Nuclear Operating Company
South Texas Project Electric Generating Station P.O. Box 289 Wadsworth, Texas 77483

April 16, 2007

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U. S. Nuclear Regulatory Commission
Attention: Document Control Desk
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Rockville, MD 20852-2738

South Texas Project
Unit 1
Docket No. STN 50-498
1RE13 Inservice Inspection Summary Report for Steam Generator Tubing

Four copies of the summary report describing the results of the steam generator tube inservice inspection performed during refueling outage 1RE13 are enclosed. The summary report satisfies the reporting requirements of ASME Section XI, Article IWA-6230, and Section 6.9.1.7 of the South Texas Project Technical Specifications.

There are no commitments in this letter.

If there are any questions regarding this report, please contact either Mr. P. L. Walker at (361) 972-8392 or me at (361) 972-7431.

Brandon Jenewein
Manager,
Testing/Programs

PLW

Enclosure: 1RE13 Inservice Inspection Summary Report for Steam Generator Tubing of the South Texas Project Electric Generating Station Unit 1

A047

STI: 32142228

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1RE13 INSPECTION SUMMARY REPORT

FOR STEAM GENERATOR TUBING

of the

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

UNIT 1

USNRC DOCKET NO.: 50-498

OPERATING LICENSE NO.: NPF-76

COMMERCIAL OPERATION DATE: August 25, 1988

Prepared By: 4/11/2007
D. A. Stuhler — Date
Test Engineer

Approved By: 11 APR 2007
C. J. Younger — Date
Supervisor, Test Engineering

SOUTH TEXAS PROJECT UNIT 1

1RE13 INSPECTION SUMMARY REPORT FOR STEAM GENERATOR TUBING

Introduction

This summary report describes the inspection of steam generator tubing at South Texas Project (STP) Unit 1 performed during refueling outage 1RE13 in October 2006.

Steam generator eddy current inspection, sludge lancing, and Foreign Object Search and Retrieval (FOSAR) were conducted in steam generators 1A, 1B, 1C, and 1D. Because of wire remnants and wall thinning found during 1RE12, a more aggressive inspection scope was developed for steam generator 1D. The wire remnants originated from a feedwater heater cable stabilizer and migrated into the steam generator during cycle 11.

This report provides the information required by STP Technical Specification 6.8.3.o for maintaining steam generator tube integrity and the reporting requirements of Technical Specification 6.9.1.7.

Scope of Examinations

The inservice inspection program, "2006 Outage Plan for the In-service Inspection of Steam Generator Tubing at the South Texas Project Electric Generating Station, Unit 1," (ISI Outage Plan) identified the steam generator tube areas to be examined by eddy current (EC) testing and the procedures expected to be used during the inservice inspection. A Degradation Assessment written prior to the outage established the scope of eddy current inspections.

EPRI guidelines require that all steam generators undergo a 50% general purpose EC bobbin inspection during the outage nearest the midpoint of the operative sequential period. Similarly, 20% examinations (+Point) of regions potentially susceptible to stress corrosion cracking should also be performed during the outage nearest the midpoint of the sequential operating period. For STP Unit 1, the operative sequential period is 144 EFPM beginning with refueling outage 1RE10, the first inservice inspection for the current steam generators. A more extensive eddy current and visual inspection of steam generator 1D was developed to support the planned cycle 3 inspection interval for the Unit 1 steam generators. This additional effort focused on potential wear at the top of the tubesheet and the flow distribution baffle related to the inventory of stabilizer wire remnants remaining in steam generator 1D. The 1RE13 inspection scope is outlined below:

<u>Steam Generators 1A, 1B, and 1C</u>

- Inspect three peripheral rows with 100% bobbin coil full length.
- Full length bobbin coil inspection of 50% of remaining tubes, other than three peripheral rows.
- +Point inspection of three peripheral rows from 3 inches into tube sheet to 6 inches above top of tube sheet to aid in loose parts detection.
- +Point inspection of 20% of hot leg tubes, from full 16 inches into tube sheet to 6 inches above top of tube sheet.
- +Point inspection of all previously identified dents and dings > 5 volts.

- +Point inspection of 20% of first two rows of U-bend looking for outer diameter stress corrosion cracking (ODSCC).
- +Point inspection of all tube bulges in tubesheet as identified in pre-service inspection.
- +Point inspection of all known unretrieved possible loose parts as identified by previous eddy current inspections, if possible.
- +Point inspection of all unretrieved visually observed loose parts as identified by previous secondary side inspections.
- +Point as required to bound potential loose parts identified by eddy current or loose parts identified by secondary side visual inspections with two clean surrounding tubes.
- Standard secondary side video probe inspection including visual inspection of loose parts previously left in place and possible loose parts as identified by eddy current during 1RE13 and previous outages, if possible.
- Sludge lancing.
- Upper steam drum inspection (SG 1C only).
- Feedring inspection (SG 1C only).
- Inspection of the ninth tube support plate (SG 1A only).
- Tube scale profiling (SG 1C only).
- Inspection of all installed plugs.

Steam Generator 1D

- 100% bobbin coil full length inspection.
- Conduct 100% top of tube sheet +Point, full depth tube sheet -3 inches to +6 inches.
- Conduct 20% of hot leg +Point inspection of tubesheet (hot leg only) from -16 inches to +6 inches at top of tube sheet.
- +Point inspection of all previously identified dents and dings > 5 volts.
- +Point inspection of 20% of first two rows of U-bend looking for ODSCC.
- +Point inspection of all tube bulges and over expansions in tubesheet as identified in pre-service inspection.
- +Point inspection of all tubes surrounding known unretrieved possible loose parts as identified by previous eddy current inspections.
- +Point inspection of all tubes surrounding unretrieved visually observed loose parts as identified by previous secondary side inspections.
- +Point inspection of all tube wear left in service during previous outages.
- +Point as required to bound potential loose parts identified by bobbin inspection or loose parts identified by as-left secondary side visual inspections with two clean surrounding tubes.

- Enhanced secondary side video probe inspection by inserting the video probe down every row to inspect for loose parts and associated wear.
- 100% hot leg and 20% cold leg +Point inspection of flow distribution baffle (FDB) from -3 inches to + 6 inches.

Summary of Examinations

All steam generators were sludge lanced and the top of the tubesheet visually inspected for foreign objects. A small number of small foreign objects were observed at the top of the tubesheet in the steam generator 1A, 1B, and 1C tube bundles; fragments of flexitallic gaskets, machining remnants, wire bristles, weld slag, pieces of tube scale, and sludge rocks account for most of the material observed. Four pieces of stabilizer wire were found in SG 1C. Except for benign objects, such as sludge rocks and fiber bristles, all identified foreign objects were removed. No degradation was identified in any of these steam generators based on the 1RE13 inspection results. Due to the known inventory of stabilizer wire in SG 1D, visual inspection of the top of the tubesheet included 100% foreign object mapping of both the hot leg and cold leg, with attempted retrieval of all identified items from the top of the tubesheet. Visual inspection of the flow distribution baffle was also performed to identify the source of eddy current potential loose part (PLP) signals.

The following table is a summary of eddy current inspections performed during 1RE13:

STEAM GENERATOR EC INSPECTIONS PERFORMED DURING 1RE13

SG	Program	Tubes Inspected	
		Hot Leg	Cold Leg
1A	Bobbin Straight Leg	4330	384
	+Point Top of Tubesheet	2064	662
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	13	14
	+Point of Prior Dents and Dings > 5 volts	28	51
	PLPs Inspected	88	-
	PLP Calls	0	0
1B	Bobbin Straight Leg	4328	384
	+Point Top of Tubesheet	2048	659
	Low Row U-bend bobbin	154	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	10	10
	+Point of Prior Dents and Dings > 5 volts	1	-
	PLPs Inspected	38	16
	PLP Calls	3	3
1C	Bobbin Straight Leg	4328	384
	+Point Top of Tubesheet	2046	662
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	2	1
	+Point of Prior Dents and Dings > 5 volts		6
	PLPs Inspected	58	14
	PLP Calls	6	0
1D	Bobbin Straight Leg	7575	386
	+Point Top of Tubesheet	7575	7575
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	5424	1468
	Special Interest	17	6
	+Point of Prior Dents and Dings > 5 volts	-	-
	PLPs Inspected	6830	1468
	PLP Calls	348	134

Examination Results and Corrective Measures

There were no axial or circumferential crack-like indications, corrosion mechanisms, or mechanical wear observed at the anti-vibration bar intersections in any of the steam generators.

A total of ten volumetric indications (one in SG 1B, and nine in SG 1D) were detected during the MRPC inspection for resolution of I-codes. Three of the indications were known prior to 1RE13 and no change was noted during the current inspection. Of these three indications, one location at 09C (R10 C50) in SG 1B was a pre-service call and did not change, and two locations at TSH (R84 C22 and R84 C24) were identified during 1RE12 as stabilizer wire wear and did not change. Seven additional volumetric indications were identified during 1RE13. Five were associated with stabilizer wire wear at the top of the tubesheet, while two were associated with PLP calls at the flow distribution baffle. Four tubes in the SG 1D cold leg were identified with wear at the top of the tubesheet: one tube (R117 C49) required plugging due to a wear depth of 44%; and the remaining three tubes (R2 C138, R99 C35, and R116 C48) had wear depths of < 20% and remain in service. One location (R2 C138) was found with two wear scars less than two inches apart. These wear scars measured 8% and 9% respectively. The observed wear was related to the known inventory of stabilizer wire.

In addition to the top of tubesheet indications, two tubes were identified with volumetric indications at the hot leg flow distribution baffle to tube intersections. The through-wall depth of the volumetric indications was 23% and 25%. Since it was not possible to clearly determine the source of the volumetric signals, these locations (R28 C8 and R71 C27) were plugged. None of the top of tubesheet or flow distribution baffle indications challenged the tube integrity limits, and no tube leakage was observed during Cycle 13 operation; therefore, the Condition Monitoring requirements were satisfied.

Due to the number of PLPs being called during the FDB inspection and the potential for additional wear sites, the +Point inspection scope was increased to 100% of the hot leg and 20% of the cold leg intersections. Additional PLP indications were identified, but there were no additional volumetric indications. During the in-bundle top of tubesheet inspection of SG 1D, a total of 227 foreign objects were identified following sludge lancing. The majority of the foreign objects were characterized as fine wire associated with the feedwater heater stabilizer released during Cycle 11. Of the foreign objects identified during top of the tubesheet mapping, five known stabilizer wires were left in place. For those loose parts/foreign objects not removed, wear assessments were performed to support the assessment of SG 1D for operation until 1RE14.

Indications

The following table lists the number of indications which includes all data, including the supplementary inspection program of the Flow Distribution Baffle.

SUMMARY OF EDDY CURRENT INDICATIONS

SOUTH TEXAS UNIT 1 1RE13 INDICATION COUNT – FINAL DATA					
INDICATION	CONDITION	S/G 1A	S/G 1B	S/G 1C	S/G 1D
ADS	Absolute Drift Signal	0	0	0	1
DNG	Freespan Ding	543	17	262	145
DNI	Distorted DNG/DNT Indication	0	0	0	0
DNS	Distorted Dent Indication - Cleared	44	14	29	69
DNT	Dent	0	1	0	0
DSS	DSI History Cleared	0	0	0	1
DTI	Distorted Tubesheet Indication	0	0	0	0
DTS	Distorted TS Indication - Cleared	0	0	0	3
INF	Indication Not Found	0	0	7	127
INR	Indication Not Reportable	30	13	27	107
MBI	Possible Indication at MBM	0	0	0	0
MBM	Manufacturing Buff Marks	140	118	144	296
MBS	Manufacturing Burnish Signal	0	1	0	2
NDD	No Detectable Degradation	7336	7467	7399	30529
NDF	No Degradation Found	10	13	2	17
NQI	Potential Bobbin Flaw Signal	0	1	0	0
NQS	Not Cleared by +Point	56	31	40	72
PLP	Possible Loose Part	0	6	6	482
PVN	Permeability Variation	0	0	0	4
RBD	Retest – Bad Data	78	32	55	53
RIC	Retest – Incomplete	26	4	9	112
RND	Retest – No Data	0	0	0	1
RRT	Retest – Restricted Tube	0	1	0	0
SVI	Single Volumetric Indication	0	1	0	9
VOL	Volumetric Indication	0	1	0	9

No flaw was found during the 1RE13 inservice inspection that met the requirement for "Active" degradation.

The only degradation identified during the 1RE13 inspections was loose parts wear in SG 1D. Wear indications at the top of the tubesheet were sized using a qualified eddy

current technique. The technique is reported to result in a conservative measurement for large volume flaws.

Tube Plugging

As a result of the 1RE13 inspection efforts, three tubes in SG 1D were removed from service by plugging. The locations plugged were R28C8, R71C27, and R117C49. No stabilization was required. No plugging was needed for active degradation mechanisms. No tubes exceeded the structural integrity requirements. No primary-to-secondary leakage was observed during Cycle 13 operation and none is predicted during the next three cycles of operation for SG 1A, 1B, and 1C, and one cycle of operation for SG 1D. Inservice inspection results confirm that the Unit 1 steam generators meet all industry and regulatory structural and leakage integrity guidance.

The total number of tubes plugged per steam generator to date is as follows:

Steam Generator 1A	33	0.44%
Steam Generator 1B	40	0.53%
Steam Generator 1C	26	0.34%
Steam Generator 1D	13	0.17%

Condition Monitoring Results

None of the observed indications exceeded the screening thresholds for in situ testing.

No tubes were pulled or subjected to in-situ pressure testing.

Based on the inspections performed, engineering analysis of the inspection results obtained during 1RE13, and that no corrosion-induced flaws were detected, tube degradation large enough to challenge structural integrity requirements is not expected during the planned operating intervals for the Unit 1 steam generators. Therefore, based on the 1RE13 inspection results, the operating interval between inspections for SG 1A, 1B, and 1C is three cycles. Based on the extensive eddy current and top of tubesheet in-bundle visual inspection efforts performed during 1RE13, the operational assessment supports the expectation that tube integrity in SG 1D will be satisfactorily maintained during the Cycle 14 operating interval.

1RE13 INSPECTION SUMMARY REPORT

FOR STEAM GENERATOR TUBING

of the

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

UNIT 1

USNRC DOCKET NO.: 50-498

OPERATING LICENSE NO.: NPF-76

COMMERCIAL OPERATION DATE: August 25, 1988

Prepared By: 4/11/2007
D. A. Stuhler — Date
Test Engineer

Approved By: 11 APR 2007
C. J. Younger — Date
Supervisor, Test Engineering

SOUTH TEXAS PROJECT UNIT 1

1RE13 INSPECTION SUMMARY REPORT FOR STEAM GENERATOR TUBING

Introduction

This summary report describes the inspection of steam generator tubing at South Texas Project (STP) Unit 1 performed during refueling outage 1RE13 in October 2006.

Steam generator eddy current inspection, sludge lancing, and Foreign Object Search and Retrieval (FOSAR) were conducted in steam generators 1A, 1B, 1C, and 1D. Because of wire remnants and wall thinning found during 1RE12, a more aggressive inspection scope was developed for steam generator 1D. The wire remnants originated from a feedwater heater cable stabilizer and migrated into the steam generator during cycle 11.

This report provides the information required by STP Technical Specification 6.8.3.o for maintaining steam generator tube integrity and the reporting requirements of Technical Specification 6.9.1.7.

Scope of Examinations

The inservice inspection program, "2006 Outage Plan for the In-service Inspection of Steam Generator Tubing at the South Texas Project Electric Generating Station, Unit 1," (ISI Outage Plan) identified the steam generator tube areas to be examined by eddy current (EC) testing and the procedures expected to be used during the inservice inspection. A Degradation Assessment written prior to the outage established the scope of eddy current inspections.

EPRI guidelines require that all steam generators undergo a 50% general purpose EC bobbin inspection during the outage nearest the midpoint of the operative sequential period. Similarly, 20% examinations (+Point) of regions potentially susceptible to stress corrosion cracking should also be performed during the outage nearest the midpoint of the sequential operating period. For STP Unit 1, the operative sequential period is 144 EFPM beginning with refueling outage 1RE10, the first inservice inspection for the current steam generators. A more extensive eddy current and visual inspection of steam generator 1D was developed to support the planned cycle 3 inspection interval for the Unit 1 steam generators. This additional effort focused on potential wear at the top of the tubesheet and the flow distribution baffle related to the inventory of stabilizer wire remnants remaining in steam generator 1D. The 1RE13 inspection scope is outlined below:

<u>Steam Generators 1A, 1B, and 1C</u>

- Inspect three peripheral rows with 100% bobbin coil full length.
- Full length bobbin coil inspection of 50% of remaining tubes, other than three peripheral rows.
- +Point inspection of three peripheral rows from 3 inches into tube sheet to 6 inches above top of tube sheet to aid in loose parts detection.
- +Point inspection of 20% of hot leg tubes, from full 16 inches into tube sheet to 6 inches above top of tube sheet.
- +Point inspection of all previously identified dents and dings > 5 volts.

- +Point inspection of 20% of first two rows of U-bend looking for outer diameter stress corrosion cracking (ODSCC).
- +Point inspection of all tube bulges in tubesheet as identified in pre-service inspection.
- +Point inspection of all known unretrieved possible loose parts as identified by previous eddy current inspections, if possible.
- +Point inspection of all unretrieved visually observed loose parts as identified by previous secondary side inspections.
- +Point as required to bound potential loose parts identified by eddy current or loose parts identified by secondary side visual inspections with two clean surrounding tubes.
- Standard secondary side video probe inspection including visual inspection of loose parts previously left in place and possible loose parts as identified by eddy current during 1RE13 and previous outages, if possible.
- Sludge lancing.
- Upper steam drum inspection (SG 1C only).
- Feedring inspection (SG 1C only).
- Inspection of the ninth tube support plate (SG 1A only).
- Tube scale profiling (SG 1C only).
- Inspection of all installed plugs.

Steam Generator 1D

- 100% bobbin coil full length inspection.
- Conduct 100% top of tube sheet +Point, full depth tube sheet -3 inches to +6 inches.
- Conduct 20% of hot leg +Point inspection of tubesheet (hot leg only) from -16 inches to +6 inches at top of tube sheet.
- +Point inspection of all previously identified dents and dings > 5 volts.
- +Point inspection of 20% of first two rows of U-bend looking for ODSCC.
- +Point inspection of all tube bulges and over expansions in tubesheet as identified in pre-service inspection.
- +Point inspection of all tubes surrounding known unretrieved possible loose parts as identified by previous eddy current inspections.
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- +Point inspection of all tube wear left in service during previous outages.
- +Point as required to bound potential loose parts identified by bobbin inspection or loose parts identified by as-left secondary side visual inspections with two clean surrounding tubes.

- Enhanced secondary side video probe inspection by inserting the video probe down every row to inspect for loose parts and associated wear.
- 100% hot leg and 20% cold leg +Point inspection of flow distribution baffle (FDB) from -3 inches to + 6 inches.

Summary of Examinations

All steam generators were sludge lanced and the top of the tubesheet visually inspected for foreign objects. A small number of small foreign objects were observed at the top of the tubesheet in the steam generator 1A, 1B, and 1C tube bundles; fragments of flexitallic gaskets, machining remnants, wire bristles, weld slag, pieces of tube scale, and sludge rocks account for most of the material observed. Four pieces of stabilizer wire were found in SG 1C. Except for benign objects, such as sludge rocks and fiber bristles, all identified foreign objects were removed. No degradation was identified in any of these steam generators based on the 1RE13 inspection results. Due to the known inventory of stabilizer wire in SG 1D, visual inspection of the top of the tubesheet included 100% foreign object mapping of both the hot leg and cold leg, with attempted retrieval of all identified items from the top of the tubesheet. Visual inspection of the flow distribution baffle was also performed to identify the source of eddy current potential loose part (PLP) signals.

The following table is a summary of eddy current inspections performed during 1RE13:

STEAM GENERATOR EC INSPECTIONS PERFORMED DURING 1RE13

SG	Program	Tubes Inspected	
		Hot Leg	Cold Leg
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	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	13	14
	+Point of Prior Dents and Dings > 5 volts	28	51
	PLPs Inspected	88	-
	PLP Calls	0	0
1B	Bobbin Straight Leg	4328	384
	+Point Top of Tubesheet	2048	659
	Low Row U-bend bobbin	154	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	10	10
	+Point of Prior Dents and Dings > 5 volts	1	-
	PLPs Inspected	38	16
	PLP Calls	3	3
1C	Bobbin Straight Leg	4328	384
	+Point Top of Tubesheet	2046	662
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	2	1
	+Point of Prior Dents and Dings > 5 volts		6
	PLPs Inspected	58	14
	PLP Calls	6	0
1D	Bobbin Straight Leg	7575	386
	+Point Top of Tubesheet	7575	7575
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	5424	1468
	Special Interest	17	6
	+Point of Prior Dents and Dings > 5 volts	-	-
	PLPs Inspected	6830	1468
	PLP Calls	348	134

Examination Results and Corrective Measures

There were no axial or circumferential crack-like indications, corrosion mechanisms, or mechanical wear observed at the anti-vibration bar intersections in any of the steam generators.

A total of ten volumetric indications (one in SG 1B, and nine in SG 1D) were detected during the MRPC inspection for resolution of I-codes. Three of the indications were known prior to 1RE13 and no change was noted during the current inspection. Of these three indications, one location at 09C (R10 C50) in SG 1B was a pre-service call and did not change, and two locations at TSH (R84 C22 and R84 C24) were identified during 1RE12 as stabilizer wire wear and did not change. Seven additional volumetric indications were identified during 1RE13. Five were associated with stabilizer wire wear at the top of the tubesheet, while two were associated with PLP calls at the flow distribution baffle. Four tubes in the SG 1D cold leg were identified with wear at the top of the tubesheet: one tube (R117 C49) required plugging due to a wear depth of 44%; and the remaining three tubes (R2 C138, R99 C35, and R116 C48) had wear depths of < 20% and remain in service. One location (R2 C138) was found with two wear scars less than two inches apart. These wear scars measured 8% and 9% respectively. The observed wear was related to the known inventory of stabilizer wire.

In addition to the top of tubesheet indications, two tubes were identified with volumetric indications at the hot leg flow distribution baffle to tube intersections. The through-wall depth of the volumetric indications was 23% and 25%. Since it was not possible to clearly determine the source of the volumetric signals, these locations (R28 C8 and R71 C27) were plugged. None of the top of tubesheet or flow distribution baffle indications challenged the tube integrity limits, and no tube leakage was observed during Cycle 13 operation; therefore, the Condition Monitoring requirements were satisfied.

Due to the number of PLPs being called during the FDB inspection and the potential for additional wear sites, the +Point inspection scope was increased to 100% of the hot leg and 20% of the cold leg intersections. Additional PLP indications were identified, but there were no additional volumetric indications. During the in-bundle top of tubesheet inspection of SG 1D, a total of 227 foreign objects were identified following sludge lancing. The majority of the foreign objects were characterized as fine wire associated with the feedwater heater stabilizer released during Cycle 11. Of the foreign objects identified during top of the tubesheet mapping, five known stabilizer wires were left in place. For those loose parts/foreign objects not removed, wear assessments were performed to support the assessment of SG 1D for operation until 1RE14.

Indications

The following table lists the number of indications which includes all data, including the supplementary inspection program of the Flow Distribution Baffle.

SUMMARY OF EDDY CURRENT INDICATIONS

SOUTH TEXAS UNIT 1 1RE13 INDICATION COUNT – FINAL DATA					
INDICATION	CONDITION	S/G 1A	S/G 1B	S/G 1C	S/G 1D
ADS	Absolute Drift Signal	0	0	0	1
DNG	Freespan Ding	543	17	262	145
DNI	Distorted DNG/DNT Indication	0	0	0	0
DNS	Distorted Dent Indication - Cleared	44	14	29	69
DNT	Dent	0	1	0	0
DSS	DSI History Cleared	0	0	0	1
DTI	Distorted Tubesheet Indication	0	0	0	0
DTS	Distorted TS Indication - Cleared	0	0	0	3
INF	Indication Not Found	0	0	7	127
INR	Indication Not Reportable	30	13	27	107
MBI	Possible Indication at MBM	0	0	0	0
MBM	Manufacturing Buff Marks	140	118	144	296
MBS	Manufacturing Burnish Signal	0	1	0	2
NDD	No Detectable Degradation	7336	7467	7399	30529
NDF	No Degradation Found	10	13	2	17
NQI	Potential Bobbin Flaw Signal	0	1	0	0
NQS	Not Cleared by +Point	56	31	40	72
PLP	Possible Loose Part	0	6	6	482
PVN	Permeability Variation	0	0	0	4
RBD	Retest – Bad Data	78	32	55	53
RIC	Retest – Incomplete	26	4	9	112
RND	Retest – No Data	0	0	0	1
RRT	Retest – Restricted Tube	0	1	0	0
SVI	Single Volumetric Indication	0	1	0	9
VOL	Volumetric Indication	0	1	0	9

No flaw was found during the 1RE13 inservice inspection that met the requirement for "Active" degradation.

The only degradation identified during the 1RE13 inspections was loose parts wear in SG 1D. Wear indications at the top of the tubesheet were sized using a qualified eddy

current technique. The technique is reported to result in a conservative measurement for large volume flaws.

Tube Plugging

As a result of the 1RE13 inspection efforts, three tubes in SG 1D were removed from service by plugging. The locations plugged were R28C8, R71C27, and R117C49. No stabilization was required. No plugging was needed for active degradation mechanisms. No tubes exceeded the structural integrity requirements. No primary-to-secondary leakage was observed during Cycle 13 operation and none is predicted during the next three cycles of operation for SG 1A, 1B, and 1C, and one cycle of operation for SG 1D. Inservice inspection results confirm that the Unit 1 steam generators meet all industry and regulatory structural and leakage integrity guidance.

The total number of tubes plugged per steam generator to date is as follows:

Steam Generator 1A	33	0.44%
Steam Generator 1B	40	0.53%
Steam Generator 1C	26	0.34%
Steam Generator 1D	13	0.17%

Condition Monitoring Results

None of the observed indications exceeded the screening thresholds for in situ testing.

No tubes were pulled or subjected to in-situ pressure testing.

Based on the inspections performed, engineering analysis of the inspection results obtained during 1RE13, and that no corrosion-induced flaws were detected, tube degradation large enough to challenge structural integrity requirements is not expected during the planned operating intervals for the Unit 1 steam generators. Therefore, based on the 1RE13 inspection results, the operating interval between inspections for SG 1A, 1B, and 1C is three cycles. Based on the extensive eddy current and top of tubesheet in-bundle visual inspection efforts performed during 1RE13, the operational assessment supports the expectation that tube integrity in SG 1D will be satisfactorily maintained during the Cycle 14 operating interval.

1RE13 INSPECTION SUMMARY REPORT

FOR STEAM GENERATOR TUBING

of the

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

UNIT 1

USNRC DOCKET NO.: 50-498

OPERATING LICENSE NO.: NPF-76

COMMERCIAL OPERATION DATE: August 25, 1988

Prepared By: 4/11/2007
D. A. Stuhler — Date
Test Engineer

Approved By: 11 APR 2007
C. J. Younger — Date
Supervisor, Test Engineering

SOUTH TEXAS PROJECT UNIT 1

1RE13 INSPECTION SUMMARY REPORT FOR STEAM GENERATOR TUBING

Introduction

This summary report describes the inspection of steam generator tubing at South Texas Project (STP) Unit 1 performed during refueling outage 1RE13 in October 2006.

Steam generator eddy current inspection, sludge lancing, and Foreign Object Search and Retrieval (FOSAR) were conducted in steam generators 1A, 1B, 1C, and 1D. Because of wire remnants and wall thinning found during 1RE12, a more aggressive inspection scope was developed for steam generator 1D. The wire remnants originated from a feedwater heater cable stabilizer and migrated into the steam generator during cycle 11.

This report provides the information required by STP Technical Specification 6.8.3.o for maintaining steam generator tube integrity and the reporting requirements of Technical Specification 6.9.1.7.

Scope of Examinations

The inservice inspection program, "2006 Outage Plan for the In-service Inspection of Steam Generator Tubing at the South Texas Project Electric Generating Station, Unit 1," (ISI Outage Plan) identified the steam generator tube areas to be examined by eddy current (EC) testing and the procedures expected to be used during the inservice inspection. A Degradation Assessment written prior to the outage established the scope of eddy current inspections.

EPRI guidelines require that all steam generators undergo a 50% general purpose EC bobbin inspection during the outage nearest the midpoint of the operative sequential period. Similarly, 20% examinations (+Point) of regions potentially susceptible to stress corrosion cracking should also be performed during the outage nearest the midpoint of the sequential operating period. For STP Unit 1, the operative sequential period is 144 EFPM beginning with refueling outage 1RE10, the first inservice inspection for the current steam generators. A more extensive eddy current and visual inspection of steam generator 1D was developed to support the planned cycle 3 inspection interval for the Unit 1 steam generators. This additional effort focused on potential wear at the top of the tubesheet and the flow distribution baffle related to the inventory of stabilizer wire remnants remaining in steam generator 1D. The 1RE13 inspection scope is outlined below:

<u>Steam Generators 1A, 1B, and 1C</u>

- Inspect three peripheral rows with 100% bobbin coil full length.
- Full length bobbin coil inspection of 50% of remaining tubes, other than three peripheral rows.
- +Point inspection of three peripheral rows from 3 inches into tube sheet to 6 inches above top of tube sheet to aid in loose parts detection.
- +Point inspection of 20% of hot leg tubes, from full 16 inches into tube sheet to 6 inches above top of tube sheet.
- +Point inspection of all previously identified dents and dings > 5 volts.

- +Point inspection of 20% of first two rows of U-bend looking for outer diameter stress corrosion cracking (ODSCC).
- +Point inspection of all tube bulges in tubesheet as identified in pre-service inspection.
- +Point inspection of all known unretrieved possible loose parts as identified by previous eddy current inspections, if possible.
- +Point inspection of all unretrieved visually observed loose parts as identified by previous secondary side inspections.
- +Point as required to bound potential loose parts identified by eddy current or loose parts identified by secondary side visual inspections with two clean surrounding tubes.
- Standard secondary side video probe inspection including visual inspection of loose parts previously left in place and possible loose parts as identified by eddy current during 1RE13 and previous outages, if possible.
- Sludge lancing.
- Upper steam drum inspection (SG 1C only).
- Feedring inspection (SG 1C only).
- Inspection of the ninth tube support plate (SG 1A only).
- Tube scale profiling (SG 1C only).
- Inspection of all installed plugs.

Steam Generator 1D

- 100% bobbin coil full length inspection.
- Conduct 100% top of tube sheet +Point, full depth tube sheet -3 inches to +6 inches.
- Conduct 20% of hot leg +Point inspection of tubesheet (hot leg only) from -16 inches to +6 inches at top of tube sheet.
- +Point inspection of all previously identified dents and dings > 5 volts.
- +Point inspection of 20% of first two rows of U-bend looking for ODSCC.
- +Point inspection of all tube bulges and over expansions in tubesheet as identified in pre-service inspection.
- +Point inspection of all tubes surrounding known unretrieved possible loose parts as identified by previous eddy current inspections.
- +Point inspection of all tubes surrounding unretrieved visually observed loose parts as identified by previous secondary side inspections.
- +Point inspection of all tube wear left in service during previous outages.
- +Point as required to bound potential loose parts identified by bobbin inspection or loose parts identified by as-left secondary side visual inspections with two clean surrounding tubes.

- Enhanced secondary side video probe inspection by inserting the video probe down every row to inspect for loose parts and associated wear.
- 100% hot leg and 20% cold leg +Point inspection of flow distribution baffle (FDB) from -3 inches to + 6 inches.

Summary of Examinations

All steam generators were sludge lanced and the top of the tubesheet visually inspected for foreign objects. A small number of small foreign objects were observed at the top of the tubesheet in the steam generator 1A, 1B, and 1C tube bundles; fragments of flexitallic gaskets, machining remnants, wire bristles, weld slag, pieces of tube scale, and sludge rocks account for most of the material observed. Four pieces of stabilizer wire were found in SG 1C. Except for benign objects, such as sludge rocks and fiber bristles, all identified foreign objects were removed. No degradation was identified in any of these steam generators based on the 1RE13 inspection results. Due to the known inventory of stabilizer wire in SG 1D, visual inspection of the top of the tubesheet included 100% foreign object mapping of both the hot leg and cold leg, with attempted retrieval of all identified items from the top of the tubesheet. Visual inspection of the flow distribution baffle was also performed to identify the source of eddy current potential loose part (PLP) signals.

The following table is a summary of eddy current inspections performed during 1RE13:

STEAM GENERATOR EC INSPECTIONS PERFORMED DURING 1RE13

SG	Program	Tubes Inspected	
		Hot Leg	Cold Leg
1A	Bobbin Straight Leg	4330	384
	+Point Top of Tubesheet	2064	662
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	13	14
	+Point of Prior Dents and Dings > 5 volts	28	51
	PLPs Inspected	88	-
	PLP Calls	0	0
1B	Bobbin Straight Leg	4328	384
	+Point Top of Tubesheet	2048	659
	Low Row U-bend bobbin	154	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	10	10
	+Point of Prior Dents and Dings > 5 volts	1	-
	PLPs Inspected	38	16
	PLP Calls	3	3
1C	Bobbin Straight Leg	4328	384
	+Point Top of Tubesheet	2046	662
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	2	1
	+Point of Prior Dents and Dings > 5 volts		6
	PLPs Inspected	58	14
	PLP Calls	6	0
1D	Bobbin Straight Leg	7575	386
	+Point Top of Tubesheet	7575	7575
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	5424	1468
	Special Interest	17	6
	+Point of Prior Dents and Dings > 5 volts	-	-
	PLPs Inspected	6830	1468
	PLP Calls	348	134

Examination Results and Corrective Measures

There were no axial or circumferential crack-like indications, corrosion mechanisms, or mechanical wear observed at the anti-vibration bar intersections in any of the steam generators.

A total of ten volumetric indications (one in SG 1B, and nine in SG 1D) were detected during the MRPC inspection for resolution of I-codes. Three of the indications were known prior to 1RE13 and no change was noted during the current inspection. Of these three indications, one location at 09C (R10 C50) in SG 1B was a pre-service call and did not change, and two locations at TSH (R84 C22 and R84 C24) were identified during 1RE12 as stabilizer wire wear and did not change. Seven additional volumetric indications were identified during 1RE13. Five were associated with stabilizer wire wear at the top of the tubesheet, while two were associated with PLP calls at the flow distribution baffle. Four tubes in the SG 1D cold leg were identified with wear at the top of the tubesheet: one tube (R117 C49) required plugging due to a wear depth of 44%; and the remaining three tubes (R2 C138, R99 C35, and R116 C48) had wear depths of < 20% and remain in service. One location (R2 C138) was found with two wear scars less than two inches apart. These wear scars measured 8% and 9% respectively. The observed wear was related to the known inventory of stabilizer wire.

In addition to the top of tubesheet indications, two tubes were identified with volumetric indications at the hot leg flow distribution baffle to tube intersections. The through-wall depth of the volumetric indications was 23% and 25%. Since it was not possible to clearly determine the source of the volumetric signals, these locations (R28 C8 and R71 C27) were plugged. None of the top of tubesheet or flow distribution baffle indications challenged the tube integrity limits, and no tube leakage was observed during Cycle 13 operation; therefore, the Condition Monitoring requirements were satisfied.

Due to the number of PLPs being called during the FDB inspection and the potential for additional wear sites, the +Point inspection scope was increased to 100% of the hot leg and 20% of the cold leg intersections. Additional PLP indications were identified, but there were no additional volumetric indications. During the in-bundle top of tubesheet inspection of SG 1D, a total of 227 foreign objects were identified following sludge lancing. The majority of the foreign objects were characterized as fine wire associated with the feedwater heater stabilizer released during Cycle 11. Of the foreign objects identified during top of the tubesheet mapping, five known stabilizer wires were left in place. For those loose parts/foreign objects not removed, wear assessments were performed to support the assessment of SG 1D for operation until 1RE14.

Indications

The following table lists the number of indications which includes all data, including the supplementary inspection program of the Flow Distribution Baffle.

SUMMARY OF EDDY CURRENT INDICATIONS

SOUTH TEXAS UNIT 1 1RE13 INDICATION COUNT – FINAL DATA					
INDICATION	CONDITION	S/G 1A	S/G 1B	S/G 1C	S/G 1D
ADS	Absolute Drift Signal	0	0	0	1
DNG	Freespan Ding	543	17	262	145
DNI	Distorted DNG/DNT Indication	0	0	0	0
DNS	Distorted Dent Indication - Cleared	44	14	29	69
DNT	Dent	0	1	0	0
DSS	DSI History Cleared	0	0	0	1
DTI	Distorted Tubesheet Indication	0	0	0	0
DTS	Distorted TS Indication - Cleared	0	0	0	3
INF	Indication Not Found	0	0	7	127
INR	Indication Not Reportable	30	13	27	107
MBI	Possible Indication at MBM	0	0	0	0
MBM	Manufacturing Buff Marks	140	118	144	296
MBS	Manufacturing Burnish Signal	0	1	0	2
NDD	No Detectable Degradation	7336	7467	7399	30529
NDF	No Degradation Found	10	13	2	17
NQI	Potential Bobbin Flaw Signal	0	1	0	0
NQS	Not Cleared by +Point	56	31	40	72
PLP	Possible Loose Part	0	6	6	482
PVN	Permeability Variation	0	0	0	4
RBD	Retest – Bad Data	78	32	55	53
RIC	Retest – Incomplete	26	4	9	112
RND	Retest – No Data	0	0	0	1
RRT	Retest – Restricted Tube	0	1	0	0
SVI	Single Volumetric Indication	0	1	0	9
VOL	Volumetric Indication	0	1	0	9

No flaw was found during the 1RE13 inservice inspection that met the requirement for "Active" degradation.

The only degradation identified during the 1RE13 inspections was loose parts wear in SG 1D. Wear indications at the top of the tubesheet were sized using a qualified eddy

current technique. The technique is reported to result in a conservative measurement for large volume flaws.

Tube Plugging

As a result of the 1RE13 inspection efforts, three tubes in SG 1D were removed from service by plugging. The locations plugged were R28C8, R71C27, and R117C49. No stabilization was required. No plugging was needed for active degradation mechanisms. No tubes exceeded the structural integrity requirements. No primary-to-secondary leakage was observed during Cycle 13 operation and none is predicted during the next three cycles of operation for SG 1A, 1B, and 1C, and one cycle of operation for SG 1D. Inservice inspection results confirm that the Unit 1 steam generators meet all industry and regulatory structural and leakage integrity guidance.

The total number of tubes plugged per steam generator to date is as follows:

Steam Generator 1A	33	0.44%
Steam Generator 1B	40	0.53%
Steam Generator 1C	26	0.34%
Steam Generator 1D	13	0.17%

Condition Monitoring Results

None of the observed indications exceeded the screening thresholds for in situ testing.

No tubes were pulled or subjected to in-situ pressure testing.

Based on the inspections performed, engineering analysis of the inspection results obtained during 1RE13, and that no corrosion-induced flaws were detected, tube degradation large enough to challenge structural integrity requirements is not expected during the planned operating intervals for the Unit 1 steam generators. Therefore, based on the 1RE13 inspection results, the operating interval between inspections for SG 1A, 1B, and 1C is three cycles. Based on the extensive eddy current and top of tubesheet in-bundle visual inspection efforts performed during 1RE13, the operational assessment supports the expectation that tube integrity in SG 1D will be satisfactorily maintained during the Cycle 14 operating interval.

1RE13 INSPECTION SUMMARY REPORT

FOR STEAM GENERATOR TUBING

of the

SOUTH TEXAS PROJECT ELECTRIC GENERATING STATION

UNIT 1

USNRC DOCKET NO.: 50-498

OPERATING LICENSE NO.: NPF-76

COMMERCIAL OPERATION DATE: August 25, 1988

Prepared By: Dave Stuhler 4/11/2007
D. A. Stuhler Date
Test Engineer

Approved By: 11 APR 2007
C. J. Younger Date
Supervisor, Test Engineering

SOUTH TEXAS PROJECT UNIT 1

1RE13 INSPECTION SUMMARY REPORT FOR STEAM GENERATOR TUBING

Introduction

This summary report describes the inspection of steam generator tubing at South Texas Project (STP) Unit 1 performed during refueling outage 1RE13 in October 2006.

Steam generator eddy current inspection, sludge lancing, and Foreign Object Search and Retrieval (FOSAR) were conducted in steam generators 1A, 1B, 1C, and 1D. Because of wire remnants and wall thinning found during 1RE12, a more aggressive inspection scope was developed for steam generator 1D. The wire remnants originated from a feedwater heater cable stabilizer and migrated into the steam generator during cycle 11.

This report provides the information required by STP Technical Specification 6.8.3.o for maintaining steam generator tube integrity and the reporting requirements of Technical Specification 6.9.1.7.

Scope of Examinations

The inservice inspection program, "2006 Outage Plan for the In-service Inspection of Steam Generator Tubing at the South Texas Project Electric Generating Station, Unit 1," (ISI Outage Plan) identified the steam generator tube areas to be examined by eddy current (EC) testing and the procedures expected to be used during the inservice inspection. A Degradation Assessment written prior to the outage established the scope of eddy current inspections.

EPRI guidelines require that all steam generators undergo a 50% general purpose EC bobbin inspection during the outage nearest the midpoint of the operative sequential period. Similarly, 20% examinations (+Point) of regions potentially susceptible to stress corrosion cracking should also be performed during the outage nearest the midpoint of the sequential operating period. For STP Unit 1, the operative sequential period is 144 EFPM beginning with refueling outage 1RE10, the first inservice inspection for the current steam generators. A more extensive eddy current and visual inspection of steam generator 1D was developed to support the planned cycle 3 inspection interval for the Unit 1 steam generators. This additional effort focused on potential wear at the top of the tubesheet and the flow distribution baffle related to the inventory of stabilizer wire remnants remaining in steam generator 1D. The 1RE13 inspection scope is outlined below:

<u>Steam Generators 1A, 1B, and 1C</u>

- Inspect three peripheral rows with 100% bobbin coil full length.
- Full length bobbin coil inspection of 50% of remaining tubes, other than three peripheral rows.
- +Point inspection of three peripheral rows from 3 inches into tube sheet to 6 inches above top of tube sheet to aid in loose parts detection.
- +Point inspection of 20% of hot leg tubes, from full 16 inches into tube sheet to 6 inches above top of tube sheet.
- +Point inspection of all previously identified dents and dings > 5 volts.

- +Point inspection of 20% of first two rows of U-bend looking for outer diameter stress corrosion cracking (ODSCC).
- +Point inspection of all tube bulges in tubesheet as identified in pre-service inspection.
- +Point inspection of all known unretrieved possible loose parts as identified by previous eddy current inspections, if possible.
- +Point inspection of all unretrieved visually observed loose parts as identified by previous secondary side inspections.
- +Point as required to bound potential loose parts identified by eddy current or loose parts identified by secondary side visual inspections with two clean surrounding tubes.
- Standard secondary side video probe inspection including visual inspection of loose parts previously left in place and possible loose parts as identified by eddy current during 1RE13 and previous outages, if possible.
- Sludge lancing.
- Upper steam drum inspection (SG 1C only).
- Feedring inspection (SG 1C only).
- Inspection of the ninth tube support plate (SG 1A only).
- Tube scale profiling (SG 1C only).
- Inspection of all installed plugs.

Steam Generator 1D

- 100% bobbin coil full length inspection.
- Conduct 100% top of tube sheet +Point, full depth tube sheet -3 inches to +6 inches.
- Conduct 20% of hot leg +Point inspection of tubesheet (hot leg only) from -16 inches to +6 inches at top of tube sheet.
- +Point inspection of all previously identified dents and dings > 5 volts.
- +Point inspection of 20% of first two rows of U-bend looking for ODSCC.
- +Point inspection of all tube bulges and over expansions in tubesheet as identified in pre-service inspection.
- +Point inspection of all tubes surrounding known unretrieved possible loose parts as identified by previous eddy current inspections.
- +Point inspection of all tubes surrounding unretrieved visually observed loose parts as identified by previous secondary side inspections.
- +Point inspection of all tube wear left in service during previous outages.
- +Point as required to bound potential loose parts identified by bobbin inspection or loose parts identified by as-left secondary side visual inspections with two clean surrounding tubes.

- Enhanced secondary side video probe inspection by inserting the video probe down every row to inspect for loose parts and associated wear.
- 100% hot leg and 20% cold leg +Point inspection of flow distribution baffle (FDB) from -3 inches to + 6 inches.

Summary of Examinations

All steam generators were sludge lanced and the top of the tubesheet visually inspected for foreign objects. A small number of small foreign objects were observed at the top of the tubesheet in the steam generator 1A, 1B, and 1C tube bundles; fragments of flexitallic gaskets, machining remnants, wire bristles, weld slag, pieces of tube scale, and sludge rocks account for most of the material observed. Four pieces of stabilizer wire were found in SG 1C. Except for benign objects, such as sludge rocks and fiber bristles, all identified foreign objects were removed. No degradation was identified in any of these steam generators based on the 1RE13 inspection results. Due to the known inventory of stabilizer wire in SG 1D, visual inspection of the top of the tubesheet included 100% foreign object mapping of both the hot leg and cold leg, with attempted retrieval of all identified items from the top of the tubesheet. Visual inspection of the flow distribution baffle was also performed to identify the source of eddy current potential loose part (PLP) signals.

The following table is a summary of eddy current inspections performed during 1RE13:

STEAM GENERATOR EC INSPECTIONS PERFORMED DURING 1RE13

SG	Program	Tubes Inspected	
		Hot Leg	Cold Leg
1A	Bobbin Straight Leg	4330	384
	+Point Top of Tubesheet	2064	662
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	13	14
	+Point of Prior Dents and Dings > 5 volts	28	51
	PLPs Inspected	88	-
	PLP Calls	0	0
1B	Bobbin Straight Leg	4328	384
	+Point Top of Tubesheet	2048	659
	Low Row U-bend bobbin	154	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	10	10
	+Point of Prior Dents and Dings > 5 volts	1	-
	PLPs Inspected	38	16
	PLP Calls	3	3
1C	Bobbin Straight Leg	4328	384
	+Point Top of Tubesheet	2046	662
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	-	-
	Special Interest	2	1
	+Point of Prior Dents and Dings > 5 volts		6
	PLPs Inspected	58	14
	PLP Calls	6	0
1D	Bobbin Straight Leg	7575	386
	+Point Top of Tubesheet	7575	7575
	Low Row U-bend bobbin	155	-
	+Point Row 1 and Row 2 U-bends	31	-
	+Point FDB (-3 inches to + 6 inches)	5424	1468
	Special Interest	17	6
	+Point of Prior Dents and Dings > 5 volts	-	-
	PLPs Inspected	6830	1468
	PLP Calls	348	134

Examination Results and Corrective Measures

There were no axial or circumferential crack-like indications, corrosion mechanisms, or mechanical wear observed at the anti-vibration bar intersections in any of the steam generators.

A total of ten volumetric indications (one in SG 1B, and nine in SG 1D) were detected during the MRPC inspection for resolution of I-codes. Three of the indications were known prior to 1RE13 and no change was noted during the current inspection. Of these three indications, one location at 09C (R10 C50) in SG 1B was a pre-service call and did not change, and two locations at TSH (R84 C22 and R84 C24) were identified during 1RE12 as stabilizer wire wear and did not change. Seven additional volumetric indications were identified during 1RE13. Five were associated with stabilizer wire wear at the top of the tubesheet, while two were associated with PLP calls at the flow distribution baffle. Four tubes in the SG 1D cold leg were identified with wear at the top of the tubesheet: one tube (R117 C49) required plugging due to a wear depth of 44%; and the remaining three tubes (R2 C138, R99 C35, and R116 C48) had wear depths of < 20% and remain in service. One location (R2 C138) was found with two wear scars less than two inches apart. These wear scars measured 8% and 9% respectively. The observed wear was related to the known inventory of stabilizer wire.

In addition to the top of tubesheet indications, two tubes were identified with volumetric indications at the hot leg flow distribution baffle to tube intersections. The through-wall depth of the volumetric indications was 23% and 25%. Since it was not possible to clearly determine the source of the volumetric signals, these locations (R28 C8 and R71 C27) were plugged. None of the top of tubesheet or flow distribution baffle indications challenged the tube integrity limits, and no tube leakage was observed during Cycle 13 operation; therefore, the Condition Monitoring requirements were satisfied.

Due to the number of PLPs being called during the FDB inspection and the potential for additional wear sites, the +Point inspection scope was increased to 100% of the hot leg and 20% of the cold leg intersections. Additional PLP indications were identified, but there were no additional volumetric indications. During the in-bundle top of tubesheet inspection of SG 1D, a total of 227 foreign objects were identified following sludge lancing. The majority of the foreign objects were characterized as fine wire associated with the feedwater heater stabilizer released during Cycle 11. Of the foreign objects identified during top of the tubesheet mapping, five known stabilizer wires were left in place. For those loose parts/foreign objects not removed, wear assessments were performed to support the assessment of SG 1D for operation until 1RE14.

<u>Indications</u>

The following table lists the number of indications which includes all data, including the supplementary inspection program of the Flow Distribution Baffle.

SUMMARY OF EDDY CURRENT INDICATIONS

SOUTH TEXAS UNIT 1 1RE13 INDICATION COUNT – FINAL DATA					
INDICATION	CONDITION	S/G 1A	S/G 1B	S/G 1C	S/G 1D
ADS	Absolute Drift Signal	0	0	0	1
DNG	Freespan Ding	543	17	262	145
DNI	Distorted DNG/DNT Indication	0	0	0	0
DNS	Distorted Dent Indication - Cleared	44	14	29	69
DNT	Dent	0	1	0	0
DSS	DSI History Cleared	0	0	0	1
DTI	Distorted Tubesheet Indication	0	0	0	0
DTS	Distorted TS Indication - Cleared	0	0	0	3
INF	Indication Not Found	0	0	7	127
INR	Indication Not Reportable	30	13	27	107
MBI	Possible Indication at MBM	0	0	0	0
MBM	Manufacturing Buff Marks	140	118	144	296
MBS	Manufacturing Burnish Signal	0	1	0	2
NDD	No Detectable Degradation	7336	7467	7399	30529
NDF	No Degradation Found	10	13	2	17
NQI	Potential Bobbin Flaw Signal	0	1	0	0
NQS	Not Cleared by +Point	56	31	40	72
PLP	Possible Loose Part	0	6	6	482
PVN	Permeability Variation	0	0	0	4
RBD	Retest – Bad Data	78	32	55	53
RIC	Retest – Incomplete	26	4	9	112
RND	Retest – No Data	0	0	0	1
RRT	Retest – Restricted Tube	0	1	0	0
SVI	Single Volumetric Indication	0	1	0	9
VOL	Volumetric Indication	0	1	0	9

No flaw was found during the 1RE13 inservice inspection that met the requirement for "Active" degradation.

The only degradation identified during the 1RE13 inspections was loose parts wear in SG 1D. Wear indications at the top of the tubesheet were sized using a qualified eddy

current technique. The technique is reported to result in a conservative measurement for large volume flaws.

Tube Plugging

As a result of the 1RE13 inspection efforts, three tubes in SG 1D were removed from service by plugging. The locations plugged were R28C8, R71C27, and R117C49. No stabilization was required. No plugging was needed for active degradation mechanisms. No tubes exceeded the structural integrity requirements. No primary-to-secondary leakage was observed during Cycle 13 operation and none is predicted during the next three cycles of operation for SG 1A, 1B, and 1C, and one cycle of operation for SG 1D. Inservice inspection results confirm that the Unit 1 steam generators meet all industry and regulatory structural and leakage integrity guidance.

The total number of tubes plugged per steam generator to date is as follows:

Steam Generator 1A	33	0.44%
Steam Generator 1B	40	0.53%
Steam Generator 1C	26	0.34%
Steam Generator 1D	13	0.17%

Condition Monitoring Results

None of the observed indications exceeded the screening thresholds for in situ testing.

No tubes were pulled or subjected to in-situ pressure testing.

Based on the inspections performed, engineering analysis of the inspection results obtained during 1RE13, and that no corrosion-induced flaws were detected, tube degradation large enough to challenge structural integrity requirements is not expected during the planned operating intervals for the Unit 1 steam generators. Therefore, based on the 1RE13 inspection results, the operating interval between inspections for SG 1A, 1B, and 1C is three cycles. Based on the extensive eddy current and top of tubesheet in-bundle visual inspection efforts performed during 1RE13, the operational assessment supports the expectation that tube integrity in SG 1D will be satisfactorily maintained during the Cycle 14 operating interval.