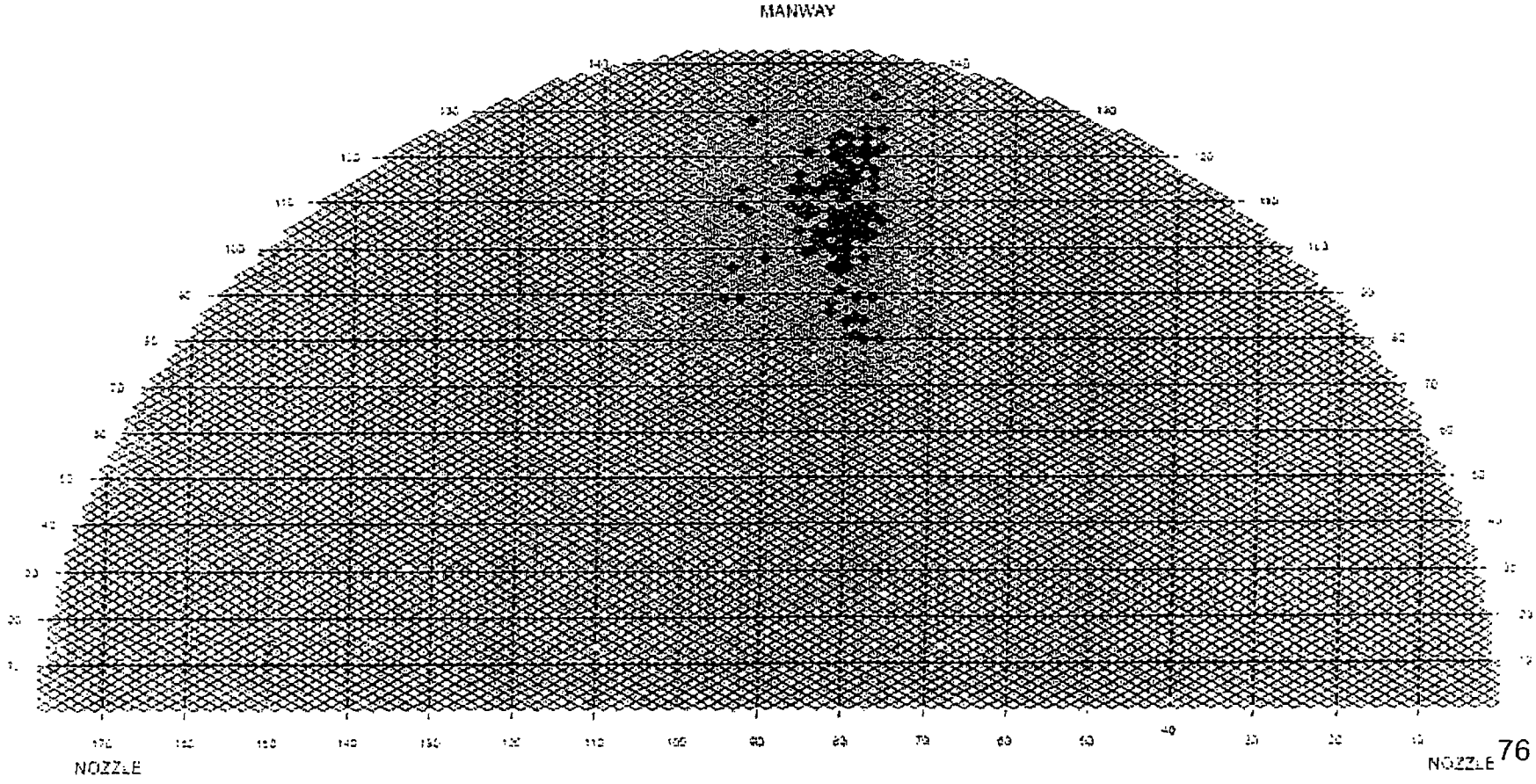
SCE-SONGS Unit 3 - REPL
SG 88 AVB Wear

GROUP	TUBES
[illegible]	[illegible]
[illegible]	[illegible]

SCALE 0.066671 X
Thu Feb 16 01 37 39 2012

SG 88 Repl
COLD
PRIMARY FACE

TOTAL TUBES 9727
SELECTED TUBES 9727
OUT OF SERVICE (#) NA



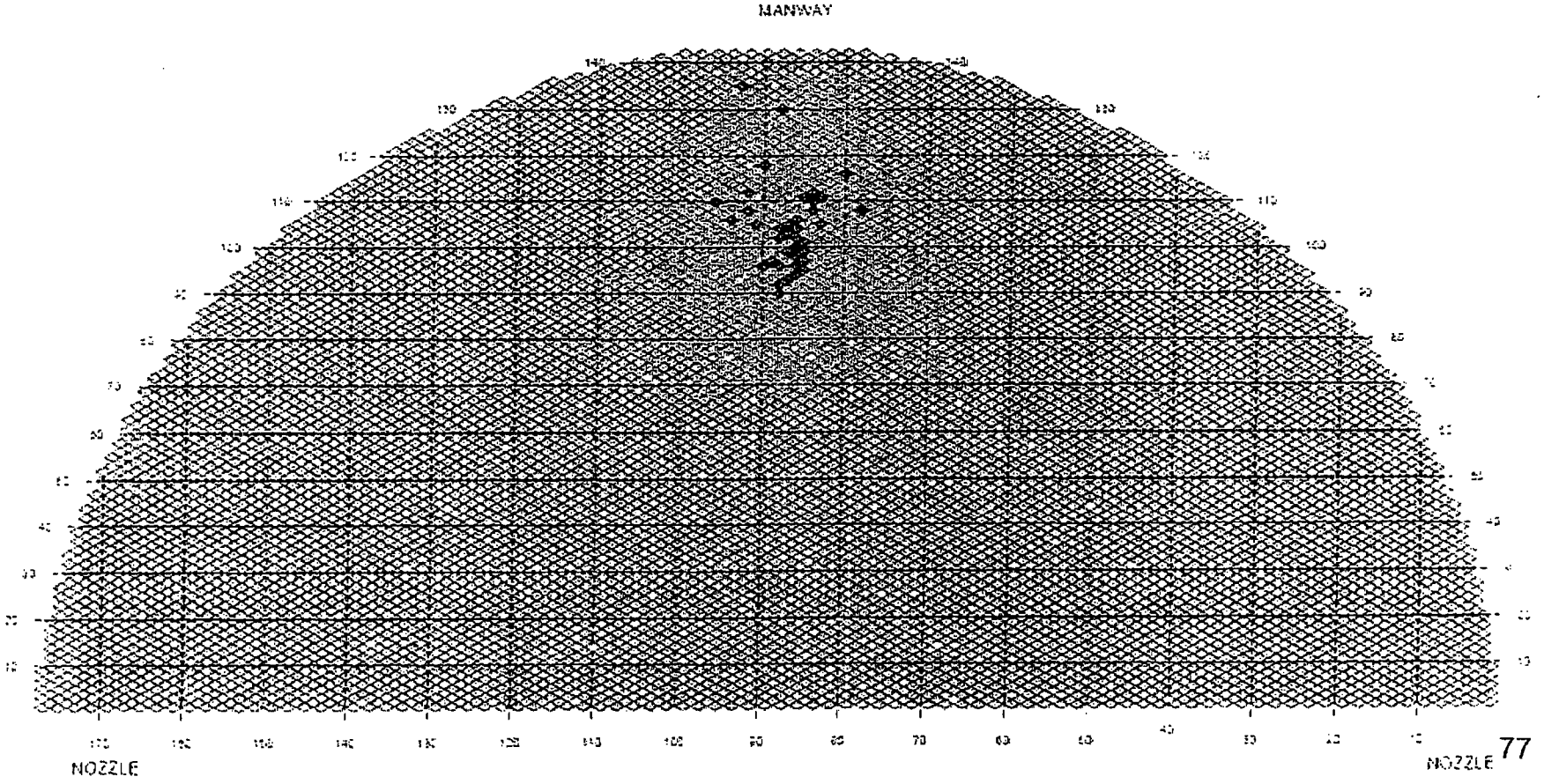
SCE-SONGS Unit 3 - REPL
AVB Wear

GROUP	TUBES
>=50% TWD	0
20-34% TWD	13

SCALE 0.066771 X
Sat Feb 18 03:04:26 2012

S/G 69 Repl
COLD
PRIMARY FACE

TOTAL TUBES 9727
SELECTED TUBES 9727
OUT OF SERVICE (#) NA



SCE-SONGS Unit 3 - REPL
SG 88 TSP Wear

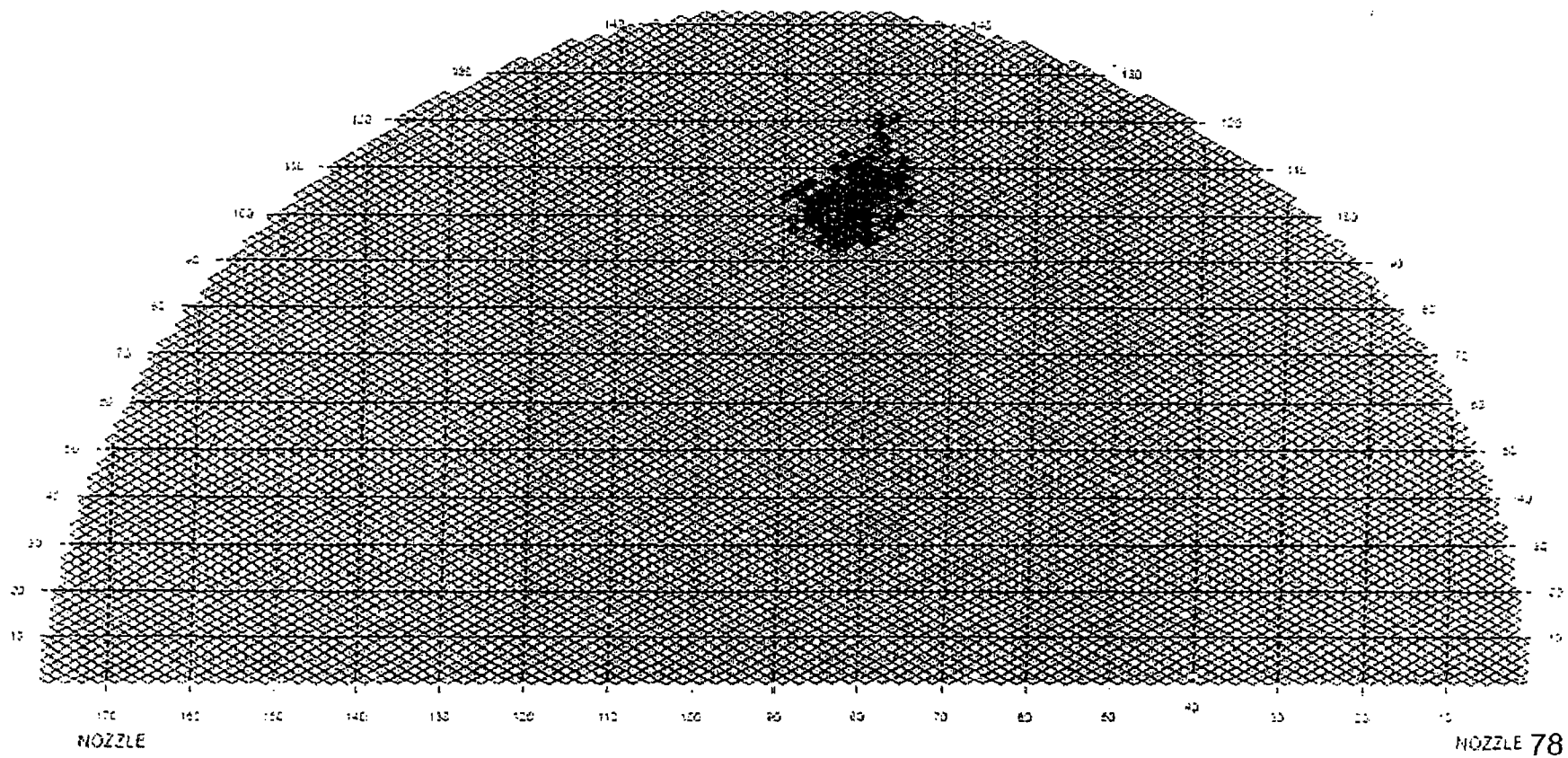
GROUP	TUBES
[illegible]	[illegible]
[illegible]	[illegible]

SG #5 Repl
COLD
PRIMARY FACE

TOTAL TUBES 9727
SELECTED TUBES 9727
OUT OF SERVICE (#) NA

SCALE 0.066571 X
Thu Feb 16 01:42:09 2012

MANWAY



NOZZLE

NOZZLE 78

SCE-SONGS Unit 3 - REPL
TSP Wear

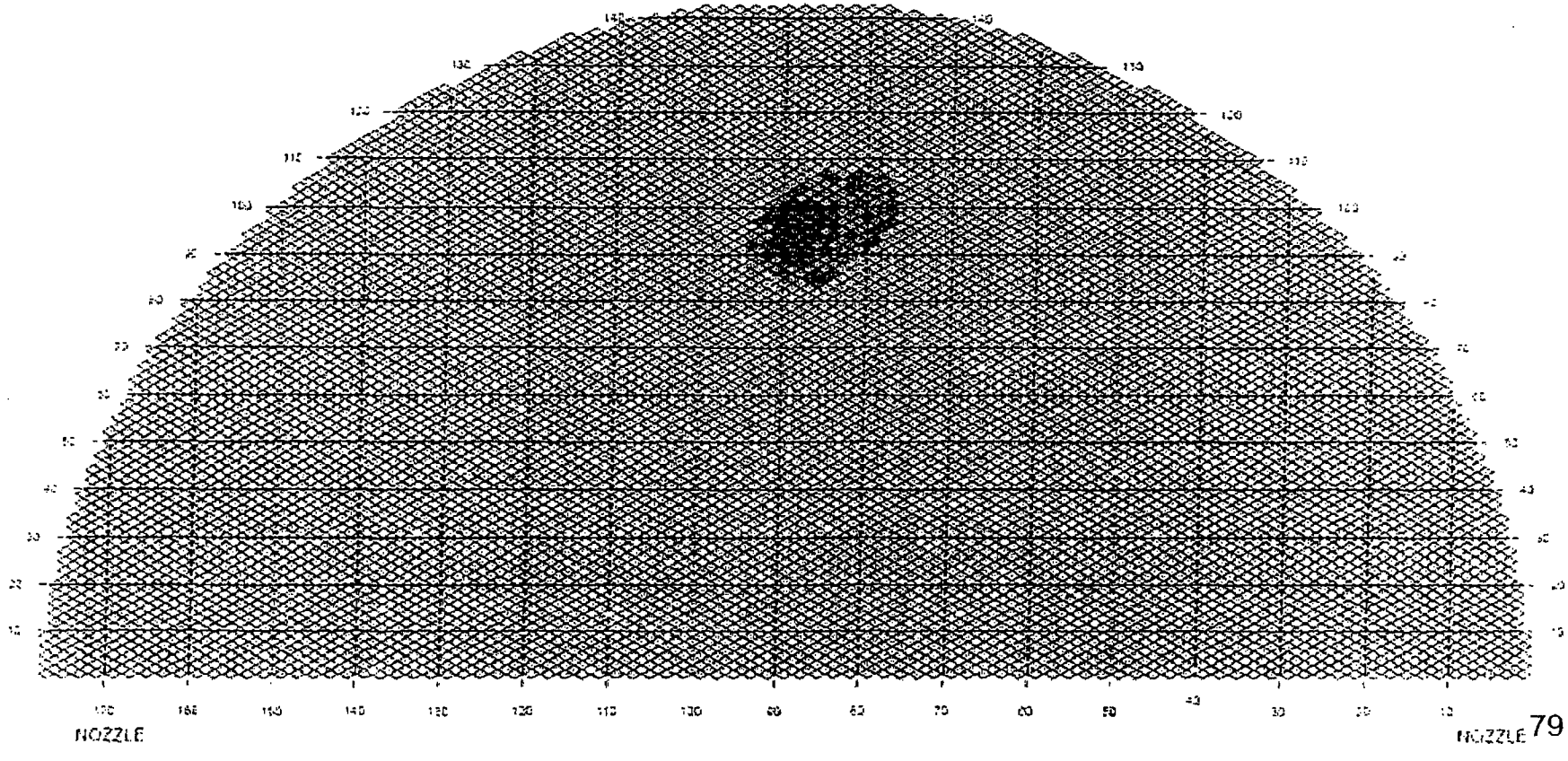
GROUP	TUBES
[illegible]	[illegible]
[illegible]	[illegible]

SG 89 Repl
COLD
PRIMARY FACE

TOTAL TUBES 9727
SELECTED TUBES 9727
OUT OF SERVICE (#) NA

SCALE 0.006571 X
Sat Feb 18 09:07:58 2012

MANWAY



NOZZLE

NOZZLE

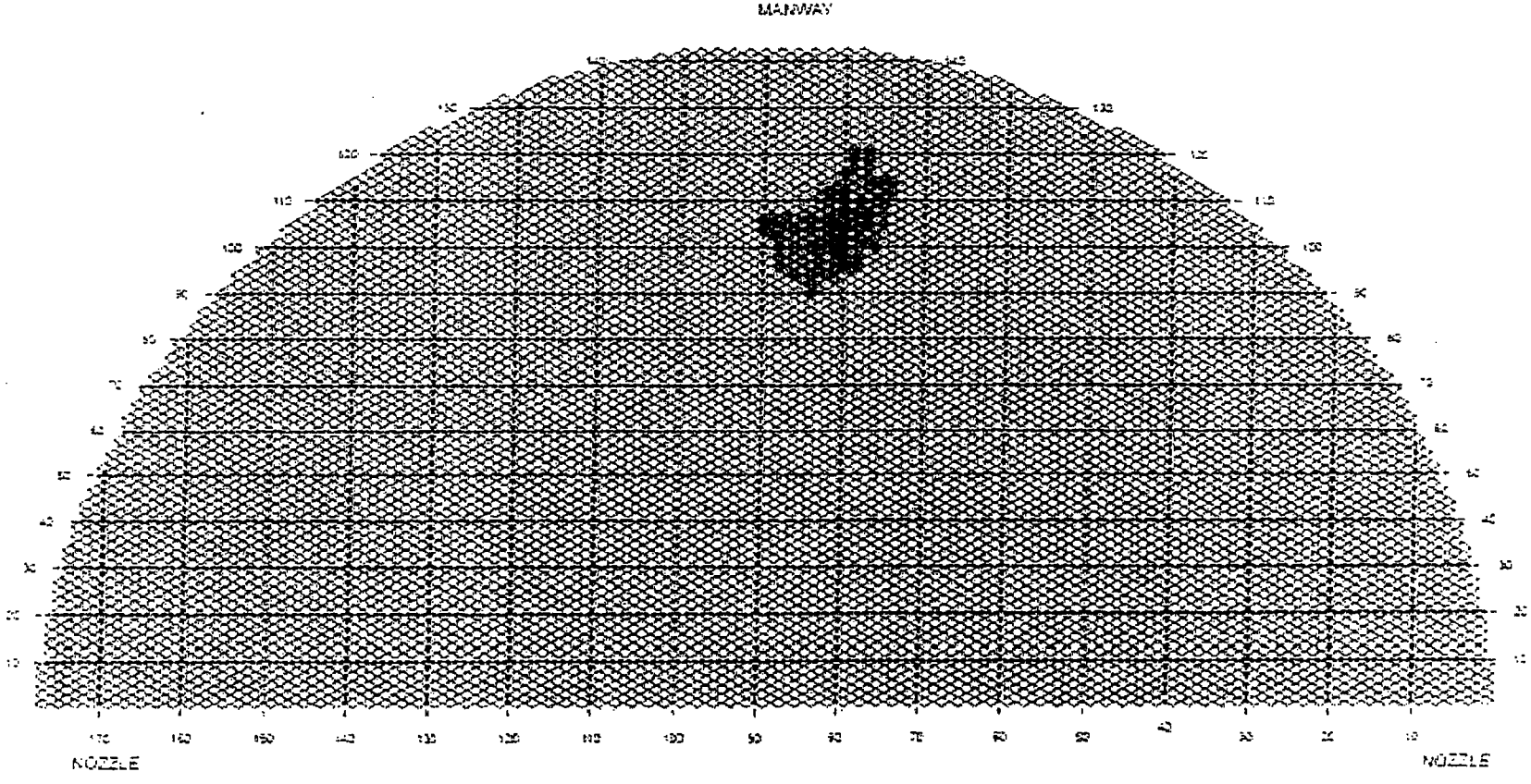
SCE-SONGS Unit 3 - REPL
Freespan Wear Indications by Depth Bin
(Largest Indication Per Tube)

GROUP	TUBES
20-34 %TWD	35
35-100 %TWD	42

E G&S Rep
COLD
PRIMARY FACE

TOTAL TUBES 8727
SELECTED TUBES 181
OUT OF SERVICE (#) NA

SCALE 0.000:1 X
Tue Feb 28 08:40:36 2012



SCE-SONGS Unit 3 - REPL
Freespan Wear Indications by Depth Bin
(Largest Indication Per Tube)

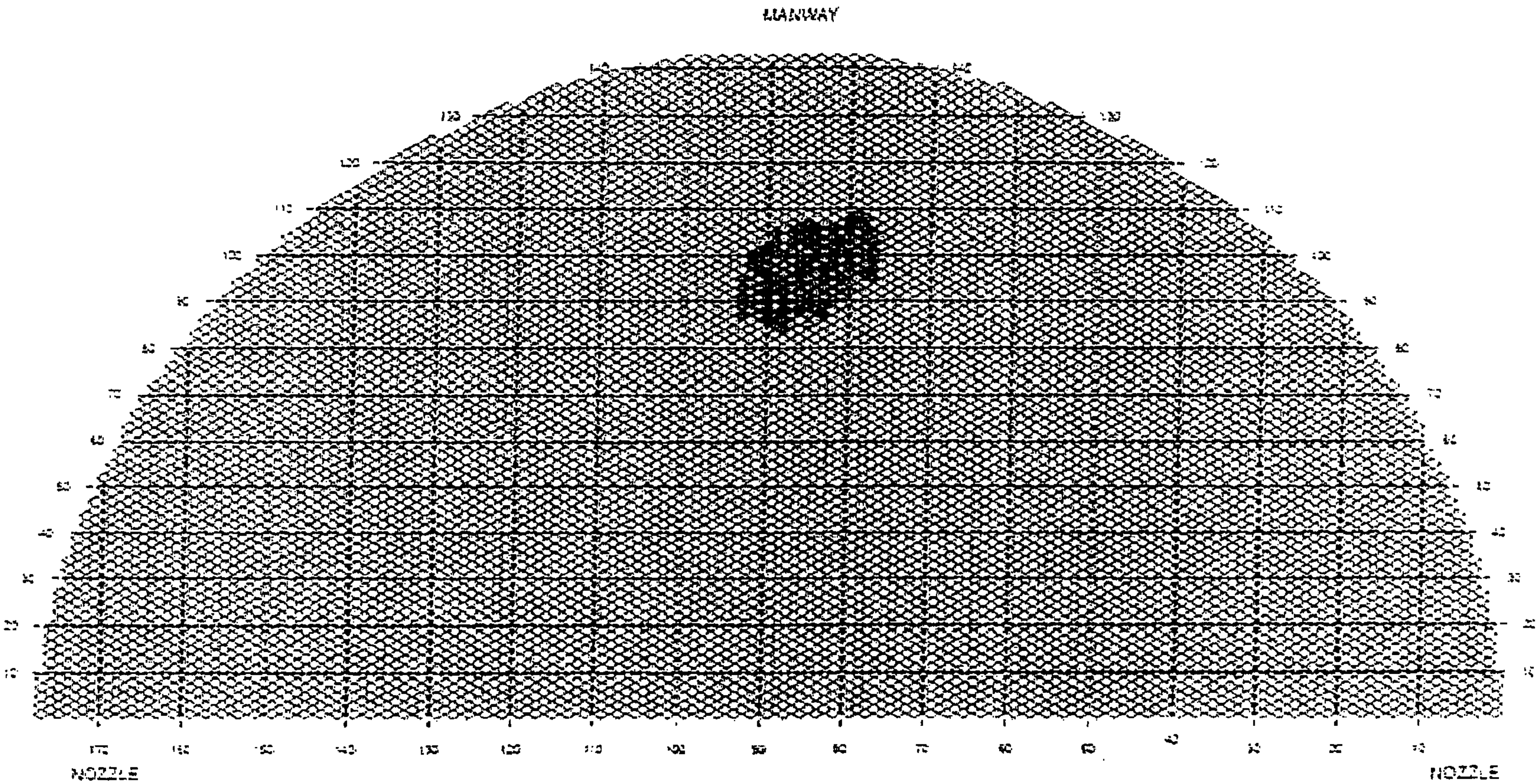
GROUP	TUBES
20-34% TWD	[illegible]
[illegible]	[illegible]

SCALE [illegible]

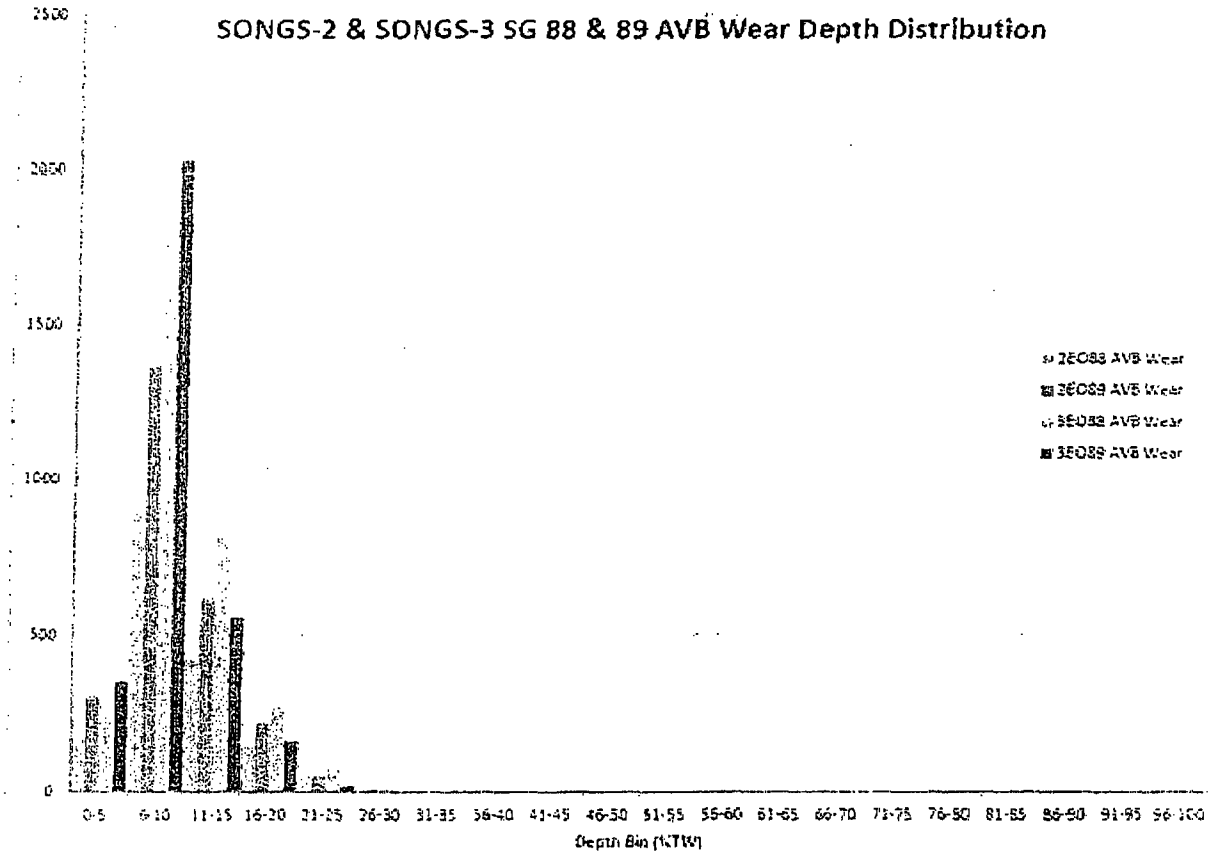
Tue Feb [illegible] 2012

S/G 3E Repl
COLD
PRIMARY FACE

TOTAL TUBES 9727
SELECTED TUBES 165
OUT OF SERVICE (#) NA

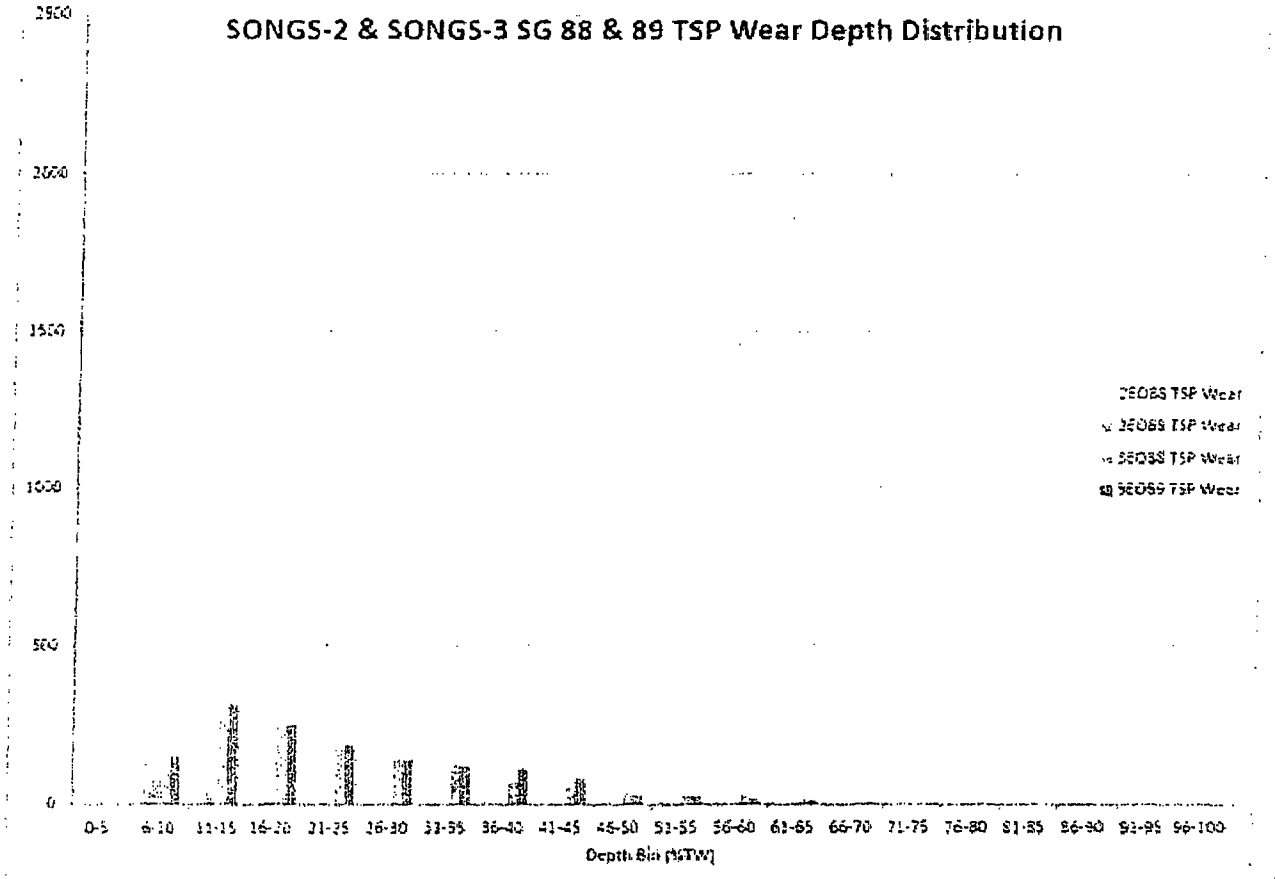


Comparison with Unit 3

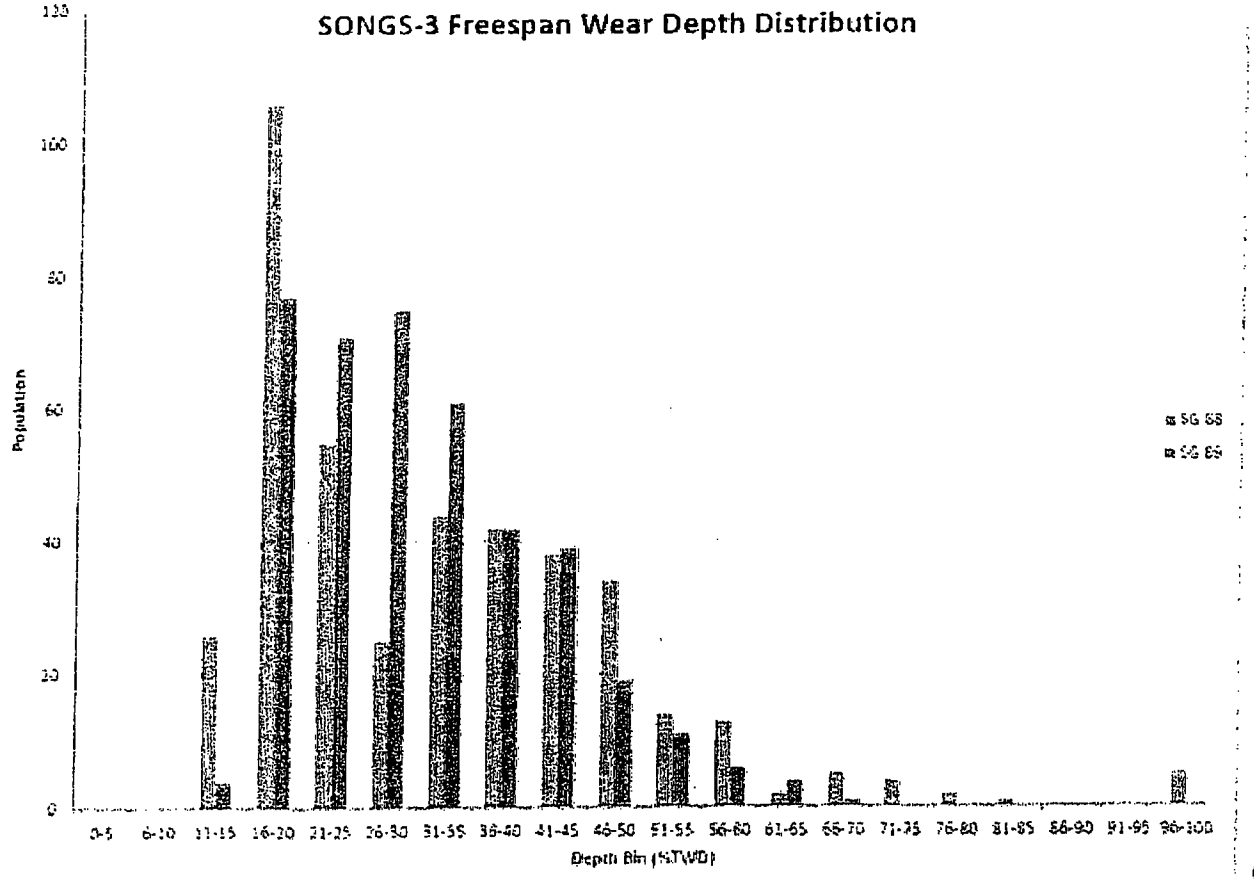


Comparison with Unit 3

SONGS-2 & SONGS-3 SG 88 & 89 TSP Wear Depth Distribution

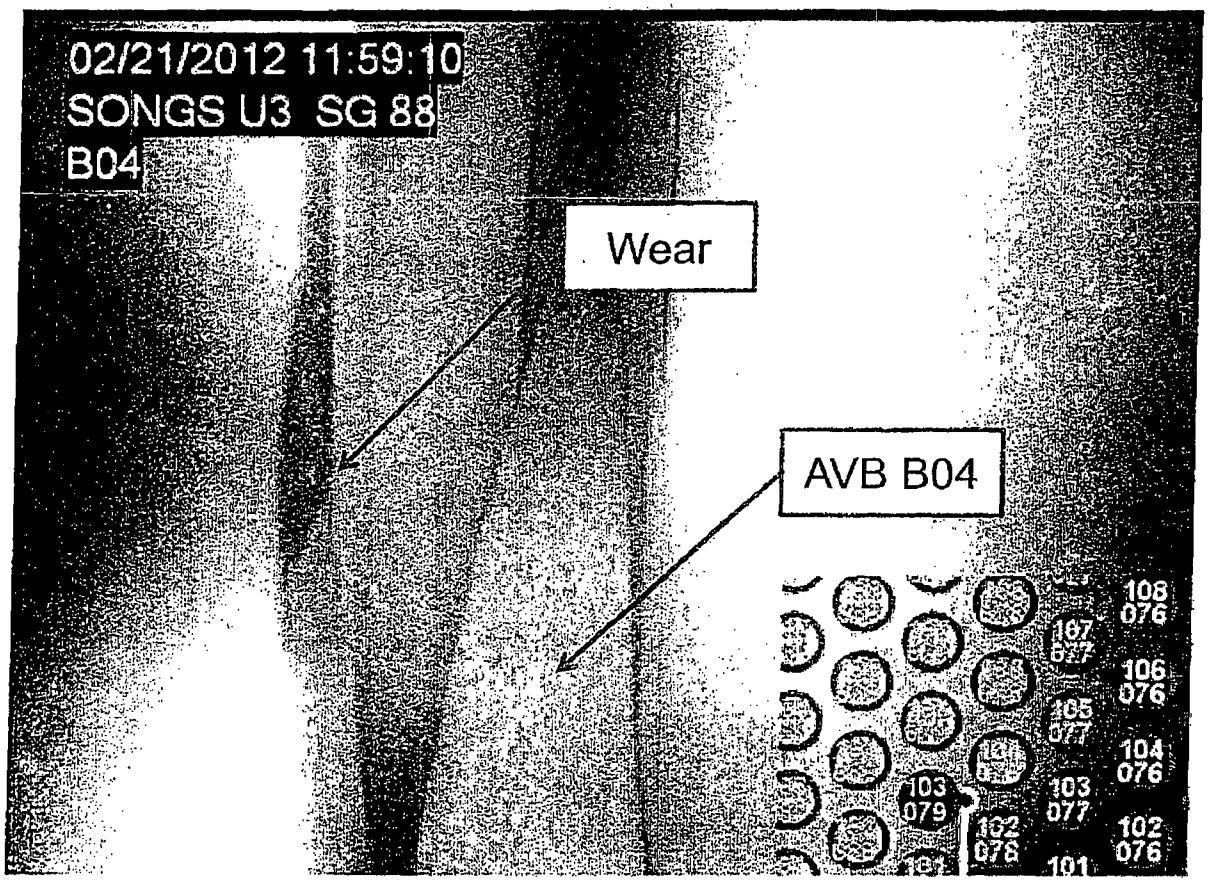


Comparison with Unit 3



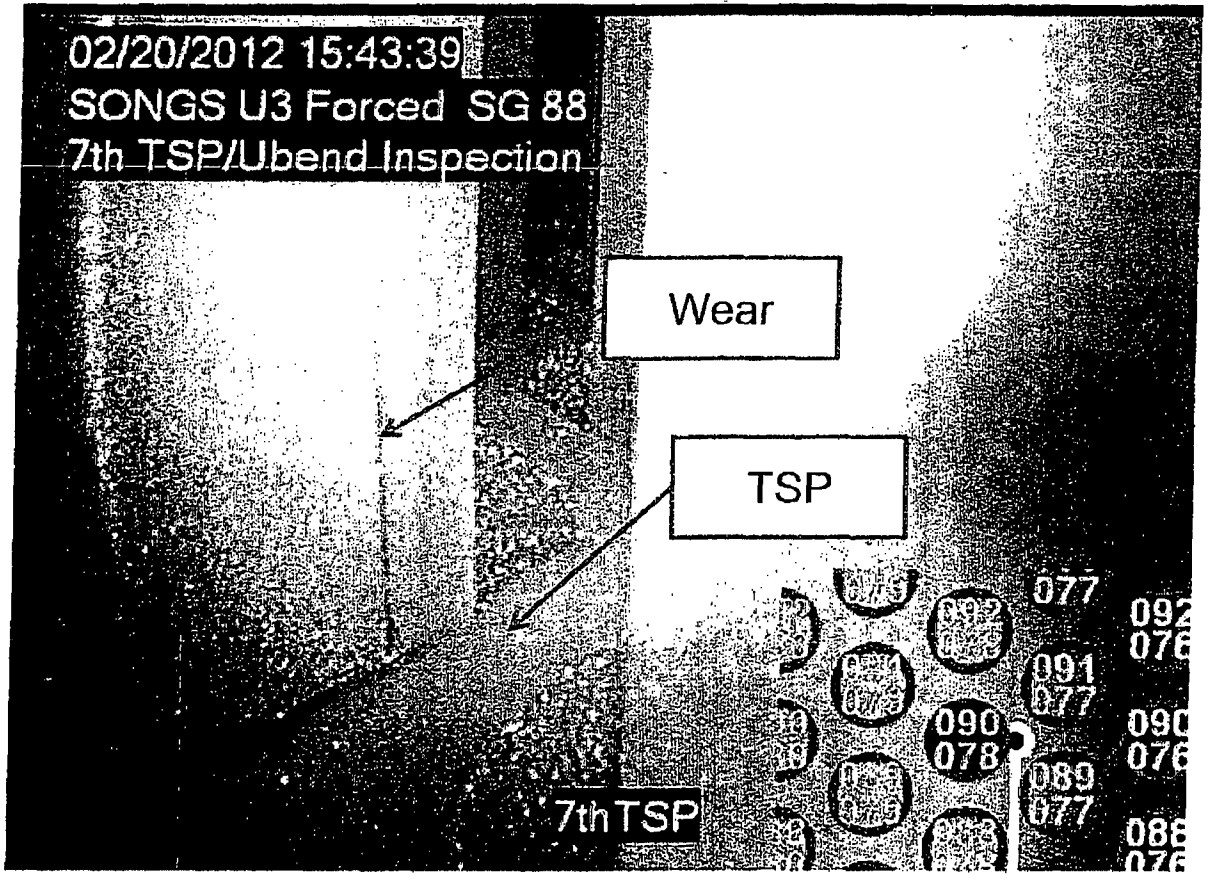
No indications found in Unit 2

Unit 3 Secondary Side Inspection



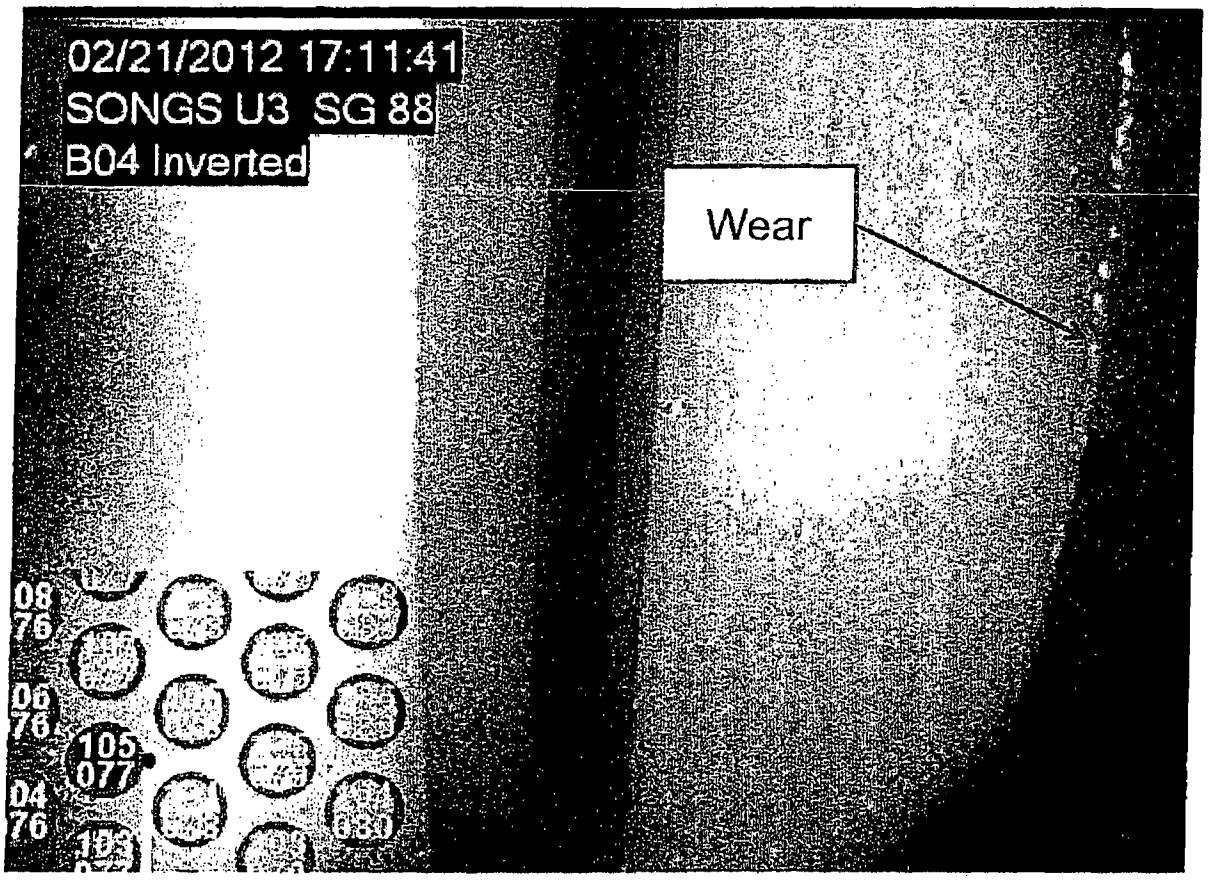
Unit 3 AVB Wear

Unit 3 Secondary Side Inspection



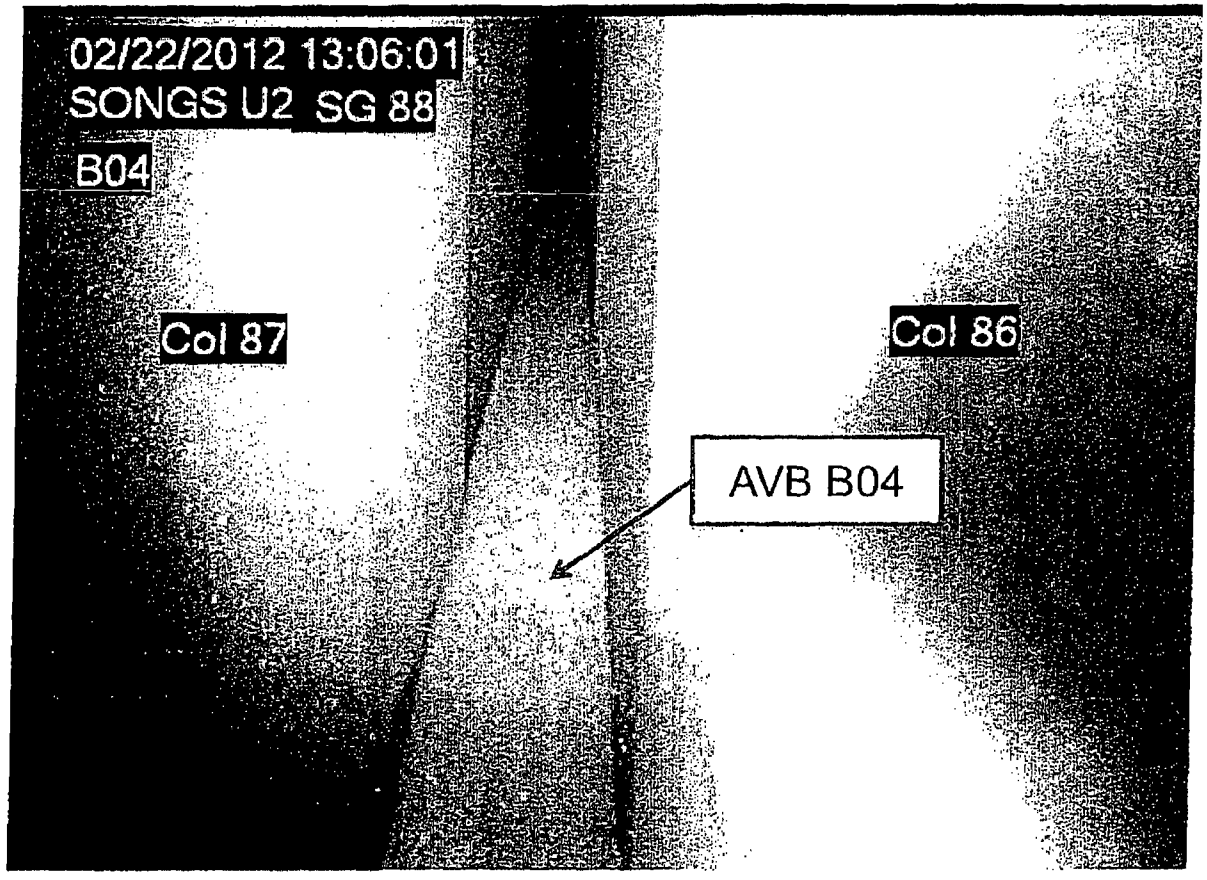
Unit 3 TSP Wear

Unit 3 Secondary Side Inspection



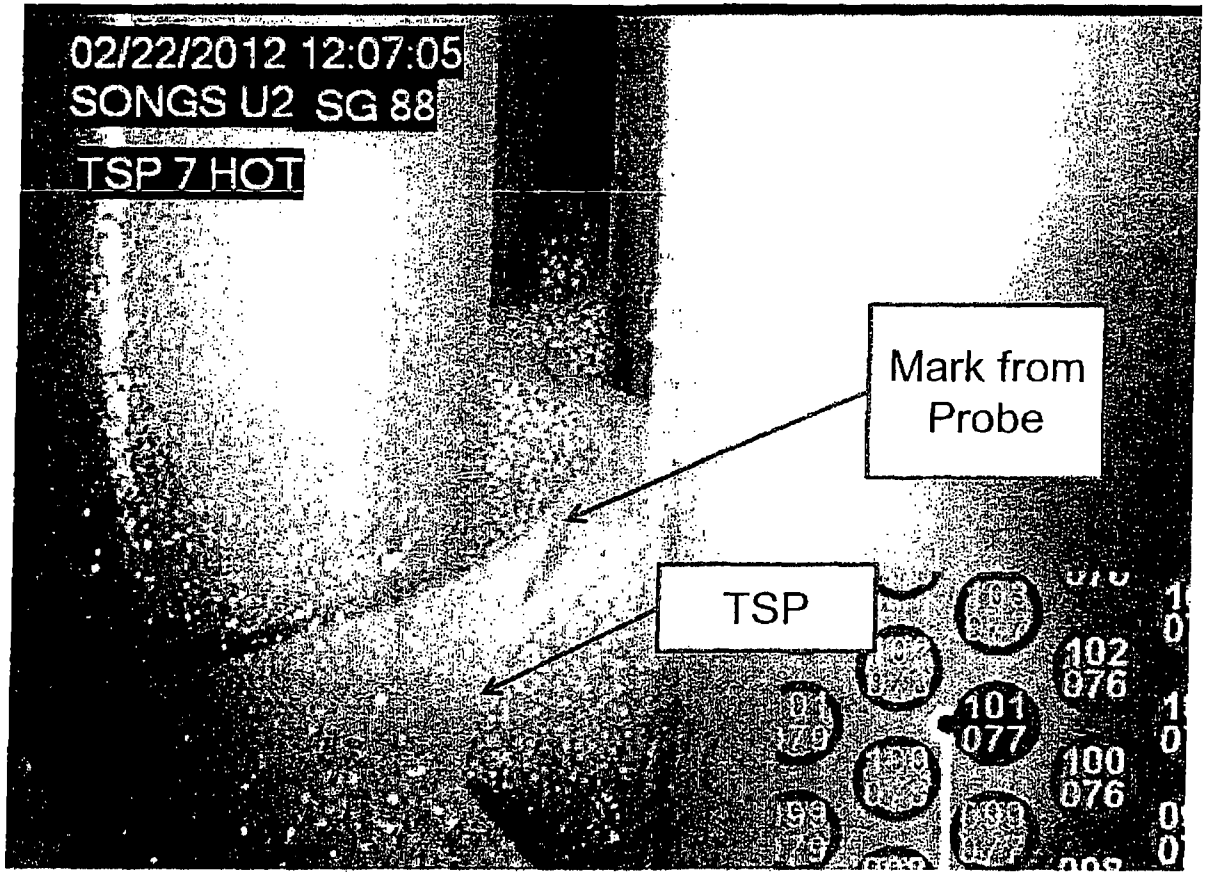
Unit 3 Tube-to-Tube Wear

Unit 2 Secondary Side Inspection



Unit 2 AVB

Unit 2 Secondary Side Inspection



Unit 2 TSP

Unit 2 Inspection Conclusions

- Eddy Current
  - No freespan wear indications
  - AVB wear indications are confined to AVB height, hence no indications of in-plane tube movement
- Secondary Side Visual
  - Sample inspection supplements the eddy current examination
  - No evidence of Tube-to-Tube wear at locations found in Unit 3

Industry Operating Experience

(b)(4)

h x3

Comparison with St Lucie 2

(b)(4)

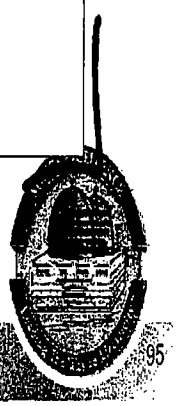
Ex 4

(b)(4)

(b)(4)

(b)(4)

(b)(4)



Ex. 4

Unit 3 Initial Assessment

Unit 3 Wear Initial Assessment

- Unit 3 Tube-to-Tube wear resulted from in-plane fluid-elastic instability (FEI)
- AVB deflections from fabrication were sufficient enough in Unit 3 to allow in-plane tube motion with reduced resistance from the AVB's
- High energy imparted by FEI was sufficient to result in tube to tube contact and wear in Unit 3
- AVB restraint in Unit 2 is greater, explaining the differences in wear at TSP's and Tube to Tube between the Units
- Independent review by AREVA, MHI, BWI, and MPR support the leading theory of the Unit 3 condition

Impact of Unit 3 on Unit 2 Return to Service

- Unit 2 has not experienced the same phenomena as Unit 3
  - No free span indications in Unit 2
  - Substantially less TSP wear
  - AVB wear is confined within width of AVB
- Unit 2 has twice the run-time as Unit 3
- Structural and Leakage criteria will be satisfied until a final operational assessment is completed
- Updated operational assessment(s) will address:
  - Increasing Thot
  - Unit 3 tube to tube wear cause and the susceptibility of Unit 2
- Updated operational assessment will be completed within 90 days of Mode 4

Unit 2 Causal Evaluation Status

- Root Cause Draft in Review
- Target presentation at CARB end of week
- Cause focuses on the significant wear on the Retainer Bar
- Cause preliminary focused on inadequate design of the small diameter Retainer Bars
- Actions to remove Retainer Bar tubes from service, both units
- Action for MHI to provide a cause document on their internal process

Unit 2 Recommendations

- Restart and Operate Unit 2
- Factor emergent findings from Unit 3 analysis into final Unit 2 Operational Assessment (due 90 days after Mode 4)
  - Assess need for an additional inspection outage
  - Complete review of Thot increase in light of Unit 3 findings prior to implementation
- Evaluate lowering SG tube leak AOI response threshold

From: (b)(6)
To: Anchondo, Isaac; Murphy, Emmett
Subject: Fw: U3 Tube Wear Photos
Date: Tuesday, March 06, 2012 8:08:12 PM
Attachments: U23 SG Wear 012.jpg
U23 SG Wear 001.jpg
U23 SG Wear 002.jpg
U23 SG Wear 003.jpg
U23 SG Wear 004.jpg
U23 SG Wear 005.jpg
U23 SG Wear 006.jpg
U23 SG Wear 007.jpg
U23 SG Wear 008.jpg
U23 SG Wear 009.jpg
U23 SG Wear 010.jpg
U23 SG Wear 011.jpg
U23 SG Wear 012.jpg
U23 SG Wear 013.jpg
U23 SG Wear 014.jpg
U23 SG Wear 015.jpg
U23 SG Wear 016.jpg

Isaac/Emmett here are the tube photos wear areas from our secondary side inspection.

(b)(6)

Inspections Manager
Nuclear Regulatory Affairs
San Onofre Nuclear Generating Station

(b)(6)

----- (b)(6) on 03/06/2012 08:01 PM -----

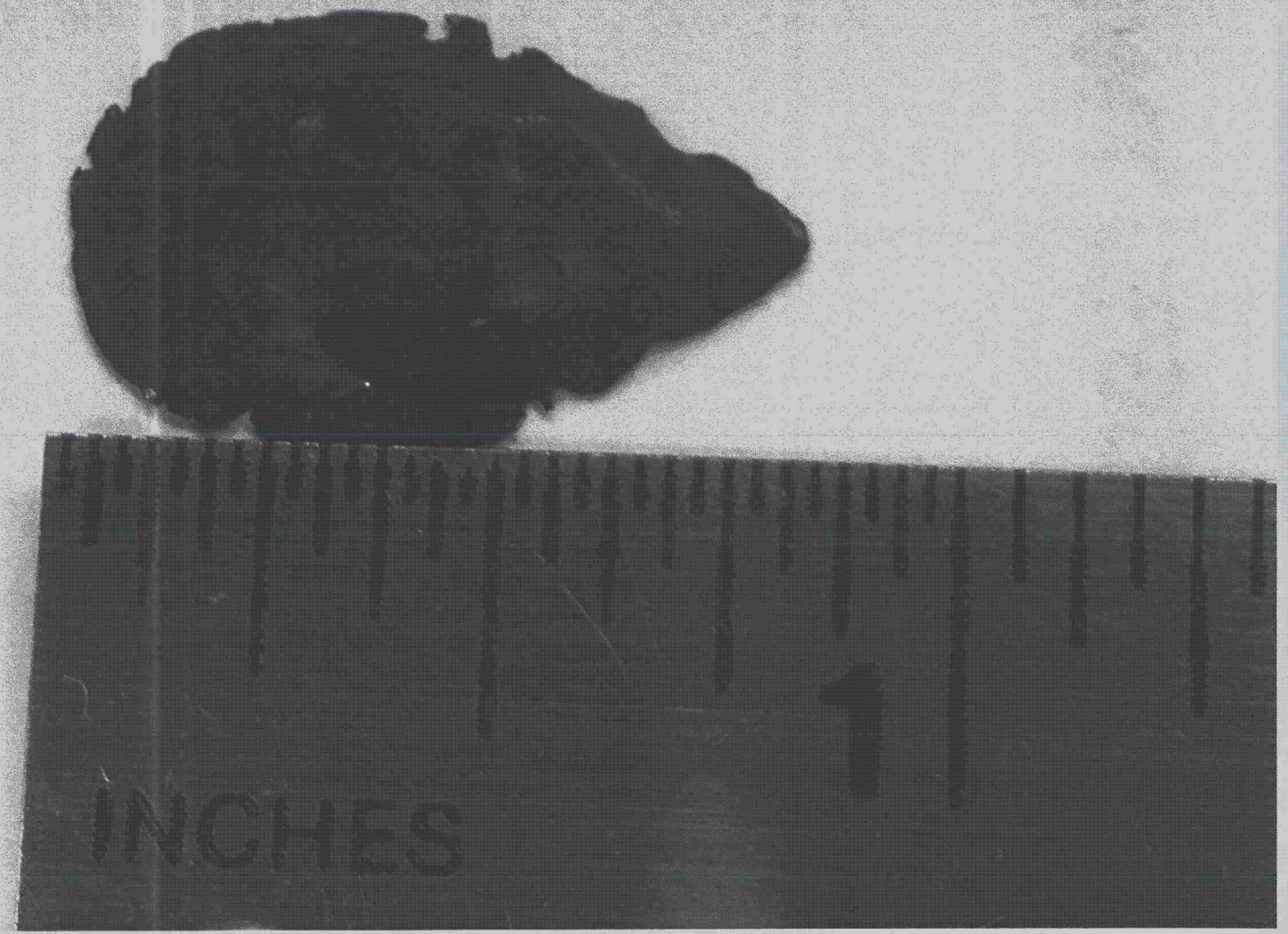
From: (b)(6)
To: (b)(6)
Date: 03/06/2012 03:24 PM
Subject: U3 Tube Wear Photos

FOR INTERNAL USE ONLY

(b)(6) Here are some additional photos of wear we have captured from our secondary side inspections that the NRC requested. Each picture has the steam generator and location on it. Let me know if you need anything further. Thanks. (b)(6)

D/24
4/0

D/24


INCHES
1

Document	File Name	File Type	Size
B	SG88 TSP Max Depth and Length.pdf	Adobe Acrobat Document	831 KB

B

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	1	1	04C	-0.5	12		
SG88	1	1	05C	-0.57	11		
SG88	1	13	05H	-0.07	10		
SG88	1	13	06H	-0.27	10		
SG88	1	47	06C	0.39	11		
SG88	12	48	04C	-0.58	11		
SG88	14	168	04H	0	7		
SG88	28	4	05H	0.41	13		
SG88	80	72	06H	-0.71	10		
SG88	84	100	05C	-0.63	10		
SG88	85	85	07H	-0.8	17	16	
SG88	85	87	07H	-0.59	19		
SG88	85	89	07H	-0.63	14		
SG88	85	99	06C	-0.5	14		
SG88	87	81	07C	-0.55	10	13	
SG88	87	99	05C	-0.59	11		
SG88	87	99	07C	-0.52	17		
SG88	88	94	07C	-0.57	17		
SG88	88	94	07H	-0.63	14		
SG88	88	96	07H	-0.68	17	12	
SG88	89	85	07H	-0.79	10	6	
SG88	89	91	07H	-0.61	15		
SG88	89	95	07H	-0.61	19		
SG88	89	105	06C	-0.56	11		
SG88	90	96	07C	-0.57	16		
SG88	91	79	07H	0	17	14	
SG88	91	81	07H	-0.72	17	15	
SG88	91	83	05C	-0.13	7		
SG88	91	83	06C	-0.02	8		
SG88	91	83	07C	-0.11	17	19	
SG88	91	85	06C	-0.06	10		
SG88	91	85	07C	-0.06	15	16	
SG88	92	74	06H	-0.63	11		
SG88	92	78	07H	-0.17	14	12	
SG88	92	84	05C	-0.13	20	19	
SG88	92	84	05H	-0.04	9		
SG88	92	84	06C	-0.09	25	24	
SG88	92	84	06H	0	20	19	
SG88	92	84	07C	-0.13	35	31	
SG88	92	84	07H	-0.15	32	28	
SG88	92	86	06C	0	16		
SG88	92	86	07C	-0.6	14	14	
SG88	92	88	07H	-0.7	10	13	
SG88	92	90	04C	-0.64	7		
SG88	92	96	05C	-0.52	11		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	92	96	06C	-0.5	18	22	
SG88	92	96	07C	-0.59	21	20	
SG88	93	73	07H	-0.57	9		
SG88	93	75	07H	-0.66	12	9	
SG88	93	77	07H	-0.83	8		
SG88	93	81	06C	0	18		
SG88	93	81	07C	-0.17	16	16	
SG88	93	81	07H	0	14	7	
SG88	93	83	02C	0.37	17		
SG88	93	83	03C	0	19		
SG88	93	83	03H	0	21	17	
SG88	93	83	04C	0	18		
SG88	93	83	05C	0	26	21	
SG88	93	83	05H	-0.63	23	19	
SG88	93	83	06C	0	31	23	
SG88	93	83	06H	0	39	38	1.44
SG88	93	83	07C	0	47	41	1.5
SG88	93	83	07H	0	54	51	1.15
SG88	93	85	03C	0	17		
SG88	93	85	03H	0.43	17		
SG88	93	85	04C	-0.59	12		
SG88	93	85	05C	0	20	22	
SG88	93	85	05H	0	24	16	
SG88	93	85	06C	0	37	31	
SG88	93	85	06H	0	39	37	
SG88	93	85	07C	0	49	41	1.49
SG88	93	85	07H	0	40	34	
SG88	93	87	05C	-0.59	11		
SG88	93	87	07H	-0.69	12	7	
SG88	93	93	05C	-0.57	12		
SG88	93	93	07C	-0.59	16	18	
SG88	94	74	07H	-0.64	8		
SG88	94	78	07H	-0.64	19	18	
SG88	94	80	04C	-0.68	10		
SG88	94	80	04H	-0.56	13		
SG88	94	80	05H	0.37	10		
SG88	94	80	06C	0	16		
SG88	94	80	07C	0	20	20	
SG88	94	80	07H	-0.15	26	17	
SG88	94	82	04C	0	23	24	
SG88	94	82	04H	-0.57	12		
SG88	94	82	05C	0	27	26	
SG88	94	82	05H	0	32	22	
SG88	94	82	06C	0	31	27	
SG88	94	82	06H	0	36	25	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	94	82	07C	0	50	40	1.52
SG88	94	82	07H	0	38	30	
SG88	94	84	03C	-0.09	20	21	
SG88	94	84	03H	0.41	16		
SG88	94	84	04C	0	22	20	
SG88	94	84	05C	0	31	23	
SG88	94	84	05H	-0.09	22	17	
SG88	94	84	06C	0	46	40	1.39
SG88	94	84	06H	0	47	50	1.42
SG88	94	84	07C	0	50	41	1.48
SG88	94	84	07H	0	57	49	1.43
SG88	94	86	04C	-0.59	13		
SG88	94	86	04H	-0.59	11		
SG88	94	86	05C	0.38	11		
SG88	94	86	05H	0	14		
SG88	94	86	06C	0.02	26	23	
SG88	94	86	06H	0	26	23	
SG88	94	86	07C	0	33	27	
SG88	94	86	07H	0	32	29	
SG88	94	88	05C	-0.53	10		
SG88	94	94	07C	-0.57	15		
SG88	94	106	07H	-0.72	10		
SG88	95	75	07H	-0.66	14	10	
SG88	95	79	04H	-0.56	12		
SG88	95	79	06C	0	18		
SG88	95	79	06H	-0.66	25	24	
SG88	95	79	07C	0	26	25	
SG88	95	79	07H	0	31	24	
SG88	95	81	03C	-0.6	9		
SG88	95	81	03H	0	14		
SG88	95	81	04C	0	20	20	
SG88	95	81	04H	-0.55	18		
SG88	95	81	05C	0	21	24	
SG88	95	81	05H	0	18		
SG88	95	81	06C	0	31	33	
SG88	95	81	06H	0	36	35	1.43
SG88	95	81	07C	0	50	45	1.54
SG88	95	81	07H	0	47	36	
SG88	95	83	01H	0	25	26	
SG88	95	83	03C	-0.02	19		
SG88	95	83	03H	0.06	31	26	
SG88	95	83	04C	-0.06	21	21	
SG88	95	83	04H	-0.06	20	19	
SG88	95	83	05C	-0.13	30	28	
SG88	95	83	05H	-0.06	24	21	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	95	83	06C	-0.13	34	35	
SG88	95	83	06H	0	44	43	1.5
SG88	95	83	07C	0	56	48	1.57
SG88	95	83	07H	0	62	53	1.55
SG88	95	85	01H	-0.44	18		
SG88	95	85	03C	-0.11	12		
SG88	95	85	03H	0	19		
SG88	95	85	04C	-0.42	17		
SG88	95	85	04H	-0.59	23	21	
SG88	95	85	05C	0	17		
SG88	95	85	05H	0	25	20	
SG88	95	85	06C	0	29	29	
SG88	95	85	06H	-0.28	33	32	
SG88	95	85	07C	0	58	53	1.48
SG88	95	85	07H	0	52	39	1.12
SG88	95	87	04C	-0.42	11		
SG88	95	87	05C	-0.62	13		
SG88	95	87	06C	0	17		
SG88	95	87	07C	0	16	14	
SG88	95	89	06C	0.33	13		
SG88	95	91	07H	-0.72	12	8	
SG88	95	93	07H	-0.68	14	12	
SG88	95	95	05C	-0.52	10		
SG88	95	97	06C	-0.48	14		
SG88	95	97	07C	-0.45	13		
SG88	96	76	06H	-0.68	9		
SG88	96	80	04C	0	10		
SG88	96	80	04H	-0.57	15		
SG88	96	80	05C	0	17		
SG88	96	80	05H	0.47	12		
SG88	96	80	06C	0	24	21	
SG88	96	80	06H	-0.66	10		
SG88	96	80	07C	0	29	29	
SG88	96	80	07H	0	28	25	
SG88	96	82	01H	0	15		
SG88	96	82	03C	-0.13	13		
SG88	96	82	03H	0	19		
SG88	96	82	04C	-0.08	23	28	
SG88	96	82	04H	-0.02	19		
SG88	96	82	05C	-0.13	17		
SG88	96	82	05H	-0.02	17		
SG88	96	82	06C	-0.17	32	29	
SG88	96	82	06H	-0.26	35	35	
SG88	96	82	07C	0	53	45	1.53
SG88	96	82	07H	0	51	40	1.52

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	96	84	01H	0	23	23	
SG88	96	84	03C	-0.06	13		
SG88	96	84	03H	0	14		
SG88	96	84	04C	-0.13	21	25	
SG88	96	84	04H	0	10		
SG88	96	84	05C	0	25	23	
SG88	96	84	05H	0	20	17	
SG88	96	84	06C	-0.06	34	31	
SG88	96	84	06H	0	47	49	1.43
SG88	96	84	07C	0	51	41	1.56
SG88	96	84	07H	0	48	38	1.5
SG88	96	86	03C	0	10		
SG88	96	86	03H	0.32	11		
SG88	96	86	04C	0	15		
SG88	96	86	04H	0	16		
SG88	96	86	05C	0	16		
SG88	96	86	05H	0	16		
SG88	96	86	06C	0	28	27	
SG88	96	86	06H	-0.28	31	28	
SG88	96	86	07C	0	35	32	
SG88	96	86	07H	-0.15	37	37	
SG88	96	88	03C	-0.54	10		
SG88	96	88	04C	-0.53	13		
SG88	96	88	04H	-0.44	17		
SG88	96	88	05C	0	18		
SG88	96	88	05H	0	18		
SG88	96	88	06C	0	28	30	
SG88	96	88	06H	0	31	30	
SG88	96	88	07C	0	43	38	1.5
SG88	96	88	07H	0	45	33	
SG88	96	90	07H	-0.6	8		
SG88	97	75	07H	-0.64	15	15	
SG88	97	77	06H	-0.62	8		
SG88	97	77	07H	0	22	22	
SG88	97	79	03H	0	12		
SG88	97	79	04C	0	16		
SG88	97	79	04H	-0.57	17		
SG88	97	79	05C	0	18		
SG88	97	79	05H	0.41	16		
SG88	97	79	06C	0	30	26	
SG88	97	79	06H	-0.81	30	33	
SG88	97	79	07C	0	35	35	
SG88	97	79	07H	0	43	33	
SG88	97	81	01H	-0.48	24	25	
SG88	97	81	03C	-0.57	16		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	97	81	03H	0	32	26	
SG88	97	81	04C	0	18		
SG88	97	81	04H	0	26	27	
SG88	97	81	05C	0	30	23	
SG88	97	81	05H	0	27	19	
SG88	97	81	06C	0	36	34	
SG88	97	81	06H	0	50	49	1.34
SG88	97	81	07C	0	72	70	1.72
SG88	97	81	07H	0	60	53	1.6
SG88	97	83	01H	-0.48	29	28	
SG88	97	83	03C	0	22	20	
SG88	97	83	03H	0	25	23	
SG88	97	83	04C	0	22	24	
SG88	97	83	04H	0	29	27	
SG88	97	83	05C	0	33	29	
SG88	97	83	05H	0	29	20	
SG88	97	83	06C	0	38	32	
SG88	97	83	06H	0	41	38	1.43
SG88	97	83	07C	0	57	49	1.4
SG88	97	83	07H	0	61	55	1.79
SG88	97	85	01H	-0.54	23	21	
SG88	97	85	03C	0	14		
SG88	97	85	03H	0	20	20	
SG88	97	85	04C	0	14		
SG88	97	85	04H	-0.52	20	18	
SG88	97	85	05C	0	26	25	
SG88	97	85	05H	0	25	18	
SG88	97	85	06C	0	38	36	
SG88	97	85	06H	0	38	33	
SG88	97	85	07C	0	45	37	
SG88	97	85	07H	0	50	45	1.59
SG88	97	87	04C	-0.15	15		
SG88	97	87	04H	0.48	12		
SG88	97	87	05C	0	24	21	
SG88	97	87	05H	0	17		
SG88	97	87	06C	0	31	26	
SG88	97	87	06H	-0.09	24	16	
SG88	97	87	07C	-0.15	39	32	
SG88	97	87	07H	0	40	28	
SG88	97	89	04H	-0.59	13		
SG88	97	89	05C	-0.57	10		
SG88	97	89	06C	0	16		
SG88	97	89	07C	0	22	18	
SG88	97	89	07H	0	16	16	
SG88	97	95	07H	-0.65	12		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	98	74	07H	-0.68	11	9	
SG88	98	76	07H	-0.62	19	15	
SG88	98	78	04C	0.35	11		
SG88	98	78	05C	0.36	13		
SG88	98	78	05H	-0.63	13		
SG88	98	78	06C	0	22	18	
SG88	98	78	06H	-0.68	23	22	
SG88	98	78	07C	-0.63	13	13	
SG88	98	78	07H	0	27	21	
SG88	98	80	01H	-0.46	24	26	
SG88	98	80	02H	0	14		
SG88	98	80	03C	0	15		
SG88	98	80	03H	0	20	16	
SG88	98	80	04C	0	27	26	
SG88	98	80	04H	0	30	28	
SG88	98	80	05C	0	35	27	
SG88	98	80	05H	0	28	21	
SG88	98	80	06C	0	44	40	1.49
SG88	98	80	06H	0	52	51	1.4
SG88	98	80	07C	0	57	50	1.56
SG88	98	80	07H	0	67	61	1.05
SG88	98	82	01H	-0.48	24	23	
SG88	98	82	03C	-0.59	19		
SG88	98	82	03H	0	16		
SG88	98	82	04C	0	25	23	
SG88	98	82	04H	0	26	24	
SG88	98	82	05C	0	30	25	
SG88	98	82	05H	0	38	28	
SG88	98	82	06C	0	41	41	1.43
SG88	98	82	06H	0	44	43	1.49
SG88	98	82	07C	0	57	54	1.54
SG88	98	82	07H	0	57	52	1.48
SG88	98	84	02C	0.42	11		
SG88	98	84	03C	-0.15	25	27	
SG88	98	84	04C	0	21	18	
SG88	98	84	04H	-0.09	23	21	
SG88	98	84	05C	0	32	30	
SG88	98	84	05H	-0.04	20	15	
SG88	98	84	06C	-0.09	39	30	
SG88	98	84	06H	-0.11	25	13	
SG88	98	84	07C	0	53	43	1.38
SG88	98	84	07H	0	52	46	1.49
SG88	98	86	03C	0	19		
SG88	98	86	04C	-0.17	18		
SG88	98	86	04H	-0.52	23	23	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	98	86	05C	0.02	28	25	
SG88	98	86	05H	-0.07	19		
SG88	98	86	06C	0.02	38	32	
SG88	98	86	06H	0	42	45	1.35
SG88	98	86	07C	0	50	40	0.81
SG88	98	86	07H	0	48	41	0.92
SG88	98	88	03C	-0.09	17		
SG88	98	88	03H	0.43	10		
SG88	98	88	04C	-0.59	18		
SG88	98	88	04H	-0.48	23	20	
SG88	98	88	05C	-0.21	22	24	
SG88	98	88	05H	0.39	22	18	
SG88	98	88	06C	-0.13	37	33	
SG88	98	88	06H	-0.04	33	30	
SG88	98	88	07C	0	49	41	1.11
SG88	98	88	07H	0	41	35	
SG88	98	90	06C	0.42	11		
SG88	98	92	07H	-0.76	17	15	
SG88	98	96	07C	-0.55	16		
SG88	98	98	07C	-0.47	13		
SG88	98	104	06C	-0.59	10		
SG88	98	104	07C	-0.57	9		
SG88	99	77	06C	0.39	18		
SG88	99	77	06H	-0.7	22	20	
SG88	99	77	07C	-0.67	13	12	
SG88	99	77	07H	0	30	24	
SG88	99	79	03H	0.46	9		
SG88	99	79	04H	-0.57	19		
SG88	99	79	05C	0	19		
SG88	99	79	05H	0.41	20	17	
SG88	99	79	06C	0	33	26	
SG88	99	79	06H	0	31	29	
SG88	99	79	07C	0	41	36	
SG88	99	79	07H	0	40	33	
SG88	99	81	01H	-0.52	22	25	
SG88	99	81	03C	0	18		
SG88	99	81	03H	0	26	24	
SG88	99	81	04C	0	27	30	
SG88	99	81	04H	0	26	29	
SG88	99	81	05C	0	31	29	
SG88	99	81	05H	0	27	23	
SG88	99	81	06C	0	36	35	
SG88	99	81	06H	0	42	37	
SG88	99	81	07C	0	60	58	1.43
SG88	99	81	07H	0	68	64	1.46

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	99	83	01H	0	23	22	
SG88	99	83	02C	-0.04	7		
SG88	99	83	03C	-0.08	14		
SG88	99	83	03H	0.02	28	23	
SG88	99	83	04C	-0.19	28	26	
SG88	99	83	04H	-0.06	27	22	
SG88	99	83	05C	-0.13	26	21	
SG88	99	83	05H	-0.06	25	25	
SG88	99	83	06C	-0.15	33	33	
SG88	99	83	06H	0	52	52	1.55
SG88	99	83	07C	0	61	58	1.48
SG88	99	83	07H	0	62	58	0.93
SG88	99	85	02H	0	13		
SG88	99	85	03C	-0.47	14		
SG88	99	85	03H	0	13		
SG88	99	85	04C	0	24	27	
SG88	99	85	04H	-0.48	31	33	
SG88	99	85	05C	0	23	22	
SG88	99	85	05H	0	25	19	
SG88	99	85	06C	0	35	35	
SG88	99	85	06H	-0.21	33	32	
SG88	99	85	07C	0	46	41	1.45
SG88	99	85	07H	0	53	48	1.43
SG88	99	87	01H	-0.5	8		
SG88	99	87	02H	0	12		
SG88	99	87	03C	0	22	23	
SG88	99	87	03H	0.46	16		
SG88	99	87	04C	0	23	21	
SG88	99	87	04H	0	33	29	
SG88	99	87	05C	0	23	23	
SG88	99	87	05H	0	28	27	
SG88	99	87	06C	0	35	38	1.39
SG88	99	87	06H	0	44	41	1.37
SG88	99	87	07C	0	55	49	1.14
SG88	99	87	07H	0	61	52	1.56
SG88	99	89	04C	-0.59	9		
SG88	99	89	06C	-0.13	11		
SG88	99	89	06H	-0.13	14		
SG88	99	89	07C	0	18	16	
SG88	99	89	07H	-0.24	25	22	
SG88	99	99	07H	-0.66	12		
SG88	100	76	06C	0.33	13		
SG88	100	76	06H	-0.6	18		
SG88	100	76	07C	-0.02	22	18	
SG88	100	76	07H	-0.72	31	28	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	100	78	04C	-0.17	10		
SG88	100	78	04H	-0.59	18		
SG88	100	78	05C	0.36	12		
SG88	100	78	05H	-0.02	15		
SG88	100	78	06C	0	21	24	
SG88	100	78	06H	-0.11	29	23	
SG88	100	78	07C	-0.06	35	37	
SG88	100	78	07H	-0.17	37	40	1.87
SG88	100	80	02H	0	15		
SG88	100	80	03C	0	19		
SG88	100	80	03H	0	23	21	
SG88	100	80	04C	-0.54	25	29	
SG88	100	80	04H	-0.59	31	34	
SG88	100	80	05C	0	29	27	
SG88	100	80	05H	0	30	25	
SG88	100	80	06C	0	32	30	
SG88	100	80	06H	0	47	41	1.29
SG88	100	80	07C	0	50	46	1.63
SG88	100	80	07H	0	63	52	1.52
SG88	100	82	01H	0	27	28	
SG88	100	82	02H	-0.02	15		
SG88	100	82	03C	-0.13	16		
SG88	100	82	03H	0	15		
SG88	100	82	04C	-0.12	16		
SG88	100	82	04H	0	22	18	
SG88	100	82	05C	-0.06	24	24	
SG88	100	82	05H	-0.02	21	17	
SG88	100	82	06C	-0.09	34	33	
SG88	100	82	06H	0	44	43	1.49
SG88	100	82	07C	0	63	58	1.58
SG88	100	82	07H	0	57	54	1.56
SG88	100	84	02H	0	10		
SG88	100	84	03C	-0.02	10		
SG88	100	84	03H	0.04	13		
SG88	100	84	04C	0.04	14		
SG88	100	84	04H	-0.02	13		
SG88	100	84	05C	-0.17	22	25	
SG88	100	84	05H	0	16		
SG88	100	84	06C	-0.17	30	31	
SG88	100	84	06H	-0.09	17		
SG88	100	84	07C	0	41	37	
SG88	100	84	07H	0	43	38	1.16
SG88	100	86	01H	0	26	28	
SG88	100	86	02H	0	19		
SG88	100	86	03C	0	22	21	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	100	86	03H	0	21	16	
SG88	100	86	04C	0	26	30	
SG88	100	86	04H	0	26	18	
SG88	100	86	05C	0	24	23	
SG88	100	86	05H	0	25	23	
SG88	100	86	06C	0	33	33	
SG88	100	86	06H	0	50	49	1.41
SG88	100	86	07C	0	55	47	1.37
SG88	100	86	07H	0	58	54	1.53
SG88	100	88	02H	0	14		
SG88	100	88	03C	-0.49	14		
SG88	100	88	03H	0.44	12		
SG88	100	88	04C	-0.48	16		
SG88	100	88	04H	-0.48	11		
SG88	100	88	05C	0	19		
SG88	100	88	05H	0.04	19		
SG88	100	88	06C	0	28	27	
SG88	100	88	06H	-0.19	35	35	
SG88	100	88	07C	0	37	37	
SG88	100	88	07H	0	44	40	1.67
SG88	100	90	06C	0	14		
SG88	100	90	07C	-0.68	9	5	
SG88	100	90	07H	-0.69	11	12	
SG88	101	75	06C	0	12		
SG88	101	75	06H	-0.64	10		
SG88	101	75	07C	-0.68	13	13	
SG88	101	75	07H	-0.68	9	5	
SG88	101	77	04H	-0.59	20	24	
SG88	101	77	05C	0.3	13		
SG88	101	77	05H	-0.19	16		
SG88	101	77	06C	-0.09	21	21	
SG88	101	77	06H	0	31	32	
SG88	101	77	07C	-0.06	34	27	
SG88	101	77	07H	-0.15	35	30	
SG88	101	79	01H	-0.52	12		
SG88	101	79	02C	0.39	8		
SG88	101	79	03H	0.48	14		
SG88	101	79	04C	0	10		
SG88	101	79	04H	-0.02	12		
SG88	101	79	05C	0.36	16		
SG88	101	79	05H	-0.66	20	21	
SG88	101	79	06C	0	29	29	
SG88	101	79	06H	0	32	28	
SG88	101	79	07C	0	36	36	
SG88	101	79	07H	0	45	33	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	101	81	01H	-0.48	32	33	
SG88	101	81	02H	0.11	14		
SG88	101	81	03C	0	27	20	
SG88	101	81	03H	0	33	26	
SG88	101	81	04C	-0.57	21	20	
SG88	101	81	04H	0	34	28	
SG88	101	81	05C	0	33	24	
SG88	101	81	05H	-0.55	33	32	
SG88	101	81	06C	0	40	38	1.48
SG88	101	81	06H	0	44	41	1.35
SG88	101	81	07C	0	63	62	1.48
SG88	101	81	07H	0	67	66	1.58
SG88	101	83	01H	-0.48	26	26	
SG88	101	83	02H	0.48	15		
SG88	101	83	03C	0	26	24	
SG88	101	83	03H	0.48	23	14	
SG88	101	83	04C	0	23	25	
SG88	101	83	04H	0	34	32	
SG88	101	83	05C	0	35	30	
SG88	101	83	05H	0	29	28	
SG88	101	83	06C	0	41	37	
SG88	101	83	06H	0	55	57	1.52
SG88	101	83	07C	0	58	57	1.4
SG88	101	83	07H	0	63	62	1.27
SG88	101	85	01H	-0.54	17		
SG88	101	85	02C	0	12		
SG88	101	85	02H	0	16		
SG88	101	85	03C	0.04	25	24	
SG88	101	85	03H	0.43	13		
SG88	101	85	04C	-0.13	17		
SG88	101	85	04H	0	31	24	
SG88	101	85	05C	0.04	31	24	
SG88	101	85	05H	0	25	21	
SG88	101	85	06C	0	39	40	1.39
SG88	101	85	06H	0	44	42	1.43
SG88	101	85	07C	0	57	52	1.53
SG88	101	85	07H	0	56	58	1.34
SG88	101	87	01H	-0.52	11		
SG88	101	87	02H	0	20	16	
SG88	101	87	03C	0	19		
SG88	101	87	03H	-0.52	9		
SG88	101	87	04C	0	22	21	
SG88	101	87	04H	-0.52	25	23	
SG88	101	87	05C	-0.02	31	23	
SG88	101	87	05H	-0.02	25	18	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	101	87	06C	0	38	34	
SG88	101	87	06H	0	46	45	1.44
SG88	101	87	07C	0	59	50	1.58
SG88	101	87	07H	0	61	56	1.53
SG88	101	89	07H	0	11		
SG88	102	74	06H	-0.64	10		
SG88	102	74	07H	-0.7	8	5	
SG88	102	76	04H	-0.04	12		
SG88	102	76	05C	0.39	15		
SG88	102	76	05H	-0.59	10		
SG88	102	76	06C	-0.13	21	24	
SG88	102	76	06H	0	28	28	
SG88	102	76	07C	-0.02	36	35	
SG88	102	76	07H	-0.19	36	40	1.26
SG88	102	78	03C	0.21	15	17	
SG88	102	78	03H	-0.36	14	17	
SG88	102	78	04C	-0.31	23	28	
SG88	102	78	04H	-0.38	21	18	
SG88	102	78	05C	-0.21	24	25	
SG88	102	78	05H	-0.13	25	23	
SG88	102	78	06C	0.09	30	27	
SG88	102	78	06H	-0.62	18	14	
SG88	102	78	07C	-0.17	40	34	
SG88	102	78	07H	-0.28	42	40	1.07
SG88	102	80	01H	-0.52	18		
SG88	102	80	03C	-0.51	15		
SG88	102	80	03H	0.46	18		
SG88	102	80	04C	0	22	22	
SG88	102	80	04H	-0.55	31	35	
SG88	102	80	05C	0	28	28	
SG88	102	80	05H	0	27	21	
SG88	102	80	06C	0	45	39	1.48
SG88	102	80	06H	0	50	52	1.4
SG88	102	80	07C	0	49	49	1.45
SG88	102	80	07H	0	63	59	1.32
SG88	102	82	01H	-0.46	20	18	
SG88	102	82	02C	0.39	14		
SG88	102	82	03C	-0.53	14		
SG88	102	82	03H	0	23	18	
SG88	102	82	04C	0	26	27	
SG88	102	82	04H	0	30	29	
SG88	102	82	05C	0	34	30	
SG88	102	82	05H	-0.63	28	25	
SG88	102	82	06C	0	37	34	
SG88	102	82	06H	0	41	38	1.46

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	102	82	07C	0	72	68	1.61
SG88	102	82	07H	0	67	66	1.49
SG88	102	84	01H	-0.54	17		
SG88	102	84	02H	0	19		
SG88	102	84	03C	-0.02	23	19	
SG88	102	84	03H	0.52	18		
SG88	102	84	04C	-0.07	24	23	
SG88	102	84	04H	0	19		
SG88	102	84	05C	0	29	26	
SG88	102	84	05H	0	31	21	
SG88	102	84	06C	-0.24	37	37	
SG88	102	84	06H	0	45	46	1.48
SG88	102	84	07C	0	50	46	1.54
SG88	102	84	07H	0	49	48	1.24
SG88	102	86	01H	0	25	27	
SG88	102	86	02H	0.48	17		
SG88	102	86	03C	0	16		
SG88	102	86	03H	0	29	22	
SG88	102	86	04C	0	31	24	
SG88	102	86	04H	0	29	19	
SG88	102	86	05C	0	30	25	
SG88	102	86	05H	0	21	14	
SG88	102	86	06C	0	39	38	1.36
SG88	102	86	06H	0	43	38	1.41
SG88	102	86	07C	0	57	47	1.37
SG88	102	86	07H	0	61	52	1.48
SG88	102	88	01H	0.15	10		
SG88	102	88	02H	-0.09	12		
SG88	102	88	03C	-0.53	11		
SG88	102	88	04C	0.39	12		
SG88	102	88	04H	-0.54	22	18	
SG88	102	88	05C	-0.11	20	20	
SG88	102	88	05H	-0.61	19		
SG88	102	88	06C	-0.18	31	28	
SG88	102	88	06H	-0.09	34	27	
SG88	102	88	07C	-0.11	37	35	
SG88	102	88	07H	0	43	38	1.37
SG88	102	90	07C	-0.02	15	14	
SG88	102	92	07C	-0.55	13	17	
SG88	102	98	07H	-0.7	14		
SG88	103	75	04H	-0.59	11		
SG88	103	75	05C	0	16		
SG88	103	75	06C	0	18		
SG88	103	75	06H	0	18		
SG88	103	75	07C	0	26	24	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	103	75	07H	-0.66	25	19	
SG88	103	77	02H	0.34	10	11	
SG88	103	77	03H	-0.13	18	18	
SG88	103	77	04C	-0.31	20	22	
SG88	103	77	04H	-0.38	21	21	
SG88	103	77	05C	-0.08	18	18	
SG88	103	77	05H	-0.11	28	24	
SG88	103	77	06C	0.13	33	34	
SG88	103	77	06H	-0.55	38	35	
SG88	103	77	07C	-0.02	42	40	2.12
SG88	103	77	07H	-0.44	46	44	1.53
SG88	103	79	01H	-0.49	20	21	
SG88	103	79	02H	-0.64	13	14	
SG88	103	79	03C	0.04	19	17	
SG88	103	79	03H	-0.23	30	24	
SG88	103	79	04C	0.19	27	28	
SG88	103	79	04H	0.06	22	17	
SG88	103	79	05C	-0.04	32	29	
SG88	103	79	05H	-0.32	30	22	
SG88	103	79	06C	0.28	36	30	
SG88	103	79	06H	-0.36	41	36	
SG88	103	79	07C	0.02	61	66	1.58
SG88	103	79	07H	-0.34	60	65	1.64
SG88	103	81	01H	-0.52	23	25	
SG88	103	81	02H	0.44	12		
SG88	103	81	03C	0	23	25	
SG88	103	81	03H	0	21	20	
SG88	103	81	04C	0	19		
SG88	103	81	04H	0	32	36	
SG88	103	81	05C	0	29	30	
SG88	103	81	05H	0	29	32	
SG88	103	81	06C	0	34	32	
SG88	103	81	06H	0	37	36	
SG88	103	81	07C	0	61	62	0.99
SG88	103	81	07H	0	68	66	1.54
SG88	103	83	01H	-0.02	27	23	
SG88	103	83	02H	-0.08	13		
SG88	103	83	03C	-0.15	25	22	
SG88	103	83	03H	0	17		
SG88	103	83	04C	-0.06	18		
SG88	103	83	04H	-0.11	30	31	
SG88	103	83	05C	-0.24	29	30	
SG88	103	83	05H	0	30	33	
SG88	103	83	06C	-0.11	37	36	
SG88	103	83	06H	0	44	41	1.46

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	103	83	07C	0	54	52	1.53
SG88	103	83	07H	0	61	51	1.19
SG88	103	85	01H	-0.46	13		
SG88	103	85	02C	0	19		
SG88	103	85	02H	0	18		
SG88	103	85	03C	0	22	23	
SG88	103	85	03H	0	19		
SG88	103	85	04C	0	26	28	
SG88	103	85	04H	0	35	30	
SG88	103	85	05C	-0.13	29	27	
SG88	103	85	05H	0	25	23	
SG88	103	85	06C	0	37	33	
SG88	103	85	06H	0	50	52	1.47
SG88	103	85	07C	0	59	53	1.47
SG88	103	85	07H	0	61	52	1.11
SG88	103	87	01H	-0.48	10		
SG88	103	87	02C	0.34	9		
SG88	103	87	02H	0.42	13		
SG88	103	87	03C	0	21	20	
SG88	103	87	03H	0	16		
SG88	103	87	04C	0	24	26	
SG88	103	87	04H	-0.5	30	31	1.15
SG88	103	87	05C	0	29	27	
SG88	103	87	05H	0	17		
SG88	103	87	06C	0	37	39	1.36
SG88	103	87	06H	0	41	39	1.46
SG88	103	87	07C	0	55	53	1.17
SG88	103	87	07H	0	59	55	1.56
SG88	103	89	04H	-0.52	11		
SG88	103	89	06C	0.35	11		
SG88	103	89	07C	-0.09	13	12	
SG88	103	89	07H	-0.53	18	15	
SG88	103	91	07H	-0.76	11	7	
SG88	104	72	06H	-0.63	12		
SG88	104	76	03C	-0.48	10	13	
SG88	104	76	03H	-0.17	9	10	
SG88	104	76	04C	-0.29	16	19	
SG88	104	76	04H	-0.06	22	20	
SG88	104	76	05C	0.11	21	20	
SG88	104	76	05H	0	17	15	
SG88	104	76	06C	-0.08	30	25	
SG88	104	76	06H	-0.17	33	27	
SG88	104	76	07C	0.04	34	34	
SG88	104	76	07H	-0.15	39	38	2.3
SG88	104	78	01H	-0.15	25	26	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	104	78	02H	-0.08	15	10	
SG88	104	78	03C	0.13	26	21	
SG88	104	78	03H	-0.06	30	24	
SG88	104	78	04C	0	25	26	
SG88	104	78	04H	-0.28	30	26	
SG88	104	78	05C	0	30	24	
SG88	104	78	05H	-0.23	31	25	
SG88	104	78	06C	0	40	35	
SG88	104	78	06H	-0.42	45	40	1.4
SG88	104	78	07C	0.02	57	59	1.57
SG88	104	78	07H	-0.08	58	58	1.59
SG88	104	80	01H	-0.39	23	23	
SG88	104	80	02C	0	11	14	
SG88	104	80	02H	-0.11	18	16	
SG88	104	80	03C	0	24	18	
SG88	104	80	03H	-0.09	23	22	
SG88	104	80	04C	0	21	21	
SG88	104	80	04H	0.04	35	33	
SG88	104	80	05C	0	32	27	
SG88	104	80	05H	-0.19	34	27	
SG88	104	80	06C	0	43	38	1.49
SG88	104	80	06H	-0.15	44	39	1.41
SG88	104	80	07C	-0.04	65	67	1.58
SG88	104	80	07H	-0.38	61	57	1.57
SG88	104	82	01H	0	13		
SG88	104	82	02H	-0.06	9		
SG88	104	82	03C	-0.11	18		
SG88	104	82	03H	-0.04	15		
SG88	104	82	04C	-0.06	24	21	
SG88	104	82	04H	-0.1	27	25	
SG88	104	82	05C	-0.06	28	25	
SG88	104	82	05H	-0.13	30	26	
SG88	104	82	06C	-0.09	37	34	
SG88	104	82	06H	0	46	42	1.53
SG88	104	82	07C	0	55	55	1.64
SG88	104	82	07H	0	63	58	1.55
SG88	104	84	01H	0.08	16		
SG88	104	84	02H	0	16		
SG88	104	84	03C	-0.11	26	25	
SG88	104	84	03H	-0.02	22	17	
SG88	104	84	04C	-0.15	29	28	
SG88	104	84	04H	-0.02	35	31	
SG88	104	84	05C	-0.15	32	35	
SG88	104	84	05H	-0.08	32	29	
SG88	104	84	06C	0	44	43	1.39

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	104	84	06H	0	48	41	1.37
SG88	104	84	07C	0	63	50	1.11
SG88	104	84	07H	0	66	61	1.54
SG88	104	86	01H	-0.46	11		
SG88	104	86	02H	0.38	19		
SG88	104	86	03C	0	20	18	
SG88	104	86	03H	0	24	18	
SG88	104	86	04C	0	26	28	
SG88	104	86	04H	0	26	26	
SG88	104	86	05C	0	29	26	
SG88	104	86	05H	0	22	16	
SG88	104	86	06C	0	36	38	1.22
SG88	104	86	06H	0	42	39	1.35
SG88	104	86	07C	0	52	46	1.23
SG88	104	86	07H	0	58	55	1.73
SG88	104	88	03C	-0.5	8		
SG88	104	88	04C	0	13		
SG88	104	88	04H	-0.53	14		
SG88	104	88	05C	0	19		
SG88	104	88	05H	0	16		
SG88	104	88	06C	0	24	23	
SG88	104	88	06H	0	25	21	
SG88	104	88	07C	0	26	24	
SG88	104	88	07H	0	24	21	
SG88	104	90	04C	-0.57	11		
SG88	104	90	04H	-0.55	12		
SG88	104	90	05C	0	15		
SG88	104	90	06C	0	15		
SG88	104	90	06H	0	19		
SG88	104	90	07C	0	16	13	
SG88	104	90	07H	0	22	20	
SG88	105	75	03H	0	9		
SG88	105	75	04C	0.32	10		
SG88	105	75	04H	-0.57	18		
SG88	105	75	05C	0	15		
SG88	105	75	05H	0	21	20	
SG88	105	75	06C	0	25	24	
SG88	105	75	06H	0	30	31	
SG88	105	75	07C	0	37	38	1.47
SG88	105	75	07H	0	36	33	
SG88	105	77	03C	-0.21	13	13	
SG88	105	77	03H	0.11	14	15	
SG88	105	77	04C	-0.08	21	20	
SG88	105	77	04H	-0.21	23	17	
SG88	105	77	05C	0.04	26	25	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	105	77	05H	-0.23	26	24	
SG88	105	77	06C	0	30	28	
SG88	105	77	06H	-0.13	39	36	
SG88	105	77	07C	0.13	43	42	1.57
SG88	105	77	07H	-0.28	40	39	1.55
SG88	105	79	01H	0	21	22	
SG88	105	79	02H	-0.02	21	22	
SG88	105	79	03C	0	27	22	
SG88	105	79	03H	-0.19	28	24	
SG88	105	79	04C	-0.06	25	20	
SG88	105	79	04H	-0.23	30	24	
SG88	105	79	05C	-0.1	33	29	
SG88	105	79	05H	-0.17	33	27	
SG88	105	79	06C	0.02	43	45	1.46
SG88	105	79	06H	-0.34	54	54	1.46
SG88	105	79	07C	0.04	57	55	1.49
SG88	105	79	07H	-0.25	58	53	1.46
SG88	105	81	01H	-0.48	12		
SG88	105	81	03C	0	21	20	
SG88	105	81	03H	0	24	22	
SG88	105	81	04C	0	24	21	
SG88	105	81	04H	0	25	21	
SG88	105	81	05C	-0.11	36	28	
SG88	105	81	05H	0	30	25	
SG88	105	81	06C	0	40	37	
SG88	105	81	06H	0	44	40	1.26
SG88	105	81	07C	0	54	53	1.55
SG88	105	81	07H	0	60	54	1.53
SG88	105	83	01H	0	22	21	
SG88	105	83	02H	0	16		
SG88	105	83	03C	0	21	17	
SG88	105	83	04C	0	24	25	
SG88	105	83	04H	-0.59	28	24	
SG88	105	83	05C	0	33	30	
SG88	105	83	05H	0	33	27	
SG88	105	83	06C	0	38	35	
SG88	105	83	06H	0	41	34	1.4
SG88	105	83	07C	0	66	67	1.64
SG88	105	83	07H	0	55	48	1.48
SG88	105	85	01H	-0.47	11		
SG88	105	85	02H	0.45	18		
SG88	105	85	03C	0	18		
SG88	105	85	03H	0	25	22	
SG88	105	85	04C	0	18		
SG88	105	85	04H	0	27	25	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	105	85	05C	0	29	29	
SG88	105	85	05H	0	19		
SG88	105	85	06C	0.04	37	31	
SG88	105	85	06H	0	46	46	1.43
SG88	105	85	07C	0	57	56	1.36
SG88	105	85	07H	0	48	42	1.48
SG88	105	87	04C	-0.57	15		
SG88	105	87	04H	-0.09	14		
SG88	105	87	05C	0	21	22	
SG88	105	87	05H	-0.02	19		
SG88	105	87	06C	0	29	28	
SG88	105	87	06H	0	32	25	
SG88	105	87	07C	0	44	44	1.34
SG88	105	87	07H	0	44	41	1.31
SG88	105	89	04C	-0.74	9		
SG88	105	89	04H	-0.15	9		
SG88	105	89	06C	-0.55	12		
SG88	105	89	06H	0	18		
SG88	105	89	07C	0	12	10	
SG88	105	89	07H	0	23	17	
SG88	105	91	07H	-0.72	12	7	
SG88	106	74	07C	-0.64	7		
SG88	106	74	07H	-0.7	17	15	
SG88	106	76	02H	0	18	16	
SG88	106	76	03C	0	16	17	
SG88	106	76	03H	-0.15	20	17	
SG88	106	76	04C	0	21	26	
SG88	106	76	04H	-0.34	19	18	
SG88	106	76	05C	0	23	22	
SG88	106	76	05H	-0.34	25	19	
SG88	106	76	06C	0	26	22	
SG88	106	76	06H	-0.34	39	32	
SG88	106	76	07C	0.06	43	48	1.47
SG88	106	76	07H	-0.34	50	54	1.77
SG88	106	78	01H	-0.67	21	22	
SG88	106	78	02H	-0.55	14	17	
SG88	106	78	03C	0	18	24	
SG88	106	78	03H	-0.04	22	21	
SG88	106	78	04C	-0.02	23	22	
SG88	106	78	04H	-0.26	28	19	
SG88	106	78	05C	0.26	30	29	
SG88	106	78	05H	-0.17	35	27	
SG88	106	78	06C	0.06	39	36	
SG88	106	78	06H	-0.19	44	35	
SG88	106	78	07C	0.06	56	65	1.02

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	106	78	07H	-0.76	70	75	1.79
SG88	106	80	01H	0	16	16	
SG88	106	80	02H	0	13	14	
SG88	106	80	03C	0.13	17	19	
SG88	106	80	03H	0	24	24	
SG88	106	80	04C	0.17	30	31	
SG88	106	80	04H	0	23	20	
SG88	106	80	05C	0	28	26	
SG88	106	80	05H	-0.21	34	30	
SG88	106	80	06C	0.04	39	35	
SG88	106	80	06H	-0.23	37	35	
SG88	106	80	07C	0.11	49	56	1.56
SG88	106	80	07H	-0.25	56	60	1.68
SG88	106	82	01H	-0.37	24	22	
SG88	106	82	02H	0	20	16	
SG88	106	82	03C	0	21	16	
SG88	106	82	03H	0	24	20	
SG88	106	82	04C	0	27	28	
SG88	106	82	04H	0	27	17	
SG88	106	82	05C	0	30	23	
SG88	106	82	05H	0	32	25	
SG88	106	82	06C	0	40	41	1.39
SG88	106	82	06H	0	43	37	
SG88	106	82	07C	0	52	56	1.47
SG88	106	82	07H	0	54	46	1.52
SG88	106	84	01H	-0.45	17		
SG88	106	84	03H	0	29	20	
SG88	106	84	04C	-0.62	27	27	
SG88	106	84	04H	-0.07	27	22	
SG88	106	84	05C	-0.06	28	21	
SG88	106	84	05H	-0.17	23	18	
SG88	106	84	06C	0	39	38	1.33
SG88	106	84	06H	0	45	35	
SG88	106	84	07C	0	52	48	1.34
SG88	106	84	07H	0	58	53	1.8
SG88	106	86	03H	0.43	12		
SG88	106	86	04H	-0.63	16		
SG88	106	86	05C	0	17		
SG88	106	86	05H	0	21	13	
SG88	106	86	06C	0	21	20	
SG88	106	86	06H	0	33	26	
SG88	106	86	07C	0.04	20	22	
SG88	106	86	07H	0	41	37	1.4
SG88	106	88	04C	-0.55	11		
SG88	106	88	05C	-0.59	16		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	106	88	05H	-0.63	9		
SG88	106	88	06C	0	16		
SG88	106	88	06H	-0.15	17		
SG88	106	88	07C	0	13	14	
SG88	106	88	07H	-0.18	24	17	
SG88	106	90	04H	-0.46	10		
SG88	106	90	05H	-0.55	9		
SG88	106	90	06H	-0.61	15		
SG88	106	90	07C	-0.13	19	19	
SG88	106	90	07H	-0.62	15	10	
SG88	106	92	06H	-0.63	16		
SG88	106	102	06H	-0.2	9		
SG88	107	75	04C	-0.63	16		
SG88	107	75	04H	0	19		
SG88	107	75	05C	0	21	21	
SG88	107	75	05H	0	22	21	
SG88	107	75	06C	0	28	26	
SG88	107	75	06H	0	32	25	
SG88	107	75	07C	0	41	44	1.26
SG88	107	75	07H	0	44	41	1.61
SG88	107	77	02H	0.13	14	9	
SG88	107	77	03C	0.13	17	20	
SG88	107	77	03H	0.08	21	20	
SG88	107	77	04C	0	22	26	
SG88	107	77	04H	-0.13	23	23	
SG88	107	77	05C	0	26	23	
SG88	107	77	05H	-0.13	31	24	
SG88	107	77	06C	0.02	32	27	
SG88	107	77	06H	-0.36	38	30	
SG88	107	77	07C	0.17	53	58	1.99
SG88	107	77	07H	-0.19	44	34	
SG88	107	79	01H	0.13	21	21	
SG88	107	79	02H	-0.13	11	12	
SG88	107	79	03C	0	22	22	
SG88	107	79	03H	0.11	17	16	
SG88	107	79	04C	0	15	15	
SG88	107	79	04H	-0.11	27	25	
SG88	107	79	05C	0	26	28	
SG88	107	79	05H	-0.17	27	22	
SG88	107	79	06C	0	31	24	
SG88	107	79	06H	-0.13	44	41	1.38
SG88	107	79	07C	0	52	53	1.67
SG88	107	79	07H	-0.42	61	58	1.47
SG88	107	81	01H	-0.48	12		
SG88	107	81	03C	-0.62	16		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	107	81	03H	0	23	21	
SG88	107	81	04C	-0.6	19		
SG88	107	81	04H	0	22	25	
SG88	107	81	05C	0	21	20	
SG88	107	81	05H	0	30	33	
SG88	107	81	06C	0	28	27	
SG88	107	81	06H	0	37	39	1.35
SG88	107	81	07C	0	44	40	1.38
SG88	107	81	07H	0	50	35	
SG88	107	83	02H	0.04	12		
SG88	107	83	03H	0.02	14		
SG88	107	83	04C	-0.15	14		
SG88	107	83	04H	-0.04	13		
SG88	107	83	05C	-0.04	24	31	
SG88	107	83	05H	-0.02	25	26	
SG88	107	83	06C	-0.13	26	25	
SG88	107	83	06H	-0.11	32	33	
SG88	107	83	07C	0	46	45	1.11
SG88	107	83	07H	-0.02	37	39	1.58
SG88	107	85	01H	-0.48	8		
SG88	107	85	02H	0.42	12		
SG88	107	85	03H	-0.56	15		
SG88	107	85	04C	-0.5	13		
SG88	107	85	04H	-0.63	15		
SG88	107	85	05C	-0.51	20	25	
SG88	107	85	05H	0	24	19	
SG88	107	85	06C	0	28	30	
SG88	107	85	06H	0	33	33	
SG88	107	85	07C	0	43	42	1.37
SG88	107	85	07H	0	47	44	1.27
SG88	107	87	04H	-0.46	12		
SG88	107	87	05C	-0.48	12		
SG88	107	87	05H	-0.15	9		
SG88	107	87	06H	-0.23	20	17	
SG88	107	87	07H	-0.11	20	20	
SG88	107	89	07H	-0.57	11	9	
SG88	108	74	06H	-0.68	11		
SG88	108	74	07H	-0.66	11	7	
SG88	108	76	04C	0	13	17	
SG88	108	76	04H	-0.68	20	21	
SG88	108	76	05C	0	26	22	
SG88	108	76	05H	-0.19	31	30	
SG88	108	76	06C	0	31	27	
SG88	108	76	06H	-0.04	30	26	
SG88	108	76	07C	-0.15	48	54	1.39

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	108	76	07H	-0.17	62	69	1.67
SG88	108	78	02H	0.19	11	11	
SG88	108	78	03C	0.06	19	19	
SG88	108	78	03H	-0.06	18	16	
SG88	108	78	04C	0	26	27	
SG88	108	78	04H	-0.04	27	23	
SG88	108	78	05C	0	31	28	
SG88	108	78	05H	-0.08	24	20	
SG88	108	78	06C	0	36	32	
SG88	108	78	06H	-0.13	44	40	1.33
SG88	108	78	07C	0	54	59	1.72
SG88	108	78	07H	-0.13	59	67	1.6
SG88	108	80	01H	-0.02	15	17	
SG88	108	80	02C	0	12	12	
SG88	108	80	02H	0.17	11	11	
SG88	108	80	03C	0	20	18	
SG88	108	80	03H	0.11	18	21	
SG88	108	80	04C	0.19	10	12	
SG88	108	80	04H	0.21	27	24	
SG88	108	80	05C	0	30	25	
SG88	108	80	05H	-0.21	32	31	
SG88	108	80	06C	0	39	37	
SG88	108	80	06H	-0.4	42	41	1.42
SG88	108	80	07C	0.04	49	55	1.46
SG88	108	80	07H	-0.32	53	56	1.47
SG88	108	82	01H	0	15		
SG88	108	82	02H	0	16		
SG88	108	82	03C	-0.06	16		
SG88	108	82	03H	0	18		
SG88	108	82	04C	-0.08	16		
SG88	108	82	04H	0	29	30	
SG88	108	82	05C	-0.04	29	26	
SG88	108	82	05H	0	29	22	
SG88	108	82	06C	-0.09	36	33	
SG88	108	82	06H	0	45	40	1.38
SG88	108	82	07C	0	57	56	1.58
SG88	108	82	07H	0	60	55	1.41
SG88	108	84	03C	-0.06	11		
SG88	108	84	03H	0	16		
SG88	108	84	04C	-0.11	12		
SG88	108	84	04H	0	21	21	
SG88	108	84	05C	-0.08	20	24	
SG88	108	84	05H	0	22	17	
SG88	108	84	06C	-0.13	30	32	
SG88	108	84	06H	-0.15	37	36	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	108	84	07C	-0.09	35	38	1.43
SG88	108	84	07H	0	46	39	1.27
SG88	108	86	04H	-0.57	11		
SG88	108	86	05C	-0.11	10		
SG88	108	86	05H	-0.53	8		
SG88	108	86	06H	0	19		
SG88	108	86	07C	-0.49	7		
SG88	108	86	07H	-0.59	13	14	
SG88	109	73	06H	-0.7	9		
SG88	109	75	04C	-0.5	11		
SG88	109	75	04H	0	18		
SG88	109	75	05C	0	20	22	
SG88	109	75	05H	0	19		
SG88	109	75	06C	0	26	25	
SG88	109	75	06H	0	31	32	
SG88	109	75	07C	-0.26	37	37	
SG88	109	75	07H	0	43	43	1.4
SG88	109	77	02H	-0.06	17	13	
SG88	109	77	03C	0	22	22	
SG88	109	77	03H	0.11	19	19	
SG88	109	77	04C	0	12	16	
SG88	109	77	04H	0.04	30	31	
SG88	109	77	05C	0	32	27	
SG88	109	77	05H	-0.11	31	26	
SG88	109	77	06C	0	37	29	
SG88	109	77	06H	-0.53	41	34	
SG88	109	77	07C	0	43	47	1.63
SG88	109	77	07H	-0.21	50	59	1.53
SG88	109	79	01H	0.06	14	14	
SG88	109	79	03C	-0.31	26	20	
SG88	109	79	03H	0.02	17	17	
SG88	109	79	04C	-0.04	20	22	
SG88	109	79	04H	0.02	31	32	
SG88	109	79	05C	-0.04	32	26	
SG88	109	79	05H	-0.15	29	26	
SG88	109	79	06C	-0.1	35	26	
SG88	109	79	06H	-0.15	40	32	
SG88	109	79	07C	0.19	53	53	1.57
SG88	109	79	07H	-0.19	53	49	1.64
SG88	109	81	01H	-0.41	15		
SG88	109	81	02H	0.52	14		
SG88	109	81	03C	0	21	18	
SG88	109	81	03H	0	22	19	
SG88	109	81	04C	-0.63	20	21	
SG88	109	81	04H	0	28	25	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	109	81	05C	0	32	26	
SG88	109	81	05H	0	26	25	
SG88	109	81	06C	0	39	33	
SG88	109	81	06H	0	43	39	1.26
SG88	109	81	07C	0	54	54	1.41
SG88	109	81	07H	0	64	60	1.58
SG88	109	83	02H	0.48	12		
SG88	109	83	04C	0	13		
SG88	109	83	04H	0	20	18	
SG88	109	83	05C	0	29	25	
SG88	109	83	05H	0.43	24	21	
SG88	109	83	06C	0	27	26	
SG88	109	83	06H	0	33	24	
SG88	109	83	07C	0	47	49	1.31
SG88	109	83	07H	0	39	29	
SG88	109	85	05C	-0.55	10		
SG88	109	85	06H	0.22	17		
SG88	109	85	07H	-0.64	23	17	
SG88	110	74	06H	0	15		
SG88	110	74	07C	0	11	12	
SG88	110	74	07H	0	14	12	
SG88	110	76	03C	-0.59	15		
SG88	110	76	03H	-0.11	19		
SG88	110	76	04C	-0.15	18		
SG88	110	76	04H	0	23	17	
SG88	110	76	05C	-0.15	23	22	
SG88	110	76	05H	0	31	24	
SG88	110	76	06C	0	35	26	
SG88	110	76	06H	-0.2	39	37	
SG88	110	76	07C	0	46	46	1.49
SG88	110	76	07H	0	41	33	
SG88	110	78	02H	0.17	14	15	
SG88	110	78	03C	-0.04	15	16	
SG88	110	78	03H	-0.15	16	15	
SG88	110	78	04C	-0.15	20	23	
SG88	110	78	04H	-0.24	21	21	
SG88	110	78	05C	0.02	27	23	
SG88	110	78	05H	-0.07	29	28	
SG88	110	78	06C	-0.1	33	28	
SG88	110	78	06H	-0.17	35	30	
SG88	110	78	07C	-0.21	46	45	1.56
SG88	110	78	07H	-0.11	43	40	1.52
SG88	110	80	03C	-0.61	18		
SG88	110	80	03H	0	16		
SG88	110	80	04C	-0.61	14		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	110	80	04H	0	29	25	
SG88	110	80	05C	0	25	26	
SG88	110	80	05H	0	27	24	
SG88	110	80	06C	0	36	30	
SG88	110	80	06H	0	40	36	
SG88	110	80	07C	0	46	48	1.4
SG88	110	80	07H	0	54	50	1.54
SG88	110	82	02H	0.5	14		
SG88	110	82	03C	-0.66	14		
SG88	110	82	03H	0.3	20	16	
SG88	110	82	04C	0	18		
SG88	110	82	04H	-0.54	30	28	
SG88	110	82	05C	0	28	28	
SG88	110	82	05H	0	30	23	
SG88	110	82	06C	0	28	24	
SG88	110	82	06H	0	38	30	
SG88	110	82	07C	0	50	49	1.41
SG88	110	82	07H	0	40	32	
SG88	110	84	04C	-0.59	12		
SG88	110	84	04H	-0.56	13		
SG88	110	84	05C	-0.48	10		
SG88	110	84	05H	0	13		
SG88	110	84	06H	-0.2	26	19	
SG88	110	84	07H	-0.04	29	23	
SG88	111	73	06H	-0.65	9		
SG88	111	75	04C	-0.59	11		
SG88	111	75	04H	-0.15	12		
SG88	111	75	05C	0	15		
SG88	111	75	05H	0	18		
SG88	111	75	06C	0	20	18	
SG88	111	75	06H	0	26	24	
SG88	111	75	07C	0	34	30	
SG88	111	75	07H	0	35	32	
SG88	111	77	04C	-0.64	12		
SG88	111	77	04H	-0.61	18		
SG88	111	77	05C	-0.68	16		
SG88	111	77	05H	-0.19	22	21	
SG88	111	77	06C	0	23	24	
SG88	111	77	06H	-0.06	35	37	
SG88	111	77	07C	0	33	33	
SG88	111	77	07H	0	43	42	1.43
SG88	111	79	02C	0.43	11		
SG88	111	79	02H	0.46	12		
SG88	111	79	03C	0.35	12		
SG88	111	79	03H	0.48	10		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	111	79	04C	-0.62	15		
SG88	111	79	04H	0	18		
SG88	111	79	05C	0	24	20	
SG88	111	79	05H	0	24	26	
SG88	111	79	06C	0	25	23	
SG88	111	79	06H	0	35	34	
SG88	111	79	07C	0	41	36	
SG88	111	79	07H	0	42	32	
SG88	111	81	03C	-0.62	16		
SG88	111	81	03H	0	15		
SG88	111	81	04C	-0.62	12		
SG88	111	81	04H	0	17		
SG88	111	81	05C	0	26	24	
SG88	111	81	05H	0	23	23	
SG88	111	81	06C	0	33	30	
SG88	111	81	06H	0	46	45	1.29
SG88	111	81	07C	0	52	50	1.63
SG88	111	81	07H	0	56	53	1.42
SG88	111	83	02H	0	12		
SG88	111	83	03C	0	7		
SG88	111	83	03H	-0.02	14		
SG88	111	83	04C	-0.1	12		
SG88	111	83	04H	-0.02	14		
SG88	111	83	05C	-0.06	22	27	
SG88	111	83	05H	-0.06	19		
SG88	111	83	06C	-0.11	30	28	
SG88	111	83	06H	-0.19	34	35	1.35
SG88	111	83	07C	-0.11	37	39	1.47
SG88	111	83	07H	0	46	47	1.44
SG88	111	89	07H	-0.65	9	6	
SG88	112	74	06H	-0.72	13		
SG88	112	74	07C	0	12	14	
SG88	112	74	07H	0	18	10	
SG88	112	76	04H	-0.63	12		
SG88	112	76	05C	-0.66	14		
SG88	112	76	05H	0.45	11		
SG88	112	76	06C	-0.11	14		
SG88	112	76	06H	-0.13	25	25	
SG88	112	76	07C	-0.15	24	20	
SG88	112	76	07H	-0.74	21	17	
SG88	112	78	04C	-0.59	13		
SG88	112	78	04H	-0.58	17		
SG88	112	78	05C	-0.54	13		
SG88	112	78	05H	0	23	20	
SG88	112	78	06C	0	18		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	112	78	06H	-0.22	33	27	
SG88	112	78	07H	-0.07	38	34	
SG88	112	80	02H	0.42	14		
SG88	112	80	03C	-0.65	12		
SG88	112	80	03H	0.48	12		
SG88	112	80	04C	0	16		
SG88	112	80	04H	-0.61	16		
SG88	112	80	05C	0	26	27	
SG88	112	80	05H	-0.63	11		
SG88	112	80	06C	0	30	29	
SG88	112	80	06H	0	35	35	
SG88	112	80	07C	0	48	48	1.21
SG88	112	80	07H	0	54	52	1.47
SG88	112	82	03H	0.04	12		
SG88	112	82	04C	-0.74	12		
SG88	112	82	04H	-0.59	16		
SG88	112	82	05C	-0.65	16		
SG88	112	82	05H	0	18		
SG88	112	82	06C	0.36	11		
SG88	112	82	06H	-0.21	30	29	
SG88	112	82	07C	0	16	18	
SG88	112	82	07H	0	42	40	1.44
SG88	112	84	07H	0.02	10	7	
SG88	113	39	04H	-0.57	8		
SG88	113	75	06C	0	11		
SG88	113	75	06H	-0.02	10		
SG88	113	75	07C	0	15	16	
SG88	113	75	07H	-0.15	14	11	
SG88	113	77	07H	-0.7	22	17	
SG88	113	79	02H	0.5	10		
SG88	113	79	03C	-0.59	12		
SG88	113	79	03H	0.43	12		
SG88	113	79	04C	-0.63	14		
SG88	113	79	04H	-0.61	20	20	
SG88	113	79	05C	0	16		
SG88	113	79	05H	0	18		
SG88	113	79	06C	0	27	22	
SG88	113	79	06H	0	35	27	
SG88	113	79	07C	0	37	35	
SG88	113	79	07H	0	38	32	
SG88	113	81	03C	-0.57	11		
SG88	113	81	03H	0	16		
SG88	113	81	04C	-0.61	14		
SG88	113	81	04H	-0.09	17		
SG88	113	81	05C	-0.63	17		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	113	81	05H	0	23	21	
SG88	113	81	06C	0	26	23	
SG88	113	81	06H	0	37	34	
SG88	113	81	07C	0	37	33	
SG88	113	81	07H	0	40	35	
SG88	113	83	06H	-0.09	24	19	
SG88	113	83	07H	-0.73	32	30	
SG88	114	74	07H	-0.68	8	5	
SG88	114	76	07C	-0.15	15	11	
SG88	114	76	07H	-0.73	20	13	
SG88	114	78	05H	0.45	10		
SG88	114	78	06C	0.34	10		
SG88	114	78	06H	0	23	21	
SG88	114	78	07C	-0.58	16	21	
SG88	114	78	07H	-0.74	30	24	
SG88	114	80	03H	0.48	15		
SG88	114	80	04C	0	16		
SG88	114	80	04H	-0.6	19		
SG88	114	80	05C	0	20	23	
SG88	114	80	05H	0	27	22	
SG88	114	80	06C	0	28	22	
SG88	114	80	06H	0	40	39	0.94
SG88	114	80	07C	0	35	33	
SG88	114	80	07H	0	40	29	
SG88	115	75	07H	-0.73	14	9	
SG88	115	77	07H	-0.76	9	5	
SG88	115	79	03H	-0.58	13		
SG88	115	79	04C	0.47	12		
SG88	115	79	04H	0	18		
SG88	115	79	05C	0	14		
SG88	115	79	05H	0	22	18	
SG88	115	79	06C	0	23	23	
SG88	115	79	06H	0	33	31	
SG88	115	79	07C	0	37	39	1.39
SG88	115	79	07H	0	32	34	
SG88	115	81	07H	-0.72	8		
SG88	116	76	07H	-0.68	20	21	
SG88	116	78	03H	0	14		
SG88	116	78	04H	0.39	11		
SG88	116	78	05C	0.44	13		
SG88	116	78	05H	-0.13	16		
SG88	116	78	06C	0	21	19	
SG88	116	78	06H	-0.13	36	32	
SG88	116	78	07C	0	19	17	
SG88	116	78	07H	0	53	50	1.25

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	116	80	05H	0.4	10		
SG88	116	80	06C	0.41	8		
SG88	116	80	06H	0	17		
SG88	116	80	07C	0.41	8	13	
SG88	116	80	07H	-0.77	22	23	
SG88	116	82	07H	-0.77	9	6	
SG88	116	88	07H	-0.63	13		
SG88	117	77	05C	-0.66	10		
SG88	117	77	05H	0	13		
SG88	117	77	06H	0	17		
SG88	117	77	07C	-0.61	14	13	
SG88	117	77	07H	-0.7	30	23	
SG88	117	79	02H	0	12		
SG88	117	79	03H	0	17		
SG88	117	79	04C	0	15		
SG88	117	79	04H	0	15		
SG88	117	79	05C	-0.11	12		
SG88	117	79	05H	0	28	24	
SG88	117	79	06C	0	33	26	
SG88	117	79	06H	0	39	33	
SG88	117	79	07C	0	47	41	1.46
SG88	117	79	07H	0	52	49	1.5
SG88	117	123	05H	-0.59	13		
SG88	118	76	07H	-0.68	14	11	
SG88	118	78	04C	-0.6	11		
SG88	118	78	04H	-0.61	13		
SG88	118	78	05H	-0.65	20	19	
SG88	118	78	06C	0.39	15		
SG88	118	78	06H	-0.02	27	21	
SG88	118	78	07H	0	35	37	
SG88	118	82	05H	0	10		
SG88	118	82	06H	0.42	11		
SG88	119	77	03H	-0.58	16		
SG88	119	77	04H	-0.58	20	24	
SG88	119	77	05C	-0.63	18		
SG88	119	77	05H	0.04	12		
SG88	119	77	06C	-0.13	13		
SG88	119	77	06H	-0.04	34	34	
SG88	119	77	07C	0	43	40	1.61
SG88	119	77	07H	0	44	40	1.43
SG88	119	79	04H	-0.63	14		
SG88	119	79	05C	0	10		
SG88	119	79	05H	0	16		
SG88	119	79	06C	0.32	12		
SG88	119	79	06H	0	32	30	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG88	119	79	07C	0	36	39	1.34
SG88	119	79	07H	0	50	50	1.5
SG88	119	85	05H	0	10		
SG88	119	85	06H	-0.02	11		
SG88	120	76	07H	-0.7	12	7	
SG88	120	78	03C	-0.15	9		
SG88	120	78	03H	0.46	13		
SG88	120	78	04C	-0.04	10		
SG88	120	78	04H	-0.63	24	23	
SG88	120	78	05C	-0.15	16		
SG88	120	78	05H	-0.61	18		
SG88	120	78	06C	-0.08	16		
SG88	120	78	06H	-0.11	35	39	1.44
SG88	120	78	07C	-0.09	34	32	
SG88	120	78	07H	0	47	50	1.69
SG88	120	80	07H	-0.77	12		
SG88	121	77	04H	-0.76	15		
SG88	121	77	05H	-0.7	10		
SG88	121	77	06H	-0.13	23	20	
SG88	121	77	07C	-0.54	20	18	
SG88	121	77	07H	-0.79	19	13	
SG88	121	79	04H	-0.72	10		
SG88	121	79	05H	-0.74	12		
SG88	121	79	06H	-0.17	23	21	
SG88	121	79	07H	-0.74	34	34	
SG88	122	78	07H	-0.78	6		
SG88	123	73	06H	-0.74	11		
SG88	124	76	07H	-0.77	11	6	
SG88	125	83	06H	0.35	9		
SG88	128	104	05H	-0.69	7		
SG88	130	100	06H	-0.71	10		
SG88	132	80	07H	-0.85	8		
SG88	132	122	03H	-0.58	7		
SG88	133	83	06H	-0.76	12		
SG88	135	79	06H	-0.83	11		
SG88	136	102	06H	-0.65	10		
SG88	138	70	06H	-0.7	12		
SG88	140	84	07H	-0.74	9		

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SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	100	80	TWD	0	B02	2.46	Freespan Wear
SG88	100	80	TWD	14	B02	2.49	Freespan Wear
SG88	100	80	TWD	20	B02	3.48	Freespan Wear
SG88	100	80	TWD	25	B02	4.47	Freespan Wear
SG88	100	80	TWD	30	B02	5.46	Freespan Wear
SG88	100	80	TWD	34	B02	6.45	Freespan Wear
SG88	100	80	TWD	39	B02	7.45	Freespan Wear
SG88	100	80	TWD	42	B02	8.44	Freespan Wear
SG88	100	80	TWD	47	B02	9.43	Freespan Wear
SG88	100	80	TWD	51	B02	10.42	Freespan Wear
SG88	100	80	TWD	54	B02	11.41	Freespan Wear
SG88	100	80	TWD	59	B02	12.4	Freespan Wear
SG88	100	80	TWD	62	B02	13.39	Freespan Wear
SG88	100	80	TWD	64	B02	14.38	Freespan Wear
SG88	100	80	TWD	68	B02	15.37	Freespan Wear
SG88	100	80	TWD	71	B02	16.36	Freespan Wear
SG88	100	80	TWD	73	B02	17.35	Freespan Wear
SG88	100	80	TWD	75	B02	18.34	Freespan Wear
SG88	100	80	TWD	76	B02	19.16	Freespan Wear
SG88	100	80	TWD	76	B02	19.19	Freespan Wear
SG88	100	80	TWD	75	B02	19.22	Freespan Wear
SG88	100	80	TWD	77	B02	19.24	Freespan Wear
SG88	100	80	TWD	76	B02	19.27	Freespan Wear
SG88	100	80	TWD	76	B02	19.3	Freespan Wear
SG88	100	80	TWD	76	B02	19.33	Freespan Wear
SG88	100	80	TWD	77	B02	19.36	Freespan Wear
SG88	100	80	TWD	76	B02	19.38	Freespan Wear
SG88	100	80	TWD	76	B02	19.41	Freespan Wear
SG88	100	80	TWD	76	B02	19.44	Freespan Wear
SG88	100	80	TWD	76	B02	19.47	Freespan Wear
SG88	100	80	TWD	77	B02	19.5	Freespan Wear
SG88	100	80	TWD	76	B02	19.53	Freespan Wear
SG88	100	80	TWD	75	B02	19.55	Freespan Wear
SG88	100	80	TWD	76	B02	19.58	Freespan Wear
SG88	100	80	TWD	76	B02	19.61	Freespan Wear
SG88	100	80	TWD	76	B02	19.64	Freespan Wear
SG88	100	80	TWD	77	B02	19.67	Freespan Wear
SG88	100	80	TWD	75	B02	19.7	Freespan Wear
SG88	100	80	TWD	77	B02	19.72	Freespan Wear
SG88	100	80	TWD	77	B02	19.75	Freespan Wear
SG88	100	80	TWD	76	B02	19.78	Freespan Wear
SG88	100	80	TWD	77	B02	19.81	Freespan Wear
SG88	100	80	TWD	77	B02	19.84	Freespan Wear
SG88	100	80	TWD	79	B02	19.87	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	100	80	TWD	78	B02	19.9	Freespan Wear
SG88	100	80	TWD	77	B02	19.92	Freespan Wear
SG88	100	80	TWD	79	B02	19.95	Freespan Wear
SG88	100	80	TWD	79	B02	19.98	Freespan Wear
SG88	100	80	TWD	79	B02	20.01	Freespan Wear
SG88	100	80	TWD	80	B02	20.04	Freespan Wear
SG88	100	80	TWD	77	B02	20.06	Freespan Wear
SG88	100	80	TWD	80	B02	20.09	Freespan Wear
SG88	100	80	TWD	80	B02	20.12	Freespan Wear
SG88	100	80	TWD	80	B02	20.15	Freespan Wear
SG88	100	80	TWD	80	B02	20.18	Freespan Wear
SG88	100	80	TWD	80	B02	20.21	Freespan Wear
SG88	100	80	TWD	79	B02	20.23	Freespan Wear
SG88	100	80	TWD	80	B02	20.26	Freespan Wear
SG88	100	80	TWD	79	B02	20.29	Freespan Wear
SG88	100	80	TWD	81	B02	20.32	Freespan Wear
SG88	100	80	TWD	80	B02	20.35	Freespan Wear
SG88	100	80	TWD	80	B02	20.38	Freespan Wear
SG88	100	80	TWD	79	B02	20.4	Freespan Wear
SG88	100	80	TWD	79	B02	20.43	Freespan Wear
SG88	100	80	TWD	80	B02	20.46	Freespan Wear
SG88	100	80	TWD	80	B02	20.49	Freespan Wear
SG88	100	80	TWD	80	B02	20.52	Freespan Wear
SG88	100	80	TWD	81	B02	20.54	Freespan Wear
SG88	100	80	TWD	81	B02	20.57	Freespan Wear
SG88	100	80	TWD	80	B02	20.6	Freespan Wear
SG88	100	80	TWD	81	B02	20.63	Freespan Wear
SG88	100	80	TWD	80	B02	20.66	Freespan Wear
SG88	100	80	TWD	79	B02	20.69	Freespan Wear
SG88	100	80	TWD	80	B02	20.72	Freespan Wear
SG88	100	80	TWD	79	B02	20.74	Freespan Wear
SG88	100	80	TWD	79	B02	20.77	Freespan Wear
SG88	100	80	TWD	79	B02	20.8	Freespan Wear
SG88	100	80	TWD	78	B02	20.83	Freespan Wear
SG88	100	80	TWD	79	B02	20.86	Freespan Wear
SG88	100	80	TWD	80	B02	20.88	Freespan Wear
SG88	100	80	TWD	80	B02	20.91	Freespan Wear
SG88	100	80	TWD	80	B02	20.94	Freespan Wear
SG88	100	80	TWD	80	B02	20.97	Freespan Wear
SG88	100	80	TWD	81	B02	21	Freespan Wear
SG88	100	80	TWD	82	B02	21.03	Freespan Wear
SG88	100	80	TWD	81	B02	21.06	Freespan Wear
SG88	100	80	TWD	82	B02	21.08	Freespan Wear
SG88	100	80	TWD	82	B02	21.11	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	100	80	TWD	82	B02	21.14	Freespan Wear
SG88	100	80	TWD	83	B02	21.17	Freespan Wear
SG88	100	80	TWD	81	B02	21.19	Freespan Wear
SG88	100	80	TWD	81	B02	21.22	Freespan Wear
SG88	100	80	TWD	80	B02	21.25	Freespan Wear
SG88	100	80	TWD	79	B02	21.28	Freespan Wear
SG88	100	80	TWD	81	B02	21.31	Freespan Wear
SG88	100	80	TWD	80	B02	21.34	Freespan Wear
SG88	100	80	TWD	80	B02	21.36	Freespan Wear
SG88	100	80	TWD	79	B02	21.39	Freespan Wear
SG88	100	80	TWD	78	B02	21.42	Freespan Wear
SG88	100	80	TWD	78	B02	21.45	Freespan Wear
SG88	100	80	TWD	77	B02	21.48	Freespan Wear
SG88	100	80	TWD	78	B02	21.51	Freespan Wear
SG88	100	80	TWD	80	B02	21.54	Freespan Wear
SG88	100	80	TWD	81	B02	21.56	Freespan Wear
SG88	100	80	TWD	80	B02	21.59	Freespan Wear
SG88	100	80	TWD	80	B02	21.62	Freespan Wear
SG88	100	80	TWD	81	B02	21.65	Freespan Wear
SG88	100	80	TWD	81	B02	21.68	Freespan Wear
SG88	100	80	TWD	81	B02	21.7	Freespan Wear
SG88	100	80	TWD	82	B02	21.73	Freespan Wear
SG88	100	80	TWD	82	B02	21.76	Freespan Wear
SG88	100	80	TWD	81	B02	21.79	Freespan Wear
SG88	100	80	TWD	81	B02	21.82	Freespan Wear
SG88	100	80	TWD	80	B02	21.85	Freespan Wear
SG88	100	80	TWD	80	B02	21.87	Freespan Wear
SG88	100	80	TWD	81	B02	21.9	Freespan Wear
SG88	100	80	TWD	79	B02	21.93	Freespan Wear
SG88	100	80	TWD	79	B02	21.96	Freespan Wear
SG88	100	80	TWD	80	B02	21.99	Freespan Wear
SG88	100	80	TWD	80	B02	22.02	Freespan Wear
SG88	100	80	TWD	81	B02	22.04	Freespan Wear
SG88	100	80	TWD	80	B02	22.07	Freespan Wear
SG88	100	80	TWD	80	B02	22.1	Freespan Wear
SG88	100	80	TWD	80	B02	22.13	Freespan Wear
SG88	100	80	TWD	80	B02	22.16	Freespan Wear
SG88	100	80	TWD	80	B02	22.19	Freespan Wear
SG88	100	80	TWD	79	B02	22.21	Freespan Wear
SG88	100	80	TWD	80	B02	22.24	Freespan Wear
SG88	100	80	TWD	79	B02	22.27	Freespan Wear
SG88	100	80	TWD	78	B02	22.3	Freespan Wear
SG88	100	80	TWD	77	B02	22.33	Freespan Wear
SG88	100	80	TWD	78	B02	22.36	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	100	80	TWD	78	B02	22.38	Freespan Wear
SG88	100	80	TWD	78	B02	22.41	Freespan Wear
SG88	100	80	TWD	79	B02	22.44	Freespan Wear
SG88	100	80	TWD	78	B02	22.47	Freespan Wear
SG88	100	80	TWD	77	B02	22.5	Freespan Wear
SG88	100	80	TWD	78	B02	22.53	Freespan Wear
SG88	100	80	TWD	77	B02	22.55	Freespan Wear
SG88	100	80	TWD	78	B02	22.58	Freespan Wear
SG88	100	80	TWD	80	B02	22.61	Freespan Wear
SG88	100	80	TWD	78	B02	22.64	Freespan Wear
SG88	100	80	TWD	76	B02	22.67	Freespan Wear
SG88	100	80	TWD	77	B02	22.7	Freespan Wear
SG88	100	80	TWD	76	B02	22.72	Freespan Wear
SG88	100	80	TWD	73	B02	22.75	Freespan Wear
SG88	100	80	TWD	75	B02	22.78	Freespan Wear
SG88	100	80	TWD	76	B02	22.81	Freespan Wear
SG88	100	80	TWD	76	B02	22.84	Freespan Wear
SG88	100	80	TWD	76	B02	22.87	Freespan Wear
SG88	100	80	TWD	75	B02	22.89	Freespan Wear
SG88	100	80	TWD	77	B02	22.92	Freespan Wear
SG88	100	80	TWD	76	B02	22.95	Freespan Wear
SG88	100	80	TWD	76	B02	22.98	Freespan Wear
SG88	100	80	TWD	75	B02	23.01	Freespan Wear
SG88	100	80	TWD	75	B02	23.04	Freespan Wear
SG88	100	80	TWD	76	B02	23.06	Freespan Wear
SG88	100	80	TWD	74	B02	23.09	Freespan Wear
SG88	100	80	TWD	74	B02	23.12	Freespan Wear
SG88	100	80	TWD	74	B02	23.15	Freespan Wear
SG88	100	80	TWD	72	B02	23.18	Freespan Wear
SG88	100	80	TWD	60	B02	24.17	Freespan Wear
SG88	100	80	TWD	52	B02	25.16	Freespan Wear
SG88	100	80	TWD	41	B02	26.15	Freespan Wear
SG88	100	80	TWD	34	B02	27.14	Freespan Wear
SG88	100	80	TWD	28	B02	28.13	Freespan Wear
SG88	100	80	TWD	19	B02	29.12	Freespan Wear
SG88	100	80	TWD	13	B02	29.92	Freespan Wear
SG88	100	80	TWD	0	B02	29.94	Freespan Wear

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SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	102	78	TWD	0	B02	9.43	Freespan Wear
SG88	102	78	TWD	14	B02	9.45	Freespan Wear
SG88	102	78	TWD	14	B02	9.48	Freespan Wear
SG88	102	78	TWD	14	B02	9.51	Freespan Wear
SG88	102	78	TWD	14	B02	9.54	Freespan Wear
SG88	102	78	TWD	15	B02	9.57	Freespan Wear
SG88	102	78	TWD	15	B02	9.6	Freespan Wear
SG88	102	78	TWD	20	B02	10.08	Freespan Wear
SG88	102	78	TWD	24	B02	10.44	Freespan Wear
SG88	102	78	TWD	27	B02	10.71	Freespan Wear
SG88	102	78	TWD	30	B02	10.98	Freespan Wear
SG88	102	78	TWD	32	B02	11.19	Freespan Wear
SG88	102	78	TWD	34	B02	11.48	Freespan Wear
SG88	102	78	TWD	37	B02	11.76	Freespan Wear
SG88	102	78	TWD	40	B02	12.06	Freespan Wear
SG88	102	78	TWD	44	B02	12.42	Freespan Wear
SG88	102	78	TWD	46	B02	12.66	Freespan Wear
SG88	102	78	TWD	48	B02	12.93	Freespan Wear
SG88	102	78	TWD	52	B02	13.25	Freespan Wear
SG88	102	78	TWD	55	B02	13.55	Freespan Wear
SG88	102	78	TWD	59	B02	14.03	Freespan Wear
SG88	102	78	TWD	60	B02	14.21	Freespan Wear
SG88	102	78	TWD	62	B02	14.39	Freespan Wear
SG88	102	78	TWD	63	B02	14.6	Freespan Wear
SG88	102	78	TWD	66	B02	14.81	Freespan Wear
SG88	102	78	TWD	69	B02	15.2	Freespan Wear
SG88	102	78	TWD	70	B02	15.53	Freespan Wear
SG88	102	78	TWD	74	B02	15.98	Freespan Wear
SG88	102	78	TWD	77	B02	16.22	Freespan Wear
SG88	102	78	TWD	80	B02	16.61	Freespan Wear
SG88	102	78	TWD	82	B02	17.03	Freespan Wear
SG88	102	78	TWD	88	B02	17.45	Freespan Wear
SG88	102	78	TWD	93	B02	17.84	Freespan Wear
SG88	102	78	TWD	94	B02	18.05	Freespan Wear
SG88	102	78	TWD	96	B02	18.35	Freespan Wear
SG88	102	78	TWD	97	B02	18.38	Freespan Wear
SG88	102	78	TWD	97	B02	18.41	Freespan Wear
SG88	102	78	TWD	96	B02	18.44	Freespan Wear
SG88	102	78	TWD	96	B02	18.47	Freespan Wear
SG88	102	78	TWD	96	B02	18.5	Freespan Wear
SG88	102	78	TWD	97	B02	18.53	Freespan Wear
SG88	102	78	TWD	97	B02	18.56	Freespan Wear
SG88	102	78	TWD	98	B02	18.58	Freespan Wear
SG88	102	78	TWD	99	B02	18.62	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	102	78	TWD	99	B02	18.65	Freespan Wear
SG88	102	78	TWD	100	B02	18.68	Freespan Wear
SG88	102	78	TWD	100	B02	18.71	Freespan Wear
SG88	102	78	TWD	100	B02	18.74	Freespan Wear
SG88	102	78	TWD	100	B02	18.77	Freespan Wear
SG88	102	78	TWD	100	B02	18.8	Freespan Wear
SG88	102	78	TWD	100	B02	18.83	Freespan Wear
SG88	102	78	TWD	100	B02	18.86	Freespan Wear
SG88	102	78	TWD	100	B02	18.88	Freespan Wear
SG88	102	78	TWD	100	B02	18.92	Freespan Wear
SG88	102	78	TWD	100	B02	18.95	Freespan Wear
SG88	102	78	TWD	100	B02	18.98	Freespan Wear
SG88	102	78	TWD	100	B02	19	Freespan Wear
SG88	102	78	TWD	100	B02	19.03	Freespan Wear
SG88	102	78	TWD	100	B02	19.06	Freespan Wear
SG88	102	78	TWD	100	B02	19.09	Freespan Wear
SG88	102	78	TWD	98	B02	19.12	Freespan Wear
SG88	102	78	TWD	98	B02	19.15	Freespan Wear
SG88	102	78	TWD	97	B02	19.18	Freespan Wear
SG88	102	78	TWD	95	B02	19.21	Freespan Wear
SG88	102	78	TWD	94	B02	19.24	Freespan Wear
SG88	102	78	TWD	94	B02	19.27	Freespan Wear
SG88	102	78	TWD	95	B02	19.3	Freespan Wear
SG88	102	78	TWD	95	B02	19.33	Freespan Wear
SG88	102	78	TWD	98	B02	19.36	Freespan Wear
SG88	102	78	TWD	98	B02	19.39	Freespan Wear
SG88	102	78	TWD	100	B02	19.42	Freespan Wear
SG88	102	78	TWD	100	B02	19.45	Freespan Wear
SG88	102	78	TWD	100	B02	19.48	Freespan Wear
SG88	102	78	TWD	100	B02	19.51	Freespan Wear
SG88	102	78	TWD	100	B02	19.54	Freespan Wear
SG88	102	78	TWD	100	B02	19.57	Freespan Wear
SG88	102	78	TWD	100	B02	19.6	Freespan Wear
SG88	102	78	TWD	100	B02	19.63	Freespan Wear
SG88	102	78	TWD	100	B02	19.66	Freespan Wear
SG88	102	78	TWD	100	B02	19.69	Freespan Wear
SG88	102	78	TWD	100	B02	19.72	Freespan Wear
SG88	102	78	TWD	100	B02	19.75	Freespan Wear
SG88	102	78	TWD	100	B02	19.78	Freespan Wear
SG88	102	78	TWD	100	B02	19.81	Freespan Wear
SG88	102	78	TWD	100	B02	19.84	Freespan Wear
SG88	102	78	TWD	100	B02	19.87	Freespan Wear
SG88	102	78	TWD	100	B02	19.9	Freespan Wear
SG88	102	78	TWD	100	B02	19.93	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	102	78	TWD	100	B02	19.96	Freespan Wear
SG88	102	78	TWD	100	B02	19.99	Freespan Wear
SG88	102	78	TWD	100	B02	20.02	Freespan Wear
SG88	102	78	TWD	100	B02	20.05	Freespan Wear
SG88	102	78	TWD	98	B02	20.08	Freespan Wear
SG88	102	78	TWD	97	B02	20.11	Freespan Wear
SG88	102	78	TWD	97	B02	20.14	Freespan Wear
SG88	102	78	TWD	97	B02	20.17	Freespan Wear
SG88	102	78	TWD	96	B02	20.2	Freespan Wear
SG88	102	78	TWD	95	B02	20.23	Freespan Wear
SG88	102	78	TWD	96	B02	20.26	Freespan Wear
SG88	102	78	TWD	95	B02	20.29	Freespan Wear
SG88	102	78	TWD	96	B02	20.32	Freespan Wear
SG88	102	78	TWD	96	B02	20.35	Freespan Wear
SG88	102	78	TWD	98	B02	20.38	Freespan Wear
SG88	102	78	TWD	100	B02	20.41	Freespan Wear
SG88	102	78	TWD	100	B02	20.44	Freespan Wear
SG88	102	78	TWD	100	B02	20.47	Freespan Wear
SG88	102	78	TWD	100	B02	20.5	Freespan Wear
SG88	102	78	TWD	100	B02	20.53	Freespan Wear
SG88	102	78	TWD	100	B02	20.56	Freespan Wear
SG88	102	78	TWD	100	B02	20.59	Freespan Wear
SG88	102	78	TWD	100	B02	20.62	Freespan Wear
SG88	102	78	TWD	100	B02	20.65	Freespan Wear
SG88	102	78	TWD	100	B02	20.68	Freespan Wear
SG88	102	78	TWD	100	B02	20.71	Freespan Wear
SG88	102	78	TWD	100	B02	20.74	Freespan Wear
SG88	102	78	TWD	100	B02	20.77	Freespan Wear
SG88	102	78	TWD	100	B02	20.8	Freespan Wear
SG88	102	78	TWD	100	B02	20.83	Freespan Wear
SG88	102	78	TWD	100	B02	20.86	Freespan Wear
SG88	102	78	TWD	99	B02	20.89	Freespan Wear
SG88	102	78	TWD	96	B02	20.92	Freespan Wear
SG88	102	78	TWD	97	B02	20.95	Freespan Wear
SG88	102	78	TWD	96	B02	20.98	Freespan Wear
SG88	102	78	TWD	94	B02	21.01	Freespan Wear
SG88	102	78	TWD	94	B02	21.04	Freespan Wear
SG88	102	78	TWD	95	B02	21.07	Freespan Wear
SG88	102	78	TWD	94	B02	21.1	Freespan Wear
SG88	102	78	TWD	95	B02	21.13	Freespan Wear
SG88	102	78	TWD	94	B02	21.16	Freespan Wear
SG88	102	78	TWD	95	B02	21.19	Freespan Wear
SG88	102	78	TWD	93	B02	21.22	Freespan Wear
SG88	102	78	TWD	95	B02	21.25	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	102	78	TWD	95	B02	21.28	Freespan Wear
SG88	102	78	TWD	93	B02	21.31	Freespan Wear
SG88	102	78	TWD	94	B02	21.34	Freespan Wear
SG88	102	78	TWD	93	B02	21.37	Freespan Wear
SG88	102	78	TWD	95	B02	21.4	Freespan Wear
SG88	102	78	TWD	94	B02	21.43	Freespan Wear
SG88	102	78	TWD	91	B02	21.46	Freespan Wear
SG88	102	78	TWD	92	B02	21.49	Freespan Wear
SG88	102	78	TWD	92	B02	21.52	Freespan Wear
SG88	102	78	TWD	92	B02	21.55	Freespan Wear
SG88	102	78	TWD	91	B02	21.58	Freespan Wear
SG88	102	78	TWD	90	B02	21.61	Freespan Wear
SG88	102	78	TWD	89	B02	21.64	Freespan Wear
SG88	102	78	TWD	91	B02	21.67	Freespan Wear
SG88	102	78	TWD	90	B02	21.7	Freespan Wear
SG88	102	78	TWD	91	B02	21.72	Freespan Wear
SG88	102	78	TWD	90	B02	21.75	Freespan Wear
SG88	102	78	TWD	90	B02	21.79	Freespan Wear
SG88	102	78	TWD	90	B02	21.82	Freespan Wear
SG88	102	78	TWD	89	B02	21.85	Freespan Wear
SG88	102	78	TWD	90	B02	21.88	Freespan Wear
SG88	102	78	TWD	90	B02	21.91	Freespan Wear
SG88	102	78	TWD	89	B02	21.94	Freespan Wear
SG88	102	78	TWD	90	B02	21.97	Freespan Wear
SG88	102	78	TWD	89	B02	22	Freespan Wear
SG88	102	78	TWD	89	B02	22.02	Freespan Wear
SG88	102	78	TWD	86	B02	22.05	Freespan Wear
SG88	102	78	TWD	87	B02	22.08	Freespan Wear
SG88	102	78	TWD	86	B02	22.12	Freespan Wear
SG88	102	78	TWD	84	B02	22.14	Freespan Wear
SG88	102	78	TWD	84	B02	22.17	Freespan Wear
SG88	102	78	TWD	83	B02	22.5	Freespan Wear
SG88	102	78	TWD	83	B02	22.74	Freespan Wear
SG88	102	78	TWD	77	B02	23.1	Freespan Wear
SG88	102	78	TWD	75	B02	23.37	Freespan Wear
SG88	102	78	TWD	73	B02	23.6	Freespan Wear
SG88	102	78	TWD	72	B02	24.02	Freespan Wear
SG88	102	78	TWD	67	B02	24.32	Freespan Wear
SG88	102	78	TWD	67	B02	24.68	Freespan Wear
SG88	102	78	TWD	65	B02	25.03	Freespan Wear
SG88	102	78	TWD	61	B02	25.3	Freespan Wear
SG88	102	78	TWD	60	B02	25.72	Freespan Wear
SG88	102	78	TWD	59	B02	25.99	Freespan Wear
SG88	102	78	TWD	58	B02	26.26	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	102	78	TWD	56	B02	26.68	Freespan Wear
SG88	102	78	TWD	54	B02	27.12	Freespan Wear
SG88	102	78	TWD	51	B02	27.45	Freespan Wear
SG88	102	78	TWD	50	B02	27.81	Freespan Wear
SG88	102	78	TWD	47	B02	28.08	Freespan Wear
SG88	102	78	TWD	44	B02	28.47	Freespan Wear
SG88	102	78	TWD	41	B02	28.85	Freespan Wear
SG88	102	78	TWD	39	B02	29.12	Freespan Wear
SG88	102	78	TWD	35	B02	29.45	Freespan Wear
SG88	102	78	TWD	33	B02	29.96	Freespan Wear
SG88	102	78	TWD	31	B02	30.14	Freespan Wear
SG88	102	78	TWD	29	B02	30.35	Freespan Wear
SG88	102	78	TWD	27	B02	30.59	Freespan Wear
SG88	102	78	TWD	26	B02	30.7	Freespan Wear
SG88	102	78	TWD	25	B02	30.92	Freespan Wear
SG88	102	78	TWD	24	B02	31.07	Freespan Wear
SG88	102	78	TWD	22	B02	31.27	Freespan Wear
SG88	102	78	TWD	21	B02	31.48	Freespan Wear
SG88	102	78	TWD	19	B02	31.75	Freespan Wear
SG88	102	78	TWD	17	B02	31.99	Freespan Wear
SG88	102	78	TWD	16	B02	32.14	Freespan Wear
SG88	102	78	TWD	15	B02	32.35	Freespan Wear
SG88	102	78	TWD	0	B02	32.5	Freespan Wear

Document	File Name	File Type	Size
E	SG88R104C78 FreespanSize.pdf	Adobe Acrobat Document	193 KB

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	104	78	TWD	0	B03	2.78	Freespan Wear
SG88	104	78	TWD	16	B03	3	Freespan Wear
SG88	104	78	TWD	17	B03	3.35	Freespan Wear
SG88	104	78	TWD	18	B03	3.67	Freespan Wear
SG88	104	78	TWD	19	B03	4	Freespan Wear
SG88	104	78	TWD	20	B03	4.33	Freespan Wear
SG88	104	78	TWD	21	B03	4.68	Freespan Wear
SG88	104	78	TWD	23	B03	5.01	Freespan Wear
SG88	104	78	TWD	25	B03	5.33	Freespan Wear
SG88	104	78	TWD	26	B03	5.66	Freespan Wear
SG88	104	78	TWD	28	B03	6.01	Freespan Wear
SG88	104	78	TWD	29	B03	6.34	Freespan Wear
SG88	104	78	TWD	31	B03	6.67	Freespan Wear
SG88	104	78	TWD	33	B03	6.99	Freespan Wear
SG88	104	78	TWD	35	B03	7.34	Freespan Wear
SG88	104	78	TWD	38	B03	7.67	Freespan Wear
SG88	104	78	TWD	39	B03	8	Freespan Wear
SG88	104	78	TWD	41	B03	8.32	Freespan Wear
SG88	104	78	TWD	45	B03	8.68	Freespan Wear
SG88	104	78	TWD	46	B03	9	Freespan Wear
SG88	104	78	TWD	48	B03	9.33	Freespan Wear
SG88	104	78	TWD	50	B03	9.66	Freespan Wear
SG88	104	78	TWD	53	B03	10.01	Freespan Wear
SG88	104	78	TWD	54	B03	10.34	Freespan Wear
SG88	104	78	TWD	56	B03	10.66	Freespan Wear
SG88	104	78	TWD	59	B03	11.01	Freespan Wear
SG88	104	78	TWD	61	B03	11.34	Freespan Wear
SG88	104	78	TWD	63	B03	11.67	Freespan Wear
SG88	104	78	TWD	67	B03	11.99	Freespan Wear
SG88	104	78	TWD	65	B03	12.35	Freespan Wear
SG88	104	78	TWD	70	B03	12.67	Freespan Wear
SG88	104	78	TWD	72	B03	13	Freespan Wear
SG88	104	78	TWD	77	B03	13.35	Freespan Wear
SG88	104	78	TWD	75	B03	13.68	Freespan Wear
SG88	104	78	TWD	75	B03	13.71	Freespan Wear
SG88	104	78	TWD	75	B03	13.73	Freespan Wear
SG88	104	78	TWD	75	B03	13.76	Freespan Wear
SG88	104	78	TWD	75	B03	13.79	Freespan Wear
SG88	104	78	TWD	75	B03	13.82	Freespan Wear
SG88	104	78	TWD	75	B03	13.84	Freespan Wear
SG88	104	78	TWD	76	B03	13.87	Freespan Wear
SG88	104	78	TWD	75	B03	13.9	Freespan Wear
SG88	104	78	TWD	75	B03	13.92	Freespan Wear
SG88	104	78	TWD	74	B03	13.95	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	104	78	TWD	75	B03	13.98	Freespan Wear
SG88	104	78	TWD	74	B03	14.01	Freespan Wear
SG88	104	78	TWD	76	B03	14.03	Freespan Wear
SG88	104	78	TWD	76	B03	14.06	Freespan Wear
SG88	104	78	TWD	75	B03	14.09	Freespan Wear
SG88	104	78	TWD	77	B03	14.12	Freespan Wear
SG88	104	78	TWD	78	B03	14.14	Freespan Wear
SG88	104	78	TWD	81	B03	14.17	Freespan Wear
SG88	104	78	TWD	80	B03	14.2	Freespan Wear
SG88	104	78	TWD	81	B03	14.22	Freespan Wear
SG88	104	78	TWD	82	B03	14.25	Freespan Wear
SG88	104	78	TWD	86	B03	14.28	Freespan Wear
SG88	104	78	TWD	84	B03	14.3	Freespan Wear
SG88	104	78	TWD	85	B03	14.33	Freespan Wear
SG88	104	78	TWD	84	B03	14.36	Freespan Wear
SG88	104	78	TWD	85	B03	14.39	Freespan Wear
SG88	104	78	TWD	83	B03	14.41	Freespan Wear
SG88	104	78	TWD	84	B03	14.44	Freespan Wear
SG88	104	78	TWD	84	B03	14.47	Freespan Wear
SG88	104	78	TWD	86	B03	14.5	Freespan Wear
SG88	104	78	TWD	84	B03	14.52	Freespan Wear
SG88	104	78	TWD	86	B03	14.55	Freespan Wear
SG88	104	78	TWD	85	B03	14.58	Freespan Wear
SG88	104	78	TWD	85	B03	14.6	Freespan Wear
SG88	104	78	TWD	84	B03	14.63	Freespan Wear
SG88	104	78	TWD	85	B03	14.66	Freespan Wear
SG88	104	78	TWD	82	B03	14.69	Freespan Wear
SG88	104	78	TWD	80	B03	14.71	Freespan Wear
SG88	104	78	TWD	80	B03	14.74	Freespan Wear
SG88	104	78	TWD	81	B03	14.77	Freespan Wear
SG88	104	78	TWD	78	B03	14.79	Freespan Wear
SG88	104	78	TWD	79	B03	14.82	Freespan Wear
SG88	104	78	TWD	77	B03	14.85	Freespan Wear
SG88	104	78	TWD	79	B03	14.88	Freespan Wear
SG88	104	78	TWD	79	B03	14.9	Freespan Wear
SG88	104	78	TWD	78	B03	14.93	Freespan Wear
SG88	104	78	TWD	78	B03	14.96	Freespan Wear
SG88	104	78	TWD	78	B03	14.98	Freespan Wear
SG88	104	78	TWD	77	B03	15.01	Freespan Wear
SG88	104	78	TWD	78	B03	15.04	Freespan Wear
SG88	104	78	TWD	79	B03	15.07	Freespan Wear
SG88	104	78	TWD	79	B03	15.09	Freespan Wear
SG88	104	78	TWD	78	B03	15.12	Freespan Wear
SG88	104	78	TWD	80	B03	15.15	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	104	78	TWD	79	B03	15.18	Freespan Wear
SG88	104	78	TWD	82	B03	15.2	Freespan Wear
SG88	104	78	TWD	80	B03	15.23	Freespan Wear
SG88	104	78	TWD	82	B03	15.26	Freespan Wear
SG88	104	78	TWD	81	B03	15.28	Freespan Wear
SG88	104	78	TWD	83	B03	15.31	Freespan Wear
SG88	104	78	TWD	81	B03	15.34	Freespan Wear
SG88	104	78	TWD	81	B03	15.37	Freespan Wear
SG88	104	78	TWD	83	B03	15.39	Freespan Wear
SG88	104	78	TWD	83	B03	15.42	Freespan Wear
SG88	104	78	TWD	82	B03	15.45	Freespan Wear
SG88	104	78	TWD	85	B03	15.47	Freespan Wear
SG88	104	78	TWD	88	B03	15.5	Freespan Wear
SG88	104	78	TWD	100	B03	15.53	Freespan Wear
SG88	104	78	TWD	100	B03	15.56	Freespan Wear
SG88	104	78	TWD	100	B03	15.58	Freespan Wear
SG88	104	78	TWD	100	B03	15.61	Freespan Wear
SG88	104	78	TWD	100	B03	15.64	Freespan Wear
SG88	104	78	TWD	100	B03	15.66	Freespan Wear
SG88	104	78	TWD	100	B03	15.69	Freespan Wear
SG88	104	78	TWD	100	B03	15.72	Freespan Wear
SG88	104	78	TWD	100	B03	15.75	Freespan Wear
SG88	104	78	TWD	100	B03	15.77	Freespan Wear
SG88	104	78	TWD	100	B03	15.8	Freespan Wear
SG88	104	78	TWD	100	B03	15.83	Freespan Wear
SG88	104	78	TWD	100	B03	15.85	Freespan Wear
SG88	104	78	TWD	97	B03	15.88	Freespan Wear
SG88	104	78	TWD	93	B03	15.91	Freespan Wear
SG88	104	78	TWD	91	B03	15.94	Freespan Wear
SG88	104	78	TWD	89	B03	15.96	Freespan Wear
SG88	104	78	TWD	87	B03	15.99	Freespan Wear
SG88	104	78	TWD	87	B03	16.02	Freespan Wear
SG88	104	78	TWD	87	B03	16.04	Freespan Wear
SG88	104	78	TWD	89	B03	16.07	Freespan Wear
SG88	104	78	TWD	88	B03	16.1	Freespan Wear
SG88	104	78	TWD	87	B03	16.13	Freespan Wear
SG88	104	78	TWD	88	B03	16.15	Freespan Wear
SG88	104	78	TWD	87	B03	16.18	Freespan Wear
SG88	104	78	TWD	85	B03	16.21	Freespan Wear
SG88	104	78	TWD	86	B03	16.24	Freespan Wear
SG88	104	78	TWD	86	B03	16.26	Freespan Wear
SG88	104	78	TWD	86	B03	16.29	Freespan Wear
SG88	104	78	TWD	87	B03	16.32	Freespan Wear
SG88	104	78	TWD	87	B03	16.34	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	104	78	TWD	86	B03	16.37	Freespan Wear
SG88	104	78	TWD	85	B03	16.4	Freespan Wear
SG88	104	78	TWD	86	B03	16.43	Freespan Wear
SG88	104	78	TWD	87	B03	16.45	Freespan Wear
SG88	104	78	TWD	85	B03	16.48	Freespan Wear
SG88	104	78	TWD	86	B03	16.51	Freespan Wear
SG88	104	78	TWD	85	B03	16.53	Freespan Wear
SG88	104	78	TWD	84	B03	16.56	Freespan Wear
SG88	104	78	TWD	83	B03	16.59	Freespan Wear
SG88	104	78	TWD	82	B03	16.62	Freespan Wear
SG88	104	78	TWD	82	B03	16.64	Freespan Wear
SG88	104	78	TWD	83	B03	16.67	Freespan Wear
SG88	104	78	TWD	81	B03	16.7	Freespan Wear
SG88	104	78	TWD	82	B03	16.72	Freespan Wear
SG88	104	78	TWD	81	B03	16.75	Freespan Wear
SG88	104	78	TWD	78	B03	16.78	Freespan Wear
SG88	104	78	TWD	77	B03	16.81	Freespan Wear
SG88	104	78	TWD	76	B03	16.83	Freespan Wear
SG88	104	78	TWD	78	B03	16.86	Freespan Wear
SG88	104	78	TWD	78	B03	16.89	Freespan Wear
SG88	104	78	TWD	79	B03	16.92	Freespan Wear
SG88	104	78	TWD	79	B03	16.94	Freespan Wear
SG88	104	78	TWD	79	B03	16.97	Freespan Wear
SG88	104	78	TWD	79	B03	17	Freespan Wear
SG88	104	78	TWD	81	B03	17.02	Freespan Wear
SG88	104	78	TWD	81	B03	17.05	Freespan Wear
SG88	104	78	TWD	81	B03	17.08	Freespan Wear
SG88	104	78	TWD	83	B03	17.11	Freespan Wear
SG88	104	78	TWD	83	B03	17.13	Freespan Wear
SG88	104	78	TWD	82	B03	17.16	Freespan Wear
SG88	104	78	TWD	84	B03	17.19	Freespan Wear
SG88	104	78	TWD	85	B03	17.22	Freespan Wear
SG88	104	78	TWD	84	B03	17.24	Freespan Wear
SG88	104	78	TWD	81	B03	17.27	Freespan Wear
SG88	104	78	TWD	83	B03	17.3	Freespan Wear
SG88	104	78	TWD	84	B03	17.32	Freespan Wear
SG88	104	78	TWD	83	B03	17.35	Freespan Wear
SG88	104	78	TWD	84	B03	17.38	Freespan Wear
SG88	104	78	TWD	84	B03	17.41	Freespan Wear
SG88	104	78	TWD	84	B03	17.43	Freespan Wear
SG88	104	78	TWD	85	B03	17.46	Freespan Wear
SG88	104	78	TWD	85	B03	17.49	Freespan Wear
SG88	104	78	TWD	85	B03	17.51	Freespan Wear
SG88	104	78	TWD	84	B03	17.54	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	104	78	TWD	84	B03	17.57	Freespan Wear
SG88	104	78	TWD	83	B03	17.59	Freespan Wear
SG88	104	78	TWD	83	B03	17.62	Freespan Wear
SG88	104	78	TWD	83	B03	17.65	Freespan Wear
SG88	104	78	TWD	84	B03	17.68	Freespan Wear
SG88	104	78	TWD	81	B03	17.7	Freespan Wear
SG88	104	78	TWD	79	B03	17.73	Freespan Wear
SG88	104	78	TWD	78	B03	17.76	Freespan Wear
SG88	104	78	TWD	76	B03	18	Freespan Wear
SG88	104	78	TWD	70	B03	18.33	Freespan Wear
SG88	104	78	TWD	70	B03	18.66	Freespan Wear
SG88	104	78	TWD	68	B03	19.01	Freespan Wear
SG88	104	78	TWD	68	B03	19.33	Freespan Wear
SG88	104	78	TWD	65	B03	19.66	Freespan Wear
SG88	104	78	TWD	65	B03	19.99	Freespan Wear
SG88	104	78	TWD	64	B03	20.34	Freespan Wear
SG88	104	78	TWD	61	B03	20.67	Freespan Wear
SG88	104	78	TWD	59	B03	20.99	Freespan Wear
SG88	104	78	TWD	55	B03	21.35	Freespan Wear
SG88	104	78	TWD	55	B03	21.7	Freespan Wear
SG88	104	78	TWD	55	B03	22	Freespan Wear
SG88	104	78	TWD	55	B03	22.33	Freespan Wear
SG88	104	78	TWD	50	B03	22.68	Freespan Wear
SG88	104	78	TWD	50	B03	23.01	Freespan Wear
SG88	104	78	TWD	47	B03	23.33	Freespan Wear
SG88	104	78	TWD	46	B03	23.66	Freespan Wear
SG88	104	78	TWD	44	B03	24.01	Freespan Wear
SG88	104	78	TWD	42	B03	24.34	Freespan Wear
SG88	104	78	TWD	38	B03	24.66	Freespan Wear
SG88	104	78	TWD	36	B03	25.02	Freespan Wear
SG88	104	78	TWD	33	B03	25.34	Freespan Wear
SG88	104	78	TWD	29	B03	25.67	Freespan Wear
SG88	104	78	TWD	27	B03	26.02	Freespan Wear
SG88	104	78	TWD	25	B03	26.35	Freespan Wear
SG88	104	78	TWD	23	B03	26.68	Freespan Wear
SG88	104	78	TWD	21	B03	27	Freespan Wear
SG88	104	78	TWD	19	B03	27.33	Freespan Wear
SG88	104	78	TWD	17	B03	27.66	Freespan Wear
SG88	104	78	TWD	15	B03	28.01	Freespan Wear
SG88	104	78	TWD	0	B03	28.17	Freespan Wear

Document	File Name	File Type	Size
F	SG88R104C78B02 FreespanSize.pdf	Adobe Acrobat Document	179 KB

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	104	78	TWD	0	B02	9.33	Freespan Wear
SG88	104	78	TWD	16	B02	9.35	Freespan Wear
SG88	104	78	TWD	18	B02	9.68	Freespan Wear
SG88	104	78	TWD	21	B02	10.01	Freespan Wear
SG88	104	78	TWD	26	B02	10.36	Freespan Wear
SG88	104	78	TWD	28	B02	10.69	Freespan Wear
SG88	104	78	TWD	31	B02	11.01	Freespan Wear
SG88	104	78	TWD	34	B02	11.34	Freespan Wear
SG88	104	78	TWD	36	B02	11.67	Freespan Wear
SG88	104	78	TWD	39	B02	11.99	Freespan Wear
SG88	104	78	TWD	41	B02	12.35	Freespan Wear
SG88	104	78	TWD	46	B02	12.67	Freespan Wear
SG88	104	78	TWD	49	B02	13	Freespan Wear
SG88	104	78	TWD	52	B02	13.33	Freespan Wear
SG88	104	78	TWD	54	B02	13.68	Freespan Wear
SG88	104	78	TWD	58	B02	14.01	Freespan Wear
SG88	104	78	TWD	59	B02	14.33	Freespan Wear
SG88	104	78	TWD	62	B02	14.66	Freespan Wear
SG88	104	78	TWD	64	B02	15.01	Freespan Wear
SG88	104	78	TWD	67	B02	15.34	Freespan Wear
SG88	104	78	TWD	67	B02	15.67	Freespan Wear
SG88	104	78	TWD	73	B02	16.02	Freespan Wear
SG88	104	78	TWD	70	B02	16.37	Freespan Wear
SG88	104	78	TWD	76	B02	16.67	Freespan Wear
SG88	104	78	TWD	80	B02	17	Freespan Wear
SG88	104	78	TWD	84	B02	17.35	Freespan Wear
SG88	104	78	TWD	84	B02	17.38	Freespan Wear
SG88	104	78	TWD	84	B02	17.41	Freespan Wear
SG88	104	78	TWD	84	B02	17.43	Freespan Wear
SG88	104	78	TWD	86	B02	17.46	Freespan Wear
SG88	104	78	TWD	86	B02	17.49	Freespan Wear
SG88	104	78	TWD	86	B02	17.52	Freespan Wear
SG88	104	78	TWD	86	B02	17.54	Freespan Wear
SG88	104	78	TWD	85	B02	17.57	Freespan Wear
SG88	104	78	TWD	87	B02	17.6	Freespan Wear
SG88	104	78	TWD	86	B02	17.63	Freespan Wear
SG88	104	78	TWD	87	B02	17.65	Freespan Wear
SG88	104	78	TWD	86	B02	17.68	Freespan Wear
SG88	104	78	TWD	87	B02	17.71	Freespan Wear
SG88	104	78	TWD	88	B02	17.73	Freespan Wear
SG88	104	78	TWD	86	B02	17.76	Freespan Wear
SG88	104	78	TWD	86	B02	17.79	Freespan Wear
SG88	104	78	TWD	87	B02	17.81	Freespan Wear
SG88	104	78	TWD	86	B02	17.84	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	104	78	TWD	87	B02	17.87	Freespan Wear
SG88	104	78	TWD	87	B02	17.9	Freespan Wear
SG88	104	78	TWD	86	B02	17.92	Freespan Wear
SG88	104	78	TWD	87	B02	17.95	Freespan Wear
SG88	104	78	TWD	88	B02	17.98	Freespan Wear
SG88	104	78	TWD	88	B02	18.01	Freespan Wear
SG88	104	78	TWD	88	B02	18.03	Freespan Wear
SG88	104	78	TWD	89	B02	18.06	Freespan Wear
SG88	104	78	TWD	90	B02	18.09	Freespan Wear
SG88	104	78	TWD	89	B02	18.11	Freespan Wear
SG88	104	78	TWD	88	B02	18.14	Freespan Wear
SG88	104	78	TWD	88	B02	18.17	Freespan Wear
SG88	104	78	TWD	92	B02	18.2	Freespan Wear
SG88	104	78	TWD	91	B02	18.22	Freespan Wear
SG88	104	78	TWD	91	B02	18.25	Freespan Wear
SG88	104	78	TWD	93	B02	18.28	Freespan Wear
SG88	104	78	TWD	95	B02	18.3	Freespan Wear
SG88	104	78	TWD	95	B02	18.33	Freespan Wear
SG88	104	78	TWD	95	B02	18.36	Freespan Wear
SG88	104	78	TWD	96	B02	18.39	Freespan Wear
SG88	104	78	TWD	96	B02	18.41	Freespan Wear
SG88	104	78	TWD	95	B02	18.44	Freespan Wear
SG88	104	78	TWD	94	B02	18.47	Freespan Wear
SG88	104	78	TWD	94	B02	18.49	Freespan Wear
SG88	104	78	TWD	94	B02	18.52	Freespan Wear
SG88	104	78	TWD	92	B02	18.55	Freespan Wear
SG88	104	78	TWD	91	B02	18.58	Freespan Wear
SG88	104	78	TWD	93	B02	18.6	Freespan Wear
SG88	104	78	TWD	91	B02	18.63	Freespan Wear
SG88	104	78	TWD	90	B02	18.66	Freespan Wear
SG88	104	78	TWD	89	B02	18.69	Freespan Wear
SG88	104	78	TWD	86	B02	18.71	Freespan Wear
SG88	104	78	TWD	87	B02	18.74	Freespan Wear
SG88	104	78	TWD	86	B02	18.77	Freespan Wear
SG88	104	78	TWD	86	B02	18.79	Freespan Wear
SG88	104	78	TWD	87	B02	18.82	Freespan Wear
SG88	104	78	TWD	86	B02	18.85	Freespan Wear
SG88	104	78	TWD	88	B02	18.88	Freespan Wear
SG88	104	78	TWD	88	B02	18.9	Freespan Wear
SG88	104	78	TWD	91	B02	18.93	Freespan Wear
SG88	104	78	TWD	95	B02	18.96	Freespan Wear
SG88	104	78	TWD	92	B02	18.98	Freespan Wear
SG88	104	78	TWD	92	B02	19.01	Freespan Wear
SG88	104	78	TWD	93	B02	19.04	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	104	78	TWD	95	B02	19.06	Freespan Wear
SG88	104	78	TWD	100	B02	19.09	Freespan Wear
SG88	104	78	TWD	99	B02	19.12	Freespan Wear
SG88	104	78	TWD	100	B02	19.15	Freespan Wear
SG88	104	78	TWD	99	B02	19.17	Freespan Wear
SG88	104	78	TWD	98	B02	19.2	Freespan Wear
SG88	104	78	TWD	100	B02	19.23	Freespan Wear
SG88	104	78	TWD	100	B02	19.25	Freespan Wear
SG88	104	78	TWD	100	B02	19.28	Freespan Wear
SG88	104	78	TWD	100	B02	19.31	Freespan Wear
SG88	104	78	TWD	100	B02	19.36	Freespan Wear
SG88	104	78	TWD	97	B02	19.39	Freespan Wear
SG88	104	78	TWD	95	B02	19.42	Freespan Wear
SG88	104	78	TWD	94	B02	19.45	Freespan Wear
SG88	104	78	TWD	96	B02	19.47	Freespan Wear
SG88	104	78	TWD	96	B02	19.5	Freespan Wear
SG88	104	78	TWD	92	B02	19.53	Freespan Wear
SG88	104	78	TWD	92	B02	19.55	Freespan Wear
SG88	104	78	TWD	91	B02	19.58	Freespan Wear
SG88	104	78	TWD	88	B02	19.61	Freespan Wear
SG88	104	78	TWD	86	B02	19.64	Freespan Wear
SG88	104	78	TWD	87	B02	19.66	Freespan Wear
SG88	104	78	TWD	87	B02	19.69	Freespan Wear
SG88	104	78	TWD	87	B02	19.72	Freespan Wear
SG88	104	78	TWD	85	B02	19.75	Freespan Wear
SG88	104	78	TWD	87	B02	19.77	Freespan Wear
SG88	104	78	TWD	86	B02	19.8	Freespan Wear
SG88	104	78	TWD	86	B02	19.83	Freespan Wear
SG88	104	78	TWD	88	B02	19.85	Freespan Wear
SG88	104	78	TWD	91	B02	19.88	Freespan Wear
SG88	104	78	TWD	94	B02	19.91	Freespan Wear
SG88	104	78	TWD	95	B02	19.94	Freespan Wear
SG88	104	78	TWD	96	B02	19.96	Freespan Wear
SG88	104	78	TWD	96	B02	19.99	Freespan Wear
SG88	104	78	TWD	95	B02	20.02	Freespan Wear
SG88	104	78	TWD	96	B02	20.04	Freespan Wear
SG88	104	78	TWD	97	B02	20.07	Freespan Wear
SG88	104	78	TWD	91	B02	20.1	Freespan Wear
SG88	104	78	TWD	93	B02	20.13	Freespan Wear
SG88	104	78	TWD	93	B02	20.15	Freespan Wear
SG88	104	78	TWD	89	B02	20.18	Freespan Wear
SG88	104	78	TWD	89	B02	20.21	Freespan Wear
SG88	104	78	TWD	91	B02	20.24	Freespan Wear
SG88	104	78	TWD	91	B02	20.26	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	104	78	TWD	87	B02	20.29	Freespan Wear
SG88	104	78	TWD	89	B02	20.32	Freespan Wear
SG88	104	78	TWD	89	B02	20.34	Freespan Wear
SG88	104	78	TWD	85	B02	20.37	Freespan Wear
SG88	104	78	TWD	83	B02	20.4	Freespan Wear
SG88	104	78	TWD	85	B02	20.43	Freespan Wear
SG88	104	78	TWD	85	B02	20.45	Freespan Wear
SG88	104	78	TWD	85	B02	20.48	Freespan Wear
SG88	104	78	TWD	85	B02	20.51	Freespan Wear
SG88	104	78	TWD	85	B02	20.53	Freespan Wear
SG88	104	78	TWD	85	B02	20.56	Freespan Wear
SG88	104	78	TWD	84	B02	20.59	Freespan Wear
SG88	104	78	TWD	85	B02	20.62	Freespan Wear
SG88	104	78	TWD	85	B02	20.64	Freespan Wear
SG88	104	78	TWD	86	B02	20.67	Freespan Wear
SG88	104	78	TWD	87	B02	20.7	Freespan Wear
SG88	104	78	TWD	87	B02	20.72	Freespan Wear
SG88	104	78	TWD	87	B02	20.75	Freespan Wear
SG88	104	78	TWD	87	B02	20.78	Freespan Wear
SG88	104	78	TWD	85	B02	20.81	Freespan Wear
SG88	104	78	TWD	87	B02	20.83	Freespan Wear
SG88	104	78	TWD	86	B02	20.86	Freespan Wear
SG88	104	78	TWD	84	B02	20.89	Freespan Wear
SG88	104	78	TWD	83	B02	20.91	Freespan Wear
SG88	104	78	TWD	84	B02	20.94	Freespan Wear
SG88	104	78	TWD	85	B02	20.97	Freespan Wear
SG88	104	78	TWD	84	B02	21	Freespan Wear
SG88	104	78	TWD	84	B02	21.02	Freespan Wear
SG88	104	78	TWD	85	B02	21.05	Freespan Wear
SG88	104	78	TWD	81	B02	21.08	Freespan Wear
SG88	104	78	TWD	82	B02	21.1	Freespan Wear
SG88	104	78	TWD	83	B02	21.13	Freespan Wear
SG88	104	78	TWD	83	B02	21.16	Freespan Wear
SG88	104	78	TWD	82	B02	21.19	Freespan Wear
SG88	104	78	TWD	83	B02	21.21	Freespan Wear
SG88	104	78	TWD	81	B02	21.24	Freespan Wear
SG88	104	78	TWD	81	B02	21.27	Freespan Wear
SG88	104	78	TWD	82	B02	21.3	Freespan Wear
SG88	104	78	TWD	81	B02	21.32	Freespan Wear
SG88	104	78	TWD	77	B02	21.65	Freespan Wear
SG88	104	78	TWD	75	B02	22	Freespan Wear
SG88	104	78	TWD	74	B02	22.33	Freespan Wear
SG88	104	78	TWD	67	B02	22.66	Freespan Wear
SG88	104	78	TWD	66	B02	23.01	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	104	78	TWD	66	B02	23.33	Freespan Wear
SG88	104	78	TWD	62	B02	23.66	Freespan Wear
SG88	104	78	TWD	60	B02	24.01	Freespan Wear
SG88	104	78	TWD	56	B02	24.34	Freespan Wear
SG88	104	78	TWD	54	B02	24.67	Freespan Wear
SG88	104	78	TWD	52	B02	24.99	Freespan Wear
SG88	104	78	TWD	49	B02	25.34	Freespan Wear
SG88	104	78	TWD	47	B02	25.67	Freespan Wear
SG88	104	78	TWD	44	B02	26	Freespan Wear
SG88	104	78	TWD	40	B02	26.35	Freespan Wear
SG88	104	78	TWD	40	B02	26.68	Freespan Wear
SG88	104	78	TWD	37	B02	27	Freespan Wear
SG88	104	78	TWD	35	B02	27.33	Freespan Wear
SG88	104	78	TWD	33	B02	27.66	Freespan Wear
SG88	104	78	TWD	30	B02	28.01	Freespan Wear
SG88	104	78	TWD	27	B02	28.34	Freespan Wear
SG88	104	78	TWD	26	B02	28.69	Freespan Wear
SG88	104	78	TWD	24	B02	29.02	Freespan Wear
SG88	104	78	TWD	20	B02	29.34	Freespan Wear
SG88	104	78	TWD	19	B02	29.67	Freespan Wear
SG88	104	78	TWD	16	B02	30.02	Freespan Wear
SG88	104	78	TWD	0	B02	30.32	Freespan Wear

Document	File Name	File Type	Size
G	SG88R106C78 7H TSP Size.pdf	Adobe Acrobat Document	50 KB

G

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	106	78	TWD	0	07H	0.73	TSP Wear
SG88	106	78	TWD	12	07H	0.7	TSP Wear
SG88	106	78	TWD	23	07H	0.68	TSP Wear
SG88	106	78	TWD	32	07H	0.64	TSP Wear
SG88	106	78	TWD	37	07H	0.62	TSP Wear
SG88	106	78	TWD	39	07H	0.59	TSP Wear
SG88	106	78	TWD	45	07H	0.55	TSP Wear
SG88	106	78	TWD	48	07H	0.52	TSP Wear
SG88	106	78	TWD	52	07H	0.5	TSP Wear
SG88	106	78	TWD	54	07H	0.47	TSP Wear
SG88	106	78	TWD	54	07H	0.44	TSP Wear
SG88	106	78	TWD	56	07H	0.41	TSP Wear
SG88	106	78	TWD	56	07H	0.38	TSP Wear
SG88	106	78	TWD	57	07H	0.35	TSP Wear
SG88	106	78	TWD	57	07H	0.32	TSP Wear
SG88	106	78	TWD	57	07H	0.29	TSP Wear
SG88	106	78	TWD	58	07H	0.26	TSP Wear
SG88	106	78	TWD	58	07H	0.23	TSP Wear
SG88	106	78	TWD	59	07H	0.2	TSP Wear
SG88	106	78	TWD	58	07H	0.17	TSP Wear
SG88	106	78	TWD	60	07H	0.14	TSP Wear
SG88	106	78	TWD	60	07H	0.11	TSP Wear
SG88	106	78	TWD	61	07H	0.08	TSP Wear
SG88	106	78	TWD	61	07H	0.05	TSP Wear
SG88	106	78	TWD	61	07H	0.02	TSP Wear
SG88	106	78	TWD	63	07H	-0.01	TSP Wear
SG88	106	78	TWD	63	07H	-0.04	TSP Wear
SG88	106	78	TWD	64	07H	-0.07	TSP Wear
SG88	106	78	TWD	64	07H	-0.1	TSP Wear
SG88	106	78	TWD	65	07H	-0.13	TSP Wear
SG88	106	78	TWD	65	07H	-0.16	TSP Wear
SG88	106	78	TWD	64	07H	-0.19	TSP Wear
SG88	106	78	TWD	63	07H	-0.22	TSP Wear
SG88	106	78	TWD	61	07H	-0.25	TSP Wear
SG88	106	78	TWD	60	07H	-0.28	TSP Wear
SG88	106	78	TWD	60	07H	-0.31	TSP Wear
SG88	106	78	TWD	60	07H	-0.34	TSP Wear
SG88	106	78	TWD	60	07H	-0.37	TSP Wear
SG88	106	78	TWD	61	07H	-0.4	TSP Wear
SG88	106	78	TWD	61	07H	-0.43	TSP Wear
SG88	106	78	TWD	62	07H	-0.46	TSP Wear
SG88	106	78	TWD	64	07H	-0.49	TSP Wear
SG88	106	78	TWD	66	07H	-0.52	TSP Wear
SG88	106	78	TWD	68	07H	-0.55	TSP Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	106	78	TWD	70	07H	-0.58	TSP Wear
SG88	106	78	TWD	72	07H	-0.61	TSP Wear
SG88	106	78	TWD	74	07H	-0.64	TSP Wear
SG88	106	78	TWD	75	07H	-0.67	TSP Wear
SG88	106	78	TWD	73	07H	-0.7	TSP Wear
SG88	106	78	TWD	72	07H	-0.73	TSP Wear
SG88	106	78	TWD	68	07H	-0.76	TSP Wear
SG88	106	78	TWD	65	07H	-0.79	TSP Wear
SG88	106	78	TWD	61	07H	-0.82	TSP Wear
SG88	106	78	TWD	57	07H	-0.85	TSP Wear
SG88	106	78	TWD	53	07H	-0.88	TSP Wear
SG88	106	78	TWD	49	07H	-0.91	TSP Wear
SG88	106	78	TWD	40	07H	-0.94	TSP Wear
SG88	106	78	TWD	32	07H	-0.97	TSP Wear
SG88	106	78	TWD	20	07H	-1	TSP Wear
SG88	106	78	TWD	10	07H	-1.03	TSP Wear
SG88	106	78	TWD	0	07H	-1.06	TSP Wear

Document	File Name	File Type	Size
H	SG88R106C78 FreespanSize.pdf	Adobe Acrobat Document	189 KB

H

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	106	78	TWD	0	B03	1.41	Freespan Wear
SG88	106	78	TWD	14	B03	1.8	Freespan Wear
SG88	106	78	TWD	15	B03	2.07	Freespan Wear
SG88	106	78	TWD	15	B03	2.37	Freespan Wear
SG88	106	78	TWD	16	B03	2.81	Freespan Wear
SG88	106	78	TWD	16	B03	3.05	Freespan Wear
SG88	106	78	TWD	17	B03	3.32	Freespan Wear
SG88	106	78	TWD	18	B03	3.5	Freespan Wear
SG88	106	78	TWD	22	B03	4.97	Freespan Wear
SG88	106	78	TWD	24	B03	5.32	Freespan Wear
SG88	106	78	TWD	26	B03	5.71	Freespan Wear
SG88	106	78	TWD	27	B03	5.95	Freespan Wear
SG88	106	78	TWD	29	B03	6.43	Freespan Wear
SG88	106	78	TWD	31	B03	6.7	Freespan Wear
SG88	106	78	TWD	32	B03	7.03	Freespan Wear
SG88	106	78	TWD	36	B03	7.39	Freespan Wear
SG88	106	78	TWD	36	B03	7.63	Freespan Wear
SG88	106	78	TWD	39	B03	7.99	Freespan Wear
SG88	106	78	TWD	41	B03	8.38	Freespan Wear
SG88	106	78	TWD	43	B03	8.73	Freespan Wear
SG88	106	78	TWD	46	B03	9.06	Freespan Wear
SG88	106	78	TWD	47	B03	9.33	Freespan Wear
SG88	106	78	TWD	49	B03	9.75	Freespan Wear
SG88	106	78	TWD	55	B03	10.05	Freespan Wear
SG88	106	78	TWD	57	B03	10.41	Freespan Wear
SG88	106	78	TWD	57	B03	10.74	Freespan Wear
SG88	106	78	TWD	60	B03	11.04	Freespan Wear
SG88	106	78	TWD	65	B03	11.37	Freespan Wear
SG88	106	78	TWD	66	B03	11.78	Freespan Wear
SG88	106	78	TWD	68	B03	12.05	Freespan Wear
SG88	106	78	TWD	70	B03	12.44	Freespan Wear
SG88	106	78	TWD	74	B03	12.77	Freespan Wear
SG88	106	78	TWD	73	B03	13.01	Freespan Wear
SG88	106	78	TWD	77	B03	13.3	Freespan Wear
SG88	106	78	TWD	78	B03	13.63	Freespan Wear
SG88	106	78	TWD	81	B03	13.87	Freespan Wear
SG88	106	78	TWD	82	B03	14.14	Freespan Wear
SG88	106	78	TWD	82	B03	14.53	Freespan Wear
SG88	106	78	TWD	89	B03	14.83	Freespan Wear
SG88	106	78	TWD	90	B03	15.16	Freespan Wear
SG88	106	78	TWD	89	B03	15.19	Freespan Wear
SG88	106	78	TWD	89	B03	15.22	Freespan Wear
SG88	106	78	TWD	90	B03	15.25	Freespan Wear
SG88	106	78	TWD	90	B03	15.28	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	106	78	TWD	91	B03	15.31	Freespan Wear
SG88	106	78	TWD	93	B03	15.34	Freespan Wear
SG88	106	78	TWD	94	B03	15.37	Freespan Wear
SG88	106	78	TWD	93	B03	15.4	Freespan Wear
SG88	106	78	TWD	93	B03	15.43	Freespan Wear
SG88	106	78	TWD	93	B03	15.46	Freespan Wear
SG88	106	78	TWD	94	B03	15.49	Freespan Wear
SG88	106	78	TWD	94	B03	15.52	Freespan Wear
SG88	106	78	TWD	93	B03	15.55	Freespan Wear
SG88	106	78	TWD	93	B03	15.58	Freespan Wear
SG88	106	78	TWD	93	B03	15.61	Freespan Wear
SG88	106	78	TWD	92	B03	15.64	Freespan Wear
SG88	106	78	TWD	96	B03	15.67	Freespan Wear
SG88	106	78	TWD	95	B03	15.7	Freespan Wear
SG88	106	78	TWD	97	B03	15.73	Freespan Wear
SG88	106	78	TWD	94	B03	15.76	Freespan Wear
SG88	106	78	TWD	92	B03	15.79	Freespan Wear
SG88	106	78	TWD	92	B03	15.82	Freespan Wear
SG88	106	78	TWD	91	B03	15.85	Freespan Wear
SG88	106	78	TWD	91	B03	15.88	Freespan Wear
SG88	106	78	TWD	90	B03	15.91	Freespan Wear
SG88	106	78	TWD	88	B03	15.94	Freespan Wear
SG88	106	78	TWD	87	B03	15.97	Freespan Wear
SG88	106	78	TWD	87	B03	16	Freespan Wear
SG88	106	78	TWD	85	B03	16.03	Freespan Wear
SG88	106	78	TWD	86	B03	16.06	Freespan Wear
SG88	106	78	TWD	85	B03	16.09	Freespan Wear
SG88	106	78	TWD	87	B03	16.12	Freespan Wear
SG88	106	78	TWD	86	B03	16.15	Freespan Wear
SG88	106	78	TWD	85	B03	16.17	Freespan Wear
SG88	106	78	TWD	85	B03	16.21	Freespan Wear
SG88	106	78	TWD	83	B03	16.23	Freespan Wear
SG88	106	78	TWD	83	B03	16.26	Freespan Wear
SG88	106	78	TWD	83	B03	16.3	Freespan Wear
SG88	106	78	TWD	86	B03	16.33	Freespan Wear
SG88	106	78	TWD	86	B03	16.36	Freespan Wear
SG88	106	78	TWD	86	B03	16.38	Freespan Wear
SG88	106	78	TWD	85	B03	16.42	Freespan Wear
SG88	106	78	TWD	87	B03	16.45	Freespan Wear
SG88	106	78	TWD	86	B03	16.48	Freespan Wear
SG88	106	78	TWD	87	B03	16.5	Freespan Wear
SG88	106	78	TWD	89	B03	16.53	Freespan Wear
SG88	106	78	TWD	90	B03	16.56	Freespan Wear
SG88	106	78	TWD	90	B03	16.6	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	106	78	TWD	89	B03	16.62	Freespan Wear
SG88	106	78	TWD	88	B03	16.65	Freespan Wear
SG88	106	78	TWD	88	B03	16.65	Freespan Wear
SG88	106	78	TWD	89	B03	16.68	Freespan Wear
SG88	106	78	TWD	89	B03	16.72	Freespan Wear
SG88	106	78	TWD	90	B03	16.74	Freespan Wear
SG88	106	78	TWD	91	B03	16.77	Freespan Wear
SG88	106	78	TWD	91	B03	16.8	Freespan Wear
SG88	106	78	TWD	90	B03	16.83	Freespan Wear
SG88	106	78	TWD	94	B03	16.86	Freespan Wear
SG88	106	78	TWD	94	B03	16.89	Freespan Wear
SG88	106	78	TWD	92	B03	16.92	Freespan Wear
SG88	106	78	TWD	94	B03	16.95	Freespan Wear
SG88	106	78	TWD	96	B03	16.98	Freespan Wear
SG88	106	78	TWD	100	B03	17.01	Freespan Wear
SG88	106	78	TWD	100	B03	17.04	Freespan Wear
SG88	106	78	TWD	100	B03	17.07	Freespan Wear
SG88	106	78	TWD	100	B03	17.1	Freespan Wear
SG88	106	78	TWD	100	B03	17.13	Freespan Wear
SG88	106	78	TWD	100	B03	17.16	Freespan Wear
SG88	106	78	TWD	100	B03	17.2	Freespan Wear
SG88	106	78	TWD	100	B03	17.23	Freespan Wear
SG88	106	78	TWD	100	B03	17.25	Freespan Wear
SG88	106	78	TWD	100	B03	17.29	Freespan Wear
SG88	106	78	TWD	100	B03	17.31	Freespan Wear
SG88	106	78	TWD	100	B03	17.34	Freespan Wear
SG88	106	78	TWD	100	B03	17.37	Freespan Wear
SG88	106	78	TWD	100	B03	17.4	Freespan Wear
SG88	106	78	TWD	100	B03	17.43	Freespan Wear
SG88	106	78	TWD	97	B03	17.46	Freespan Wear
SG88	106	78	TWD	93	B03	17.49	Freespan Wear
SG88	106	78	TWD	95	B03	17.52	Freespan Wear
SG88	106	78	TWD	92	B03	17.55	Freespan Wear
SG88	106	78	TWD	93	B03	17.58	Freespan Wear
SG88	106	78	TWD	94	B03	17.61	Freespan Wear
SG88	106	78	TWD	94	B03	17.64	Freespan Wear
SG88	106	78	TWD	95	B03	17.67	Freespan Wear
SG88	106	78	TWD	94	B03	17.7	Freespan Wear
SG88	106	78	TWD	92	B03	17.73	Freespan Wear
SG88	106	78	TWD	91	B03	17.76	Freespan Wear
SG88	106	78	TWD	91	B03	17.79	Freespan Wear
SG88	106	78	TWD	89	B03	17.82	Freespan Wear
SG88	106	78	TWD	91	B03	17.85	Freespan Wear
SG88	106	78	TWD	91	B03	17.88	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	106	78	TWD	89	B03	17.91	Freespan Wear
SG88	106	78	TWD	84	B03	17.94	Freespan Wear
SG88	106	78	TWD	85	B03	17.97	Freespan Wear
SG88	106	78	TWD	85	B03	18	Freespan Wear
SG88	106	78	TWD	87	B03	18.03	Freespan Wear
SG88	106	78	TWD	85	B03	18.06	Freespan Wear
SG88	106	78	TWD	83	B03	18.09	Freespan Wear
SG88	106	78	TWD	83	B03	18.12	Freespan Wear
SG88	106	78	TWD	82	B03	18.15	Freespan Wear
SG88	106	78	TWD	81	B03	18.18	Freespan Wear
SG88	106	78	TWD	82	B03	18.21	Freespan Wear
SG88	106	78	TWD	82	B03	18.24	Freespan Wear
SG88	106	78	TWD	84	B03	18.27	Freespan Wear
SG88	106	78	TWD	85	B03	18.3	Freespan Wear
SG88	106	78	TWD	84	B03	18.33	Freespan Wear
SG88	106	78	TWD	84	B03	18.36	Freespan Wear
SG88	106	78	TWD	85	B03	18.39	Freespan Wear
SG88	106	78	TWD	86	B03	18.42	Freespan Wear
SG88	106	78	TWD	88	B03	18.45	Freespan Wear
SG88	106	78	TWD	89	B03	18.48	Freespan Wear
SG88	106	78	TWD	90	B03	18.51	Freespan Wear
SG88	106	78	TWD	91	B03	18.54	Freespan Wear
SG88	106	78	TWD	89	B03	18.57	Freespan Wear
SG88	106	78	TWD	90	B03	18.6	Freespan Wear
SG88	106	78	TWD	89	B03	18.63	Freespan Wear
SG88	106	78	TWD	89	B03	18.66	Freespan Wear
SG88	106	78	TWD	87	B03	18.69	Freespan Wear
SG88	106	78	TWD	88	B03	18.72	Freespan Wear
SG88	106	78	TWD	87	B03	18.75	Freespan Wear
SG88	106	78	TWD	87	B03	18.78	Freespan Wear
SG88	106	78	TWD	88	B03	18.81	Freespan Wear
SG88	106	78	TWD	89	B03	18.84	Freespan Wear
SG88	106	78	TWD	88	B03	18.87	Freespan Wear
SG88	106	78	TWD	88	B03	18.9	Freespan Wear
SG88	106	78	TWD	87	B03	18.93	Freespan Wear
SG88	106	78	TWD	85	B03	18.96	Freespan Wear
SG88	106	78	TWD	86	B03	18.99	Freespan Wear
SG88	106	78	TWD	86	B03	19.02	Freespan Wear
SG88	106	78	TWD	88	B03	19.05	Freespan Wear
SG88	106	78	TWD	85	B03	19.08	Freespan Wear
SG88	106	78	TWD	85	B03	19.08	Freespan Wear
SG88	106	78	TWD	85	B03	19.11	Freespan Wear
SG88	106	78	TWD	83	B03	19.14	Freespan Wear
SG88	106	78	TWD	85	B03	19.17	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	106	78	TWD	85	B03	19.23	Freespan Wear
SG88	106	78	TWD	80	B03	19.59	Freespan Wear
SG88	106	78	TWD	80	B03	19.8	Freespan Wear
SG88	106	78	TWD	78	B03	20.19	Freespan Wear
SG88	106	78	TWD	76	B03	20.4	Freespan Wear
SG88	106	78	TWD	72	B03	20.88	Freespan Wear
SG88	106	78	TWD	70	B03	21.21	Freespan Wear
SG88	106	78	TWD	69	B03	21.56	Freespan Wear
SG88	106	78	TWD	68	B03	21.68	Freespan Wear
SG88	106	78	TWD	67	B03	22.07	Freespan Wear
SG88	106	78	TWD	64	B03	22.46	Freespan Wear
SG88	106	78	TWD	62	B03	22.79	Freespan Wear
SG88	106	78	TWD	60	B03	23.36	Freespan Wear
SG88	106	78	TWD	59	B03	23.66	Freespan Wear
SG88	106	78	TWD	56	B03	23.9	Freespan Wear
SG88	106	78	TWD	55	B03	24.32	Freespan Wear
SG88	106	78	TWD	50	B03	24.68	Freespan Wear
SG88	106	78	TWD	50	B03	24.92	Freespan Wear
SG88	106	78	TWD	48	B03	25.28	Freespan Wear
SG88	106	78	TWD	45	B03	25.76	Freespan Wear
SG88	106	78	TWD	41	B03	26.24	Freespan Wear
SG88	106	78	TWD	39	B03	26.6	Freespan Wear
SG88	106	78	TWD	37	B03	26.87	Freespan Wear
SG88	106	78	TWD	34	B03	27.22	Freespan Wear
SG88	106	78	TWD	31	B03	27.56	Freespan Wear
SG88	106	78	TWD	29	B03	27.85	Freespan Wear
SG88	106	78	TWD	26	B03	28.18	Freespan Wear
SG88	106	78	TWD	25	B03	28.42	Freespan Wear
SG88	106	78	TWD	23	B03	28.66	Freespan Wear
SG88	106	78	TWD	21	B03	28.99	Freespan Wear
SG88	106	78	TWD	19	B03	29.29	Freespan Wear
SG88	106	78	TWD	17	B03	29.59	Freespan Wear
SG88	106	78	TWD	15	B03	29.92	Freespan Wear
SG88	106	78	TWD	0	B03	29.98	Freespan Wear

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SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	107	77	TWD	0	B02	8.12	Freespan Wear
SG88	107	77	TWD	16	B02	8.58	Freespan Wear
SG88	107	77	TWD	13	B02	8.92	Freespan Wear
SG88	107	77	TWD	21	B02	9.17	Freespan Wear
SG88	107	77	TWD	21	B02	9.35	Freespan Wear
SG88	107	77	TWD	23	B02	9.5	Freespan Wear
SG88	107	77	TWD	23	B02	9.74	Freespan Wear
SG88	107	77	TWD	23	B02	9.86	Freespan Wear
SG88	107	77	TWD	26	B02	10.09	Freespan Wear
SG88	107	77	TWD	26	B02	10.31	Freespan Wear
SG88	107	77	TWD	27	B02	10.54	Freespan Wear
SG88	107	77	TWD	28	B02	10.82	Freespan Wear
SG88	107	77	TWD	30	B02	11	Freespan Wear
SG88	107	77	TWD	31	B02	11.18	Freespan Wear
SG88	107	77	TWD	32	B02	11.47	Freespan Wear
SG88	107	77	TWD	33	B02	11.71	Freespan Wear
SG88	107	77	TWD	34	B02	11.92	Freespan Wear
SG88	107	77	TWD	36	B02	12.19	Freespan Wear
SG88	107	77	TWD	37	B02	12.4	Freespan Wear
SG88	107	77	TWD	38	B02	12.61	Freespan Wear
SG88	107	77	TWD	39	B02	12.85	Freespan Wear
SG88	107	77	TWD	41	B02	13.12	Freespan Wear
SG88	107	77	TWD	42	B02	13.33	Freespan Wear
SG88	107	77	TWD	44	B02	13.57	Freespan Wear
SG88	107	77	TWD	43	B02	13.75	Freespan Wear
SG88	107	77	TWD	45	B02	14.01	Freespan Wear
SG88	107	77	TWD	48	B02	14.46	Freespan Wear
SG88	107	77	TWD	49	B02	14.64	Freespan Wear
SG88	107	77	TWD	49	B02	14.88	Freespan Wear
SG88	107	77	TWD	51	B02	15.15	Freespan Wear
SG88	107	77	TWD	52	B02	15.33	Freespan Wear
SG88	107	77	TWD	53	B02	15.63	Freespan Wear
SG88	107	77	TWD	55	B02	15.84	Freespan Wear
SG88	107	77	TWD	56	B02	16.04	Freespan Wear
SG88	107	77	TWD	56	B02	16.26	Freespan Wear
SG88	107	77	TWD	56	B02	16.47	Freespan Wear
SG88	107	77	TWD	58	B02	16.68	Freespan Wear
SG88	107	77	TWD	61	B02	16.98	Freespan Wear
SG88	107	77	TWD	61	B02	17.15	Freespan Wear
SG88	107	77	TWD	60	B02	17.43	Freespan Wear
SG88	107	77	TWD	63	B02	17.75	Freespan Wear
SG88	107	77	TWD	65	B02	17.9	Freespan Wear
SG88	107	77	TWD	65	B02	18.14	Freespan Wear
SG88	107	77	TWD	68	B02	18.47	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	107	77	TWD	69	B02	18.77	Freespan Wear
SG88	107	77	TWD	67	B02	19.04	Freespan Wear
SG88	107	77	TWD	69	B02	19.25	Freespan Wear
SG88	107	77	TWD	71	B02	19.55	Freespan Wear
SG88	107	77	TWD	73	B02	19.79	Freespan Wear
SG88	107	77	TWD	74	B02	20.03	Freespan Wear
SG88	107	77	TWD	73	B02	20.3	Freespan Wear
SG88	107	77	TWD	76	B02	20.45	Freespan Wear
SG88	107	77	TWD	73	B02	20.69	Freespan Wear
SG88	107	77	TWD	75	B02	20.96	Freespan Wear
SG88	107	77	TWD	76	B02	21.2	Freespan Wear
SG88	107	77	TWD	77	B02	21.44	Freespan Wear
SG88	107	77	TWD	78	B02	21.74	Freespan Wear
SG88	107	77	TWD	77	B02	21.92	Freespan Wear
SG88	107	77	TWD	79	B02	22.19	Freespan Wear
SG88	107	77	TWD	78	B02	22.34	Freespan Wear
SG88	107	77	TWD	79	B02	22.37	Freespan Wear
SG88	107	77	TWD	77	B02	22.4	Freespan Wear
SG88	107	77	TWD	79	B02	22.43	Freespan Wear
SG88	107	77	TWD	79	B02	22.46	Freespan Wear
SG88	107	77	TWD	79	B02	22.49	Freespan Wear
SG88	107	77	TWD	81	B02	22.52	Freespan Wear
SG88	107	77	TWD	79	B02	22.55	Freespan Wear
SG88	107	77	TWD	80	B02	22.58	Freespan Wear
SG88	107	77	TWD	78	B02	22.61	Freespan Wear
SG88	107	77	TWD	79	B02	22.64	Freespan Wear
SG88	107	77	TWD	77	B02	22.67	Freespan Wear
SG88	107	77	TWD	79	B02	22.7	Freespan Wear
SG88	107	77	TWD	80	B02	22.73	Freespan Wear
SG88	107	77	TWD	79	B02	22.76	Freespan Wear
SG88	107	77	TWD	80	B02	22.79	Freespan Wear
SG88	107	77	TWD	81	B02	22.82	Freespan Wear
SG88	107	77	TWD	79	B02	22.85	Freespan Wear
SG88	107	77	TWD	81	B02	22.88	Freespan Wear
SG88	107	77	TWD	79	B02	22.91	Freespan Wear
SG88	107	77	TWD	79	B02	22.94	Freespan Wear
SG88	107	77	TWD	80	B02	22.97	Freespan Wear
SG88	107	77	TWD	79	B02	23	Freespan Wear
SG88	107	77	TWD	81	B02	23.03	Freespan Wear
SG88	107	77	TWD	80	B02	23.06	Freespan Wear
SG88	107	77	TWD	79	B02	23.09	Freespan Wear
SG88	107	77	TWD	78	B02	23.12	Freespan Wear
SG88	107	77	TWD	76	B02	23.15	Freespan Wear
SG88	107	77	TWD	78	B02	23.18	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	107	77	TWD	80	B02	23.21	Freespan Wear
SG88	107	77	TWD	80	B02	23.24	Freespan Wear
SG88	107	77	TWD	78	B02	23.27	Freespan Wear
SG88	107	77	TWD	77	B02	23.3	Freespan Wear
SG88	107	77	TWD	78	B02	23.33	Freespan Wear
SG88	107	77	TWD	80	B02	23.36	Freespan Wear
SG88	107	77	TWD	80	B02	23.39	Freespan Wear
SG88	107	77	TWD	80	B02	23.42	Freespan Wear
SG88	107	77	TWD	80	B02	23.45	Freespan Wear
SG88	107	77	TWD	81	B02	23.48	Freespan Wear
SG88	107	77	TWD	81	B02	23.51	Freespan Wear
SG88	107	77	TWD	82	B02	23.54	Freespan Wear
SG88	107	77	TWD	81	B02	23.57	Freespan Wear
SG88	107	77	TWD	81	B02	23.6	Freespan Wear
SG88	107	77	TWD	81	B02	23.63	Freespan Wear
SG88	107	77	TWD	81	B02	23.66	Freespan Wear
SG88	107	77	TWD	80	B02	23.69	Freespan Wear
SG88	107	77	TWD	82	B02	23.72	Freespan Wear
SG88	107	77	TWD	81	B02	23.75	Freespan Wear
SG88	107	77	TWD	80	B02	23.78	Freespan Wear
SG88	107	77	TWD	78	B02	23.81	Freespan Wear
SG88	107	77	TWD	78	B02	23.84	Freespan Wear
SG88	107	77	TWD	79	B02	23.87	Freespan Wear
SG88	107	77	TWD	79	B02	23.9	Freespan Wear
SG88	107	77	TWD	78	B02	23.93	Freespan Wear
SG88	107	77	TWD	77	B02	23.96	Freespan Wear
SG88	107	77	TWD	77	B02	23.99	Freespan Wear
SG88	107	77	TWD	77	B02	24.02	Freespan Wear
SG88	107	77	TWD	77	B02	24.05	Freespan Wear
SG88	107	77	TWD	79	B02	24.08	Freespan Wear
SG88	107	77	TWD	78	B02	24.11	Freespan Wear
SG88	107	77	TWD	78	B02	24.14	Freespan Wear
SG88	107	77	TWD	79	B02	24.17	Freespan Wear
SG88	107	77	TWD	78	B02	24.2	Freespan Wear
SG88	107	77	TWD	80	B02	24.23	Freespan Wear
SG88	107	77	TWD	81	B02	24.26	Freespan Wear
SG88	107	77	TWD	81	B02	24.29	Freespan Wear
SG88	107	77	TWD	81	B02	24.32	Freespan Wear
SG88	107	77	TWD	81	B02	24.35	Freespan Wear
SG88	107	77	TWD	81	B02	24.38	Freespan Wear
SG88	107	77	TWD	82	B02	24.41	Freespan Wear
SG88	107	77	TWD	79	B02	24.44	Freespan Wear
SG88	107	77	TWD	76	B02	24.47	Freespan Wear
SG88	107	77	TWD	79	B02	24.5	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	107	77	TWD	80	B02	24.52	Freespan Wear
SG88	107	77	TWD	79	B02	24.55	Freespan Wear
SG88	107	77	TWD	80	B02	24.59	Freespan Wear
SG88	107	77	TWD	80	B02	24.61	Freespan Wear
SG88	107	77	TWD	79	B02	24.65	Freespan Wear
SG88	107	77	TWD	80	B02	24.68	Freespan Wear
SG88	107	77	TWD	77	B02	24.71	Freespan Wear
SG88	107	77	TWD	80	B02	24.74	Freespan Wear
SG88	107	77	TWD	79	B02	24.77	Freespan Wear
SG88	107	77	TWD	77	B02	24.79	Freespan Wear
SG88	107	77	TWD	79	B02	24.82	Freespan Wear
SG88	107	77	TWD	80	B02	24.85	Freespan Wear
SG88	107	77	TWD	79	B02	24.88	Freespan Wear
SG88	107	77	TWD	76	B02	24.92	Freespan Wear
SG88	107	77	TWD	79	B02	24.95	Freespan Wear
SG88	107	77	TWD	77	B02	24.97	Freespan Wear
SG88	107	77	TWD	77	B02	25.01	Freespan Wear
SG88	107	77	TWD	79	B02	25.03	Freespan Wear
SG88	107	77	TWD	78	B02	25.06	Freespan Wear
SG88	107	77	TWD	78	B02	25.09	Freespan Wear
SG88	107	77	TWD	78	B02	25.13	Freespan Wear
SG88	107	77	TWD	77	B02	25.16	Freespan Wear
SG88	107	77	TWD	77	B02	25.19	Freespan Wear
SG88	107	77	TWD	79	B02	25.22	Freespan Wear
SG88	107	77	TWD	78	B02	25.25	Freespan Wear
SG88	107	77	TWD	79	B02	25.28	Freespan Wear
SG88	107	77	TWD	75	B02	25.31	Freespan Wear
SG88	107	77	TWD	77	B02	25.33	Freespan Wear
SG88	107	77	TWD	76	B02	25.37	Freespan Wear
SG88	107	77	TWD	75	B02	25.39	Freespan Wear
SG88	107	77	TWD	75	B02	25.43	Freespan Wear
SG88	107	77	TWD	76	B02	25.46	Freespan Wear
SG88	107	77	TWD	75	B02	25.49	Freespan Wear
SG88	107	77	TWD	77	B02	25.52	Freespan Wear
SG88	107	77	TWD	78	B02	25.55	Freespan Wear
SG88	107	77	TWD	76	B02	25.58	Freespan Wear
SG88	107	77	TWD	78	B02	25.6	Freespan Wear
SG88	107	77	TWD	77	B02	25.63	Freespan Wear
SG88	107	77	TWD	77	B02	25.67	Freespan Wear
SG88	107	77	TWD	76	B02	25.7	Freespan Wear
SG88	107	77	TWD	76	B02	25.73	Freespan Wear
SG88	107	77	TWD	76	B02	25.75	Freespan Wear
SG88	107	77	TWD	77	B02	25.79	Freespan Wear
SG88	107	77	TWD	75	B02	25.82	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	107	77	TWD	77	B02	25.84	Freespan Wear
SG88	107	77	TWD	74	B02	25.87	Freespan Wear
SG88	107	77	TWD	77	B02	25.91	Freespan Wear
SG88	107	77	TWD	77	B02	25.94	Freespan Wear
SG88	107	77	TWD	76	B02	25.97	Freespan Wear
SG88	107	77	TWD	76	B02	26	Freespan Wear
SG88	107	77	TWD	75	B02	26.03	Freespan Wear
SG88	107	77	TWD	76	B02	26.06	Freespan Wear
SG88	107	77	TWD	76	B02	26.09	Freespan Wear
SG88	107	77	TWD	76	B02	26.12	Freespan Wear
SG88	107	77	TWD	77	B02	26.15	Freespan Wear
SG88	107	77	TWD	77	B02	26.18	Freespan Wear
SG88	107	77	TWD	75	B02	26.21	Freespan Wear
SG88	107	77	TWD	76	B02	26.24	Freespan Wear
SG88	107	77	TWD	75	B02	26.27	Freespan Wear
SG88	107	77	TWD	76	B02	26.3	Freespan Wear
SG88	107	77	TWD	75	B02	26.33	Freespan Wear
SG88	107	77	TWD	75	B02	26.36	Freespan Wear
SG88	107	77	TWD	73	B02	26.57	Freespan Wear
SG88	107	77	TWD	74	B02	26.78	Freespan Wear
SG88	107	77	TWD	72	B02	27.1	Freespan Wear
SG88	107	77	TWD	69	B02	27.24	Freespan Wear
SG88	107	77	TWD	69	B02	27.48	Freespan Wear
SG88	107	77	TWD	71	B02	27.53	Freespan Wear
SG88	107	77	TWD	69	B02	27.83	Freespan Wear
SG88	107	77	TWD	68	B02	28.1	Freespan Wear
SG88	107	77	TWD	67	B02	28.34	Freespan Wear
SG88	107	77	TWD	65	B02	28.6	Freespan Wear
SG88	107	77	TWD	62	B02	28.84	Freespan Wear
SG88	107	77	TWD	62	B02	29.04	Freespan Wear
SG88	107	77	TWD	62	B02	29.7	Freespan Wear
SG88	107	77	TWD	60	B02	30.09	Freespan Wear
SG88	107	77	TWD	60	B02	30.51	Freespan Wear
SG88	107	77	TWD	59	B02	30.93	Freespan Wear
SG88	107	77	TWD	58	B02	31.38	Freespan Wear
SG88	107	77	TWD	56	B02	31.83	Freespan Wear
SG88	107	77	TWD	59	B02	32.36	Freespan Wear
SG88	107	77	TWD	54	B02	32.87	Freespan Wear
SG88	107	77	TWD	54	B02	33.29	Freespan Wear
SG88	107	77	TWD	54	B02	33.68	Freespan Wear
SG88	107	77	TWD	51	B02	34.17	Freespan Wear
SG88	107	77	TWD	50	B02	34.43	Freespan Wear
SG88	107	77	TWD	48	B02	34.79	Freespan Wear
SG88	107	77	TWD	46	B02	35.21	Freespan Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	107	77	TWD	45	B02	35.57	Freespan Wear
SG88	107	77	TWD	44	B02	36.05	Freespan Wear
SG88	107	77	TWD	43	B02	36.47	Freespan Wear
SG88	107	77	TWD	40	B02	36.89	Freespan Wear
SG88	107	77	TWD	38	B02	37.24	Freespan Wear
SG88	107	77	TWD	34	B02	37.87	Freespan Wear
SG88	107	77	TWD	34	B02	38.29	Freespan Wear
SG88	107	77	TWD	32	B02	38.68	Freespan Wear
SG88	107	77	TWD	32	B02	38.98	Freespan Wear
SG88	107	77	TWD	29	B02	39.28	Freespan Wear
SG88	107	77	TWD	28	B02	39.61	Freespan Wear
SG88	107	77	TWD	26	B02	39.97	Freespan Wear
SG88	107	77	TWD	24	B02	40.28	Freespan Wear
SG88	107	77	TWD	23	B02	40.7	Freespan Wear
SG88	107	77	TWD	23	B02	40.85	Freespan Wear
SG88	107	77	TWD	21	B02	41.15	Freespan Wear
SG88	107	77	TWD	19	B02	41.51	Freespan Wear
SG88	107	77	TWD	17	B02	41.72	Freespan Wear
SG88	107	77	TWD	17	B02	42.09	Freespan Wear
SG88	107	77	TWD	17	B02	42.18	Freespan Wear
SG88	107	77	TWD	0	B02	42.34	Freespan Wear

Document	File Name	File Type	Size
J	SG88R108C76 7H TSP Size.pdf	Adobe Acrobat Document	48 KB

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	108	76	TWD	0	07H	0.75	TSP Wear
SG88	108	76	TWD	13	07H	0.72	TSP Wear
SG88	108	76	TWD	19	07H	0.69	TSP Wear
SG88	108	76	TWD	31	07H	0.66	TSP Wear
SG88	108	76	TWD	35	07H	0.63	TSP Wear
SG88	108	76	TWD	38	07H	0.6	TSP Wear
SG88	108	76	TWD	41	07H	0.57	TSP Wear
SG88	108	76	TWD	45	07H	0.54	TSP Wear
SG88	108	76	TWD	50	07H	0.51	TSP Wear
SG88	108	76	TWD	53	07H	0.48	TSP Wear
SG88	108	76	TWD	55	07H	0.45	TSP Wear
SG88	108	76	TWD	55	07H	0.42	TSP Wear
SG88	108	76	TWD	55	07H	0.39	TSP Wear
SG88	108	76	TWD	54	07H	0.36	TSP Wear
SG88	108	76	TWD	53	07H	0.33	TSP Wear
SG88	108	76	TWD	51	07H	0.3	TSP Wear
SG88	108	76	TWD	51	07H	0.27	TSP Wear
SG88	108	76	TWD	50	07H	0.24	TSP Wear
SG88	108	76	TWD	49	07H	0.21	TSP Wear
SG88	108	76	TWD	49	07H	0.18	TSP Wear
SG88	108	76	TWD	49	07H	0.15	TSP Wear
SG88	108	76	TWD	49	07H	0.12	TSP Wear
SG88	108	76	TWD	47	07H	0.09	TSP Wear
SG88	108	76	TWD	46	07H	0.06	TSP Wear
SG88	108	76	TWD	44	07H	0.03	TSP Wear
SG88	108	76	TWD	44	07H	0	TSP Wear
SG88	108	76	TWD	45	07H	-0.03	TSP Wear
SG88	108	76	TWD	46	07H	-0.06	TSP Wear
SG88	108	76	TWD	46	07H	-0.09	TSP Wear
SG88	108	76	TWD	45	07H	-0.12	TSP Wear
SG88	108	76	TWD	45	07H	-0.12	TSP Wear
SG88	108	76	TWD	40	07H	-0.15	TSP Wear
SG88	108	76	TWD	37	07H	-0.18	TSP Wear
SG88	108	76	TWD	36	07H	-0.21	TSP Wear
SG88	108	76	TWD	38	07H	-0.24	TSP Wear
SG88	108	76	TWD	39	07H	-0.27	TSP Wear
SG88	108	76	TWD	39	07H	-0.3	TSP Wear
SG88	108	76	TWD	37	07H	-0.33	TSP Wear
SG88	108	76	TWD	37	07H	-0.36	TSP Wear
SG88	108	76	TWD	38	07H	-0.39	TSP Wear
SG88	108	76	TWD	42	07H	-0.42	TSP Wear
SG88	108	76	TWD	47	07H	-0.45	TSP Wear
SG88	108	76	TWD	50	07H	-0.48	TSP Wear
SG88	108	76	TWD	55	07H	-0.51	TSP Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	108	76	TWD	59	07H	-0.54	TSP Wear
SG88	108	76	TWD	64	07H	-0.57	TSP Wear
SG88	108	76	TWD	66	07H	-0.6	TSP Wear
SG88	108	76	TWD	68	07H	-0.63	TSP Wear
SG88	108	76	TWD	69	07H	-0.66	TSP Wear
SG88	108	76	TWD	67	07H	-0.69	TSP Wear
SG88	108	76	TWD	67	07H	-0.72	TSP Wear
SG88	108	76	TWD	63	07H	-0.75	TSP Wear
SG88	108	76	TWD	58	07H	-0.78	TSP Wear
SG88	108	76	TWD	49	07H	-0.81	TSP Wear
SG88	108	76	TWD	28	07H	-0.83	TSP Wear
SG88	108	76	TWD	17	07H	-0.86	TSP Wear
SG88	108	76	TWD	11	07H	-0.89	TSP Wear
SG88	108	76	TWD	0	07H	-0.92	TSP Wear

Document	File Name	File Type	Size
K	SG88R108C78 7H TSP Size.pdf	Adobe Acrobat Document	46 KB

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	108	78	TWD	0	07H	0.63	TSP Wear
SG88	108	78	TWD	7	07H	0.61	TSP Wear
SG88	108	78	TWD	13	07H	0.58	TSP Wear
SG88	108	78	TWD	19	07H	0.55	TSP Wear
SG88	108	78	TWD	22	07H	0.52	TSP Wear
SG88	108	78	TWD	26	07H	0.49	TSP Wear
SG88	108	78	TWD	30	07H	0.46	TSP Wear
SG88	108	78	TWD	35	07H	0.43	TSP Wear
SG88	108	78	TWD	38	07H	0.4	TSP Wear
SG88	108	78	TWD	40	07H	0.37	TSP Wear
SG88	108	78	TWD	40	07H	0.34	TSP Wear
SG88	108	78	TWD	41	07H	0.31	TSP Wear
SG88	108	78	TWD	41	07H	0.28	TSP Wear
SG88	108	78	TWD	42	07H	0.25	TSP Wear
SG88	108	78	TWD	42	07H	0.22	TSP Wear
SG88	108	78	TWD	43	07H	0.19	TSP Wear
SG88	108	78	TWD	44	07H	0.16	TSP Wear
SG88	108	78	TWD	45	07H	0.13	TSP Wear
SG88	108	78	TWD	45	07H	0.1	TSP Wear
SG88	108	78	TWD	46	07H	0.07	TSP Wear
SG88	108	78	TWD	46	07H	0.04	TSP Wear
SG88	108	78	TWD	48	07H	0.01	TSP Wear
SG88	108	78	TWD	48	07H	-0.02	TSP Wear
SG88	108	78	TWD	49	07H	-0.05	TSP Wear
SG88	108	78	TWD	50	07H	-0.08	TSP Wear
SG88	108	78	TWD	50	07H	-0.11	TSP Wear
SG88	108	78	TWD	52	07H	-0.14	TSP Wear
SG88	108	78	TWD	52	07H	-0.17	TSP Wear
SG88	108	78	TWD	53	07H	-0.2	TSP Wear
SG88	108	78	TWD	54	07H	-0.23	TSP Wear
SG88	108	78	TWD	55	07H	-0.26	TSP Wear
SG88	108	78	TWD	56	07H	-0.29	TSP Wear
SG88	108	78	TWD	57	07H	-0.32	TSP Wear
SG88	108	78	TWD	58	07H	-0.35	TSP Wear
SG88	108	78	TWD	59	07H	-0.38	TSP Wear
SG88	108	78	TWD	59	07H	-0.41	TSP Wear
SG88	108	78	TWD	59	07H	-0.44	TSP Wear
SG88	108	78	TWD	60	07H	-0.47	TSP Wear
SG88	108	78	TWD	62	07H	-0.5	TSP Wear
SG88	108	78	TWD	63	07H	-0.53	TSP Wear
SG88	108	78	TWD	66	07H	-0.56	TSP Wear
SG88	108	78	TWD	67	07H	-0.59	TSP Wear
SG88	108	78	TWD	67	07H	-0.62	TSP Wear
SG88	108	78	TWD	66	07H	-0.65	TSP Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG88	108	78	TWD	65	07H	-0.68	TSP Wear
SG88	108	78	TWD	64	07H	-0.71	TSP Wear
SG88	108	78	TWD	59	07H	-0.74	TSP Wear
SG88	108	78	TWD	55	07H	-0.77	TSP Wear
SG88	108	78	TWD	50	07H	-0.8	TSP Wear
SG88	108	78	TWD	45	07H	-0.83	TSP Wear
SG88	108	78	TWD	39	07H	-0.86	TSP Wear
SG88	108	78	TWD	29	07H	-0.89	TSP Wear
SG88	108	78	TWD	17	07H	-0.92	TSP Wear
SG88	108	78	TWD	6	07H	-0.95	TSP Wear
SG88	108	78	TWD	0	07H	-0.97	TSP Wear

Document	File Name	File Type	Size
L	SG89 TSP Max Depth and Length.pdf	Adobe Acrobat Document	850 KB

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	1	5	06C	0.29	11		
SG89	1	19	06C	0.34	15		
SG89	1	41	06C	-0.57	14		
SG89	1	65	05C	-0.11	12		
SG89	1	89	06C	-0.64	8		
SG89	1	119	04C	0.34	8		
SG89	4	128	05C	-0.69	7		
SG89	26	36	03H	-0.61	12		
SG89	29	119	02C	-0.65	7		
SG89	66	90	03H	-0.54	9		
SG89	74	82	02H	-0.65	12		
SG89	78	60	07H	-0.65	10		
SG89	80	74	03H	-0.53	22	18	
SG89	82	70	07H	-0.7	10		
SG89	82	102	07H	0.79	12		
SG89	83	79	07H	-0.65	12		
SG89	83	81	04H	0	10		
SG89	84	86	05H	0	12		
SG89	84	86	06H	0	10		
SG89	84	86	07C	0	14	12	
SG89	84	86	07H	0	23	18	
SG89	84	88	06C	0	11		
SG89	84	88	06H	0	10		
SG89	84	88	07H	0	13	12	
SG89	85	75	05H	-0.7	9		
SG89	85	79	05H	-0.62	12		
SG89	85	79	06H	-0.67	16		
SG89	85	79	07H	-0.67	15		
SG89	85	85	04C	0	12		
SG89	85	85	05C	0	13		
SG89	85	85	05H	0	10		
SG89	85	85	06C	0	15		
SG89	85	85	06H	0	21	20	
SG89	85	85	07C	0	21	12	
SG89	85	85	07H	0	30	23	
SG89	85	87	02H	0	10		
SG89	85	87	05C	0	14		
SG89	85	87	05H	0	14		
SG89	85	87	06C	0	25	23	
SG89	85	87	06H	0	30	23	
SG89	85	87	07C	0	33	23	
SG89	85	87	07H	0	32	26	
SG89	85	89	01H	-0.47	16		
SG89	85	89	02H	0.39	12		
SG89	85	89	03H	-0.47	9		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	85	89	04C	0	20	17	
SG89	85	89	05H	-0.54	9		
SG89	85	89	06C	0	32	29	
SG89	85	89	06H	0	34	28	
SG89	85	89	07C	0	42	33	
SG89	85	89	07H	0	46	37	
SG89	85	91	06C	-0.17	13		
SG89	85	91	07C	-0.63	11	12	
SG89	85	95	06C	-0.55	12		
SG89	86	74	05H	-0.7	9		
SG89	86	76	05H	-0.58	8		
SG89	86	76	07H	-0.71	8		
SG89	86	78	07H	-0.67	11		
SG89	86	84	07H	0	25	24	
SG89	86	86	06C	0	13		
SG89	86	86	06H	0	16		
SG89	86	86	07C	0	32	28	
SG89	86	86	07H	0	24	26	
SG89	86	88	01C	-0.46	9		
SG89	86	88	01H	-0.5	10		
SG89	86	88	04C	0	15		
SG89	86	88	04H	0	8		
SG89	86	88	05H	0	19		
SG89	86	88	06C	0	30	24	
SG89	86	88	06H	0	33	29	
SG89	86	88	07C	0	44	33	
SG89	86	88	07H	0	43	41	1.34
SG89	86	90	05H	-0.61	9		
SG89	86	90	06C	0	22	15	
SG89	86	90	06H	0	15		
SG89	86	90	07C	0	31	26	
SG89	86	90	07H	0	25	18	
SG89	87	75	07H	-0.73	11		
SG89	87	79	07H	-0.67	11		
SG89	87	81	07H	0	14	12	
SG89	87	83	06H	0	8		
SG89	87	83	07H	0	16	13	
SG89	87	85	02H	0.39	9		
SG89	87	85	04C	0	14		
SG89	87	85	04H	0	11		
SG89	87	85	05C	0	16		
SG89	87	85	05H	0	22	16	
SG89	87	85	06C	0	18		
SG89	87	85	06H	0	34	35	
SG89	87	85	07C	0	32	23	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	87	85	07H	0	42	36	
SG89	87	87	02C	0.33	9		
SG89	87	87	02H	0	9		
SG89	87	87	03C	0	9		
SG89	87	87	03H	0	14		
SG89	87	87	04C	0	15		
SG89	87	87	04H	0	17		
SG89	87	87	05C	0	11		
SG89	87	87	05H	0	25	21	
SG89	87	87	06C	0	28	21	
SG89	87	87	06H	0	32	25	
SG89	87	87	07C	0	38	27	
SG89	87	87	07H	0	44	40	0.65
SG89	87	89	01C	-0.52	13		
SG89	87	89	01H	-0.43	11		
SG89	87	89	02H	0	12		
SG89	87	89	03C	0	11		
SG89	87	89	04C	0	18		
SG89	87	89	04H	0	14		
SG89	87	89	05C	0	14		
SG89	87	89	05H	0	25	20	
SG89	87	89	06C	0	36	30	
SG89	87	89	06H	0	36	28	
SG89	87	89	07C	0	47	42	1.48
SG89	87	89	07H	0	49	40	1.26
SG89	87	91	01H	-0.43	10		
SG89	87	91	02H	0.47	12		
SG89	87	91	03C	0.52	7		
SG89	87	91	04C	-0.61	18		
SG89	87	91	05C	0	11		
SG89	87	91	05H	-0.52	20	22	
SG89	87	91	06C	0	28	28	
SG89	87	91	06H	0	27	20	
SG89	87	91	07C	0	41	31	
SG89	87	91	07H	0	42	33	
SG89	87	93	06C	-0.63	15		
SG89	87	99	07H	0.33	15		
SG89	88	74	07H	-0.67	12		
SG89	88	82	05H	0	10		
SG89	88	82	06H	0	11		
SG89	88	82	07H	0	9	8	
SG89	88	84	04H	-0.54	10		
SG89	88	84	05C	-0.56	17		
SG89	88	84	05H	-0.6	16		
SG89	88	84	06C	0	22	16	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	88	84	06H	0	25	22	
SG89	88	84	07C	0	32	22	
SG89	88	84	07H	0	34	26	
SG89	88	86	01H	0	18		
SG89	88	86	02H	0	12		
SG89	88	86	03H	0	12		
SG89	88	86	04C	0	21	20	
SG89	88	86	04H	0.28	9		
SG89	88	86	05C	0	15		
SG89	88	86	05H	0	25	25	
SG89	88	86	06C	0	31	27	
SG89	88	86	06H	0	34	34	
SG89	88	86	07C	0	39	26	
SG89	88	86	07H	0	42	39	1.42
SG89	88	88	01H	0	21	20	
SG89	88	88	02H	0	16		
SG89	88	88	03C	0	13		
SG89	88	88	03H	0	11		
SG89	88	88	04C	0	27	25	
SG89	88	88	04H	0	20	18	
SG89	88	88	05C	0	28	22	
SG89	88	88	05H	0	28	25	
SG89	88	88	06C	0	38	31	
SG89	88	88	06H	0	42	40	1.54
SG89	88	88	07C	0	49	41	1.49
SG89	88	88	07H	0	58	52	1.54
SG89	88	90	01C	-0.52	10		
SG89	88	90	01H	-0.36	12		
SG89	88	90	02C	0	17		
SG89	88	90	02H	0	20	19	
SG89	88	90	03C	0.39	15		
SG89	88	90	03H	0	18		
SG89	88	90	04C	0	18		
SG89	88	90	04H	0	24	23	
SG89	88	90	05C	0	15		
SG89	88	90	05H	0	31	24	
SG89	88	90	06C	0	38	39	1.44
SG89	88	90	06H	0	41	42	1.63
SG89	88	90	07C	0	50	41	1.34
SG89	88	90	07H	0	47	43	1.56
SG89	88	92	04C	-0.65	15		
SG89	88	92	04H	-0.52	12		
SG89	88	92	05H	-0.58	21	21	
SG89	88	92	06C	0	29	22	
SG89	88	92	06H	0	23	18	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	88	92	07C	-0.07	38	30	
SG89	88	92	07H	0	36	25	
SG89	88	94	06C	-0.11	16		
SG89	88	94	07C	-0.66	11	10	
SG89	88	94	07H	-0.69	10	7	
SG89	88	96	07C	-0.7	12	9	
SG89	89	81	07H	0	9		
SG89	89	83	03H	0	9		
SG89	89	83	04H	0	14		
SG89	89	83	05C	0	10		
SG89	89	83	05H	0	22	21	
SG89	89	83	06C	0	15		
SG89	89	83	06H	0	27	24	
SG89	89	83	07C	0	34	29	
SG89	89	83	07H	0	40	42	1.21
SG89	89	85	01H	0	17		
SG89	89	85	02H	0	10		
SG89	89	85	03H	0	15		
SG89	89	85	04C	0	17		
SG89	89	85	04H	0	19		
SG89	89	85	05C	0	16		
SG89	89	85	05H	0	23	15	
SG89	89	85	06C	0	20	13	
SG89	89	85	06H	0	29	25	
SG89	89	85	07C	0	44	38	1.53
SG89	89	85	07H	0	43	41	1.39
SG89	89	87	01C	0	10		
SG89	89	87	01H	0	9		
SG89	89	87	02C	0	16		
SG89	89	87	02H	0	17		
SG89	89	87	03H	0	22	16	
SG89	89	87	04C	0	24	23	
SG89	89	87	05C	0	22	14	
SG89	89	87	05H	0	36	24	
SG89	89	87	06C	0	34	30	
SG89	89	87	06H	0	41	40	1.46
SG89	89	87	07C	0	53	48	1.65
SG89	89	87	07H	0	51	44	1.4
SG89	89	89	01C	-0.5	17		
SG89	89	89	01H	-0.4	16		
SG89	89	89	02H	0	19		
SG89	89	89	03C	0.35	15		
SG89	89	89	04C	0	24	23	
SG89	89	89	04H	-0.56	19		
SG89	89	89	05C	0.33	9		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	89	89	05H	0	29	21	
SG89	89	89	06C	0	33	26	
SG89	89	89	06H	0	37	32	
SG89	89	89	07C	0	65	60	1.51
SG89	89	89	07H	0	54	46	1.53
SG89	89	91	01C	0	11		
SG89	89	91	02H	0.45	17		
SG89	89	91	03C	0	14		
SG89	89	91	04C	0	27	25	
SG89	89	91	04H	0	31	20	
SG89	89	91	05C	0	11		
SG89	89	91	05H	0	29	23	
SG89	89	91	06C	0	35	29	
SG89	89	91	06H	0	41	40	1.51
SG89	89	91	07C	0	46	43	1.45
SG89	89	91	07H	0	47	46	1.63
SG89	89	93	02H	0.44	15		
SG89	89	93	04C	-0.52	13		
SG89	89	93	04H	0.43	17		
SG89	89	93	05H	-0.56	16		
SG89	89	93	06C	-0.09	17		
SG89	89	93	06H	-0.07	30	24	
SG89	89	93	07C	-0.09	26	14	
SG89	89	93	07H	-0.13	38	29	
SG89	90	74	05H	-0.58	9		
SG89	90	76	07H	-0.74	8		
SG89	90	78	07H	-0.65	13		
SG89	90	82	02H	0	11		
SG89	90	82	03H	0	11		
SG89	90	82	04H	0	9		
SG89	90	82	05C	0	12		
SG89	90	82	05H	0	15		
SG89	90	82	06C	0	22	16	
SG89	90	82	06H	0	26	22	
SG89	90	82	07C	0	21	13	
SG89	90	82	07H	0	34	31	
SG89	90	84	02H	0	8		
SG89	90	84	04C	0	19		
SG89	90	84	04H	0	16		
SG89	90	84	05C	0	14		
SG89	90	84	05H	0	19		
SG89	90	84	06C	0	21	17	
SG89	90	84	06H	0	35	32	
SG89	90	84	07C	0	31	24	
SG89	90	84	07H	0	37	36	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	90	86	01C	-0.48	11		
SG89	90	86	01H	-0.41	12		
SG89	90	86	03H	-0.43	9		
SG89	90	86	04C	0	17		
SG89	90	86	04H	0.41	8		
SG89	90	86	05H	0	19		
SG89	90	86	06C	0	37	35	
SG89	90	86	06H	0	40	42	1.33
SG89	90	86	07C	0	44	41	1.54
SG89	90	86	07H	0	44	35	
SG89	90	88	01H	0	24	23	
SG89	90	88	02H	0	13		
SG89	90	88	03H	0.45	13		
SG89	90	88	04C	0	21	23	
SG89	90	88	04H	0.39	18		
SG89	90	88	05C	0	21	23	
SG89	90	88	05H	0	36	28	
SG89	90	88	06C	0	38	28	
SG89	90	88	06H	0	44	40	1.6
SG89	90	88	07C	0	48	40	1.59
SG89	90	88	07H	0	54	45	1.53
SG89	90	90	01C	0	21	24	
SG89	90	90	01H	0	20	19	
SG89	90	90	02H	-0.47	14		
SG89	90	90	04C	-0.61	20	23	
SG89	90	90	04H	0	12		
SG89	90	90	05C	0	20	22	
SG89	90	90	05H	0	34	28	
SG89	90	90	06C	0	39	32	
SG89	90	90	06H	0	40	38	1.48
SG89	90	90	07C	0	54	42	1.46
SG89	90	90	07H	0	56	50	1.57
SG89	90	92	02C	0.48	11		
SG89	90	92	02H	0.41	14		
SG89	90	92	03H	0	17		
SG89	90	92	04C	-0.63	17		
SG89	90	92	04H	0	26	18	
SG89	90	92	05C	0	21	16	
SG89	90	92	05H	0	30	22	
SG89	90	92	06C	0.04	32	24	
SG89	90	92	06H	-0.19	42	37	
SG89	90	92	07C	0	50	39	1.38
SG89	90	92	07H	0	50	43	1.55
SG89	91	75	06H	-0.56	12		
SG89	91	77	03H	-0.64	7		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	91	79	05H	-0.64	28	20	
SG89	91	79	07H	-0.68	8		
SG89	91	81	03H	0	9		
SG89	91	81	04C	0	11		
SG89	91	81	04H	0	9		
SG89	91	81	05C	0	10		
SG89	91	81	05H	0	17		
SG89	91	81	06C	0	28	21	
SG89	91	81	06H	0	31	30	
SG89	91	81	07C	0	37	36	
SG89	91	81	07H	0	40	37	
SG89	91	83	02H	0	10		
SG89	91	83	03C	0	9		
SG89	91	83	03H	0	18		
SG89	91	83	04C	0	11		
SG89	91	83	04H	0	16		
SG89	91	83	05C	0	15		
SG89	91	83	05H	0	23	19	
SG89	91	83	06C	0	23	23	
SG89	91	83	06H	0	33	26	
SG89	91	83	07C	0	41	38	1.44
SG89	91	83	07H	0	46	41	1.74
SG89	91	85	01H	0	20	22	
SG89	91	85	03H	0	16		
SG89	91	85	04C	0	24	16	
SG89	91	85	04H	0	21	16	
SG89	91	85	05C	0	24	14	
SG89	91	85	05H	0	29	24	
SG89	91	85	06C	0	35	26	
SG89	91	85	06H	0	42	36	
SG89	91	85	07C	0	50	45	1.57
SG89	91	85	07H	0	53	47	1.39
SG89	91	87	01C	-0.5	11		
SG89	91	87	01H	-0.37	15		
SG89	91	87	02H	0	14		
SG89	91	87	03C	0	10		
SG89	91	87	03H	0	12		
SG89	91	87	04C	0	22	22	
SG89	91	87	04H	0	20	15	
SG89	91	87	05C	0	26	18	
SG89	91	87	05H	0	31	29	
SG89	91	87	06C	0	36	33	
SG89	91	87	06H	0	41	32	
SG89	91	87	07C	0	53	49	1.68
SG89	91	87	07H	0	62	62	1.45

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	91	89	01C	-0.55	12		
SG89	91	89	01H	-0.45	11		
SG89	91	89	02H	0	12		
SG89	91	89	03H	0.37	12		
SG89	91	89	04C	0	22	17	
SG89	91	89	04H	0	12		
SG89	91	89	05C	0	10		
SG89	91	89	05H	0	32	23	
SG89	91	89	06C	0	39	35	
SG89	91	89	06H	0	43	38	1.54
SG89	91	89	07C	0	57	52	1.6
SG89	91	89	07H	0	51	43	1.37
SG89	91	91	01C	-0.59	16		
SG89	91	91	01H	0.11	13		
SG89	91	91	02H	-0.54	12		
SG89	91	91	03C	0	19		
SG89	91	91	04C	0	22	22	
SG89	91	91	04H	0	17		
SG89	91	91	05C	0	21	14	
SG89	91	91	05H	0	34	21	
SG89	91	91	06C	0	41	30	
SG89	91	91	06H	0	44	41	1.44
SG89	91	91	07C	0	53	46	1.42
SG89	91	91	07H	0	56	59	1.45
SG89	91	93	02H	0.41	14		
SG89	91	93	03H	-0.47	11		
SG89	91	93	04C	-0.61	15		
SG89	91	93	05H	0	18		
SG89	91	93	06C	0	18		
SG89	91	93	06H	0	26	18	
SG89	91	93	07C	-0.04	43	37	
SG89	91	93	07H	-0.21	44	36	
SG89	92	78	02H	-0.57	14		
SG89	92	78	07H	-0.65	15	17	
SG89	92	80	02H	-0.57	11		
SG89	92	80	03H	-0.55	12		
SG89	92	80	05H	-0.58	15		
SG89	92	80	06C	0	20	13	
SG89	92	80	06H	-0.59	19		
SG89	92	80	07H	0	26	21	
SG89	92	82	01H	0	12		
SG89	92	82	02C	0	11		
SG89	92	82	02H	0	14		
SG89	92	82	03H	0	10		
SG89	92	82	04C	0	23	18	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	92	82	04H	0	20	18	
SG89	92	82	05C	0	15		
SG89	92	82	05H	0	28	28	
SG89	92	82	06C	0	32	24	
SG89	92	82	06H	0	34	31	
SG89	92	82	07C	0	39	31	
SG89	92	82	07H	0	48	46	1.42
SG89	92	84	02C	0.3	10		
SG89	92	84	04H	0	19		
SG89	92	84	05C	-0.61	14		
SG89	92	84	05H	0	28	26	
SG89	92	84	06C	0	30	25	
SG89	92	84	06H	0	27	19	
SG89	92	84	07C	0	41	42	1.51
SG89	92	84	07H	0	43	40	1.26
SG89	92	86	01C	0	10		
SG89	92	86	01H	0	15		
SG89	92	86	02H	0	12		
SG89	92	86	03C	0	15		
SG89	92	86	03H	0	10		
SG89	92	86	04C	0	21	19	
SG89	92	86	04H	0	16		
SG89	92	86	05C	0	17		
SG89	92	86	05H	0	30	27	
SG89	92	86	06C	0	32	27	
SG89	92	86	06H	0	33	25	
SG89	92	86	07C	0	46	39	1.57
SG89	92	86	07H	0	48	42	1.53
SG89	92	88	01H	0	20	18	
SG89	92	88	02C	0	11		
SG89	92	88	02H	0	15		
SG89	92	88	03C	0	15		
SG89	92	88	03H	0	15		
SG89	92	88	04C	0	21	20	
SG89	92	88	05C	0	15		
SG89	92	88	05H	0	33	27	
SG89	92	88	06C	0	37	33	
SG89	92	88	06H	0	38	32	
SG89	92	88	07C	0	54	49	1.84
SG89	92	88	07H	0	54	49	1.54
SG89	92	90	01C	-0.43	17		
SG89	92	90	02C	0	15		
SG89	92	90	02H	0.36	12		
SG89	92	90	03C	0	21	17	
SG89	92	90	03H	0	10		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	92	90	04C	0	24	22	
SG89	92	90	04H	0	31	28	
SG89	92	90	05C	0	12		
SG89	92	90	05H	0	35	30	
SG89	92	90	06C	0	36	29	
SG89	92	90	06H	0	35	29	
SG89	92	90	07C	0	61	55	1.45
SG89	92	90	07H	0	56	47	1.62
SG89	92	92	01C	-0.59	15		
SG89	92	92	02H	0.36	10		
SG89	92	92	03C	0.5	13		
SG89	92	92	03H	-0.53	21	19	
SG89	92	92	04C	0	26	24	
SG89	92	92	04H	0	19		
SG89	92	92	05H	0	31	24	
SG89	92	92	06C	0	37	25	
SG89	92	92	06H	0	36	29	
SG89	92	92	07C	0	56	51	1.64
SG89	92	92	07H	0	56	47	1.38
SG89	92	94	06C	-0.15	13		
SG89	92	94	07C	0	21	17	
SG89	93	77	05H	-0.56	19		
SG89	93	77	06H	-0.63	14		
SG89	93	77	07H	-0.76	8		
SG89	93	79	05H	-0.58	15		
SG89	93	79	06H	-0.56	13		
SG89	93	79	07H	0	22	15	
SG89	93	81	04C	0	13		
SG89	93	81	04H	0	12		
SG89	93	81	05H	0	21	21	
SG89	93	81	06C	0	24	20	
SG89	93	81	06H	0	26	19	
SG89	93	81	07C	0	40	37	1.46
SG89	93	81	07H	0	32	30	
SG89	93	83	01H	0	15		
SG89	93	83	02H	0	16		
SG89	93	83	03C	0	19		
SG89	93	83	03H	0	22	21	
SG89	93	83	04C	0.45	8		
SG89	93	83	04H	0	15		
SG89	93	83	05C	0	22	16	
SG89	93	83	05H	0	23	20	
SG89	93	83	06C	0	27	16	
SG89	93	83	06H	0	32	30	
SG89	93	83	07C	0	46	41	1.57

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	93	83	07H	0	47	43	1.48
SG89	93	85	01H	-0.47	8		
SG89	93	85	02H	0	17		
SG89	93	85	03C	0	10		
SG89	93	85	03H	0	20	14	
SG89	93	85	04C	0	29	17	
SG89	93	85	04H	0	17		
SG89	93	85	05C	0	20	12	
SG89	93	85	05H	0	32	23	
SG89	93	85	06C	0	39	25	
SG89	93	85	06H	0	41	34	
SG89	93	85	07C	0	49	44	1.58
SG89	93	85	07H	0	52	45	1.43
SG89	93	87	01C	0	11		
SG89	93	87	01H	0	10		
SG89	93	87	02C	0	15		
SG89	93	87	02H	0	21	15	
SG89	93	87	03H	0	23	19	
SG89	93	87	04C	0	26	24	
SG89	93	87	05C	0	23	22	
SG89	93	87	05H	0	33	21	
SG89	93	87	06C	0	37	36	
SG89	93	87	06H	0	42	41	1.68
SG89	93	87	07C	0	58	48	1.64
SG89	93	87	07H	0	53	47	1.37
SG89	93	89	01C	-0.46	19		
SG89	93	89	01H	0	26	24	
SG89	93	89	02C	0	13		
SG89	93	89	02H	0	11		
SG89	93	89	03C	0.28	11		
SG89	93	89	04C	0	29	27	
SG89	93	89	04H	0	33	25	
SG89	93	89	05C	0	22	17	
SG89	93	89	05H	0	33	26	
SG89	93	89	06C	0	38	31	
SG89	93	89	06H	0	41	39	1.7
SG89	93	89	07C	0	53	51	1.53
SG89	93	89	07H	0	62	56	1.56
SG89	93	91	01C	-0.52	15		
SG89	93	91	02H	0	16		
SG89	93	91	03H	0	13		
SG89	93	91	04C	0	23	20	
SG89	93	91	04H	0	27	21	
SG89	93	91	05H	0	32	26	
SG89	93	91	06C	0	38	27	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	93	91	06H	0	41	38	1.6
SG89	93	91	07C	0	59	48	1.56
SG89	93	91	07H	0	58	53	1.49
SG89	93	93	02C	-0.52	10		
SG89	93	93	02H	0.44	11		
SG89	93	93	03H	-0.48	14		
SG89	93	93	04C	-0.5	23	24	
SG89	93	93	04H	-0.53	18		
SG89	93	93	05C	0	20	14	
SG89	93	93	05H	0	27	21	
SG89	93	93	06C	0	30	20	
SG89	93	93	06H	0	29	18	
SG89	93	93	07C	-0.17	43	39	1.51
SG89	93	93	07H	0	43	40	1.95
SG89	94	76	05H	-0.54	10		
SG89	94	78	05H	-0.6	9		
SG89	94	78	06H	0.41	10		
SG89	94	80	04C	-0.59	13		
SG89	94	80	04H	0.43	12		
SG89	94	80	05C	-0.63	20	16	
SG89	94	80	05H	-0.62	18		
SG89	94	80	06C	0	22	20	
SG89	94	80	06H	0	26	24	
SG89	94	80	07C	0	40	40	1.32
SG89	94	80	07H	0	39	38	1.43
SG89	94	82	01C	0	18		
SG89	94	82	01H	0	16		
SG89	94	82	02C	0	17		
SG89	94	82	03C	0	15		
SG89	94	82	03H	0	11		
SG89	94	82	04C	0	17		
SG89	94	82	04H	0	17		
SG89	94	82	05C	0	20	18	
SG89	94	82	05H	0	27	22	
SG89	94	82	06C	0	30	22	
SG89	94	82	06H	0	31	24	
SG89	94	82	07C	0	49	49	1.55
SG89	94	82	07H	0	50	42	1.41
SG89	94	84	01C	-0.48	9		
SG89	94	84	01H	-0.45	13		
SG89	94	84	02H	0.45	13		
SG89	94	84	03C	0.35	9		
SG89	94	84	03H	-0.39	12		
SG89	94	84	04C	0	17		
SG89	94	84	04H	0	17		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	94	84	05C	0	21	12	
SG89	94	84	05H	0	28	26	
SG89	94	84	06C	0	29	23	
SG89	94	84	06H	-0.19	30	23	
SG89	94	84	07C	0	48	42	1.51
SG89	94	84	07H	0	50	44	1.09
SG89	94	86	01H	-0.35	12		
SG89	94	86	02C	0	20	23	
SG89	94	86	02H	0	18		
SG89	94	86	03C	0	12		
SG89	94	86	03H	0	26	19	
SG89	94	86	04C	0	16		
SG89	94	86	04H	0	18		
SG89	94	86	05C	0	22	18	
SG89	94	86	05H	0	27	24	
SG89	94	86	06C	0	38	31	
SG89	94	86	06H	0	40	32	
SG89	94	86	07C	0	59	53	1.71
SG89	94	86	07H	0	58	47	1.4
SG89	94	88	01H	-0.45	8		
SG89	94	88	02H	-0.45	10		
SG89	94	88	03C	0	24	23	
SG89	94	88	04C	0	23	19	
SG89	94	88	04H	0	15		
SG89	94	88	05C	0	32	24	
SG89	94	88	05H	0	35	30	
SG89	94	88	06C	0	39	32	
SG89	94	88	06H	0	42	32	
SG89	94	88	07C	0	58	58	1.49
SG89	94	88	07H	0	65	61	1.44
SG89	94	90	01C	-0.52	18		
SG89	94	90	01H	-0.32	14		
SG89	94	90	02C	0	15		
SG89	94	90	03C	0	19		
SG89	94	90	03H	0.41	12		
SG89	94	90	04C	0	26	22	
SG89	94	90	04H	0	28	22	
SG89	94	90	05C	0	19		
SG89	94	90	05H	0	28	20	
SG89	94	90	06C	0	38	27	
SG89	94	90	06H	0	43	36	
SG89	94	90	07C	0	53	41	1.4
SG89	94	90	07H	0	56	57	1.4
SG89	94	92	01C	-0.63	18		
SG89	94	92	03C	0.48	13		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	94	92	03H	0.45	12		
SG89	94	92	04C	0	22	21	
SG89	94	92	04H	0	22	20	
SG89	94	92	05H	0	30	22	
SG89	94	92	06C	-0.15	36	26	
SG89	94	92	06H	0	35	27	
SG89	94	92	07C	0	48	42	1.48
SG89	94	92	07H	0	47	41	1.93
SG89	95	77	05H	-0.64	13		
SG89	95	79	06H	0	15		
SG89	95	79	07C	0	21	18	
SG89	95	79	07H	0	29	25	
SG89	95	81	02H	0	13		
SG89	95	81	03H	0	11		
SG89	95	81	04C	0	19		
SG89	95	81	04H	0	17		
SG89	95	81	05C	0	18		
SG89	95	81	05H	0	24	19	
SG89	95	81	06C	0	21	16	
SG89	95	81	06H	0	32	29	
SG89	95	81	07C	0	41	41	1.46
SG89	95	81	07H	0	44	40	1.31
SG89	95	83	01H	0	17		
SG89	95	83	03H	0	19		
SG89	95	83	04C	0	16		
SG89	95	83	04H	0	21	14	
SG89	95	83	05C	0	15		
SG89	95	83	05H	0	26	23	
SG89	95	83	06C	0	29	17	
SG89	95	83	06H	0	35	25	
SG89	95	83	07C	0	41	41	1.52
SG89	95	83	07H	0	45	41	1.49
SG89	95	85	02C	0.3	7		
SG89	95	85	03C	0.44	11		
SG89	95	85	04C	0	14		
SG89	95	85	04H	0	11		
SG89	95	85	05C	0	16		
SG89	95	85	05H	0	22	22	
SG89	95	85	06C	0	24	21	
SG89	95	85	06H	0	29	21	
SG89	95	85	07C	0	26	21	
SG89	95	85	07H	0	46	42	1.52
SG89	95	87	01C	-0.5	9		
SG89	95	87	01H	-0.48	19		
SG89	95	87	02C	-0.59	7		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	95	87	02H	0.43	13		
SG89	95	87	03C	0	19		
SG89	95	87	03H	-0.52	14		
SG89	95	87	04C	0	23	18	
SG89	95	87	04H	-0.56	19		
SG89	95	87	05C	0	23	24	
SG89	95	87	05H	0	21	22	
SG89	95	87	06C	0	38	34	
SG89	95	87	06H	0	38	30	
SG89	95	87	07C	0	57	52	1.63
SG89	95	87	07H	0	52	42	1.48
SG89	95	89	01C	-0.5	14		
SG89	95	89	01H	0	27	27	
SG89	95	89	02C	0.35	10		
SG89	95	89	02H	0	17		
SG89	95	89	03C	0	13		
SG89	95	89	03H	0	14		
SG89	95	89	04C	0	32	33	
SG89	95	89	04H	0	13		
SG89	95	89	05C	0	14		
SG89	95	89	05H	0	34	25	
SG89	95	89	06C	0	41	33	
SG89	95	89	06H	0	42	35	
SG89	95	89	07C	0	73	68	1.48
SG89	95	89	07H	0	76	71	1.82
SG89	95	91	01C	-0.57	17		
SG89	95	91	01H	-0.45	11		
SG89	95	91	02C	-0.55	16		
SG89	95	91	02H	-0.09	11		
SG89	95	91	03H	0	10		
SG89	95	91	04C	0	23	15	
SG89	95	91	04H	-0.56	20	21	
SG89	95	91	05C	0	17		
SG89	95	91	05H	0	31	28	
SG89	95	91	06C	0	37	28	
SG89	95	91	06H	0	34	25	
SG89	95	91	07C	0	64	60	1.53
SG89	95	91	07H	0	69	64	1.64
SG89	95	93	04C	-0.63	14		
SG89	95	93	05H	0	17		
SG89	95	93	06C	-0.09	12		
SG89	95	93	06H	0	22	17	
SG89	95	93	07C	0	43	38	1.45
SG89	95	93	07H	0	42	35	
SG89	96	78	05H	-0.54	16		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	96	78	06H	0	21	15	
SG89	96	78	07H	0	29	23	
SG89	96	80	04C	-0.52	18		
SG89	96	80	04H	0	14		
SG89	96	80	05C	0	18		
SG89	96	80	05H	0	24	22	
SG89	96	80	06C	0	26	21	
SG89	96	80	06H	0	32	23	
SG89	96	80	07C	0	34	27	
SG89	96	80	07H	0	41	36	
SG89	96	82	01H	0	14		
SG89	96	82	02H	0	11		
SG89	96	82	04C	0	19		
SG89	96	82	05C	0	19		
SG89	96	82	05H	0	21	19	
SG89	96	82	06C	0	20	19	
SG89	96	82	06H	0	22	15	
SG89	96	82	07C	0	41	39	1.49
SG89	96	82	07H	0	41	39	1.32
SG89	96	84	01H	-0.51	23	21	
SG89	96	84	02H	0	22	15	
SG89	96	84	03C	0.46	10		
SG89	96	84	03H	0	20	16	
SG89	96	84	04C	0	26	23	
SG89	96	84	05C	0	27	21	
SG89	96	84	05H	-0.62	22	21	
SG89	96	84	06C	0	37	22	
SG89	96	84	06H	0	36	35	
SG89	96	84	07C	0	52	48	1.56
SG89	96	84	07H	0	54	47	1.53
SG89	96	86	01H	0	18		
SG89	96	86	02C	0	12		
SG89	96	86	02H	0	15		
SG89	96	86	03C	0	11		
SG89	96	86	03H	0	20	21	
SG89	96	86	04C	0	28	25	
SG89	96	86	04H	0	23	20	
SG89	96	86	05C	0	27	24	
SG89	96	86	05H	0	28	22	
SG89	96	86	06C	0	34	40	1.46
SG89	96	86	06H	0	40	33	
SG89	96	86	07C	0	60	58	1.76
SG89	96	86	07H	0	62	60	1.36
SG89	96	88	01C	0	18		
SG89	96	88	01H	0	24	22	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	96	88	02C	0	23	20	
SG89	96	88	02H	0	12		
SG89	96	88	03C	0	20	18	
SG89	96	88	03H	-0.02	20	17	
SG89	96	88	04C	0	29	24	
SG89	96	88	04H	0	21	16	
SG89	96	88	05C	0	29	23	
SG89	96	88	05H	0	37	28	
SG89	96	88	06C	0	39	30	
SG89	96	88	06H	0	39	35	
SG89	96	88	07C	0	62	60	1.55
SG89	96	88	07H	0	64	59	1.4
SG89	96	90	01C	-0.56	13		
SG89	96	90	01H	-0.43	21	19	
SG89	96	90	02H	0	26	19	
SG89	96	90	03C	0	22	17	
SG89	96	90	03H	0	19		
SG89	96	90	04C	0	31	29	
SG89	96	90	04H	0	27	23	
SG89	96	90	05C	0	15		
SG89	96	90	05H	0	34	30	
SG89	96	90	06C	0	38	32	
SG89	96	90	06H	0	37	35	
SG89	96	90	07C	0	64	57	1.46
SG89	96	90	07H	0	69	67	1.59
SG89	96	92	02H	0	18		
SG89	96	92	03C	0.46	17		
SG89	96	92	03H	0	11		
SG89	96	92	04C	-0.09	18		
SG89	96	92	04H	0.43	11		
SG89	96	92	05C	-0.07	24	17	
SG89	96	92	05H	-0.56	23	19	
SG89	96	92	06C	0	32	23	
SG89	96	92	06H	0	29	19	
SG89	96	92	07C	-0.17	42	40	1.48
SG89	96	92	07H	0	36	32	
SG89	97	77	05C	0	15		
SG89	97	77	05H	-0.56	10		
SG89	97	77	06C	0	26	20	
SG89	97	77	06H	0	19		
SG89	97	77	07C	0	24	21	
SG89	97	77	07H	-0.19	28	18	
SG89	97	79	04C	-0.61	11		
SG89	97	79	04H	0	13		
SG89	97	79	05C	-0.65	14		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	97	79	05H	-0.6	22	19	
SG89	97	79	06C	0	20	13	
SG89	97	79	06H	0	30	21	
SG89	97	79	07C	0	38	37	
SG89	97	79	07H	0	36	26	
SG89	97	81	01H	0	12		
SG89	97	81	02H	0	14		
SG89	97	81	03C	0	15		
SG89	97	81	03H	0	12		
SG89	97	81	04C	0	18		
SG89	97	81	04H	0	19		
SG89	97	81	05C	0	17		
SG89	97	81	05H	0	25	23	
SG89	97	81	06C	0	39	33	
SG89	97	81	06H	0	35	28	
SG89	97	81	07C	0	39	34	
SG89	97	81	07H	0	47	38	1.41
SG89	97	83	01C	0	15		
SG89	97	83	01H	0	13		
SG89	97	83	02C	0	12		
SG89	97	83	02H	0	15		
SG89	97	83	03C	0	15		
SG89	97	83	03H	0	15		
SG89	97	83	04C	0	20	14	
SG89	97	83	04H	0	17		
SG89	97	83	05C	0	26	24	
SG89	97	83	05H	0	23	20	
SG89	97	83	06C	0	38	24	
SG89	97	83	06H	0	35	33	
SG89	97	83	07C	0	40	42	1.53
SG89	97	83	07H	0	45	40	1.76
SG89	97	85	01H	0	15		
SG89	97	85	02C	0	10		
SG89	97	85	02H	0	14		
SG89	97	85	03C	0	19		
SG89	97	85	03H	0	25	20	
SG89	97	85	04C	0	28	24	
SG89	97	85	04H	0	23	18	
SG89	97	85	05C	0	24	17	
SG89	97	85	05H	0	34	34	
SG89	97	85	06C	0	43	38	1.45
SG89	97	85	06H	0	42	37	
SG89	97	85	07C	0	53	47	1.57
SG89	97	85	07H	0	60	52	1.47
SG89	97	87	01H	0	23	22	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	97	87	02C	0	24	26	
SG89	97	87	02H	0	14		
SG89	97	87	03C	0	17		
SG89	97	87	03H	0	22	23	
SG89	97	87	04C	0	26	28	
SG89	97	87	04H	0	20	17	
SG89	97	87	05C	0	23	20	
SG89	97	87	05H	0	29	23	
SG89	97	87	06C	0	43	39	1.47
SG89	97	87	06H	0	43	38	1.68
SG89	97	87	07C	0	62	55	1.57
SG89	97	87	07H	0	61	59	1.74
SG89	97	89	01C	-0.5	11		
SG89	97	89	01H	0	21	20	
SG89	97	89	02C	0	23	21	
SG89	97	89	02H	0	35	28	
SG89	97	89	03C	0.37	8		
SG89	97	89	03H	0	26	26	
SG89	97	89	04C	0	30	30	
SG89	97	89	04H	0	29	22	
SG89	97	89	05C	0	31	25	
SG89	97	89	05H	0	36	34	
SG89	97	89	06C	0	41	35	
SG89	97	89	06H	0	45	46	1.45
SG89	97	89	07C	0	75	73	1.68
SG89	97	89	07H	0	70	65	1.68
SG89	97	91	01H	-0.44	20	19	
SG89	97	91	02C	0	15		
SG89	97	91	03C	0	14		
SG89	97	91	03H	0	17		
SG89	97	91	04C	0	27	29	
SG89	97	91	04H	0	29	27	
SG89	97	91	05C	0	23	19	
SG89	97	91	05H	0	24	19	
SG89	97	91	06C	0	30	29	
SG89	97	91	06H	0	36	32	
SG89	97	91	07C	0	66	57	1.48
SG89	97	91	07H	0	63	60	1.5
SG89	97	93	05H	0	12		
SG89	97	93	06H	-0.06	20	17	
SG89	97	93	07H	0	28	21	
SG89	98	78	03C	0.28	7		
SG89	98	78	04C	-0.6	10		
SG89	98	78	05C	-0.54	8		
SG89	98	78	05H	-0.56	15		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	98	78	06C	0.37	14		
SG89	98	78	06H	0	24	16	
SG89	98	78	07C	0	34	32	
SG89	98	78	07H	0	39	34	
SG89	98	80	02C	0	11		
SG89	98	80	02H	0.43	12		
SG89	98	80	03C	0	16		
SG89	98	80	04C	0	21	22	
SG89	98	80	04H	0.45	10		
SG89	98	80	05C	0	18		
SG89	98	80	05H	-0.64	29	25	
SG89	98	80	06C	0	38	22	
SG89	98	80	06H	0	40	39	1.45
SG89	98	80	07C	0	49	42	1.49
SG89	98	80	07H	0	54	47	1.49
SG89	98	82	01H	0	25	24	
SG89	98	82	02H	0	9		
SG89	98	82	03C	0	10		
SG89	98	82	03H	0	15		
SG89	98	82	04C	0	16		
SG89	98	82	05C	0	19		
SG89	98	82	05H	0	20	16	
SG89	98	82	06C	0	32	20	
SG89	98	82	06H	0	30	25	
SG89	98	82	07C	0	39	35	
SG89	98	82	07H	0	36	30	
SG89	98	84	01H	-0.5	15		
SG89	98	84	03C	0.33	18		
SG89	98	84	03H	0	8		
SG89	98	84	04C	0	21	19	
SG89	98	84	05C	0	16		
SG89	98	84	05H	0	25	25	
SG89	98	84	06C	0	35	27	
SG89	98	84	06H	0	37	33	
SG89	98	84	07C	0	51	47	1.51
SG89	98	84	07H	0	51	46	1.4
SG89	98	86	01C	-0.48	12		
SG89	98	86	01H	0	16		
SG89	98	86	02H	0	15		
SG89	98	86	03C	0	13		
SG89	98	86	03H	0	20	23	
SG89	98	86	04C	0	25	28	
SG89	98	86	04H	0	17		
SG89	98	86	05C	0	21	19	
SG89	98	86	05H	0	28	22	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	98	86	06C	0	41	32	
SG89	98	86	06H	0	45	41	1.53
SG89	98	86	07C	0	51	48	1.59
SG89	98	86	07H	0	68	60	1.2
SG89	98	88	01C	-0.48	19		
SG89	98	88	01H	0	21	20	
SG89	98	88	02C	-0.57	7		
SG89	98	88	02H	0	18		
SG89	98	88	03C	0	30	26	
SG89	98	88	03H	0	22	17	
SG89	98	88	04C	0	29	26	
SG89	98	88	04H	0	22	14	
SG89	98	88	05C	0	39	30	
SG89	98	88	05H	0	32	28	
SG89	98	88	06C	0	43	32	
SG89	98	88	06H	0	48	46	1.77
SG89	98	88	07C	0	64	61	1.57
SG89	98	88	07H	0	76	63	1.63
SG89	98	90	01H	-0.45	21	22	
SG89	98	90	02C	0	18		
SG89	98	90	02H	0	21	18	
SG89	98	90	03C	0	19		
SG89	98	90	03H	0	18		
SG89	98	90	04C	0	32	24	
SG89	98	90	04H	0	9		
SG89	98	90	05C	0	17		
SG89	98	90	05H	0	40	36	
SG89	98	90	06C	0	40	37	
SG89	98	90	06H	0	45	41	1.54
SG89	98	90	07C	0	59	49	1.45
SG89	98	90	07H	0	69	60	1.51
SG89	98	92	02H	-0.47	15		
SG89	98	92	03H	-0.49	14		
SG89	98	92	04C	-0.56	16		
SG89	98	92	04H	0.5	18		
SG89	98	92	05H	0	28	19	
SG89	98	92	06C	0	30	22	
SG89	98	92	06H	0	34	23	
SG89	98	92	07C	0	55	48	1.49
SG89	98	92	07H	0	53	44	1.2
SG89	99	77	03H	-0.55	8		
SG89	99	77	04C	0	8		
SG89	99	77	05C	0	9		
SG89	99	77	05H	0	10		
SG89	99	77	06C	0	19		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	99	77	06H	0	14		
SG89	99	77	07C	0	27	16	
SG89	99	77	07H	0	33	27	
SG89	99	79	04C	-0.6	15		
SG89	99	79	05C	0.39	15		
SG89	99	79	05H	-0.58	19		
SG89	99	79	06C	0	25	17	
SG89	99	79	06H	0	29	21	
SG89	99	79	07C	0	36	33	
SG89	99	79	07H	0	34	24	
SG89	99	81	01H	0	21	22	
SG89	99	81	02H	0	10		
SG89	99	81	03H	0	15		
SG89	99	81	04C	0	23	22	
SG89	99	81	04H	0	16		
SG89	99	81	05C	0	17		
SG89	99	81	05H	0	27	25	
SG89	99	81	06C	0	32	22	
SG89	99	81	06H	0	35	33	
SG89	99	81	07C	0	38	36	
SG89	99	81	07H	0	46	39	1.29
SG89	99	83	01H	0	15		
SG89	99	83	02C	0	18		
SG89	99	83	02H	0	13		
SG89	99	83	04C	0	21	18	
SG89	99	83	04H	0	17		
SG89	99	83	05C	0	21	17	
SG89	99	83	05H	0	23	17	
SG89	99	83	06C	0	37	24	
SG89	99	83	06H	0	32	25	
SG89	99	83	07C	0	41	40	1.5
SG89	99	83	07H	0	47	39	1.41
SG89	99	85	01H	-0.45	7		
SG89	99	85	02C	0	11		
SG89	99	85	02H	0	17		
SG89	99	85	03C	0	20	22	
SG89	99	85	04C	0	22	23	
SG89	99	85	04H	0	20	17	
SG89	99	85	05C	0	16		
SG89	99	85	05H	0	31	28	
SG89	99	85	06C	0	39	25	
SG89	99	85	06H	0	43	38	1.48
SG89	99	85	07C	0	45	40	1.56
SG89	99	85	07H	0	51	45	1.6
SG89	99	87	01H	-0.45	19		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	99	87	02C	0	24	25	
SG89	99	87	02H	0	17		
SG89	99	87	03C	0	13		
SG89	99	87	03H	-0.47	12		
SG89	99	87	04C	0	17		
SG89	99	87	04H	0	21	20	
SG89	99	87	05C	0	28	24	
SG89	99	87	05H	0	27	21	
SG89	99	87	06C	0	43	40	1.47
SG89	99	87	06H	0	43	43	1.62
SG89	99	87	07C	0	56	47	1.54
SG89	99	87	07H	0	53	51	1.43
SG89	99	89	01C	0	19		
SG89	99	89	01H	-0.39	27	29	
SG89	99	89	02C	0	19		
SG89	99	89	02H	0	13		
SG89	99	89	03C	0	21	20	
SG89	99	89	03H	0	25	18	
SG89	99	89	04C	0	36	36	
SG89	99	89	04H	0	35	24	
SG89	99	89	05C	0	35	23	
SG89	99	89	05H	0	41	37	
SG89	99	89	06C	0	44	38	1.48
SG89	99	89	06H	0	42	44	1.71
SG89	99	89	07C	0	79	72	1.63
SG89	99	89	07H	0	78	72	1.74
SG89	99	91	01C	-0.5	15		
SG89	99	91	02H	0	22	20	
SG89	99	91	03C	0	18		
SG89	99	91	03H	0	21	17	
SG89	99	91	04C	0	26	22	
SG89	99	91	04H	0	19		
SG89	99	91	05C	0	24	17	
SG89	99	91	05H	0	27	19	
SG89	99	91	06C	0	36	30	
SG89	99	91	06H	0	37	35	
SG89	99	91	07C	0	68	62	1.57
SG89	99	91	07H	0	68	68	1.54
SG89	100	78	04C	-0.52	16		
SG89	100	78	06C	0	26	18	
SG89	100	78	06H	-0.09	23	14	
SG89	100	78	07C	0	31	23	
SG89	100	78	07H	0	40	33	
SG89	100	80	03C	0	18		
SG89	100	80	04C	0	25	24	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	100	80	05C	0	23	11	
SG89	100	80	05H	-0.6	32	28	
SG89	100	80	06C	0	32	18	
SG89	100	80	06H	0	33	29	
SG89	100	80	07C	0	40	34	
SG89	100	80	07H	0	43	40	1.33
SG89	100	82	02H	0	11		
SG89	100	82	03H	0	9		
SG89	100	82	04C	0	21	20	
SG89	100	82	04H	0	15		
SG89	100	82	05C	0	16		
SG89	100	82	05H	0	19		
SG89	100	82	06C	0	33	20	
SG89	100	82	06H	0	31	29	
SG89	100	82	07C	0	36	33	
SG89	100	82	07H	0	41	39	1.27
SG89	100	84	01H	0	25	23	
SG89	100	84	03C	0	21	22	
SG89	100	84	03H	0	22	15	
SG89	100	84	04C	0	22	19	
SG89	100	84	04H	0	28	21	
SG89	100	84	05C	0	17		
SG89	100	84	05H	0	26	25	
SG89	100	84	06C	0	37	27	
SG89	100	84	06H	0	36	30	
SG89	100	84	07C	0	51	46	1.6
SG89	100	84	07H	0	48	43	1.48
SG89	100	86	01H	0	22	22	
SG89	100	86	02C	0	13		
SG89	100	86	02H	0	10		
SG89	100	86	03C	0	20	17	
SG89	100	86	04C	0	24	23	
SG89	100	86	04H	0	26	19	
SG89	100	86	05C	0	22	19	
SG89	100	86	05H	0	28	28	
SG89	100	86	06C	0	39	36	
SG89	100	86	06H	0	41	40	1.42
SG89	100	86	07C	0	46	43	1.51
SG89	100	86	07H	0	54	48	1.32
SG89	100	88	01H	0	23	21	
SG89	100	88	02C	0	26	27	
SG89	100	88	02H	0	14		
SG89	100	88	03C	0	18		
SG89	100	88	03H	0	17		
SG89	100	88	04C	0	32	33	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	100	88	05C	0	25	19	
SG89	100	88	05H	0	37	33	
SG89	100	88	06C	0	40	28	
SG89	100	88	06H	0	50	49	1.71
SG89	100	88	07C	0	54	51	1.62
SG89	100	88	07H	0	74	67	1.67
SG89	100	90	02C	0.37	14		
SG89	100	90	02H	0	25	21	
SG89	100	90	03C	0	25	23	
SG89	100	90	03H	0	16		
SG89	100	90	04C	0	25	26	
SG89	100	90	04H	0	16		
SG89	100	90	05C	0	25	21	
SG89	100	90	05H	0	32	25	
SG89	100	90	06C	0	41	36	
SG89	100	90	06H	0	37	32	
SG89	100	90	07C	0	61	61	1.45
SG89	100	90	07H	0	71	65	1.58
SG89	100	92	04C	-0.61	11		
SG89	100	92	04H	0.48	14		
SG89	100	92	05C	0	10		
SG89	100	92	05H	-0.5	19		
SG89	100	92	06C	0	20	13	
SG89	100	92	06H	-0.17	25	21	
SG89	100	92	07C	-0.15	42	42	1.43
SG89	100	92	07H	0	38	37	
SG89	100	94	06C	0.37	11		
SG89	101	77	05C	0	16		
SG89	101	77	05H	-0.64	15		
SG89	101	77	06C	-0.15	17		
SG89	101	77	06H	0	22	15	
SG89	101	77	07C	0	26	26	
SG89	101	77	07H	0	32	26	
SG89	101	79	03H	-0.47	14		
SG89	101	79	04C	-0.56	15		
SG89	101	79	05H	-0.58	19		
SG89	101	79	06C	0	26	17	
SG89	101	79	06H	0	25	19	
SG89	101	79	07C	0	30	25	
SG89	101	79	07H	0	37	27	
SG89	101	81	03H	0	11		
SG89	101	81	04C	0	15		
SG89	101	81	05C	0	18		
SG89	101	81	05H	0	21	21	
SG89	101	81	06C	0	27	19	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	101	81	06H	0	24	16	
SG89	101	81	07C	0	31	38	1.3
SG89	101	81	07H	0	31	18	
SG89	101	83	02H	0	11		
SG89	101	83	03C	0	21	19	
SG89	101	83	04C	0	20	15	
SG89	101	83	04H	0	9		
SG89	101	83	05C	0	15		
SG89	101	83	05H	0	20	15	
SG89	101	83	06C	0	36	21	
SG89	101	83	06H	0	33	31	
SG89	101	83	07C	0	41	38	1.5
SG89	101	83	07H	0	42	39	1.33
SG89	101	85	01H	0	22	22	
SG89	101	85	03C	0	16		
SG89	101	85	03H	0	18		
SG89	101	85	04C	0	18		
SG89	101	85	05C	0	22	18	
SG89	101	85	05H	0	24	23	
SG89	101	85	06C	0	33	27	
SG89	101	85	06H	0	34	32	
SG89	101	85	07C	-0.13	42	39	1.59
SG89	101	85	07H	0	44	40	1.55
SG89	101	87	01H	0	13		
SG89	101	87	03C	0	14		
SG89	101	87	03H	0	24	24	
SG89	101	87	04C	0	23	25	
SG89	101	87	04H	0	20	13	
SG89	101	87	05C	0	26	27	
SG89	101	87	05H	0	33	30	
SG89	101	87	06C	0	34	28	
SG89	101	87	06H	0	32	27	
SG89	101	87	07C	0	52	51	1.49
SG89	101	87	07H	0	57	50	1.51
SG89	101	89	01C	-0.5	11		
SG89	101	89	02H	0	20	17	
SG89	101	89	03H	-0.51	14		
SG89	101	89	04C	0	26	30	
SG89	101	89	05C	0	21	15	
SG89	101	89	05H	0	34	28	
SG89	101	89	06C	0	37	33	
SG89	101	89	06H	0	36	27	
SG89	101	89	07C	0	68	67	1.49
SG89	101	89	07H	0	56	54	1.69
SG89	101	91	04C	-0.63	16		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	101	91	04H	0	17		
SG89	101	91	05C	0	11		
SG89	101	91	05H	0	16		
SG89	101	91	06C	0	19		
SG89	101	91	06H	0	23	19	
SG89	101	91	07C	0	36	36	
SG89	101	91	07H	0	45	44	1.53
SG89	102	76	07H	-0.74	9	5	
SG89	102	78	01H	-0.53	14		
SG89	102	78	03H	0.49	8		
SG89	102	78	04C	-0.56	13		
SG89	102	78	04H	0	10		
SG89	102	78	05C	-0.48	10		
SG89	102	78	05H	-0.58	19		
SG89	102	78	06C	0	25	19	
SG89	102	78	06H	0	28	20	
SG89	102	78	07C	0	38	32	
SG89	102	78	07H	0	39	30	
SG89	102	80	03C	0.56	9		
SG89	102	80	04C	-0.5	12		
SG89	102	80	04H	0.3	10		
SG89	102	80	05C	0.43	19		
SG89	102	80	05H	-0.54	21	23	
SG89	102	80	06C	0	36	21	
SG89	102	80	06H	0	30	30	
SG89	102	80	07C	0	40	32	
SG89	102	80	07H	0	39	31	
SG89	102	82	04C	0	16		
SG89	102	82	05C	0	10		
SG89	102	82	05H	0	23	22	
SG89	102	82	06C	0	24	19	
SG89	102	82	06H	0	28	23	
SG89	102	82	07C	0	34	28	
SG89	102	82	07H	0	35	32	
SG89	102	84	01H	-0.43	7		
SG89	102	84	02H	0.47	8		
SG89	102	84	03C	0.37	10		
SG89	102	84	03H	0.34	9		
SG89	102	84	04C	-0.5	19		
SG89	102	84	04H	0	17		
SG89	102	84	05C	0	16		
SG89	102	84	05H	-0.56	20	21	
SG89	102	84	06C	0	32	18	
SG89	102	84	06H	0	40	33	
SG89	102	84	07C	0	40	32	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	102	84	07H	0	43	42	1.39
SG89	102	86	02H	0	10		
SG89	102	86	03C	0	8		
SG89	102	86	04C	0	19		
SG89	102	86	05C	0	15		
SG89	102	86	05H	-0.63	20	22	
SG89	102	86	06C	0	33	26	
SG89	102	86	06H	0	28	26	
SG89	102	86	07C	0	38	30	
SG89	102	86	07H	0	41	41	1.5
SG89	102	88	03C	0.44	9		
SG89	102	88	04C	-0.52	16		
SG89	102	88	05C	-0.54	10		
SG89	102	88	05H	0	27	27	
SG89	102	88	06C	0	35	35	
SG89	102	88	06H	0	39	35	
SG89	102	88	07C	0	43	42	1.38
SG89	102	88	07H	0	41	40	1.35
SG89	102-	90	04C	-0.63	10		
SG89	102	90	04H	0.37	11		
SG89	102	90	05C	-0.57	11		
SG89	102	90	05H	-0.52	19		
SG89	102	90	06C	0	18		
SG89	102	90	06H	0	21	18	
SG89	102	90	07C	0	41	34	
SG89	102	90	07H	0	45	41	1.49
SG89	103	77	04C	-0.52	12		
SG89	103	77	05H	-0.6	12		
SG89	103	77	06C	0	17		
SG89	103	77	06H	0	20	15	
SG89	103	77	07C	0	26	26	
SG89	103	77	07H	0	31	26	
SG89	103	79	01H	-0.45	13		
SG89	103	79	04H	-0.58	11		
SG89	103	79	05C	-0.58	9		
SG89	103	79	05H	-0.58	17		
SG89	103	79	06C	0	18		
SG89	103	79	06H	0	19		
SG89	103	79	07C	0	22	21	
SG89	103	79	07H	0	37	26	
SG89	103	81	01H	0	11		
SG89	103	81	03H	0	10		
SG89	103	81	04C	0	15		
SG89	103	81	05C	0	12		
SG89	103	81	05H	0	15		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	103	81	06C	0	27	18	
SG89	103	81	06H	0	24	19	
SG89	103	81	07C	0	30	27	
SG89	103	81	07H	0	35	27	
SG89	103	83	02H	0	16		
SG89	103	83	03C	0	13		
SG89	103	83	03H	0	18		
SG89	103	83	04C	0	17		
SG89	103	83	04H	0	11		
SG89	103	83	05C	0	18		
SG89	103	83	05H	0	18		
SG89	103	83	06C	0	33	26	
SG89	103	83	06H	0	29	21	
SG89	103	83	07C	0	39	39	1.44
SG89	103	83	07H	0	33	25	
SG89	103	85	03H	0.37	9		
SG89	103	85	04C	0	17		
SG89	103	85	04H	-0.56	12		
SG89	103	85	05C	0	20	18	
SG89	103	85	05H	-0.5	24	24	
SG89	103	85	06C	0	36	24	
SG89	103	85	06H	-0.02	30	29	
SG89	103	85	07C	0	45	40	1.51
SG89	103	85	07H	0	46	40	1.47
SG89	103	87	02H	0	7		
SG89	103	87	03C	0.48	7		
SG89	103	87	03H	-0.56	11		
SG89	103	87	04C	0	11		
SG89	103	87	04H	0	9		
SG89	103	87	05H	0	20	21	
SG89	103	87	06C	0	29	25	
SG89	103	87	06H	0	28	27	
SG89	103	87	07C	0	37	30	
SG89	103	87	07H	0	36	33	
SG89	103	89	04C	-0.59	8		
SG89	103	89	05H	-0.58	15		
SG89	103	89	06C	0	18		
SG89	103	89	06H	0	18		
SG89	103	89	07C	0	27	26	
SG89	103	89	07H	0	28	21	
SG89	103	91	06H	-0.09	11		
SG89	103	91	07C	-0.63	10	9	
SG89	104	78	04H	0	15		
SG89	104	78	05C	0	17		
SG89	104	78	05H	0	17		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	104	78	06C	0	27	17	
SG89	104	78	06H	0	32	25	
SG89	104	78	07C	0	37	31	
SG89	104	78	07H	0	38	30	
SG89	104	80	04C	-0.52	14		
SG89	104	80	05C	0	19		
SG89	104	80	05H	0	24	22	
SG89	104	80	06C	0	29	16	
SG89	104	80	06H	0	27	20	
SG89	104	80	07C	0	37	39	1.41
SG89	104	80	07H	0	38	30	
SG89	104	82	05C	0	9		
SG89	104	82	05H	0	19		
SG89	104	82	06C	0	12		
SG89	104	82	06H	0	18		
SG89	104	82	07C	0	25	20	
SG89	104	82	07H	0	32	32	
SG89	104	84	04C	-0.61	15		
SG89	104	84	05C	0	16		
SG89	104	84	05H	0	23	16	
SG89	104	84	06C	0	26	16	
SG89	104	84	06H	0	31	25	
SG89	104	84	07C	0	34	31	
SG89	104	84	07H	0	33	27	
SG89	104	86	02C	0	12		
SG89	104	86	02H	0	14		
SG89	104	86	03H	0	16		
SG89	104	86	04C	0	16		
SG89	104	86	05C	0	19		
SG89	104	86	05H	0	19		
SG89	104	86	06C	0	31	17	
SG89	104	86	06H	0	27	27	
SG89	104	86	07C	0	38	37	
SG89	104	86	07H	0	43	39	1.42
SG89	104	88	03H	-0.54	9		
SG89	104	88	04C	0	12		
SG89	104	88	05C	0	13		
SG89	104	88	05H	0	14		
SG89	104	88	06C	0	15		
SG89	104	88	06H	0	31	20	
SG89	104	88	07C	0	12	13	
SG89	104	88	07H	0	30	25	
SG89	104	90	05H	-0.54	13		
SG89	104	90	06H	0	11		
SG89	104	90	07C	-0.56	13	14	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	104	90	07H	-0.56	11	8	
SG89	105	77	04H	0	13		
SG89	105	77	05H	0	11		
SG89	105	77	06C	0	15		
SG89	105	77	06H	0	26	20	
SG89	105	77	07C	-0.13	23	24	
SG89	105	77	07H	-0.15	36	30	
SG89	105	79	01H	-0.51	11		
SG89	105	79	02H	0.53	10		
SG89	105	79	03C	0.48	11		
SG89	105	79	04C	-0.54	15		
SG89	105	79	04H	0	15		
SG89	105	79	05C	0	13		
SG89	105	79	05H	-0.6	18		
SG89	105	79	06C	0	30	20	
SG89	105	79	06H	0	34	28	
SG89	105	79	07C	0	38	40	1.39
SG89	105	79	07H	0	43	38	1.38
SG89	105	81	04C	0	14		
SG89	105	81	05C	0	14		
SG89	105	81	05H	0	17		
SG89	105	81	06C	0	23	17	
SG89	105	81	06H	0	26	19	
SG89	105	81	07C	0	31	28	
SG89	105	81	07H	0	32	22	
SG89	105	83	03H	0	12		
SG89	105	83	04C	0	13		
SG89	105	83	05C	0	19		
SG89	105	83	05H	0	21	19	
SG89	105	83	06C	0	30	22	
SG89	105	83	06H	0	23	17	
SG89	105	83	07C	0	36	35	
SG89	105	83	07H	0	31	23	
SG89	105	85	04C	0	18		
SG89	105	85	05C	0	16		
SG89	105	85	05H	0	21	19	
SG89	105	85	06C	0	31	23	
SG89	105	85	06H	0	30	29	
SG89	105	85	07C	0	41	39	1.36
SG89	105	85	07H	0	44	41	1.68
SG89	105	87	04C	0	11		
SG89	105	87	05C	0	12		
SG89	105	87	05H	0	16		
SG89	105	87	06C	0	10		
SG89	105	87	06H	0	22	20	

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	105	87	07C	0	37	38	1.54
SG89	105	87	07H	0	34	30	
SG89	105	89	07H	-0.63	14	9	
SG89	106	78	04C	-0.52	8		
SG89	106	78	05C	-0.54	11		
SG89	106	78	05H	-0.62	9		
SG89	106	78	06H	0	18		
SG89	106	78	07C	0	25	22	
SG89	106	78	07H	0	25	19	
SG89	106	80	03C	0.37	9		
SG89	106	80	04C	-0.59	8		
SG89	106	80	05C	0	14		
SG89	106	80	05H	0	11		
SG89	106	80	06C	0	15		
SG89	106	80	06H	-0.65	22	22	
SG89	106	80	07C	0	28	27	
SG89	106	80	07H	0	35	29	
SG89	106	82	04C	0	9		
SG89	106	82	05H	0	10		
SG89	106	82	06C	0	9		
SG89	106	82	06H	0	17		
SG89	106	82	07C	0	21	20	
SG89	106	82	07H	0	25	22	
SG89	106	84	04C	0	12		
SG89	106	84	05C	0	13		
SG89	106	84	05H	-0.58	18		
SG89	106	84	06C	0	10		
SG89	106	84	06H	0	18		
SG89	106	84	07C	0	30	29	
SG89	106	84	07H	0	32	27	
SG89	106	86	03C	0	9		
SG89	106	86	04H	-0.58	9		
SG89	106	86	05H	-0.5	11		
SG89	106	86	06C	0	20	17	
SG89	106	86	06H	0	12		
SG89	106	86	07C	0	28	29	
SG89	106	86	07H	0	39	34	
SG89	106	88	06H	0	10		
SG89	106	88	07C	-0.57	15	17	
SG89	106	88	07H	-0.7	7		
SG89	106	94	03H	-0.47	11		
SG89	107	77	06H	0	17		
SG89	107	77	07H	-0.69	15	13	
SG89	107	79	04C	-0.52	9		
SG89	107	79	05C	0.35	8		

SONGS-3 List of TSP Wear Indications (PRELIMINARY)

SG	ROW	COL	ELEV	INCH	Bobbin %TW	+Point™ %TW	+Point™ Length (In)
SG89	107	79	05H	-0.58	19		
SG89	107	79	06C	0.37	9		
SG89	107	79	06H	0	29	27	
SG89	107	79	07C	0	25	26	
SG89	107	79	07H	0	41	38	1.31
SG89	107	81	04H	0	12		
SG89	107	81	06H	0	12		
SG89	107	81	07C	0	21	22	
SG89	107	81	07H	0	27	23	
SG89	107	83	06C	0	11		
SG89	107	83	06H	0	10		
SG89	107	83	07C	0	19	21	
SG89	107	83	07H	0	10	7	
SG89	107	85	06C	0.35	8		
SG89	107	85	06H	-0.58	9		
SG89	107	85	07C	0	31	28	
SG89	107	85	07H	-0.59	10	8	
SG89	107	87	05H	-0.58	10		
SG89	107	87	06H	-0.71	18		
SG89	107	87	07C	-0.54	8	9	
SG89	107	87	07H	-0.7	21	16	
SG89	108	78	07H	-0.65	11	8	
SG89	108	80	07H	-0.65	14	8	
SG89	108	88	06H	-0.09	13		
SG89	109	79	05H	-0.6	11		
SG89	109	79	07H	-0.65	20	16	
SG89	109	85	05H	-0.54	9		
SG89	115	85	05H	-0.58	8		
SG89	135	91	06H	-0.65	9		

Document	File Name	File Type	Size
M	SG89R99C89 7CTSP Size.pdf	Adobe Acrobat Document	50 KB

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG89	99	89	TWD	0	07C	-0.84	TSP Wear
SG89	99	89	TWD	18	07C	-0.81	TSP Wear
SG89	99	89	TWD	39	07C	-0.76	TSP Wear
SG89	99	89	TWD	56	07C	-0.73	TSP Wear
SG89	99	89	TWD	55	07C	-0.71	TSP Wear
SG89	99	89	TWD	56	07C	-0.68	TSP Wear
SG89	99	89	TWD	64	07C	-0.65	TSP Wear
SG89	99	89	TWD	66	07C	-0.62	TSP Wear
SG89	99	89	TWD	63	07C	-0.6	TSP Wear
SG89	99	89	TWD	72	07C	-0.57	TSP Wear
SG89	99	89	TWD	71	07C	-0.54	TSP Wear
SG89	99	89	TWD	72	07C	-0.52	TSP Wear
SG89	99	89	TWD	70	07C	-0.49	TSP Wear
SG89	99	89	TWD	67	07C	-0.47	TSP Wear
SG89	99	89	TWD	60	07C	-0.44	TSP Wear
SG89	99	89	TWD	56	07C	-0.41	TSP Wear
SG89	99	89	TWD	59	07C	-0.39	TSP Wear
SG89	99	89	TWD	50	07C	-0.36	TSP Wear
SG89	99	89	TWD	42	07C	-0.33	TSP Wear
SG89	99	89	TWD	44	07C	-0.31	TSP Wear
SG89	99	89	TWD	43	07C	-0.28	TSP Wear
SG89	99	89	TWD	42	07C	-0.25	TSP Wear
SG89	99	89	TWD	41	07C	-0.23	TSP Wear
SG89	99	89	TWD	41	07C	-0.2	TSP Wear
SG89	99	89	TWD	41	07C	-0.17	TSP Wear
SG89	99	89	TWD	39	07C	-0.14	TSP Wear
SG89	99	89	TWD	41	07C	-0.12	TSP Wear
SG89	99	89	TWD	41	07C	-0.09	TSP Wear
SG89	99	89	TWD	41	07C	-0.07	TSP Wear
SG89	99	89	TWD	46	07C	-0.04	TSP Wear
SG89	99	89	TWD	46	07C	-0.01	TSP Wear
SG89	99	89	TWD	45	07C	0.02	TSP Wear
SG89	99	89	TWD	45	07C	0.04	TSP Wear
SG89	99	89	TWD	44	07C	0.07	TSP Wear
SG89	99	89	TWD	45	07C	0.1	TSP Wear
SG89	99	89	TWD	49	07C	0.12	TSP Wear
SG89	99	89	TWD	47	07C	0.15	TSP Wear
SG89	99	89	TWD	50	07C	0.18	TSP Wear
SG89	99	89	TWD	51	07C	0.2	TSP Wear
SG89	99	89	TWD	53	07C	0.23	TSP Wear
SG89	99	89	TWD	55	07C	0.26	TSP Wear
SG89	99	89	TWD	56	07C	0.28	TSP Wear
SG89	99	89	TWD	55	07C	0.31	TSP Wear
SG89	99	89	TWD	60	07C	0.34	TSP Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG89	99	89	TWD	65	07C	0.36	TSP Wear
SG89	99	89	TWD	68	07C	0.39	TSP Wear
SG89	99	89	TWD	70	07C	0.42	TSP Wear
SG89	99	89	TWD	71	07C	0.44	TSP Wear
SG89	99	89	TWD	72	07C	0.47	TSP Wear
SG89	99	89	TWD	68	07C	0.5	TSP Wear
SG89	99	89	TWD	71	07C	0.52	TSP Wear
SG89	99	89	TWD	64	07C	0.55	TSP Wear
SG89	99	89	TWD	66	07C	0.57	TSP Wear
SG89	99	89	TWD	62	07C	0.6	TSP Wear
SG89	99	89	TWD	51	07C	0.63	TSP Wear
SG89	99	89	TWD	52	07C	0.66	TSP Wear
SG89	99	89	TWD	42	07C	0.68	TSP Wear
SG89	99	89	TWD	26	07C	0.71	TSP Wear
SG89	99	89	TWD	26	07C	0.76	TSP Wear
SG89	99	89	TWD	0	07C	0.79	TSP Wear

Document	File Name	File Type	Size
N	SG89R99C89 7HTSP Size.pdf	Adobe Acrobat Document	55 KB

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG89	99	89	TWD	0	07H	-0.96	TSP Wear
SG89	99	89	TWD	5	07H	-0.93	TSP Wear
SG89	99	89	TWD	9	07H	-0.9	TSP Wear
SG89	99	89	TWD	7	07H	-0.87	TSP Wear
SG89	99	89	TWD	28	07H	-0.85	TSP Wear
SG89	99	89	TWD	52	07H	-0.82	TSP Wear
SG89	99	89	TWD	50	07H	-0.8	TSP Wear
SG89	99	89	TWD	61	07H	-0.77	TSP Wear
SG89	99	89	TWD	65	07H	-0.74	TSP Wear
SG89	99	89	TWD	69	07H	-0.72	TSP Wear
SG89	99	89	TWD	69	07H	-0.69	TSP Wear
SG89	99	89	TWD	71	07H	-0.66	TSP Wear
SG89	99	89	TWD	71	07H	-0.64	TSP Wear
SG89	99	89	TWD	72	07H	-0.61	TSP Wear
SG89	99	89	TWD	69	07H	-0.58	TSP Wear
SG89	99	89	TWD	56	07H	-0.56	TSP Wear
SG89	99	89	TWD	49	07H	-0.53	TSP Wear
SG89	99	89	TWD	49	07H	-0.51	TSP Wear
SG89	99	89	TWD	61	07H	-0.48	TSP Wear
SG89	99	89	TWD	53	07H	-0.45	TSP Wear
SG89	99	89	TWD	45	07H	-0.43	TSP Wear
SG89	99	89	TWD	40	07H	-0.4	TSP Wear
SG89	99	89	TWD	34	07H	-0.37	TSP Wear
SG89	99	89	TWD	34	07H	-0.35	TSP Wear
SG89	99	89	TWD	30	07H	-0.32	TSP Wear
SG89	99	89	TWD	28	07H	-0.29	TSP Wear
SG89	99	89	TWD	27	07H	-0.27	TSP Wear
SG89	99	89	TWD	27	07H	-0.24	TSP Wear
SG89	99	89	TWD	29	07H	-0.22	TSP Wear
SG89	99	89	TWD	28	07H	-0.19	TSP Wear
SG89	99	89	TWD	30	07H	-0.16	TSP Wear
SG89	99	89	TWD	31	07H	-0.14	TSP Wear
SG89	99	89	TWD	31	07H	-0.11	TSP Wear
SG89	99	89	TWD	26	07H	-0.09	TSP Wear
SG89	99	89	TWD	29	07H	-0.06	TSP Wear
SG89	99	89	TWD	29	07H	-0.03	TSP Wear
SG89	99	89	TWD	33	07H	-0.01	TSP Wear
SG89	99	89	TWD	30	07H	0.02	TSP Wear
SG89	99	89	TWD	29	07H	0.04	TSP Wear
SG89	99	89	TWD	29	07H	0.07	TSP Wear
SG89	99	89	TWD	36	07H	0.1	TSP Wear
SG89	99	89	TWD	48	07H	0.13	TSP Wear
SG89	99	89	TWD	51	07H	0.16	TSP Wear
SG89	99	89	TWD	50	07H	0.18	TSP Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG89	99	89	TWD	45	07H	0.2	TSP Wear
SG89	99	89	TWD	51	07H	0.23	TSP Wear
SG89	99	89	TWD	54	07H	0.26	TSP Wear
SG89	99	89	TWD	61	07H	0.28	TSP Wear
SG89	99	89	TWD	63	07H	0.31	TSP Wear
SG89	99	89	TWD	62	07H	0.33	TSP Wear
SG89	99	89	TWD	61	07H	0.36	TSP Wear
SG89	99	89	TWD	59	07H	0.39	TSP Wear
SG89	99	89	TWD	42	07H	0.42	TSP Wear
SG89	99	89	TWD	32	07H	0.44	TSP Wear
SG89	99	89	TWD	47	07H	0.47	TSP Wear
SG89	99	89	TWD	56	07H	0.49	TSP Wear
SG89	99	89	TWD	48	07H	0.52	TSP Wear
SG89	99	89	TWD	33	07H	0.54	TSP Wear
SG89	99	89	TWD	9	07H	0.57	TSP Wear
SG89	99	89	TWD	8	07H	0.59	TSP Wear
SG89	99	89	TWD	11	07H	0.62	TSP Wear
SG89	99	89	TWD	8	07H	0.65	TSP Wear
SG89	99	89	TWD	8	07H	0.67	TSP Wear
SG89	99	89	TWD	8	07H	0.7	TSP Wear
SG89	99	89	TWD	5	07H	0.73	TSP Wear
SG89	99	89	TWD	6	07H	0.75	TSP Wear
SG89	99	89	TWD	0	07H	0.78	TSP Wear

Document	File Name	File Type	Size
O	SG89R99C91 7H TSP Size.pdf	Adobe Acrobat Document	47 KB

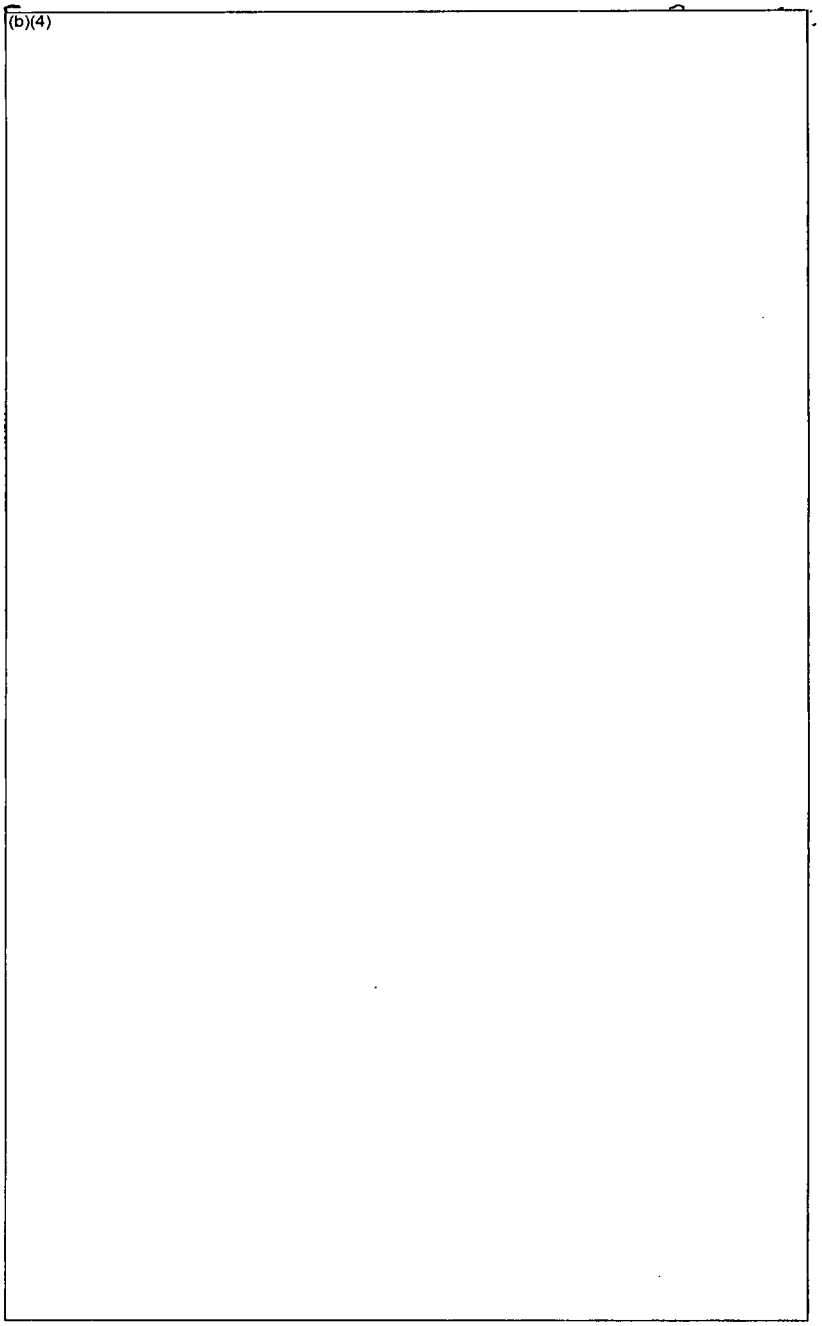
SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG89	99	91	TWD	0	07H	-0.89	TSP Wear
SG89	99	91	TWD	3	07H	-0.86	TSP Wear
SG89	99	91	TWD	36	07H	-0.83	TSP Wear
SG89	99	91	TWD	42	07H	-0.81	TSP Wear
SG89	99	91	TWD	35	07H	-0.78	TSP Wear
SG89	99	91	TWD	50	07H	-0.75	TSP Wear
SG89	99	91	TWD	61	07H	-0.72	TSP Wear
SG89	99	91	TWD	60	07H	-0.7	TSP Wear
SG89	99	91	TWD	67	07H	-0.67	TSP Wear
SG89	99	91	TWD	68	07H	-0.64	TSP Wear
SG89	99	91	TWD	68	07H	-0.61	TSP Wear
SG89	99	91	TWD	67	07H	-0.59	TSP Wear
SG89	99	91	TWD	68	07H	-0.56	TSP Wear
SG89	99	91	TWD	67	07H	-0.53	TSP Wear
SG89	99	91	TWD	68	07H	-0.51	TSP Wear
SG89	99	91	TWD	63	07H	-0.48	TSP Wear
SG89	99	91	TWD	45	07H	-0.45	TSP Wear
SG89	99	91	TWD	42	07H	-0.42	TSP Wear
SG89	99	91	TWD	46	07H	-0.39	TSP Wear
SG89	99	91	TWD	36	07H	-0.36	TSP Wear
SG89	99	91	TWD	36	07H	-0.34	TSP Wear
SG89	99	91	TWD	36	07H	-0.31	TSP Wear
SG89	99	91	TWD	37	07H	-0.28	TSP Wear
SG89	99	91	TWD	35	07H	-0.26	TSP Wear
SG89	99	91	TWD	36	07H	-0.23	TSP Wear
SG89	99	91	TWD	38	07H	-0.2	TSP Wear
SG89	99	91	TWD	39	07H	-0.17	TSP Wear
SG89	99	91	TWD	38	07H	-0.14	TSP Wear
SG89	99	91	TWD	40	07H	-0.12	TSP Wear
SG89	99	91	TWD	38	07H	-0.09	TSP Wear
SG89	99	91	TWD	38	07H	-0.06	TSP Wear
SG89	99	91	TWD	39	07H	-0.03	TSP Wear
SG89	99	91	TWD	44	07H	0	TSP Wear
SG89	99	91	TWD	45	07H	0.02	TSP Wear
SG89	99	91	TWD	45	07H	0.05	TSP Wear
SG89	99	91	TWD	44	07H	0.07	TSP Wear
SG89	99	91	TWD	47	07H	0.1	TSP Wear
SG89	99	91	TWD	48	07H	0.13	TSP Wear
SG89	99	91	TWD	50	07H	0.16	TSP Wear
SG89	99	91	TWD	50	07H	0.18	TSP Wear
SG89	99	91	TWD	50	07H	0.21	TSP Wear
SG89	99	91	TWD	51	07H	0.24	TSP Wear
SG89	99	91	TWD	50	07H	0.27	TSP Wear
SG89	99	91	TWD	49	07H	0.29	TSP Wear

SONGS Unit 3 Line-by-Line Sizing (PRELIMINARY)

SG	Row	Col	Ind	%TW	Elev	Inch1	Category
SG89	99	91	TWD	51	07H	0.32	TSP Wear
SG89	99	91	TWD	50	07H	0.35	TSP Wear
SG89	99	91	TWD	50	07H	0.37	TSP Wear
SG89	99	91	TWD	50	07H	0.4	TSP Wear
SG89	99	91	TWD	47	07H	0.43	TSP Wear
SG89	99	91	TWD	33	07H	0.46	TSP Wear
SG89	99	91	TWD	33	07H	0.48	TSP Wear
SG89	99	91	TWD	40	07H	0.51	TSP Wear
SG89	99	91	TWD	30	07H	0.54	TSP Wear
SG89	99	91	TWD	26	07H	0.56	TSP Wear
SG89	99	91	TWD	28	07H	0.59	TSP Wear
SG89	99	91	TWD	3	07H	0.62	TSP Wear
SG89	99	91	TWD	0	07H	0.65	TSP Wear

Document	File Name	File Type	Size
P	SONGS Steam Generator Drawings.pdf	Adobe Acrobat Document	8,495 KB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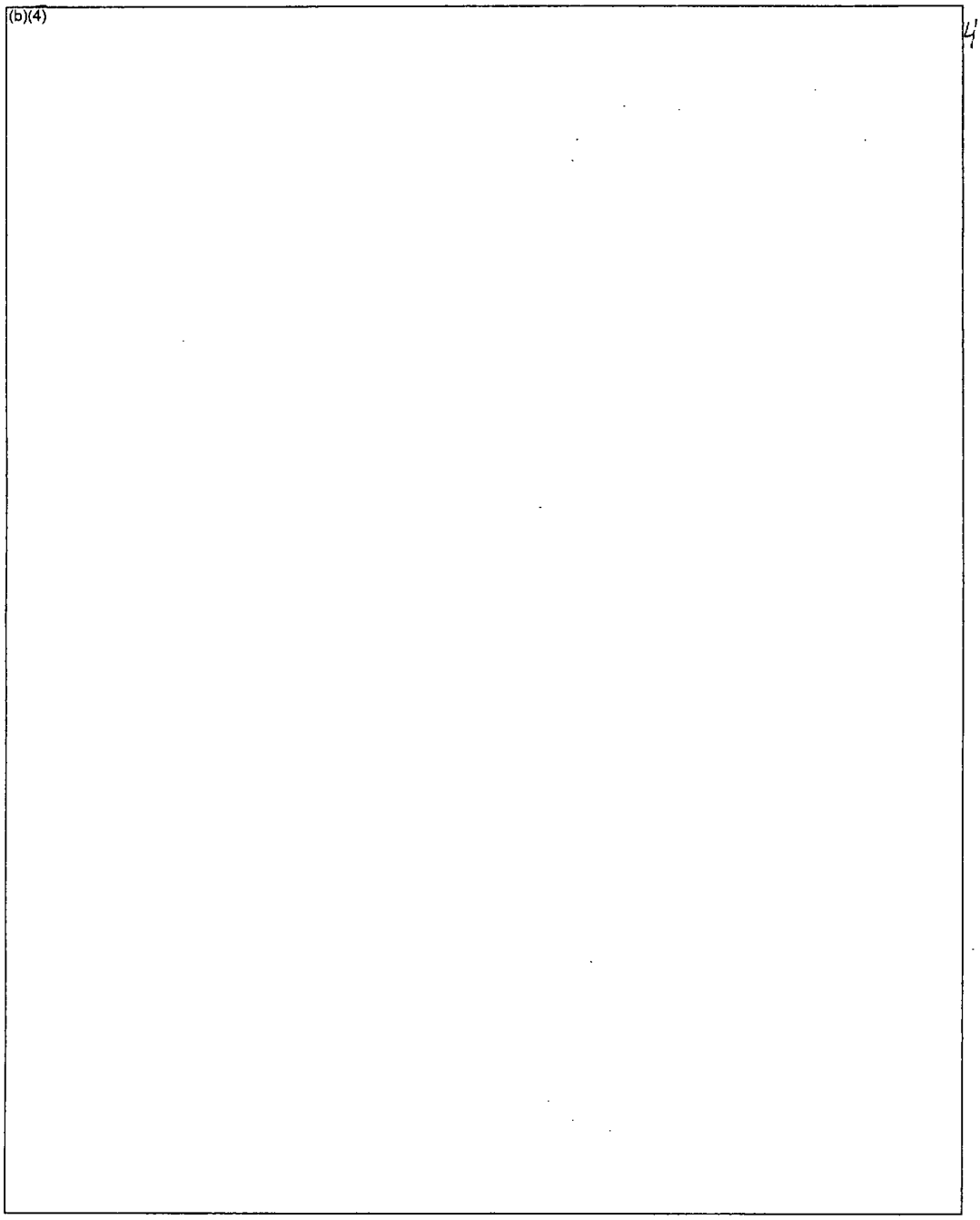
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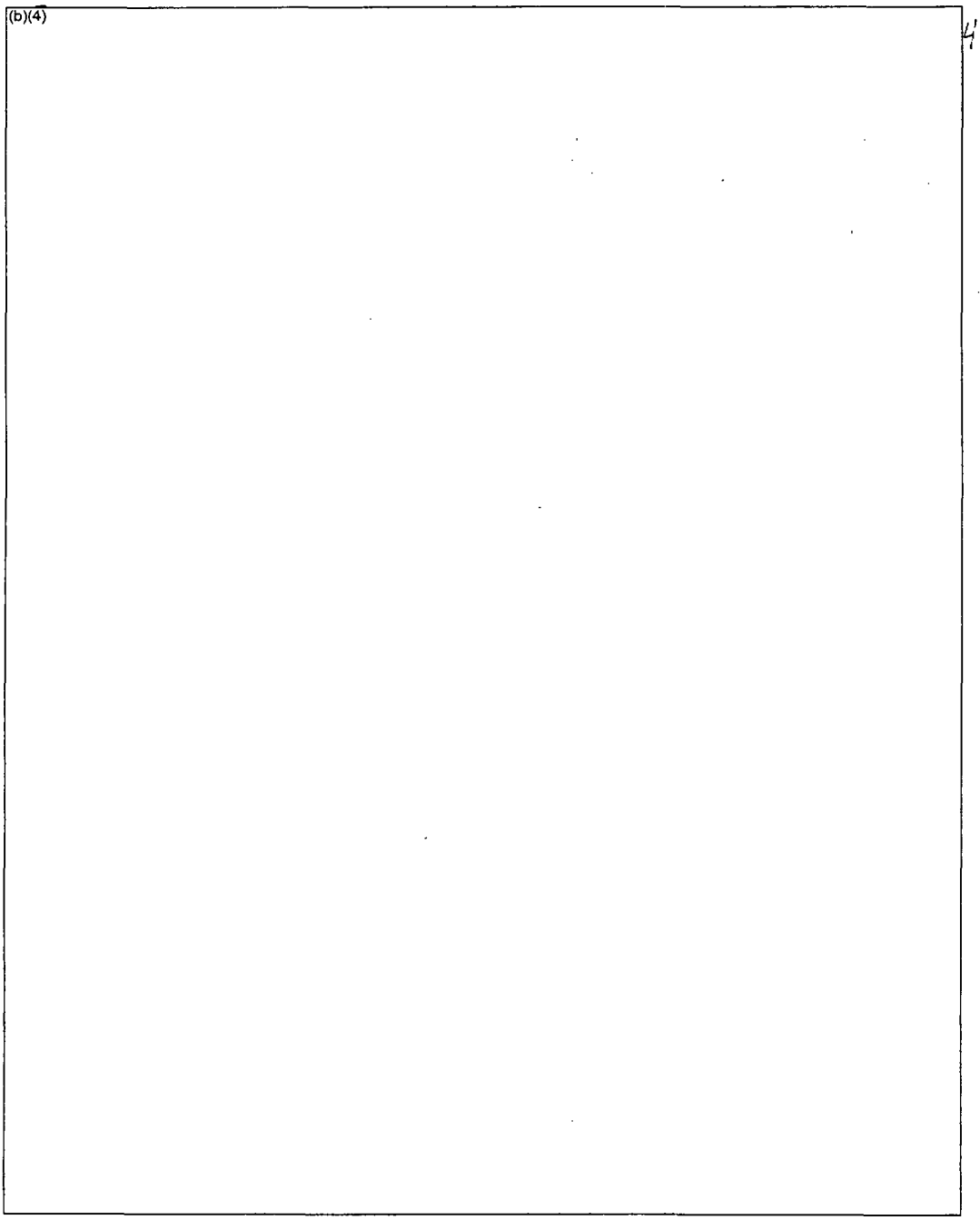
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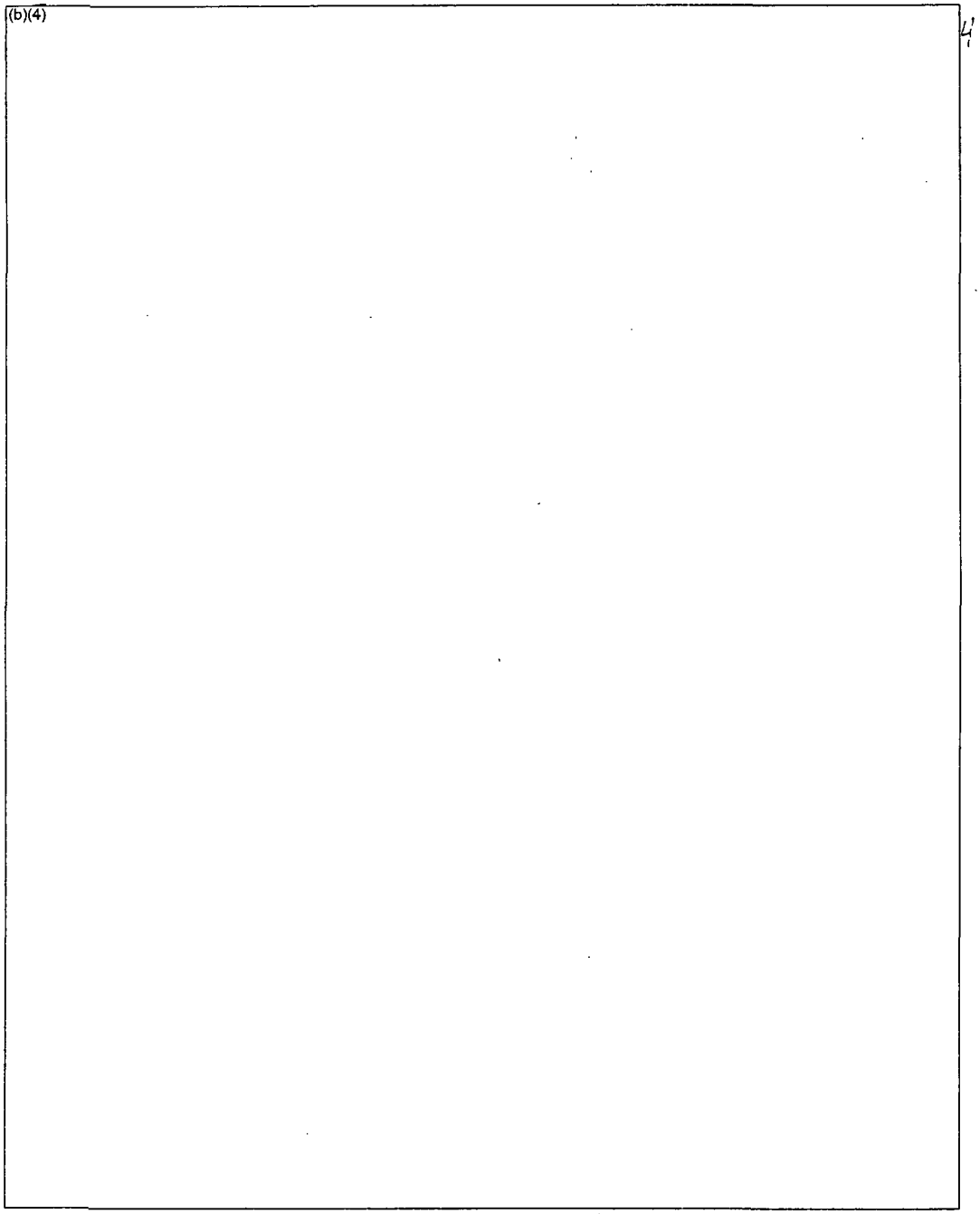
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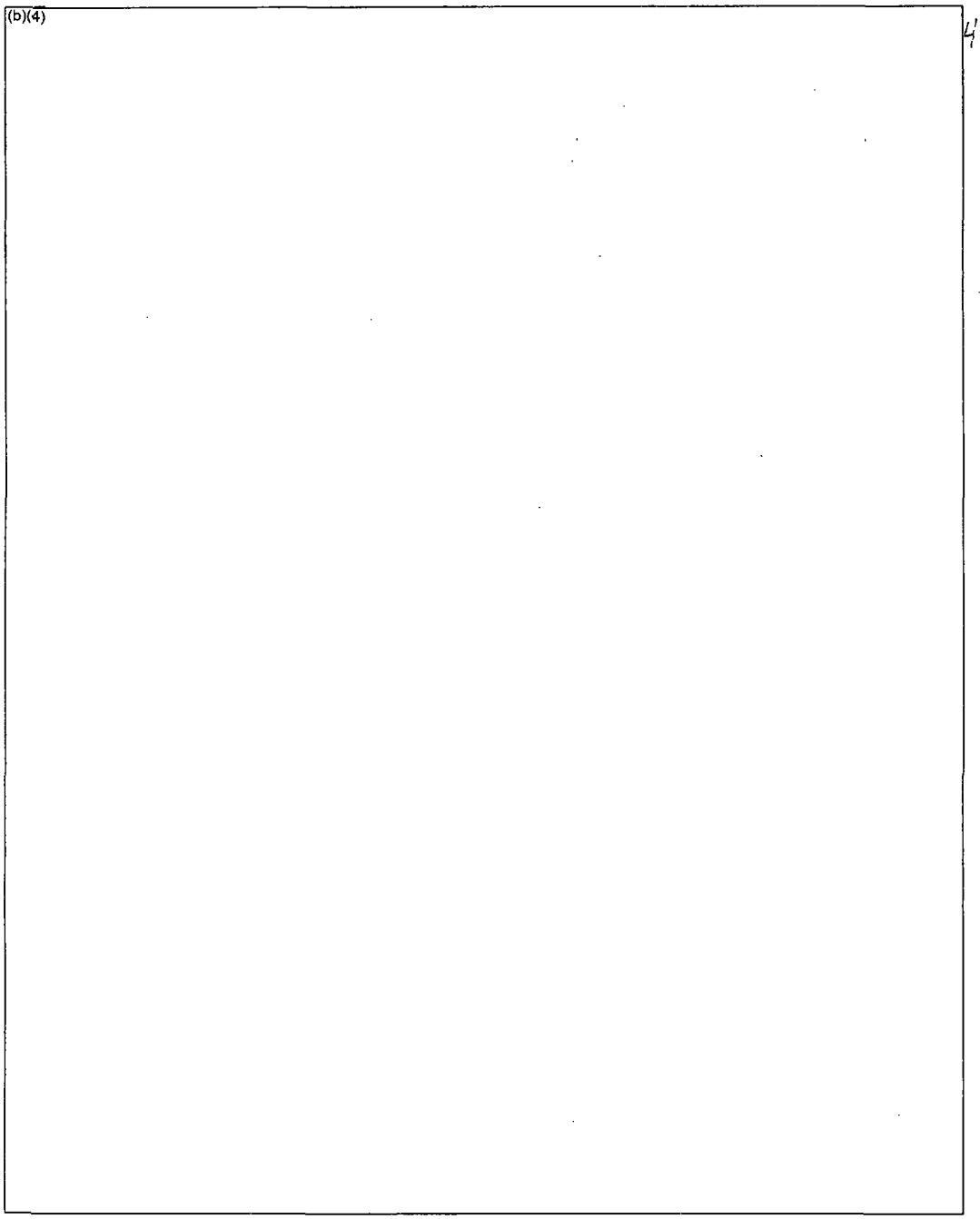
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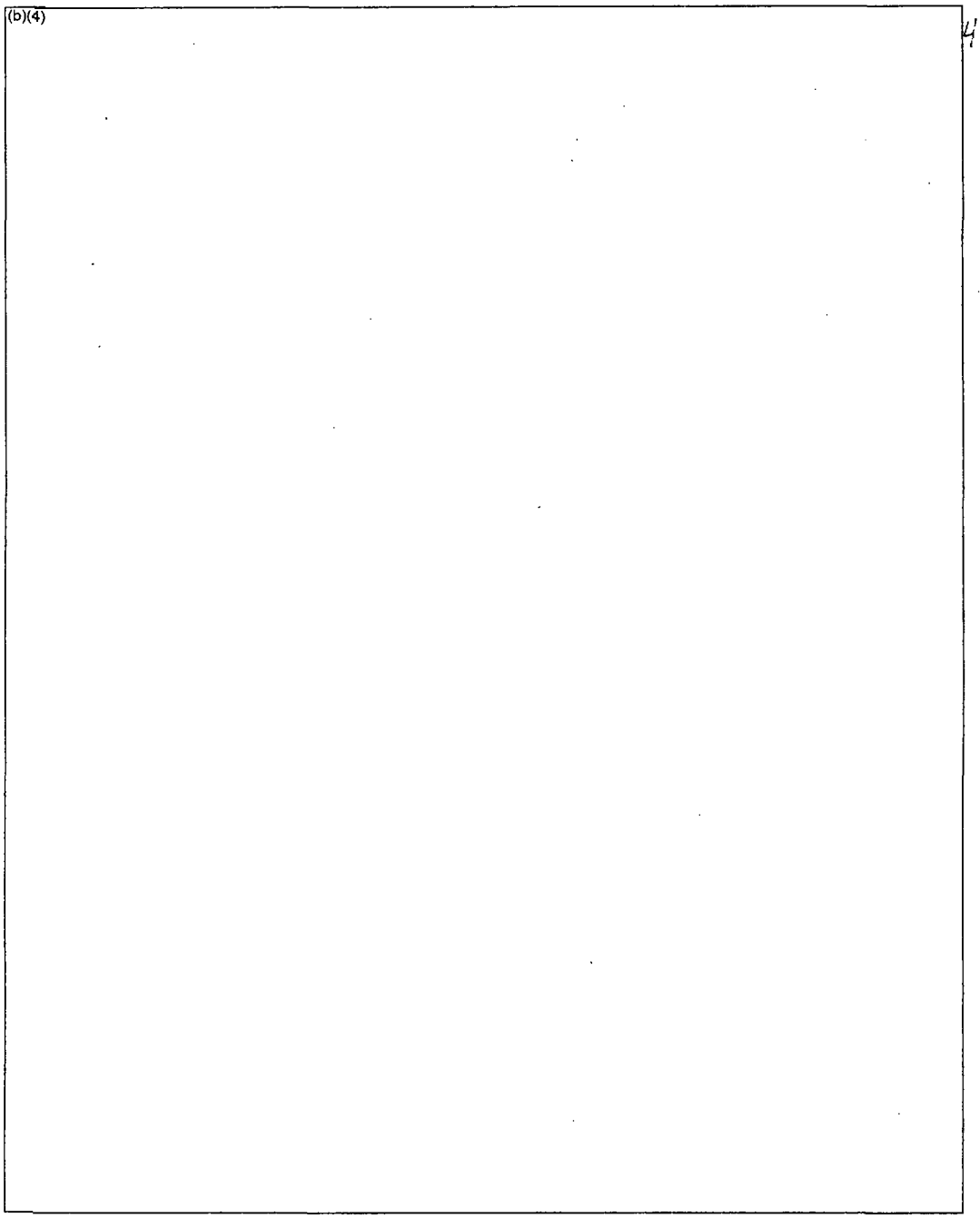
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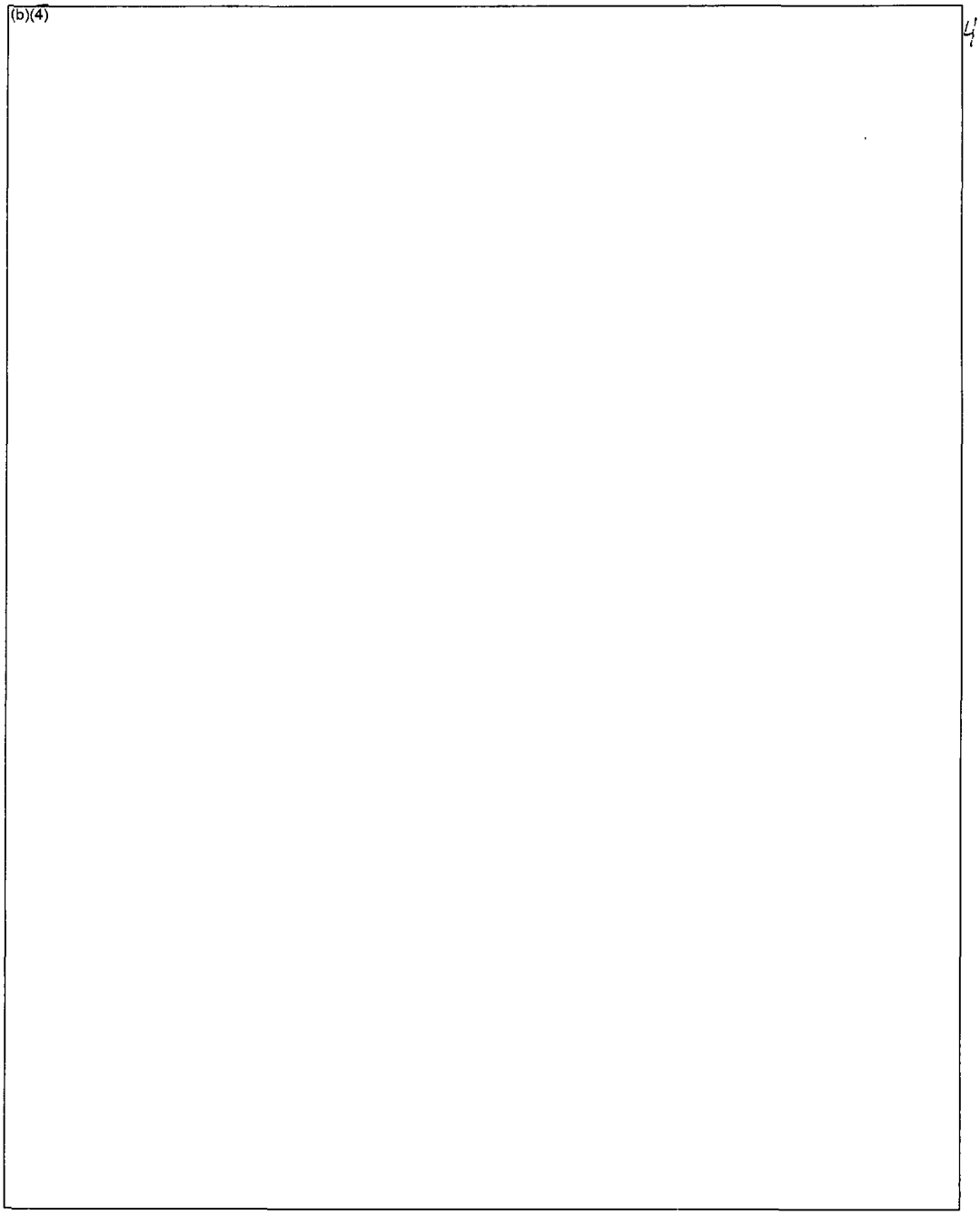
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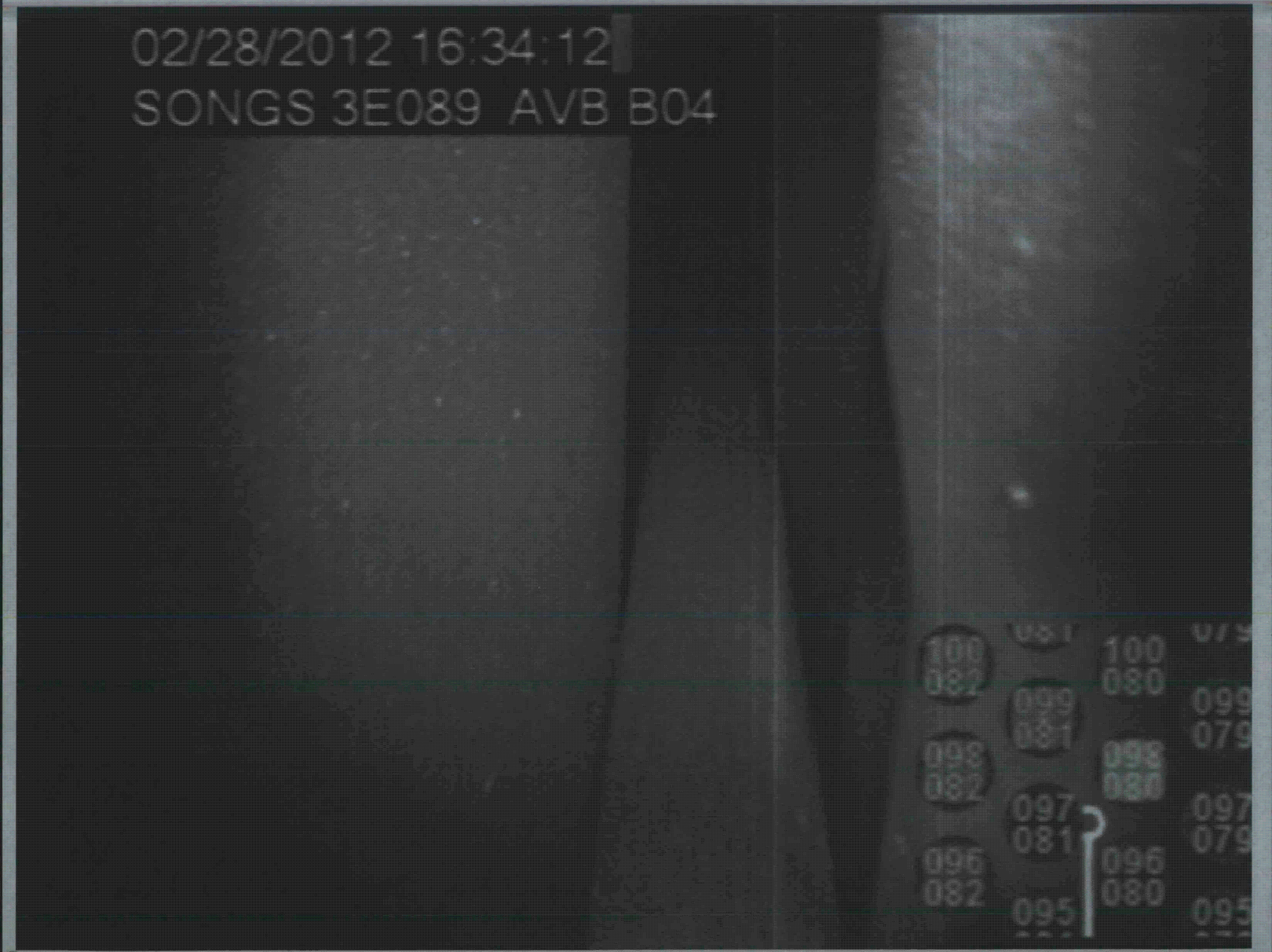
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Document	File Name	File Type	Size
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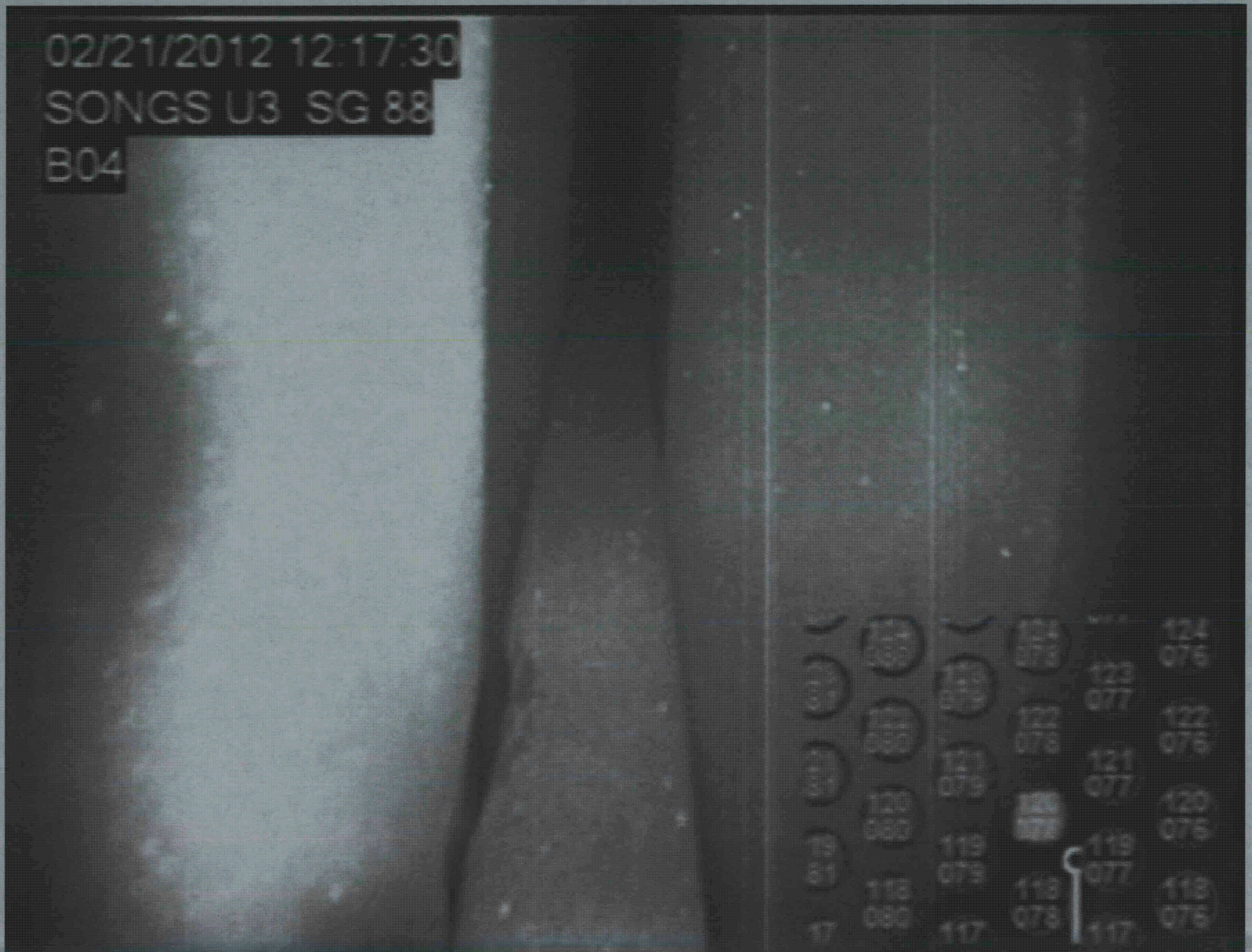
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SONGS U3 SG 88
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Document	File Name	File Type	Size
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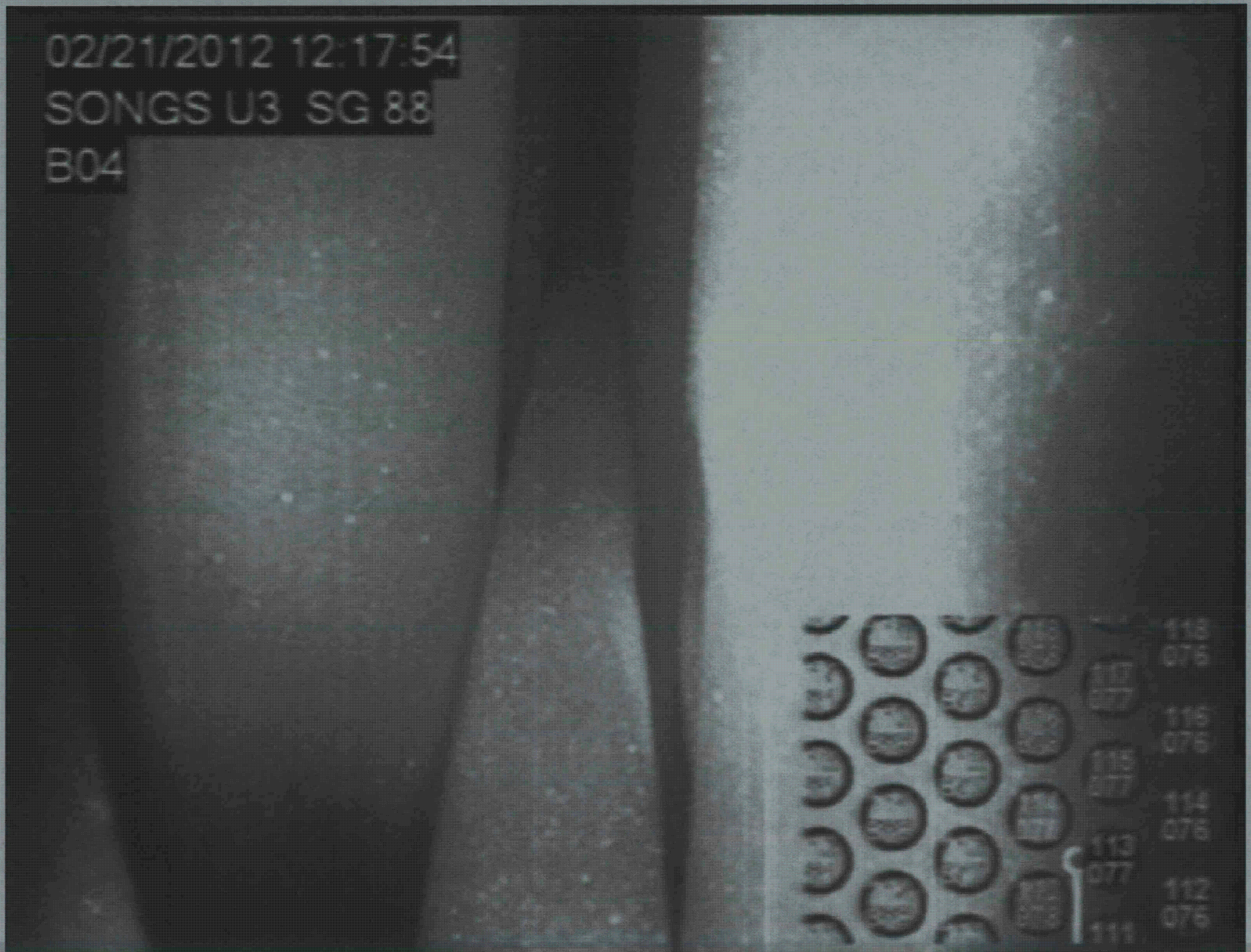
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Document	File Name	File Type	Size
T	U23 SG Wear 004.jpg	JPEG image	121 KB


02/21/2012 12:20:12
SONGS U3 SG 88
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Document	File Name	File Type	Size
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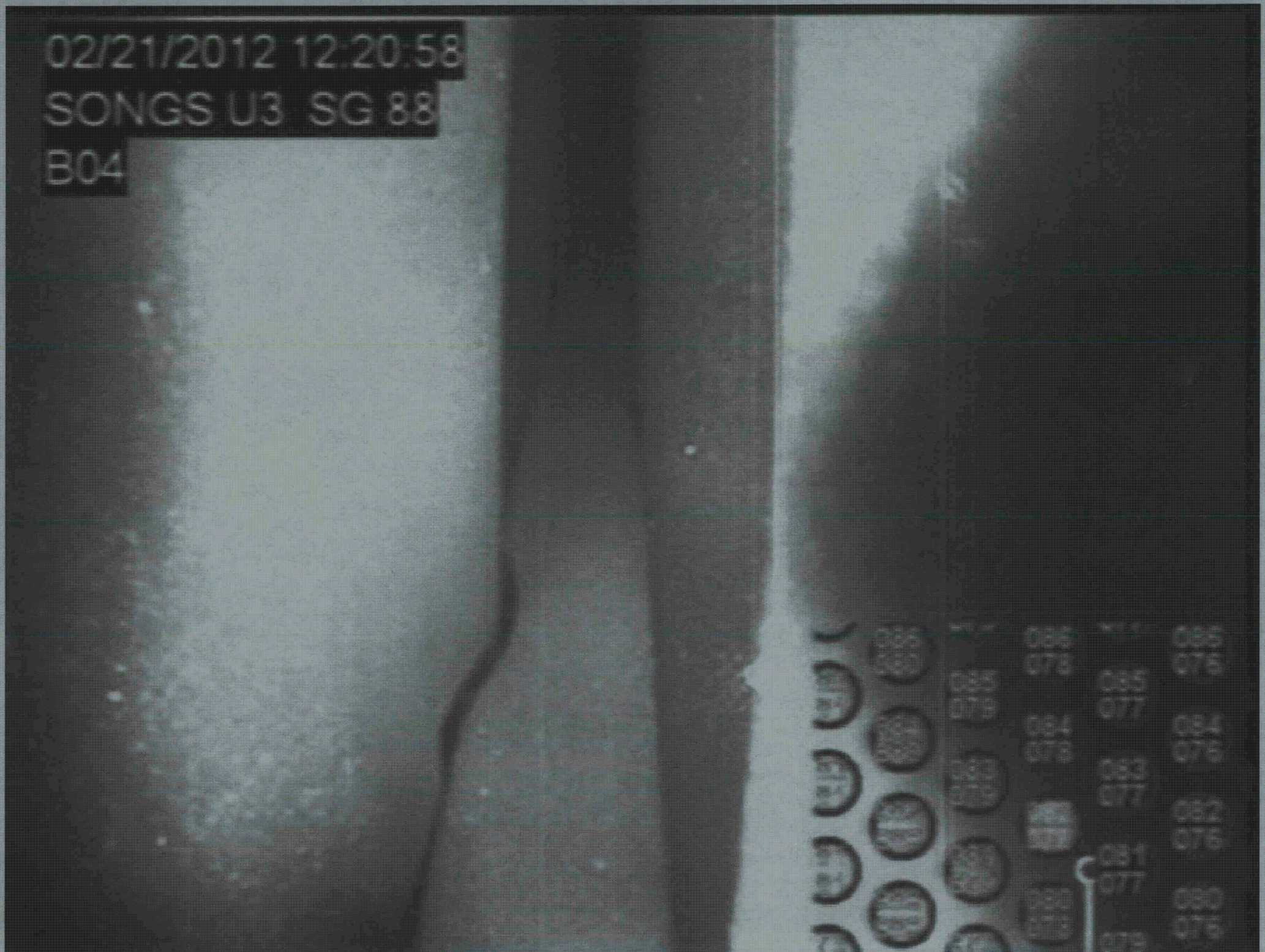
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SONGS U3 SG 88
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02/21/2012 12:32:08
SONGS U3 SG 88
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Document	File Name	File Type	Size
W	U23 SG Wear 007.jpg	JPEG image	117 KB


02/21/2012 13:04:58
SONGS U3 SG 88
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Document	File Name	File Type	Size
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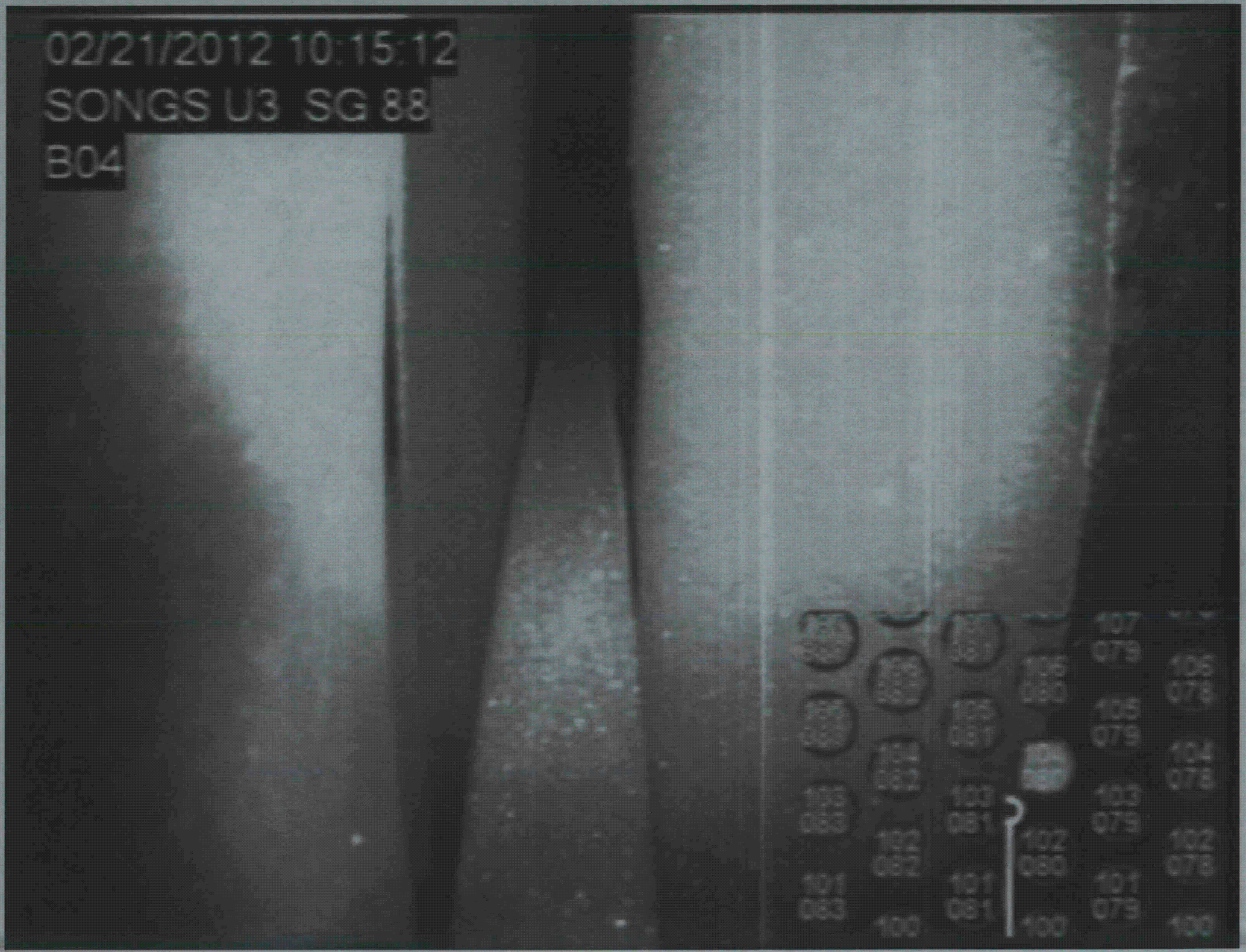
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SONGS U3 SG 88
B04

Document	File Name	File Type	Size
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02/21/2012 11:33:24
SONGS U3 SG 88
B04

Document	File Name	File Type	Size
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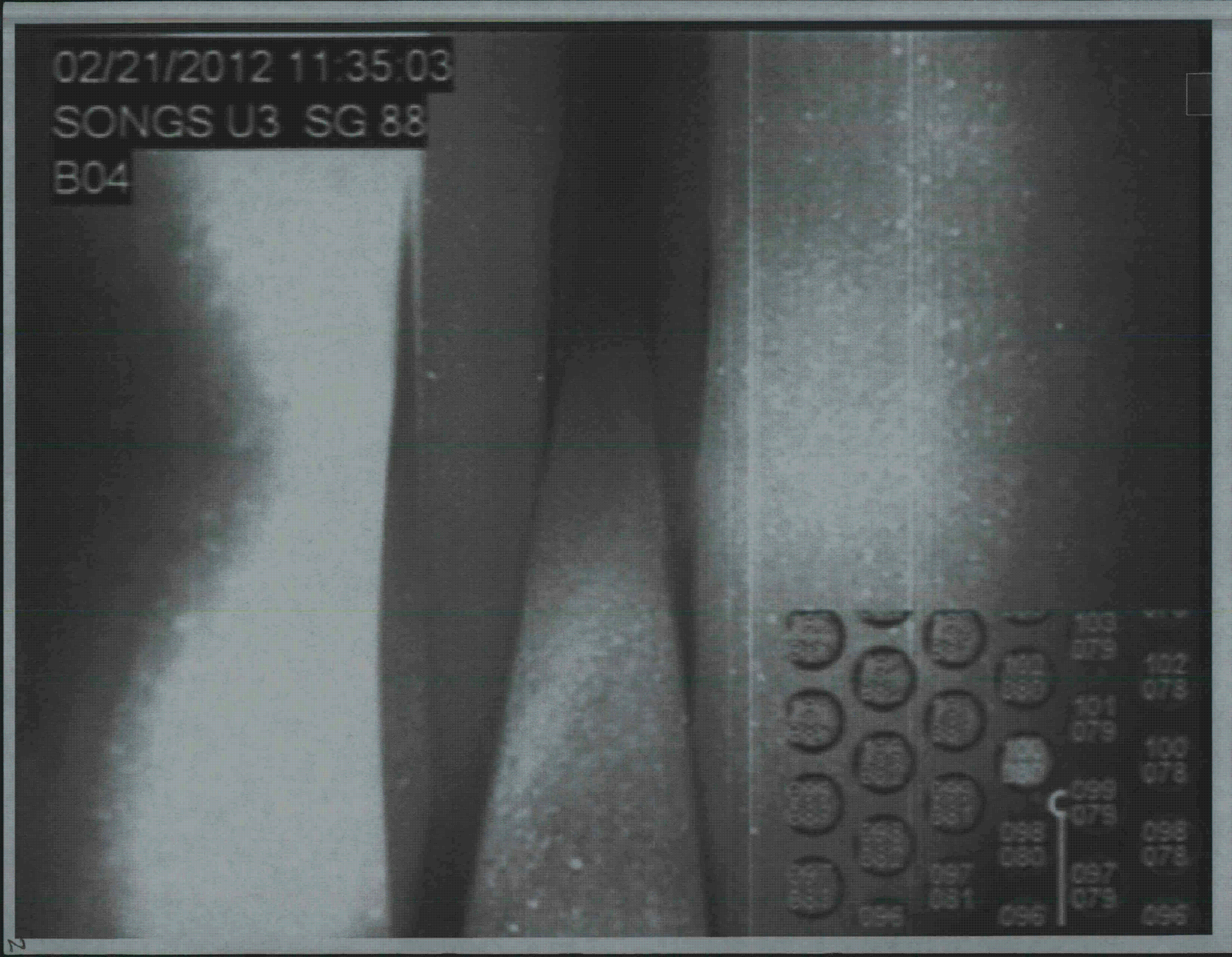
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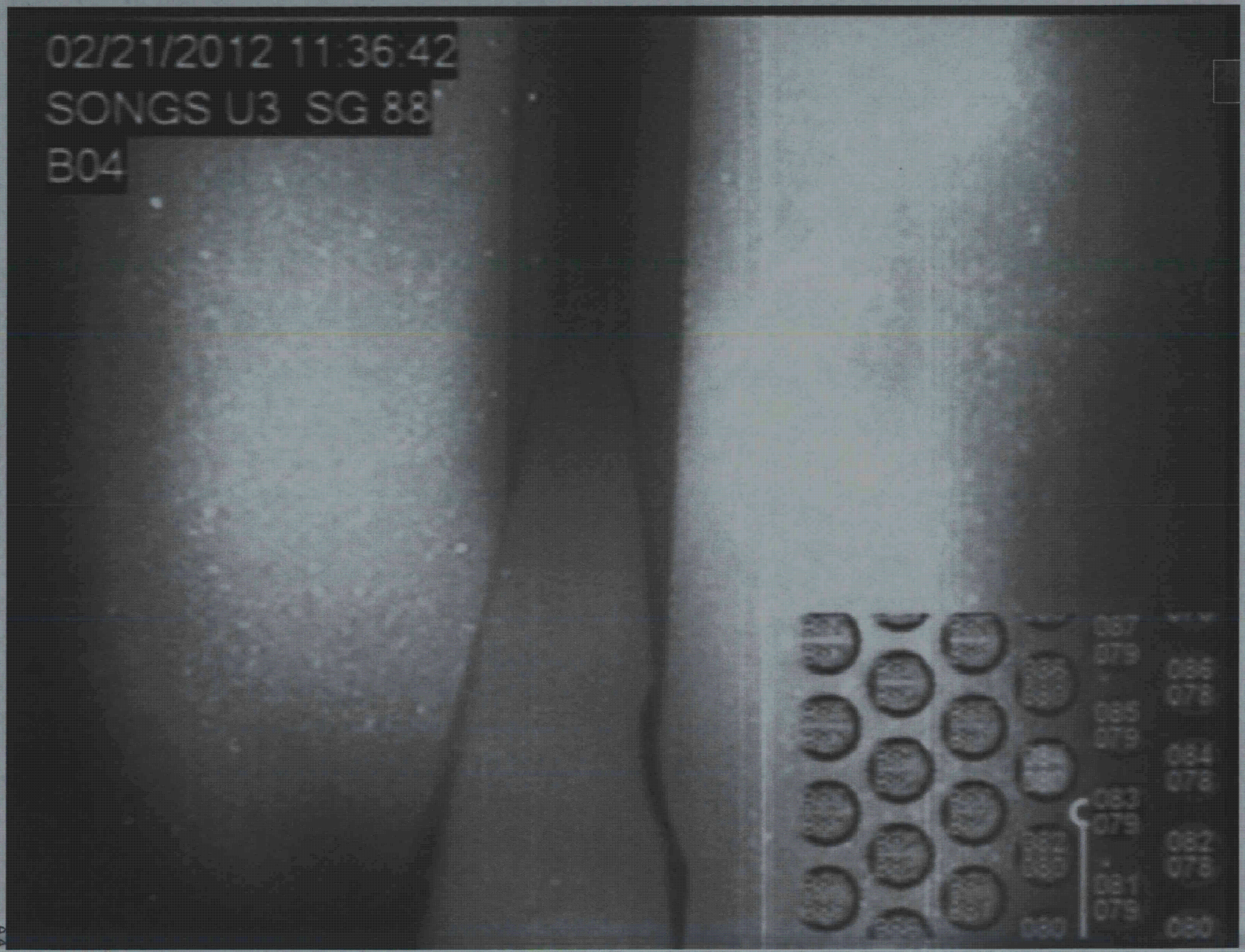
02/21/2012 11:36:42
SONGS U3 SG 88°
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Document	File Name	File Type	Size
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02/21/2012 11:57:10
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Chapter 2
00:06:43 / 00

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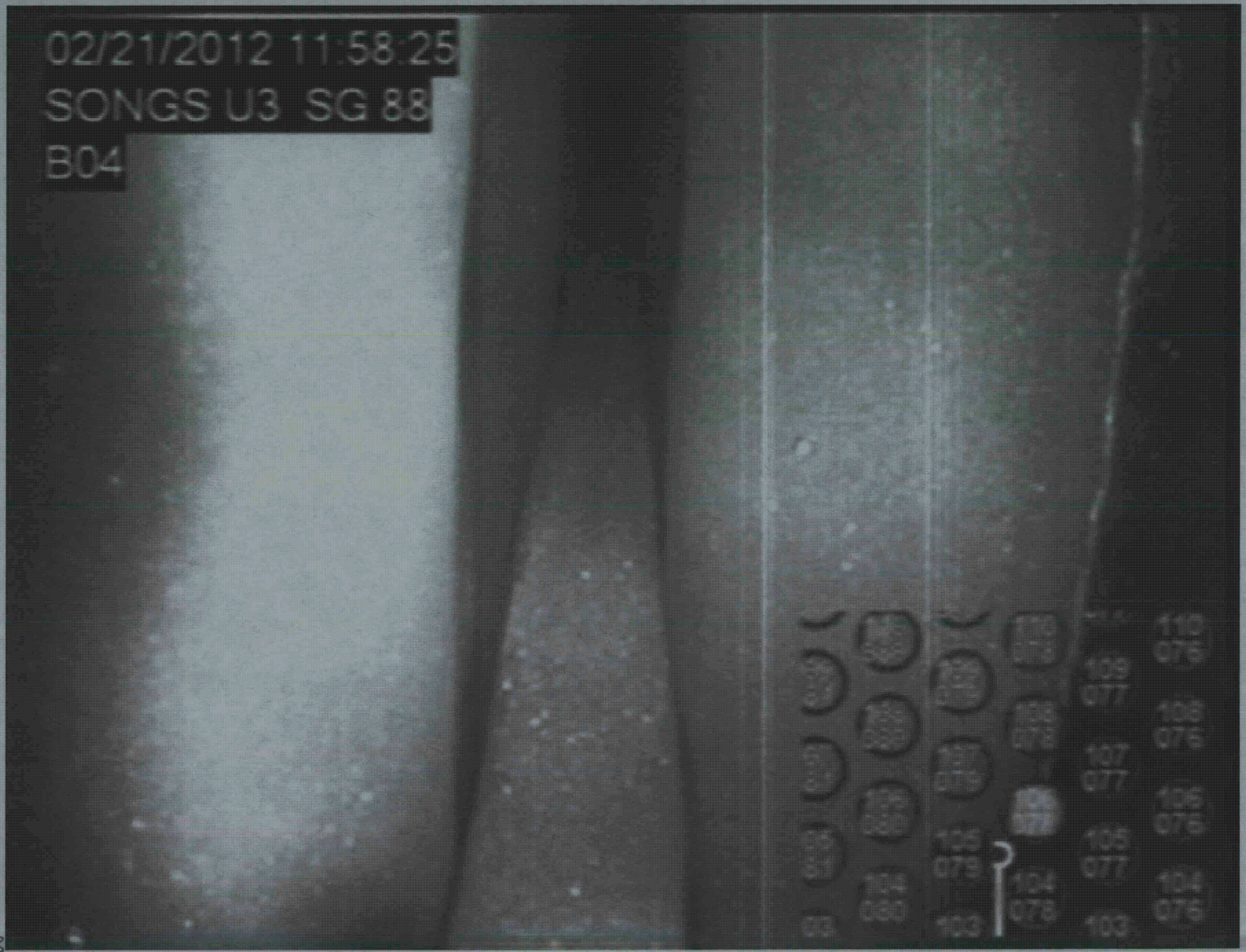
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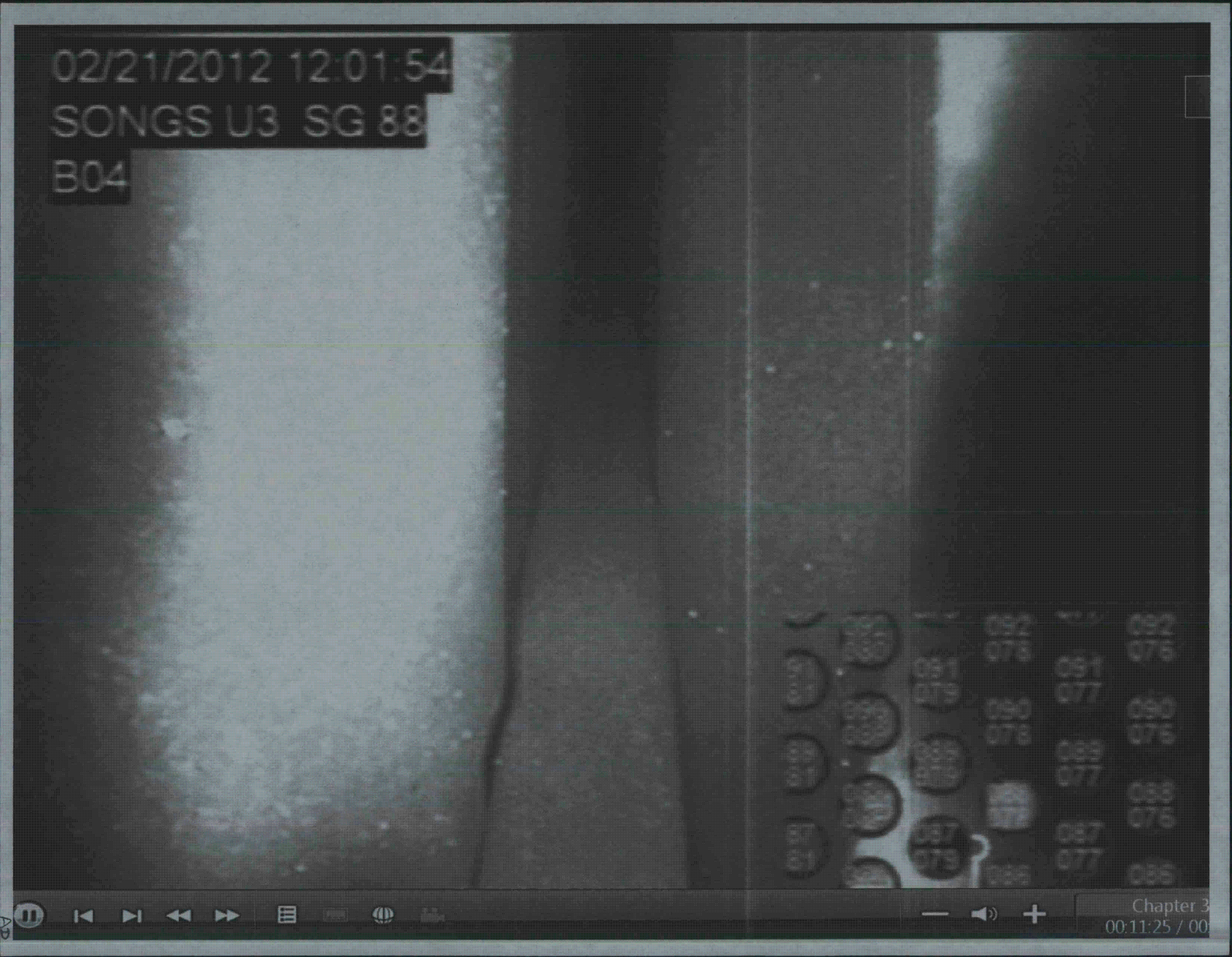
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Chapter 3
00:11:25 / 00

Document	File Name	File Type	Size
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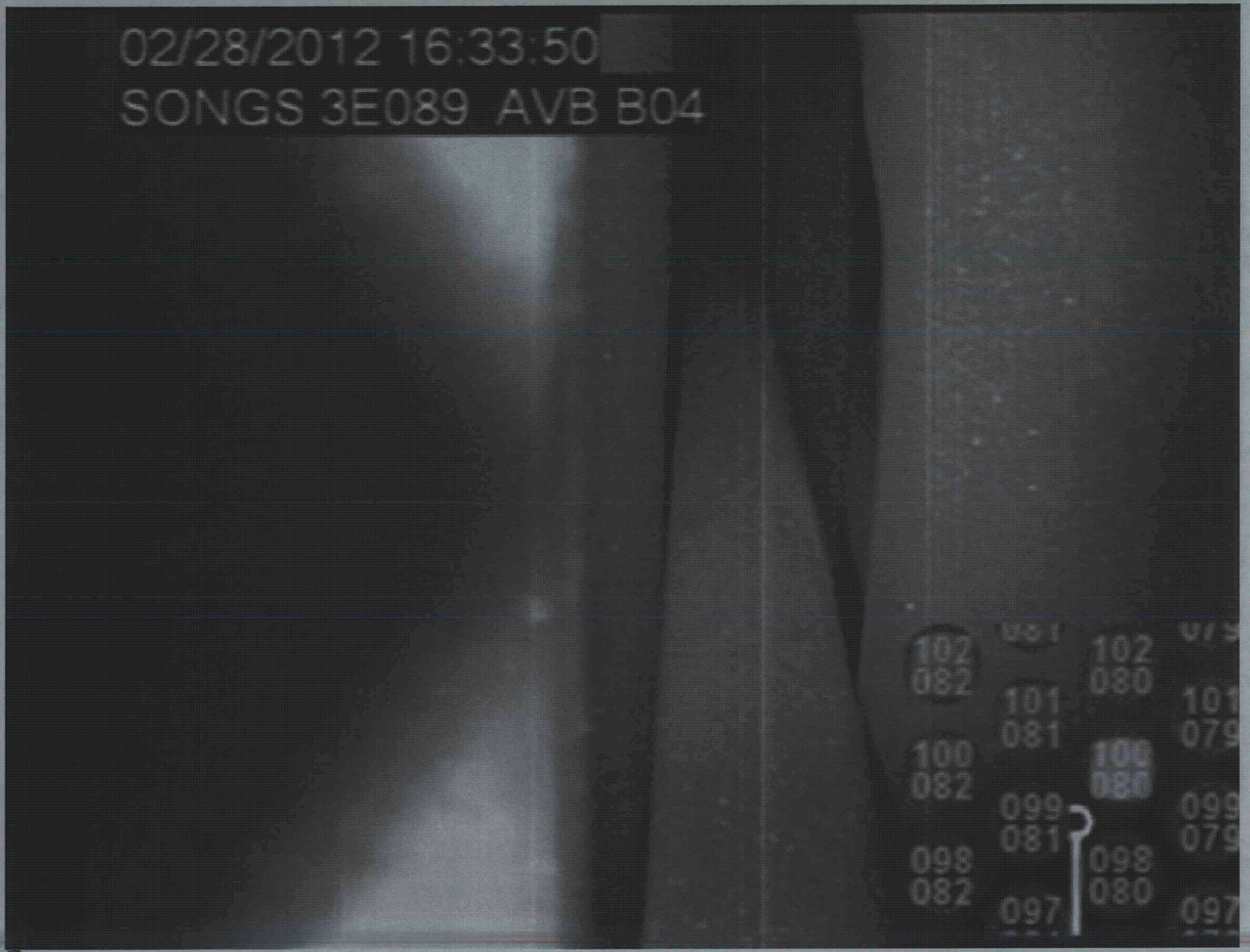
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Document	File Name	File Type	Size
AF	U23 SG Wear 016.jpg	JPEG image	118 KB


02/28/2012 16:34:04
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Document	File Name	File Type	Size
AG	U23 SG Wear 017.jpg	JPEG image	124 KB


02/28/2012 16:34:09
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From: Lantz, Ryan
To: Hall, Randy; Kulesa, Gloria; Werner, Greg; Karwoski, Kenneth; Anchondo, Isaac; Drake, James
Cc: Murphy, Emmett; Reynoso, John; Melfi, Jim; Johnson, Andrew; Markley, Michael
Subject: RE: SONGS Unit 3 In Situ testing schedule
Date: Wednesday, March 07, 2012 7:56:28 AM

A call would be beneficial, just to hear the scope of testing planned for Unit 3. Early Friday would be best, 7am PST, if the licensee could support. I would not be available from 7:30 - 9am PST, then available after that.... But preference is earlier than later.

From: Hall, Randy
Sent: Wednesday, March 07, 2012 6:37 AM
To: Kulesa, Gloria; Werner, Greg; Karwoski, Kenneth; Anchondo, Isaac; Drake, James
Cc: Murphy, Emmett; Lantz, Ryan; Reynoso, John; Melfi, Jim; Johnson, Andrew; Markley, Michael
Subject: FW: SONGS Unit 3 In Situ testing schedule

I received this information from SCE licensing; hopefully it is consistent with other communications. If RIV and NRR want a call with the licensee this Friday, 3/9, please let me know a proposed time and I'll set up a bridge.

Randy Hall, Senior Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation
USNRC
(301) 415-4032
Randy.Hall@nrc.gov

From: (b)(6)
Sent: Tuesday, March 06, 2012 5:20 PM
To: Hall, Randy; Murphy, Emmett
Subject:

Randy,
We intend to start in-situ pressure testing early next week (either Monday 3/12 or Tuesday 3/13). We can support a conference call to discuss our plans on Friday 3/9.
We expect a final list of tubes to test by Friday 3/9. The list will be in excess of 100 tubes.

(b)(6)
Manager, Plant Licensing
San Onofre Nuclear Generating Station
Office (b)(6)
Cell: (b)(6)

D/25
41

D/25

(b)(6)

From: Hall, Randy
To: Werner, Greg; Kuiken, Gloria; Murphy, Emmett; Kenyaid, Kenneth; Johnson, Andrew; Drake, James; Anchondo, Cruz; Reynolds, John; Warnick, Greg; Markley, Michael; Lantz, Ryan; Hiott, Tim
Subject: FW: Handouts for NRC In-Situ Pressure Test Call
Date: Thursday, March 08, 2012 2:02:32 PM
Attachments: Unit 2 03-8-2012 Status Report.pdf
Unit 3 03-8-2012 Status Report.pdf
Unit 3 SG In-Situ Outline Rev 2 NRC.pdf
SONGS 3 In-Situ Pressure Test Scope.pdf

Everyone,

I just received the attached info for the upcoming call with SONGS on SG tube issues.

Randy

From: (b)(6)
Sent: Thursday, March 08, 2012 2:52 PM
To: Hall, Randy
Subject: FW: Handouts for NRC In-Situ Pressure Test Call

Randy

Information for Discussion at our schedule 1600 EST phone call is attached. Please distribute to the expected participants.

Regards,

(b)(6)

San Onofre Nuclear Generating Station
Office (b)(6)
Cell: (b)(6) Ex 6

This communication is intended solely for the use of the individual or entity to which it is addressed. If you have received this communication in error, please notify the sender immediately and permanently delete the original and any copy of this communication.

----- Forwarded by Linda Conklin/SONGS/SCE/EIX on 03/08/2012 11:52 AM -----

From: (b)(6)
To: (b)(6)
Cc: (b)(6)
Date: 03/08/2012 11:47 AM
Subject: Handouts for NRC In-Situ Pressure Test Call

FOR INTERNAL USE ONLY

Unit 2 SG Status

P/26
42

P/26

Unit 3 SG In-Situ Pressure Testing

Testing Outline

3-8-12

Scope:

1. Selection for in situ pressure and leak test candidates was performed in accordance with Revision 3 of the EPRI Steam Generator In Situ Pressure Test Guidelines
2. No deviations to the guidelines were taken
3. The Monte Carlo approach in Appendix A of the EPRI Guidelines was used for selection of test candidates
4. ~ 130 tubes to test - likely all will be the full length of tube and many will be testing multiple flaws (freespan as well as TSP)
5. Test parameters - similar to Unit 2
   a. NODP 1850 psig
   b. MSLB 3200 psig
   c. 3NODP 5250 psig
6. Hold points at each of the above pressures as well as at:
   a. 3600 psig
   b. 4300 psig
   c. 4800 psig
7. Leakage acceptance criteria is <= 0.5 gpm total (for all tubes in a single steam generator) at MSLB and <= 150 gpd total (for all tubes in a single steam generator) at NODP
8. (6)(4)
9. 2 minute hold with no leakage
10. 5 minute hold when leakage is detected

Schedule:

1. AREVA Test List (Preliminary) Completed
2. Final List approved by SCE FC 3/9
3. AREVA Tube End Repair FC 3/10
4. First In-Situ Tuesday 3/13
5. Duration 8-10 days for testing plus 2 days for ECT
6. Two sets of equipment – one per steam generator
7. Four test teams
8. Planning to test on two 12 hour shifts

Approach:

1. Day shift only for first 1 - 2 days
2. All test engineers (SCE and AREVA) observe on day shift
3. Test Sequence:
    a. Tube with low failure probability
    b. Tube with high failure probability
        i. If preceding tube indicates leakage during testing, the next test will be a tube with a low probability of failure
    c. Tube with leakage detected during SG leakage test
    d. Tube with low failure probability
    e. Tube with next highest failure probability
        i. If preceding tube indicates leakage during testing, the next test will be a tube with a low probability of failure
    f. Continue in sequence from highest probability to lowest, alternating with low failure probability after any test with leakage
4. Following first day shift, acquire eddy current testing data (bobbin and rotating probe) of all tested tubes
5. Evaluate eddy results and compare test results with predictions
6. Proceed with remaining tubes in order of probability
7. Higher probability only on day shift
8. Nights proceed from lowest probability up
9. Bobbin and rotating coil examinations of all pressure tested tubes to inspect for changes in the flaw characteristics
10. Video probe examinations may be used to supplement the ECT results

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 88R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_88R	95	81	WAR 07C -0.47 SVI B03 -1.23	TSP Wear Freespan Wear	43.7	1	0
SONGS3_88R	95	83	WAR 07C -0.60 WAR 07H -0.51 SVI B07 +10.02	TSP Wear TSP Wear Freespan Wear	44.6 48.11 58.6	2	0
SONGS3_88R	95	85	WAR 07C -0.47	TSP Wear	42.89	3	0
SONGS3_88R	95	87	SVI B03 +2.26	Freespan Wear	47.4	4	0
SONGS3_88R	96	82	WAR 07C +0.48	TSP Wear	42	5	0
SONGS3_88R	96	84	SVI B08 +8.21	Freespan Wear	46.3	6	0
SONGS3_88R	96	86	SVI B08 +6.04	Freespan Wear	47.72	7	0
SONGS3_88R	97	81	WAR 07C -0.44 WAR 07H -0.59 SVI B02 +13.57	TSP Wear TSP Wear Freespan Wear	56.2 44.68 64.2	8	0
SONGS3_88R	97	83	WAR 07C +0.39 WAR 07H -0.78 SVI B07 +10.49 SVI B09 +7.23	TSP Wear TSP Wear Freespan Wear Freespan Wear	45.5 45.18 57.46 47.3	9	0
SONGS3_88R	97	85	SVI B08 +0.94	Freespan Wear	46.77	10	0
SONGS3_88R	97	87	SVI B08 +12.68	Freespan Wear	47.12	11	0
SONGS3_88R	98	80	WAR 07H -0.39 WAR 07C -0.58 SVI B02 +2.41	TSP Wear TSP Wear Freespan Wear	53.27 46 74.39	12	0
SONGS3_88R	98	82	WAR 07C +0.45 WAR 07H -0.55 SVI B02 +10.46	TSP Wear TSP Wear Freespan Wear	48.79 46.06 46.63	13	0

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 88R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_88R	98	84	WAR 07C +0.38	TSP Wear	41	14	0
SONGS3_88R	99	81	WAR 07C -0.54 WAR 07H -0.57 SVI B02 +9.95	TSP Wear TSP Wear Freespan Wear	49.1 50.84 71.81	15	0
SONGS3_88R	99	83	WAR 07C -0.54 WAR 07H -0.30 WAR 06H -0.68 SVI B07 +8.31	TSP Wear TSP Wear TSP Wear Freespan Wear	50.02 48.5 45.04 52.89	16	0
SONGS3_88R	99	87	WAR 07C -0.40 WAR 07H -0.65	TSP Wear TSP Wear	45.3 41.79	17	0
SONGS3_88R	100	80	WAR 07H -0.59 WAR 07C +0.48 SVI B02 +2.33 SVI B02 +1.50	TSP Wear TSP Wear Freespan Wear Freespan Wear	44.25 42.8 79.67 52.61	18	0
SONGS3_88R	100	82	WAR 07C -0.57 WAR 07H -0.58	TSP Wear TSP Wear	54.2 47.02	19	0
SONGS3_88R	100	86	WAR 07C -0.47	TSP Wear	41.54	20	0
SONGS3_88R	101	81	WAR 07C -0.48 WAR 07H -0.64 SVI B02 +9.79 SVI B02 +6.98	TSP Wear TSP Wear Freespan Wear Freespan Wear	53.08 50.13 74.28 50.74	21	0
SONGS3_88R	101	83	WAR 07C -0.50 WAR 06H -0.67 WAR 07H -0.41 SVI B07 +8.22 SVI B09 -0.76	TSP Wear TSP Wear TSP Wear Freespan Wear Freespan Wear	47.53 49.2 53.18 53.17 47.01	22	0

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 88R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_88R	101	85	WAR 07H -0.52 WAR 07C -0.48 SVI B02 +3.12	TSP Wear TSP Wear Freespan Wear	47.3 47.32 46.82	23	0
SONGS3_88R	101	87	WAR 07C -0.51 WAR 07H -0.54	TSP Wear TSP Wear	47.0 45.13	24	0
SONGS3_88R	102	78	SVI B02 +7.66	Freespan Wear	98.67	25	0
SONGS3_88R	102	80	WAR 07C -0.48 SVI B02 +9.22 SVI B02 +1.80	TSP Wear Freespan Wear Freespan Wear	43.2 58.04 52.74	26	0
SONGS3_88R	102	82	WAR 07C -0.56 WAR 07H -0.60 SVI B02 +5.55	TSP Wear TSP Wear Freespan Wear	57.53 56.99 57.67	27	0
SONGS3_88R	102	86	WAR 07H -0.28 WAR 07C -0.56	TSP Wear TSP Wear	46.03 41.05	28	0
SONGS3_88R	103	77	WAR 07C -0.73	TSP Wear	41	29	0
SONGS3_88R	103	79	WAR 07C -0.64 WAR 07H -0.69	TSP Wear TSP Wear	54.8 55.0	30	0
SONGS3_88R	103	81	WAR 07H -0.62 WAR 07C -0.38 SVI B02 +7.01	TSP Wear TSP Wear Freespan Wear	51.83 48.54 50.2	31	0
SONGS3_88R	103	83	WAR 07H -0.62 WAR 07C -0.48	TSP Wear TSP Wear	45.15 44.7	32	0
SONGS3_88R	103	85	WAR 07C -0.58 SVI B02 +2.97	TSP Wear Freespan Wear	48.09 48.34	33	0
SONGS3_88R	103	87	WAR 07C -0.35	TSP Wear	46	34	0

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 88R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_88R	104	78	WAR 07C -0.57 WAR 07H -0.74 SVI B02 +9.03 SVI B03 +1.37	TSP Wear TSP Wear Freespan Wear Freespan Wear	49.7 48.6 92.55 91.66	35	0
SONGS3_88R	104	80	WAR 07H -0.73 WAR 07C -0.55 SVI B02 +9.75	TSP Wear TSP Wear Freespan Wear	46.06 56.9 58.64	36	0
SONGS3_88R	104	82	WAR 07H -0.55 WAR 07C -0.58 SVI B02 +4.54 SVI B08 +8.50	TSP Wear TSP Wear Freespan Wear Freespan Wear	51.22 47.84 59.14 47.3	37	0
SONGS3_88R	104	84	WAR 07C +0.02 WAR 07H -0.48 SVI B08 +15.16	TSP Wear TSP Wear Freespan Wear	48.49 50.75 65.65	38	0
SONGS3_88R	104	86	WAR 07H -0.58 SVI B02 +7.32	TSP Wear Freespan Wear	51.84 48.65	39	0
SONGS3_88R	105	77	SVI B02 +7.90	Freespan Wear	72.85	40	0
SONGS3_88R	105	79	WAR 07C -0.50 WAR 06H -0.55 SVI B03 +0.55	TSP Wear TSP Wear Freespan Wear	48.2 48.02 51.44	41	0
SONGS3_88R	105	81	WAR 07H -0.59 WAR 07C -0.66 SVI B02 +3.83	TSP Wear TSP Wear Freespan Wear	48.86 45 57.82	42	0
SONGS3_88R	105	83	WAR 07C -0.70	TSP Wear	53.13	43	0
SONGS3_88R	105	85	WAR 07C -0.43	TSP Wear	42.8	44	0
SONGS3_88R	105	87	SVI B02 +11.26	Freespan Wear	54.61	45	0

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 88R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_88R	106	76	WAR 07H -0.81	TSP Wear	45.4	46	0
SONGS3_88R	106	78	WAR 07H -0.70 WAR 07C -0.31 SVI B03 +1.39	TSP Wear TSP Wear Freespan Wear	64.6 55.3 91.7	47	0
SONGS3_88R	106	80	WAR 07C -0.53 WAR 07H -0.75 SVI B08 +7.16	TSP Wear TSP Wear Freespan Wear	48.6 48.8 54	48	0
SONGS3_88R	106	82	WAR 07C -0.43 SVI B08 +8.32 SVI B03 -0.41	TPS Wear Freespan Wear Freespan Wear	46.48 49.6 50.8	49	0
SONGS3_88R	106	84	WAR 07H -0.64 SVI B09 +0.00	TSP Wear Freespan Wear	45.3 65.5	50	0
SONGS3_88R	106	86	SVI B02 +6.03	Freespan Wear	48.45	51	0
SONGS3_88R	107	77	WAR 07C -0.85 SVI B08 +10.74 SVI B02 +8.30	TSP Wear Freespan Wear Freespan Wear	47.2 47.5 78.8	52	0
SONGS3_88R	107	79	WAR 07H -0.77 SVI B03 +0.19	TSP Wear Freespan Wear	45.4 56.16	53	0
SONGS3_88R	107	81	SVI B02 +5.43	Freespan Wear	58.9	54	0
SONGS3_88R	107	85	SVI B02 +12.44	Freespan Wear	46.77	55	0
SONGS3_88R	107	87	SVI B02 +10.66 SVI B02 +11.20	Freespan Wear Freespan Wear	54 53.74	56	0
SONGS3_88R	108	76	WAR 07H -0.72 SVI B08 +6.92	TSP Wear Freespan Wear	62.3 46.8	57	0

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 88R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_88R	108	78	WAR 07C -0.70 WAR 07H -0.62 SVI B02 +11.31 SVI B09 +0.25	TSP Wear TSP Wear Freespan Wear Freespan Wear	53.5 60.5 66.6 47.2	58	0
SONGS3_88R	108	80	WAR 07H -0.68 SVI B08 +7.76 SVI B02 +12.36	TSP Wear Freespan Wear Freespan Wear	45.3 53.4 71.98	59	0
SONGS3_88R	108	82	WAR 07C -0.56 WAR 07H -0.54 SVI B02 +13.40	TSP Wear TSP Wear Freespan Wear	43.57 45.38 48.8	60	0
SONGS3_88R	109	77	WAR 07H -0.70 SVI B08 +11.19	TSP Wear Freespan Wear	47.9 48.5	61	0
SONGS3_88R	109	79	WAR 07C -0.51	TSP Wear	41.7	62	0
SONGS3_88R	109	81	WAR 07H -0.53 WAR 07C -0.57	TSP Wear TSP Wear	50.41 42.44	63	0
SONGS3_88R	110	78	WAR 07C -0.60 SVI B02 +11.16	TSP Wear Freespan Wear	47.2 62	64	0
SONGS3_88R	110	80	SVI B02 +12.10 SVI B08 +10.78	Freespan Wear Freespan Wear	67 48.6	65	0
SONGS3_88R	111	81	WAR 07H -0.56 SVI B02 +14.33	TSP Wear Freespan Wear	46.12 55.65	66	0
SONGS3_88R	112	80	WAR 07H -0.49 SVI B08 +10.81	TSP Wear Freespan Wear	42.5 52.2	67	0
SONGS3_88R	113	81	SVI B02 +12.68	Freespan Wear	56.54	68	0
SONGS3_88R	117	77	SVI B02 +13.85	Freespan Wear	57	69	0

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 88R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_88R	117	79	SVI B03 +1.69	Freespan Wear	50.03	70	0
SONGS3_88R	119	77	SVI B02 +15.01	Freespan Wear	54	71	0
SONGS3_88R	119	79	SVI B03 +1.51	Freespan Wear	51.1	72	0
SONGS3_88R	120	78	WAR 07H -0.81	TSP Wear	47.6	73	0
			Totals:			73	

Notes (Rev. 0):

1. All locations have been verified for completion of all required ET exams.
2. Tube 106-78 has a 100% TWD flaw confirmed via pressurized drip testing. Tubes 102-78 and 104-78 also have flaws that measure 100% TWD by eddy current, but these are not believed to be throughwall based on the absence of leakage during the drip test. All other locations have been checked for %TWD and no locations are throughwall.
3. All locations have been examined for dents, bulges, obstructions, skip rolls, over expansions or other indications that could impair delivery of the tooling or the ability to seal in a tube.
4. Tube end repair may be performed at the Task Leader's discretion prior to in situ testing as allowed by SCE document S023-XXVII-29.85 Revision 9 (AREVA Procedure 03-6016219-008).

Approvals:

AREVA Integrity Engineering

SCE Concurrence

AREVA Lead Level III

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 88R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.

AREVA Data Management Lead

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 89R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_89R	88	88	WAR 07H -0.59	TSP Wear	44.9	1	0
SONGS3_89R	88	90	SVI B08 +6.04	Freespan Wear	55.13	2	0
SONGS3_89R	89	85	SVI B08 +7.69	Freespan Wear	48.8	3	0
SONGS3_89R	89	87	WAR 07C +0.29	TSP Wear	41.5	4	0
SONGS3_89R	89	89	WAR 07C -0.54	TSP Wear	50.7	5	0
SONGS3_89R	90	90	SVI B08 +6.30	Freespan Wear	55.15	6	0
SONGS3_89R	91	85	SVI B08 +7.96	Freespan Wear	48.29	7	0
SONGS3_89R	91	87	WAR 07C -0.53 WAR 07H -0.57	TSP Wear TSP Wear	43.4 49.4	8	0
SONGS3_89R	91	89	WAR 07C -0.55	TSP Wear	48.3	9	0
SONGS3_89R	91	91	WAR 07H -0.56	TSP Wear	50.7	10	0
SONGS3_89R	92	82	SVI B03 +0.88	Freespan Wear	46.8	11	0
SONGS3_89R	92	86	SVI B03 +0.97	Freespan Wear	46.3	12	0
SONGS3_89R	92	88	WAR 07C +0.49 SVI B07 +7.13	TSP Wear Freespan Wear	45.7 60.6	13	0
SONGS3_89R	92	90	WAR 07C -0.51 SVI B08 +6.10	TSP Wear Freespan Wear	46.0 49.5	14	0
SONGS3_89R	92	92	WAR 07C -0.69	TSP Wear	43.1	15	0
SONGS3_89R	93	87	WAR 07C +0.22	TSP Wear	48	16	0
SONGS3_89R	93	89	WAR 07H -0.52 WAR 07C -0.52 SVI B02 +11.96	TSP Wear TSP Wear Freespan Wear	44.4 44.4 53.5	17	0
SONGS3_89R	93	91	WAR 07C +0.28	TSP Wear	43.6	18	0
SONGS3_89R	94	82	SVI B03 +0.91	Freespan Wear	46.3	19	0

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 89R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_89R	94	86	WAR 07C -0.63 SVI B08 +3.70	TSP Wear Freespan Wear	42.6 52.7	20	0
SONGS3_89R	94	88	WAR 07H -0.58 WAR 07C -0.49 SVI B07 +7.15	TSP Wear TSP Wear Freespan Wear	45.1 51.7 61.7	21	0
SONGS3_89R	94	90	WAR 07H -0.51 SVI B03 -0.29 SVI B08 +6.48	TSP Wear Freespan Wear Freespan Wear	42.5 65.0 49.9	22	0
SONGS3_89R	95	83	SVI B08 +10.22	Freespan Wear	49.2	23	0
SONGS3_89R	95	89	WAR 07H -0.52 WAR 07C -0.57 SVI B02 +11.94	TSP Wear TSP Wear Freespan Wear	61.88 54.93 53.2	24	0
SONGS3_89R	95	91	WAR 07H -0.65 WAR 07C -0.54	TSP Wear TSP Wear	46.16 51.2	25	0
SONGS3_89R	96	86	WAR 07H -0.55 WAR 07C -0.52 SVI B08 +3.67	TSP Wear TWP Wear Freespan Wear	48.21 48.83 53.2	26	0
SONGS3_89R	96	88	WAR 07C -0.55 WAR 07H -0.51	TSP Wear TSP Wear	44 49.96	27	0
SONGS3_89R	96	90	WAR 07H -0.69 WAR 07C -0.55 SVI B02 +13.95	TSP Wear TSP Wear Freespan Wear	48.3 45.7 64.3	28	0
SONGS3_89R	97	83	SVI B08 +10.51	Freespan Wear	50.7	29	0
SONGS3_89R	97	85	WAR 07H -0.58 WAR 07C +0.43 SVI B02 +12.65	TSP Wear TWP Wear Freespan Wear	45.1 45 58.53	30	0
SONGS3_89R	97	87	WAR 07H -0.71 WAR 07C -0.59	TSP Wear TSP Wear	53.7 45.7	31	0

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 89R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_89R	97	89	WAR 07C -0.54 WAR 07H -0.43 SVI B08 +8.35	TSP Wear TSP Wear Freespan Wear	56.73 57.22 46.4	32	0
SONGS3_89R	97	91	WAR 07H -0.61 WAR 07C -0.65	TSP Wear TSP Wear	52.42 46.8	33	0
SONGS3_89R	98	80	SVI B02 +10.68	Freespan Wear	53	34	0
SONGS3_89R	98	82	SVI B02 +9.44	Freespan Wear	49.5	35	0
SONGS3_89R	98	84	WAR 07C -0.54	TSP Wear	43.3	36	0
SONGS3_89R	98	86	WAR 07H -0.52	TSP Wear	52.31	37	0
SONGS3_89R	98	88	WAR 07H -0.64 WAR 07C -0.50	TSP Wear TSP Wear	57.07 42.31	38	0
SONGS3_89R	98	90	WAR 07H -0.48 WAR 07C +0.10	TSP Wear TSP Wear	53.21 46.2	39	0
SONGS3_89R	99	85	SVI B02 +13.08	Freespan Wear	58.3	40	0
SONGS3_89R	99	87	WAR 07C +0.39	TSP Wear	44.2	41	0
SONGS3_89R	99	89	WAR 07C -0.57 WAR 07H -0.59	TSP Wear TSP Wear	63.55 61.97	42	0
SONGS3_89R	99	91	WAR 07H -0.58 WAR 07C -0.59	TSP Wear TSP Wear	63.93 47.67	43	0
SONGS3_89R	100	80	SVI B02 +10.46	Freespan Wear	53.6	44	0
SONGS3_89R	100	82	SVI B02 +9.60	Freespan Wear	48.6	45	0
SONGS3_89R	100	88	WAR 07H -0.62 WAR 07C -0.51	TSP Wear TSP Wear	56.55 42.9	46	0
SONGS3_89R	100	90	WAR 07H -0.65 WAR 07C -0.52	TSP Wear TSP Wear	55.51 45.72	47	0
SONGS3_89R	101	87	WAR 07C -0.55	TSP Wear	40.9	48	0

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 89R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.
SONGS3_89R	101	89	WAR 07C -0.53	TSP Wear	52.22	49	0
SONGS3_89R	102	78	SVI B08 +4.79	Freespan Wear	47.9	50	0
SONGS3_89R	102	80	SVI B08 +5.27	Freespan Wear	48.3	51	0
SONGS3_89R	103	85	SVI B08 +2.72	Freespan Wear	49.8	52	0
SONGS3_89R	103	87	SVI B08 +5.50	Freespan Wear	57.83	53	0
SONGS3_89R	104	78	SVI B08 +4.81	Freespan Wear	49.6	54	0
SONGS3_89R	105	85	SVI B08 +2.58	Freespan Wear	51.5	55	0
SONGS3_89R	105	87	SVI B08 +5.64	Freespan Wear	59.1	56	0
			Totals:			56	

Notes (Rev. 0):

1. All locations have been verified for completion of all required ET exams.
2. All locations have been checked for %TWD and no locations are throughwall.
3. All locations have been examined for dents, bulges, obstructions, skip rolls, over expansions or other indications that could impair delivery of the tooling or the ability to seal in a tube.
4. Tube end repair may be performed at the Task Leader's discretion prior to in situ testing as allowed by SCE document S023-XXVII-29.85 Revision 9 (AREVA Procedure 03-6016219-008).

Approvals:

AREVA Integrity Engineering

SCE Concurrence

AREVA Lead Level III

San Onofre Nuclear Station Unit 3 - U3F16B - S/G 89R
INSITU LIST (Rev. 0)

S/G	Row	Col	Reason for Test	Flaw Type	Structural Depth (%TWD)	Tube Qty.	Rev.

AREVA Data Management Lead

SONGS Unit 3
Steam Generator Inspection and Eddy Current Testing
0500 March 8, 2012

Examination Scope

Steam Generator 3E088 Secondary Side Leakage Test:
- Completed 2/10/12
- One leaking tube at approximately R106 C78, confirmed by eddy current
- Probable leak location in U-bend and is located 2" above 4th AVB on hot leg side
- Leakage rate approximately 0.001 gpm at 80 psi

Bobbin ECT
- Completed
- Refer to attached AREVA "Big Picture" report for status.

Rotating Probe (special interest)
- Base Scope:
- AVB bobbin indications => 20%
- TSP bobbin indications => 20%
- Freespan indications – all bobbin indications
- Bobbin indications as requested by ECT Level III

Rotating Probe Expansions:
- Expansion 1: Rotating probe inspection of all tube interface locations with retainer bars, issued to AREVA 2/19. Scope – U-bend region from TSP's 07H to 07C (94 tubes per steam generator)
- Expansion 2: Rotating probe inspection of tubes bounding the bobbin freespan indications by one tube, issued to AREVA 2/20. Scope consists of the U-bend region from TSP's 07H to 07C (72 tubes in 3E088 and 61 tubes in 3E089).
- Expansion 3: Rotating probe inspection of tubes with bobbin wear indications >= 20%. Scope is (23 tubes in 3E088 and 14 tubes in 3E089).
- Expansion 4: Rotating probe inspection of tubes bounding the bobbin freespan indications by three tube pitches, issued to AREVA 2/23. Scope consists of the U-bend region from TSP's 07H to 07C (146 tubes in 3E088 and 183 tubes in 3E089). Acquisition and resolution of the data from this expansion is complete, no new indications were found. No further bounding of the freespan indications is planned.
- Expansion 5: Rotating probe (pancake coil) inspection of tubes to determine if AVB to Tube gap size (cold) can be estimated. Scope consists of the U-bend region from TSP's 07H to 07C (21 tubes in steam generator E088). Data analysis is completed. The results concluded no additional information on AVB to Tube gap size can be obtained using pancake coil rotating probes.
- Expansion 6 (not yet issued): Bobbin and rotating probe inspections of in-situ candidate tubes following pressure testing. Scope will be issued once the in-situ candidates have been identified (FC 3/8).

- Refer to attached AREVA "Big Picture" report for status.

Findings to Date

Bobbin and Rotating Probe ECT

- Steam Generator 3E088

Through Wall Thickness Percentage, Number of Tubes

	>= 50%	35-49%	20-34%	10-19%	<10%	Total
U-Bend Freespan Wear	26	18	18	7	0	69
TSP Wear	48	25	14	55	11	153
AVB Wear	0	2	48	298	346	694
Totals	74	45	80	360	357	916

(The totals above reflect only the largest indication in each tube. Since a tube may have multiple indications, the above totals will not match the attached charts)

8811 tubes do not have indications

- Steam Generator 3E089

Through Wall Thickness Percentage, Number of Tubes

	>= 50%	35-49%	20-34%	10-19%	<10%	Total
U-Bend Freespan Wear	16	29	13	9	0	67
TSP Wear	44	39	20	27	9	139
AVB Wear	0	0	14	243	423	680
Totals	60	68	47	279	432	886

(The totals above reflect only the largest indication in each tube. Since a tube may have multiple indications, the above totals will not match the attached charts)

8841 tubes do not have indications

Retainer Bar Indications Characterized by Rotating Probe ECT

- Steam Generator 3E088: Three tubes with wear indications at retainer bars B10 and B11, 44%, 28%, and 41% through wall depth.
- Steam Generator 3E089: One tube with wear indication at retainer bar B11, 46% through wall depth.

Repair Scope

- Depth sizing of the rotating probe examinations is complete.
- The repair scope will be determined once the cause of the freespan indications is determined. A preliminary estimate of the repair scope can be estimated by including all tubes with TSP and AVB wear >= 35% as well as all tubes with freespan indications and tubes that interface with Retainer Bars.
- From the above tables, the repair scope estimate is provided in the following table:

	3E088	3E089
U-Bend Freespan Wear (All)	69	67
TSP Wear (>=35% TWD)	73	83
AVB Wear (>=35% TWD)	2	0
Retainer Bar (All)	94	94
Totals	238	244

Significance of Findings

Leakage Test

The leak location is near the center of the tube bundle in the region with tube to AVB wear in Unit 2's steam generators. This location is not associated with the retainer bars.

A remote visual inspection from the tube ID was completed 3/5. No evidence of leak location.

Freespan Indications

Bobbin ECT results indicate the leak location is in the U-bend of the tube; ~2" above the 4th AVB intersection with the tube. The leak location is near the middle of a 20" long axial freespan indication. Similar indications have been found in adjacent tubes. Additionally, wear has been found in nearly all of the tube to support structures for this tube. Similar support structure wear has been identified in adjacent tubes. The freespan indications are oriented at the top or bottom of the tube.

The bobbin probe examination has been used to bound the region with these indications. One region of 161 tubes has been identified in steam generator 3E088. A similar region of 165 tubes is present in 3E089. The freespan bobbin indications have been characterized by rotating probe. Rotating probe results are consistent with the bobbin findings.

Data review of wear profile above and below AVB is complete.

ECT Techniques for Freespan Indications

The ECT consultant from (b)(4) has completed his review. He concurs with the use of the bobbin probe for detection of the freespan indications and the rotating probe for depth sizing. AREVA has initiated a site-specific validation of the sizing technique as recommended by the consultant. Validation was completed 2/17.

Condition monitoring will require in-situ pressure testing.

Condition monitoring is a formal evaluation process that reviews the ECT results against performance criteria from the plant technical specifications. According to EPRI guidelines, the leaking tube requires in-situ testing to be completed as part of the condition monitoring process. In this test, the individual tube is pressurized to design conditions. Testing procedures are complete; testing acceptance criteria need to be finalized.

Refueling Outage Inspection

The industry steam generator inspection guidelines require a complete inspection during the upcoming Unit 3 refueling outage. Inspections performed during the forced outage do not offset this requirement.

Retainer Bar Inspections

100% of the bobbin data has been evaluated, 4 tubes have indications. Wear locations are consistent with those found in Unit 2 steam generators. A visual examination performed 2/19 found no unexpected or unusual conditions in 3E088. A similar inspection is being planned for 3E089.

Industry Experts

In parallel with the efforts of (b)(4) technical team, we have put together a team of other industry experts in thermal-hydraulics and flow-induced vibration analysis. Team members are also experienced in previous industry events involving unusual steam generator tube wear. Current efforts include a comprehensive, independent review of the steam generator thermal-hydraulic modeling and refinements to tube stability analysis.

Secondary Side Inspection

Inspections from the secondary side of the steam generator are in progress to supplement the ECT inspection results. Refer to the Secondary Side Inspection Summary for more information.

Divider Plate Weld Separation

During fabrication of the Unit 3 steam generators in Japan, the primary channel head divider plate weld separated from the channel head in both steam generators. Repairs were completed by MHI

prior to shipping the steam generators to the SONGS. Visual and Ultrasonic (UT) examinations of the divider to bowl region are planned during this outage. The UT examination was completed 2/20 with satisfactory results. The visual examination was completed 2/29 with satisfactory results.

Current Actions

- Eddy Current Testing	Steam Generator E088 – Special Interest began 2/17 Steam Generator E089 – Special Interest began 2/18
- In-situ testing	Schedule under review – In-situ scope forecast 3/9
- Plugging/Stabilizing	Holding for In-situ test and criteria development
- Secondary Side Inspections	Refer to table
- Industry Experts	Daily meetings
- Visual of Leaking Tube from ID	Data Obtained, no evidence of leak location observed

Planned Actions

- Examination in 3C17
- Discussions with manufacturer and NRC
- Industry communications per S/G Program
- Condition Monitoring and Operational Assessment – TBD
- First In Situ Test – testing forecast to begin early in week of 3/12

Unit 3 Secondary Side Inspection

Unit 3 SG E088	Status	Unit 3 SG E089	Status
Revision 0: Secondary Manway - Condition of Upper Bundle - Condition of Retainer Bars	Data Obtained, Engineering Review FC 3/9	Revision 0: Secondary Manway - Condition of Upper Bundle - Condition of Retainer Bars	Data Obtained, Engineering Review After 3E088
Revision 1: Transition Cone Handhole - Condition of 7th TSP in region of U3 Wear - Condition of AVB and tube to AVB gaps in region of U3 Wear - Condition of areas of no wear	Review Complete, Correlating with ECT	Revision 1: Transition Cone Handhole - Condition of 7th TSP in region of U3 Wear - Condition of AVB and tube to AVB gaps in region of U3 Wear - Condition of areas of no wear	Complete " "

Steam Generator 3E088 Additional Detail:

The revision 0 inspection found retainer bars and AVB's intact with no anomalous indications. Additional inspection scope was added to align the content of both Unit 2 and Unit 3 inspections. The revision 1 visual examination has found tube to tube wear and tube to AVB wear consistent the ECT results. Engineering review of the examination and a tube by tube comparison with the ECT results has resumed following completion of the Unit 2 secondary side inspections.

SONGS Unit 2
Steam Generator Inspection and Eddy Current Testing
0500 March 8, 2012

Scope and Status

Bobbin ECT

- Steam Generator 2E088: Complete on 9727/9727 tubes (100%)
- Steam Generator 2E089: Complete on 9727/9727 tubes (100%)
- Totals: 19454/19454 tubes (100%)

Rotating Probe (special interest)

- Steam Generator 2E088: Complete on 203/203 tubes (100%)
- Steam Generator 2E089: Complete on 162/162 tubes (100%)
- Totals: 365/365 tubes (100%)

Rotating Probe (top of tubesheet expanded scope)

- Steam Generator 2E088: Complete on 2060/2060 tubes (100%)
- Steam Generator 2E089: Complete on 2060/2060 tubes (100%)
- Totals: 4120/4120 tubes (100%)

Rotating Probe (tube/retainer bar intersections expanded scope)

- Steam Generator 2E088: Complete on 192/192 tubes (100%)
- Steam Generator 2E089: Complete on 192/192 tubes (100%)
- Totals: 384/384 tubes (100%)

Findings to Date

Bobbin ECT

	Through Wall Thickness Percentage, Number of Tubes				
	>35%	20-34%	10-19%	<10%	None
- Steam Generator 2E088:	2	74	406	600	8645
- Steam Generator 2E089:	-	65	496	768	8398
- Totals:	2	139	902	1368	17043

Rotating Probe (special interest)

- Steam Generator 2E088: Two wear indications at retainer bars, on separate tubes, 54% and 47% through wall depth.
- Steam Generator 2E089: Five wear indications at retainer bars, on four tubes. Indications characterized at 90%, 38%, 30%, 29% and 28% through wall depth.

Rotating Probe (top of tubesheet expanded scope)

- Steam Generator 2E088: No wear or potential loose part indications.
- Steam Generator 2E089: No wear or potential loose part indications.

Rotating Probe (tube/retainer bar intersections)

- Steam Generator 2E088: No other indications.
- Steam Generator 2E089: No other indications.

Significance of Findings

Wear indications at retainer bars

The top of the tube bundle has two sets of retainer bars, each set spanning between 23 tube columns at the periphery. The total number of tubes that are adjacent to retainer bars is 94 per steam generator.

Potential loose part at tube support plate

The straight leg portion of the tube bundle has seven tube support plates approximately equally spaced between the tubesheet and the U-bend portion. Steam generator 2E088 had a foreign object at the middle support plate between adjacent tubes. The foreign object (~7/8" long by ½" wide) has been removed. Metallurgical analysis of the object indicates it was weld metal from a nickel to carbon steel weld. This means the object was most likely introduced during fabrication by MHI. MHI has been asked to attempt to identify the likely source of the weld metal. This is a longer term action. In addition, the ECT preplan included a provision for expanding the scope of rotating probe exams to include the top of tubesheet area, outer three tubes, in case of a confirmed loose part. This examination is complete with no wear or potential loose part indications.

Condition monitoring required in-situ pressure testing.

Condition monitoring is a formal evaluation process that reviews the ECT results against performance criteria from the plant technical specifications. According to EPRI guidelines, the depth of the retainer bar wear indications required in-situ testing to be completed as part of the condition monitoring process. In this test, the individual tube is pressurized to design conditions. Test complete and satisfactory; no leakage occurred.

Operational assessment will require examinations in the next outage.

Operational assessment is a forward-looking process of predicting the expected wear during the interval to the next examination. This process determines when the next examination will be required.

Preliminary Operational Assessment (OA) – Completed. The evaluation (considering only Unit 2's inspection results) showed the structural and leakage criteria will continue to be met during the next operating cycle.

Preliminary Operational Assessment Update – an update to the preliminary OA is planned following SCE's determination of the Reactor Coolant System and Steam Generator operational parameters for the upcoming cycle (refer to later discussion).

An updated OA will be prepared addressing the emergent findings of freespan tube to tube wear in Unit 3's steam generators. The preliminary OA discussed above contains results of Unit 2 steam generator inspections performed as a result of the tube-to tube wear found in Unit 3, but does not yet address the potential for this mechanism to arise during further operation of Unit 2. An update of this OA is planned prior to Unit 2's return to service.

Tube plugging and stabilization criteria.

The four tubes with wear indications at AVB supports have been plugged and stabilized.

Retainer Bar and Unit 3 Wear Secondary Side Inspections.

An additional secondary side inspection of the upper bundle U-bend region in both Unit 2 steam generators has been completed. The purpose of the inspection was to visually examine the AVB's and AVB retaining structures (including the Retainer Bars) as well as tubes and supports in the region experiencing wear in Unit 3's steam generators.

Current Actions

- Operating Parameters – Resolution for Return to Service T_{hot} – FC 3/9
- Preliminary Operational Assessment Report – Incorporate RTS T_{hot} (if needed) – FC 3/12

- Final Operational Assessment Report – Incorporate Unit 3 investigation results

Planned Actions

- Examination in 2C18
- Discussions with manufacturer and NRC
- Industry communications per S/G Program

Retainer Bar Investigation

Rotating Probe (special interest)

- Steam Generator 2E088: Two wear indications at retainer bars, on separate tubes, 54% and 47% through wall depth.
- Steam Generator 2E089: Five wear indications at retainer bars, on four tubes. Indications characterized at 90%, 38%, 30%, 29% and 28% through wall depth.

MHI Input

- Retainer Bar Dimensions: Two diameters of retainer bar are in use in our steam generators, twelve of each diameter are present in each steam generator. The indications only occurred at the smaller diameter bars.
- Repair Plan MHI issued their analysis and a repair scope was developed for the retainer bar indications. All tubes adjacent (94) to the retainer bars have been removed from service by the installation of tube plugs. Twelve of these tubes and the tubes with the wear at retainer bar locations have been internally stabilized.

In-Situ Pressure Testing

Testing Program – Test complete no leakage observed

- Main Steam Line Break: 3200 psi with leak rate < 0.5 gpm. Hold time for the test is 2 minutes. Note that the testing equipment is capable of a maximum of ~4.5 gpm at 7000 psi.
- Structural Integrity: 5300 psi without tube burst; i.e., which would be indicated by depressurization. There is no leakage acceptance limit for this test pressure. Hold time for the test is 2 minutes.

Remaining Eddy Current Testing

Following completion of the Unit 2 ECT examinations, Unit 3 ECT data developed indicating a tube-to-tube contact mechanism affecting both steam generators in the other unit. In order to confirm that this mechanism is not present in the Unit 2 steam generators, an additional review was conducted of the previously collected Unit 2 ECT data.

The data review plan sampled existing bobbin data from approximately 1000 tubes in each steam generator for similar indications in Unit 2 locations that mirror the locations where freespan indications have been found in Unit 3. The review has been completed; no freespan indications were found in either Unit 2 steam generator.

As work on the cause of the Unit 3 freespan indications continues, we have concluded that the ECT program conducted during the Unit 2 inspection proved freespan indications are absent from both Unit 2 steam generators.

All ECT examinations and data review have been completed in Unit 2.

Operating Parameters – Resolution for Return to Service T_{hot}

(b)(4)

Condition Monitoring Report

- Draft for review by SCE and Industry Peers – Complete
- Complete and issue report – Complete

Operational Assessment Report

- Draft preliminary report for review by SCE and Industry Peers – Complete
- Complete and issue preliminary report – Complete
- Final report draft for SCE and Industry Peer Review – TBD

Unit 2 Secondary Side Inspection

Unit 2 SG E088	Status	Unit 2 SG E089	Status
Revision 0: Secondary Manway - Condition of Upper Bundle - Condition of Retainer Bars	Complete "	Revision 0 Secondary Manway - Condition of Upper Bundle - Condition of Retainer Bars	Complete "
Revision 1: Transition Cone Handhole - Condition of 7th TSP in region of U3 Wear - Condition of AVB and tube to AVB gaps in region of U3 Wear	Complete "	Revision 1: Transition Cone Handhole - Condition of 7th TSP in region of U3 Wear - Condition of AVB and tube to AVB gaps in region of U3 Wear	Complete "

Results from Unit 2 Secondary Side Inspection

The inspection from the transition cone handhole in both steam generators is complete. No indications of tube to tube or tube to AVB wear have been identified. No abnormal conditions have been detected at the top of the 7th TSB. Visual tube wear at AVB locations has been correlated with ECT data. A second review of the recordings has been completed with no additional findings.

The inspection from the secondary manway of both steam generators is complete. No abnormal conditions were found with the condition of the upper bundle or the retainer bars.

From:	Werner, Greg
To:	Thurston, Carl; Murphy, Emmett; Rivera-Ortiz, Jose; Ornega-Luciano, Jonathan; Johnson, Andrew; Reynoso, John
Cc:	Anchondo, Isaac; Bloodgood, Michael; Warrick, Greg
Subject:	FW: presentation
Date:	Friday, April 20, 2012 12:11:21 PM
Attachments:	SONGS 3 OPERATIONAL Assess Draft 4-4-12.pdf

FYI

From: (b)(6)
Sent: Friday, April 20, 2012 12:11 PM
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Engineering Information Record

Document No.: 51 - 9180144 - 000

SONGS Unit 3 February 2012 Leaker Outage - Steam Generator Operational Assessment

Safety Related? ☒ YES ☐ NO

Does this document contain assumptions requiring verification? ☒ YES ☐ NO

Does this document contain Customer Required Format? ☐ YES ☒ NO

Signature Block

Name and Title/Discipline	Signature	P/LP, R/LR, A/A-CRF, A/A-CRI	Date	Pages/Sections Prepared/Reviewed/ Approved or Comments
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Note: P/LP designates Preparer (P), Lead Preparer (LP)
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Record of Revision

Revision No.	Pages/Sections/ Paragraphs Changed	Brief Description / Change Authorization
000	All	Original Release

Table of Contents

List of Tables

Page

List of Figures

1.0 PURPOSE

In accordance with the SONGS technical specifications and EPRI Steam Generator Integrity Assessment Guidelines [2], an operational assessment (OA) must be performed to ensure that steam generator (SG) tubing will meet established performance criteria for structural and leakage integrity during the operating period prior to the next planned inspection. The OA projects and evaluates tube degradation mechanisms which have affected the SGs to date. The performance criteria are defined in plant technical specifications and are based on NEI 97-06 [1] (see Section 4.0 below).

This report documents the OA performed during the 2012 SONGS Unit 3 leaker outage, and concludes that there is reasonable assurance that the performance criteria will be satisfied throughout the next four effective full power months (EFPM) of operation, contingent upon verification of the assumptions identified in Section 3.0.

2.0 SCOPE

This evaluation pertains to the SONGS Unit 3 replacement steam generators which are reactor coolant system components. In accordance with reference [10], the OA documented in this report is required to be completed prior to plant entry into Mode 4 during start up from the current outage.

Note that the required SG condition monitoring (CM) assessment is documented in a separate report [11] and is summarized below in Section 5.3.

3.0 ASSUMPTIONS REQUIRING VERIFICATION

1) All tubes that were degraded by tube-to-tube wear (TTW) will be plugged.

2) All tubes with degradation sized ≥35%TW will be plugged.

3) All tubes with retainer bar (RB) wear indications will be stabilized and plugged.

3) All tubes adjacent to retainer bars will be plugged. Prior to plugging, the tubes on either side of all retainer bars, at each end of the retainer bars, and at the center of the retainer bars, will be stabilized.

3) Regarding the discrete bundle regions affected by aggressive TTW: It is assumed that corrective actions implemented and analyses performed during the current outage will provide reasonable assurance that the region of instability that caused the wear will not shift to another region within the tube bundle, and will not threaten the integrity of inservice tubes during another four effective full power months (EFPM) of operation.

4) The secondary side steam pressure will remain at or above 830 psia during normal operation following startup from the current outage.

5) No changes to nominal operating conditions which could exacerbate the growth rate of anti-vibration bar (AVB) wear and tube support plate (TSP) wear will be implemented during the next operating period (4 EFPM).

4.0 PERFORMANCE CRITERIA

The SONGS-3 performance criteria, based on NEI 97-06 [1], are as follows:

- *Structural Integrity Performance Criterion (SIPC)*: All inservice steam generator tubes shall retain structural integrity over the full range of normal operating conditions (including startup, operation in the power range, hot standby, cooldown, and all anticipated transients included in the design specification) and design basis accidents. This includes retaining a safety factor of 3.0 against burst under normal steady state full power operation primary-to-secondary pressure differential and a safety factor of 1.4 against burst applied to the design basis accident primary-to-secondary pressure differentials. Apart from the above requirements, additional loading conditions associated with the design basis accidents, or combination of accidents in accordance with the design and licensing basis, shall also be evaluated to determine if the associated loads contribute significantly to burst or collapse. In the assessment of tube integrity, those loads that do significantly affect burst or collapse shall be determined and assessed in combination with the loads due to pressure with a safety factor of 1.2 on the combined primary loads and 1.0 on axial secondary loads.

- *Accident Induced Leakage Performance Criterion (AILPC)*: The primary to secondary accident induced leakage rate for the limiting design basis accident, other than a SG tube rupture, shall not exceed the leakage rate assumed in the accident analysis in terms of total leakage rate for all SGs and leakage rate for an individual SG. In the SONGS-3 SGs, for all types of degradation, leakage is not to exceed 0.5 gpm per SG and 1 gpm through both SGs.

- *Operational Leakage Performance Criterion (OLPC)*: The RCS operational primary-to-secondary leakage through any one SONGS-3 SG shall be limited to 150 gallons per day (0.104 gpm) per SONGS Limiting Condition for Operation (LCO) 3.4.13 "RCS Operational Leakage."

5.0 BACKGROUND

5.1 Steam Generator Design

SONGS Unit 3 is a two loop Combustion Engineering (CE) PWR which began commercial operation in 1984. The original CE steam generators were replaced in the fall of 2010 with new SGs designed and manufactured by Mitsubishi Heavy Industries (MHI). (b)(4)

(b)(4)

(b)(4)

5.2 Mid-Cycle 16 Operational Leakage

On January 31, 2012 while operating normally at full power, a high radiation alarm from the condenser air ejector line revealed a primary to secondary leak within SG88. The leak rate increased from 30 gallons per day to 82 gallons per day within 66 minutes; remaining below the Technical Specification limit of 150 gallons per day. Operations responded by rapidly reducing power at approximately 1% per minute to 35% power and then removed the unit from service. After cooling to mode 5 and draining the primary coolant system to midloop, the leaking SG tube (SG88 R106 C78) was located by filling the secondary side of the steam generator and pressurizing to 60 psig with nitrogen. The leak location was confirmed by eddy current testing to be within the u-bend portion of the tube bundle, in the tube freespan. The tube degradation which resulted in the leak was most likely caused by in-plane flow-induced tube vibration and associated tube-to-tube wear (TTW). A root cause assessment has been initiated.

Prior to the forced shutdown, the replaced Unit 3 SGs had been operated for approximately 10 months, or 338 effective full power days (EFPD) in fuel cycle 16.

5.3 Condition Monitoring Assessment Conclusions

A detailed description of the steam generator workscope and findings, and the CM assessment of SG tube condition as determined during the 2012 Unit 3 leaker outage are documented in reference [11]. The CM assessment evaluated all SG tube degradation detected during the leaker outage against the three SONGS technical specification performance criteria. Through a combination of eddy current inspection, analytical evaluation, in-situ pressure testing, and operational leakage monitoring, the following conclusions were drawn:

- Despite the fact that operational SG tube leakage resulted in a forced outage, the leak rate remained well below the technical specification limit (150 GPD); therefore the operational leakage integrity performance criterion was met.
- A total of eight tubes failed to meet the structural integrity performance criterion due to severe tube-to-tube wear and tube support plate wear.
- A total of three tubes failed to meet the accident induced leakage performance criteria due to severe tube-to-tube wear and tube support plate wear.

Figure 5-1: SONGS Steam Generator Support Structure Layout

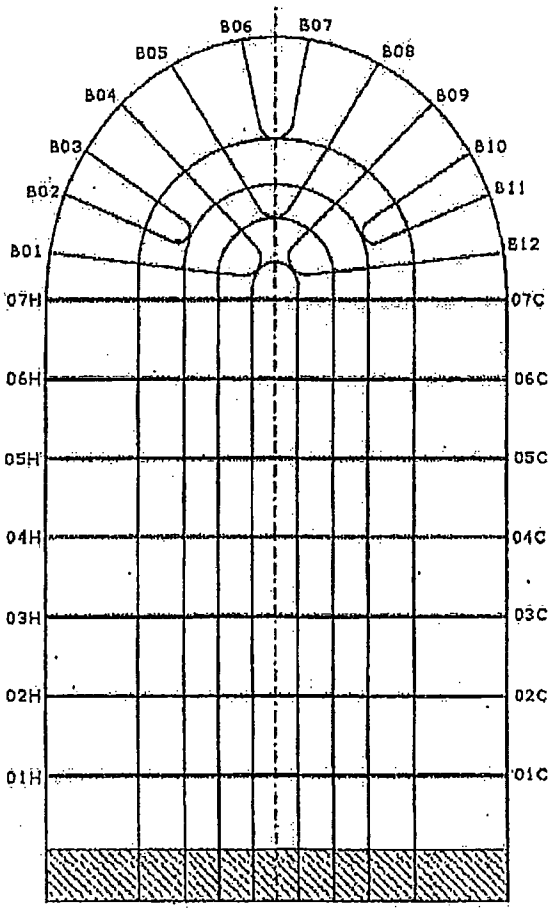

Figure 5-2: View From Above Bundle Showing Retainer Bar Locations

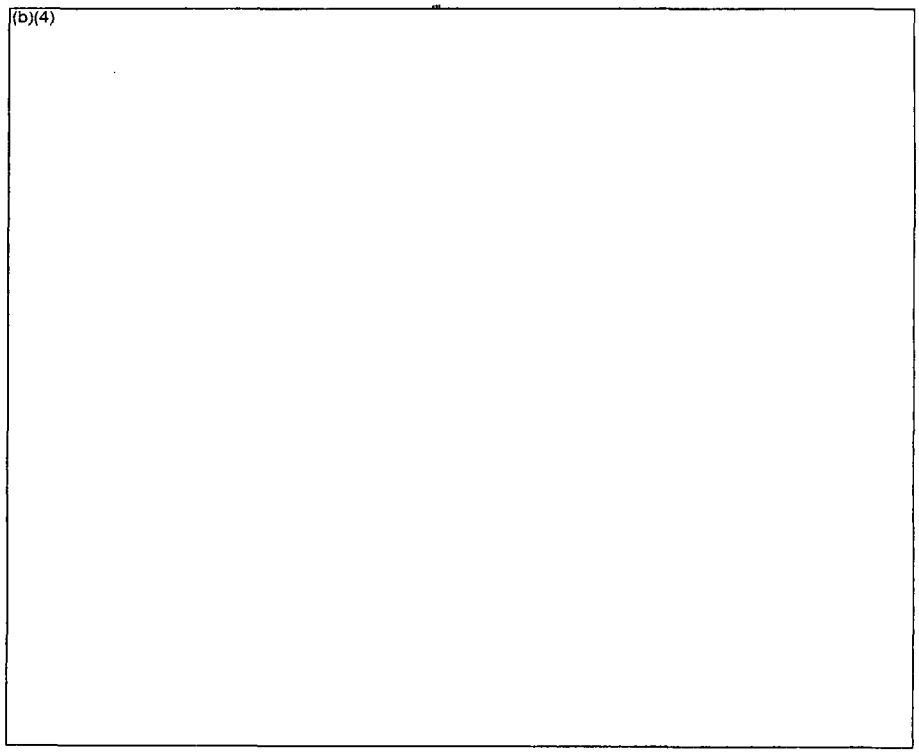

Figure 5-3: Sketch Showing Retainer Bar Location

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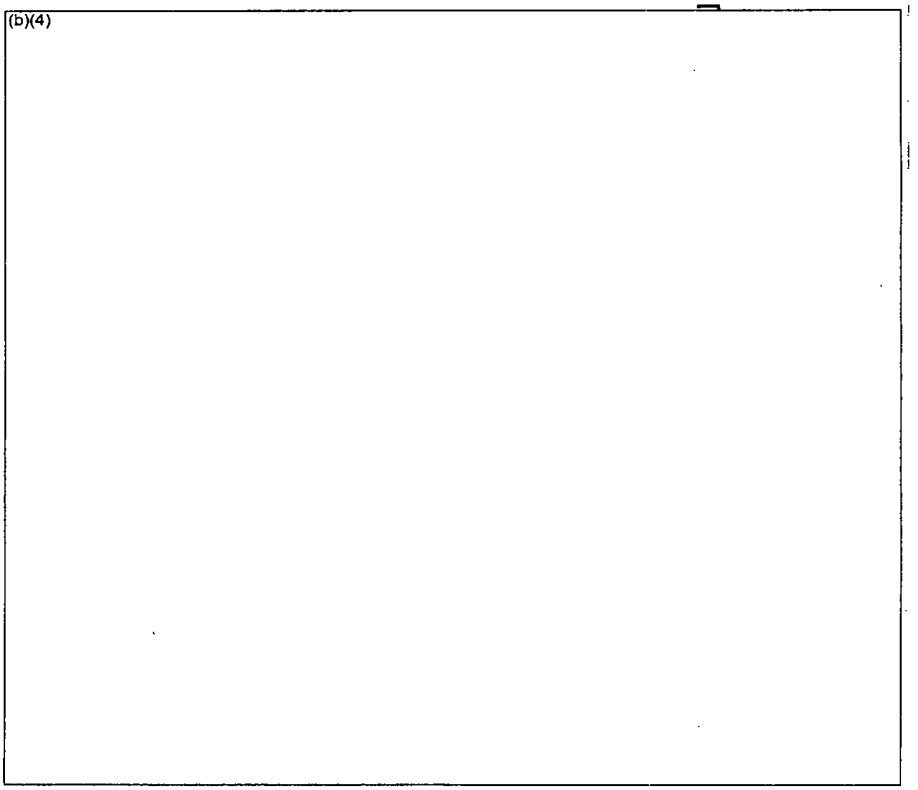
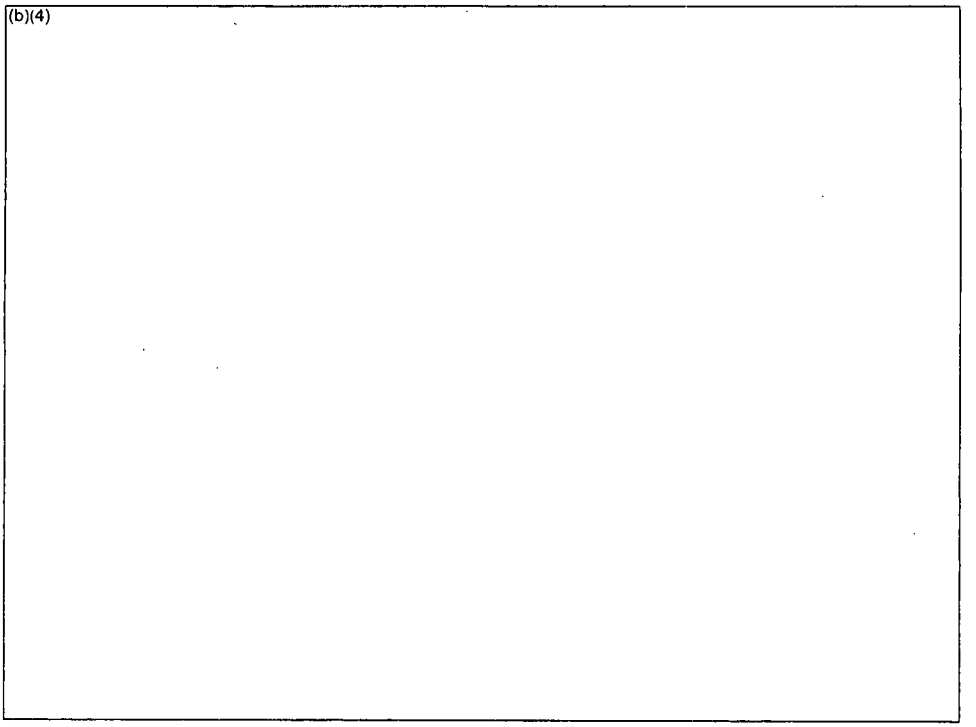


Figure 5-4: Sketch Showing Retainer/Retaining Bar Configuration

(b)(4)



6.0 OPERATIONAL ASSESSMENT

The SONGS SG Program requires that a "forward looking" operational assessment (OA) be performed in accordance with reference [2] to determine if the steam generator tubing will continue to meet the structural and leakage integrity requirements at the end of the upcoming operating period. The OA is based upon an evaluation of the degradation mechanisms observed during the current inspection. As discussed in reference [11], the following tube degradation mechanisms were identified during the Unit leaker outage:

- Anti-vibration bar (AVB) wear
- Tube support plate (TSP) wear
- Retainer bar (RB) wear
- Tube-to-tube wear (TTW)

The aggressive advancement of TTW and TSP wear observed within a discrete region of the tube bundles during the leaker outage requires rigorous thermal hydraulic and FIV analyses that, at the time of this writing, have not been completed. One of the objectives of these analyses is to determine if corrective actions (e.g., tube stabilization and plugging) to be implemented during the current outage provide adequate bases for concluding that the regions affected will remain isolated and unchanged during future operation. For the purpose of the analyses herein it is assumed that the corrective actions and analyses to be implemented will provide reasonable assurance that the region of instability will not shift to another region within the tube bundle, and will not affect the integrity of inservice tubes during another four effective full power months (EFPM) of operation. This assumption requires verification.

6.1 Input Parameters

Table 6-1 and Table 6-2 identify the input parameters used to perform the operational assessment. Consistent with the structural integrity criteria described in Section 4.0, the limiting pressure loading occurs at a value of three times the normal operating differential pressure. For Unit 3 this value is 4260 psi. The 4260 psi 3ΔP value is based on a conservative assessment of Unit 3 secondary side steam pressure as measured during cycle 16 (i.e., 830 psia). It is assumed that the secondary side steam pressure will remain at or above 830 psia during normal operation following startup from the leaker outage.

In addition to pressure loads, the OA must also consider the impact of non-pressure accident loads if they could have a significant effect on the burst pressure of the degraded tubes. The CM assessment [11] provides the basis for concluding that design-basis, non-pressure accident loads are not limiting for the tube wear mechanisms identified in the Unit 3 SG tubes. Consequently, the limiting loading scenario for the evaluation of structural and leakage integrity is that involving pressure loads evaluated with a safety factor of three (i.e., three times the normal operating differential pressure).

In order for a degraded tube to be returned to service, the degradation must be measured using a qualified ECT sizing technique and the degradation must be evaluated as acceptable for continued operation. The sizing techniques qualified for use at SONGS-3 are identified in the degradation assessment [5] and their sizing performance parameters are summarized in Table 6-2. If a degradation

mechanism cannot be sized with appropriate sizing confidence, it is plugged upon detection. All degradation identified during the current outage was measured with a qualified ECT technique.

Table 6-1: SONGS-3 Steam Generator Input Values

Parameter	*Value*
Desired probability of meeting burst pressure limit	0.95
Tubing wall thickness	0.043 inch, [7]
Tubing outer diameter	0.750 inch, [7]
Mean of the sum of yield and ultimate strengths at temperature	116440 psi, [8]
Standard deviation of the sum of yield and ultimate strengths	2460 psi, [8]
3 X Normal Operating Pressure Differential (3XNOPD)	4260 psid, [7]
MSLB Pressure Differential	2560 psid, [9]
EFPD from SG Replacement through U3 2/12 Leaker Outage	338, [7]
Expected EFPD from U3 2/12 Leaker Outage to EOC16	252, [7]

Table 6-2: Eddy Current ETSS Input Values [4]

Parameter	*ETSS 96004.1*	*ETSS 27903.1*	*ETSS 27901.1*	*ETSS 27902.2*	*ETSS 96910.1*
Probe Type	Bobbin Coil	+Point	+Point	+Point	+Point
NDE depth sizing regression parameters	Slope = 0.98 Intercept = 2.89 %TW	Slope = 0.97 Intercept = 2.80 %TW	Slope = 1.05 Intercept = -1.97 %TW	Slope = 1.02 Intercept = 0.94 %TW	Slope = 1.01 Intercept = 4.30 %TW
NDE depth sizing technique uncertainty (std)	4.19 %TW	2.11 %TW	2.30 %TW	2.87 %TW	6.68 %TW
NDE depth sizing analysis uncertainty (std)	2.10 %TW	1.06 %TW	1.15 %TW	1.44 %TW	3.34 %TW
Total NDE (Sizing and Technique) (std)*	4.69 %TW	2.36 %TW	2.60 %TW	3.22 %TW	7.48 %TW

* Total uncertainty is the technique and analysis uncertainties combined via the square root of the sum of the squares.

6.2 Evaluation of Structural Integrity

The fundamental OA structural integrity criteria is that the projected worst case degraded tube for each existing degradation mechanism must meet the limiting structural performance parameter with a 95% probability and 50% confidence. Due to the relatively large number of AVB wear and TSP wear flaws identified during the Unit 3 leaker outage, a probabilistic approach was used to perform the OA for these mechanisms.

6.2.1 AVB Wear and TSP Wear

It is assumed that all tubes that were affected by tube-to-tube wear (TTW) will be removed from service. As discussed above, it is also assumed that corrective actions implemented and analyses performed during the current outage provide the basis for concluding that the instability which caused aggressive wear will not threaten the integrity of inservice tubes during the next 4 EFPM of operation. These assumptions require verification. Since all tubes with TTW will be removed from service and since the phenomenon that caused TTW is assumed to remain isolated, the AVB wear and TSP wear mechanisms will be evaluated on the basis of their behavior outside the TTW region. This evaluation assumes that all tubes with AVB wear or TSP wear sized ≥35%TW will be plugged.

The typical deterministic approach for performing an OA for wear is to identify the worst case flaw during the current outage, apply an upper bound growth rate to reflect growth during the next cycle, and compare the resulting depth (i.e., the end-of-cycle (EOC) depth) to the CM limit curve. This is generally appropriate for degradation mechanisms which involve a small number of flaws. However, when a large number of flaws of a particular mechanism are expected to develop or are left inservice, it is non-conservative to perform a deterministic OA evaluation of this type. A probabilistic approach addresses

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degraded tube is calculated and compared with the value of 3XNOPD. This process is repeated thousands of times (via a monte carlo process) in order to develop a probability of burst for the worst case degraded tube. This value must be at least 95% to successfully satisfy the fundamental OA criteria. If the result is less than 95%, a lower plugging limit must be implemented. The calculation also considers uncertainties associated with material strength, NDE sizing, the ratio of maximum flaw depth to structurally significant flaw depth, and the burst equation itself. Within the full bundle OA tool, AVB and TSP wear are evaluated using the EPRI Flaw Handbook [3] degradation model for axial part-throughwall degradation less than 135° in circumferential extent, subjected to pressure loading of 3XNOP. The basis for the use of this flaw model is discussed in the CM assessment [11].

6.2.1.1 Growth Rates

One of the underlying assumptions implemented within the full bundle OA tool is that growth rates going forward are random with respect to the current wear depth. Since the Unit 3 SGs have operated for only a partial cycle it is not known if or to what extent this behavior will manifest itself.

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The growth rate distributions applicable to AVB wear and TSP wear for tubes outside of the TTW region are provided in Figure 6-1 through Figure 6-4. The AVB wear growth rates are based upon the data for SG88 which exhibited a somewhat higher growth rate than SG89. For TSP wear, the data from the two SGs was combined due to the relatively low number of flaws outside the TTW regions.

6.2.1.2 Structural Depth Ratio

For both AVB wear and TSP wear, a fixed value of 1.0 was used for the ratio of structural to maximum depth. This constitutes a conservative underlying assumption that the maximum indicated depth occurs throughout the entire flaw length.

6.2.1.3 Initiation and Depth Distribution of New Indications

(b)(4)

6.2.1.4 Results of Probabilistic OA for AVB Wear and TSP Wear

The fundamental OA criteria is that the projected worst case degraded tube for each existing degradation mechanism must meet the limiting structural performance parameter with a 95% probability and 50% confidence. The results of the probabilistic OA for AVB wear and TSP wear are provided in Table 6-3. Recall that this evaluation and these results pertain only to those AVB and TSP wear flaws which lie outside of the TTW region in each SG. The values provided in the table represent the projected probability of non-burst for the entire population of flaws in the specified group. These values compare directly with the 95/50 OA criteria. Note that the combined probability of non-burst for each mechanism is simply the product of the probabilities for the two depth groups evaluated (e.g., 0.997 x 0.967 = 0.964). Implementation of the ≥35%TW technical specification plugging limit for AVB and TSP wear provides adequate margin to the OA criteria such that the probability of non-burst for AVB wear exceeds 96% in both SGs. In all cases the OA structural integrity criteria is satisfied for a 4 EFPM operating period.

Table 6-3: Projected Probability of Non-Burst - Four EFPM Operation

Flaw Category	Plugging Limit	No. of Tubes Requiring Plugging		4 EFPM Tube Bundle Probability of Compliance	
		SG88	SG89	SG88	SG89
AVB Wear >20%	≥35 %TW	1	0	0.997	0.999
AVB Wear ≤20%	≥35 %TW	No Plugging Required		0.867	0.97
All AVB Wear				0.964	0.969
TSP Wear >15%	≥35 %TW	No Plugging Required		0.999	0.998
TSP Wear ≤15%	≥35 %TW	No Plugging Required		0.998	0.999
All TSP Wear				0.997	0.997

Figure 6-1: Depth Growth Rate Distribution, AVB Wear (b)(4)

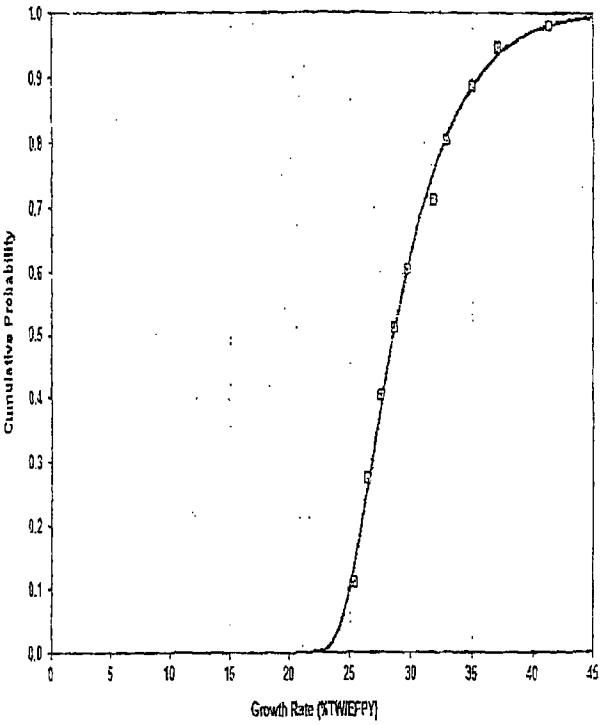


Figure 6-2: Depth Growth Rate Distribution, AVB Wear (b)(4)

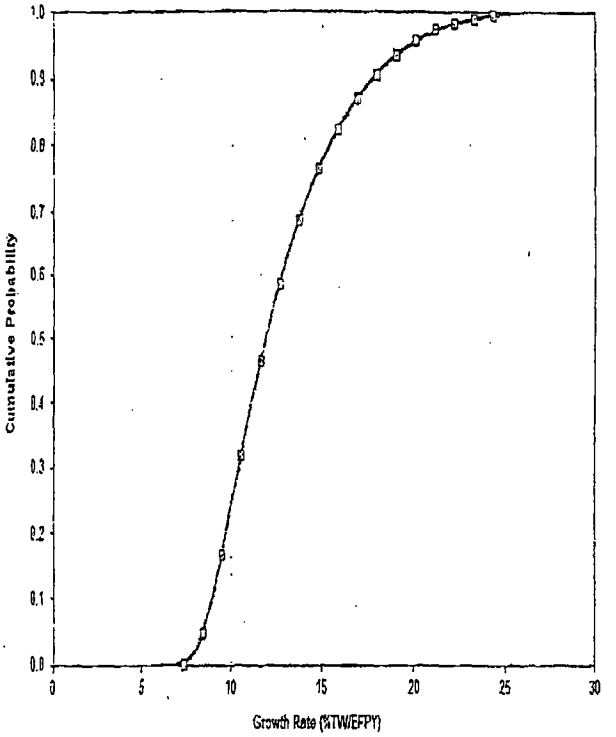


Figure 6-3: Depth Growth Rate Distribution, TSP Wear (b)(4)

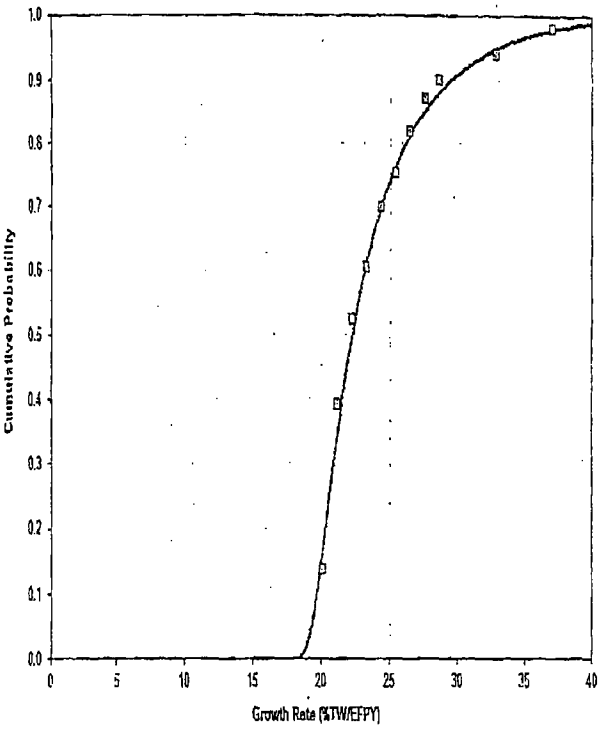


Figure 6-4: Depth Growth Rate Distribution, TSP Wear (b)(4)

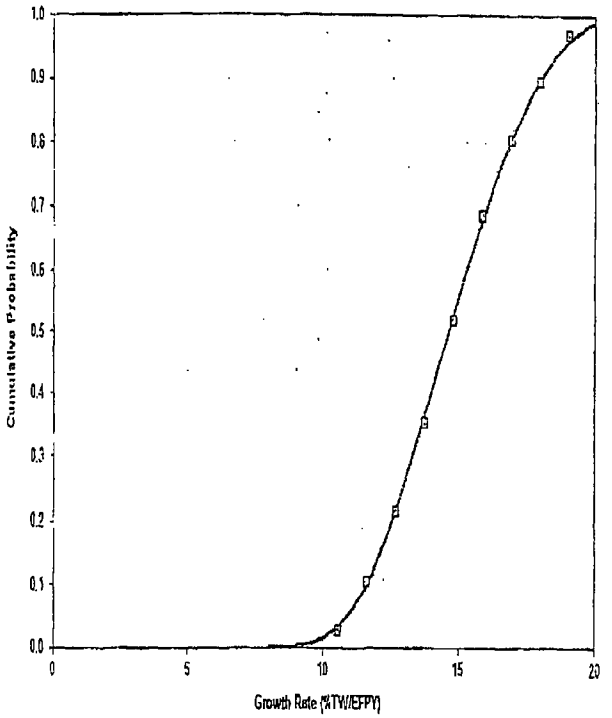


Figure 6-5: AVB Wear Depth Histogram (SG88)

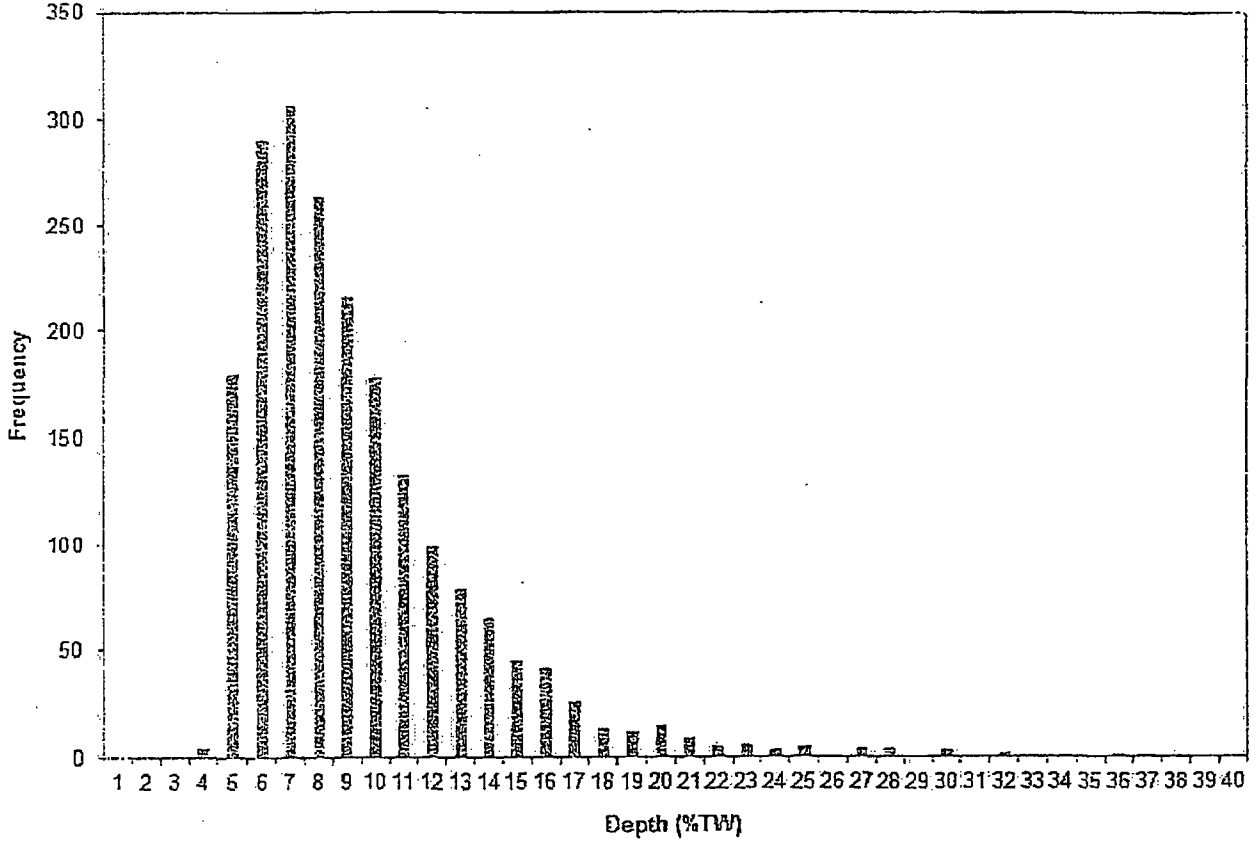
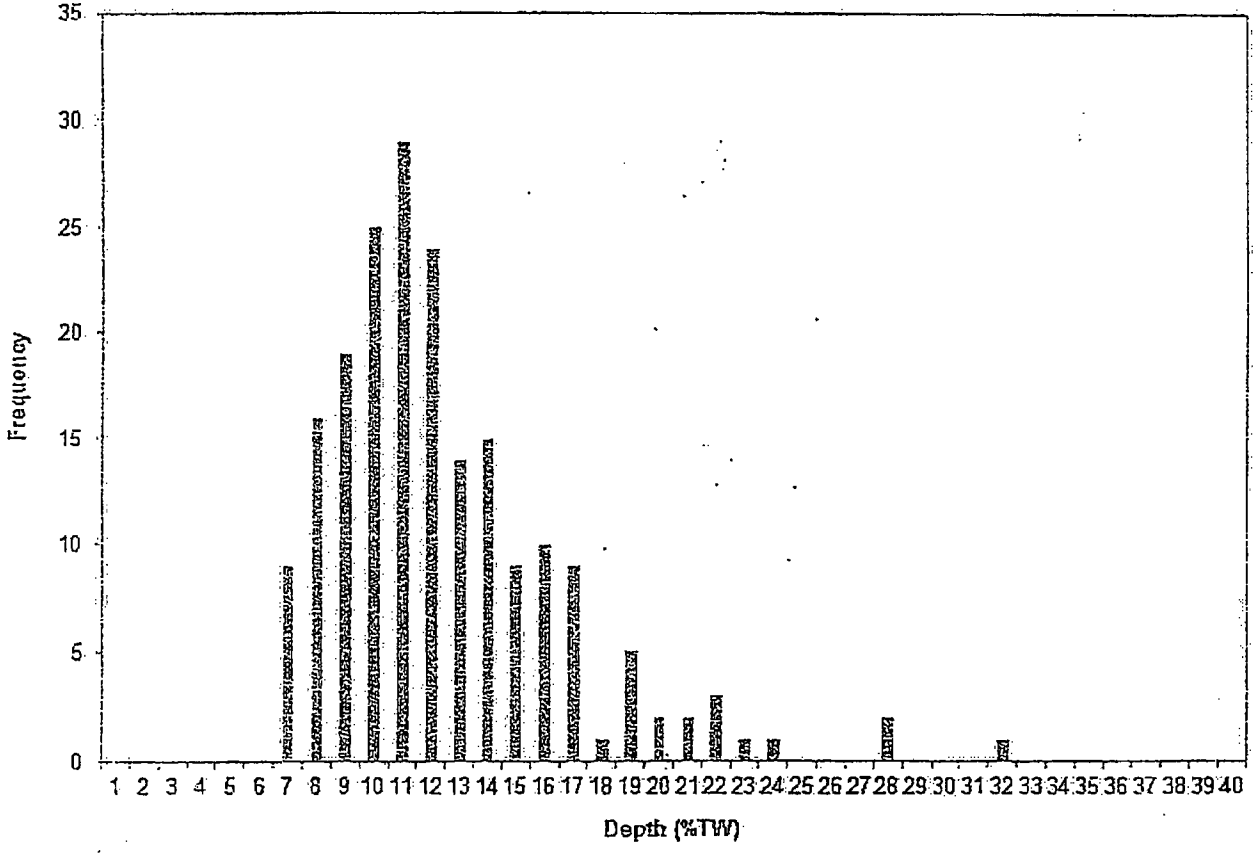


Figure 6-6: TSP Wear Depth Histogram (SG88 & SG89 Combined)



6.2.2 Retainer Bar Wear

To eliminate the potential for future RB wear in inservice tubes, all tubes adjacent to retainer bars will be plugged in both SGs. Prior to plugging, all tubes with RB wear indications will be stabilized with u-bend cable stabilizers. The tubes on either side of all retainer bars, at each end of the retainer bars, and at the center of the retainer bars, will also be stabilized prior to plugging in both SGs. This augmented stabilization provides additional material volume to resist continued RB wear, and provides added assurance that the retainer bars will not interact with inservice tubes. These corrective actions provide reasonable assurance that retainer bar wear will not challenge the structural and leakage integrity performance criteria during the remaining life of the steam generators. In addition, the stabilization of these tubes provides reasonable assurance that a tube severance event will not occur as a result of RB wear during the remaining life of the steam generators. Monitoring of the tubes adjacent to these plugged tubes must be performed on a periodic basis during future steam generator inspections.

6.2.3 Tube-to-Tube Wear

As discussed earlier and in [11], TTW and TSP wear within the region of tubes affected by TTW led to the failure of structural and accident leakage integrity performance criteria during the first operating period following SG replacement. Studies currently underway to understand the phenomena which led to this condition are also expected to define the corrective actions required to prevent its recurrence. For the purpose of the analyses herein it is assumed that the corrective actions to be implemented will provide reasonable assurance that the region of instability will not shift to another region within the tube bundle, and will not impair the structural or leakage integrity of inservice tubes during another four effective full power months (EFPM) of operation. This assumption requires verification.

6.2.4 Foreign Object Wear

Extensive ECT inspections and secondary side visual examinations were performed during the current Unit 3 outage. No foreign objects or foreign object wear flaws were identified. No foreign objects capable of causing tube degradation are known to remain in the Unit 3 SGs; hence, there is reasonable assurance that foreign objects will not cause the structural or leakage integrity performance criteria to be exceeded prior to the next tube examination in each steam generator.

6.3 Evaluation of Leakage Integrity

All tubes with degradation exceeding the technical specification plugging limit have been removed from service by plugging. Per reference [2], the onset of pop-through and leakage for axially oriented volumetric flaws with limited circumferential extent - the nature of the degradation identified in Unit 3 SGs - is coincident with burst. Since none of the identified degradation mechanisms are projected to exceed the structural performance criteria prior to the next scheduled inspection in each SG, there is reasonable assurance that neither the operational, nor the accident-induced leakage performance criteria will be exceeded prior to the next inspection of the Unit 3 SGs.

6.4 Secondary Side Internals

No degradation of secondary side internals which could impact tube integrity prior to the next examination was identified during this outage. No tube support degradation or misplacement was identified during the 100% bobbin probe examination or during the secondary side visual examinations.

7.0 OPERATIONAL ASSESSMENT CONCLUSION

Specific assumptions requiring verification have been identified in Section 3.0. These assumptions must be verified in order to validate this OA. Key among the assumptions is the expectation that the root cause evaluation currently underway, and any associated corrective actions implemented, will provide reasonable assurance that the region of instability which led to aggressive tube wear will not shift to another region within the tube bundle, and will not impair the structural or leakage integrity of inservice tubes during another four effective full power months (EFPM) of operation. Subject to verification of this and the other assumptions in Section 3.0, this operational assessment concludes that the steam generator structural and leakage integrity performance criteria will be satisfied during the next 4 EFPM operating period.

8.0 REFERENCES

1. NEI 97-06, "SG Program Guidelines," Rev. 3, January 2011.
2. EPRI Report 1019038, "SG Integrity Assessment Guidelines: Revision 3", November 2009.
3. EPRI Report 1019037 "Steam Generator Degradation Specific Management Flaw Handbook, Revision 1", December 2009.
4. EPRI, SG Management Project, "sgmp.epriq.com."
5. AREVA Document 51-9176667-000, "SONGS U3 2/12 Leaker Outage & 2C17 Steam Generator Degradation Assessment," February 2012
6. AREVA Proprietary Document 32-9104082-002, "MATHCAD Implementation of SG Full Probabilistic Operational Assessment", March 2011.
7. *Matheny, Southern California Edison, "Numerical Values for the SG OAs, SONGS Units 2 and 3," February 8, 2012
8. *SONGS Unit 3 Replacement Steam Generator Receipt Inspection QA Document Review Package
9. SONGS UFSAR Chapter 5
10. NRC, "Confirmatory Action Letter – SONGS Units 2 and 3, Commitments to Address SG Tube Degradation," CAL 4-12-001, March 27, 2012
11. AREVA 51-9180143-000, "SONGS Unit 3 February 2012 Leaker Outage – SG Condition Monitoring Assessment,"

*Document is not retrievable from the AREVA document control system, but can be retrieved from the SCE document control system. Per AREVA Administrative Procedure 0402-01, Attachment 8, this document is an acceptable reference.

AREVA Project Manager Signature _____ Date _____

7
CONDITION MONITORING

7.1 Introduction

Condition monitoring (CM) involves the evaluation of inspection results at the end of the inspection interval to determine the state of the steam generator tubing for the most recent period of operation relative to structural and leakage integrity performance criteria. This section provides guidance on performing structural assessments. Guidance for leakage assessments is given in Section 9. Condition monitoring can be accomplished by analytical methods or by in situ pressure testing. The CM evaluation is required by NEI 97-06 [2].

Condition monitoring provides a means of verifying EOC tube integrity and previous OA predictions. This guideline identifies a computational hierarchy for combining uncertainties in these assessments when structural and leakage integrity is inferred from NDE inspection results. The assessment strategies include an arithmetic bounding approach, a simplified statistical approach, and Monte Carlo analysis. In order to decide on the appropriate evaluation methodology, information provided in the following discussion specifies the essential elements of the different assessment strategies. In situ pressure testing may be needed to demonstrate structural and leakage integrity. All detected degradation shall be evaluated, including secondary side inspection results, for structural and leakage integrity.

7.2 Condition Monitoring Evaluation Procedure

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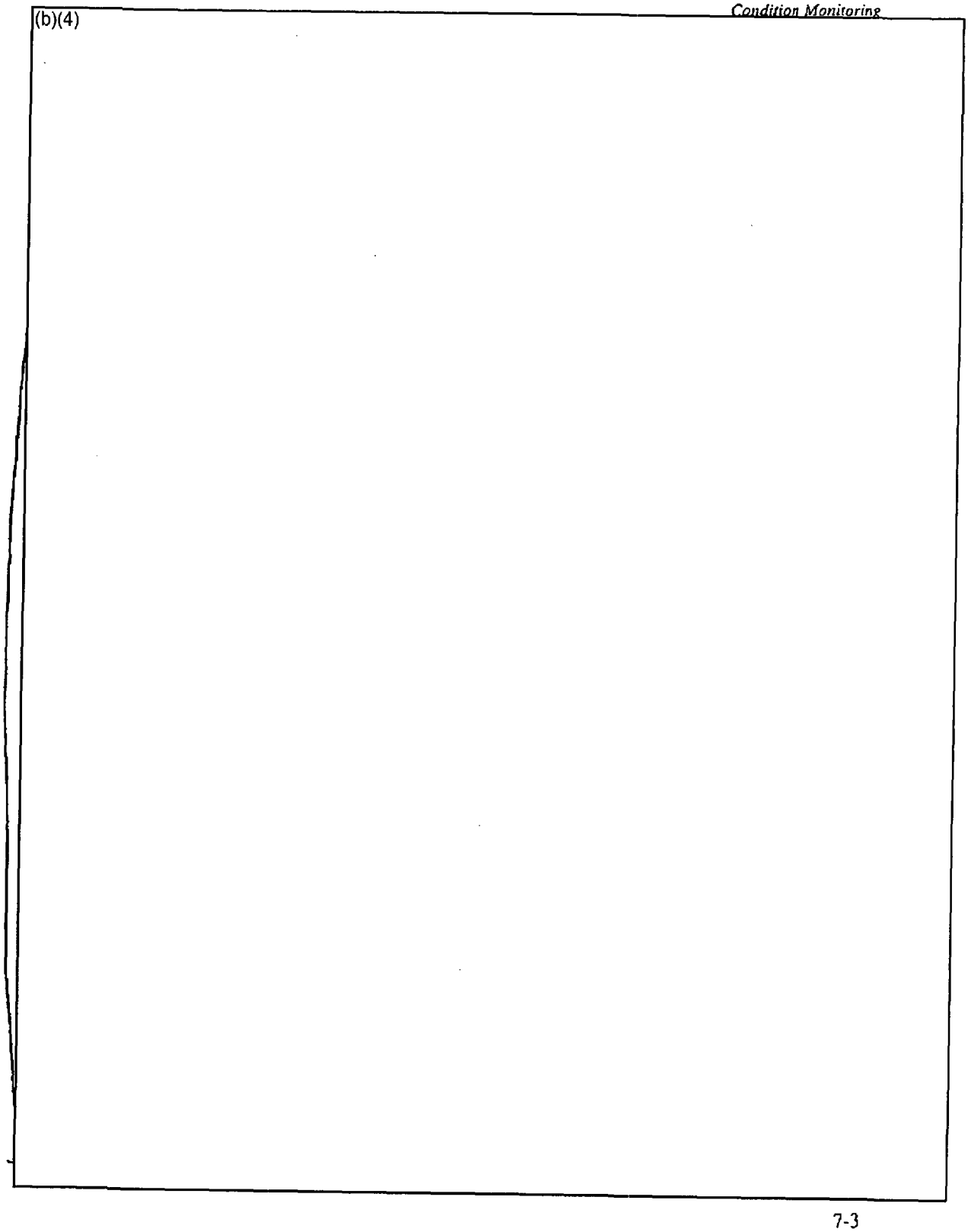
D/28

(b)(4)

7.3 Structural Integrity Evaluation Using Inspection Results

(b)(4)

(b)(4)



(b)(4)

7.3.1 Probabilities and Percentiles

(b)(4)

7.3.2 Arithmetic Strategy for Combining Uncertainties

(b)(4)

7.3.3 Simplified Statistical Strategy for Combining Uncertainties

(b)(4)

7.3.4 Monte Carlo Strategy for Combining Uncertainties

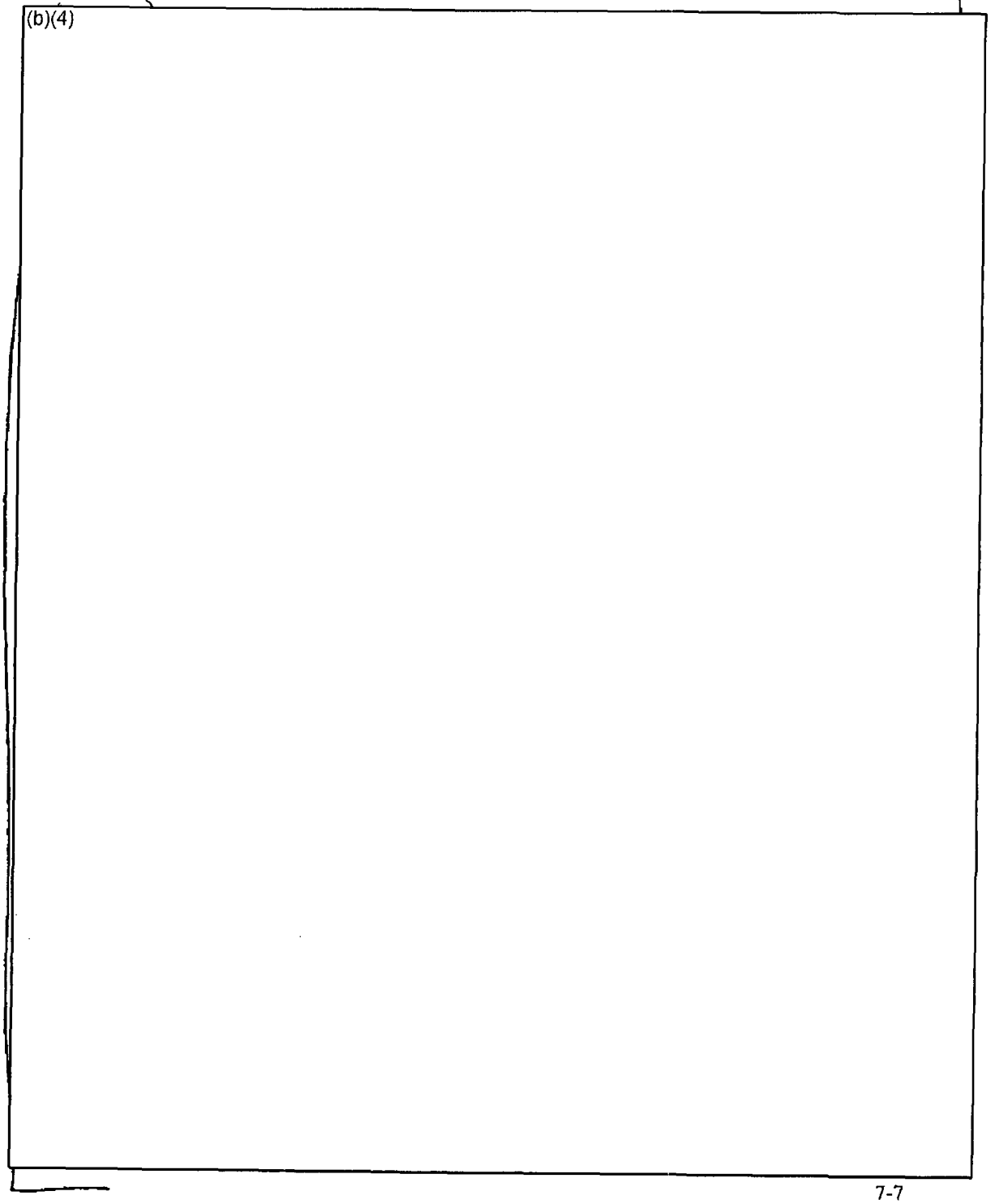
(b)(4)

Table 7-1
Condition Monitoring Uncertainty Treatment for Structural Integrity

(b)(4)

7.3.5 Strategy Comparison

(b)(4)



(b)(4)

7.3.5.1 Arithmetic Evaluation

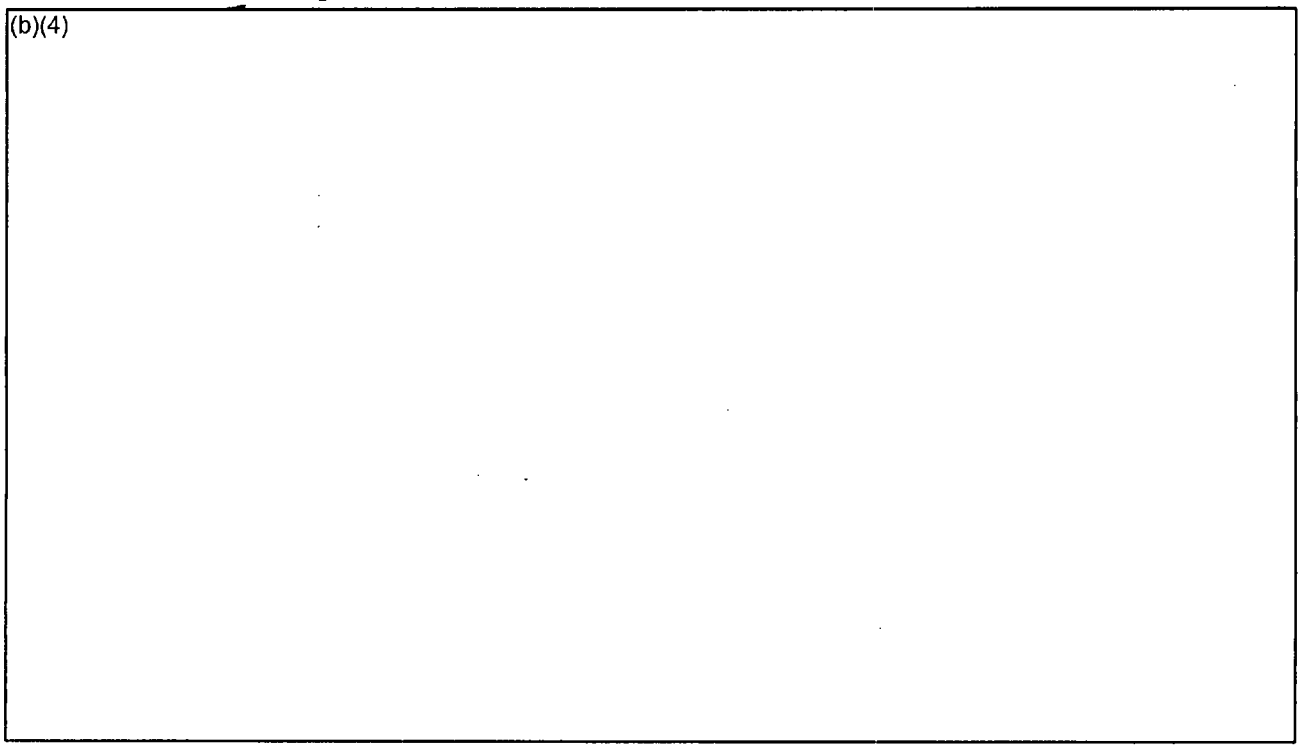
(b)(4)

(b)(4)

7.3.5.2 Simplified Statistical Evaluation

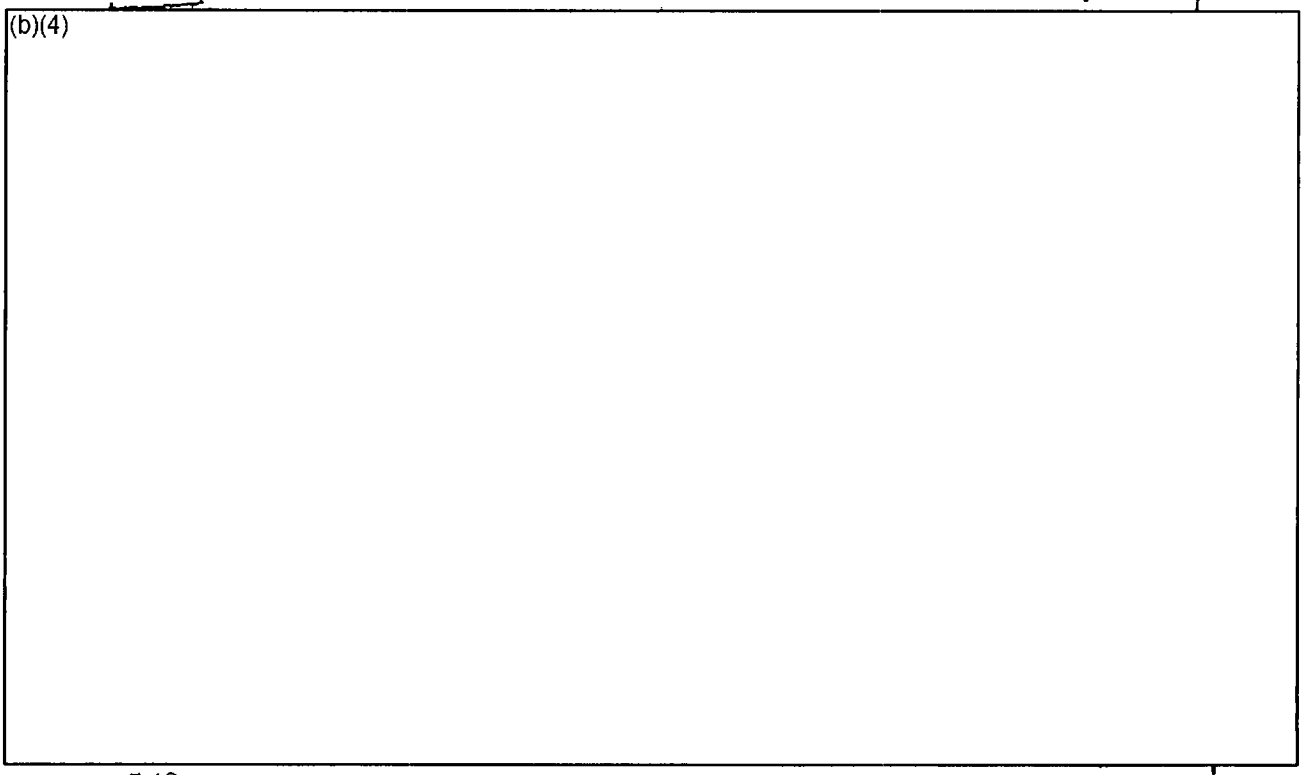
(b)(4)

(b)(4)



7.3.5.3 Monte Carlo Evaluation

(b)(4)



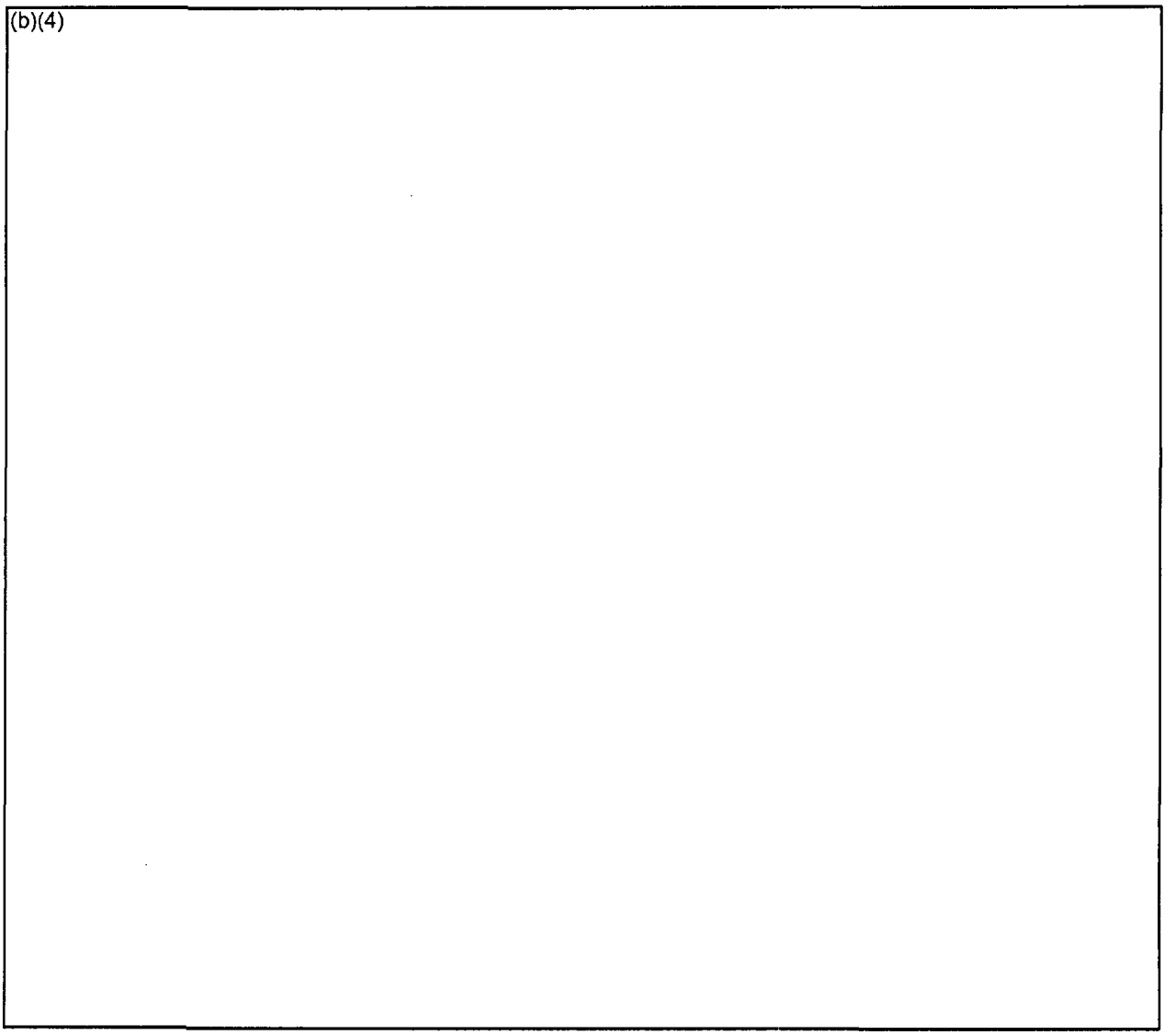


Figure 7-1
Condition Monitoring Structural Limit Curves for Axial PWSCC Per ETSS 96703.1 at 4155 psi Using Three Strategies for Combining Uncertainties

7.4 Signal Amplitude Approaches to Structural Integrity

(b)(4)

(b)(4)

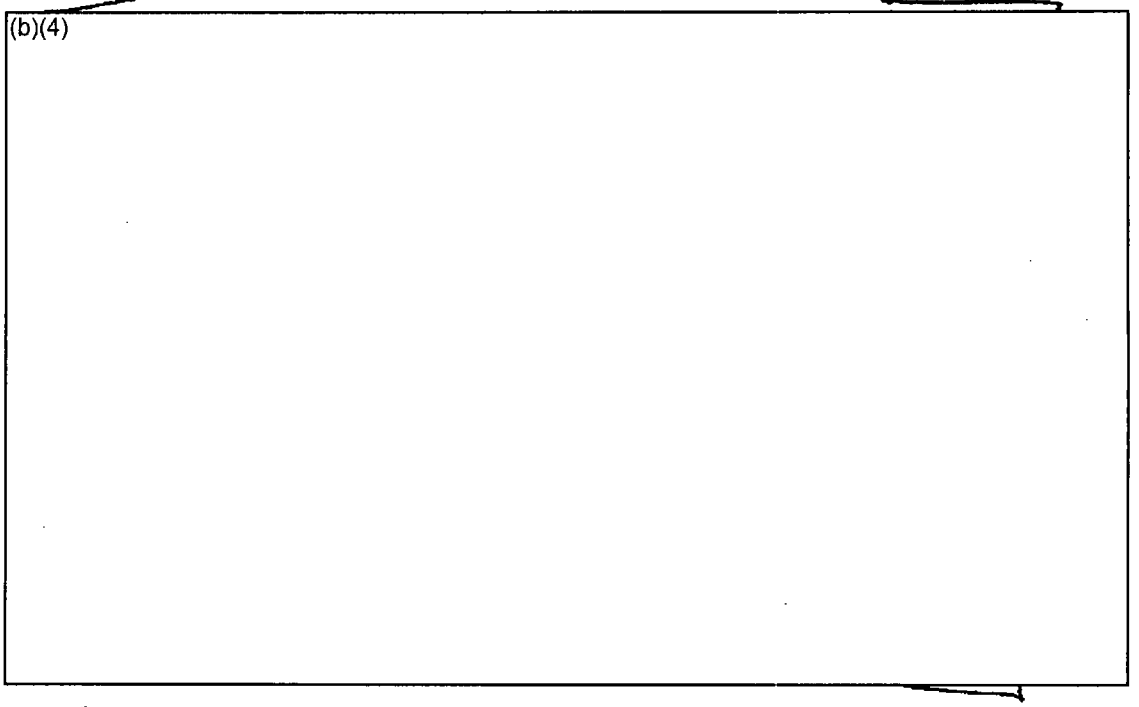


Figure 7-2
Condition Monitoring Plot for Freespan Axial ODSCC/IGA in OTSG Tubing at 4050 psi

7.5 Role of In Situ Pressure Testing

(b)(4)

7.6 Verification

A comparison of the CM results to the previous cycle OA predictions shall be performed. If the previous cycle OA did not bound the CM results, a root cause evaluation, in accordance with the Licensee Corrective Action Program, shall be performed to identify the reason and the applicable values in the forthcoming OA shall be changed to account for the difference. This verification process is also part of the OA process for the next cycle of operation and is discussed further in Section 8.

If, upon completion of the CM evaluation, which may include in situ pressure testing, the results indicate that structural and/or leakage integrity evaluations fail to satisfy any of the performance criteria, the condition shall be reported to the NRC and Industry in accordance with the reporting requirements of the Licensee's Technical Specifications and NEI 97-06 [2]. Failure to meet the CM criteria indicates that the conclusions of the prior OA were incorrect. Therefore, a root cause evaluation shall be completed and necessary corrective actions shall be identified.

Some examples of appropriate corrective actions include: lowering the repair limit to account for unexpectedly high degradation growth rates; reanalysis of eddy current data to increase detection sensitivity; augmentation of eddy current inspection with an alternate NDE technique such as UT; and reducing inspection interval. In some cases, identified corrective actions may require an extended period of time to implement. For example, a tube may have to be pulled to identify the nature and severity of degradation.

8
OPERATIONAL ASSESSMENT

8.1 Introduction

Operational Assessment (OA) involves projecting the condition of the SG tubes to the time of the next scheduled inspection outage and determining their acceptability relative to the tube integrity performance criteria of NEI 97-06 [2]. All detected degradation mechanisms shall be evaluated, including secondary side inspection results. Forms of degradation that have been found at prior inspections but have not been observed at the current inspection shall also be evaluated.

The purpose of this section is to provide guidance for performing an OA and evaluating the results. The focus of this section is structural integrity. Leakage integrity is covered in Section 9.

Intervals between inspections of the SGs depend on the results of the OA. NEI 97-06 [2] requires that an OA be performed after each SG inspection. The intent is to assess tube integrity for inservice degradation in operating SGs. In general, for new or replacement SGs, an OA for the interval between baseline and the inspection after the first cycle of operation is not required. An example when an OA should be performed for new or replacement SGs for initial operation would be when baseline inspections detect foreign objects which can not be retrieved. In this example, an OA would assess the potential for tube wear during the first inspection interval.

The fundamental objective of an OA is to ensure that structural and leakage performance criteria will be met over the length of the upcoming inspection interval. It shall be demonstrated that the degradation detection sensitivity and/or NDE sizing uncertainty combined with degradation growth rates leads to the expectation that structural and leakage integrity criteria will be met at the end of the next inspection interval. In terms of structural integrity, the fundamental OA requirement is that the projected worst case degraded tube for each existing degradation mechanism shall meet the limiting structural performance parameter with a 0.95 probability at 50% confidence.

During actual operation of a given SG in a given cycle, for the degradation mechanism of interest, one tube has the lowest structural performance parameter associated with it. However, this is one of many possible outcomes for the given starting condition. A fully probabilistic analysis leads to a distribution of possible outcomes of SG operation for all degradation sites both detected and undetected for a given degradation mechanism. An illustration of a fully probabilistic treatment of the tube bundle for a given mechanism is shown in Figure 8-1. In this illustration, a Monte Carlo analysis for the tube bundle is used to establish the distribution of the tubes that produce the lowest burst pressure for the given degradation mechanism. As shown in

(b)(4)

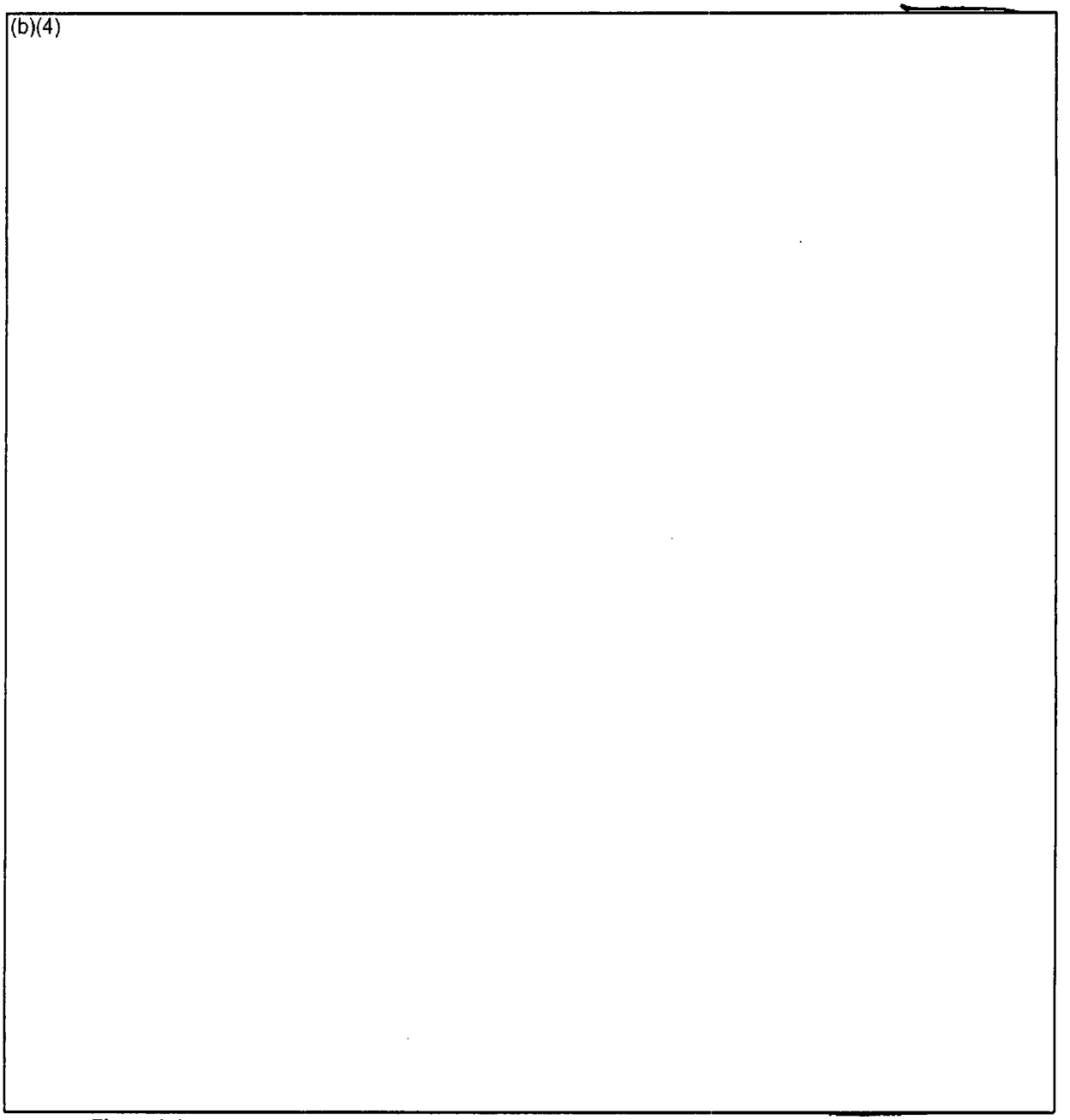


Figure 8-1
Fully Probabilistic Monte Carlo Simulation to Established Worst-Case Degraded Tube – Full Bundle Analysis

calculation steps needed to project worst case degraded tubes using the three assessment strategies for combining uncertainties are included in what follows.

Two final general points are important:

- To assist the OA process, it is recommended that a facility specific checklist that outlines the steps necessary for successful implementation be developed, depending on the design and condition of the SGs.
- Prior to Mode 4, a review of the CM results and growth shall be performed. If CM results are not as expected and/or growth rates are larger than expected, one or more tubes may fail to satisfy the performance criteria prior to the next scheduled inspection. In this case, remedial actions can be taken. For example, the length of the inspection interval and/or the tube repair criteria could be adjusted. Waiting for the final OA report after the next inspection interval has begun limits options for remedial actions if needed.

8.2.3 Applicability Limits on Simple Assessment Methods

As mentioned earlier, the simplified statistical methods (i.e., arithmetic, simplified statistical and simplified Monte Carlo) are approximate techniques that will yield conservative results for the projected worst-case degraded tube parameters in most situations. The convenience of the simplified procedures, as described Section 8.4 and 8.5, is desirable for situations in which structural integrity parameters are not significantly challenged by existing mechanisms.

(b)(4)

(b)(4)

8.3 Fully Probabilistic Operational Assessment Methods

Fully probabilistic OA approaches require the use of well developed computer codes, and the level of experience and effort required to correctly perform this calculation can be significant. However, these approaches can provide definitive and accurate projections of detected and undetected flaw populations. Both Repair on Detection and Repair on Sizing strategies are described. A fully probabilistic approach is sometimes referred to as a full-bundle analysis. The terms are meant to imply that all degradation sites in the bundle for a given degradation mechanism are included in the analysis.

8.3.1 Repair on Detection

(b)(4)

(b)(4)

8.3.2 Repair on NDE Sizing

(b)(4)

8.4 Simplified Analysis Procedures for Repair on NDE Sizing

The following five sections describe and illustrate simple methods to project the EOC worst case degraded tube and its associated structural integrity for a Repair on NDE Sizing strategy while accounting for all appropriate uncertainties. The various uncertainty strategies and procedures for their use are summarized in Table 8-1. Operational Assessment structural integrity is demonstrated if the projected worst case degraded tube meets the limiting structural integrity performance criterion with at least a probability of 0.95 with 50% confidence. Undetected flaws in a Repair on NDE Sizing strategy can and should be included if the applicable POD curve indicates that undetected flaws and/or flaws initiating during the cycle of operation are an issue. If undetected flaws and/or flaws initiating during the cycle of operation are an issue, the simple analysis techniques listed in Table 8-1 are not applicable.

(b)(4)

(b)(4)

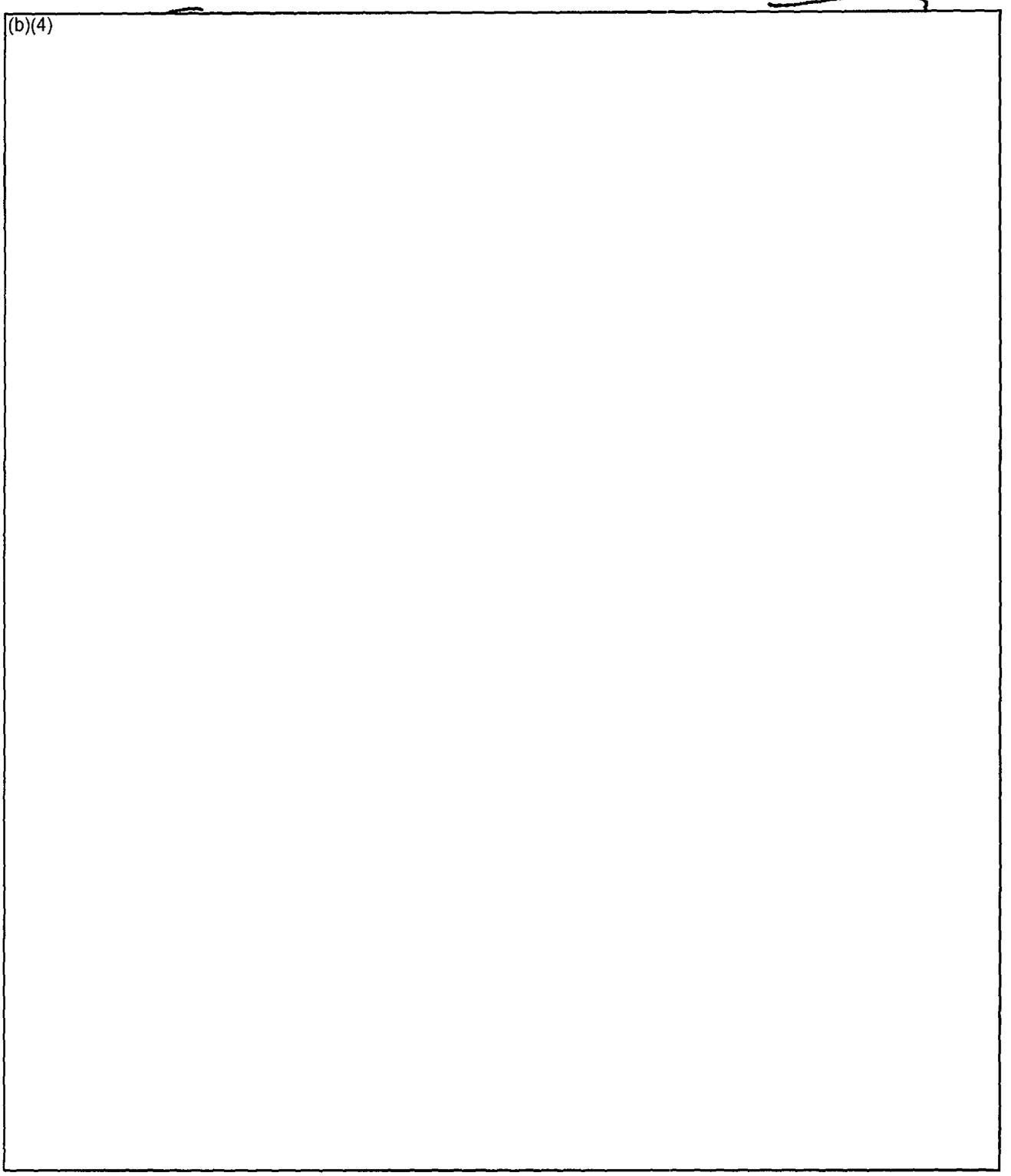
Table 8-1
Operational Assessment Uncertainty Treatment for Structural Integrity for Repair on NDE Sizing

(b)(4)

Table 8-1 (continued)
Operational Assessment Uncertainty Treatment for Structural Integrity for Repair on NDE Sizing

(b)(4)

(b)(4)



8.4.1 Arithmetic Strategy for Repair on NDE Sizing

(b)(4)

8.4.2 Simplified Statistical Strategy for Repair on NDE Sizing

(b)(4)

8.4.3 Mixed Arithmetic/Simplified Statistical Strategy for Repair on NDE Sizing

(b)(4)

8.4.4 Monte Carlo Strategy for Repair on NDE Sizing

(b)(4)

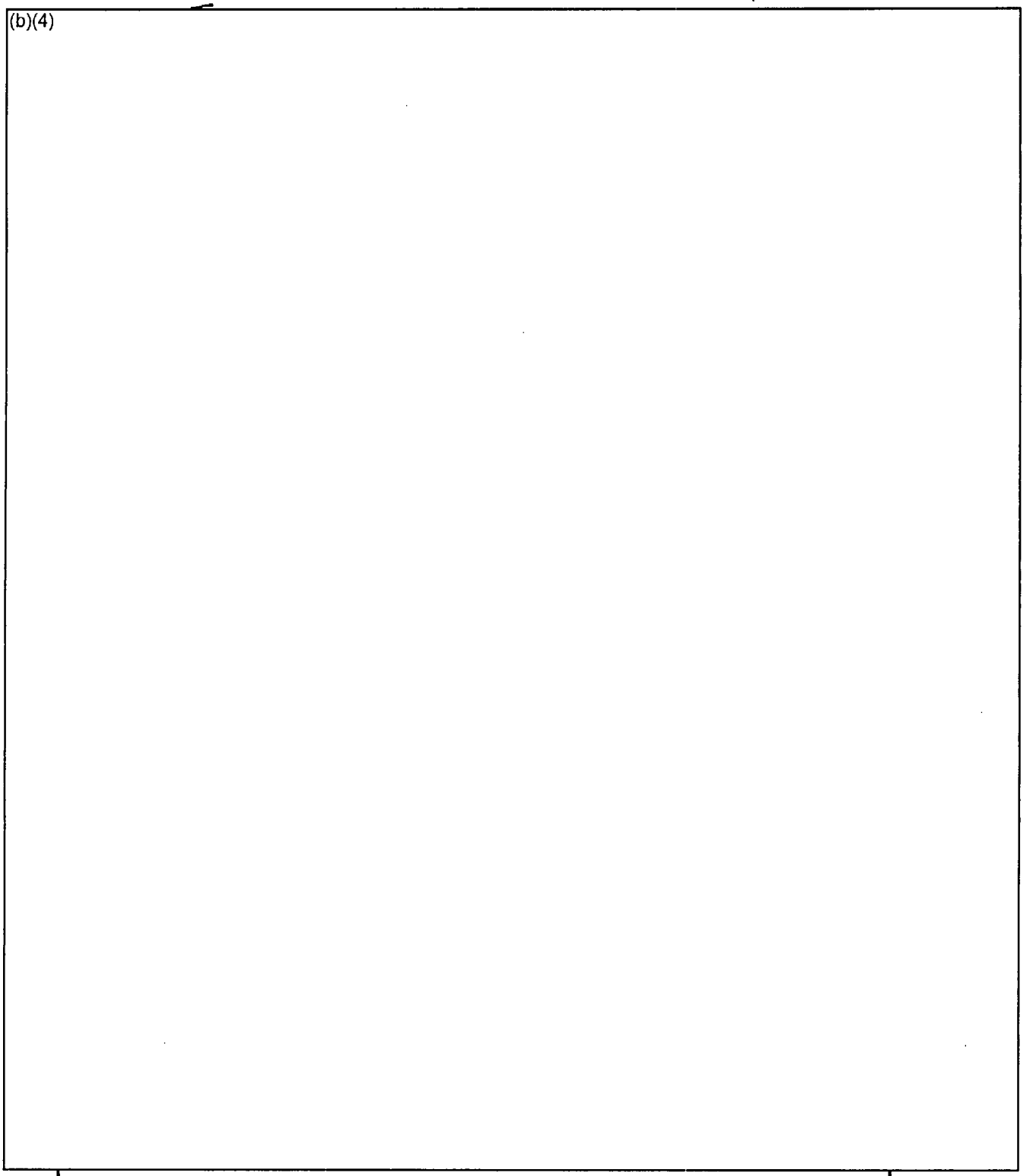
(b)(4)

8.4.5 Strategy Comparison for Repair on NDE Sizing

8.4.5.1 Example: Cold Leg Thinning at Drilled Tube Support Plates

(b)(4)

(b)(4)



(b)(4)

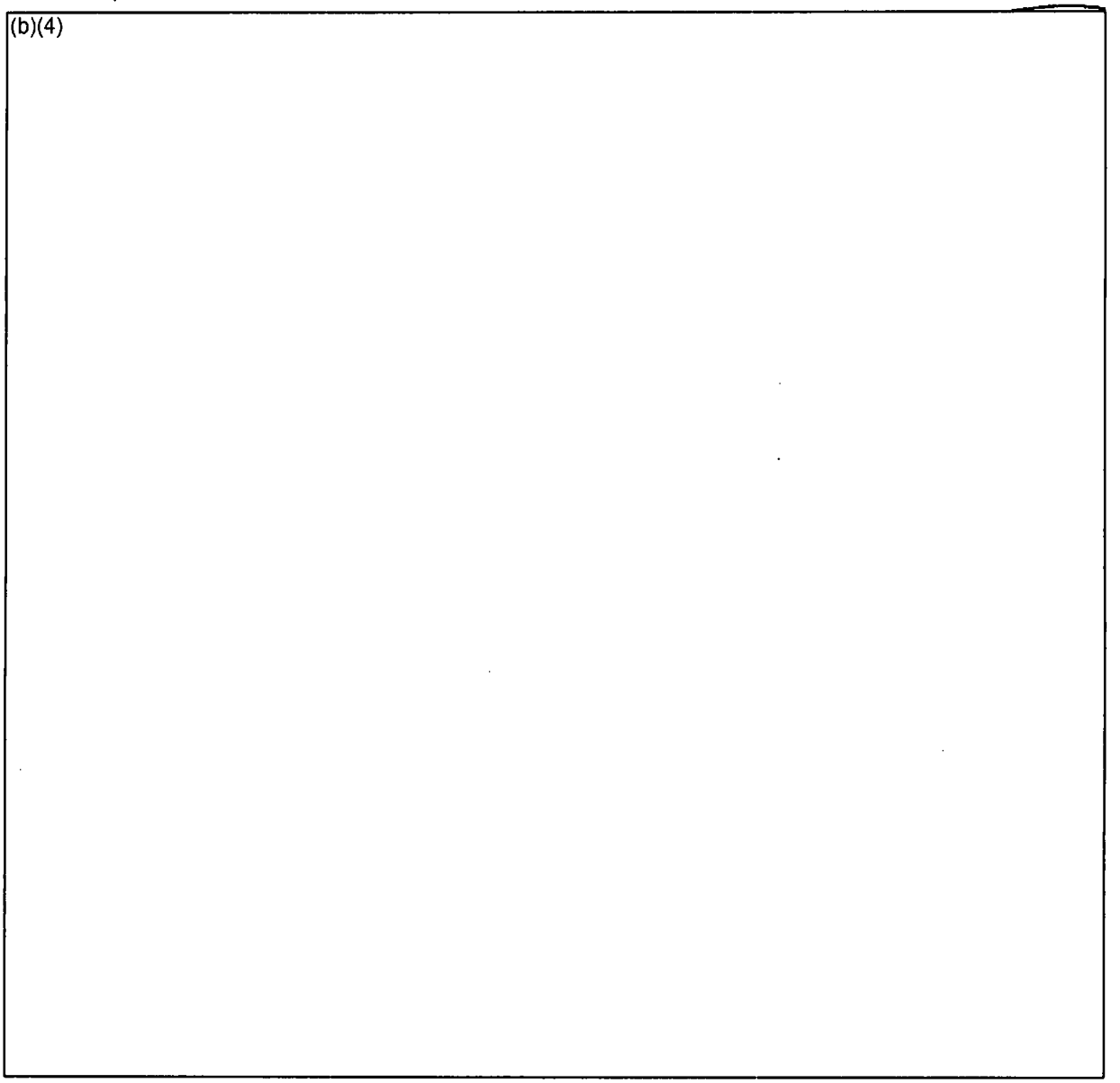


Figure 8-2
Cumulative Distribution of Cold Leg Thinning Depth Growth Rate NDE Measurements, Computer Simulation of NDE Measurements, and Best Estimate Growth Rate Distribution

8.4.5.2 Arithmetic Strategy

(b)(4)

(b)(4)

8.4.5.3 Mixed Arithmetic/Simplified Statistical/Monte Carlo Strategy

(b)(4)

(b)(4)

8.4.5.4 Simplified Statistical Strategy

(b)(4)

8.4.5.5 Monte Carlo Strategy

(b)(4)

(b)(4)

8.5 Simplified Analysis Procedures for Repair on Detection

(b)(4)

Table 8-2
OA Uncertainty Treatment for Structural Integrity for Repair on Detection

(b)(4)

(b)(4)

(b)(4)

8.5.1 Arithmetic Strategy for Repair on Detection

(b)(4)

8.5.2 Simplified Statistical Strategy for Repair on Detection

(b)(4)

8.5.3 Mixed Arithmetic/ Simplified Statistical Strategy for Repair on Detection

(b)(4)

8.5.4 Monte Carlo Strategy for Repair on Detection

(b)(4)

8.5.5 Comparison of Strategies for Repair on Detection

8.5.5.1 Example Equation

(b)(4)

(b)(4)

8.5.5.2 Arithmetic Strategy

(b)(4)

8.5.5.3 Mixed Arithmetic/Simplified Statistical Strategy

(b)(4)

8.5.5.4 Simplified Statistical Strategy

(b)(4)

8.5.5.5 Monte Carlo Strategy

(b)(4)

(b)(4)

8.6 Verification

(b)(4)

8.7 Review of the Operational Assessment prior to a Refueling Outage without SG Inspections

Prior to a refueling outage that does not have planned SG primary-side and/or secondary-side activities, the information used in projecting SG tube integrity in the OA shall be reviewed. There may have been subsequent plant or industry experience that impacts the information used in the tube integrity assessment process that might impact the ability to have an outage without SG inspections. See Section 11.2.4 for additional review requirements.

9
PRIMARY-TO-SECONDARY LEAKAGE ASSESSMENT

9.1 Introduction

This section provides requirements for primary-to-secondary leakage assessment and documents methods to calculate leakage. For CM, degradation detected during an inspection shall be evaluated against the accident-induced leakage performance criterion. Degradation length or depth measured for CM purposes is adjusted for NDE measurement uncertainties. Leakage at normal operating conditions is monitored during plant operation and shall be compared to the operational leakage performance criteria. Operational assessment shall be performed to provide assurance that the leakage integrity performance criteria will be met until the next scheduled SG inspection. Degradation length or depth estimated at the EOC is not a measured parameter and therefore no NDE measurement uncertainties need be applied.

9.2 Accident Induced Leakage

The allowable tube leakage limit is defined by the accident leakage performance criterion in Section 2. Leakage limits shall be met for all design basis accidents, other than a steam generator tube rupture, and shall not exceed the leakage assumed in the plant accident analysis in terms of the total leakage for all steam generators and the leakage rate for an individual steam generator. The maximum leakage limit is further limited to not exceed 1 gpm per steam generator unless an approved specific alternate repair criteria is being implemented. Consequently, it is useful to identify the limiting accident for leakage. The limiting accident may depend on the type of tubing degradation of interest, for example, high axial loads are significant for circumferential degradation but not for axial degradation. The limiting accident is defined by the combination of accident specific loads and the accident specific leakage limit leading to the smallest allowable flaw size. It is this flaw size that must meet CM and OA requirements.

Typically, the limiting accident for leakage is simply the accident producing the largest tube loads. However, this may not always be the case. There may be accidents with a low allowable leakage limit combined with loads that, while less than the maximum, lead to the smallest allowable flaw size for leakage. Accident specific loads and accident specific leakage limits must be evaluated to identify the limiting leakage accident. This can be a difficult exercise since leakage limits based on dose assessments must be combined with accident loads that may be grouped under umbrella transients for convenience and economy. In the absence of more detailed information it is conservative to construct a bounding case by combining the lowest allowable accident leakage with the largest accident tube loads. For plants with accident analyses that assume the same accident leakage for all design basis accidents, other than steam generator tube rupture, the limiting accident for leakage is not necessarily the accident producing

the largest tube loads. Prior to each outage, the limiting leakage accident and allowable leakage value shall be confirmed.

Several plants have made commitments to the NRC Regulatory Guide 1.183 [30] which provides an alternate source term approach for the parameters and assumptions to be met for accident analysis. This would enable plants to increase accident induced leakage limits. These limits require approval by the NRC prior to implementation.

This section provides recommended approaches for calculating both leakage through cracks in steam generator tubes and flaw sizes leading to 100 %TW throughwall penetration under combined accident loads and thus accident leakage contributions. Applications to CM and OA leakage integrity evaluations are discussed. Note that the effect of contributing primary loads other than pressure and axial secondary loads that must be treated as primary loads in OTSG's shall be included in leakage integrity evaluations. In practice this reduces to consideration of axial tensile and bending loads when evaluating circumferential cracking and the circumferential extent of volumetric degradation.

9.3 Operational Leakage

The allowable operational leakage limit is defined in plant Technical Specifications and Section 2. Primary-to- secondary leakage that develops during operation shall be evaluated per the latest revision of the PWR Primary-to-Secondary Leak Guidelines [31].

The following information generalizes the relationship between operational and accident-induced leakage limits and is provided by the NRC in Regulatory Issue Summary 2007-20 [32]:

> The loading conditions on the tubes during an accident may be different than the loading conditions on the tubes during normal operation. As a result, the primary-to-secondary leak rate observed during normal operation may change under accident conditions. In some cases, the primary-to-secondary leak rate may increase as a result of the accident, while in other cases it may decrease. If the loading conditions during an accident result in an increase in the primary-to-secondary leak rate (when compared to the normal operating leak rate), it may be necessary to restrict the normal operating leak rate to less than the normal operating leakage rate limit. This applies not only to units that assume the primary-to-secondary leak rate observed during the accident is the same as the normal operating primary-to-secondary leak rate limit, an assumption that is permitted by the NRC's Standard Review Plan; but also to other units since the increase in primary-to-secondary leak rate going from normal operating conditions to accident conditions can result in significant increases in the leak rate (depending on the accident). The actual amount that the leak rate may increase is a function of several factors including the type of flaw that is leaking. For example, the leak rate from a crack may increase significantly (e.g., by an order of magnitude depending on through-wall crack length) under accident conditions [32].

If operational leakage causes a forced outage, a root cause evaluation shall be performed and included as part of the OA report for the forced outage. A forced outage can result from incorrect assumptions or errors in past analyses.

If operational leakage is less than shut-down levels and is consistent with that predicted by the OA, no adjustments to OA methodologies are required; however in situ pressure tests may be required. If operational leakage is not predicted by the OA, assessment strategies shall be modified accordingly.

During an inspection outage following operational leakage of greater than 5 GPD in any SG, the following steps shall be taken to establish information about the leak:

1. Determine which SG(s) are leaking: Monitor all SGs to determine which SG(s) are leaking.
2. If possible, determine the source of the leakage: This is typically performed by a hydrostatic test, bubble test, or helium leak test to identify suspect tube(s) locations on the tubesheet. Quantify the rate (for example, drops per minute or gallons per minute [liters per minute]) of leakage. Correlate the calculated leakage (pressure/temperature adjusted leakage) versus the operational leakage. Determine if results have accounted for the observed operational leakage, while recognizing that an accurate comparison of operating and shutdown leakage measurements is difficult. If the source of the leakage cannot be identified using the methods described above, 100% eddy current examination should be considered. If the eddy current examination locates the potential leakage, proceed with Step 4. If the leakage has not been identified, an evaluation of the actions within Step 6 should be considered.
3. Examine leaking location(s): This inspection is typically performed by bobbin coil eddy current examination to establish axial location within the SG.
4. Examine to determine extent, orientation, and morphology: This is typically performed by rotating coil or array coil technology. Refer to the SGMP PWR Steam Generator Examination Guidelines [1].
5. Review prior inspection history: Review the information contained in the database and the actual historical bobbin and rotating data to establish factual information about the data. If the leakage is originating from a plug or sleeve, review the installation records for that location. Evaluate if installation parameters were met and identify any inconsistencies or nonconforming conditions.
6. Perform a root cause evaluation that includes all SG program elements in accordance with the utility's program(s). This evaluation should address the need to perform eddy current and/or secondary-side visual inspections. Also consider supplementing the root cause team with industry peers. The root cause team shall identify immediate, short-term, and long-term actions to correct any process deficiencies.
7. Execute root cause corrective actions
8. Update and revise the DA, CM, and OA as necessary to address the unexpected leakage.
9. Perform required repairs.

(1

Johnson, Andrew

From: (b)(6)
Sent: Monday, February 06, 2012 5:48 PM
To: Kalyanam, Kaly
Cc: Karwoski, Kenneth; Johnson, Andrew; Murphy, Emmett; Markley, Michael; Hall, Randy; Lantz, Ryan; Reynoso, John; Warnick, Greg; Kulesa, Gloria
Subject: Re: SONGS Unit 2 Steam Generator Inspection Teleconference Agenda
Attachments: SG Bundle With Detail.pdf; Unit 2 02-06-2012 Status Report.pdf

Categories: Red Category

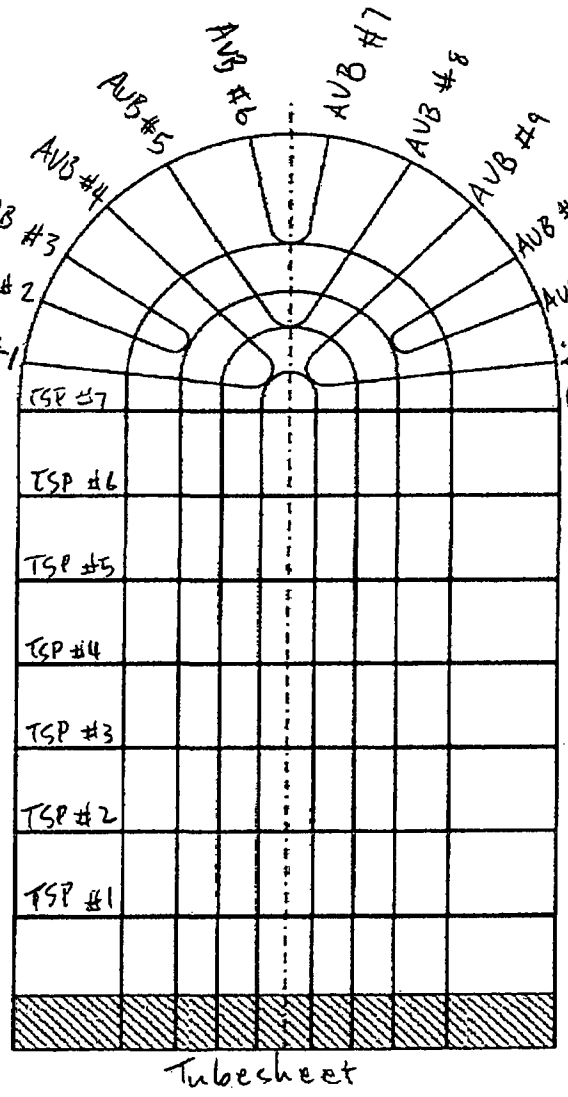
Here are the files that were referenced in the call this afternoon.

(b)(6)
Manager, Plant Licensing
San Onofre Nuclear Generating Station
Office (b)(6)
Fax (b)(6)

P/29
4/

SONGS-2
Jan-2012 Refueling

TSP & AVB Wear Indications
SG88 Bobbin Data



	<10	10-19	20-29	>=30
B06	154	158	20	1
B05	139	110	18	
B04	93	31	1	
B03	33	7		
B02	2	1		
B01	1			
07H	8	13		
06H	11	20		
05H	24	20		
04H	31	19		
03H	11	9		
02H	4			
01H				
TSH				

	>=30	20-29	10-19	<10
B07	1	21	145	194
B08	1	15	132	176
B09	1	8	88	94
B10		1	32	69
B11			1	7
B12				2
07C			7	6
06C			7	6
05C			1	5
04C			6	8
03C			5	1
02C			1	1
01C				1
TSC				

>=30	20-29	10-19	<10	
4	84	813	1081	TOTAL INDICATIONS
9727				TOTAL INSPECTED

PRELIMINARY RESULTS

Status as of: 2/6/2012 7:17 AM

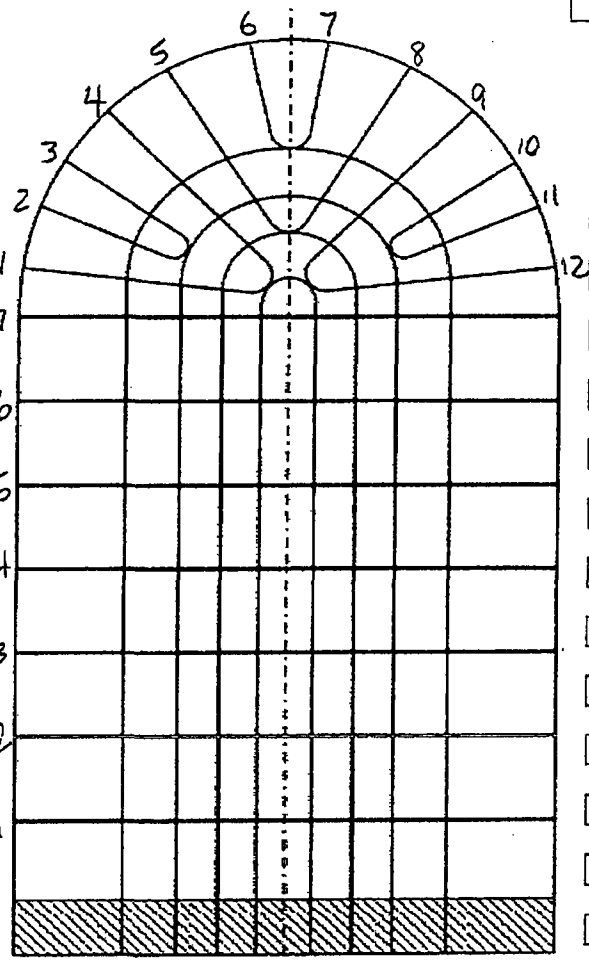
SONGS-2

Jan-2012 Refueling

TSP & AVB Wear Indications

SG89 Bobbin Data

	<10	10-19	20-29	>=30
B06	274	228	20	
B05	221	134	9	
B04	131	54		
B03	75	10		
B02	11			
B01	5			
07H	16	19		
06H	11	14		
05H	10	10		
04H	7	5		
03H	2	2		
02H				
01H				
TSH				



	>=30	20-29	10-19	<10
B07		23	252	271
B08		17	213	268
B09		8	96	169
B10		1	25	60
B11			2	12
B12				2
07C		1	3	1
06C			5	
05C			8	2
04C			12	3
03C			5	
02C				
01C				
TSC				

PRELIMINARY RESULTS

>=30	20-29	10-19	<10	
0	79	1097	1551	TOTAL INDICATIONS
9629				TOTAL INSPECTED

Status as of: 2/6/2012 7:21 AM

SCE-SONGS Unit 2 - REPL
Outage

GROUP	TUBES
>=30%	4
20-29%	72
10-19%	406
<10%	600

S/G 88 Repl
COLD
PRIMARY FACE

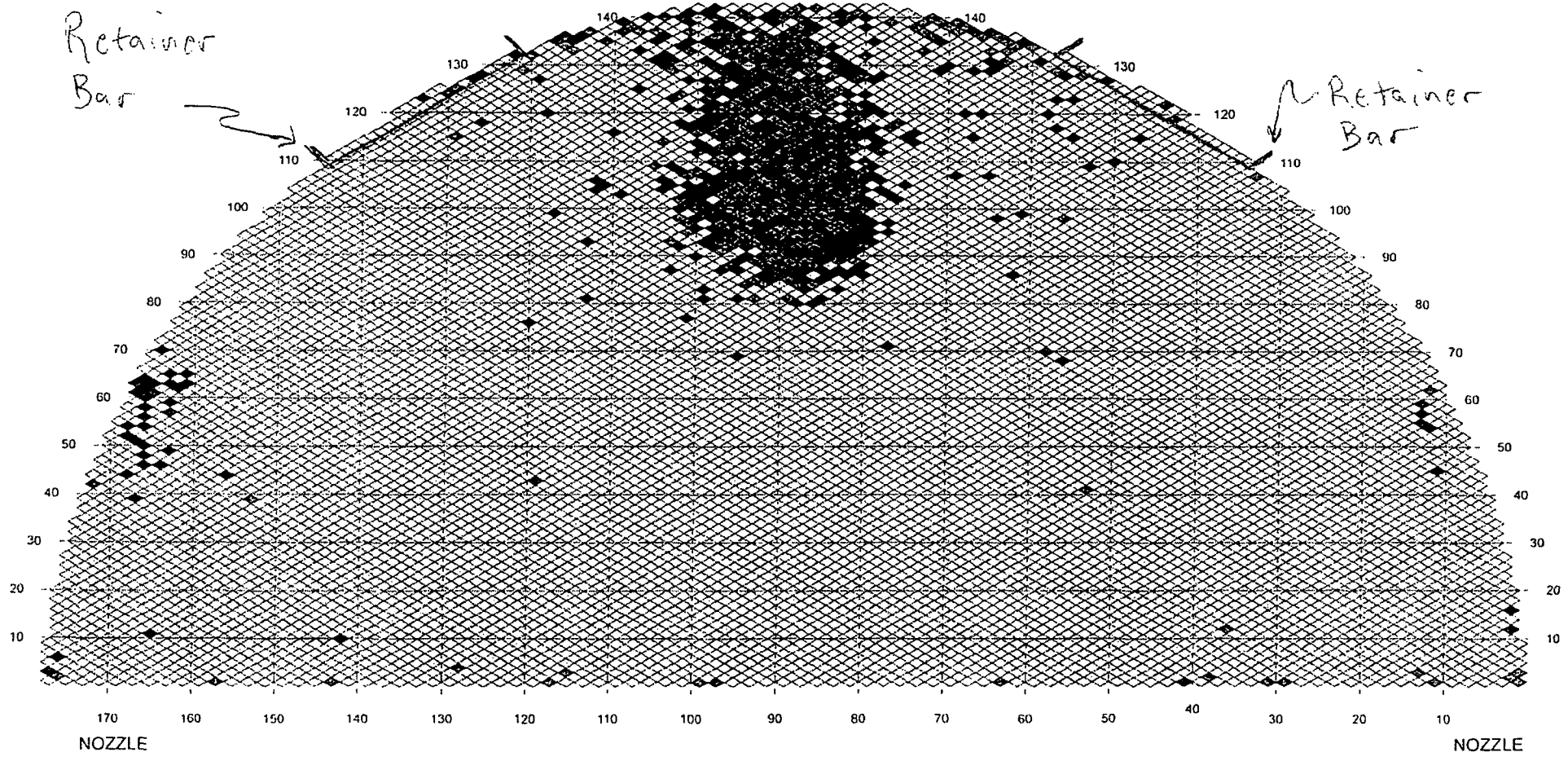
PRELIMINARY RESULTS

AREVA - I DMS map module Version 11.0

TOTAL TUBES: 9727
SELECTED TUBES: 9727
OUT OF SERVICE (#): NA

SCALE: 0.066571 X
Sun Feb 05 14:20:59 2012

MANWAY



SCE-SONGS Unit 2 - REPL
Outage

GROUP	TUBES
>=30%	0
20-29%	65
10-19%	494
<10%	767

AREVA - EDIMS map module Version 11.0

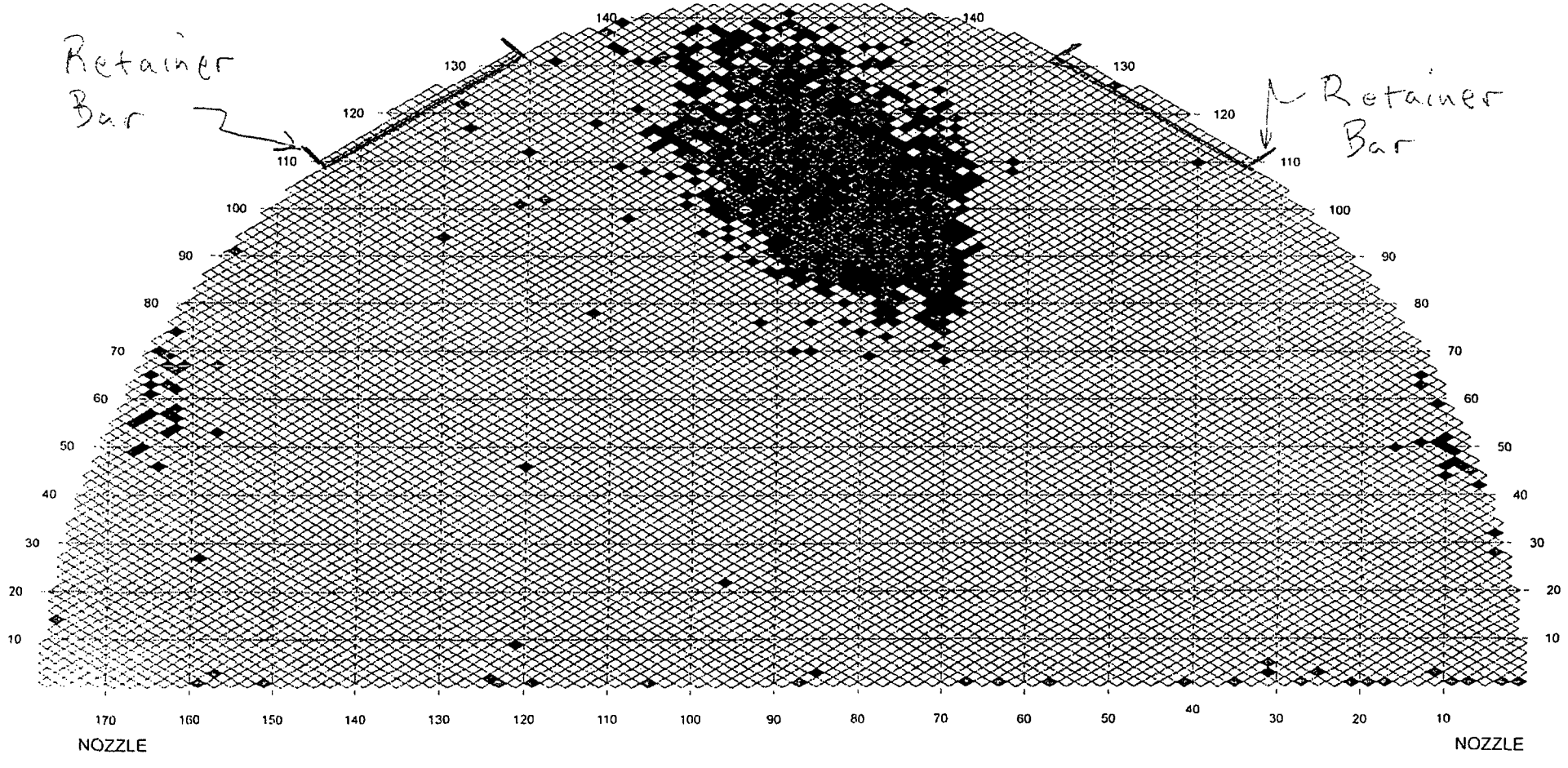
S/G 89 Repl
COLD
PRIMARY FACE

PRELIMINARY RESULTS

TOTAL TUBES: 9727
SELECTED TUBES: 9629
OUT OF SERVICE (#): NA

SCALE: 0.066571 X
Mon Feb 06 06:45:01 2012

MANWAY



SONGS Unit 2
Steam Generator Eddy Current Testing
February 6, 2012

Status

Bobbin ECT

- Steam Generator 2E088: Complete on 9727/9727 tubes (100%)
- Steam Generator 2E089: Complete on 9629/9727 tubes (99%)
- Totals: 19356/19454 tubes (99%)

Rotating Probe (special interest):

- Steam Generator 2E088: Complete on 224/224 tubes (100%)
- Steam Generator 2E089: Complete on 43/158 tubes (27%)
- Totals: 267/382 tubes (70%)

(Note: See discussion below for expanded examination scope due to potential loose part)

Findings to Date

Bobbin ECT

	Through Wall Thickness Percentage, Number of Tubes				
	>35%	20-34%	10-19%	<10%	None
Steam Generator 2E088	2	75	407	600	8643
Steam Generator 2E089	-	65	466	744	6502
	2	140	873	1344	15145

Rotating Probe (special interest) ECT

- Steam Generator 2E088: Two wear indications at retainer bars, on separate tubes, 54% and 47% through wall depth.
  Potential Loose Part (PLP) at adjacent tubes, middle tube support plate.
- Steam Generator 2E089: Five wear indications at retainer bars, on four tubes. Two indications characterized at 90% and 38% through wall depth; remaining three yet to be characterized but expected to be less based on bobbin voltage.

Significance of Findings

- Wear indications at retainer bars

  The top of the tube bundle has two sets of retainer bars, each set spanning between 23 tube columns at the periphery. The total number of tubes that are adjacent to retainer bars is approximately 100 per steam generator. The location and depth of these wear indications found in both Unit 2 steam generators indicate that retainer bar wear should now be considered the most likely cause of the tube leak in Unit 3 steam generator 3E088.

- Potential loose part at tube support plate

  The straight leg portion of the tube bundle has seven tube support plates approximately equally spaced between the tubesheet and the U-bend portion. Steam generator 2E088 has a foreign object at the middle support plate between adjacent tubes. This finding will require opening the available inspection port above the middle tube support for FOSAR. In

PRELIMINARY RESULTS

addition, the ECT preplan included a provision for expanding the scope of rotating probe exams to include the top of tubesheet area, outer three tubes, in case of a confirmed loose part. This planning element was based on specific EPRI recommendations for SONGS.

- Condition monitoring will require in-situ pressure testing.

  Condition monitoring is a formal evaluation process that reviews the ECT results against performance criteria from the plant technical specifications. According to EPRI guidelines, the depth of the retainer bar wear indications will require in-situ testing to be completed as part of the condition monitoring process. In this test, the individual tube is pressurized to design conditions (~5,000 psi). Test and acceptance criteria are being developed.

- Operational assessment will require examinations in the next outage

  Operational assessment is a forward-looking process of predicting the expected wear during the interval to the next examination. This process determines when the next examination will be required. The evaluation is expected to show that all structural and leakage critieria will continue to be met during the next operating cycle. Examinations will be required at the next refueling outage.

- Tube plugging and stabilization criteria are being developed.

  Further analytical work is needed to understand the mechanism producing retaining bar wear indications. The supplier, MHI, is currently mobilizing home-office resources in Japan to support these analyses. MHI also has an on-site team arriving at SONGS 2/7.

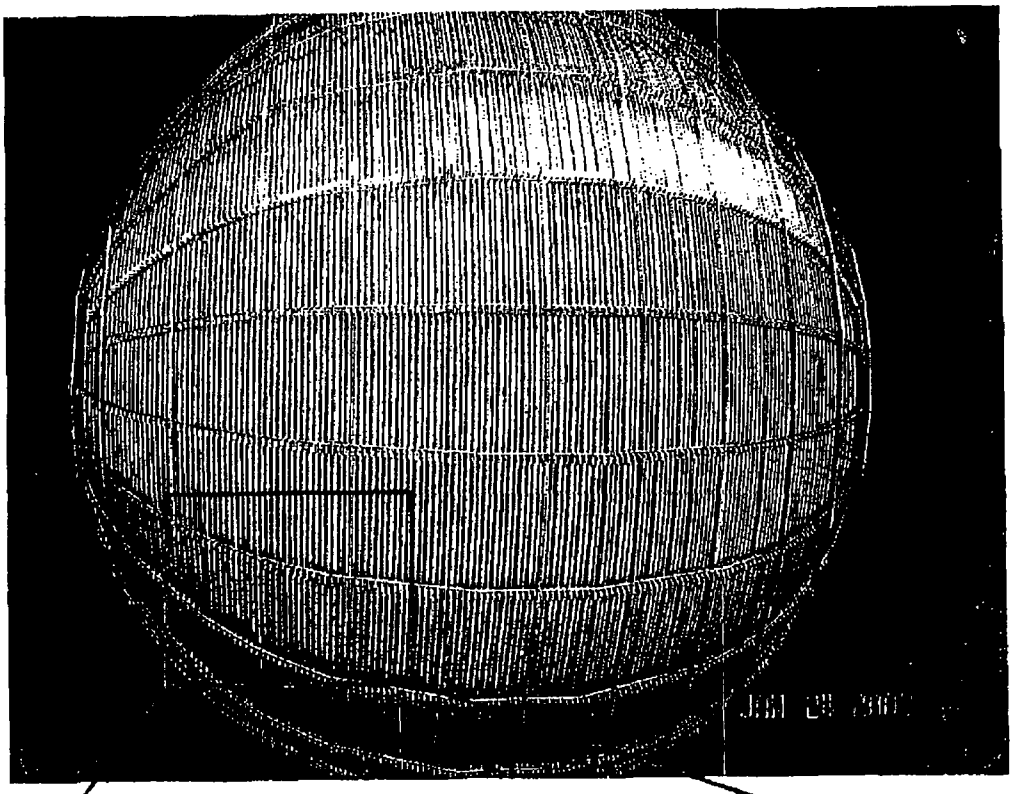
Current Actions

- Eddy Current Testing	Completion Forecast 2/7
- In-situ testing	Completion Forecast 2/9
- Plugging	Holding for in-situ test and criteria development
- Tube stabilization analyses	Completion Forecast 2/10

Planned Actions

- Examination in 2C18
- Discussions with manufacturer and NRC
- Industry communications per S/G Program

PRELIMINARY RESULTS



(b)(4)

Johnson, Andrew

Subject:	SCE update on SONGS Steam Generator inspections
Location:	various
Start:	Fri 2/10/2012 4:00 PM
End:	Fri 2/10/2012 5:00 PM
Show Time As:	Tentative
Recurrence:	(none)
Meeting Status:	Not yet responded
Organizer:	Hall, Randy
Required Attendees:	Markley, Michael; Kulesa, Gloria; Werner, Greg; Lantz, Ryan; Anchondo, Isaac; Jim Melfi; Warnick, Greg; Johnson, Andrew; Reynoso, John; Murphy, Emmett; Karwoski, Kenneth
Categories:	Red Category

Bridge No. 888-677-3916, passcode (b)(6)
Time: 1:00 – 2:00 pm PST (4:00 – 5:00 EST)

This call is a follow-up to the status call held on 2/6/2012. It will primarily focus on the licensee's inspections and testing of the U2 SG tubes. U3 SG activities may be mentioned, but will be discussed more fully in a future call.
Attached are some preliminary responses from SCE regarding some of the NRC questions asked in the previous call on 2/6.

SO_D3B_MX450
SCE_COM_20120

Additional information to be provided as I receive it.

Randy Hall, NRR/DORL
(301) 415-4032

D/30

1. Provide sketches or drawings of the Anti Vibration Bar, Retaining Bar and the Retainer Bar.

Figure 2-1 SONGS 2 & 3 RSG General Arrangment Drawing

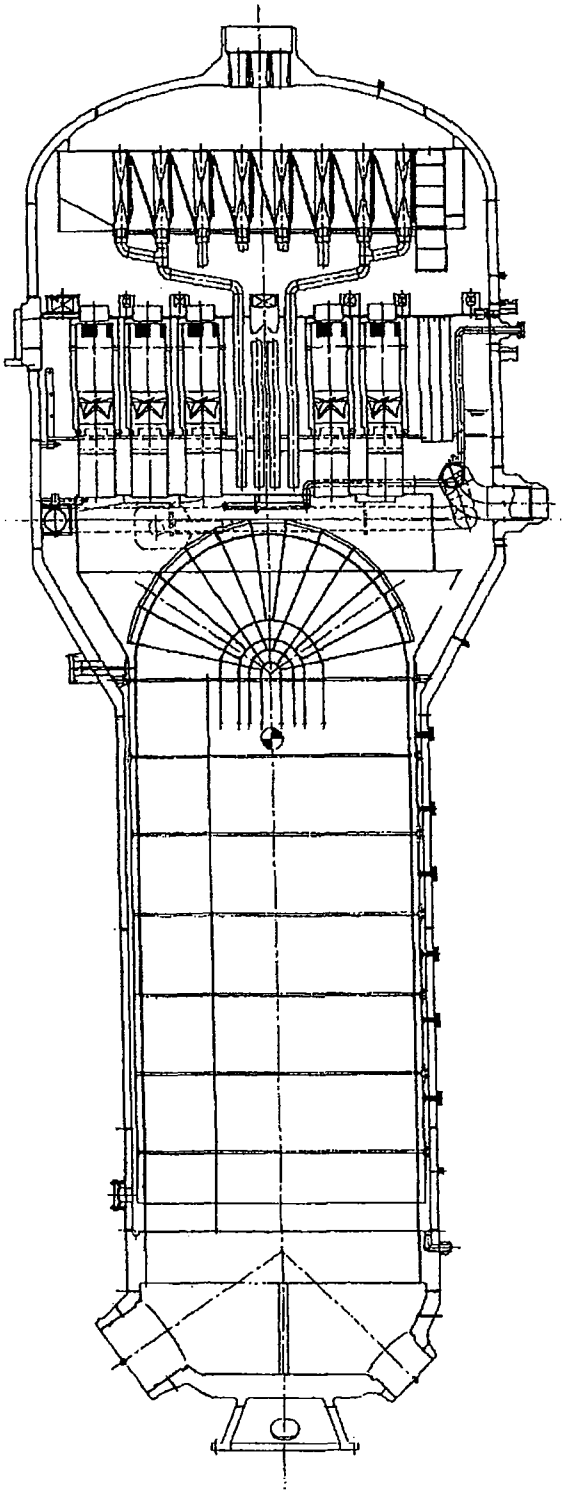


Figure 2-2 SONGS 2 & 3 RSG AVB Layout

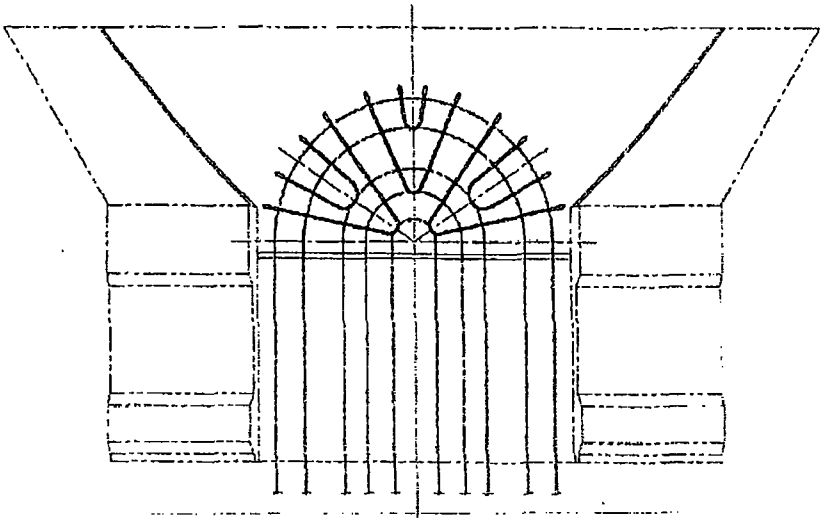


Figure 2-3 SONGS 2 & 3 RSG TSP Layout

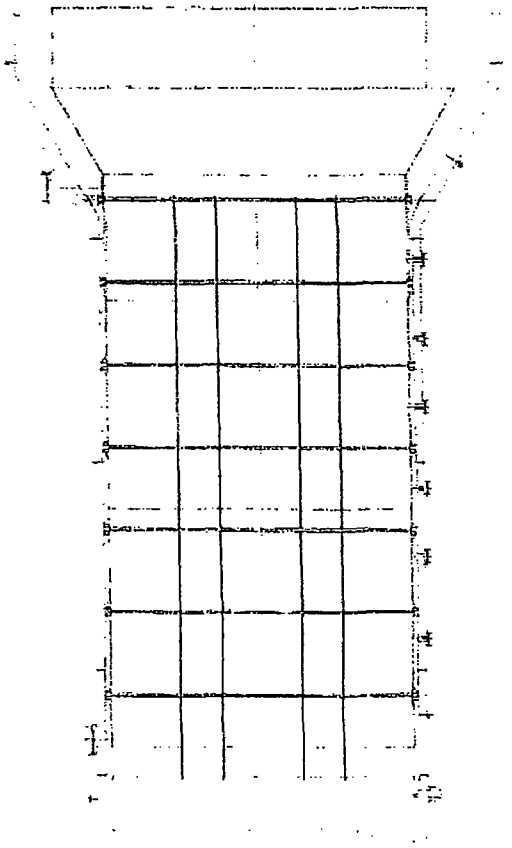


Figure 2-4: SONGS-2&3 AVB Retainer Bar General Arrangement (overhead view)

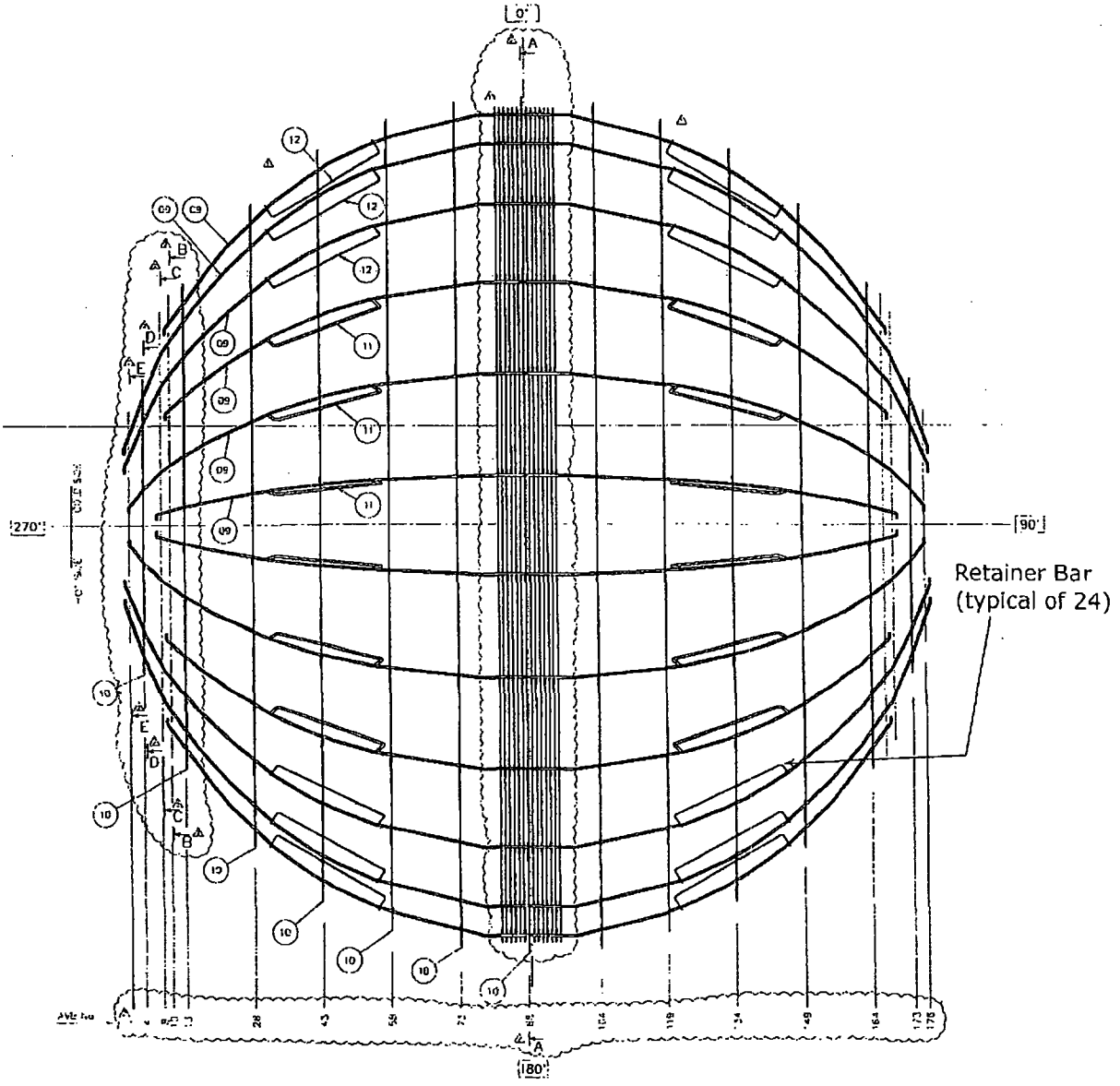


Figure 2-5 SONGS 2 & 3 Tube-to-Tubesheet Installation

(b)(4)

AREVA	Data Analysis Guideline San Onofre Nuclear Generating Station (SONGS) Units 2 & 3	
	Doc #:03-9101495	Rev: 003

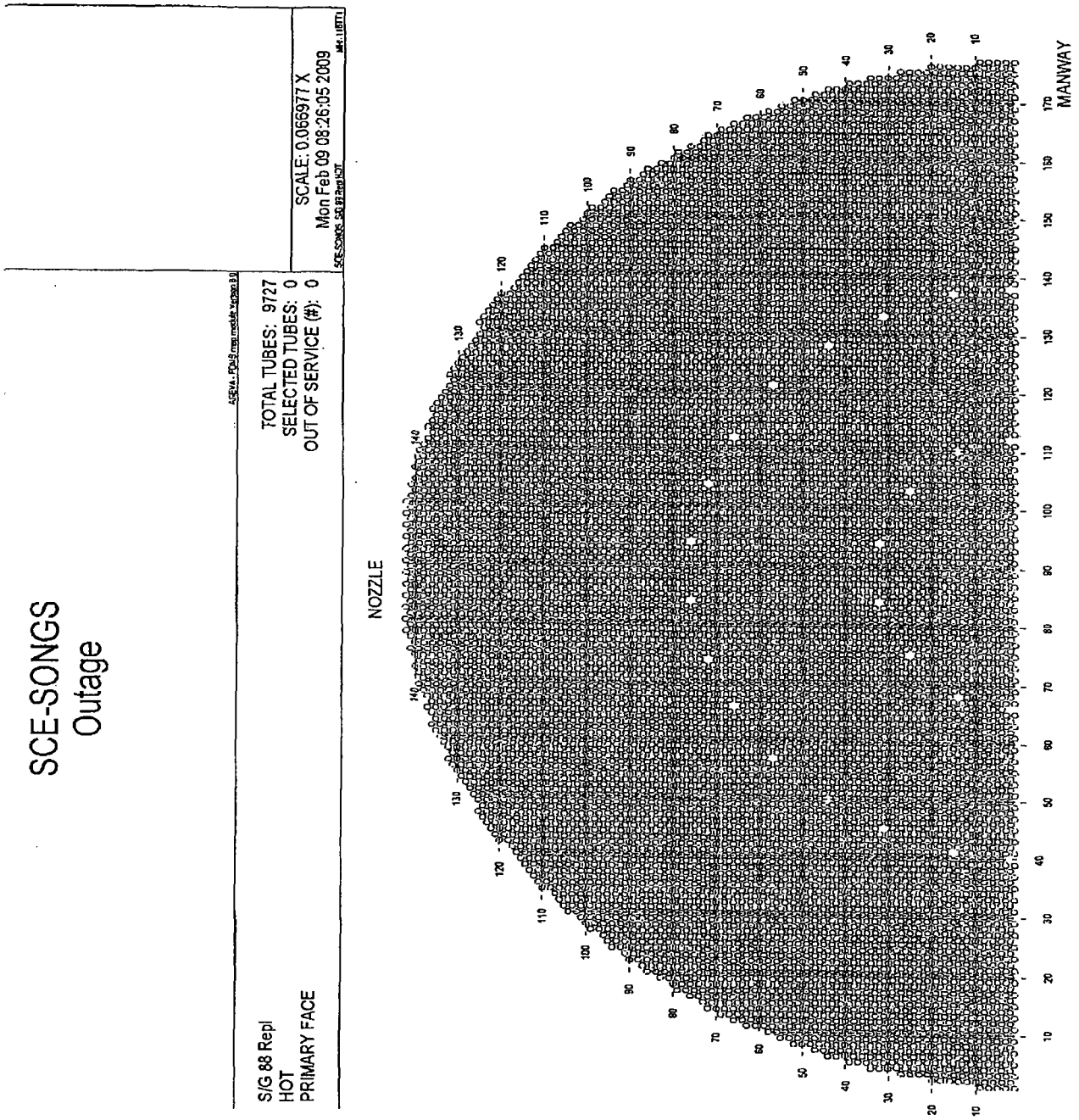


Figure 3-2 Tubesheet Map SONGS MHI S/G Model: 116TT1

AREVA	Data Analysis Guideline San Onofre Nuclear Generating Station (SONGS) Units 2 & 3	
	Doc #:03-9101495	Rev: 003

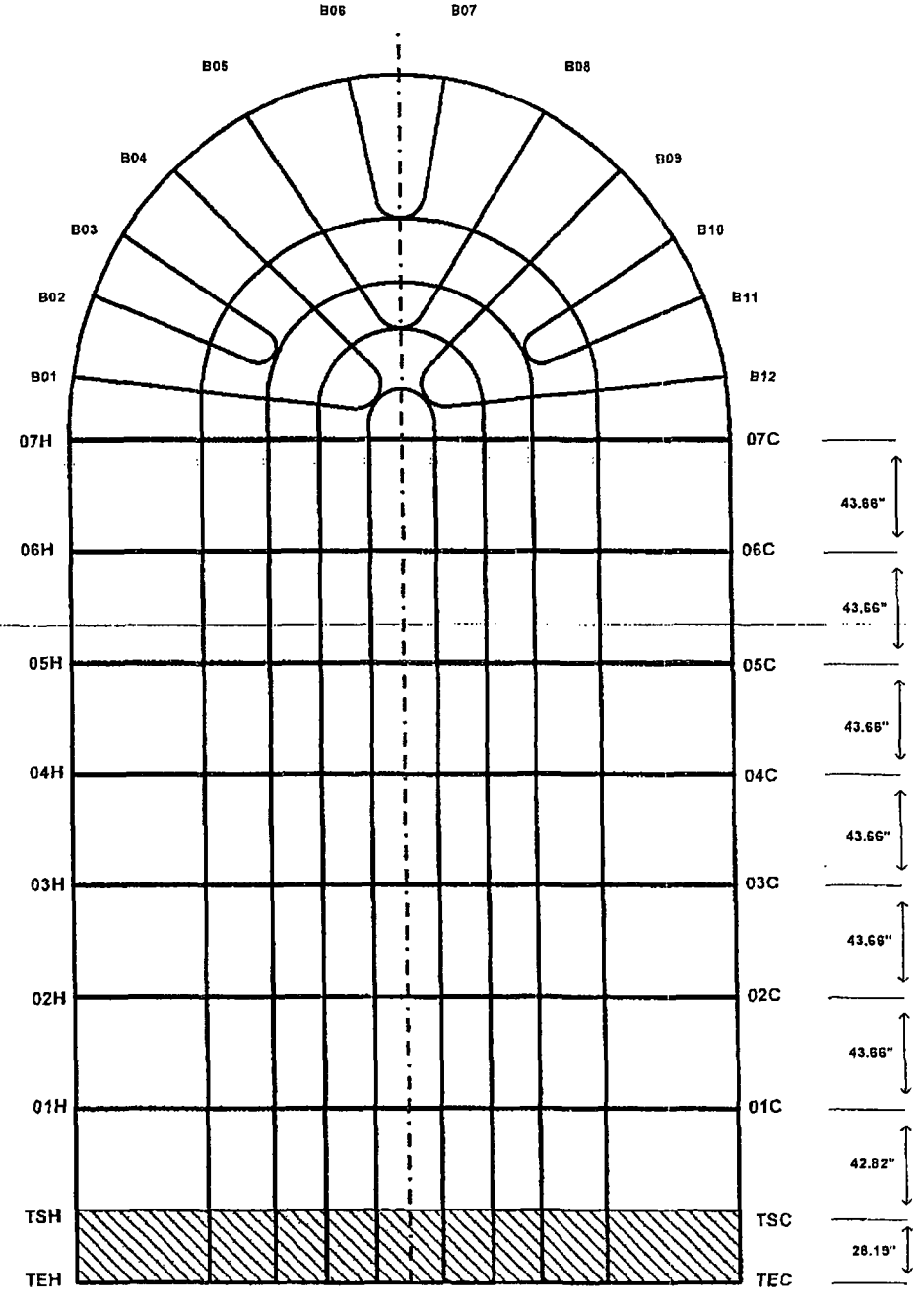


Figure 3-9 SONGS Steam Generator Model MHI -116TT1 Tube Support Drawing

2. Provide a material list of all SG components in contact with tubes.

Retainer Bar Material

SB-166, UNS NC6690 per Drawing SO23-617-1-D507, Rev 4
Chrome Plated per Drawing SO23-617-1-D542, Rev 8

Table 2-1 SG Design Highlights

Number of SGs per unit	2
Tube material	SB-163 (Inconel 690 TT) Rows 1-13 are stress-relieved
Number of tubes per SG	9727
Tube nominal outside diameter	0.750 in.
Tube nominal wall thickness	0.043 in.
Pitch	1.00 in.
Layout of tubes	Equilateral triangular array
Tube Support Plates	Seven trefoil broached plates, 405 ferritic stainless steel
Tube Support Plate Thickness	1.38"
Anti Vibration Bars	Six sets (AV1 – AV12), 405 Stainless Steel
AVB dimensions	(b)(4)
Tubesheet Material Note: Unit 3 material re-certified due to heat addition during repair of Divider Plate-to-Channelhead weld.	Low alloy steel Unit 2: (SA-508 Gr3 Class 2) Unit 3: (SA-508 Gr3 Class 1)
Tubesheet nominal thickness	(b)(4)

3. Provide condition monitoring structural limit curves.

Figure 7-2: Structural and Condition Monitoring Limit Curves for Wall Thinning at 820 psia Secondary Pressure

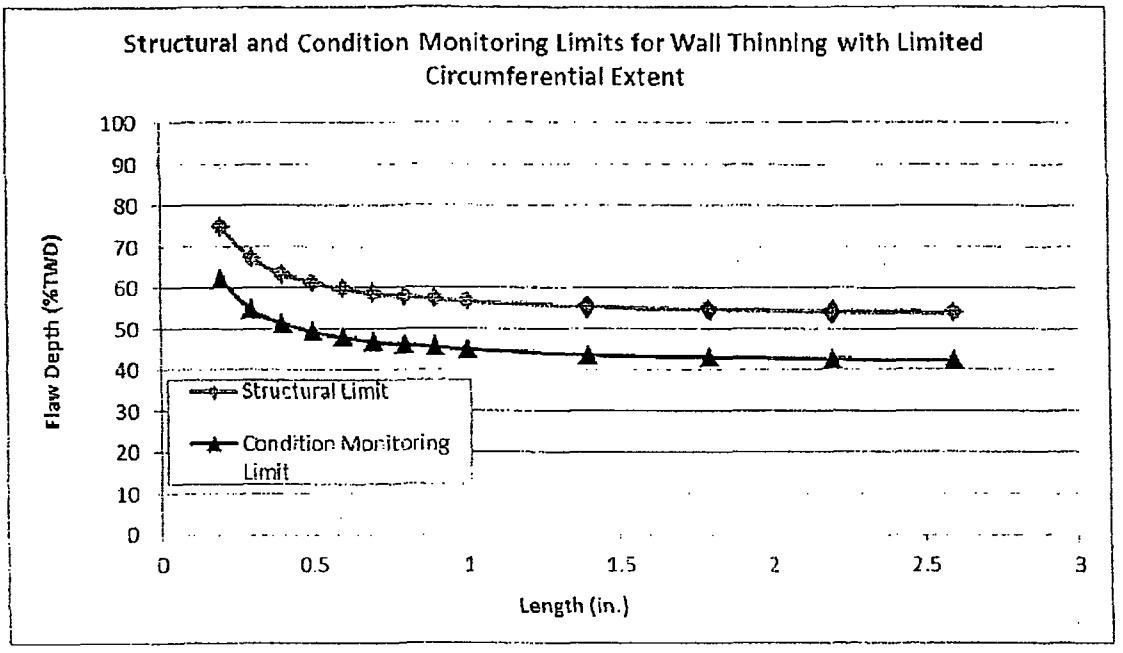
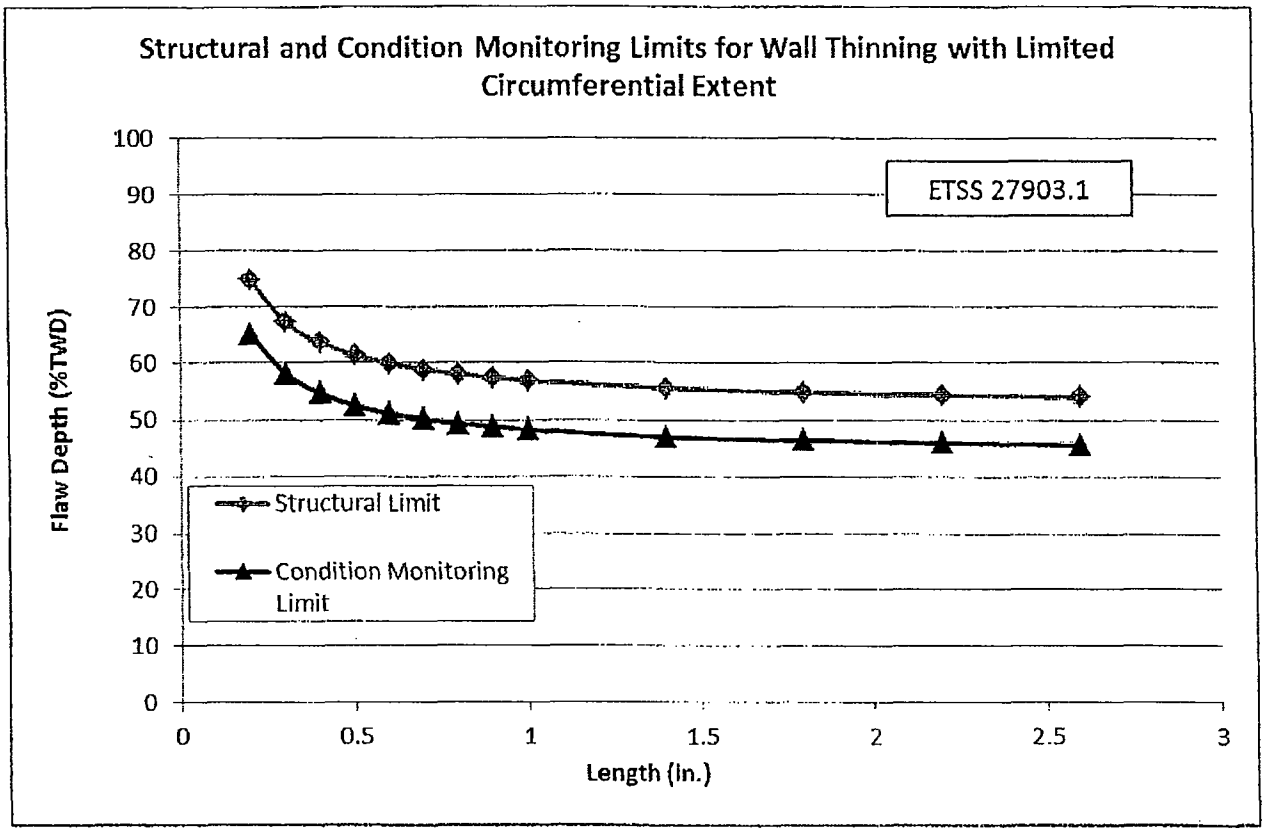
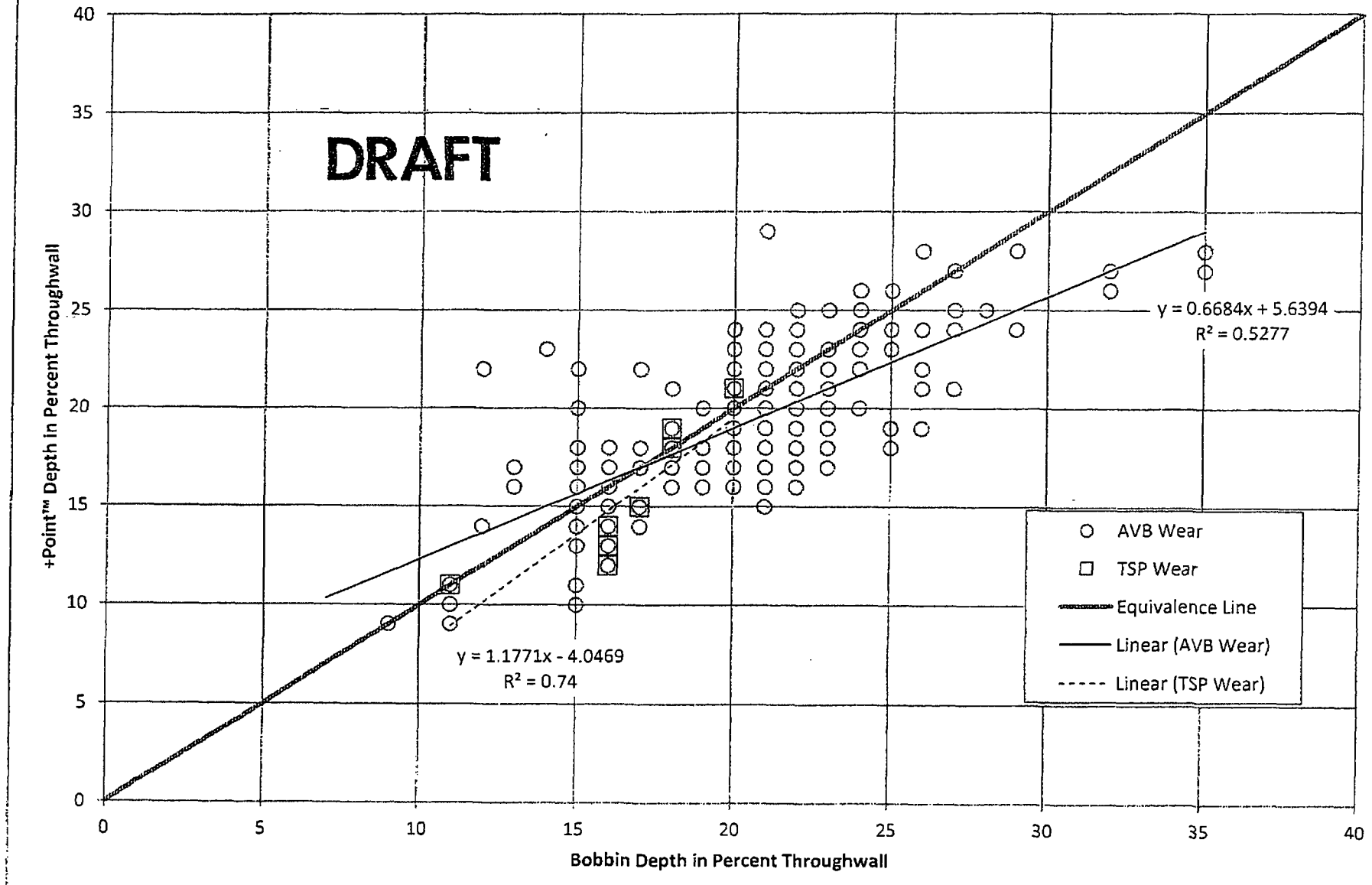


Figure 7-4: Structural and Condition Monitoring Limit Curves for Wear at 820 psia Secondary Pressure (ETSS 27903.1)



4. Provide info on the consistency between the tube wear results from the Bobbin ECT and the Rotating Probe results.

SONGS 2C17 SG 88 & 89
AVB and TSP Wear +Point™ Depth vs Bobbin Depth



5.Provide the flaw profile for the Retainer Bar flaws.

DRAFT

List of Retainer Bar Indications

SG	Row	Col	Location	Bobbin Ind	Bobbin Volts	+Point™ Ind	+Point™ Volts	+Point™ Depth	Circumferential Extent	Axial Extent
SG88	124	48	B03 +0.60"	NQI	1.35	SVI	0.52	47%	0.35"	0.30"
SG88	125	49	B03 +0.45"	NQI	2.9	SVI	0.71	54%	0.30"	0.31"
SG89	118	44	B11 -0.63"	NQI	0.2	+Point™ Data Not Acquired/Analyzed				
SG89	119	133	B02 +0.41"	NQI	7.82	SVI	2.8	90%	0.46"	0.41"
SG89	120	132	B10 -0.47"	NQI	0.17	SVI	0.15	28%	0.16"	0.24"
SG89	120	132	B11 -0.43"	NQI	0.11	SVI	0.17	29%	0.21"	0.36"
SG89	127	127	B03 +0.53"	NQI	0.44	SVI	0.32	38%	0.31"	0.36"

Status as of: 2/8/2012 6:54 AM

Johnson, Andrew

From:	Hall, Randy NRR
Sent:	Thursday, February 16, 2012 10:50 AM
To:	Markley, Michael; Sifre, Wayne; Drake, James; Melfi, Jim; Anchondo, Isaac; Karwoski, Kenneth
Cc:	Johnson, Andrew; Warnick, Greg; Reynoso, John
Subject:	FW: SONGS U2/3 Steam Generator Status Reports
Attachments:	Unit 3 NRC Steam Generator NRC Status Report 2 -16-2012.pdf; Unit 2 Steam Generator NRC Status Report 02-16-2012.pdf

Here are the latest status reports from SONGS

From: (b)(6) SCE
Sent: Thursday, February 16, 2012 10:47 AM
To: Werner, Greg; Lantz, Ryan; Hall, Randy; Kulesa, Gloria
Cc: (b)(6)
Subject: SONGS U2/3 Steam Generator Status Reports

From (b)(6) for 0800 Conference Call.

(b)(6)
Nuclear Regulatory Affairs
Administrative Assistant
AWS/D3D
PAX (b)(6)

Please consider the environment before printing this email

D/31

SONGS Unit 2
Steam Generator Eddy Current Testing
0500 February 16, 2012

Status

Bobbin ECT
- Steam Generator 2E088: Complete on 9727/9727 tubes (100%)
- Steam Generator 2E089: Complete on 9727/9727 tubes (100%)
- Totals: 19454/19454 tubes (100%)

Rotating Probe (special interest)
- Steam Generator 2E088: Complete on 203/203 tubes (100%)
- Steam Generator 2E089: Complete on 162/162 tubes (100%)
- Totals: 365/365 tubes (100%)

Rotating Probe (top of tubesheet expanded scope)
- Steam Generator 2E088: Complete on 2060/2060 tubes (100%)
- Steam Generator 2E089: Complete on 2060/2060 tubes (100%)
- Totals: 4120/4120 tubes (100%)

Rotating Probe (tube/retainer bar intersections expanded scope)
- Steam Generator 2E088: Complete on 192/192 tubes (100%)
- Steam Generator 2E089: Complete on 192/192 tubes (100%)
- Totals: 384/384 tubes (100%)

Findings to Date

Bobbin ECT

	Through Wall Thickness Percentage, Number of Tubes				
	>35%	20-34%	10-19%	<10%	None
- Steam Generator 2E088:	2	74	406	600	8645
- Steam Generator 2E089:	-	65	496	768	8398
- Totals:	2	139	902	1368	17043

Rotating Probe (special interest)
- Steam Generator 2E088: Two wear indications at retainer bars, on separate tubes, 54% and 47% through wall depth.
- Steam Generator 2E089: Five wear indications at retainer bars, on four tubes. Indications characterized at 90%, 38%, 30% 29% and 28% through wall depth.

Rotating Probe (top of tubesheet expanded scope)
- Steam Generator 2E088: No wear or potential loose part indications.
- Steam Generator 2E089: No wear or potential loose part indications.

Rotating Probe (tube/retainer bar intersections)
- Steam Generator 2E088: No other indications.
- Steam Generator 2E089: No other indications.

Current Actions

- Eddy Current Testing	Review for Unit 3 type freespan indications – Complete
- Plug List Development	Steam Generator E088 – Complete
	Steam Generator E089 – Complete
- Plugging	In-progress
- Tube stabilization analyses	Complete
- Secondary Side Inspection	Steam Generator 2E089 retainer bars in progress
- NRC NRR Conference Call	0800 2/16/12

Planned Actions

- Examination in 2C18
- Discussions with manufacturer and NRC
- Industry communications per S/G Program

SONGS Unit 3
Steam Generator Inspection and Eddy Current Testing
February 16, 2012

Status

Steam Generator 3E088 Secondary Side Leakage Test:
- Completed 2/10/12
- One leaking tube at approximately R106 C78, confirmed by eddy current
- Leak location in U-bend and is located 2" above 4th AVB on hot leg side
- Leakage rate approximately 0.001 gpm at 80 psi

Bobbin ECT

- Steam Generator 3E088:	Complete on	8590/9727 tubes	(88%)
- Steam Generator 3E089:	Complete on	7968/9727 tubes	(82%)
- Overall:	Complete on	16558/19454 tubes	(85%)

- Scope – 100% full-length bobbin followed by rotating probe as determined by bobbin results

Rotating Probe (special interest)
- Following completion of bobbin ECT
- Forecast to begin 2/16

In-situ Testing
- Leaking tube and any other indications required by EPRI guidelines
- Schedule following completion of eddy current testing

Findings to Date (as of 2/15/12)

Freespan Indications
- Leak is located near center of a 20" axially oriented freespan indication
- Similar indications found in adjacent tubes
- Consistent with tube to tube wear
- ~ 300 tubes with similar indications (present in both SG's)
- Reanalyzed ~ 1000 tubes in each Unit 2 SG for this mechanism; no indications found, the tubes were selected to bound the same region as the freespan indications in Unit 3

Wear at Support Structures - Tube Support Plates (TSP) and Anti-Vibration Bars (AVB)
- Wear found at TSP's and AVB's in tubes with freespan indications
- Overall ~ 280 TSP locations with wear => 35% (TS plugging limit)

Wear at Retainer Bars
- Four locations (SG88 – 3; SG89 – 1) with Non-Quantifiable Indications (NQI) by bobbin

Phone Call with NRC
Steam Generator Inspection and Evaluation Status
4/16/12
1200 PST
D3A

SAN ONOFRE NUCLEAR GENERATING STATION

Purpose of Meeting & Expected Outcome(s):
Discuss status of Unit 2/3 steam generator inspections and evaluations

Requirements for Every Meeting:
1. Take Two for Safety and Nuclear Safety Culture Message of the Day
2. Action Scribe
3. Timekeeper
4. Meeting Skeptic

(Meetings should end 10 min. before the hour to accommodate travel between meetings)

AGENDA

Time	Topic	Who	Expected Outcome	
1200	Introduction and Overview	(b)(6)	✓ N/A	EX6
1210	Status and results of Unit 2 tube inspections	(b)(6)	✓ N/A	EX6
1220	AREVA eddy current inspection process validation	(b)(6)	✓ N/A	EX6
1230	Tube plugging strategy	(b)(6)	✓ N/A	EX6
1235	T/H model confirmation schedule	(b)(6)	✓ N/A	EX6
1240	Tube wear pattern and contact force	(b)(6)	✓ N/A	EX6
1245	Review of communication plan and data requests	(b)(6)	✓ N/A	EX6

As employees of SONGS, we are committed to demonstrating the right behaviors required of a Nuclear Professional and embracing our Values of:

Integrity ~ Excellence ~ Respect ~ Continuous Improvement ~ Teamwork

From:	ALLISON SPOLERICH/SONGS/SCE/EIX
To:	Johnson, Andrew; bruce.marlow@areva.com; Thurston, Carl; Murphy, Emmett; Warnick, Greg; Werner, Greg; Anchondo, Isaac; Rivera-Ortiz, Joel; John Brabec/SONGS/SCE/EIX; Reynoso, John; Ortega-Luciano, Jonathan; LEE KELLY/SONGS/SCE/EIX; Michael Stevens/SONGS/SCE/EIX; Mike Short/SCE/EIX; Hall, Randy; RICH ST ONGE/SONGS/SCE/EIX; RICHARD COE/SONGS/SCE/EIX; Ryan Treadway/SONGS/SCE/EIX
Subject:	Information Update - Description has changed: NRC Teleconference - Unit 2 Inspection Update - REQUESTED BY RICH ST. ONGE (See below for Call In Numbers)
Start:	Monday, April 16, 2012 2:00:00 PM
End:	Monday, April 16, 2012 3:00:00 PM
Location:	D4A
Attachments:	NRC Phone Call Meeting Agenda 04 16 12.doc ATT00001.htm ATT00002.htm c111410.ics } Icons or Agenda

DIAL IN - 1 866 776 1098
PARTIC (b)(6)
HOST (b)(6)