Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(7.2) Tendon No.: H46-39 Tendon End: Buttress 6 ☒ Shop ☐ Field

Grease Cap Removal

	Q.C. Signoff
(7.5)Date Removal Started: 10-20-2010	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 67 °F Thermometer No.: ST 82 Re-Cal Date: 6-23-11	
Ambient Temp.: 68 °F Thermometer No.: PK 102 Re-Cal Date: 2-9-11	WRR 10-20-10
(8.4) Anchorhead I.D.: EX4W4/ABTW7 Anchorhead Verification: ☒ Match ☐ No Match	WRR 10-20-10
(8.5) Grease Coating Grease Cap - Complete ✓ Partial ___ Uncoated ___ % Buttonheads - Complete ✓ Partial ___ Uncoated ___ % Anchorhead - Complete ✓ Partial ___ Uncoated ___ % Shims - Complete ✓ Partial ___ Uncoated ___ % Bearing Plate – (1) Complete ✓ Partial ___ Uncoated ___ % (1) - *Limited within the inside diameter of the grease cap.*	WRR 10-20-10
(8.6) Unusual Conditions: None	WRR 10-20-10
(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Med. Brown Comments: None	WRR 10-20-10
(8.8) Quantity of Samples 2 Quart Samples identified per Step 8.8.1? ☒ Yes ☐ No Location of Removal ☒ A.H. ☐ B.P. ☒ Shims ☐ Cap ☐ Duct	WRR 10-20-10
(8.9) Qty. of Grease lost during removal of cap: 0 gal.	WRR 10-20-10
(8.9.1) Grease from cap to be reused? ☒ Yes ☐ No Qty. of Grease removed from cap: .25 gal.	WRR 10-20-10
(9.6) Qty. of Grease removed from anchorage: .25 gal.	WRR 10-20-10
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: None	WRR 10-20-10
(10.3) Method of Tendon Protection: Wraped with plastic WRR 10-20-10 Reinstalled the greasecan w/a new gasket	WRR 10-21-10
(10.4) Amount of Grease Loss from Tendon duct: 0 gal.	WRR 10-21-10
(10.5) Total quantity of lost grease (below): (8.8) .5 + (8.9) 0 + (8.9.1) .25 + (9.6) .25 + (10.4) 0 = 1.0 TOTAL	WRR 10-21-10
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒ Yes ☐ No	WRR 10-21-10

QC Reviewed: Level: II Date: 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒UNIT 1

(7.2) Tendon No.: H46-39 Tendon End: Butt. 4 ☐ Shop ☒ Field

Grease Cap Removal

	Q.C. Signoff
(7.5)Date Removal Started: 10-20-10	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 62 °F Thermometer No.: ST-83 Re-Cal Date: 6-23-11	
Ambient Temp.: 62 °F Thermometer No.: PK-103 Re-Cal Date: 6-23-11	TLB 10-20-10
(8.4) Anchorhead I.D.: FY19R19 Anchorhead Verification: ☒ Match ☐ No Match	TLB 10-20-10

(8.5) Grease Coating

Grease Cap -	Complete	✓	Partial		Uncoated	%
Buttonheads -	Complete	✓	Partial		Uncoated	%
Anchorhead -	Complete	✓	Partial		Uncoated	%
Shims -	Complete	✓	Partial		Uncoated	%
Bearing Plate – (1)	Complete	✓	Partial		Uncoated	%

(1) - *Limited within the inside diameter of the grease cap.* — TLB 10-20-10

(8.6) Unusual Conditions: None — TLB 10-20-10

(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Brown
Comments: None — TLB 10-20-10

(8.8) Quantity of Samples 2 Quart Samples Identified per Step 8.8.1? ☒ Yes ☐ No
Location of Removal ☒ A.H. ☐ B.P. ☒ Shims ☐ Cap ☐ Duct — TLB 10-20-10

(8.9) Qty. of Grease lost during removal of cap: 0 gal. — TLB 10-20-10
(8.9.1) Grease from cap to be reused? ☒ Yes ☐ No Qty. of Grease removed from cap: 0 gal. — TLB 10-20-10
(9.6) Qty. of Grease removed from anchorage: 1 gal. — TLB 10-20-10
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: N/A — TLB 10-20-10

(10.3) Method of Tendon Protection: ~~cover with Plastic~~ 10-20-10 TLB Install cap with new gasket — TLB 10-21-10

(10.4) Amount of Grease Loss from Tendon duct: 0 gal. — TLB 10-20-10

(10.5) Total quantity of lost grease (below):
(8.8) .5 + (8.9) 0 + (8.9.1) 0 + (9.6) 1 + (10.4) 0 = 1.5 TOTAL — TLB 10-20-10
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒ Yes ☐ No — TLB 10-20-10

QC Reviewed: W. Vance Robbins Level: II Date: 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: *H 46.39* Tendon End: *Buttress 6* ☒ Shop ☐ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: *0* Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: *None*

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: *0* Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: *None*

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: *0* Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: *None*

(9.9.1) DURING DETENSIONING

Water Detected: ☐ Yes ☒ No Quantity: *0* Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments:

(11.1) NOTIFICATION *N/A*

Exelon Notified: ☐ Yes ☐ No Individual Name: Date:

SAMPLE IDENTIFICATION AND STORAGE *N/A*

(12.2) Samples adequately identified: ☐ Yes ☐ No

(12.3) Samples stored at:

QC Signoff: *W. Pance Pelle* Level: *II* Date: *10-20-2010*

QC Reviewed: *[signature]* Level: *II* Date: *10-22-10*

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: H 46-39 Tendon End: Butt 4 ☐ Shop ☒ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.9.1) DURING DETENSIONING

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(11.1) NOTIFICATION

Exelon Notified: ☐ Yes ☐ No Individual Name: N/A Date:

SAMPLE IDENTIFICATION AND STORAGE

(12.2) Samples adequately identified: ☐ Yes ☐ No N/A

(12.3) Samples stored at:

QC Signoff: [signature] Level: II Date: 10-20-10

QC Reviewed: W. Vance Robbins Level: II Date: 10-27-10

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-20-2010 Report No:

WO No(s).: R2139507 Tendon Anchorage No.: H46-39 Tendon End: ☒ Shop ☐ Field

Location: Tunnel, Gallery, Buttress: 6 Elevation: 389'6" Bearing Plate I.D.: Unable to locate

Bearing Plate I.D. Anchor Head I.D. EX4W4 Bushing I.D. AB7W7

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☒ As Found Exam ☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0015 Visual Aids: None

M&TE Used: Steel Scale R-21 cal due 6-24-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-20-10 Time: 12:30

Special / Specific Instructions:

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
H46-39 steel anchorage components.	✓			NO indications

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins *W. Rance Robbins* LEVEL II DATE 10-20-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson *[signature]* DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) ____ DATE:

ANII REVIEW (as applicable) *Joseph Shelby* DATE: 11-4-10

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-20-10 Report No: N/A

WO No(s).: R2139507 Tendon Anchorage No.: H46-39 Tendon End: ☐ Shop ☒ Field

Location: Tunnel, Gallery, Buttress 4 Elevation: 389'-5" Bearing Plate I.D.: unable to locate.

Bearing Plate I.D. unable to locate Anchor Head I.D. FY 19 R19 Bushing I.D. N/A

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☒ As Found Exam ~~TMI 1-0016~~ ☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0016 Visual Aids: None

M&TE Used: steel Rule R-22 cal. due 6-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-20-10 Time: 12:30 PM

Special / Specific Instructions: N/A

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
Tendon Anchorag on H46-39 Butt. 4/Field	✓			No indications. Reference Enclosure 6 Data sheet. 4.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-20-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) [signature] DATE: 11-4-10

Page 1 of 1

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI	Unit: 1	Date: 10-21-2010	Report No:
WO No(s).: R2139507	Tendon Anchorage No.: H46-39	Tendon End: ☒ Shop ☐ Field	
Location: Tunnel, Gallery, Buttress: 6	Elevation: 389'6"	Bearing Plate I.D. Unable to locate	
Bearing Plate I.D.	Anchor Head I.D. EX4W4	Bushing I.D. AB7W7	
Exam Type: ☐ DV ☒ VT-1	Type Of Exam: ☒ Direct ☐ Remote		
☐ As Found Exam	☒ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned		
Design Drawing(s) TMI 1-0015	Visual Aids: None		
M&TE Used: Steel scale R-21 Cal due 6-24-11 ☒ Test Card	UTC or Serial No. N/A	Cal. Due Date: N/A	
Illumination Used Flashlight	Illumination Verified: Date: 10-21-2010	Time: 11:50	
Special / Specific Instructions:			

Component / Item Number and Description	RESULTS NI	RESULTS RI TYPE	RESULTS IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
H46-39 steel anchorage components			A	1 missing wire, pulled for testing 10-21-2010 (see attachment 6 data sheet 4)

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-21-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/28/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) Joseph A Stubbly DATE: 11-4-10

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-21-10 Report No: N/A

WO No(s).: R 2139507 Tendon Anchorage No.: H46-39 Tendon End: ☐ Shop ☒ Field

Location: Tunnel, Gallery, Buttress 4 Elevation: 389'-5" Bearing Plate I.D.: unable to locate.

Bearing Plate I.D. unable to locate. Anchor Head I.D. FY 19 R19 Bushing I.D. N/A

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☐ As Found Exam ☒ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI-0016 Visual Aids: None

M&TE Used: steel Rule R-22 Cal. Due 6-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-21-10 Time: 8:00 A.M.

Special / Specific Instructions: N/A

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
Tendon Anchorage on H 46-39 Butt. 4/Field.			A	Wire missing pulled for testing 10-21-10. See Enclosure 6 Data sheet 4.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-21-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) ____ DATE: ____

ANII REVIEW (as applicable) Joseph [signature] DATE: 11-4-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-20-2010 Report No:

System: Containment Tendons Component: 2' area of concrete around H46-39 WO No(s).: R2139507

Location: Building: Containment Elev.: 389'6" Col.: N/A Row: N/A Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☒ VT-1C ☐ VT-3C Type Of Exam: ☒ Direct ☐ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0015 Visual Aids: None

Surface: ID (OD) Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: Steel Scale R-216 Cal due 6-24-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-20-2010 Time: 12:30

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
2' area of concrete around H46-39 at buttress 6. Shop end.			A	6" long stress crack extending vertically from the top ~~left~~ Right WEE 10-20-10 corner of the bearing plate.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)
B. Exposed Reinforcing Steel
C. Exposed Metallic Items (Other)
D. Evidence Of Grease Leakage
E. Evidence Of Moisture
F. Leaching Or Chemical Attack
G. Settlements Or Deflections
H. Degraded Patches or Repairs
I. Popouts, Voids, Honeycomb
J. Spalls
K. Cold Joint Lines
L. Corrosion Staining
M. Scaling / Dusting
N. Coating Deterioration
O. Abrasion, Cavitation, Wear
P. Air Voids / Bug Holes
Q. Efflorescence
R. Other (Explain)

Supplemental Information: ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-20-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/25/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) Joseph Shelby DATE:

ANII REVIEW (as applicable) Joseph Shelby DATE: 11-4-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI   Unit: 1   Date: 10-20-10   Report No: N/A

System: Containment Tendons   Component: Concrete 24" around Anchor Plate H46-39   WO No(s).: A2131507

Location: Building: Containment   Elev.: 389'-5"   Col.: N/A   Row: N/A   Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☒ VT-1C ~~☐ VT-3C~~   Type Of Exam: ☒ Direct ☐ Remote   Matl. Type: Concrete

Design Drawing(s) TMI 1-0016   Visual Aids: None

Surface: ID OD   Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: Steel Rule, R-26 6-28-11 ☒ Test Card   UTC or Serial No. N/A   Cal. Due Date: N/A

Illumination Used Flashlight   Illumination Verified: Date: 10-20-10   Time: 1030 AM.

Special / Specific Instructions: N/A

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Concrete 24" around anchor plate on Tendon H46-39. Butt. 4 / Field.	✓			No Indications.

Results Legend:
NI - No Indications   RI - Recordable Indication   IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts , Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information : ☒ Yes ☐ No   ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature]   LEVEL II   DATE 10-20-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature]   II   DATE 10/05/2010 2-9-11

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

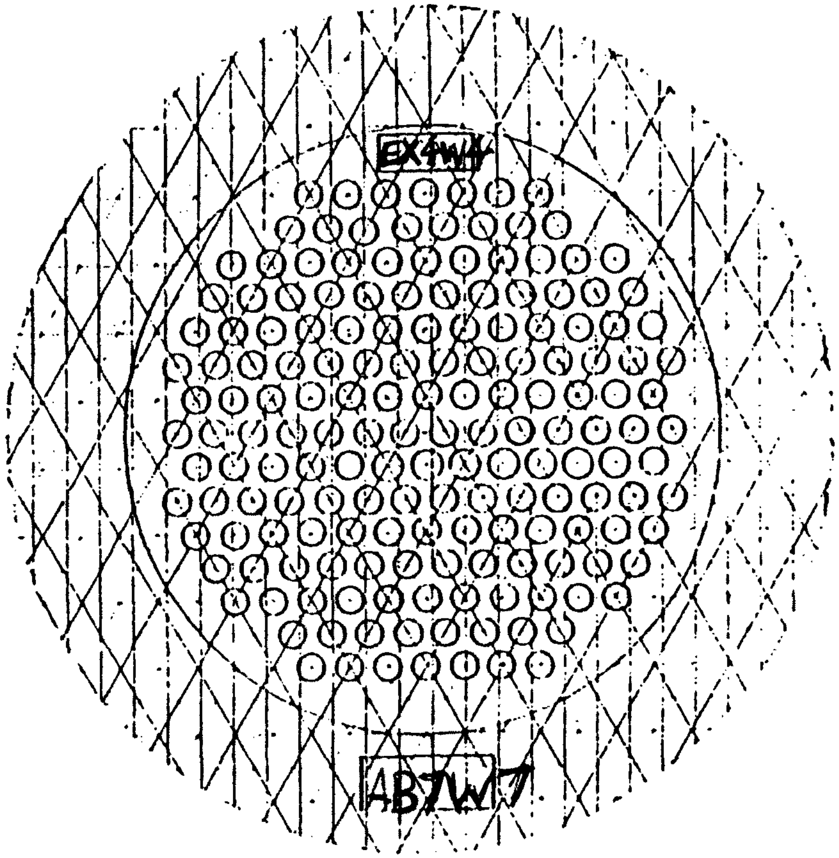
LEVEL III or RE REVIEW (as applicable) ____________________ DATE: ________

ANII REVIEW (as applicable) Joseph Hubby [signature]   DATE: 11-4-10

2/9/11

Page 1 of 1

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
AS Found



RB Tendon Surveillance

COMMENT: Shim Stack ht. -7.6" (2, 1, 1, 1, 1/8, 1/2, 2).
No corrosion

INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR W. Rance Robles Date 10-20-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

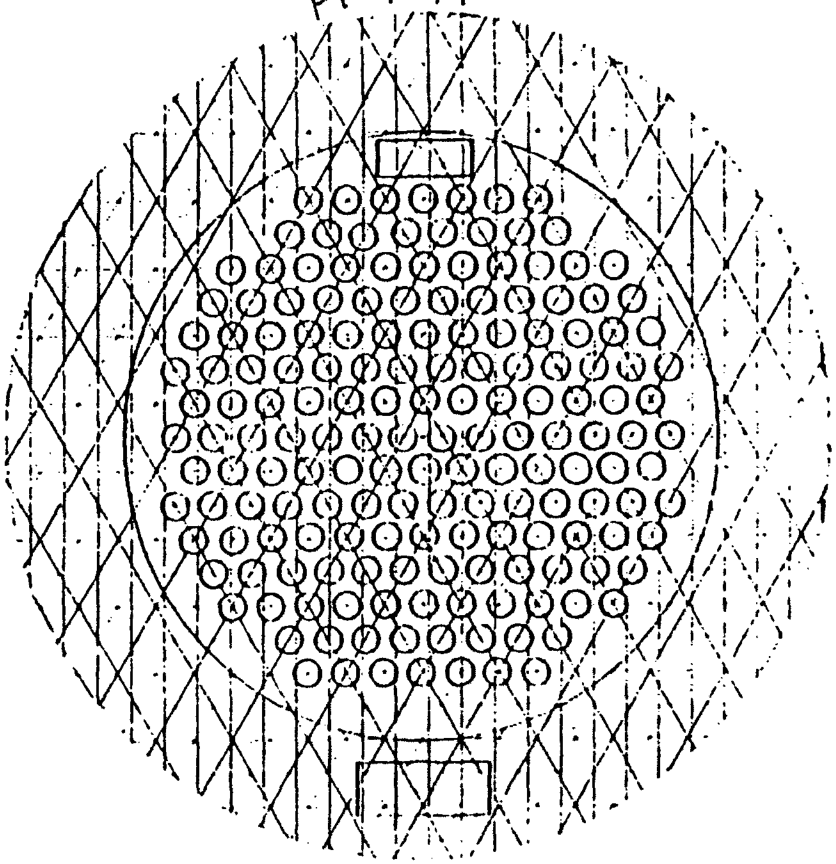
INSPECTION PERIOD 35th yr AS

Tendon # H46-39
END: FIELD____(1 piece washer)
SHOP ✓ (2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection

AS Found Inspection

FY 19 R/19



RB Tendon Surveillance

COMMENT: Shim Stack Hieght 8"
(4", 1, 1/4, 1/8, 1/2, 2)

NO Corrosion noted.

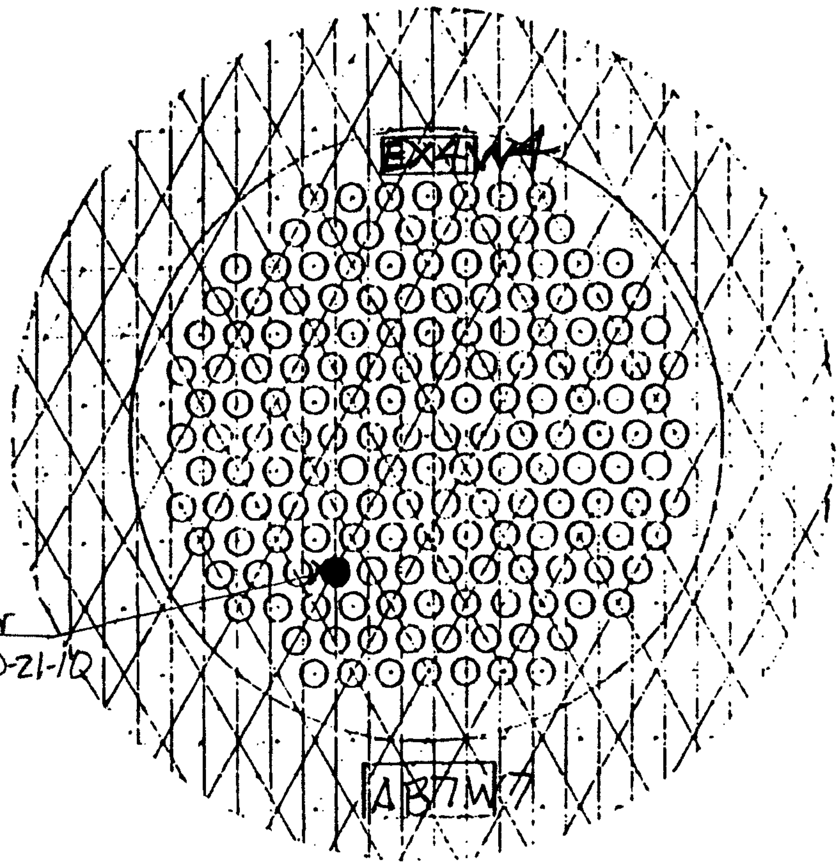
INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR________________ Date 10-20-10
COGNIZANT MECH/STRUCT ENGINEER________________ Date 29 Oct 10
REVIEWED BY

INSPECTION PERIOD 35 Yr. / AS

Tendon # H 46-39
END: FIELD X (1 piece washer)
SHOP______(2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection

Post Re tension



Pulled for testing 10-21-10

RB Tendon Surveillance

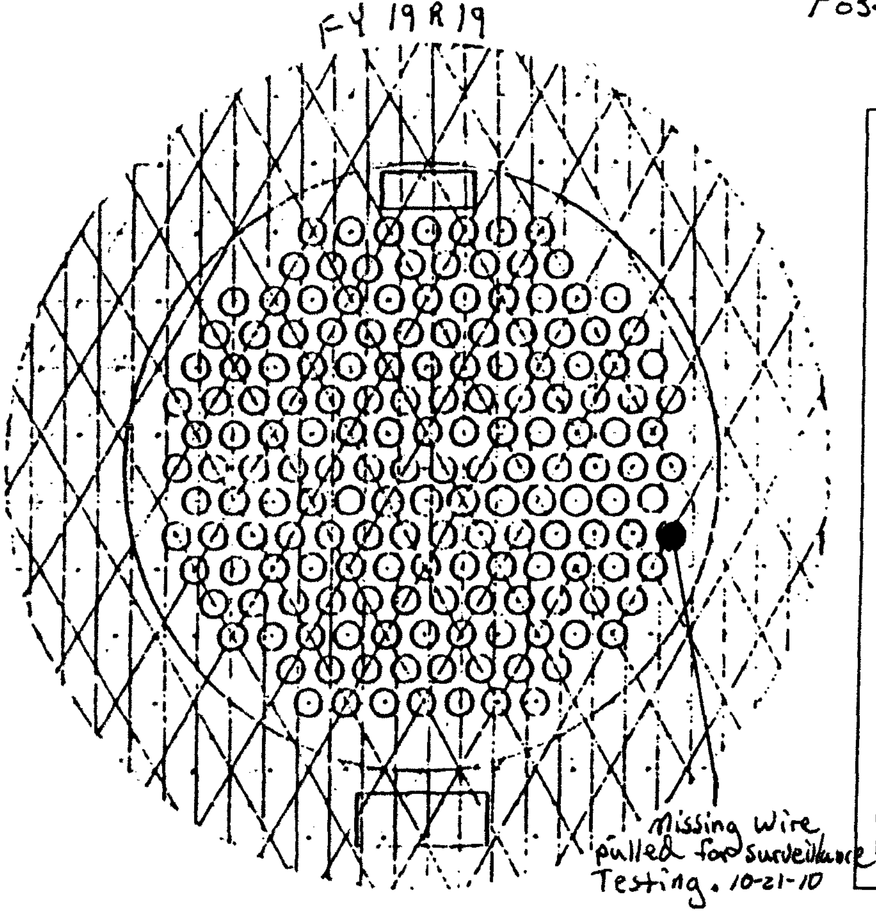
COMMENT: Shim Stack ht. 7.6"
(2, 1, 1, 1/8, 1/2, 1, 2)
No corrosion.

INSPECTED BY
CONTRACTOR FOREMAN__________ Date__________
VERIIFIED BY
COGNIZANT QV INSPECTOR W. [signature] Date 10-21-2010
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

INSPECTION PERIOD 35th yr. AS

Tendon # H46-39
END: FIELD______(1 piece washer)
SHOP ✓ (2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
Post Retension



RB Tendon Surveillance

COMMENT: Shim Stack Hieght 8".
(4, 1, 1/4, 1/8, 1/2, 2)

No Corrosion.

INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-21-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 OCT 10
REVIEWED BY

Tendon # # 46-39
INSPECTION PERIOD 35 Yr.
AS
END: FIELD X (1 piece washer)
SHOP______(2 piece washer)

PSC PROCEDURE SQ 7.1
INSPECTION DOCUMENTATION
DATA SHEET 7.1
July 31, 2009
Page 1 of 1
Revision 0

Project: TMI – 35th YEAR TENDON SURVEILLANCE

Tendon No.: H 46-39 Tendon End/Buttress No.: Buttress 6 Shop End

Anchorage ID.: EX4W4/AB7W7 Adaptor ID: C6002

EQUIPMENT	MICROMETER		WIRE		SHIMS	
Thread	Mic ID	Recal Date	ID No.	Recal Date	ID No.	Recal Date
Ext. Major	QC-38	4-5-11				
Ext. Pitch	QC-38	4-5-11	Set 16	6-25-11	Sur 10	12-25-10
Ext. Minor	QC-38	4-5-11	Blue	12-25-10	Sur 11	12-25-10
Int. Major	N/A	N/A				
Int. Minor	N/A	N/A				

MEASUREMENTS		THREAD			Average	Wire Constant	Wire Diameter	Shim Size	Average Diameter
Thread	Read	3rd	6th	9th					
Ext. Major	1	9.371	9.371	9.378					9.373
	2	9.370	9.372	9.375					
Ext. Pitch (1)	1	9.537		9.546	9.545	.254		.032	9.259
	2	9.547		9.549					
Ext. Minor (2)	1	9.458		9.465	9.463		.120	.032	9.191
	2	9.460		9.469					
Int. Major	1	N/A		N/A					
	2	N/A		N/A					
Int. Minor	1	N/A	N/A	N/A					
	2	N/A	N/A	N/A					

Int.	Go Gauge ID:	N/A	Recal Date:	N/A	Result:	N/A
Pitch	No-Go Gauge ID:	N/A	Recal Date:	N/A	Result:	N/A

Notes: (1) External Pitch Diameter = [Average] – [Wire Constant] – [Shim Size]
(2) External Minor Diameter = [Average] – [2 X Wire Diameter] – [Shim Size]

DISPOSITION

	Trial 1	Trial 2	Trial 3	Trial 4
Adaptor Mark	C6002			
Min. Minor Diameter from Adaptor Table	9.638			
Acceptable? (Yes or No)	Yes			

QC Signoff: W. Lance Golden Level: II Date: 10-20-2010

QC Reviewed: Timothy C. [illegible] Level: II Date: 10-22-2010

Project: TMI – 35th YEAR TENDON SURVEILLANCE

Tendon No.: H 46-39 Tendon End/Buttress No.: Field / Butt. 4

Anchorage ID: FY 19 R19 Adaptor ID: C6001

EQUIPMENT	MICROMETER		WIRE		SHIMS	
Thread	Mic ID	Recal Date	ID No.	Recal Date	ID No.	Recal Date
Ext. Major	QC-52	4-5-11				
Ext. Pitch	QC-52	4-5-11	Set 5	6-25-11	Sur 1	12-25-10
Ext. Minor	QC-52	4-5-11	Dk. Red / Blue	12-25-10	Sur 3	12-25-10
Int. Major	N/A	N/A				
Int. Minor	N/A	N/A				

MEASUREMENTS		THREAD			Average	Wire Constant	Wire Diameter	Shim Size	Average Diameter
Thread	Read	3rd	6th	9th					
Ext. Major	1	9.369	9.372	9.372					
	2	9.368	9.369	9.369					9.369
Ext. Pitch (1)	1	9.540		9.541					
	2	9.539		9.541	9.540	.254		.032	9.254
Ext. Minor (2)	1	9.459		9.460			(.180)		
	2	9.460		9.461	9.460		.240	.032	9.188
Int. Major	1	N/A		N/A					
	2	N/A		N/A					
Int. Minor	1	N/A	N/A	N/A					
	2	N/A	N/A	N/A					

Int. Pitch
Go Gauge ID: N/A Recal Date: N/A Result: N/A
No-Go Gauge ID: N/A Recal Date: N/A Result: N/A

Notes: (1) External Pitch Diameter = [Average] – [Wire Constant] – [Shim Size]
(2) External Minor Diameter = [Average] – [2 X Wire Diameter] – [Shim Size]

DISPOSITION

	Trial 1	Trial 2	Trial 3	Trial 4
Adaptor Mark	C6001			
Min. Minor Diameter from Adaptor Table	8.612			
Acceptable? (Yes or No)	Yes			

QC Signoff: [signature] Level: II Date: 10-20-10
QC Reviewed: [signature] Level: II Date: 1-12-11

DATA SHEET 1
Lift-Off Force Measurement

Surveillance No. 35 th yr. AS Tendon ID H46-39 Predicted Force (F_p) 1316 kip Tendon End (Circle One): Shop / Field

Phase (Circle One): As-found / Re-Tension Ram ID 6002 Ram Calibration Constants: A = 191.381 k = -8.275

Date 10-20-10 Temp: RB Interior 111 °F / Concrete Surface 67 °F No. Effective Wires, N_w 169 Shim Stack Ht. 7.6 in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF [(1,592 x N_w / 169) – k] x 1,000 / A = 8361.72 psig

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p'[1] psig[1,2]
1	7120	N/A	N/A
2	7120	N/A	N/A
3	7120	0	7120
4			
5			
6			
7			
8			
9			
10			

Stressing Washer Rotation

	Rotation, Turns CW or CCW
At Feeler Gage Insertion	
At Trial 1	0
At Trial 2	0
At Trial 3	0
At Trial 4	
At Trial 5	
At Trial 6	
At Trial 7	
Sum	

End Lift-Off Force = (A x P' / 1,000) = k = 1354.35 kip

For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead

N/A in.

[1] N/A if 3 trial pressure spread > 25,000 / A = 130.62 psi

[2] Re-tension P' range: $P'_{min} = (F_p - k) \times 1{,}000 / A$ = N/A psig < P' < P'_{max} = [(1,394 x N_w / 169) – k] x 1,000 / A = N/A psig

For Re-Tension Only: F_p < End Lift-Off Force < 1394 x N_w / 169; N/A < N/A < N/A **Yes / No (Circle One)**

Notes: None

Recorded by: Signature W. [signature] Date 10-20-10 / Reviewed by: Signature [signature] QV Date 10-22-10

DATA SHEET 1
Lift-Off Force Measurement

Surveillance No. 35 Yr. AS Tendon ID H46-39 Predicted Force (F_p) 1316 kip Tendon End (Circle One): Shop / Field

Phase (Circle One): As-found / Re-Tension Ram ID 6001 Ram Calibration Constants: A = 191.181 k = -8.352

Date 10-20-10 Temp: RB Interior 111 °F / Concrete Surface 62 °F No. Effective Wires, N_w 169 Shim Stack Ht. 8 in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF [(1,592 x N_w / 169) – k] x 1,000 / A = 8370.87 psig

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p'[1] psig[1,2]
1	7320	N/A	N/A
2	7320	N/A	N/A
3	7320	0	7320
4			
5			
6			
7			
8			
9			
10			

Stressing Washer Rotation

	Rotation, Turns CW or CCW
At Feeler Gage Insertion	
At Trial 1	0
At Trial 2	0
At Trial 3	0
At Trial 4	
At Trial 5	
At Trial 6	
At Trial 7	
Sum	0

End Lift-Off Force = (A x P' / 1,000) = k = 1391.09 kip

For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead

N/A in.

[1] N/A if 3 trial pressure spread > 25,000 / A = 130.76 psi

[2] Re-tension P' range: $P'_{min} = (F_p - k) \times 1{,}000 / A$ = N/A psig < P' < $P'_{max} = [(1{,}394 \times N_w / 169) - k] \times 1{,}000 / A$ = N/A psig

For Re-Tension Only: F_p < End Lift-Off Force < 1394 x N_w / 169; N/A < N/A < N/A **Yes / No (Circle One)**

Notes: None

Recorded by: Signature [signature] Date 10-20-10 / Reviewed by: Signature W. Pence Noble QV Date 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

Tendon No.: H 46-39 Tendon End: Buttress 6 ☒ Shop ☐ Field

Removal Date: 10-21-2010 Inspection Date: 10-21-2010

WIRE REMOVAL INSPECTION

CORROSION INSPECTION @ LENGTH INTERVALS

(8.5.4.1.1) Document the Corrosion Category for each 10' of wire in the increments below. Use Categories described in PSC SQ 8.0.

For Corrosion Level E document condition on an NCR. NCR Req'd: ☒ NO ☐ YES NCR# N/A

(8.5.4.3.1) Document the total length of the wire on the diagram below. Completed: ☐ NO ☒ YES

Buttonhead End

sample # 1

X 0'	1	X 10'	1	20'	1	30'
30'	1	40'	1	50'	1	60'
X 60'	Sample # 2 1	X 70'	1	80'	1	90'
90'	1	100'	1	110'	1	120'
120'	1	130'	1	X 140'	Sample # 3 1	X 150'
150'	1	160'		170'		180'
180'		190'		200'		210'
210'		220'		230'		240'
240'		250'		260'		270'
270'		280'		290'		300'
300'		310'		320'		330'

5' 2 1/4" + 1 3/8" = 155' 3 5/8" Total length

Cut End

(8.5.4.6.2) Was the wire cut for samples: ☐ NO ☒ YES document the area of removal above using symbol X.

(8.7) Document the location of wire removed on Data Sheet 8.0, ANCHORAGE INSPECTION: ☒ Completed

(8.8) Measuring Device: Steel Rule ID Number: R-21 Recal Date: 6-24-11

(8.8) Wire Pull Ram ID Number: N/A

Q.C Inspector: W. Rance Robbins	Level: II	Date:	10-21-2010
QC Reviewed [signature]	Level: II	Date:	10-27-2010

DATA SHEET 4

Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID #46-39 Surveillance No. 35 th yr.

Part 1
Original Stressing Data

NOTE

PTF force is that equivalent to a ram pressure of 1,000 psi. PTF removes tendon slack and is the starting point for elongation measurements. OSF force is 80% (may be less) of tendon ultimate strength. The tendon is loaded to OSF in order to provide the required force distribution. It is also the force at which final elongation is measured. PTF force / elongation, OSF force / elongation and number of effective wires are documented in construction records.

Table 1

Row, R	Parameter	Value
1	Shop End PTF Force	200.4 kip
2	Field end PTF force	199.6 kip
3	Mean PTF Force = (R1 + R2) / 2	200.0 kip
4	Shop End PTF Reference Distance	3.5 in.
5	Field End PTF Reference Distance	2.8 in.
6	Net PTF Reference Distance = R4 + R5	6.3 in.
7	Shop End OSF Force	1588.9 kip
8	Field end OSF force	1588.3 kip
9	Mean OSF Force = (R7 + R8) / 2	1588.6 kip
10	Shop End OSF Reference Distance	8.3 in.
11	Field End OSF Reference Distance	8.6 in.
12	Net OSF Reference Distance = R10 + R11	16.9 in.
13	Differential Force = R9 – R3	1388.6 kip
14	Differential Elongation = R12 – R6	10.6 in.
15	Number of Effective Wires	169
16	Elongation Rate = R14 x R15 / R13	1.29

DATA SHEET 4

Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID H 46 39 Surveillance No. 35th yr.

Part 1
Original Stressing Data

NOTE

PTF force is that equivalent to a ram pressure of 1,000 psi. PTF removes tendon slack and is the starting point for elongation measurements. OSF force is 80% (may be less) of tendon ultimate strength. The tendon is loaded to OSF in order to provide the required force distribution. It is also the force at which final elongation is measured. PTF force / elongation, OSF force / elongation and number of effective wires are documented in construction records.

Table 1			
Row, R	Parameter	Value	
1	Shop End PTF Force	200.4	kip
2	Field end PTF force	199.6	kip
3	Mean PTF Force = (R1 + R2) / 2	200.0	kip
4	Shop End PTF Reference Distance	3.5	in.
5	Field End PTF Reference Distance	2.8	in.
6	Net PTF Reference Distance = R4 + R5	6.3	in.
7	Shop End OSF Force	1588.9	kip
8	Field end OSF force	1588.3	kip
9	Mean OSF Force = (R7 + R8) / 2	1588.6	kip
10	Shop End OSF Reference Distance	8.3	in.
11	Field End OSF Reference Distance	8.6	in.
12	Net OSF Reference Distance = R10 + R11	16.9	in.
13	Differential Force = R9 – R3	1388.6	kip
14	Differential Elongation = R12 – R6	10.6	in.
15	Number of Effective Wires	169	
16	Elongation Rate = R14 x R15 / R13	1.29	

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID H 46-39   Surveillance No. 35 th yr

Part 2
Shop End Re-Tensioning Data

Ram ID 6002   Ram Area, A 191.381 in²   Ram k -8.275 kip

NOTE

The number of effective wires entered in R1 must be the same as the number entered for the field end in Table 3. Also, the calculations identified in Rows 4, 16, 18 & 19 (shaded) may be done after stressing work at both ends of the tendon is complete.

Table 2

Row, R	Parameter	Value	Signature	Date
1	Number of Effective Wires	168	WRR	10-21
2	PTF Target Pressure	1,000 psi	WRR	10-21
3	PTF Actual Pressure	1080 psi	WRR	10-21
4	PTF Actual Force = R3 x A/1000 + k	198.41 kip	WRR	10-21
5	PTF Reference Distance	2.4 in.	WRR	10-21
6	OSF Maximum Force = R1 x 9.4	1579.20 kip	WRR	10-21
7	OSF Max. Pressure = 1000 (R6 + k) / A	8294.84 psi	WRR	10-21
8	1/3 Pressure Interval = R7 / 3 – 330	2434.94 psi	WRR	10-21
9	Target 1/3 Pressure = 1,000 + R8	3440 psi	WRR	10-21
10	Actual 1/3 Pressure	3448 psi	WRR	10-21
11	1/3 Reference Distance	5.1 in.	WRR	10-21
12	Target 2/3 Pressure = R9 + R8	5874.94 psi	WRR	10-21
13	Actual 2/3 Pressure	5790 psi	WRR	10-21
14	2/3 Reference Distance	6.7 in.	WRR	10-21
15	OSF Actual Pressure	8290 psi	WRR	10-21
16	OSF Actual Force = R15 x A/1000 + k	1578.27 kip	WRR	10-21
17	OSF Reference Distance	8.6 in.	WRR	10-21
18	Differential Force = R16 – R4	1379.86 kip	WRR	10-21
19	Differential Elongation = R17 – R5	6.2 in.	WRR	10-21

		Number
	TMI - Unit 1 Surveillance Procedure	1301-9.1
Title		Revision No.
RB Structural Integrity Tendon Surveillance		21

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Page 3 of 4

Tendon ID H46-39 Surveillance No. 35 th year

Part 3
Field End Re-Tensioning Data

Ram ID 6001 Ram Area, A 191.181 in² Ram k −8.352 kip

NOTE

The number of effective wires entered in R1 must be the same as the number entered for the shop end in Table 2. Also, the calculations identified in Rows 4, 16, 18 & 19 (shaded) may be done after stressing work at both ends of the tendon is complete.

Table 3

Row, R	Parameter	Value	Signature	Date
1	Number of Effective Wires	168	7.ws.	10-4-10
2	PTF Target Pressure	1,000 psi	7.ws.	10-21-10
3	PTF Actual Pressure	1080 psi	7.ws.	10-4-10
4	PTF Actual Force = (R3 x A/1000) + k	[illegible] kip	[illegible]	[illegible]
5	PTF Reference Distance	5 in.	7.ws.	10-21-10
6	OSF Maximum Force = R1 x 9.4	1579.20 kip	7.ws.	10-21-10
7	OSF Max. Pressure = 1000 (R6 + k) / A	8303.92 psi	7.ws	10-21-10
8	1/3 Pressure Interval = R7 / 3 - 330	2437.97 psi	7.ws.	10-21-10
9	Target 1/3 Pressure = 1,000 + R8	3440 psi	7.ws.	10-21-10
10	Actual 1/3 Pressure	3440 psi	7.ws.	10-21-10
11	1/3 Reference Distance	5.6 in.	7.ws.	10-21-10
12	Target 2/3 Pressure = R9 + R8	5877.97 psi	7.ws.	10-21-10
13	Actual 2/3 Pressure	5790 psi	7.ws	10-21-10
14	2/3 Reference Distance	7.2 in.	7.ws.	10-21-10
15	OSF Actual Pressure	8290 psi	7.ws.	10-21-10
16	OSF Actual Force = (R15 x A/1000) + k	[illegible] kip	[illegible]	[illegible]
17	OSF Reference Distance	9 in.	7.ws.	10-21-10
18	Differential Force = R16 - R4	[illegible] kip	[illegible]	[illegible]
19	Differential Elongation = R17 - R5	4 in.	[illegible]	10-21-10

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID H46-39 Surveillance No. 35th yr.

Part 4
Elongation Comparison

Table 4		
Row, R	Parameter	Value
1	Shop End Differential Force from Table 2, R18	1379.86 kip
2	Field End Differential Force from Table 3, R18	1378.41 kip
3	Average Differential Force = (R1 + R2) / 2*	1379.13 kip
4	Shop End Differential Elongation from Table 2, R19	6.2 in.
5	Field End Differential Elongation from Table 3, R19	4.0 in.
6	Total Elongation = R4 + R5**	10.2 in.
7	Number of Effective Wires from Table 2, R1	168
8	Re-Tensioning Elongation Rate = R6 x R7 / R3	1.24
9	Original Elongation Rate from Table 1, R16	1.29
10	Fractional Difference in Rates = (R8 – R9) / R9	.03

Absolute value of the above Fractional Difference in Rates ≤ 0.1 Yes ✓

No ______

* For vertical tendon = R1
** For vertical tendon = R4

Signature: W. Lance Pebbles Date: 10-21-2010

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID H46-39 Surveillance No. 35th yr.

Part 4
Elongation Comparison

Table 4		
Row, R	Parameter	Value
1	Shop End Differential Force from Table 2, R18	1379.86 kip
2	Field End Differential Force from Table 3, R18	1378.41 kip
3	Average Differential Force = (R1 + R2) / 2*	1379.13 kip
4	Shop End Differential Elongation from Table 2, R19	6.2 in.
5	Field End Differential Elongation from Table 3, R19	4.0 in.
6	Total Elongation = R4 + R5**	10.2 in.
7	Number of Effective Wires from Table 2, R1	168
8	Re-Tensioning Elongation Rate = R6 x R7 / R3	1.24
9	Original Elongation Rate from Table 1, R16	1.29
10	Fractional Difference in Rates = (R8 – R9) / R9	.03

Absolute value of the above Fractional Difference in Rates ≤ 0.1 Yes ✓ No ____

* For vertical tendon = R1
** For vertical tendon = R4

Signature: W. Lance Robb Date: 10-21-2010

DATA SHEET 1
Lift-Off Force Measurement

Surveillance No. 35th yr AS Tendon ID H46-39 Predicted Force (F_p) 1316 kip Tendon End (Circle One): Shop / Field

Phase (Circle One): As-found / Re-Tension Ram ID 6002 Ram Calibration Constants: A = 191.381 k = -8.275

Date 10-21-2010 Temp: RB Interior 109 °F / Concrete Surface 58 °F No. Effective Wires, N_w 168 Shim Stack Ht. 7.6 in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF [(1,592 x N_w / 169) – k] x 1,000 / A = 8312.50 psig

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p[1] psig[1,2]	Stressing Washer Rotation	Rotation, Turns CW or CCW	For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead
				At Feeler Gage Insertion		
1	6930	N/A	N/A	At Trial 1	0	2 in.
2	6930	N/A	N/A	At Trial 2	0	1 "
3	6930	0	6930	At Trial 3	0	1/2 "
4				At Trial 4		1/8 "
5				At Trial 5		1 "
6				At Trial 6		1 "
7				At Trial 7		2 "
8				Sum	0	"
9						"
10						

End Lift-Off Force = (A x P' / 1,000) = k = 1317.99 kip

[1] N/A if 3 trial pressure spread > 25,000 / A = 130.62 psi

[2] Re-tension P' range: P'_{min} = (F_p – k) x 1,000 / A = 6919.47 psig < P' < P'_{max} = [(1,394 x N_w / 169) – k] x 1,000 / A = ~~7276.55~~ 7284.03 WRR 10-27-10 psig

For Re-Tension Only: F_p < End Lift-Off Force < 1394 x N_w / 169; 1316 < 1317.99 < 1385.75 **Yes / No (Circle One)**

Notes: None

Recorded by: Signature W. Rance [signature] Date 10-21-2010 / Reviewed by: Signature [signature] QV Date 10-27-10

DATA SHEET 1
Lift-Off Force Measurement

Surveillance No. 35 Yr. Tendon ID H46-39 Predicted Force (F_p) 1316 kip Tendon End (Circle One): Shop / Field

Phase (Circle One): As-found / Re-Tension Ram ID 6001 Ram Calibration Constants: A = 191.181 k = -8.352

Date 10-27-10 Temp: RB Interior 109 °F / Concrete Surface 62 °F No. Effective Wires, N_w 168 Shim Stack Ht. 8 in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF $[(1{,}592 \times N_w / 169) - k] \times 1{,}000 / A$ = 8321.59 psig

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p'[1] psig[1,2]	Stressing Washer Rotation	Rotation, Turns CW or CCW	For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead
				At Feeler Gage Insertion		
1	7040	N/A	N/A	At Trial 1	0	2 in.
2	7040	N/A	N/A	At Trial 2	0	1/2 "
3	7040	0	7040	At Trial 3	0	1/8 "
4				At Trial 4		1/4 "
5				At Trial 5		1 "
6				At Trial 6		4 "
7				At Trial 7		"
8				Sum	0	"
9						"
10						

End Lift-Off Force = (A x P' / 1,000) = k = 1339.56 kip

[1] N/A if 3 trial pressure spread > 25,000 / A = 130.76 psi

[2] Re-tension P' range: $P'_{min} = (F_p - k) \times 1{,}000 / A$ = 6927.21 psig < P' < $P'_{max} = [(1{,}394 \times N_w / 169) - k] \times 1{,}000 / A$ = 7292.06 psig

For Re-Tension Only: F_p < End Lift-Off Force < 1394 x N_w / 169; 1316 < 1339.56 < 1385.75 Yes / No (Circle One)

Notes: None

Recorded by: Signature [signature] Date 10-27-10 / Reviewed by: Signature W. [signature] Date 10-27-10
QV

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: H46-39 Tendon End: Buttress 6 ☒ Shop ☐ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☒ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☒ YES	☐ NO

COMMENTS None

CREW FOREMAN SIGNOFF [signature] Date: 10-21-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: H46-39 Tendon End: Butt. 4 ☐ Shop ☒ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☒ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☒ YES	☐ NO

COMMENTS None

CREW FOREMAN SIGNOFF [signature] Date: 10-21-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35th YEAR TENDON SURVEILLANCE Tendon No.: H 46-39

GREASE REPLACEMENT

QC SIGNOFFS

				QC
(8.4) Grease Used	☒ NEW ☐ OLD - TEST DATE:	☐ ACCEPTABLE	☐ APPROVAL LETTER DATED:	2Cd 10-21-10
8.0 PREREQUISITES				
(8.5) Total Grease Loss from Data Sheet 6.0 for	Butt 4/ Field	tendon end:	~~1~~ 1.5 OBR gal.	2Cd 10-21-10
(8.6) Total Grease Loss from Data Sheet 6.0 for	Butt 6/ Shop	tendon end:	1 gal.	2Cd 10-21-10
(8.7) Estimated grease losses from leaks for	Butt 4/ Field	tendon end:	0 gal.	2Cd 10-21-10
(8.8) Estimated grease losses from leaks for	Butt 6/ Shop	tendon end:	0 gal.	2Cd 10-21-10
(8.9) TOTAL Tendon Grease Loss:			2.5 OBR gal.	2Cd 10-21-10

13.0 POURING AND HAND PUMPING – FIRST END

(13.6) Ambient Temp.: 65 °F Thermometer ID: PK-103 Recal Date: 6-23-11

(13.7) Grease Temp.: 220 °F Thermometer ID: PK-103 Recal Date: 6-23-11

(13.9) **Initial** Grease Height (a) 24 in. (13.12) **Final** Grease Height (b) 22.25 in.

(13.14) Total amount of Grease added: 3.09 gal. (a – b) x 1.77 into the Field end

(13.16) Quantity of Waste Grease: 0 gal. (13.15) ☒ Poured ☐ Hand Pumped

(13.17) Total Grease **Replaced** this end: 3.09 gal. — 2Cd 10-21-10

13.0 HAND PUMPING – SECOND END

(13.6) Ambient Temp.: 65 °F Thermometer ID: PK-103 Recal Date: 6-23-11

(13.7) Grease Temp.: 220 °F Thermometer ID: PK-103 Recal Date: 6-23-11

(13.9) **Initial** Grease Height (a) 22.25 in. (13.12) **Final** Grease Height (b) 20.75 in.

(13.14) Total amount of Grease added: 2.65 gal. (a – b) x 1.77 into the Shop end

(13.16) Quantity of Waste Grease: 0 gal. (13.15) ☒ Poured ☐ Hand Pumped

(13.17) Total Grease **Replaced** this end: 2.65 gal. — 2Cd 10-21-10

14.0 CALCULATION OF PRESSURE PUMPING

(14.1) Total **Tendon** Grease Replaced: 5.74 gal. *(13.17 + 13.17)*

(14.2) Net Tendon Duct Grease Volume: 115.26 gal. *Refer to SQ 12.2 – GREASE VOLUMES, for the Tendon Net Duct Volume*

(14.3) Percent Difference: $\frac{\text{Total Tendon Replaced (14.1) - Total Tendon Loss (8.9)}}{\text{Net Tendon Duct Grease Volume (14.2)}} \times 100 =$ ~~3.24~~ 2.81 OBR % Difference — 2Cd 10-21-10

(14.4) Grease Leaks: ☐ Yes ☒ No — 2Cd 10-21-10

(14.5) Refill Acceptable: ☒ Yes *(less than 10%)* ☐ No *(greater than 10%)* — 2Cd 10-21-10

If No – Customer Notified NCR No.: N/A — 2Cd 10-21-10

(14.6) Comments: None

QC Reviewed: W. Vance Potter Level: IV Date: 10-27-2010

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(7.2) Tendon No.: H4641 Tendon End: Buttress 6 ☒ Shop ☐ Field

Grease Cap Removal

	Q.C. Signoff
(7.5)Date Removal Started: 10-20-2010	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 56 °F Thermometer No.: ST 82 Re-Cal Date: 6-23-11	
Ambient Temp.: 55 °F Thermometer No.: PK102 Re-Cal Date: 2-9-11	NRR 10-20-10
(8.4) Anchorhead I.D.: 969/ABSW5 Anchorhead Verification: ☒ Match ☐ No-Match	NRR 10-20-10

(8.5) Grease Coating

	Complete		Partial		Uncoated	
Grease Cap -	Complete	✓	Partial		Uncoated	%
Buttonheads -	Complete	✓	Partial		Uncoated	%
Anchorhead -	Complete	✓	Partial		Uncoated	%
Shims -	Complete	✓	Partial		Uncoated	%
Bearing Plate – (1)	Complete	✓	Partial		Uncoated	%

(1) - *Limited within the inside diameter of the grease cap.* NRR 10-20-10

(8.6) Unusual Conditions: None NRR 10-20-10

(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Med. Brown
Comments: None NRR 10-20-10

(8.8) Quantity of Samples 2 Quart Samples Identified per Step 8.8.1? ☒ Yes ☐ No
Location of Removal ☒ A.H. ☐ B.P. ☒ Shims ☐ Cap ☐ Duct NRR 10-20-10

(8.9) Qty. of Grease lost during removal of cap: 0 gal. NRR 10-20-10
(8.9.1) Grease from cap to be reused? ☒ Yes ☐ No Qty. of Grease removed from cap: 0 gal. NRR 10-20-10
(9.6) Qty. of Grease removed from anchorage: .25 gal. NRR 10-20-10
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: None NRR 10-20-10

(10.3) Method of Tendon Protection: Reinstalled the grease can w/a new gasket NRR 10-20-10
(10.4) Amount of Grease Loss from Tendon duct: 0 gal. NRR 10-20-10

(10.5) Total quantity of lost grease (below):
(8.8) .5 + (8.9) 0 + (8.9.1) 0 + (9.6) .25 + (10.4) 0 = .75 TOTAL NRR 10-20-10
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒ Yes ☐ No NRR 10-20-10

QC Reviewed: [signature] Level: II Date: 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(7.2) Tendon No.: H 46-41 Tendon End: Field / Butt. 4 ☐ Shop ☒ Field

Grease Cap Removal

	Q.C. Signoff
(7.5) Date Removal Started: 10-20-10	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 52 °F Thermometer No.: PK-103 Re-Cal Date: 6-23-11	
Ambient Temp.: 50 °F Thermometer No.: ST-78 Re-Cal Date: 6-23-11	TLS 10-20-10
(8.4) Anchorhead I.D.: 971 Anchorhead Verification: ☒ Match ☐ No Match	TLS 10-20-10

(8.5) Grease Coating

Grease Cap -	Complete	✓	Partial		Uncoated	%
Buttonheads -	Complete	✓	Partial		Uncoated	%
Anchorhead -	Complete	✓	Partial		Uncoated	%
Shims -	Complete	✓	Partial		Uncoated	%
Bearing Plate – (1)	Complete	✓	Partial		Uncoated	%

Q.C. Signoff: TLS 10-20-10

(1) - *Limited within the inside diameter of the grease cap.*

(8.6) Unusual Conditions: None — TLS 10-20-10

(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Brown
Comments: None — TLS 10-20-10

(8.8) Quantity of Samples 2 Quart Samples Identified per Step 8.8.1? ☒ Yes ☐ No
Location of Removal ☒ A.H. ☐ B.P. ☒ Shims ☐ Cap ☐ Duct — TLS 10-20-10

	Q.C. Signoff
(8.9) Qty. of Grease lost during removal of cap: 0 gal.	TLS 10-20-10
(8.9.1) Grease from cap to be reused? ☒ Yes ☐ No Qty. of Grease removed from cap: 0 gal.	TLS 10-20-10
(9.6) Qty. of Grease removed from anchorage: 1 gal.	TLS 10-20-10
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: N/A	TLS 10-20-10
(10.3) Method of Tendon Protection: Installed Can with new gasket	TLS 10-20-10
(10.4) Amount of Grease Loss from Tendon duct: 0 gal.	TLS 10-20-10
(10.5) Total quantity of lost grease (below): (8.8) .5 + (8.9) 0 + (8.9.1) 0 + (9.6) 1 + (10.4) 0 = 1.5 TOTAL	TLS 10-20-10
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒ Yes ☐ No	TLS 10-20-10

QC Reviewed: W. Vance Robbins Level: II Date: 10-28-2010

PSC PROCEDURE SQ 6.1
INSPECT FOR WATER
Data Sheet 6.1
July 31, 2009
Page 1 of 1
Revision 0

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: H 46-41 Tendon End: Butt. 6 ☒ Shop ☐ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A
Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable
Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A
Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable
Comments: None

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A
Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable
Comments: None

(9.9.1) DURING DETENSIONING N/A

Water Detected: ☐ Yes ☐ No Quantity: Sample Taken: ☐ Yes ☐ No ☐ N/A
Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable
Comments:

(11.1) NOTIFICATION N/A

Exelon Notified: ☐ Yes ☐ No Individual Name: Date:

SAMPLE IDENTIFICATION AND STORAGE N/A

(12.2) Samples adequately identified: ☐ Yes ☐ No
(12.3) Samples stored at:

QC Signoff: W. Vance Patton Level: II Date: 10-20-10
QC Reviewed: [signature] Level: II Date: 10-20-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: H 46-41 Tendon End: Butt. 4 ☐ Shop ☒ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.9.1) DURING DETENSIONING

Water Detected: ☐ Yes ☐ No Quantity: N/A Sample Taken: ☐ Yes ☐ No ☐ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable

Comments:

(11.1) NOTIFICATION

Exelon Notified: ☐ Yes ☐ No Individual Name: N/A Date:

SAMPLE IDENTIFICATION AND STORAGE

(12.2) Samples adequately identified: ☐ Yes ☐ No N/A

(12.3) Samples stored at:

QC Signoff: Timothy C. Dotts Level: II Date: 10-20-10

QC Reviewed: W. Lance Robbins Level: II Date: 10-28-10

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-20-2010 Report No:

WO No(s).: R2139507 Tendon Anchorage No.: H46-41 Tendon End: ☒ Shop ☐ Field

Location: Tunnel, Gallery, Buttress 6 Elevation: 294'11" Bearing Plate I.D. unable to locat

Bearing Plate I.D. Anchor Head I.D. 909 Bushing I.D. A85W5

Exam Type: ☒ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☒ As Found Exam ☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0015 Visual Aids: NONE

M&TE Used: Steel Scale R-21 Cal due 6-24-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-20-2010 Time: 0730

Special / Specific Instructions:

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
H4641 Tendon anchorage components at buttress 6. shop end.	✓			NO indications

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☐ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-20-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) Joseph A Shabby DATE: 11-4-10

Page 1 of 1

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: I Date: 10-20-10 Report No: N/A

WO No(s).: R2139507 | Tendon Anchorage No.: H 46-41 | Tendon End: ☐ Shop ☒ Field

Location: Tunnel, Gallery, Buttress: 4 Elevation: 294'-11" Bearing Plate I.D.: Unable To locate

Bearing Plate I.D. Unable To locate Anchor Head I.D. 971 Bushing I.D. N/A

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☒ As Found Exam ☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0016 Visual Aids: None

M&TE Used: Steel Rule R-Lee Cal. Due 6-18-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date N/A

Illumination Used Flashlight Illumination Verified: Date: 10-20-10 Time: 8:00 AM.

Special / Specific Instructions: N/A

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
H-46-41 Tendon Anchorage		~~B~~ TJ 10-27-10	B	2 Missing button Heads See Data Sheet 4 Enclousure 6 Previously Reported

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water (Quantify)	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☒ Yes ☐ No ☒ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-20-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) [signature] Joseph A Shelby DATE: 11-4-10

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-20-2010 Report No:

System: Containment Tendons Component: 2' area of concrete around H46-41 WO No(s).: R2139507

Location: Building: Containment Elev.: 294'11" Col.: N/A Row: N/A Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☒ VT-1C ☐ VT-3C Type Of Exam: ☒ Direct ☐ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0015 Visual Aids: None

Surface: ID OD Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: None ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-20-10 Time: 0730

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
2' area of concrete around H46-41 tendon, Shop/BT6 END ~~EAG~~ 1-17-11	✓			No indications

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts , Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information : ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-20-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 2/4/11

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) ______ DATE:

ANII REVIEW (as applicable) Joseph S Stoklosa DATE: 2/9/11

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: I Date: 10-20-10 Report No: N/A

System: Containment Tendons Component: H46-41 24" around anchor plate, concrete. WO No(s).: R2139507

Location: Building: containment Elev.: 294'-11" Col.: N/A Row: N/A Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☒ VT-1C ☐ VT-3C Type Of Exam: ☒ Direct ☐ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0016 Visual Aids: None

Surface: ID OD Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: Steel Rule A226-28 Cal Due 1-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-20-10 Time: 8:00 AM

Special / Specific Instructions: N/A

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Concrete 24" around anchor plate at tendon H46-41. Butt. 4 / Field.	✓			No indications

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts , Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information : ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-20-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

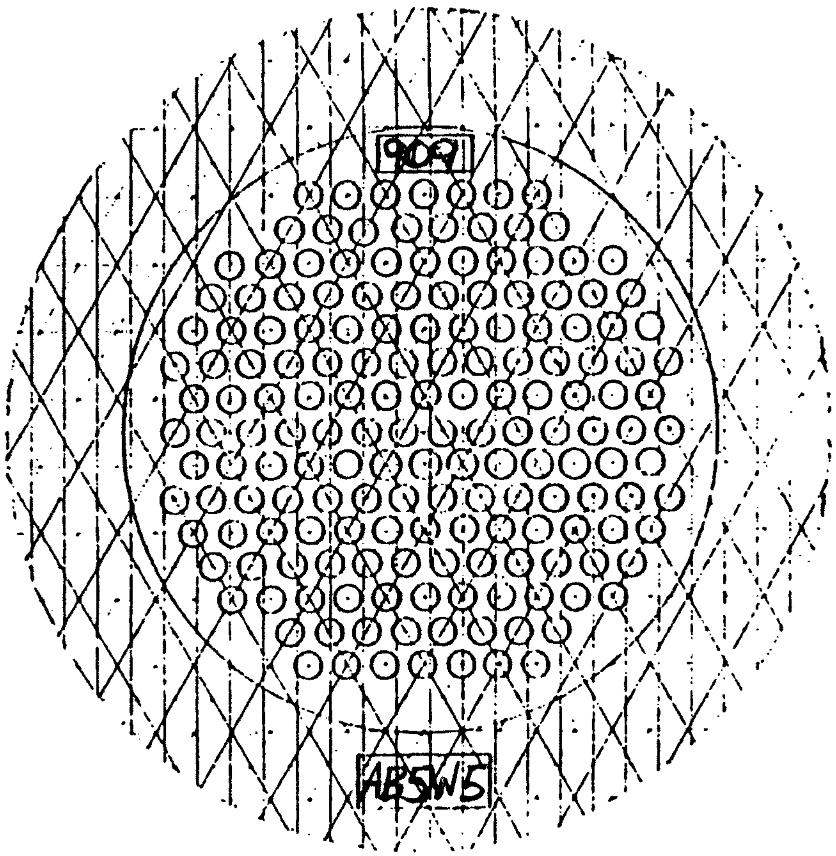
Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) ______ DATE: ______

ANII REVIEW (as applicable) Joseph [signature] DATE: 11-4-10

Page 1 of 1

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
AS Found Inspection



RB Tendon Surveillance

COMMENT: Shim stack ht. - 8.25" (2,1,1,1,1,1/4,1/2,1/2,1)
No corrosion

INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR W. Lance [signature] Date 10-20-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

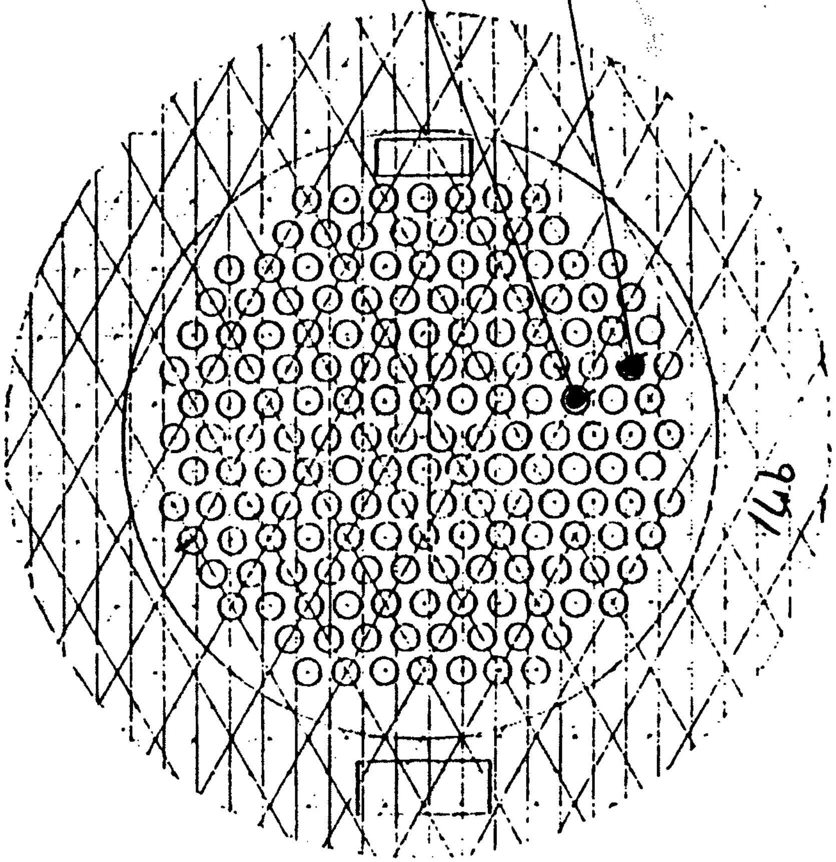
INSPECTION PERIOD 35th yr. AS

Tendon # H4641
END: FIELD_____(1 piece washer)
SHOP ✓ (2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
AS Found Inspection

missing button head

Missing Button Head



RB Tendon Surveillance

COMMENT: Shim Stack Hieght 9.3''
(2,1,1,1,1/8,1,1,1,1)

No Corrosion Noted.
Missing Wires Previously Reported

INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR ________ Date 10-20-10
COGNIZANT MECH/STRUCT ENGINEER ________ Date 29 Oct 10
REVIEWED BY

INSPECTION PERIOD 35 yr. AS

Tendon # H 46-41
END: FIELD X (1 piece washer)
SHOP______(2 piece washer)

Project: TMI – 35th YEAR TENDON SURVEILLANCE

Tendon No.: H4641 Tendon End/Buttress No.: Butt. 6

Anchorage ID.: 909/ABSWS Adaptor ID: C6002

EQUIPMENT	MICROMETER		WIRE		SHIMS	
Thread	Mic ID	Recal Date	ID No.	Recal Date	ID No.	Recal Date
Ext. Major	QC-38	4-5-11				
Ext. Pitch	QC-38	4-5-11	Set #16	6-25-11	SUR 10	12-25-10
Ext. Minor	QC-38	4-5-11	Blue Set	12-25-10	SUR 11	12-25-10
Int. Major	N/A	N/A				
Int. Minor	N/A	N/A				

MEASUREMENTS		THREAD			Average	Wire Constant	Wire Diameter	Shim Size	Average Diameter
Thread	Read	3rd	6th	9th					
Ext. Major	1	9.367	9.372	9.376					9.371
	2	9.368	9.370	9.375					
Ext. Pitch (1)	1	9.545		9.555	9.548	.254		.032	9.262
	2	9.545		9.547					
Ext. Minor (2)	1	9.468		9.468	9.467		.120	.032	9.195
	2	9.463		9.470					
Int. Major	1	N/A		N/A					
	2	N/A		N/A					
Int. Minor	1	N/A	N/A	N/A					
	2	N/A	N/A	N/A					

Int.	Go Gauge ID:	N/A	Recal Date:	N/A	Result:	N/A
Pitch	No-Go Gauge ID:	N/A	Recal Date:	N/A	Result:	N/A

Notes: (1) External Pitch Diameter = [Average] – [Wire Constant] – [Shim Size]
(2) External Minor Diameter = [Average] – [2 X Wire Diameter] – [Shim Size]

DISPOSITION

	Trial 1	Trial 2	Trial 3	Trial 4
Adaptor Mark	C6002			
Min. Minor Diameter from Adaptor Table	8.619			
Acceptable? (Yes or No)	Yes			

QC Signoff: W. Rance Robbins Level: II Date: 10-20-10

QC Reviewed: Ronald C. Dix Level: II Date: 10-27-10

Project: TMI – 35th YEAR TENDON SURVEILLANCE

Tendon No.: H 46-41 Tendon End/Buttress No.: Field / Butt 4

Anchorage ID: 971 Adaptor ID: ~~D2~~ C-6001 20-10-2010

EQUIPMENT	MICROMETER		WIRE		SHIMS	
Thread	Mic ID	Recal Date	ID No.	Recal Date	ID No.	Recal Date
Ext. Major	QC-52	4-5-11				
Ext. Pitch	QC-52	4-5-11	Set	6-25-11	Sur 1	12-25-10
Ext. Minor	QC-52	4-5-11	Ork / Blue	12-25-10	Sur 3	12-25-10
Int. Major	N/A	N/A				
Int. Minor	N/A	N/A				

MEASUREMENTS		THREAD			Average	Wire Constant	Wire Diameter	Shim Size	Average Diameter
Thread	Read	3rd	6th	9th					
Ext. Major	1	9.369	9.372	9.371					9.371
	2	9.369	9.373	9.372					
Ext. Pitch (1)	1	9.527		9.526	9.527	,254		.032	9.241
	2	9.527		9.528					
Ext. Minor (2)	1	9.456		9.457	9.457		.240	.032	9.185
	2	9.457		9.458					
Int. Major	1	N/A		N/A					
	2	N/A		N/A					
Int. Minor	1	N/A	N/A	N/A					
	2	N/A	N/A	N/A					

Int. Pitch

Go Gauge ID: N/A Recal Date: N/A Result: N/A

No-Go Gauge ID: N/A Recal Date: N/A Result: N/A

Notes: (1) External Pitch Diameter = [Average] – [Wire Constant] – [Shim Size]
(2) External Minor Diameter = [Average] – [2 X Wire Diameter] – [Shim Size]

DISPOSITION

	Trial 1	Trial 2	Trial 3	Trial 4
Adaptor Mark	D2	C-6001	C-6002	
Min. Minor Diameter from Adaptor Table	8.663	8.631	8.657	
Acceptable? (Yes or No)	Yes	Yes	Yes	

QC Signoff: [signature] Level: II Date: 10-20-10

QC Reviewed: [signature] Level: II Date: 1-12-11

DATA SHEET 1
Lift-Off Force Measurement

Surveillance No. 35th yr. Tendon ID H46-41 Predicted Force (F_p) 1314 kip Tendon End (Circle One): Shop / Field

Phase (Circle One): As-found / Re-Tension Ram ID 6002 Ram Calibration Constants: A = 191.381 k = -8.275

Date 10-20-10 Temp: RB Interior 111 °F / Concrete Surface 56 °F No. Effective Wires, N_w 169 Shim Stack Ht. 8.25 in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF [(1,592 x N_w / 169) – k] x 1,000 / A = 8361.72 psig

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p'[1] psig[1,2]
1	7060	N/A	N/A
2	7060	N/A	N/A
3	7060	0	7060
4			
5			
6			
7			
8			
9			
10			

Stressing Washer Rotation

	Rotation, Turns CW or CCW
At Feeler Gage Insertion	
At Trial 1	0
At Trial 2	0
At Trial 3	0
At Trial 4	
At Trial 5	
At Trial 6	
At Trial 7	
Sum	0

End Lift-Off Force = (A x P' / 1,000) = k = 1342.87 kip

For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead

N/A in.

[1] N/A if 3 trial pressure spread > 25,000 / A = 130.62 psi

[2] Re-tension P' range: P'_{min} = (F_p – k) x 1,000 / A = N/A psig < P' < P'_{max} = [(1,394 x N_w / 169) – k] x 1,000 / A = N/A psig

For Re-Tension Only: F_p < End Lift-Off Force < 1394 x N_w / 169; N/A < N/A < N/A **Yes / No (Circle One)**

Notes: None

Recorded by: Signature W. Bruce [signature] Date 10-20-10 / Reviewed by: Signature [signature] QV Date 10-27-10

DATA SHEET 1
Lift-Off Force Measurement

Surveillance No. 35 Yr. Tendon ID H 46-41 Predicted Force (F_p) 1314 kip Tendon End (Circle One): Shop / Field

Phase (Circle One): As-found / Re-Tension Ram ID 6001 Ram Calibration Constants: A = 191.181 k = -8.352

Date 10-20-10 Temp: RB Interior 111 °F / Concrete Surface 52 °F No. Effective Wires, N_w 167 Shim Stack Ht. 9.3 in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF $[(1,592 \times N_w / 169) - k] \times 1,000 / A$ = ~~8390.89~~ 8272.32 psig
TD 10-28-10

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p[1] psig[1,2]
1	7220	N/A	N/A
2	7220	N/A	N/A
3	7200	20	7213.33
4			
5			
6			
7			
8			
9			
10			

Stressing Washer Rotation

	Rotation, Turns CW or CCW
At Feeler Gage Insertion	
At Trial 1	0
At Trial 2	0
At Trial 3	0
At Trial 4	
At Trial 5	
At Trial 6	
At Trial 7	
Sum	

End Lift-Off Force = (A x P' / 1,000) = k = 1370.69 kip

For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead

N/A in.

[1] N/A if 3 trial pressure spread > 25,000 / A = 130 psi

[2] Re-tension P' range: $P'_{min} = (F_p - k) \times 1,000 / A$ = N/A psig < P' < $P'_{max} = [(1,394 \times N_w / 169) - k] \times 1,000 / A$ = N/A psig

For Re-Tension Only: F_p < End Lift-Off Force < 1394 x N_w / 169; N/A < N/A < N/A **Yes / No (Circle One)**

Notes: None

Recorded by: Signature [signature] Date 10-20-10 / Reviewed by: Signature W. Rance [signature] QV Date 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: H 46-41 Tendon End: Buttress 6 ☒ Shop ☐ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED: ☒ YES ☐ NO

GREASE CAP SURFACE PROPERLY PREPARED: ☒ YES ☐ NO

GASKET MATING SURFACE PROPERLY PREPARED: ☒ YES ☐ NO

STUD/BOLT HOLES PROPERLY PREPARED: ☒ YES ☐ NO

FOREIGN MATERIAL EXCLUSION CONTROLLED: ☒ YES ☐ NO

COMMENTS None

CREW FOREMAN SIGNOFF [signature] Date: 10-20-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: H 46-41 Tendon End: Butt. 4 ☐ Shop ☒ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☒ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☒ YES	☐ NO

COMMENTS None

CREW FOREMAN SIGNOFF [signature] Date: 10-20-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35th YEAR TENDON SURVEILLANCE   Tendon No.: H46-41

GREASE REPLACEMENT

QC SIGNOFFS

(8.4) Grease Used ☒ NEW ☐ OLD - TEST DATE: ☐ ACCEPTABLE ☐ APPROVAL LETTER DATED: — 7.W. 10-21-10

8.0 PREREQUISITES

(8.5) Total Grease Loss from Data Sheet 6.0 for	Butt.4/Field	tendon end:	1.5 gal.	7.W. 10-21-10
(8.6) Total Grease Loss from Data Sheet 6.0 for	Butt.6/Shop	tendon end:	.75 gal.	7.W. 10-21-10
(8.7) Estimated grease losses from leaks for	Butt 4/Field	tendon end:	0 gal.	7.W. 10-21-10
(8.8) Estimated grease losses from leaks for	Butt.6/Shop	tendon end:	0 gal.	7.W. 10-21-10
(8.9) TOTAL Tendon Grease Loss:			2.25 gal.	7.W. 10-21-10

13.0 POURING AND HAND PUMPING – FIRST END

(13.6) Ambient Temp.: 65 °F Thermometer ID: PK-103 Recal Date: 6-23-11

(13.7) Grease Temp.: 220 °F Thermometer ID: PK-103 Recal Date: 6-23-11

(13.9) **Initial** Grease Height (a) 20.75 in. (13.12) **Final** Grease Height (b) 19.25 in.

(13.14) Total amount of Grease added: 2.65 gal. (a – b) x 1.77 into the Field end

(13.16) Quantity of Waste Grease: 0 gal. (13.15) ☒ Poured ☐ Hand Pumped

(13.17) Total Grease **Replaced** this end: 2.65 gal. — 7.W. 10-21-10

13.0 HAND PUMPING – SECOND END

(13.6) Ambient Temp.: 65 °F Thermometer ID: PK-103 Recal Date: 6-23-11

(13.7) Grease Temp.: 220 °F Thermometer ID: PK-103 Recal Date: 6-23-11

(13.9) **Initial** Grease Height (a) 19.25 in. (13.12) **Final** Grease Height (b) 18 in.

(13.14) Total amount of Grease added: 2.21 gal. (a – b) x 1.77 into the Shop end

(13.16) Quantity of Waste Grease: 0 gal. (13.15) ☒ Poured ☐ Hand Pumped

(13.17) Total Grease **Replaced** this end: 2.21 gal. — 7.W. 10-21-10

14.0 CALCULATION OF PRESSURE PUMPING

(14.1) Total **Tendon** Grease Replaced: 4.86 gal. *(13.17 + 13.17)*

(14.2) Net Tendon Duct Grease Volume: 114.86 gal. *Refer to SQ 12.2 – GREASE VOLUMES for the Tendon Net Duct Volume*

(14.3) Percent Difference: $\frac{\text{Total Tendon Replaced (14.1) - Total Tendon Loss (8.9)}}{\text{Net Tendon Duct Grease Volume (14.2)}} \times 100 =$ 2.27 % Difference — 7.W. 10-21-10

(14.4) Grease Leaks: ☐ Yes ☒ No — 7.W. 10-21-10

(14.5) Refill Acceptable: ☒ Yes *(less than 10%)* ☐ No *(greater than 10%)* — 7.W. 10-21-10

If No – Customer Notified NCR No.: N/A — 7.W. 10-21-10

(14.6) Comments: None

QC Reviewed: W. Pamo Pobleim Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(7.2) Tendon No.: V-117 Tendon End: Shop Top ☒ Shop ☐ Field

Grease Cap Removal

	Q.C. Signoff
(7.5) Date Removal Started: 10-25-2010	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 59 °F Thermometer No.: ~~ST-782~~ WRR 10-25-10 Re-Cal Date: 6-23-11	
Ambient Temp.: 63 °F Thermometer No.: PK102 Re-Cal Date: 2-9-11	WRR 10-25-10
(8.4) Anchorhead I.D.: 812/581 Anchorhead Verification: ☒ Match ☐ No-Match	WRR 10-25-10

(8.5) Grease Coating

Grease Cap -	Complete	✓	Partial		Uncoated	%
Buttonheads -	Complete	✓	Partial		Uncoated	%
Anchorhead -	Complete	✓	Partial		Uncoated	%
Shims -	Complete	✓	Partial		Uncoated	%
Bearing Plate - [1]	Complete	✓	Partial		Uncoated	%

[1] - Limited within the inside diameter of the grease cap. — WRR 10-25-10

(8.6) Unusual Conditions: None — WRR 10-25-10

(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Medium Brown
Comments: None — WRR 10-25-10

(8.8) Quantity of Samples 0 Quart Samples Identified per Step 8.8.1? ☐ Yes N/A ☐ No
Location of Removal ☐ A.H. ☐ B.P. ☐ Shims ☐ Cap ☐ Duct — WRR 10-25-10
Note: No samples taken per TMI engineering.

	Q.C. Signoff
(8.9) Qty. of Grease lost during removal of cap: 0 gal.	WRR 10-25-10
(8.9.1) Grease from cap to be reused? ☒ Yes ☐ No Qty. of Grease removed from cap: 0.5 gal.	WRR 10-25-10
(9.6) Qty. of Grease removed from anchorage: 2.5 gal.	WRR 10-25-10
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: None	WRR 10-25-10
(10.3) Method of Tendon Protection: Reinstalled the grease cap w/a new gasket	WRR 10-25-10
(10.4) Amount of Grease Loss from Tendon duct: 0 gal.	WRR 10-25-10
(10.5) Total quantity of lost grease (below): (8.8) 0 + (8.9) 0 + (8.9.1) 0.5 + (9.6) 2.5 + (10.4) 0 = 3 TOTAL	WRR 10-25-10
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT: ☒ Yes ☐ No	WRR 10-25-10

QC Reviewed: [signature] Level: II Date: 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(7.2) Tendon No.: V-117 Tendon End: Bottom ☐ Shop ☒ Field

Grease Cap Removal

	Q.C. Signoff
(7.5)Date Removal Started: 10-26-10	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 86 °F Thermometer No.: ST-78 Re-Cal Date: 6-23-11	
Ambient Temp.: 80 °F Thermometer No.: PK-103 Re-Cal Date: 6-23-11	TCS 10-26-10
(8.4) Anchorhead I.D.: 739 Anchorhead Verification: ☒ Match ☐ No-Match	TCS 10-26-10

(8.5) Grease Coating

Grease Cap -	Complete	✓	Partial		Uncoated	%
Buttonheads -	Complete	✓	Partial		Uncoated	%
Anchorhead -	Complete	✓	Partial		Uncoated	%
Shims -	Complete	✓	Partial		Uncoated	%
Bearing Plate – (1)	Complete	✓	Partial		Uncoated	%

Q.C. Signoff: TCS 10-26-10

(1) - Limited within the inside diameter of the grease cap.

(8.6) Unusual Conditions: None — TCS 10-26-10

(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Brown
Comments: — TCS 10-26-10

(8.8) Quantity of Samples 0 Quart Samples identified per Step 8.8.1? ☐ Yes N/A ☐ No
Location of Removal ☐ A.H. ☐ B.P. ☐ Shims ☐ Cap ☐ Duct — TCS 10-26-10
NOTE: No Samples Taken Per TMI Engineering.

(8.9) Qty. of Grease lost during removal of cap: 0 gal. — TCS 10-26-10
(8.9.1) Grease from cap to be reused? ☒ Yes ☐ No Qty. of Grease removed from cap: .5 gal. — TCS 10-26-10
(9.6) Qty. of Grease removed from anchorage: .5 gal. — TCS 10-26-10
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: N/A — TCS 10-26-10

(10.3) Method of Tendon Protection: Install can with new gasket — TCS 10-26-10
(10.4) Amount of Grease Loss from Tendon duct: 0 gal. — TCS 10-26-10

(10.5) Total quantity of lost grease (below):
(8.8) 0 + (8.9) 0 + (8.9.1) .5 + (9.6) .5 + (10.4) 0 = 1 TOTAL — TCS 10-26-10
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒ Yes ☐ No — TCS 10-26-10

QC Reviewed: W. Rance Robertson Level: II Date: 10-28-10

PSC

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: V-117 Tendon End: Top ☒ Shop ☐ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.9.1) DURING DETENSIONING N/A

Water Detected: ☐ Yes ☐ No Quantity: ______ Sample Taken: ☐ Yes ☐ No ☐ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable

Comments: ______

(11.1) NOTIFICATION N/A

Exelon Notified: ☐ Yes ☐ No Individual Name: ______ Date: ______

SAMPLE IDENTIFICATION AND STORAGE N/A

(12.2) Samples adequately identified: ☐ Yes ☐ No

(12.3) Samples stored at: ______

QC Signoff: W. Lance Robbins Level: II Date: 10-25-10

QC Reviewed: [signature] Level: II Date: 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: V-117 Tendon End: Bottom ☐ Shop ☒ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.9.1) DURING DETENSIONING

N/A

Water Detected: ☐ Yes ☐ No Quantity: Sample Taken: ☐ Yes ☐ No ☐ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable

Comments:

(11.1) NOTIFICATION

Exelon Notified: ☐ Yes ☐ No Individual Name: N/A Date:

SAMPLE IDENTIFICATION AND STORAGE

N/A

(12.2) Samples adequately identified: ☐ Yes ☐ No

(12.3) Samples stored at:

QC Signoff: [signature] Level: II Date: 10-26-10

QC Reviewed: W. Vance Robberson [signature] Level: II Date: 10-28-10

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-25-2010 Report No:

WO No(s).: R2139507 Tendon Anchorage No.: V-117 Tendon End: ☒ Shop ☐ Field

Location: (Tunnel) Gallery, Buttress: Elevation: N/A Bearing Plate I.D. Unable to locate

Bearing Plate I.D. Anchor Head I.D. 812 Bushing I.D. 581

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☒ As Found Exam ☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0016 Visual Aids: None

M&TE Used: Steel scale R-21 Cal. due 6-24-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-25-2010 Time: 0730

Special / Specific Instructions:

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
V-117 tendon anchorage components.	✓			No indications

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water (Quantify)	N.	Surface Discontinuities, Deflections		

Supplemental Information: ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Lance Robbins W. Lance Robbins LEVEL II DATE 10-25-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) ____________ DATE:

ANII REVIEW (as applicable) Joseph J Shelly DATE 11-4-10

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-26-10 Report No: N/A

WO No(s).: R 2139507 Tendon Anchorage No.: V-117 Tendon End: ☐ Shop ☒ Field

Location: Tunnel, Gallery, Buttress: Elevation: Tendon Gallery Bearing Plate I.D.: unable to locate

Bearing Plate I.D. N/A Anchor Head I.D. 739 Bushing I.D. N/A

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☒ As Found Exam ☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI-1-0016 Visual Aids: None

M&TE Used: Steel Rule R-22 Cal. Due 6-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-26-10 Time: 12:35 P.M.

Special / Specific Instructions: N/A

Component / Item Number and Description	RESULTS: NI	RESULTS: RI TYPE	RESULTS: IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
Anchorage Components for V-117 Bottom/Field.	✓			No Indications

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-26-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) [signature] DATE: 11-4-10

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-25-2010 Report No:

System: Containment Tendons Component: 2' Area of concrete around V-119 7 WRR 10-25-10 WO No(s).: R2139507

Location: Building: Containment Elev.: n/a Col.: n/a Row: n/a Azimuth/Radius: n/a

Exam Type: ☐ DV ☐ GV ☒ VT-1C ☐ VT-3C Type Of Exam: ☒ Direct ☐ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0016 Visual Aids: None

Surface: ID (OD) Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: None ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-25-2010 Time: 0730

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
2' Area of concrete around V-117. Shop/Top end	✓			No visable indications.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts , Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information : ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-25-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/26/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) Joseph S Skabby DATE: 11-4-10

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-26-10 Report No: N/A

System: Containment Tendons Component: 24" area of concrete around bearing plate. WO No(s).: R 2139507

Location: Building: Containment Elev.: Tendon Gallery Col.: N/A Row: N/A Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☒ VT-1C ☐ VT-3C Type Of Exam: ☒ Direct ☐ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0016 Visual Aids: None

Surface: ID (OD) Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: Steel Rule K-22 Cal due 6-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-26-10 Time: 12:25 P.M.

Special / Specific Instructions: N/A

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RESULTS RI TYPE	RESULTS IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Concrete area 24" around bearing plate. V-117 Bottom/Field	✓			No Indications

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts, Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information: ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-26-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/28/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

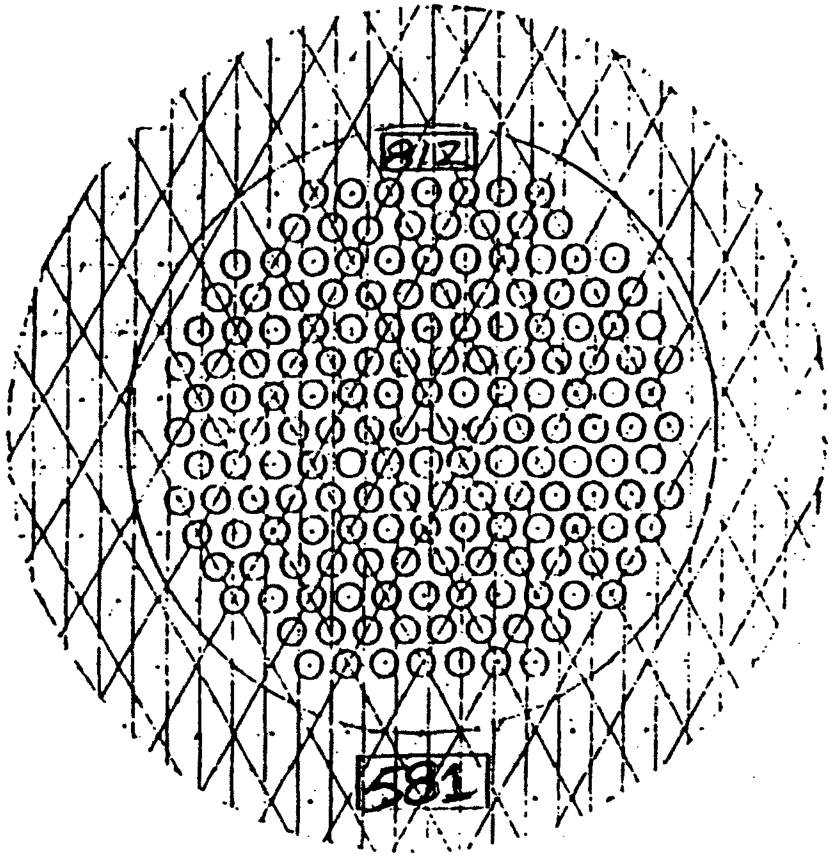
Additional Actions:
(Action Request, Work Order, Issue Report, etc initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) ____________ DATE: ____

ANII REVIEW (as applicable) Joseph [signature] DATE: 11-4-10

Page 1 of 1

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
AS Found Inspection



RB Tendon Surveillance

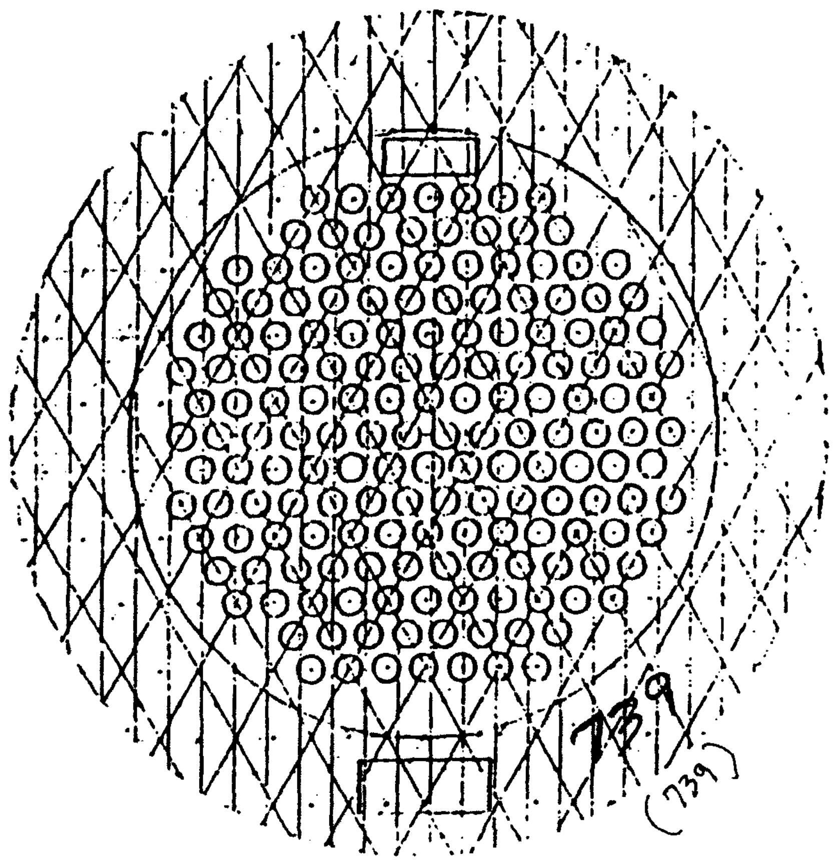
COMMENT: Shim stack ht. – 15.6"
(4, 4, 4, ½, 1, 2)
No corrosion
169 wires seated.

INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR W. Lance Robb... Date 10-25-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

INSPECTION PERIOD 35th yr AS

Tendon # V-117
END: FIELD_____(1 piece washer)
SHOP ✓ (2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
AS Found Inspection



RB Tendon Surveillance

COMMENT: Shim stack 4.1"
(4")
No corrosion

INSPECTED BY
CONTRACTOR FOREMAN__________ Date______
VERIIFIED BY
COGNIZANT QV INSPECTOR__________ Date 10-26-10
COGNIZANT MECH/STRUCT ENGINEER__________ Date 29 OCT 10
REVIEWED BY

INSPECTION PERIOD 35 Yr.
AS

Tendon # V-117
END: FIELD X (1 piece washer)
SHOP_____(2 piece washer)

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: V-117 Tendon End: Top ☒ Shop ☐ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☒ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☒ YES	☐ NO

COMMENTS
None

CREW FOREMAN SIGNOFF [signature] Date: 10-25-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: V-117 Tendon End: Bottom ☐ Shop ☒ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☒ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☒ YES	☐ NO

COMMENTS None

CREW FOREMAN SIGNOFF [signature] Date: 10-26-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35th YEAR TENDON SURVEILLANCE   Tendon No.: V-117

GREASE REPLACEMENT

QC SIGNOFFS

(8.4) Grease Used ☒ NEW ☐ OLD - TEST DATE: ☐ ACCEPTABLE ☐ APPROVAL LETTER DATED: — WRR 10-26-10

8.0 PREREQUISITES

(8.5) Total Grease Loss from Data Sheet 6.0 for Shop/Top tendon end:	3 gal.	WRR 10-26-10
(8.6) Total Grease Loss from Data Sheet 6.0 for Field/Gallery tendon end:	1 gal.	WRR 10-26-10
(8.7) Estimated grease losses from leaks for Shop/Top tendon end:	0 gal.	WRR 10-26-10
(8.8) Estimated grease losses from leaks for Field/Gallery tendon end:	0 gal.	WRR 10-26-10
(8.9) TOTAL Tendon Grease Loss:	4 gal.	WRR 10-26-10

13.0 POURING AND HAND PUMPING – FIRST END

(13.6) Ambient Temp.: 61 °F Thermometer ID: PK-102 Recal Date: 2-9-11

(13.7) Grease Temp.: 220 °F Thermometer ID: PK-102 Recal Date: 2-9-11

(13.9) Initial Grease Height (a) 18 in. (13.12) Final Grease Height (b) 14.5 in.

(13.14) Total amount of Grease added: 6.195 gal. (a – b) x 1.77 into the Shop/Top end

(13.16) Quantity of Waste Grease: 0 gal. (13.15) ☒ Poured ☐ Hand Pumped

(13.17) Total Grease Replaced this end: 6.195 gal. — WRR 10-26-10

13.0 HAND PUMPING – SECOND END

(13.6) Ambient Temp.: °F Thermometer ID: Recal Date:

(13.7) Grease Temp.: °F Thermometer ID: Recal Date:

(13.9) Initial Grease Height (a) in. (13.12) Final Grease Height (b) in.

(13.14) Total amount of Grease added: gal. (a – b) x 1.77 into the end

(13.16) Quantity of Waste Grease: gal. (13.15) ☐ Poured ☐ Hand Pumped

(13.17) Total Grease Replaced this end: gal. — WRR 10-26-10

14.0 CALCULATION OF PRESSURE PUMPING

(14.1) Total Tendon Grease Replaced: 6.195 gal. *(13.17 + 13.17)*

(14.2) Net Tendon Duct Grease Volume: 129.86 gal. *Refer to SQ 12.2 – GREASE VOLUMES, for the Tendon Net Duct Volume*

(14.3) Percent Difference: $\frac{\text{Total Tendon Replaced (14.1) - Total Tendon Loss (8.9)}}{\text{Net Tendon Duct Grease Volume (14.2)}} \times 100 =$ 1.69 % Difference — WRR 10-26-10

(14.4) Grease Leaks: ☐ Yes ☒ No — WRR 10-26-10

(14.5) Refill Acceptable: ☒ Yes *(less than 10%)* ☐ No *(greater than 10%)* — WRR 10-26-10

If No – Customer Notified NCR No.: N/A — WRR 10-26-10

(14.6) Comments: None

QC Reviewed: [signature] Level: II Date: 10-27-10

PSC

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒UNIT 1

(7.2) Tendon No.: V-118 Tendon End: Top ☒Shop ☐Field

Grease Cap Removal

	Q.C. Signoff
(7.5)Date Removal Started: 10-19-10	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐Yes ☒No	
(7.7) Temp. of Concrete: 78 °F Thermometer No.: ST-78 Re-Cal Date: 6-23-11	
Ambient Temp.: 68 °F Thermometer No.: PK-103 Re-Cal Date: 6-23-11	7.W. 10-19-10
(8.4) Anchorhead I.D. : 793/578 Bushing Anchorhead Verification: ☐Match ☒No-Match	7.W. 10-19-10

(8.5) Grease Coating

Grease Cap -	Complete	✓	Partial		Uncoated	%
Buttonheads -	Complete	✓	Partial		Uncoated	%
Anchorhead -	Complete	✓	Partial		Uncoated	%
Shims -	Complete	✓	Partial		Uncoated	%
Bearing Plate – [1]	Complete	✓	Partial		Uncoated	%

[1] - *Limited within the inside diameter of the grease cap.*

Q.C. Signoff: 7.W. 10-19-10

(8.6) Unusual Conditions: None — 7.W. 10-19-10

(8.7) Grease Color Match: ☒Yes ☐No Grease Color: Brown
Comments: None — 7.W. 10-19-10

(8.8) Quantity of Samples 2 Quart Samples identified per Step 8.8.1? ☒Yes ☐No
Location of Removal ☒A.H. ☐B.P. ☒Shims ☐Cap ☐Duct — 7.W. 10-19-10

	Q.C. Signoff
(8.9) Qty. of Grease lost during removal of cap: 0 gal.	7.W. 10-19-10
(8.9.1) Grease from cap to be reused? ☐Yes ☒No Qty. of Grease removed from cap: 2.5 gal.	7.W. 10-19-10
(9.6) Qty. of Grease removed from anchorage: 2.5 gal.	7.W. 10-19-10
(9.7) Damage during cap removal or anchorage cleaning? ☐Yes ☒No Describe: N/A	7.W. 10-19-10
(10.3) Method of Tendon Protection: ~~Install can with old gasket. 7.W. 10-19-10~~ Reinstall can with new gasket.	7.W. 10-27-10
(10.4) Amount of Grease Loss from Tendon duct: 0 gal.	7.W. 10-19-10

(10.5) Total quantity of lost grease (below):
(8.8) .5 + (8.9) 0 + (8.9.1) 2.5 + (9.6) 2.5 + (10.4) 0 = 5.5 TOTAL — 7.W. 10-19-10

(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒Yes ☐No — 7.W. 10-19-10

QC Reviewed: W. Vance Roble Level: II Date: 10-27-2010

PSC PROCEDURE SQ 6.0
GREASE CAP REMOVAL
Data Sheet 6.0
July 31, 2009
Page1 of 1
Revision 0

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(7.2) Tendon No.: V-118 Tendon End: Bottom ☐ Shop ☒ Field

Grease Cap Removal

	Q.C. Signoff
(7.5) Date Removal Started: 10-19-10	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 84 °F Thermometer No.: ST-78 Re-Cal Date: 6-23-11	
Ambient Temp.: 82 °F Thermometer No.: PK-103 Re-Cal Date: 6-23-11	TCS 10-19-10
(8.4) Anchorhead I.D.: 597 Anchorhead Verification: ☒ Match ☐ No-Match	TCS 10-19-10

(8.5) Grease Coating

	Complete	Partial	Uncoated
Grease Cap -	✓		%
Buttonheads -	✓		%
Anchorhead -	✓		%
Shims -	✓		%
Bearing Plate – (1)	✓		%

Q.C. Signoff: TCS 10-19-10

(1) - *Limited within the inside diameter of the grease cap.*

(8.6) Unusual Conditions: None — TCS 10-19-10

(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Red. Brown
Comments: None — TCS 10-19-10

(8.8) Quantity of Samples 2 Quart Samples Identified per Step 8.8.1? ☒ Yes ☐ No
Location of Removal ☒ A.H. ☐ B.P. ☒ Shims ☐ Cap ☐ Duct — TCS 10-19-10

(8.9) Qty. of Grease lost during removal of cap: 0 gal. — TCS 10-19-10
(8.9.1) Grease from cap to be reused? ☒ Yes ☐ No Qty. of Grease removed from cap: .5 gal. — TCS 10-19-10
(9.6) Qty. of Grease removed from anchorage: .5 gal. — TCS 10-19-10
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: N/A — TCS 10-19-10

(10.3) Method of Tendon Protection: ~~Install can with old Gasket TCS 10-19-10~~ Install can with New Gasket — TCS 10-27-10

(10.4) Amount of Grease Loss from Tendon duct: 4.5 gal. — TCS 10-19-10

(10.5) Total quantity of lost grease (below):
(8.8) .5 + (8.9) 0 + (8.9.1) .5 + (9.6) .5 + (10.4) 4.5 = 6 TOTAL — TCS 10-19-10
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒ Yes ☐ No — TCS 10-19-10

QC Reviewed: W. Vance Robbins Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: V-118 Tendon End: Top ☒ Shop ☐ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments:

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.9.1) DURING DETENSIONING

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(11.1) NOTIFICATION

Exelon Notified: ☐ Yes ☐ No Individual Name: N/A Date:

SAMPLE IDENTIFICATION AND STORAGE

(12.2) Samples adequately identified: ☐ Yes ☐ No N/A

(12.3) Samples stored at:

QC Signoff: [signature] Level: II Date: 10-22-10

QC Reviewed: W. Vance Robles Level: II Date: 10-27-10

PSC PROCEDURE SQ 6.1
INSPECT FOR WATER
Data Sheet 6.1
July 31, 2009
Page 1 of 1
Revision 0

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: V-118 Tendon End: Bottom ☐ Shop ☒ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A
Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable
Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A
Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable
Comments: None

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A
Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable
Comments: None

(9.9.1) DURING DETENSIONING

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A
Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable
Comments: None

(11.1) NOTIFICATION

Exelon Notified: ☐ Yes ☐ No Individual Name: N/A Date:

SAMPLE IDENTIFICATION AND STORAGE

(12.2) Samples adequately identified: ☐ Yes ☐ No N/A
(12.3) Samples stored at:

QC Signoff: [signature] Level: II Date: 10-19-10
QC Reviewed: W. Vance Cobb [signature] Level: II Date: 10-28-10

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage
Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI	Unit: 1	Date: 10-19-2010	Report No: N/A
WO No(s).: R2139507	Tendon Anchorage No.: V-118	Tendon End: ☒ Shop ☐ Field	
Location: (Tunnel) Gallery, Buttress:	Elevation: 456'-2"	Bearing Plate I.D.: unable to locate.	
Bearing Plate I.D. Unable to locate	Anchor Head I.D. 793	Bushing I.D. 578	
Exam Type: ☐ DV ☒ VT-1	Type Of Exam: ☒ Direct ☐ Remote		
☒ As Found Exam	☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned		
Design Drawing(s) TMI 1-0016	Visual Aids: None		
M&TE Used: Steel Rule R-22 Cal Due 2-14-11 ☒ Test Card	UTC or Serial No. N/A	Cal. Due Date: N/A	
Illumination Used Spot Light	Illumination Verified:	Date: 10-19-10	Time: 12:30 PM
Special / Specific Instructions:			

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
V-118 Tendon Anchorage Shop/Top end.		C	O	2 protruding wires. Both protruding .100". See enclosure 6 Data sheet 4. These wires appear to be slighty oversized.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Missing Wires	H. Cracks	O. Other (Explain)
B. Missing Button Heads	I. Pitting	
C. Protruding / Unseated Wires	J. Nicks, Gouges, Mechanical Damage	
D. Broken Wires	K. Uneven Shim Stack	
E. Active Corrosion	L. Excessive Shim Gaps	
F. Other Corrosion	M. Gasket Seating Surface Damage	
G. Evidence Of Free Water (Quantify)	N. Surface Discontinuities, Deflections	

Supplemental Information : ☒ Yes ☐ No ☒ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature]	LEVEL II	DATE 10-19-10
STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature]		DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☒ Yes ☐ No ~~NO RI~~ 04 NOV 10
Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) [signature] (Howard Hill)	DATE: 29 Oct 10
ANII REVIEW (as applicable) [signature] Joseph A Stubbs	DATE: 11-4-10

Page 1 of 1

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-19-10 Report No: N/A

WO No(s).: R2139507 Tendon Anchorage No.: V-118 Tendon End: ☐ Shop ☒ Field

Location: Tunnel (Gallery) Buttress: Elevation: Tendon Gallery Bearing Plate I.D.: unable to locate

Bearing Plate I.D. Unable to locate Anchor Head I.D. 597 Bushing I.D. N/A

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☒ As Found Exam ☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0016 Visual Aids: None

M&TE Used: Steel Rule R-22 cal due 6-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-19-10 Time: 8:00 AM

Special / Specific Instructions: N/A

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
Tendon anchorage on V-118 Bottom/Field End	✓			No indications, No corrosion.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-19-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) [signature] Joseph Shelly DATE: 11-4-10

Page 1 of 1

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-26-2010 Report No:

WO No(s).: R2139507 | Tendon Anchorage No.: V-118 | Tendon End: ☒ Shop ☐ Field

Location: Tunnel Gallery, Buttress: Elevation: Bearing Plate I.D. Unable to locate

Bearing Plate I.D. Anchor Head I.D. 793 Bushing I.D. 578

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☐ As Found Exam ☒ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0016 Visual Aids: None

M&TE Used: Steel scale R-21 cal due 2-24-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-26-2010 Time: 1300

Special / Specific Instructions:

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
V-118 tendon anchorage components at top/shop end.			A	3 missing wires-1 removed for testing 2 noted as protruding in as found exam were found to be broken when tendon was detensioned. They have been removed.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-26-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No No RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) (Howard Hill) DATE: 29 OCT 10

ANII REVIEW (as applicable) Joseph A. [signature] DATE: 11-4-10

Page 1 of 1

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI	Unit: 1	Date: 10-26-10	Report No: N/A
WO No(s).: R 2139507	Tendon Anchorage No.: V-118	Tendon End: ☐ Shop ☒ Field	
Location: Tunnel (Gallery) Buttress:	Elevation: Tendon Gallery	Bearing Plate I.D.: unable to locate	
Bearing Plate I.D. N/A	Anchor Head I.D. 597	Bushing I.D. N/A	
Exam Type: ☐ DV ☒ VT-1		Type Of Exam: ☒ Direct ☐ Remote	
☐ As Found Exam	☒ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned		
Design Drawing(s) TMI-0016	Visual Aids: None		
M&TE Used: Steel Rule R-22 Cal Due 6-28-11 ☒ Test Card	UTC or Serial No. N/A	Cal. Due Date: N/A	
Illumination Used Flashlight	Illumination Verified:	Date: 10-26-10	Time: 12:35 P.M.
Special / Specific Instructions: N/A			

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
Anchorage components for V-118 Bottom/Field Post Retension.		~~D~~ ~~A~~ C (Initialed 10-26-10)	D	2-broken wires removed for testing. 10-24-10, 10-26-10
			A	1-wire pulled during surveillance for testing. 10-26-10
			C	1-Protruding wire .060".

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information: ☒ Yes ☐ No ☒ ~~Sketch~~ ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-26-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) ______ DATE: ______

ANII REVIEW (as applicable) Joseph A. Hubly [signature] DATE: 11-4-10

Page 1 of 1

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-27-2010 Report No:

WO No(s).: RZ139507 | Tendon Anchorage No.: V-118 | Tendon End: ☒ Shop ☐ Field

Location: (Tunnel) Gallery, Buttress: Elevation: Bearing Plate I.D.: Unable to locate

Bearing Plate I.D. Anchor Head I.D. 793 Bushing I.D. 578

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☐ As Found Exam ☒ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0016 Visual Aids: None

M&TE Used: Steel scale R-21 Cal. due 12-24-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flash light Illumination Verified: Date: 10-27-2010 Time 0745

Special / Specific Instructions:

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
V-118 tendon anchorage components at shop/top end.			A	3 missing wires - 1 removed for testing 2 noted as protruding in as found exam were found to be broken when tendon was detensioned. They have been removed. For location see enclosure to data sheet 4.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Missing Wires	H. Cracks	O. Other (Explain)
B. Missing Button Heads	I. Pitting	
C. Protruding / Unseated Wires	J. Nicks, Gouges, Mechanical Damage	
D. Broken Wires	K. Uneven Shim Stack	
E. Active Corrosion	L. Excessive Shim Gaps	
F. Other Corrosion	M. Gasket Seating Surface Damage	
G. Evidence Of Free Water **(Quantify)**	N. Surface Discontinuities, Deflections	

Supplemental Information : ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-27-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) Joseph A Melby DATE: 11-4-10

Page 1 of 1

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-27-10 Report No: N/A

WO No(s).: R2139507 Tendon Anchorage No.: V-118 Tendon End: ☐ Shop ☒ Field

Location: Tunnel, Gallery, Buttress: Elevation: Tendon Gallery Bearing Plate I.D.: unable to locate

Bearing Plate I.D. N/A Anchor Head I.D. 597 Bushing I.D. N/A

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☐ As Found Exam ☒ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0016 Visual Aids: None

M&TE Used: Steel Rule Cal. Due 8-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-27-10 Time: 8:00 AM

Special / Specific Instructions: N/A

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
Tendon Anchorage on V-118 Bottom / Field			D	2-Broken Wires Pulled for Testing. (10-24-10) (10-26-10)
			A	1-Wire Pulled During Surveillance For Testing. 10-26-10
				All 166 Wires Are Seated.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water (Quantify)	N.	Surface Discontinuities, Deflections		

Supplemental Information: ☒ Yes ~~☒ No~~ TCG 10-27-10 ☒ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-27-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) ______ DATE: ______

ANII REVIEW (as applicable) Joseph S Shelby [signature] DATE: 11-4-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-19-10 Report No: N/A

System: Containment Tendons Component: Concrete 24" around anchor plate V-118 WO No(s).: R 2139507

Location: Building: Containment Elev.: 456'-2" Col.: N/A Row: N/A Azimuth/Radius:

Exam Type: ☐ DV ☐ GV ☒ VT-1C ☐ VT-3C Type Of Exam: ☒ Direct ☐ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0016 Visual Aids: None

Surface: ID (OD) Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: steel Rule Ref. Cal. Due 6-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Spot light Illumination Verified: Date: 10-19-10 Time: 12:10 PM

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
V-118 Area 24" around anchore plate. Shop / Top end.	✓			No indications.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)
B. Exposed Reinforcing Steel
C. Exposed Metallic Items (Other)
D. Evidence Of Grease Leakage
E. Evidence Of Moisture
F. Leaching Or Chemical Attack
G. Settlements Or Deflections
H. Degraded Patches or Repairs
I. Popouts, Voids, Honeycomb
J. Spalls
K. Cold Joint Lines
L. Corrosion Staining
M. Scaling / Dusting
N. Coating Deterioration
O. Abrasion, Cavitation, Wear
P. Air Voids / Bug Holes
Q. Efflorescence
R. Other (Explain)

Supplemental Information: ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-19-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No No RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) [signature] (Howard Hill) DATE: 29 OCT 10

ANII REVIEW (as applicable) Joseph [signature] DATE: 11-4-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-19-10 Report No: N/A

System: Containment Tendons Component: Concrete 24" around anchor plate V-118 WO No(s).: R 2139507

Location: Building: Containment Elev.: Gallery Col.: N/A Row: N/A Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☒ VT-1C ☒ VT-3C Type Of Exam: ☒ Direct ☐ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0016 Visual Aids: None

Surface: ID OD Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: Steel Rule R-226-2817 ☐ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-19-10 Time: 8:00 A.M.

Special / Specific Instructions: N/A

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Concrete Area 24" around anchor plate V-118 Field end.	✓			NO Indications

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)	G. Settlements Or Deflections	M. Scaling / Dusting
B. Exposed Reinforcing Steel	H. Degraded Patches or Repairs	N. Coating Deterioration
C. Exposed Metallic Items (Other)	I. Popouts, Voids, Honeycomb	O. Abrasion, Cavitation, Wear
D. Evidence Of Grease Leakage	J. Spalls	P. Air Voids / Bug Holes
E. Evidence Of Moisture	K. Cold Joint Lines	Q. Efflorescence
F. Leaching Or Chemical Attack	L. Corrosion Staining	R. Other (Explain)

Supplemental Information: ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy Gibson [signature] LEVEL II DATE 10-19-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/20/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

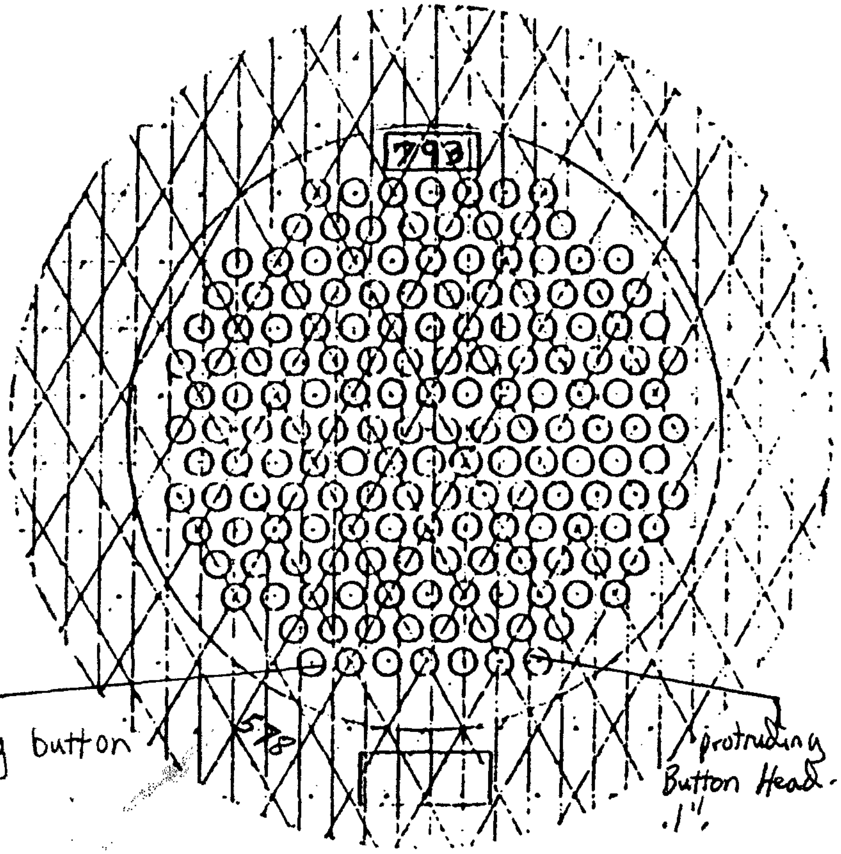
LEVEL III or RE REVIEW (as applicable) ____ DATE: ____

ANII REVIEW (as applicable) Joseph [signature] DATE: 12-1-10

Page 1 of 1

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection

AS Found Inspection



protruding button head .1"

protruding Button Head .1"

RB Tendon Surveillance

COMMENT: Shim Stack Hieght - 16.3"
(4,4,4,1,1,2)

No noted corrosion.

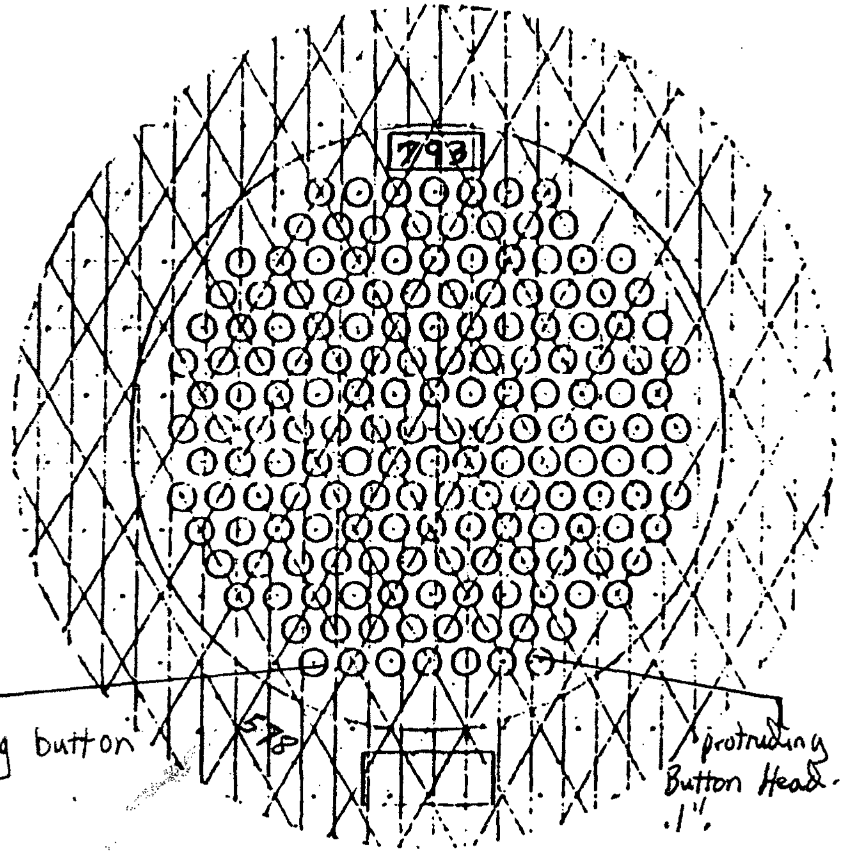
INSPECTED BY
CONTRACTOR FOREMAN__________ Date______
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Level II Date 10-19-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

INSPECTION PERIOD 35th.

Tendon # V-118
END: FIELD_____(1 piece washer)
SHOP X (2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection

AS Found Inspection



protruding button head .1"

protruding Button Head .1"

RB Tendon Surveillance

COMMENT: Shim Stack Hieght - 16.3"
(4,4,4,1,1,2)

No noted corrosion.

INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Level II Date 10-19-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

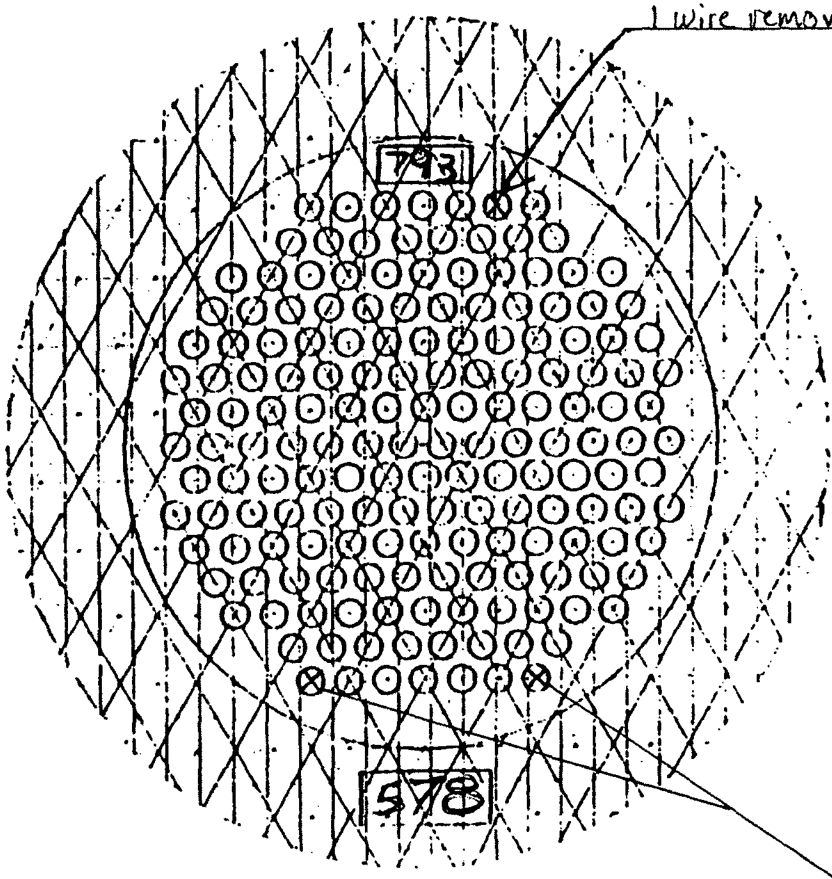
INSPECTION PERIOD 35 Yr.

Tendon # V-118
END: FIELD_____(1 piece washer)
SHOP X (2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection

As left post retensioning

1 wire removed for testing 10-26-2010



RB Tendon Surveillance

COMMENT: Shim stack ht. 17.5"
(4, 4, 4, 2, 1, 1/4, 1/2, 1/2, 1)
166 effictive wires.

INSPECTED BY
CONTRACTOR FOREMAN________________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR W. [signature] Date 10-26-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

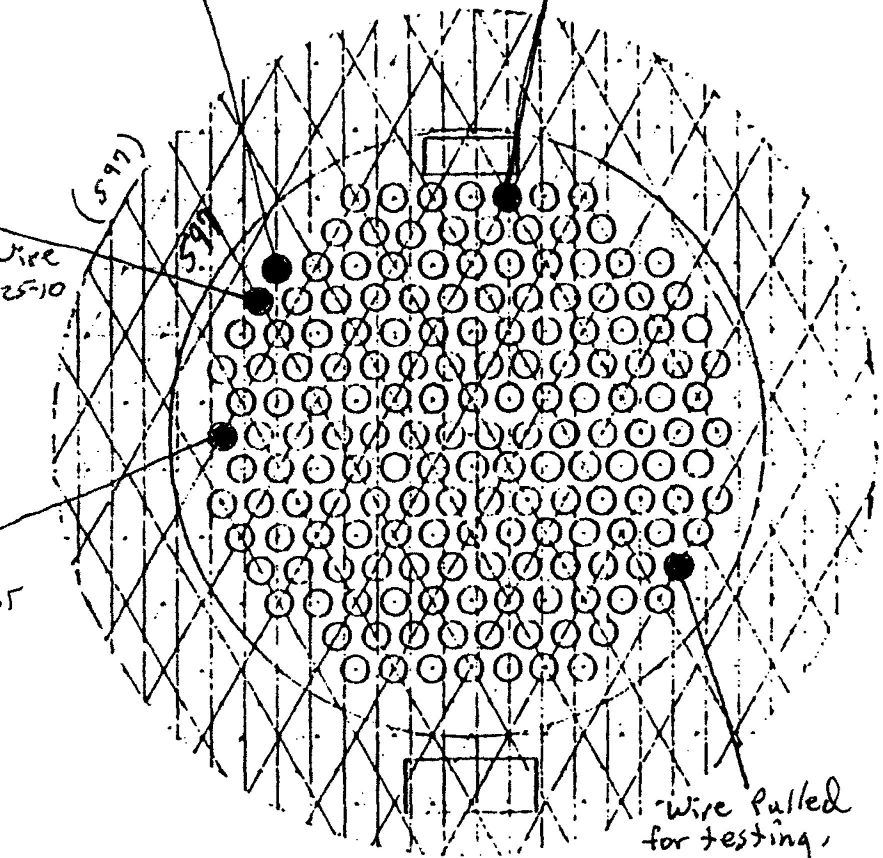
2 Wires found to be broken after detensioning removed and turned over to the Client.

INSPECTION PERIOD 35th yr. AS
Tendon # V-118
END: FIELD_____(1 piece washer)
SHOP ✓ (2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
Post Retension

Broken Wire Pulled
10-26-10

Protruding wire .060"



roken wire
lled 10-25-10

MI Test
wire.

Wire Pulled
for testing,
10-26-10

RB Tendon Surveillance

COMMENT: Shim Stack Hieght - 4.1"
(4")

No Corrosion.

INSPECTED BY
CONTRACTOR FOREMAN______________ Date______
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-26-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

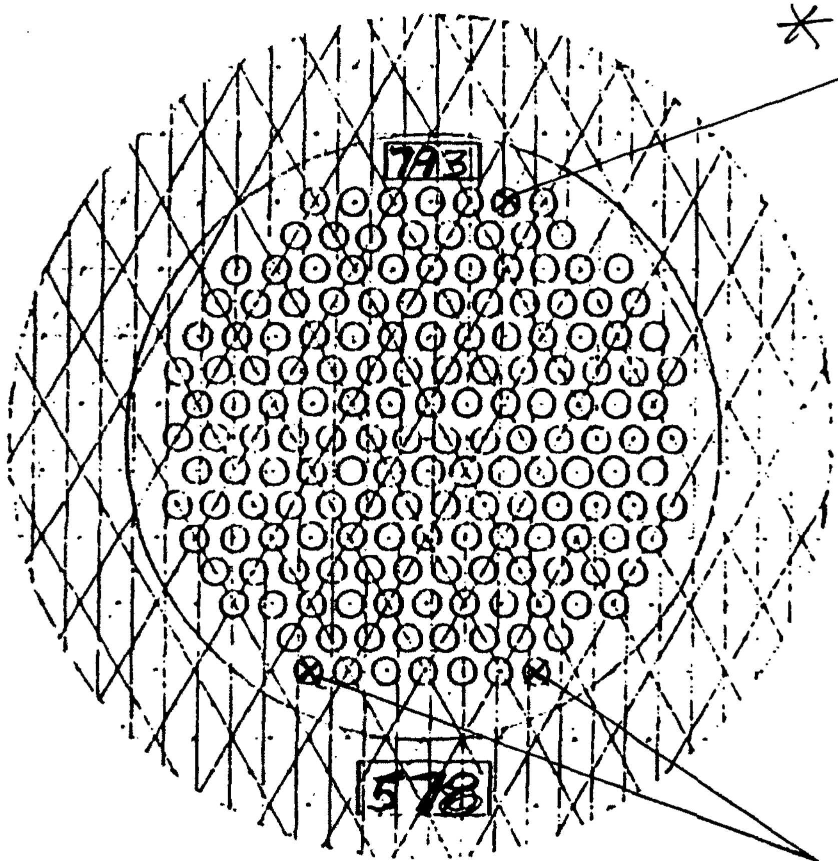
INSPECTION PERIOD 35th
AS

Tendon # V-18
END: FIELD X (1 piece washer)
SHOP______(2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection

AS left post retension

* 1 wire removed for testing 10-26-2010



RB Tendon Surveillance

COMMENT: Shim stack ht. - 16.1"
(4, 4, 4, 1, 1/4, 1/2, 1/2, 1/2, 1/8, 1)
166 wires seated

* This is the second re-tension. The shim stack WAS to tall after the first.

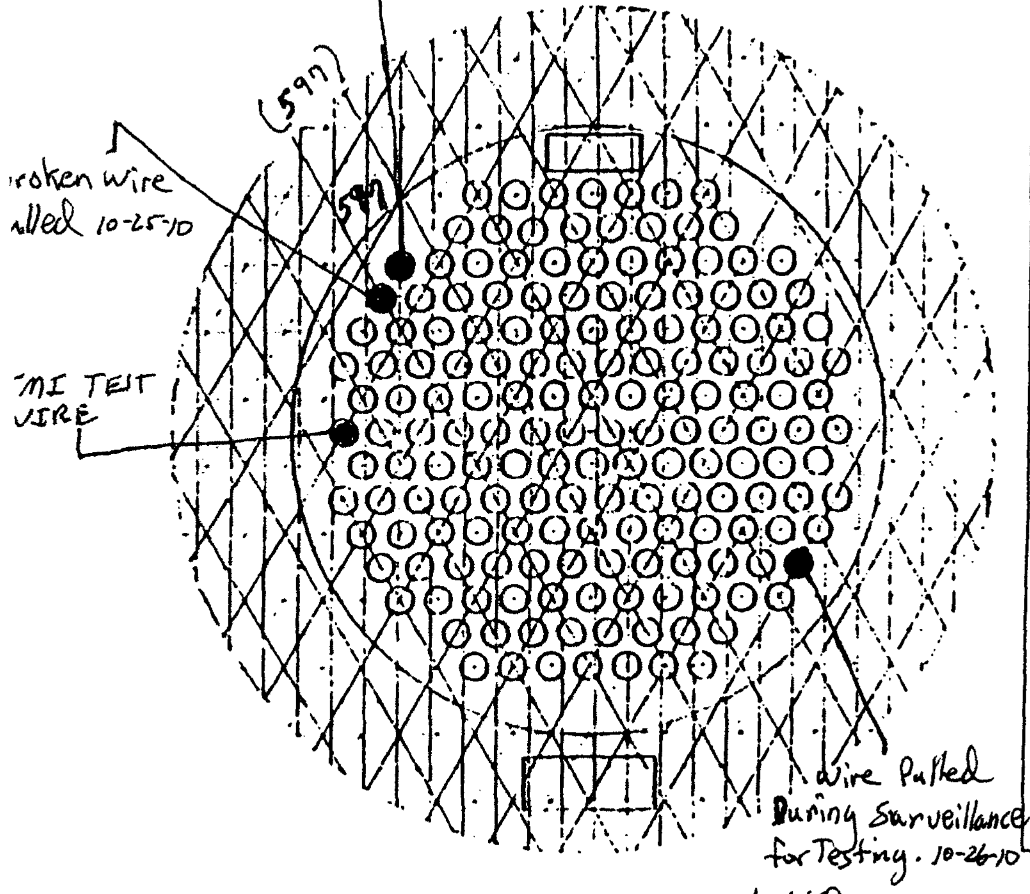
INSPECTED BY
CONTRACTOR FOREMAN ________ Date ________
VERIIFIED BY
COGNIZANT QV INSPECTOR W. Rance Robb Date 10-27-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 OCT 10
REVIEWED BY

2 wires found to be broken after detensioning removed and turned over to the client.

INSPECTION PERIOD 35th yr. AS

Tendon # V-118
END: FIELD ______ (1 piece washer)
SHOP ✓ (2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
* Post Retension Inspection



RB Tendon Surveillance

COMMENT: Shim Stack Hieght 6.1".
(4", 2")

No Corrosion.
All 166 wires are seated.
*2nd detension and retension due to shimstack being to tall for top grease can.

INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-27-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

INSPECTION PERIOD 35 Yr.
AS

Tendon # V-118
END: FIELD X (1 piece washer)
SHOP______(2 piece washer)

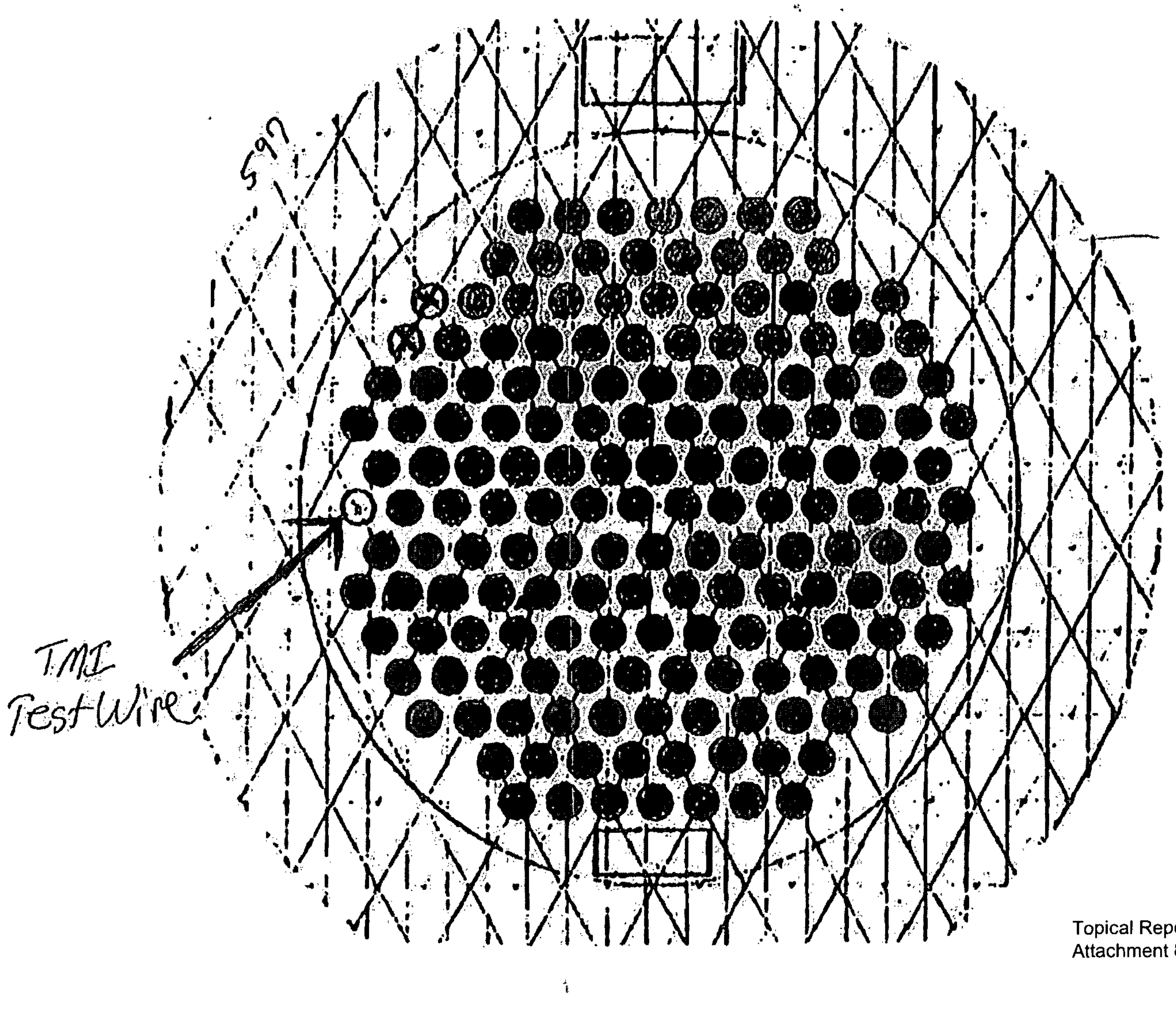
TMI-1 2010 Augmented Tendon Surveillance
Wire Continuity Test Data Sheet 1 of 2
(Use for Verifying Continuity of Vertical Wires by Pulling at the Bottom End)

Tendon Number V-118 / Date 10-25-2010 / Signature [signature]

Dynamometer ID No. 000288915 / Cal due Date 11-09-2010 / Accuracy MFR. Specs.

Data Sheet 1 Instructions:

1. Connect pulling device with in-line dynamometer to each wire in sequence.
2. Increase pulling force until dynamometer indicates between 5,500 and 6,000 lb. DO NOT EXCEED A PULLING FORCE OF 6,000 LB.
3. If pulling force will not reach 5,500 lb, wire is broken. Remove in one piece and store against inside wall of the tendon gallery. Record on Data Sheet 2 the maximum pulling force applied to the removed wire.
4. If continuity is verified, blacken the appropriate circle in the anchor head sketch below.
5. If wire is broken and removed, mark the appropriate circle with an 'X '.
6. If wire is removed for a surveillance test sample, mark the appropriate circle with a single slash.
7. Identify the short test wire with an arrow pointing to the appropriate circle.



TMI-1 2010 Augmented Tendon Surveillance
Wire Continuity Test Data Sheet 2 of 2
(Use for Verifying Continuity of Vertical Wires by Pulling at the Bottom End)

Tendon Number V-118 / Date 10-25-10 / Signature [signature]

Dynamometer ID No. 0002789/5 / Cal due Date 11-09-2010 / Accuracy AFRS. SPBCS.

Data Sheet 2 Instructions:

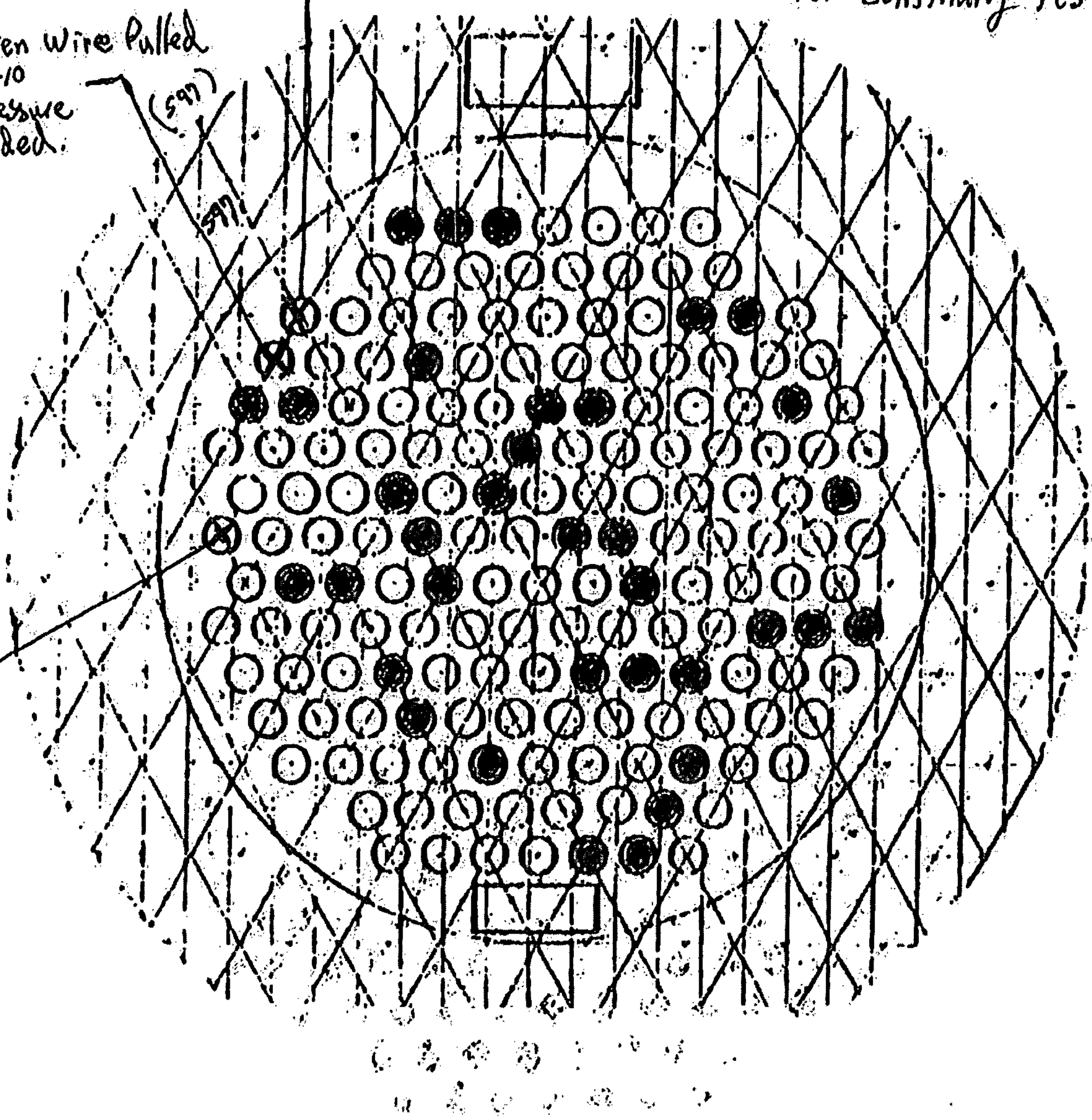
1. On the diagram below, identify each removed wire by marking the appropriate circle with an 'X'.
2. For each wire removed, record the maximum applied pulling force adjacent to the anchor head diagram. Draw an arrow from the recorded force to the appropriate marked circle.

Broken Wire Pulled 10-25-10
100PSI Max.

● = wires pulled from top for continuity tes.

Broken Wire Pulled
10-24-10
No Pressure
Recorded.

(597)



TMI
est wire.

Project: TMI – 35th YEAR TENDON SURVEILLANCE

Tendon No.: V-118 Tendon End/Buttress No.: Top

Anchorage ID.: 793 / 578 Adaptor ID: 02

EQUIPMENT	MICROMETER		WIRE		SHIMS	
Thread	Mic ID	Recal Date	ID No.	Recal Date	ID No.	Recal Date
Ext. Major	QC 52	4-5-11				
Ext. Pitch	QC 52	4-5-11	Set 5	6-25-11	Sur 1	12-25-10
Ext. Minor	QC 52	4-5-11	Dark Red / Blue	12-25-10	Sur 3	12-25-10
Int. Major	N/A	N/A				
Int. Minor	N/A	N/A				

MEASUREMENTS		THREAD			Average	Wire Constant	Wire Diameter	Shim Size	Average Diameter
Thread	Read	3rd	6th	9th					
Ext. Major	1	9.373	9.372	9.372					9.372
	2	9.372	9.373	9.372					
Ext. Pitch (1)	1	9.540		9.539	~~9.517~~ 9.540	.254		.032	~~9.231~~ 9.254
	2	9.538		9.539					
Ext. Minor (2)	1	9.458		9.457	9.456		(.120) .240	.032	9.184
	2	9.453		9.457					
Int. Major	1	N/A		N/A					
	2	N/A		N/A					
Int. Minor	1	N/A	N/A	N/A					
	2	N/A	N/A	N/A					

Int.	Go Gauge ID:	N/A	Recal Date:	N/A	Result:	N/A
Pitch	No-Go Gauge ID:	N/A	Recal Date:	N/A	Result:	N/A

Notes: (1) External Pitch Diameter = [Average] – [Wire Constant] – [Shim Size]
(2) External Minor Diameter = [Average] – [2 X Wire Diameter] – [Shim Size]

DISPOSITION

	Trial 1	Trial 2	Trial 3	Trial 4
Adaptor Mark	02			
Min. Minor Diameter from Adaptor Table	8.682			
Acceptable? (Yes or No)	Yes			

QC Signoff: [signature] Level: II Date: 10-19-10

QC Reviewed: W. [signature] Level: II Date: 10-27-10

Surveillance No. 35th Yr. Tendon ID V-118 Predicted Force (F_p) 1340 kip Tendon End (Circle One): Shop / Field

Phase (Circle One) As-found / Re-Tension Ram ID 9400 Ram Calibration Constants: A = 235.787 k = -6.961

Date 10-19-10 Temp: RB Interior 109 °F / Concrete Surface 78 °F No. Effective Wires, N_w ~~169~~ 167 1-12-11 Shim Stack Ht. 16.3" in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF $[(1{,}592 \times N_w / 169) - k] \times 1{,}000 / A$ = 6781.37 psig

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p'[1] psig[1,2]
1	5820	N/A	N/A
2	5820	N/A	N/A
3	5820	0	5820
4			
5			
6			
7			
8			
9			
10			

Stressing Washer Rotation

	Rotation, Turns CW or CCW
At Feeler Gage Insertion	
At Trial 1	0
At Trial 2	0
At Trial 3	0
At Trial 4	
At Trial 5	
At Trial 6	
At Trial 7	
Sum	0

End Lift-Off Force = (A x P' / 1,000) = k = 1365.31 kip

For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead

N/A in.

[1] N/A if 3 trial pressure spread > 25,000 / A = 106.02 psi

[2] Re-tension P' range: $P'_{min} = (F_p - k) \times 1{,}000 / A$ = N/A psig < P' < $P'_{max} = [(1{,}394 \times N_w / 169) - k] \times 1{,}000 / A$ = N/A psig

For Re-Tension Only: F_p < End Lift-Off Force < $1394 \times N_w / 169$; N/A < N/A < N/A **Yes / No (Circle One)**

Notes: None

Recorded by: Signature [signature] Date 10-19-10 / Reviewed by: Signature W. Lance Potter QV Date 10-27-10

DATA SHEET 1
Lift-Off Force Measurement

Surveillance No. 35th yr. Tendon ID V-118 Predicted Force (F_p) 1340 kip Tendon End (Circle One): Shop / Field

Phase (Circle One): As-found / Re-Tension Ram ID 9400 Ram Calibration Constants: A = 235.787 k = -6.961

Date 10-27-2010 Temp: RB Interior 115 °F / Concrete Surface 69 °F No. Effective Wires, N_w 166 Shim Stack Ht. 16.1 in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF $[(1.592 \times N_w / 169) - k] \times 1{,}000 / A$ = 6661.52 psig

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p[1] psig[1,2]
1	5720	N/A	N/A
2	5720	N/A	N/A
3	5720	0	5720
4			
5			
6			
7			
8			
9			
10			

Stressing Washer Rotation

At Feeler Gage Insertion	Rotation, Turns CW or CCW
At Trial 1	0
At Trial 2	0
At Trial 3	0
At Trial 4	
At Trial 5	
At Trial 6	
At Trial 7	
Sum	0

End Lift-Off Force = (A x P' / 1,000) = k = 1341.74 kip

For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead

1	in.
1/8	"
1/2	"
1/2	"
1/2	"
1/4	"
1	"
4	"
4	"
4	"

[1] N/A if 3 trial pressure spread > 25,000 / A = 106.02 psi

[2] Re-tension P' range: $P'_{min} = (F_p - k) \times 1{,}000 / A$ = 5712.61 psig < P' < $P'_{max} = [(1{,}394 \times N_w / 169) - k] \times 1{,}000 / A$ = 5836.68 psig

For Re-Tension Only: F_p < End Lift-Off Force < $1394 \times N_w / 169$; 1340 < 1341.74 < 1369.25 Yes / No (Circle One)

Notes: None

Recorded by: Signature W. Pamca Robl... Date 10-27-10 / Reviewed by: Signature [signature] QV Date 10-27-10

DATA SHEET 1
Lift-Off Force Measurement

1301-9.1
Revision 21

Surveillance No. 35th yr. Tendon ID V-118 Predicted Force (F_p) 1340 kip Tendon End (Circle One): Shop / Field

Phase (Circle One): As-found / Re-Tension Ram ID 9400 Ram Calibration Constants: A = 235.787 k = -6.961

Date 10-26-10 Temp: RB Interior 114 °F / Concrete Surface 60 °F No. Effective Wires, N_w 166 Shim Stack Ht. 17.5 in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF $[(1{,}592 \times N_w / 169) - k] \times 1{,}000 / A$ = 6661.40 psig

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p'[1] psig[1,2]
1	5780	N/A	N/A
2	5780	N/A	N/A
3	5780	0	5780
4			
5			
6			
7			
8			
9			
10			

Stressing Washer Rotation

	Rotation, Turns CW or CCW
At Feeler Gage Insertion	
At Trial 1	0
At Trial 2	0
At Trial 3	0
At Trial 4	
At Trial 5	
At Trial 6	
At Trial 7	
Sum	0

End Lift-Off Force = (A x P' / 1,000) = k = 1355.88 kip

For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead

1 in.
1/2 "
1/2 "
1/4 "
1 "
2 "
4 "
4 "
4 "

[1] N/A if 3 trial pressure spread > 25,000 / A = 106.02 psi

[2] Re-tension P' range: $P'_{min} = (F_p - k) \times 1{,}000 / A$ = 5712.61 psig < P' < $P'_{max} = [(1{,}394 \times N_w / 169) - k] \times 1{,}000 / A$ = 5830.69 psig

For Re-Tension Only: F_p < End Lift-Off Force < 1394 x N_w / 169: 1340 < 1355.88 < 1369.25 **Yes / No (Circle One)**

Notes: None

Recorded by: Signature W. Bruce Robb Date 10-27-10 / Reviewed by: Signature [signature] QV Date 10-27-10

PSC PROCEDURE SQ10.2
TEST WIRE REMOVAL
Data Sheet 10.2
July 31, 2009
Page 1 of 1
Revision 0

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

Tendon No.: V-118 Tendon End: Top ☒ Shop ☐ Field

Removal Date: 10-26-10 Inspection Date: 10-26-10

WIRE REMOVAL INSPECTION

CORROSION INSPECTION @ LENGTH INTERVALS

(8.5.4.1.1) Document the Corrosion Category for each 10' of wire in the increments below. Use Categories described in PSC SQ 8.0.

For Corrosion Level E document condition on an NCR. NCR Req'd: ☒ NO ☐ YES NCR# N/A

(8.5.4.3.1) Document the total length of the wire on the diagram below: Completed: ☐ NO ☒ YES

Buttonhead End

Sample 1

0' 10' 20' 30'

30' 40' 50' 60'

60' 70' 80' 90'

Sample 2

90' 100' 110' 120'

120' 130' 140' 150'

Sample 3

150' 160' 170' 180'

180' 190' 200' 210'

+5' 1" end = 185' 1" total length

210' 220' 230' 240'

240' 250' 260' 270'

270' 280' 290' 300'

300' 310' 320' 330'

Cut End

(8.5.4.6.2) Was the wire cut for samples: ☐ NO ☒ YES document the area of removal above using symbol X.

(8.7) Document the location of wire removed on Data Sheet 8.0, ANCHORAGE INSPECTION: ☒ Completed

(8.8) Measuring Device: R-21 Steel Rule ID Number: R-21 Recal Date: 6-24-11

(8.8) Wire Pull Ram ID Number: N/A

Q.C. Inspector: W. Pence Pebb[illegible]	Level: II	Date:	10-26-2010
QC Reviewed	Level: II	Date:	10-27-2010

DATA SHEET 4

Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID V-118

Surveillance No. 35th yr.

Part 1
Original Stressing Data

NOTE

PTF force is that equivalent to a ram pressure of 1,000 psi. PTF removes tendon slack and is the starting point for elongation measurements. OSF force is 80% (may be less) of tendon ultimate strength. The tendon is loaded to OSF in order to provide the required force distribution. It is also the force at which final elongation is measured. PTF force / elongation, OSF force / elongation and number of effective wires are documented in construction records.

Table 1

Row, R	Parameter	Value	
1	Shop End PTF Force	199.2	kip
2	Field end PTF force	N/A	kip
3	Mean PTF Force = (R1 + R2) / 2	199.2	kip
4	Shop End PTF Reference Distance	3.8	in.
5	Field End PTF Reference Distance	N/A	in.
6	Net PTF Reference Distance = R4 + R5	3.8	in.
7	Shop End OSF Force	1581.9	kip
8	Field end OSF force	N/A	kip
9	Mean OSF Force = (R7 + R8) / 2	1581.9	kip
10	Shop End OSF Reference Distance	17.8	in.
11	Field End OSF Reference Distance	N/A	in.
12	Net OSF Reference Distance = R10 + R11	17.8	in.
13	Differential Force = R9 – R3	1382.7	kip
14	Differential Elongation = R12 – R6	14	in.
15	Number of Effective Wires	169	
16	Elongation Rate = R14 x R15 / R13	1.71	

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID V-118

Surveillance No. 35th yr.

Part 2

Shop End Re-Tensioning Data

Ram ID 9400 Ram Area, A 235.787 in^2 Ram k ~6.961 kip

NOTE

The number of effective wires entered in R1 must be the same as the number entered for the field end in Table 3. Also, the calculations identified in Rows 4, 16, 18 & 19 (shaded) may be done after stressing work at both ends of the tendon is complete.

Table 2

Row, R	Parameter	Value	Signature	Date
1	Number of Effective Wires	166	WRR	10-26
2	PTF Target Pressure	1,000 psi	WRR	10-26
3	PTF Actual Pressure	860 psi	WRR	10-26
4	PTF Actual Force = R3 x A/1000 - k	195.6 kip	WRR	10-26
5	PTF Reference Distance	5.0 in.	WRR	10-26
6	OSF Maximum Force = R1 x 9.4	1560.4 kip	WRR	10-26
7	OSF Max. Pressure = 1000 (R6 + k) / A	6647.35 psi	WRR	10-26
8	1/3 Pressure Interval = R7 / 3 – 330	1885.78 psi	WRR	10-26
9	Target 1/3 Pressure = 1,000 + R8	2885.78 psi	WRR	10-26
10	Actual 1/3 Pressure	2790 psi	WRR	10-26
11	1/3 Reference Distance	9.4 in.	WRR	10-26
12	Target 2/3 Pressure = R9 + R8	4771.56 psi	WRR	10-26
13	Actual 2/3 Pressure	4700 psi	WRR	10-26
14	2/3 Reference Distance	14 in.	WRR	10-26
15	OSF Actual Pressure	6640 psi	WRR	10-26
16	OSF Actual Force = R15 x A/1000 - k	1558.75 kip	WRR	10-26
17	OSF Reference Distance	18.5 in.	WRR	10-26
18	Differential Force = R16 - R4	1362.9 kip	WRR	10-26
19	Differential Elongation = R17 - R5	13.5 in.	WRR	10-26

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID V-118

Surveillance No. 35th yr

Part 4
Elongation Comparison

Table 4		
Row, R	Parameter	Value
1	Shop End Differential Force from Table 2, R18	1362.92 kip
2	Field End Differential Force from Table 3, R18	N/A kip
3	Average Differential Force = (R1 + R2) / 2*	1362.92 kip
4	Shop End Differential Elongation from Table 2, R19	13.5 in.
5	Field End Differential Elongation from Table 3, R19	N/A in.
6	Total Elongation = R4 + R5**	13.5 in.
7	Number of Effective Wires from Table 2, R1	166
8	Re-Tensioning Elongation Rate = R6 x R7 / R3	WRR 10-27-10 ~~2.631~~ 1.64
9	Original Elongation Rate from Table 1, R16	1.71
10	Fractional Difference in Rates = (R8 – R9) / R9	.040

Absolute value of the above Fractional Difference in Rates ≤ 0.1 Yes ✓ No ____

* For vertical tendon = R1
** For vertical tendon = R4

Signature: W. Rance Robb[illegible] Date: 10-27-10

DATA SHEET 4

Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID V-118

Surveillance No. 35 th yr.

Part 1
Original Stressing Data

> **NOTE**
>
> PTF force is that equivalent to a ram pressure of 1,000 psi. PTF removes tendon slack and is the starting point for elongation measurements. OSF force is 80% (may be less) of tendon ultimate strength. The tendon is loaded to OSF in order to provide the required force distribution. It is also the force at which final elongation is measured. PTF force / elongation, OSF force / elongation and number of effective wires are documented in construction records.

Table 1

Row, R	Parameter	Value	
1	Shop End PTF Force	199.2	kip
2	Field end PTF force	N/A	kip
3	Mean PTF Force = (R1 + R2) / 2	199.2	kip
4	Shop End PTF Reference Distance	3.8	in.
5	Field End PTF Reference Distance	N/A	in.
6	Net PTF Reference Distance = R4 + R5	3.8	in.
7	Shop End OSF Force	1581.9	kip
8	Field end OSF force	N/A	kip
9	Mean OSF Force = (R7 + R8) / 2	1581.9	kip
10	Shop End OSF Reference Distance	17.8	in.
11	Field End OSF Reference Distance	N/A	in.
12	Net OSF Reference Distance = R10 + R11	17.8	in.
13	Differential Force = R9 – R3	1382.7	kip
14	Differential Elongation = R12 – R6	14	in.
15	Number of Effective Wires	169	
16	Elongation Rate = R14 x R15 / R13	1.71	

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID V-118 Surveillance No. 35th yr.

Part 2
Shop End Re-Tensioning Data

Ram ID 9400 Ram Area, A 235.787 in² Ram k -6.961 kip

NOTE

The number of effective wires entered in R1 must be the same as the number entered for the field end in Table 3. Also, the calculations identified in Rows 4, 16, 18 & 19 (shaded) may be done after stressing work at both ends of the tendon is complete.

Table 2

Row, R	Parameter	Value	Signature	Date
1	Number of Effective Wires	166	WRR	10-27
2	PTF Target Pressure	1,000 psi	WRR	10-27
3	PTF Actual Pressure	860 psi	WRR	10-27
4	PTF Actual Force = R3 x A/1000 - k	195.8 kip	WRR	10-27
5	PTF Reference Distance	4.5 in.	WRR	10-27
6	OSF Maximum Force = R1 x 9.4	1560.4 kip	WRR	10-27
7	OSF Max. Pressure = 1000 (R6 + k) / A	6647.35 psi	WRR	10-27
8	1/3 Pressure Interval = R7 / 3 – 330	1885.78 psi	WRR	10-27
9	Target 1/3 Pressure = 1,000 + R8	2885.78 psi	WRR	10-27
10	Actual 1/3 Pressure	2790 psi	WRR	10-27
11	1/3 Reference Distance	8.8 in.	WRR	10-27
12	Target 2/3 Pressure = R9 + R8	4771.56 psi	WRR	10-27
13	Actual 2/3 Pressure	4700 psi	WRR	10-27
14	2/3 Reference Distance	13.5 in.	WRR	10-27
15	OSF Actual Pressure	6640 psi	WRR	10-27
16	OSF Actual Force = R15 x A/1000 - k	1558.76 kip	WRR	10-27
17	OSF Reference Distance	18.5 in.	WRR	10-27
18	Differential Force = R16 - R4	1362.92 kip	WRR	10-27
19	Differential Elongation = R17 - R5	14 in.	WRR	10-27

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID V-118 Surveillance No. 35 th yr.

Part 4
Elongation Comparison

Table 4		
Row, R	Parameter	Value
1	Shop End Differential Force from Table 2, R18	1362.92 kip
2	Field End Differential Force from Table 3, R18	N/A kip
3	Average Differential Force = (R1 + R2) / 2*	1362.92 kip
4	Shop End Differential Elongation from Table 2, R19	14 in.
5	Field End Differential Elongation from Table 3, R19	N/A in.
6	Total Elongation = R4 + R5**	14 in.
7	Number of Effective Wires from Table 2, R1	166
8	Re-Tensioning Elongation Rate = R6 x R7 / R3	1.70
9	Original Elongation Rate from Table 1, R16	1.71
10	Fractional Difference in Rates = (R8 – R9) / R9	0

Absolute value of the above Fractional Difference in Rates ≤ 0.1 Yes ✓

No ______

* For vertical tendon = R1
** For vertical tendon = R4

Signature: W. Bruce Robbins Date: 10-27-2010

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: V-118 Tendon End: Top ☒ Shop ☐ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☑ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☑ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☑ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☑ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☑ YES	☐ NO

COMMENTS: None

CREW FOREMAN SIGNOFF [signature] Date: 10-27-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: V-118 Tendon End: Bottom ☐ Shop ☒ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☒ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☒ YES	☐ NO

COMMENTS None

CREW FOREMAN SIGNOFF [signature] Date: 10-27-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35th YEAR TENDON SURVEILLANCE   Tendon No.: V-118

GREASE REPLACEMENT

QC SIGNOFFS

(8.4) Grease Used ☒ NEW ☐ OLD - TEST DATE: ☐ ACCEPTABLE ☐ APPROVAL LETTER DATED: WRR 10-27-10

8.0 PREREQUISITES

(8.5) Total Grease Loss from Data Sheet 6.0 for	Shop/Top	tendon end:	5.5 gal.	WRR 10-27-10
(8.6) Total Grease Loss from Data Sheet 6.0 for	Field/Gallery	tendon end:	6 gal.	WRR 10-27-10
(8.7) Estimated grease losses from leaks for	Shop/Top	tendon end:	0 gal.	WRR 10-27-10
(8.8) Estimated grease losses from leaks for	Field/Gallery	tendon end:	0 gal.	WRR 10-27-10
(8.9) TOTAL Tendon Grease Loss:			11.5 gal.	WRR 10-27-10

13.0 POURING AND HAND PUMPING – FIRST END

(13.6) Ambient Temp.: 71 °F   Thermometer ID: PK 102   Recal Date: 2-9-11

(13.7) Grease Temp.: 200 °F   Thermometer ID: PK 102   Recal Date: 2-9-11

(13.9) Initial Grease Height (a) 12.5 in.   (13.12) Final Grease Height (b) 5.5 in.

(13.14) Total amount of Grease added: 12.39 gal. (a – b) x 1.77 into the Top/Shop end

(13.16) Quantity of Waste Grease: 0 gal.   (13.15) ☒ Poured ☐ Hand Pumped

(13.17) Total Grease Replaced this end: 12.39 gal.   WRR 10-27-10

13.0 HAND PUMPING – SECOND END

(13.6) Ambient Temp.: ____ °F   Thermometer ID: ____   Recal Date: ____

(13.7) Grease Temp.: ____ °F   Thermometer ID: ____   Recal Date: ____

(13.9) Initial Grease Height (a) ____ in.   (13.12) Final Grease Height (b) ____ in.

(13.14) Total amount of Grease added: N ____ gal. (a – b) x 1.77 into the ____ end

(13.16) Quantity of Waste Grease: A ____ gal.   (13.15) ☐ Poured ☐ Hand Pumped

(13.17) Total Grease Replaced this end: ____ gal.   WRR 10-27-10

14.0 CALCULATION OF PRESSURE PUMPING

(14.1) Total Tendon Grease Replaced: 12.39 gal. (13.17 + 13.17)

(14.2) Net Tendon Duct Grease Volume: 129.61 gal. Refer to SQ 12.2 – GREASE VOLUMES, for the Tendon Net Duct Volume

(14.3) Percent Difference: $\frac{\text{Total Tendon Replaced (14.1) - Total Tendon Loss (8.9)}}{\text{Net Tendon Duct Grease Volume (14.2)}} \times 100 =$ .68 % Difference   WRR 10-27-10

(14.4) Grease Leaks: ☐ Yes ☒ No   WRR 10-27-10

(14.5) Refill Acceptable: ☒ Yes (less than 10%) ☐ No (greater than 10%)   WRR 10-27-10

If No – Customer Notified NCR No.: N/A   WRR 10-27-10

(14.6) Comments: None

QC Reviewed: [signature]   Level: II   Date: 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(7.2) Tendon No.: V-119 Tendon End: Top ☒ Shop ☐ Field

Grease Cap Removal

	Q.C. Signoff
(7.5) Date Removal Started: 10-25-2010	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 59 °F Thermometer No.: 9-82 Re-Cal Date: 6-23-11	
Ambient Temp.: 65 °F Thermometer No.: PK-102 Re-Cal Date: 2-9-11	WRR 10-25-10
(8.4) Anchorhead I.D.: 817/1097 Anchorhead Verification: ☒ Match ☐ No-Match	WRR 10-25-10

(8.5) Grease Coating

Grease Cap -	Complete	✓	Partial		Uncoated	%
Buttonheads -	Complete	✓	Partial		Uncoated	%
Anchorhead -	Complete	✓	Partial		Uncoated	%
Shims -	Complete	✓	Partial		Uncoated	%
Bearing Plate - (1)	Complete	✓	Partial		Uncoated	%

(1) - *Limited within the inside diameter of the grease cap.*

Q.C. Signoff: WRR 10-25-10

(8.6) Unusual Conditions: None — WRR 10-25-10

(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Med. Brown
Comments: None — WRR 10-25-10

(8.8) Quantity of Samples 0 Quart Samples Identified per Step 8.8.1? ☐ Yes N/A ☐ No
Location of Removal ☐ A.H. ☐ B.P. ☐ Shims ☐ Cap ☐ Duct
Note: No samples taken per. TMI engineering. — WRR 10-25-10

(8.9) Qty. of Grease lost during removal of cap: 0 gal. — WRR 10-25-10

(8.9.1) Grease from cap to be reused? ☒ Yes ☐ No Qty. of Grease removed from cap: .5 gal. — WRR 10-25-10

(9.6) Qty. of Grease removed from anchorage: 1.5 gal. — WRR 10-25-10

(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: 0 — WRR 10-25-10

(10.3) Method of Tendon Protection: Reinstalled the greasecap w/a new gasket — WRR 10-25-10

(10.4) Amount of Grease Loss from Tendon duct: 0 gal. — WRR 10-25-10

(10.5) Total quantity of lost grease (below):
(8.8) 0 + (8.9) 0 + (8.9.1) 0.5 + (9.6) 1.5 + (10.4) 0 = 2 TOTAL — WRR 10-25-10

(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒ Yes ☐ No — WRR 10-25-10

QC Reviewed: [signature] Level: II Date: 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(7.2) Tendon No.: V-119 Tendon End: Bottom ☐ Shop ☒ Field

Grease Cap Removal

	Q.C. Signoff
(7.5) Date Removal Started: 10-26-10	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 86 °F Thermometer No.: ST-78 Re-Cal Date: 6-23-11 Ambient Temp.: 80 °F Thermometer No.: PK-103 Re-Cal Date: 6-23-11	TWL 10-26-10
(8.4) Anchorhead I.D.: 885 Anchorhead Verification: ☒ Match ☐ No-Match	TWL 10-26-10

(8.5) Grease Coating

Grease Cap -	Complete	✓	Partial		Uncoated	%	
Buttonheads -	Complete	✓	Partial		Uncoated	%	
Anchorhead -	Complete	✓	Partial		Uncoated	%	
Shims -	Complete	✓	Partial		Uncoated	%	
Bearing Plate – (1)	Complete	✓	Partial		Uncoated	%	TWL 10-26-10

(1) - *Limited within the inside diameter of the grease cap.*

	Q.C. Signoff
(8.6) Unusual Conditions: None	TWL 10-26-10
(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Brown Comments: None	TWL 10-26-10
(8.8) Quantity of Samples 0 Quart Samples Identified per Step 8.8.1? ☐ Yes N/A ☐ No Location of Removal ☐ A.H. ☐ B.P. ☐ Shims ☐ Cap ☐ Duct NOTE: No Samples Taken Per. TMI Engineering.	TWL 10-26-10
(8.9) Qty. of Grease lost during removal of cap: 0 gal.	TWL 10-26-10
(8.9.1) Grease from cap to be reused? ☒ Yes ☐ No Qty. of Grease removed from cap: .5 gal.	TWL 10-26-10
(9.6) Qty. of Grease removed from anchorage: .5 gal.	TWL 10-26-10
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: N/A	TWL 10-26-10
(10.3) Method of Tendon Protection: Install can with new gasket.	TWL 10-26-10
(10.4) Amount of Grease Loss from Tendon duct: 0 gal.	TWL 10-26-10
(10.5) Total quantity of lost grease (below): (8.8) 0 + (8.9) 0 + (8.9.1) .5 + (9.6) .5 + (10.4) 0 = 1 TOTAL	TWL 10-26-10
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒ Yes ☐ No	TWL 10-26-10

QC Reviewed: W. Lance Robbins Level: II Date: 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: V-119 Tendon End: Top ☒ Shop ☐ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.9.1) DURING DETENSIONING N/A

Water Detected: ☐ Yes ☐ No Quantity: Sample Taken: ☐ Yes ☐ No ☐ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable

Comments:

(11.1) NOTIFICATION N/A

Exelon Notified: ☐ Yes ☐ No Individual Name: Date:

SAMPLE IDENTIFICATION AND STORAGE N/A

(12.2) Samples adequately identified: ☐ Yes ☐ No

(12.3) Samples stored at:

QC Signoff:	W. Lance Roble	Level: II	Date: 10-25-2010
QC Reviewed:	Timmy L. Oster	Level: II	Date: 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE [X] UNIT 1

(8.1) Tendon No.: V-119 Tendon End: Bottom [ ] Shop [X] Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: [ ] Yes [X] No Quantity: 0 Sample Taken: [ ] Yes [ ] No [X] N/A

Moisture Description: [ ] Observable Moisture [ ] Significant Moisture [X] Not Applicable

Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: [ ] Yes [X] No Quantity: 0 Sample Taken: [ ] Yes [ ] No [X] N/A

Moisture Description: [ ] Observable Moisture [ ] Significant Moisture [X] Not Applicable

Comments: None

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: [ ] Yes [X] No Quantity: 0 Sample Taken: [ ] Yes [ ] No [X] N/A

Moisture Description: [ ] Observable Moisture [ ] Significant Moisture [X] Not Applicable

Comments: None

(9.9.1) DURING DETENSIONING

N/A

Water Detected: [ ] Yes [ ] No Quantity: Sample Taken: [ ] Yes [ ] No [ ] N/A

Moisture Description: [ ] Observable Moisture [ ] Significant Moisture [ ] Not Applicable

Comments:

(11.1) NOTIFICATION

N/A

Exelon Notified: [ ] Yes [ ] No Individual Name: Date:

SAMPLE IDENTIFICATION AND STORAGE

N/A

(12.2) Samples adequately identified: [ ] Yes [ ] No

(12.3) Samples stored at:

QC Signoff: [signature] Level: II Date: 10-26-10

QC Reviewed: W. [signature] Level: II Date: 10-27-10

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI	Unit: 1	Date: 10-25-2010	Report No:
WO No(s).: R2139507	Tendon Anchorage No.: V-119	Tendon End: ☒ Shop ☐ Field	
Location: (Tunnel) Gallery, Buttress:	Elevation: N/A	Bearing Plate I.D.: Unable to locate	
Bearing Plate I.D.	Anchor Head I.D. 817	Bushing I.D. 1097	
Exam Type: ☐ DV ☒ VT-1		Type Of Exam: ☒ Direct ☐ Remote	
☒ As Found Exam	☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned		
Design Drawing(s) TMI 1-0016	Visual Aids: None		
M&TE Used: Steel Scale R-21 Cal due 6-24-11 ☒ Test Card	UTC or Serial No. N/A	Cal. Due Date: N/A	
Illumination Used Flashlight	Illumination Verified: Date: 10-25-2010	Time: 0730	
Special / Specific Instructions:			

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
Tendon anchorage components for V-119 shop/Top End			F	Inactive corrosion on surface of bushing. No pitting.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water (Quantify)	N.	Surface Discontinuities, Deflections		

Supplemental Information: ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Lance Robbins W. Lance Robbins LEVEL II DATE 10-25-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) Joseph S Hasty DATE: 11-6-10

Page 1 of 1

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-26-10 Report No: N/A

WO No(s).: A 2139507 Tendon Anchorage No.: V-119 Tendon End: ☐ Shop ☒ Field

Location: Tunnel, Gallery, Buttress: Elevation: Tendon Gallery Bearing Plate I.D.: Unable to Locate.

Bearing Plate I.D. N/A Anchor Head I.D. 885 Bushing I.D. N/A

Exam Type: ☐ DV ☒ VT-1 Type Of Exam: ☒ Direct ☐ Remote

☒ As Found Exam ☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0016 Visual Aids: None

M&TE Used: steel Rule K-22 cal due 6-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-26-10 Time: 8:00 AM

Special / Specific Instructions: N/A

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
Anchorage Components for V-119 Bottom/Field.			A	1 previously missing wire. See Enclosure 6, Datasheet 4.
			F	Light rust on anchor head and shims.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information: ☒ Yes ☐ No ☒ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Tim C. [signature] LEVEL II DATE 10-26-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) Joseph [signature] DATE: 11-4-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-25-2010 Report No:

System: Containment Tendons Component: 2' area of concrete around V-119 WO No(s).: R2139507

Location: Building: Containment Elev.: N/A Col.: N/A Row: N/A Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☒ VT-1C ☐ VT-3C Type Of Exam: ☒ Direct ☐ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0016 Visual Aids: None

Surface: ID (OD) Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: None ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-25-2010 Time: 0730

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RESULTS RI TYPE	RESULTS IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
2' area of concrete around V-119 tendon, shop/top end	✓			No visible indications

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts , Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information : ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-25-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) DATE:

ANII REVIEW (as applicable) Joseph S Shelby DATE: 11-4-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-26-10 Report No: N/A

System: Containment Tendons Component: Concrete 24" around bearing plate. WO No(s).: R 2139507

Location: Building: Containment Elev.: Tendon Gallery Col.: N/A Row: N/A Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☒ VT-1C ☐ VT-3C Type Of Exam: ☒ Direct ☐ Remote Matl. Type: Concrete

Design Drawing(s) TMI-0016 Visual Aids: None

Surface: ID (OD) Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: Steel Rule R-22 Cal Due 6-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-26-10 Time: 8:00 AM

Special / Specific Instructions: N/A

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Concrete area 24" around Anchor Plate for tendon V-119 Bottom / Field			✓ A.	Crack from corner of bearing plate to containment. 19" long <.010 wide
			A.	From adjacent corner to outerwall. 7½" long <.010 wide.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts, Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information: ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy L. Gibson [signature] LEVEL II DATE 10-26-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:

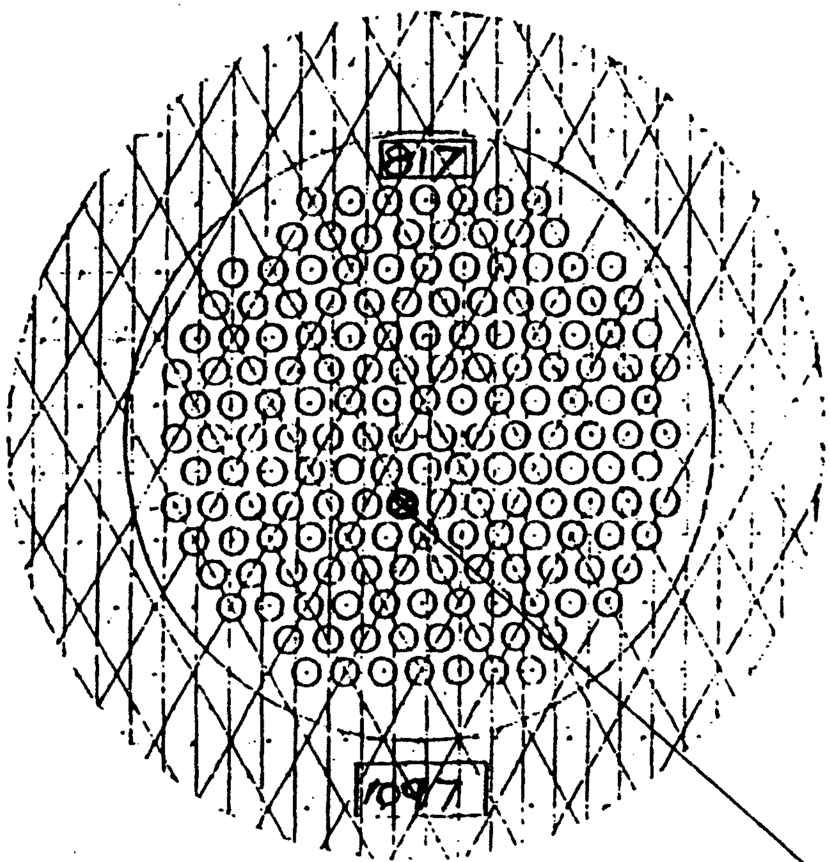
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) ______ DATE: ______

ANII REVIEW (as applicable) Joseph [signature] DATE: 11-4-10

Page 1 of 1

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
As Found Inspection



RB Tendon Surveillance

COMMENT: Shim stack ht. - 15.25
(4, 4, 4, 1, 2)

Inactive level 1 corrosion on bushing surface. No pitting.
None on all other components.

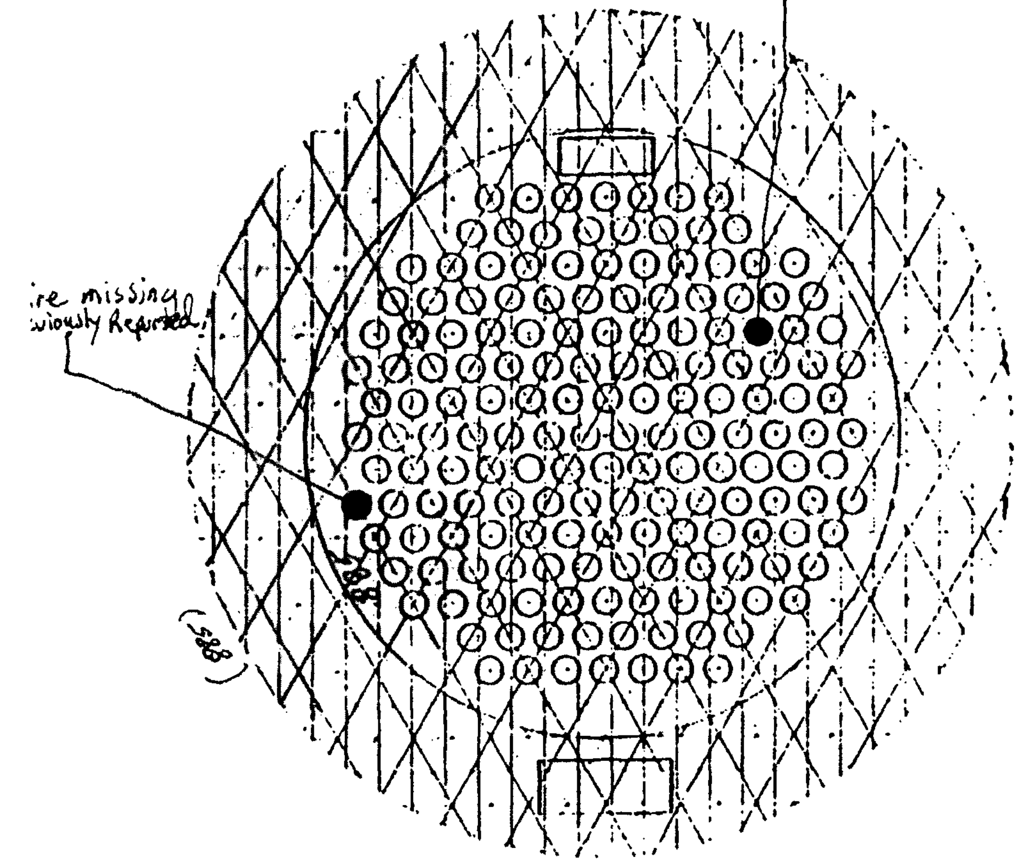
INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR W. [signature] Date 10-25-2010
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

1 Missing wire previously reported.

INSPECTION PERIOD 35th yr.

Tendon # V-119
END: FIELD______(1 piece washer)
SHOP ✓ (2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
As Found Inspection



RB Tendon Surveillance

COMMENT: Shim Stack Hieght - 5.2"
(4", 1")

Light Rust On Anchor Head
and Shims.
168 efficitive wires.

INSPECTED BY
CONTRACTOR FOREMAN________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR ________ Date 10-26-10
COGNIZANT MECH/STRUCT ENGINEER ________ Date 29Oct10
REVIEWED BY

INSPECTION PERIOD 35 Yr.

Tendon # V-119
END: FIELD X (1 piece washer)
SHOP____(2 piece washer)

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: V-119 Tendon End: Top ☒ Shop ☐ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☒ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☒ YES	☐ NO

COMMENTS None

CREW FOREMAN SIGNOFF [signature] Date: 10-25-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: V-119 Tendon End: Bottom ☐ Shop ☒ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☒ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☒ YES	☐ NO

COMMENTS None

CREW FOREMAN SIGNOFF [signature] Date: 10-26-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35th YEAR TENDON SURVEILLANCE Tendon No.: V-119

GREASE REPLACEMENT — QC SIGNOFFS

(8.4) Grease Used ☒ NEW ☐ OLD - TEST DATE: ☐ ACCEPTABLE ☐ APPROVAL LETTER DATED: WRR 10-26-10

8.0 PREREQUISITES

(8.5) Total Grease Loss from Data Sheet 6.0 for Shop/Top tendon end: 2 gal. WRR 10-26-10

(8.6) Total Grease Loss from Data Sheet 6.0 for Bottom/Gallery tendon end: 1 gal. WRR 10-26-10

(8.7) Estimated grease losses from leaks for Shop/Top tendon end: 0 gal. WRR 10-26-10

(8.8) Estimated grease losses from leaks for Bottom/Gallery tendon end: 0 gal. WRR 10-26-10

(8.9) TOTAL Tendon Grease Loss: 3 gal. WRR 10-26-10

13.0 POURING AND HAND PUMPING – FIRST END

(13.6) Ambient Temp.: 61 °F Thermometer ID: PK102 Recal Date: 2-9-11

(13.7) Grease Temp.: 220 °F Thermometer ID: PK102 Recal Date: 2-9-11

(13.9) Initial Grease Height (a) 14.5 in. (13.12) Final Grease Height (b) 12 in.

(13.14) Total amount of Grease added: 4.425 gal. (a – b) x 1.77 into the Shop/Top end

(13.16) Quantity of Waste Grease: 0 gal. (13.15) ☒ Poured ☐ Hand Pumped

(13.17) Total Grease Replaced this end: 4.425 gal. WRR 10-26-10

13.0 HAND PUMPING – SECOND END

(13.6) Ambient Temp.: °F Thermometer ID: Recal Date:

(13.7) Grease Temp.: °F Thermometer ID: Recal Date:

(13.9) Initial Grease Height (a) N in. (13.12) Final Grease Height (b) in.

(13.14) Total amount of Grease added: A gal. (a – b) x 1.77 into the end

(13.16) Quantity of Waste Grease: gal. (13.15) ☐ Poured ☐ Hand Pumped

(13.17) Total Grease Replaced this end: gal. WRR 10-26-10

14.0 CALCULATION OF PRESSURE PUMPING

(14.1) Total Tendon Grease Replaced: 4.425 gal. *(13.17 + 13.17)*

(14.2) Net Tendon Duct Grease Volume: 129.60 gal. *Refer to SQ 12.2 – GREASE VOLUMES, for the Tendon Net Duct Volume*

(14.3) Percent Difference: $\frac{\text{Total Tendon Replaced (14.1) - Total Tendon Loss (8.9)}}{\text{Net Tendon Duct Grease Volume (14.2)}} \times 100 =$ 1.09 % Difference WRR 10-26-10

(14.4) Grease Leaks: ☐ Yes ☒ No WRR 10-26-10

(14.5) Refill Acceptable: ☒ Yes *(less than 10%)* ☐ No *(greater than 10%)* WRR 10-26-10

If No – Customer Notified NCR No.: N/A WRR 10-26-10

(14.6) Comments: None

QC Reviewed: [signature] Level: II Date: 10-27-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(7.2) Tendon No.: U-134 Tendon End: Top ☒ Shop ☐ Field

Grease Cap Removal

	Q.C. Signoff
(7.5) Date Removal Started: 10-19-10	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 58 °F Thermometer No.: ST-78 Re-Cal Date: 6-23-11	
Ambient Temp.: 58 °F Thermometer No.: PR-103 Re-Cal Date: 6-23-11	WS. 10-19-10
(8.4) Anchorhead I.D.: EX 7W7/1058 Anchorhead Verification: ☒ Match ☐ No-Match	WS. 10-19-10

(8.5) Grease Coating

	Complete		Partial		Uncoated		Q.C. Signoff
Grease Cap -	Complete	✓	Partial		Uncoated	%	
Buttonheads -	Complete	✓	Partial		Uncoated	%	
Anchorhead -	Complete	✓	Partial		Uncoated	%	
Shims -	Complete	✓	Partial		Uncoated	%	
Bearing Plate - (1)	Complete	✓	Partial		Uncoated	%	WS. 10-19-10

(1) - *Limited within the inside diameter of the grease cap.*

	Q.C. Signoff
(8.6) Unusual Conditions: None	WS. 10-19-10
(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Med- Brown Comments: None	WS 10-19-10
(8.8) Quantity of Samples 2 Quart Samples Identified per Step 8.8.1? ☒ Yes ☐ No Location of Removal ☒ A.H. ☐ B.P. ☒ Shims ☐ Cap ☐ Duct	WS 10-19-10
(8.9) Qty. of Grease lost during removal of cap: 0 gal.	WS 10-19-10
(8.9.1) Grease from cap to be reused? ☐ Yes ☒ No Qty. of Grease removed from cap: 5 gal.	WS 10-19-10
(9.6) Qty. of Grease removed from anchorage: 1.5 gal.	WS. 10-19-10
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: N/A	WS 10-19-10
(10.3) Method of Tendon Protection: Install Cap With New Gasket	W.S. 10-19-10
(10.4) Amount of Grease Loss from Tendon duct: 0 gal.	WS. 10-19-10
(10.5) Total quantity of lost grease (below): (8.8) .5 + (8.9) 0 + (8.9.1) 5 + (9.6) 1.5 + (10.4) 0 = 7 TOTAL	WS. 10-19-10
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒ Yes ☐ No	WS. 10-19-10

QC Reviewed: W. Pence Robles Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(7.2) Tendon No.: V-134 Tendon End: Bottom ☐ Shop ☒ Field

Grease Cap Removal

	Q.C. Signoff
(7.5)Date Removal Started: 10-19-10	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☒ No	
(7.7) Temp. of Concrete: 78 °F Thermometer No.: ST-78 Re-Cal Date: 6-23-11	
Ambient Temp.: 78 °F Thermometer No.: PK-103 Re-Cal Date: 6-23-11	7WS 10-19-10
(8.4) Anchorhead I.D.: FY 27 R 27 Anchorhead Verification: ☒ Match ☐ No-Match	7WS 10-19-10

(8.5) Grease Coating

Grease Cap -	Complete	✓	Partial		Uncoated	%
Buttonheads -	Complete	✓	Partial		Uncoated	%
Anchorhead -	Complete	✓	Partial		Uncoated	%
Shims -	Complete	✓	Partial		Uncoated	%
Bearing Plate - (1)	Complete	✓	Partial		Uncoated	%

(1) - *Limited within the inside diameter of the grease cap.*

Q.C. Signoff: 7WS 10-19-10

(8.6) Unusual Conditions: None — 7WS 10-19-10

(8.7) Grease Color Match: ☒ Yes ☐ No Grease Color: Med. Brown
Comments: None — 7WS 10-19-10

(8.8) Quantity of Samples 2 Quart Samples Identified per Step 8.8.1? ☒ Yes ☐ No
Location of Removal ☐ A.H. ☐ B.P. ☒ Shims ☒ Cap ☐ Duct — 7WS 10-19-10

(8.9) Qty. of Grease lost during removal of cap: 0 gal. — 7WS 10-19-10
(8.9.1) Grease from cap to be reused? ☒ Yes ☐ No Qty. of Grease removed from cap: .5 gal. — 7WS 10-19-10
(9.6) Qty. of Grease removed from anchorage: 0 gal. — 7WS 10-19-10
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☒ No Describe: N/A — 7WS 10-19-10

(10.3) Method of Tendon Protection: Install Can With New Gasket — 7WS 10-19-10
(10.4) Amount of Grease Loss from Tendon duct: 0 gal. — 7WS 10-19-10

(10.5) Total quantity of lost grease (below):
(8.8) .5 + (8.9) 0 + (8.9.1) .5 + (9.6) 0 + (10.4) 0 = 1 TOTAL — 7WS 10-19-10
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☒ Yes ☐ No — 7WS 10-19-10

QC Reviewed: W. Rance Roblin Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: V-134 Tendon End: Top ☒ Shop ☐ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.9.1) DURING DETENSIONING

Water Detected: ☐ Yes ☐ No Quantity: N/A Sample Taken: ☐ Yes ☐ No ☐ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable

Comments:

(11.1) NOTIFICATION

Exelon Notified: ☐ Yes ☐ No Individual Name: N/A Date:

SAMPLE IDENTIFICATION AND STORAGE

(12.2) Samples adequately identified: ☐ Yes ☐ No N/A

(12.3) Samples stored at:

QC Signoff: [signature] Level: II Date: 10-19-10

QC Reviewed: W. Lance Robertson Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☒ UNIT 1

(8.1) Tendon No.: V-134 Tendon End: Bottom ☐ Shop ☒ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☒ No Quantity: 0 Sample Taken: ☐ Yes ☐ No ☒ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☒ Not Applicable

Comments: None

(9.9.1) DURING DETENSIONING

Water Detected: ☐ Yes ☐ No Quantity: Sample Taken: ☐ Yes ☐ No ☐ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable

Comments:

N/A

(11.1) NOTIFICATION

Exelon Notified: ☐ Yes ☐ No Individual Name: N/A Date:

SAMPLE IDENTIFICATION AND STORAGE

(12.2) Samples adequately identified: ☐ Yes ☐ No

(12.3) Samples stored at: N/A

QC Signoff: [signature] Level: II Date: 10-20-10

QC Reviewed: W. [signature] Level: II Date: 10-28-10

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI   Unit: 1   Date: 10-19-10   Report No: N/A

WO No(s).: R2139507   Tendon Anchorage No.: V-134   Tendon End: ☒ Shop ☐ Field

Location: Tunnel, Gallery, Buttress: Elevation: 456'-2"   Bearing Plate I.D.: unable to locate

Bearing Plate I.D. Unable to locate   Anchor Head I.D. EX 707   Bushing I.D. 1058

Exam Type: ☐ DV ☒ VT-1   Type Of Exam: ☒ Direct ☐ Remote

☒ As Found Exam   ☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0016   Visual Aids: None

M&TE Used: Steel Rule R-22 Cal. Due 6-28-11 ☒ Test Card   UTC or Serial No. N/A   Cal. Due Date: N/A

Illumination Used Flashlight   Illumination Verified: Date: 10-19-10   Time: 12:30 P.M.

Special / Specific Instructions: N/A

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
Anchorage components on Tendon V-134 shop/Top.	✓			No indications.

Results Legend:
NI - No Indications   RI - Recordable Indication   IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☒ Yes ☐ No   ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature]   LEVEL II   DATE 10-19-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature]   DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable)   DATE:

ANII REVIEW (as applicable) Joseph [signature]   DATE: 11-4-10

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-19-10 Report No: N/A

WO No(s).: R2139507 Tendon Anchorage No.: V-134 Tendon End: ☐ Shop ☒ Field

Location: Tunnel, Gallery, Buttress: Elevation: Tendon Gallery Bearing Plate I.D.: unable to locate

Bearing Plate I.D. Unable to locate Anchor Head I.D. ~~FYA~~ FY27R27 Bushing I.D. N/A

Exam Type: ☐ DV ☒ VT-1 (10-19-10) Type Of Exam: ☒ Direct ☐ Remote

☒ As Found Exam ☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned

Design Drawing(s) TMI 1-0016 Visual Aids: None

M&TE Used: Steel Rule R-CC cal due 6-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-19-10 Time: 8:00 AM

Special / Specific Instructions: N/A

Component / Item Number and Description	RESULTS NI	RI TYPE	IO	Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
Anchorage for V134 Field end.	✓			No indications.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information: ☒ Yes ☐ No ☒ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-19-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) ______ DATE: ______

ANII REVIEW (as applicable) Joseph [signature] DATE: 12-1-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI   Unit: 1   Date: 10-19-10   Report No: N/A

System: Containment Tendons   Component: Concrete 24" around anchor plate V-134   WO No(s).: R 2139507

Location: Building: Containment   Elev.: 456'-2"   Col.: N/A   Row: N/A   Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☒ VT-1C ~~☐ VT-3C~~   Type Of Exam: ☒ Direct ☐ Remote   Matl. Type: Concrete

Design Drawing(s) TMI 1-0016 10-28-10   Visual Aids: None

Surface: ID (OD)   Surface / Components Coated: ☐ YES ☒ NO

M&TE Used Steel Rule 1-22 6-25-11 cut due ☒ Test Card   UTC or Serial No. N/A   Cal. Due Date: N/A

Illumination Used Flashlight   Illumination Verified: Date: 10-19-10   Time: 12:30 PM

Special / Specific Instructions: N/A

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Concrete area 24" around Anchor Plate V-134 shop end, Top.	✓			No indications

Results Legend:
NI - No Indications   RI - Recordable Indication   IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts , Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information : ☒ Yes ☐ No   ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature]   LEVEL II   DATE 10-19-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature]   DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) ______   DATE: ______

ANII REVIEW (as applicable) Joseph L Shebby [signature]   DATE: 11-4-10

Page ___ of ___

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-19-10 Report No: N/A

System: Containment Tendons Component: Concrete 24" around anchor Plate V-134 WO No(s).: R2139507

Location: Building: Containment Elev.: Tendon Galley Col.: N/A Row: N/A Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☒ VT-1C ~~☐ VT-3C~~ TCG 10-28-10 Type Of Exam: ☒ Direct ☐ Remote Matl. Type: Concrete

Design Drawing(s): TMI 1-0016 Visual Aids: None

Surface: ID (OD) Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: Steel Ruler R-22 Cal. Due 6-28-11 ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used: Flashlight Illumination Verified: Date: 10-19-10 Time: 8:00 AM

Special / Specific Instructions: N/A

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Concrete area 24" around anchor Plate V-134 field end.	✓			No indications.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts, Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information: ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) Timothy C. Gibson [signature] LEVEL II DATE 10-19-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

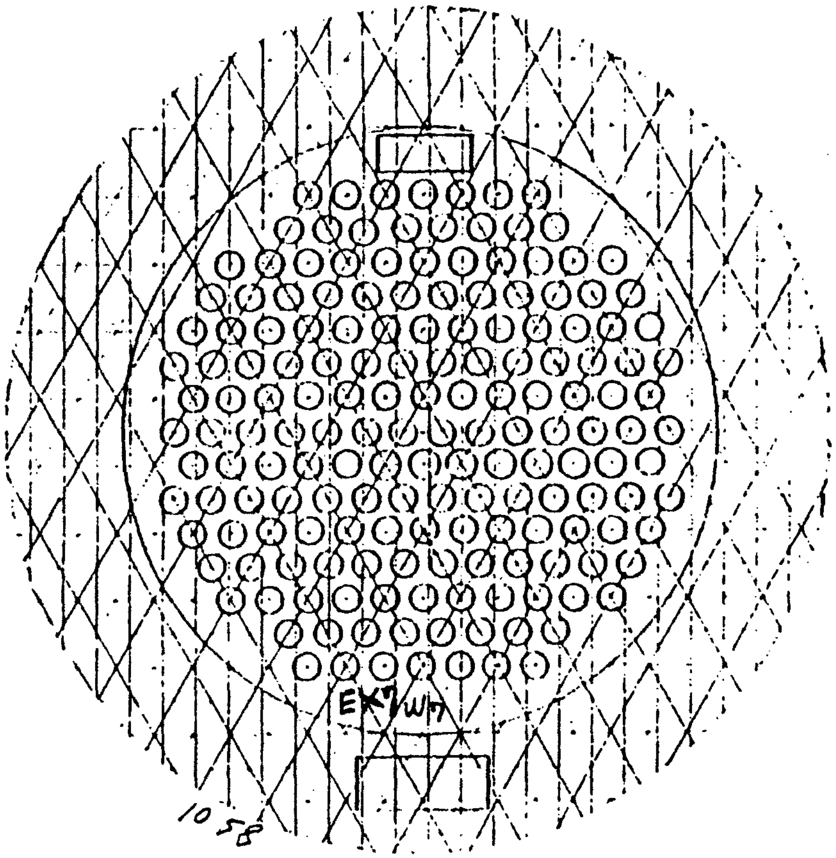
Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) ____________ DATE: ______

ANII REVIEW (as applicable) Joseph [signature] DATE: 12-1-10

Page 1 of 1

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
As Found Inspection



RB Tendon Surveillance

COMMENT:
Shim Stack Hieght - 14.4"
(4,2,4,4)

No Noted corrosion

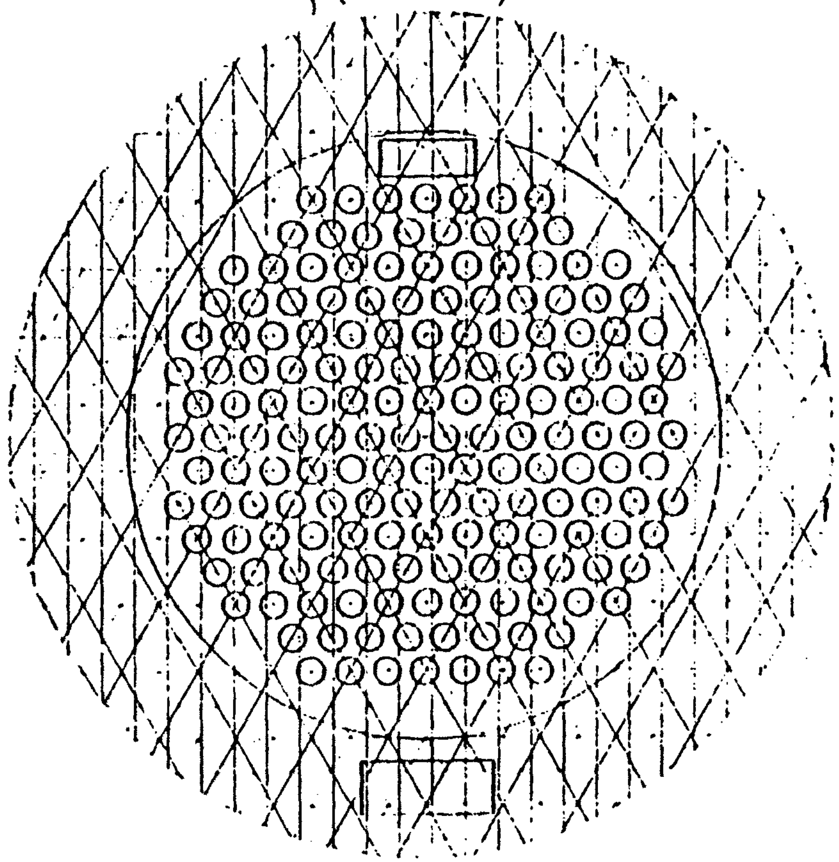
INSPECTED BY
CONTRACTOR FOREMAN__________ Date______
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-19-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

INSPECTION PERIOD 35 Yr. AS

Tendon # V-134
END: FIELD_____(1 piece washer)
SHOP X (2 piece washer)

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection
As Found Inspection

FY 27 R27



RB Tendon Surveillance

COMMENT:

Shim stack Hieght - 4.1
(2", 2")

No noted corrosion.

INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-19-10
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 29 Oct 10
REVIEWED BY

INSPECTION PERIOD 35 yr.

Tendon # V-134
END: FIELD ✓ (1 piece washer)
SHOP_____(2 piece washer)

Project: TMI – 35th YEAR TENDON SURVEILLANCE

Tendon No.: V-134 Tendon End/Buttress No.: Shop / Top

Anchorage ID.: EX7W7/1058 Adaptor ID: D2

EQUIPMENT	MICROMETER		WIRE		SHIMS	
Thread	**Mic ID**	**Recal Date**	**ID No.**	**Recal Date**	**ID No.**	**Recal Date**
Ext. Major	QC-52	4-5-11				
Ext. Pitch	QC-52	4-5-11	Set 5	6-25-11	Sur 1	12-25-10
Ext. Minor	QC-52	4-5-11	Dk Red / Blue	12-25-10	Sur 3	12-25-10
Int. Major	N/A	N/A				
Int. Minor	N/A	N/A				

MEASUREMENTS		THREAD			Average	Wire Constant	Wire Diameter	Shim Size	Average Diameter
Thread	Read	3rd	6th	9th					
Ext. Major	1	9.371	9.372	9.374					
	2	9.367	9.370	9.378					9.372
Ext. Pitch (1)	1	9.569		9.571					
	2	9.572		9.570	9.570	.254		.032	9.284
Ext. Minor (2)	1	9.456		9.464			(.120)		
	2	9.454		9.456	9.457		.240	.032	9.185
Int. Major	1	N/A		N/A					
	2	N/A		N/A					
Int. Minor	1	N/A	N/A	N/A					
	2	N/A	N/A	N/A					

Int.	Go Gauge ID:	N/A	Recal Date:	N/A	Result:	N/A
Pitch	No-Go Gauge ID:	N/A	Recal Date:	N/A	Result:	N/A

Notes: (1) External Pitch Diameter = [Average] – [Wire Constant] – [Shim Size]
(2) External Minor Diameter = [Average] – [2 X Wire Diameter] – [Shim Size]

DISPOSITION

	Trial 1	Trial 2	Trial 3	Trial 4
Adaptor Mark	D2			
Min. Minor Diameter from Adaptor Table	8.645			
Acceptable? (Yes or No)	Yes			

QC Signoff: [signature] Level: II Date: 10-19-10

QC Reviewed: [signature] Level: III Date: 2/15/11

DATA SHEET 1
Lift-Off Force Measurement

1301-9.1
Revision 21
Page 1 of 1

Surveillance No. 35 Yr. Tendon ID U-134 Predicted Force (F_p) 1332 kip Tendon End (Circle One): Shop / Field

Phase (Circle One): As-found / Re-Tension Ram ID ~~6400~~ 9400 TLB 10-19-10 Ram Calibration Constants: A = 235.787 k = -6.961

Date 10-19-10 Temp: RB Interior 109 °F / Concrete Surface 58 °F No. Effective Wires, N_w 169 Shim Stack Ht. 14.4 in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF $[(1,592 \times N_w / 169) - k] \times 1,000 / A$ = 6281.37 psig

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p'[1] psig[1,2]
1	5720	N/A	N/A
2	5720	N/A	N/A
3	5720	0	5720
4			
5			
6			
7			
8			
9			
10			

Stressing Washer Rotation

At Feeler Gage Insertion	Rotation, Turns CW or CCW
At Trial 1	0
At Trial 2	0
At Trial 3	0
At Trial 4	
At Trial 5	
At Trial 6	
At Trial 7	
Sum	

End Lift-Off Force = (A x P' / 1,000) = k = 1341.24 **kip**

For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead

N/A in.

[1] N/A if 3 trial pressure spread > 25,000 / A = 106.02 psi

[2] Re-tension P' range: $P'_{min} = (F_p - k) \times 1,000 / A$ = N/A psig < P' < $P'_{max} = [(1,394 \times N_w / 169) - k] \times 1,000 / A$ = N/A psig

For Re-Tension Only: F_p < End Lift-Off Force < 1394 x N_w / 169; N/A < N/A < N/A **Yes / No (Circle One)**

Notes: None

Recorded by: Signature [signature] Date 10-19-10 / Reviewed by: Signature W. Vance [signature] QV Date 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: V-134 Tendon End: Top ☒ Shop ☐ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☒ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☒ YES	☐ NO

COMMENTS None

CREW FOREMAN SIGNOFF [signature] Date: 10-19-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: V-134 Tendon End: Bottom ☐ Shop ☒ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☒ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☒ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☒ YES	☐ NO

COMMENTS None

CREW FOREMAN SIGNOFF [signature] Date: 10-19-10

QC Reviewed: [signature] Level: II Date: 10-28-10

Project: TMI 35th YEAR TENDON SURVEILLANCE Tendon No.: V-134

GREASE REPLACEMENT

QC SIGNOFFS

(8.4) Grease Used ☒ NEW ☐ OLD - TEST DATE: ☐ ACCEPTABLE ☐ APPROVAL LETTER DATED: WRR 10-21-10

8.0 PREREQUISITES

(8.5) Total Grease Loss from Data Sheet 6.0 for Field/Gallery tendon end: 1 gal. WRR 10-21-10
(8.6) Total Grease Loss from Data Sheet 6.0 for Top/Shop tendon end: 7 gal. WRR 10-21-10
(8.7) Estimated grease losses from leaks for Field/Gallery tendon end: 0 gal. WRR 10-21-10
(8.8) Estimated grease losses from leaks for Top/Shop tendon end: 0 gal. WRR 10-21-10
(8.9) TOTAL Tendon Grease Loss: 8 gal. WRR 10-21-10

13.0 POURING AND HAND PUMPING – FIRST END

(13.6) Ambient Temp.: 55 °F Thermometer ID: PK 102 Recal Date: 2-9-11
(13.7) Grease Temp.: 210 °F Thermometer ID: PK 102 Recal Date: 2-9-11
(13.9) Initial Grease Height (a) 31 in. (13.12) Final Grease Height (b) 26 in.
(13.14) Total amount of Grease added: 8.85 gal. (a – b) x 1.77 into the Shop/Top end
(13.16) Quantity of Waste Grease: 0 gal. (13.15) ☒ Poured ☐ Hand Pumped
(13.17) Total Grease Replaced this end: 8.85 gal. WRR 10-21-10

13.0 HAND PUMPING – SECOND END

(13.6) Ambient Temp.: °F Thermometer ID: Recal Date:
(13.7) Grease Temp.: °F Thermometer ID: Recal Date:
(13.9) Initial Grease Height (a) in. (13.12) Final Grease Height (b) in.
(13.14) Total amount of Grease added: N/A gal. (a – b) x 1.77 into the end
(13.16) Quantity of Waste Grease: gal. (13.15) ☐ Poured ☐ Hand Pumped
(13.17) Total Grease Replaced this end: gal. WRR 10-21-10

14.0 CALCULATION OF PRESSURE PUMPING

(14.1) Total Tendon Grease Replaced: 8.85 gal. (13.17 + 13.17)
(14.2) Net Tendon Duct Grease Volume: 131.62 gal. Refer to SQ 12.2 – GREASE VOLUMES, for the Tendon Net Duct Volume

(14.3) Percent Difference: $\frac{\text{Total Tendon Replaced (14.1) - Total Tendon Loss (8.9)}}{\text{Net Tendon Duct Grease Volume (14.2)}} \times 100 =$ .64 % Difference WRR 10-21-10

(14.4) Grease Leaks: ☐ Yes ☒ No WRR 10-21-10
(14.5) Refill Acceptable: ☒ Yes (less than 10%) ☐ No (greater than 10%) WRR 10-21-10
If No – Customer Notified NCR No.: N/A WRR 10-21-10
(14.6) Comments: None

Reviewed: [signature] Level: II Date: 10-27-10

Exova
194 Internationale Boulevard
Glendale Heights
Illinois
USA
60139

T: +1 (630) 221-0385
F: +1 (630) 221-0796
E: sales@exova.com
W: www.exova.com

Exova

Test Certificate

Precision Surveillance Corp
3468 Watling Road
East Chicago, IN
46312

Attn: Gerrald Bussone

REF No	T 020357	: Issue 1
Page	1 of 1	
Ord No	1096	
Date Tested	11/18/10	
Date Printed	11/18/10	
Date Received	11/15/10	

Item - TENSILE TESTING OF Six 1/4" DIAMETER TYPE BA WIRE

Specification - ASTM-A370-09A & A421/A 421M-06

Tensile Test - ASTM E8-09

	Dimensions [in]	Area [in2]	GL [in]	0.20%YS [psi]	UTS [psi]	%El	%RA	Comments
001:Parent	0.2500	0.0491	10.00	212900	247300	4.5	47.0	V118 Shop/Top #1
002:Parent	0.2500	0.0491	10.00	207000	246200	5.9	47.7	V118 Shop/Top #2
003:Parent	0.2500	0.0491	10.00	208500	246600	5.4	48.7	V118 Shop/Top #3
004:Parent	0.2500	0.0491	10.00	236200	267000	5.1	44.6	H46-39 Shop/Butt6 #1
005:Parent	0.2500	0.0491	10.00	238600	269900	5.6	47.0	H46-39 Shop/Butt6 #2
006:Parent	0.2500	0.0491	10.00	233200	267400	4.6	43.4	H46-39 Shop/Butt6 #3
Specification Minimum				199750	235000			
Specification Maximum								

Elongation determined after fracture unless otherwise indicated.

Certificate Comments

The preceding testing was performed in accordance with Exova Americas Materials Division QA Manual Issue 2, 2/1/2010.

Mark K Goodyear
Test Engineer
For and on behalf of
Exova Inc.

PSC
REVIEWED
BY: GBussone
DATE: 11/18/10

ACCREDITED
TESTING CERT# 0104.01 & 0104.02

Accredited Nadcap Materials Testing Laboratory

ENCLOSURE 4
Data Sheet 2
Tendon Wire Test Results

INSPECTION PERIOD 2010 Augmented exam

TENDON WIRE (1) SAMPLE NO.	LOCATION (2) FROM END OF WIRE	YIELD (3) STRESS (ksi)	ULTIMATE STRESS (ksi)	PERCENT (4) ELONGATION	COMMENTS (IDENTIFY MOST CORRODED SECTION)
DOME					
1.					
2.					
3.					
VERTICAL					
1. 1	0'-10'	212.9	247.3	4.5	
2. 2	90'-100'	207.0	246.2	5.9	
3. 3	170'-190'	209.5	246.6	5.4	
HOOP					
1. 1	0'-10'	236.2	267.0	5.1	
2. 2	60'-70'	239.6	269.9	5.6	
3. 3	140'-150'	233.2	267.4	4.6	

NOTES:

(1) See Section 7 of this enclosure.
(2) End starts from end of zero length as indicated on Data Sheet 1 of this enclosure.
(3) Yield stress is defined per ASTM A421.
(4) At Ultimate Tensile Strength.

Laboratory Technician
Prepared By: ______ Date ______

See Exova Wire Test Results (Attachment A)

Laboratory Supervisor
Verified By: ______ Date ______

Cognizant Mech/Struct Engineer
Approved By: [signature] Date 2/9/11

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 35 Yr. AS

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H46-39	BT 4	NO	N/A	10-20-10	TW.
2.	H46-39	BT6	NO	N/A	10-20-10	WRR
3.	H46-41	BT4	NO	N/A	10-20-10	TW.
4.	H46-41	BT6	NO	N/A	10-20-10	WRR
5.	V-117	Top	NO	N/A	10-25-10	WRR
6.	V-117	Bottom	NO	N/A	10-26-10	TW
7.	V-118	Top	NO	N/A	10-19-10	TW.
8.	V-118	Bottom	NO	N/A	10-19-10	TW.
9.	V-119	Top	NO	N/A	10-25-10	WRR
10.	V-134	Top	NO	N/A	10-19-10	TW.
11.	V-134	Bottom	NO	N/A	10-19-10	TW.
12.	V-119	Bottom	NO	N/A	10-26-10	TW.

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 10-27-10

Cognizant Mech/Struct Engineer Review By: [signature] (Howard Hill) Date: 29 Oct 10

ENCLOSURE 6

Data Sheet 2
Anchorage Assembly Surveillance Inspection
Vertical Tendons

INSPECTION PERIOD 35 Yr. AS

TENDON	END			BUTTONHEADS		STRESSING WASHER & NUT			SHIMS			BEARING PLATE			DATE INSP.	COMMENTS	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV INSP.
I.D. 1	Location 2	Corr. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	CORR. 5	*SKETCHED 7	CORR. 8	CRACKS 9	*SKETCHED 10	CORR. 11	CRACKS 12	SKETCHED 13	CORR. 14	CRACKS 15	SKETCHED 16	17	18	19	20
1. U-117	T-S	NO	0	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO	10-25-10	None	NO	Yes
	B-F	NO	0	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO	10-26-10			
2. U-118	B-F	NO	3	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO	10-27-10	None	Yes ~~NO~~ 10-28-10	Yes
	T-S	NO	3	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO				
3. U-119	T-S	Yes	1	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO	10-25-10	None	NO	Yes
	B-F	Yes	1	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO				
4. U-134	B-F	NO	0	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO	10-19-10	None	NO	Yes
	T-S	NO	0	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO				
5.																		
6.																		

LEGEND

GENERAL

Y = YES
N = NO

TENDON END-LOCATION

IDENTIFY TENDON END (SHOP OR FIELD) AND TOP (T) OR BOTTOM (B) OF TENDON

* - See Enclosure 6, Data Sheet 4

ENCLOSURE 6

Data Sheet 3
Anchorage Assembly Surveillance Inspection
Hoop Tendons

INSPECTION PERIOD 35 Yr. AS

TENDON I.D. 1	END Location 2	Corr. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	BUTTONHEADS CORR. 5	BUTTONHEADS *SKETCHED 6	STRESSING WASHER & NUT CORR. 7	STRESSING WASHER & NUT CRACKS 8	STRESSING WASHER & NUT *SKETCHED 9	SHIMS CORR. 10	SHIMS CRACKS 11	SHIMS SKETCHED 12	BEARING PLATE CORR. 13	BEARING PLATE CRACKS 14	BEARING PLATE SKETCHED 15	DATE INSP. 16	COMMENTS 17	INSP. BY CONTR. FOREMAN 18	VERIF. BY COGNIZANT QV INSP. 19
1. H46-29	6-S	NO	0	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO	10-20-10	None	NO	Yes
	4-F	NO	0	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO				
2. H46-41	4-F	NO	2	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO	10-20-10	None	NO	Yes
	6-S	NO	2	NO	Yes	NO	NO	Yes	NO	NO	NO	NO	NO	NO				
3.																		
4.																		
5.																		
6.																		

LEGEND

GENERAL

Y = YES
N = NO

TENDON END-LOCATION

IDENTIFY TENDON END (SHOP OR FIELD) AND NUMBER OF BUTTRESS (1 TO 6) AT TENDON END

* - See Enclousure 6, Data Sheet 4

ENCLOSURE 6
Data Sheet 6
Tendon Anchorage Area Concrete Crack Inspection
Vertical Tendons

Inspection Period 35th year AS

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location(A)	Width (IN.)(B)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. V-118	Top	None	N/A	N/A	10-19-10	NO	yes
	Bottom	None	N/A	N/A			
2. V-134	Top	None	N/A	N/A	10-19-10	NO	yes
	Bottom	None	N/A	N/A			
3. V-117	Top	None	N/A	N/A	10-25-10	NO	yes
	Bottom	None	N/A	N/A	10-26-10	NO	yes
4. V-119	Top	None	N/A	N/A	10-25-10	NO	yes
	Bottom	straight line crack	Bottom F/E	less than .010"	10-26-10	NO	yes
5.							
6.							
7.							

NOTE: (A) Location:
Identify Tendon End (Shop or Field) and
T or B - Top or Bottom of Vertical Tendon
(B) If concrete crack width > 0.01", provide sketch

Cognizant Mech/Struct Engineer
Reviewed By: (Howard Hill) Date: 29 OCT 10

ENCLOSURE 6
Data Sheet 7
Tendon Anchorage Area Concrete Crack Inspection
Hoop Tendons

Inspection Period 35th year AS

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location(A)	Width (IN.)(B)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. H4639	Butt. 4	NONE	N/A	N/A	10-20-10	NO	yes
	Butt. 6	6" long stress crack	Buttress 6	less than .010"	10-20-10	NO	yes
2. H4641	Butt. 4	NONE	N/A	N/A	10-20-10	NO	yes
	Butt. 6	NONE	N/A	N/A	10-20-10	NO	yes
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

NOTE: (A) Location:
Identify Tendon End (Shop or Field) and
1 to 6 - Number of Buttress At End of Tendon
(B) If concrete crack width > 0.01", provide sketch

Cognizant Mech/Struct Engineer
Reviewed By: (HOWARD HILL) Date: 29 OCT 10

DATA SHEET 2
As-Found Lift-Off Force Summary Results

Group	Tendon ID	As-Found Lift Off Force, kip Shop End	Field End	Average Force, F	Predicted Force, F_P kip	F_{acc} = 0.95 F_p	F > F_{acc} Circle Yes or No	F_{llim} = 0.90 F_p	F > F_{llim} Circle Yes or No
Hoop	H46-39	1354.35	1391.09	1372.72	1316	1250	Yes / No	1184	Yes / No
	H46-41	1342.87	1370.69	1356.78	1314	1248	Yes / No	1183	Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
Vertical	V-118	1365.31	N/A	1365.31	1340	1273	Yes / No	1206	Yes / No
	V-134	1341.74	N/A	1341.74	1332	1265	Yes / No	1199	Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
Dome							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No

Notes: (Initial & Date) TCJ 10-28-10

DATA SHEET 6
Retensioning Criteria Confirmation

(1) TENDON ID		(2) NUMBER OF EFFECTIVE WIRES	(3) 70 % OF ULTIMATE STRENGTH [8.24 X (2)]	(4) PREDICTED BASE FORCE[1]	(5) AVERAGE [(3)+(4)]÷2	(6) LOCK-OFF FORCE	(7) (4)<(6)<(3) Yes / No
DOME							
	SHOP END						
	FIELD END						
	SHOP END						
	FIELD END						
VERTICAL							
V-118	SHOP END	166	1367.84	1340	1353.92	1355.88	Yes
	SHOP END						
	SHOP END						
HOOP TENDONS							
H46-39	SHOP END	168	1384.32	1316	1350.16	1317.99	Yes
	FIELD END	168	138432	1316	1350.16	1337.56	Yes
	SHOP END						
	FIELD END						
	SHOP END						
	FIELD END						

Cognizant Mech/Struct Engineer
Reviewed By: (Howard Hill) Date: 29 OCT 10

Performed By: Date: 10-28-10

[1] Predicted Base Force from DC-5390-225.01-SE or separate calculation.

DATA SHEET 11
Tendon Surveillance Program

Inspection Period 35 Yr. AS

	Tendon No.	Gallons Removed* Shop End	Field End	Sum (Q_1) Shop & Field End	Net Duct Volume, (Q_N), Gallons	Gallons Replaced* Shop End	Field End	Sum (Q_2) Shop & Field End	100 x (Q_2 - Q_1) / Q_N,%	Acceptable (Yes or No)
1.	H46-39	1	1	2	115.26	2.65	3.09	5.74	3.24	Yes
2.	H46-41	.75	1.5	2.25	114.86	2.21	2.65	4.86	2.27	Yes
3.	V-117	3	1	4	129.86	6.195	N/A	6.195	1.69	Yes
4.	V-118	5.5	6	11.5	129.61	12.39	N/A	12.39	.68	Yes
5.	V-119	2	1	3	129.60	4.425	N/A	4.425	1.09	Yes
6.	V-134	7	1	8	131.62	8.85	N/A	8.85	~~131.62~~ .65 10-28-10	Yes
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

Cognizant QV Inspector Verification By: [signature] Date: 10-28-10
Cognizant Mech/Struct Engineer Review By: [signature] Date: 29 Oct 10

DATA SHEET 12

VT-1, VT-3, VT-1C, and VT-3C Examiner Qualification

Name of Examiner	Employer	Method	Level
W. RANCE ROBBINS	PSC	VT-1, VT-3, VT-1C, VT-3C	II
TIMOTHY C. GIBSON	PSC	VT-1, VT-3, VT-1C, VT-3C	II

I have reviewed the records relevant to the experience and training of the above named individuals and have, as necessary, trained these individuals in the requirements applicable to the performance of visual examinations of the containment concrete surface. Based on this review and, if applicable, training, I find that these individuals are qualified to perform said examinations.

Responsible Engineer: Name HOWARD T. HILL

Registration CA C 22265 30 SEP 11
State License No. Expiration

Signature [signature] Date 20 OCT 10

Exelon NDE Services Concurrence [signature] Date 10/20/10

ANII Concurrence [signature] Date 10-6-10

ENCLOSURE 3

Data Sheet 2

Laboratory Analysis of Bulk Filler Grease

Vertical Tendons

INSPECTION PERIOD 2010 Augmented exam

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES(1) (PPM)	NITRATES(1) (PPM)	SULFIDES(1) (PPM)	WATER/DRY WEIGHT (2) %	RESERVE(1) ALKALINITY (BASE NUMBER)
1. V118	Bottom/Field	<0.50	<0.50	<0.500	<0.10	65.1
2. V119	Top/shop	<0.50	<0.50	<0.500	0.19	69.1
3. V134	Bottom/Field	<0.50	<0.50	<0.500	<0.10	63.3
4. V134	Top/shop	<0.50	<0.50	<0.500	<0.10	70.9
5.						

(1) ACCEPTANCE CRITERION IS GIVEN ON PAGE 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT. TENDON END: TOP, BOTTOM

LABORATORY TECHNICIAN
PREPEARED BY: ______ DATE: ______

LABORATORY SUPERVISOR See Suburban Laboratories, Inc
VERIFIED BY: ______ DATE: Grease Analyses

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: [signature] DATE: 2/9/11

ENCLOSURE 3

Data Sheet 3

Laboratory Analysis of Bulk Filler Grease

Hoop Tendons

INSPECTION PERIOD 2010 Augmented exam

	SAMPLE IDENTIFICATION	TENDON END	CHLORIDES(1) (PPM)	NITRATES(1) (PPM)	SULFIDES(1) (PPM)	WATER/DRY WEIGHT (2) %	RESERVE(1) ALKALINITY (BASE NUMBER)
1.	H46-41	Butt 6/ shop	<0.50	<0.50	<0.500	<0.10	74.0
2.	H46-41	Butt 4/ Field	<0.50	<0.50	<0.500	<0.10	71.3
3.	H46-39	Butt 6/ shop	<0.50	<0.50	<0.500	<0.10	73.6
4.	H46-39	Butt 4/Field	<0.50	<0.50	<0.500	<0.10	71.2
5.							
6.							

(1) ACCEPTANCE CRITERION IS GIVEN ON PAGE 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT. TENDON END: BUTTRESS NUMBER

LABORATORY TECHNICIAN
PREPEARED BY: ________ DATE: ________

See Suburban Laboratories, Inc Grease Analysis

LABORATORY SUPERVISOR
VERIFIED BY: ________ DATE: ________

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: [signature] DATE: 2/9/11

SUBURBAN LABORATORIES, Inc.

4140 Litt Drive Hillside, Illinois 60162
Tel. (708) 544-3260 Toll Free (800) 783-LABS
Fax (708-544-8587
www.suburbanlabs.com

January 20, 2011

Gerald Bussone
Precision Surveillance Corp.
3468 Watling Street
East Chicago, IN 46312

Workorder: 1011234

TEL: (219) 975-5826
FAX: (219) 975-5867
RE: 1094

Dear Gerald Bussone:

Suburban Laboratories, Inc. received 8 sample(s) on 11/04/10 for the analyses presented in the following report.

All data for the associated quality control (QC) met EPA, method, or internal laboratory specifications except where noted in the case narrative. If you are comparing these results to external QC specifications or compliance limits and have any questions, please contact us.

This final report of laboratory analysis consists of this cover letter, case narrative, analytical report, dates report, and any accompanying documentation on, but not limited to, chain of custody records, raw data, and letters of explanation or reliance. This report may not be reproduced, except in full, without the prior written approval of Suburban Laboratories, Inc.

If you have any questions regarding these test results, please call me at (708) 544-3260.

Sincerely,

Melissa Amador

Melissa Amador
Project Manager

PSC
Q.A. REVIEWED
BY: A Bussone
DATE: 1/20/11

Suburban Laboratories, Inc.
4140 Litt Drive, Hillside, IL 60162 (708) 544-3260

Case Narrative

Client: Precision Surveillance Corp. **Date:** January 20, 2011
Project: 1094 **PO #:**
WorkOrder: 1011234 **QC Level:** LEVEL I
Temperature of samples upon receipt at SLI: 18 C **Chain of Custody #:**

General Comments:
- All results reported in wet weight unless otherwise indicated. (dry = Dry Weight)
- Sample results relate only to the analytes of interest tested and to sample as received by the laboratory.
- Environmental compliance sample results meet the requirements of 35 IAC Part 186 unless otherwise indicated.
- Waste water analysis follows the rules set forth in 40 CFR part 136 except where otherwise noted.
- Accreditation by the State of Illinois is not an endorsement or a guarantee of the validity of data generated.
- For more information about the laboratories' scope of accreditation, please contact us at (708) 544-3260 or the Agency at (217) 782-6455.

Abbreviations:
- Reporting Limit: The concentration at which an analyte can be routinely detected on a day to day basis, and which also meets regulatory and client needs.
- Quantitation Limit: The lowest concentration at which results can be accurately quantitated.
- J: The analyte was positively identified above our Method Detection Limit and is considered detectable and usable; however, the associated numerical value is the approximate concentration of the analyte in the sample.
- ATC: Automatic Temperature Correction. - TNTC: Too Numerous To Count
- In Laboratory: EPA recommends this analyte be analyzed "immediately" (e.g., tests that should be performed in the field within 15 minutes of collection). Analytes with "immediate" hold times are analyzed as soon as possible upon receipt by the laboratory.
- TIC: Tentatively Identified Compound (GCMS library search identification, concentration estimated to nearest internal standard).

Method References:
For a complete list of method references please contact us.
- E: USEPA Reference methods
- SW: USEPA, Test Methods for Evaluating Solid Waste (SW-846)
- M: Standard Methods for the Examination of Water and Wastewater
- USP: Latest version of United States Pharmacopeia

PSC
Q.A. REVIEWED
BY: ABussone
DATE: 1/20/11

Workorder Specific Comments:

This report supersedes the report dated 11/18/10.

STMCL: Choride - Samples 1011234-001A through 1011234-008A: The volume of titrant was was the same for the blank and the sample. Therefore the samples were indistinguishable from the blank which is known to contain

Client: Precision Surveillance Corp.
Project: 1094
WorkOrder: 1011234
Temperature of samples upon receipt at SLI: 18 C

Date: January 20, 2011
PO #:
QC Level: LEVEL I
Chain of Custody #:

no chloride ion.

PSC
Q.A. REVIEWED
BY: GBussone
DATE: 1/20/11

Suburban Laboratories, Inc.
4140 Litt Drive, Hillside, IL 60162 (708) 544-3260

Laboratory Results

Client ID: Precision Surveillance Corp. **Report Date:** January 20, 2011
Project Name: 1094 **Lab Order:** 1011234

Client Sample ID: H46-41 BUTT 6 S/E **Matrix:** GREASE
Lab ID: 1011234-001 **Date Received:** 11/04/2010 10:15 AM **Collection Date:** 10/20/2010 12:00 AM

Parameter	Result	Report Limit	Qual.	Units	Dilution Factor	Date Analyzed	Batch ID
CHLORIDE BY ASTM		Method: ASTM-D512-Rev 2004				Analyst: lb	
Chloride	< 0.50	0.50	c	ppm	1	11/05/2010 12:09 PM	R7045
MOISTURE BY ASTM		Method: ASTM-D95-Rev -				Analyst: ll	
Moisture Content	< 0.10	0.10	c	wt%	1	11/05/2010 9:55 AM	R7060
NITRATE BY ASTM		Method: ASTM-D992-Rev -				Analyst: lb	
Nitrate	< 0.50	0.50	c	ppm	1	11/06/2010 3:08 PM	R7079
NEUTRALIZATION NUMBER BY ASTM		Method: ASTM-D974 Modified-Rev -				Analyst: lb	
Base Number	74.0	0.500	c	mg KOH/g	1	11/07/2010 12:01 PM	R7083
SULFIDE BY APHA		Method: APHA-M427-Rev -				Analyst: lb	
Sulfide	< 0.500	0.500	c	ppm	1	11/05/2010 12:24 PM	R7047

Client Sample ID: H46-39 BUTT 6 S/E **Matrix:** GREASE
Lab ID: 1011234-002 **Date Received:** 11/04/2010 10:15 AM **Collection Date:** 10/20/2010 12:00 AM

Parameter	Result	Report Limit	Qual.	Units	Dilution Factor	Date Analyzed	Batch ID
CHLORIDE BY ASTM		Method: ASTM-D512-Rev 2004				Analyst: lb	
Chloride	< 0.50	0.50	c	ppm	1	11/05/2010 12:09 PM	R7045
MOISTURE BY ASTM		Method: ASTM-D95-Rev -				Analyst: ll	
Moisture Content	< 0.10	0.10	c	wt%	1	11/05/2010 9:55 AM	R7060
NITRATE BY ASTM		Method: ASTM-D992-Rev -				Analyst: lb	
Nitrate	< 0.50	0.50	c	ppm	1	11/06/2010 3:08 PM	R7079
NEUTRALIZATION NUMBER BY ASTM		Method: ASTM-D974 Modified-Rev -				Analyst: lb	
Base Number	73.6	0.500	c	mg KOH/g	1	11/07/2010 12:01 PM	R7083
SULFIDE BY APHA		Method: APHA-M427-Rev -				Analyst: lb	
Sulfide	< 0.500	0.500	c	ppm	1	11/05/2010 12:24 PM	R7047

PSC
Q.A. REVIEWED
BY: AButtone
DATE: 1/20/11

Qualifiers:

*/x	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
c	Analyte not in SLI scope of accreditation	E	Estimated, detected above quantitation range
G	Refer to case narrative page for specific comments	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limit (QL)	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

Suburban Laboratories, Inc.

4140 Litt Drive, Hillside, IL 60162 (708) 544-3260

Laboratory Results

Client ID: Precision Surveillance Corp.
Project Name: 1094

Report Date: January 20, 2011
Lab Order: 1011234

Client Sample ID: V118 BOTTOM F/E
Lab ID: 1011234-003
Date Received: 11/04/2010 10:15 AM
Matrix: GREASE
Collection Date: 10/20/2010 12:00 AM

Parameter	Result	Report Limit	Qual.	Units	Dilution Factor	Date Analyzed	Batch ID
CHLORIDE BY ASTM		Method: ASTM-D512-Rev 2004				Analyst: lb	
Chloride	< 0.50	0.50	c	ppm	1	11/05/2010 12:09 PM	R7045
MOISTURE BY ASTM		Method: ASTM-D95-Rev -				Analyst: ll	
Moisture Content	< 0.10	0.10	c	wt%	1	11/05/2010 9:55 AM	R7060
NITRATE BY ASTM		Method: ASTM-D992-Rev -				Analyst: lb	
Nitrate	< 0.50	0.50	c	ppm	1	11/06/2010 3:08 PM	R7079
NEUTRALIZATION NUMBER BY ASTM		Method: ASTM-D974 Modified-Rev -				Analyst: lb	
Base Number	65.1	0.500	c	mg KOH/g	1	11/07/2010 12:01 PM	R7083
SULFIDE BY APHA		Method: APHA-M427-Rev -				Analyst: lb	
Sulfide	< 0.500	0.500	c	ppm	1	11/05/2010 12:24 PM	R7047

Client Sample ID: V134 BOTTOM F/E
Lab ID: 1011234-004
Date Received: 11/04/2010 10:15 AM
Matrix: GREASE
Collection Date: 10/20/2010 12:00 AM

Parameter	Result	Report Limit	Qual.	Units	Dilution Factor	Date Analyzed	Batch ID
CHLORIDE BY ASTM		Method: ASTM-D512-Rev 2004				Analyst: lb	
Chloride	< 0.50	0.50	c	ppm	1	11/05/2010 12:09 PM	R7045
MOISTURE BY ASTM		Method: ASTM-D95-Rev -				Analyst: ll	
Moisture Content	< 0.10	0.10	c	wt%	1	11/05/2010 9:55 AM	R7060
NITRATE BY ASTM		Method: ASTM-D992-Rev -				Analyst: lb	
Nitrate	< 0.50	0.50	c	ppm	1	11/06/2010 3:08 PM	R7079
NEUTRALIZATION NUMBER BY ASTM		Method: ASTM-D974 Modified-Rev -				Analyst: lb	
Base Number	63.3	0.500	c	mg KOH/g	1	11/07/2010 12:01 PM	R7083
SULFIDE BY APHA		Method: APHA-M427-Rev -				Analyst: lb	
Sulfide	< 0.500	0.500	c	ppm	1	11/05/2010 12:24 PM	R7047

PSC
Q.A. REVIEWED
BY: ABussone
DATE: 1/20/11

Qualifiers:

*/x	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
c	Analyte not in SLI scope of accreditation	E	Estimated, detected above quantitation range
G	Refer to case narrative page for specific comments	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limit (QL)	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

Suburban Laboratories, Inc.
4140 Litt Drive, Hillside, IL 60162 (708) 544-3260

Laboratory Results

Client ID: Precision Surveillance Corp.
Project Name: 1094

Report Date: January 20, 2011
Lab Order: 1011234

Client Sample ID: V134 TOP S/E
Lab ID: 1011234-005
Date Received: 11/04/2010 10:15 AM
Matrix: GREASE
Collection Date: 10/20/2010 12:00 AM

Parameter	Result	Report Limit	Qual.	Units	Dilution Factor	Date Analyzed	Batch ID
CHLORIDE BY ASTM		Method: ASTM-D512-Rev 2004				Analyst: lb	
Chloride	< 0.50	0.50	c	ppm	1	11/05/2010 12:09 PM	R7045
MOISTURE BY ASTM		Method: ASTM-D95-Rev -				Analyst: ll	
Moisture Content	< 0.10	0.10	c	wt%	1	11/05/2010 9:55 AM	R7060
NITRATE BY ASTM		Method: ASTM-D992-Rev -				Analyst: lb	
Nitrate	< 0.50	0.50	c	ppm	1	11/06/2010 3:08 PM	R7079
NEUTRALIZATION NUMBER BY ASTM		Method: ASTM-D974 Modified-Rev -				Analyst: lb	
Base Number	70.8	0.500	c	mg KOH/g	1	11/07/2010 12:01 PM	R7083
SULFIDE BY APHA		Method: APHA-M427-Rev -				Analyst: lb	
Sulfide	< 0.500	0.500	c	ppm	1	11/05/2010 12:24 PM	R7047

Client Sample ID: H46-41 BUTT4 FIELD
Lab ID: 1011234-006
Date Received: 11/04/2010 10:15 AM
Matrix: GREASE
Collection Date: 10/20/2010 12:00 AM

Parameter	Result	Report Limit	Qual.	Units	Dilution Factor	Date Analyzed	Batch ID
CHLORIDE BY ASTM		Method: ASTM-D512-Rev 2004				Analyst: lb	
Chloride	< 0.50	0.50	c	ppm	1	11/05/2010 12:09 PM	R7045
MOISTURE BY ASTM		Method: ASTM-D95-Rev -				Analyst: ll	
Moisture Content	< 0.10	0.10	c	wt%	1	11/05/2010 9:55 AM	R7060
NITRATE BY ASTM		Method: ASTM-D992-Rev -				Analyst: lb	
Nitrate	< 0.50	0.50	c	ppm	1	11/06/2010 3:08 PM	R7079
NEUTRALIZATION NUMBER BY ASTM		Method: ASTM-D974 Modified-Rev -				Analyst: lb	
Base Number	71.3	0.500	c	mg KOH/g	1	11/07/2010 12:01 PM	R7083
SULFIDE BY APHA		Method: APHA-M427-Rev -				Analyst: lb	
Sulfide	< 0.500	0.500	c	ppm	1	11/05/2010 12:24 PM	R7047

PSC
Q.A. REVIEWED
BY: A Bussone
DATE: 1/20/11

Qualifiers:

*/x	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
c	Analyte not in SLI scope of accreditation	E	Estimated, detected above quantitation range
G	Refer to case narrative page for specific comments	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limit (QL)	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

Client ID: Precision Surveillance Corp.
Project Name: 1094
Report Date: January 20, 2011
Lab Order: 1011234

Client Sample ID: H46-39 BUTT 4 FIELD
Lab ID: 1011234-007
Date Received: 11/04/2010 10:15 AM
Matrix: GREASE
Collection Date: 10/20/2010 12:00 AM

Parameter	Result	Report Limit	Qual.	Units	Dilution Factor	Date Analyzed	Batch ID
CHLORIDE BY ASTM		Method: ASTM-D512-Rev 2004				Analyst: lb	
Chloride	< 0.50	0.50	c	ppm	1	11/05/2010 12:09 PM	R7045
MOISTURE BY ASTM		Method: ASTM-D95-Rev -				Analyst: ll	
Moisture Content	< 0.10	0.10	c	wt%	1	11/05/2010 9:55 AM	R7060
NITRATE BY ASTM		Method: ASTM-D992-Rev -				Analyst: lb	
Nitrate	< 0.50	0.50	c	ppm	1	11/06/2010 3:08 PM	R7079
NEUTRALIZATION NUMBER BY ASTM		Method: ASTM-D974 Modified-Rev -				Analyst: lb	
Base Number	71.2	0.500	c	mg KOH/g	1	11/07/2010 12:01 PM	R7083
SULFIDE BY APHA		Method: APHA-M427-Rev -				Analyst: lb	
Sulfide	< 0.500	0.500	c	ppm	1	11/05/2010 12:24 PM	R7047

Client Sample ID: V118 TOP S/E
Lab ID: 1011234-008
Date Received: 11/04/2010 10:15 AM
Matrix: GREASE
Collection Date: 10/19/2010 12:00 AM

Parameter	Result	Report Limit	Qual.	Units	Dilution Factor	Date Analyzed	Batch ID
CHLORIDE BY ASTM		Method: ASTM-D512-Rev 2004				Analyst: lb	
Chloride	< 0.50	0.50	c	ppm	1	11/05/2010 12:09 PM	R7045
MOISTURE BY ASTM		Method: ASTM-D95-Rev -				Analyst: ll	
Moisture Content	0.19	0.10	c	wt%	1	11/05/2010 9:55 AM	R7060
NITRATE BY ASTM		Method: ASTM-D992-Rev -				Analyst: lb	
Nitrate	< 0.50	0.50	c	ppm	1	11/06/2010 3:08 PM	R7079
NEUTRALIZATION NUMBER BY ASTM		Method: ASTM-D974 Modified-Rev -				Analyst: lb	
Base Number	68.1	0.500	c	mg KOH/g	1	11/07/2010 12:01 PM	R7083
SULFIDE BY APHA		Method: APHA-M427-Rev -				Analyst: lb	
Sulfide	< 0.500	0.500	c	ppm	1	11/05/2010 12:24 PM	R7047

PSC
Q.A. REVIEWED
BY: A Bussone
DATE: 1/20/11

Qualifiers:

*/x	Value exceeds Maximum Contaminant Level	B	Analyte detected in the associated Method Blank
c	Analyte not in SLI scope of accreditation	E	Estimated, detected above quantitation range
G	Refer to case narrative page for specific comments	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limit (QL)	N	Tentatively identified compounds
ND	Not Detected at the Reporting Limit	R	RPD outside accepted recovery limits

Precision Surveillance Corporation

3468 Watling Street
East Chicago, IN 46312
Email: info@psctendon.com

Phone: (219) 397-5826
Fax: (219) 397-5867
http://www.psctendon.com

November 2, 2010

Suburban Laboratories, Inc.
4140 Litt Drive
Hillside, IL. 60162

SLI WO#
1011234

Attention Melissa Amador,

Please test the following eight (8) grease samples per PSC-P.O. # 1094.

H46-41	BUTT 6	S/E - 001A
H46-41	BUTT 4	Field - 006A
H46-39	BUTT 6	S/E - 002A
H46-39	BUTT 4	Field - 007A
V118	Top	S/E - 008A
V118	Bottom	F/E - 003A
V134	Top	S/E - 005A
V134	Bottom	F/E - 004A

We would like results 10-15 days after receipt of samples. Any questions or problems please contact me. The above samples are being shipped to you via UPS Ground on 11/3/10.

Thank you,

Gerald Bussone
PSC/QA

ORDERED BY:

PRECISION SURVEILLANCE CORPORATION
3466 WATLING ROAD
EAST CHICAGO, IN 46312-1709
USA

Voice: 219-397-5826
Fax: 219-397-5807

PURCHASE ORDER

Purchase Order No.: 1094
Date Issued: 11/2/10

To:	Ship To:
SUBURBAN LABORATORIES INC 4140 LITT DRIVE HILLSIDE, IL 60162-1183	PRECISION SURVEILLANCE CORPORATION 3466 WATLING ROAD EAST CHICAGO, IN 46312-1709 USA

Good Thru	Ship Via	Account No.	Terms
12/2/10	BEST WAY		Net 30 Days

Quantity	Description	Unit Cost	Amount
	Test grease samples (6) samples as per attached procedure SQ 7.0, Rev. 0, dated 07/31/09. Test for water soluble chlorides, nitrates, and sulfides, water content and neutralization number as per procedure sections 5 and 6. Provide results to PSC QA Department. All provisions of the Suburban Quality Assurance Plan, Rev. 9, dated 9/1/07 apply to the contracted services herein. Suburban shall submit a laboratory report indicating the results of the tests were in conformance with the requirements of this Purchase Order. A member of Suburban's QA Department shall authenticate the laboratory results. PSC, including authorized Clients and Contractors shall have right-of-access to the Suburban facility for the purposes of record review, and/or audit or surveillance activities. Suburban shall report any defects or nonconforming conditions from the Purchase Order requirements to the PSC Quality Department prior to completion of this Purchase Order to determine acceptability. 1011 234- 1A-8A 11/4/10 1015 Am 18°C MJ		
		TOTAL	0.00

Authorized Signature [signature]

PSC
Q.A. REVIEWED
BY: [signature]
DATE: 11/2/10

ENCLOSURE 1
Data Sheet
Stressing Ram Calibration

RAM DESCRIPTION PINE 450 Ton #6001

LOAD CELL CONSTANT 10.0031

RAM TARGET LOAD (KIPS)	CALCULATED TARGET PRESS. (PSIG)	AT 25% = _____ IN LOADING #1		AT 50% = _____ IN LOADING #2		AT 75% = _____ IN LOADING #3		AVERAGE LOAD (KIPS)
		LOAD CELL	(KIPS)*	LOAD CELL	(KIPS)*	LOAD CELL	(KIPS)*	
150K								
300K								
500K								
600K								
700K								
800K								
900K								
1000K								
1100K								
1200K								
1300K								
1400K								
1500K								
1600K								

See PSC Jack Calibration Records

RAM CALIBRATION CONSTANTS DETERMINED FROM SLOPE AND INTERCEPT OF STRAIGHT LINE FITTED TO AVERAGE LOAD AND PRESSURE DATA USING THE METHOD OF LEAST SQUARES. AREA_____IN^2 INTERNAL RESISTANCE(K)_____KIP *LOAD CELL X LOAD CELL CONSTANT
ATTACH CERTIFICATIONS OF NIST TRACEABILITY FOR TESTING APPARATUS

APPROVED BY COGNIZANT MECH/STRUCT ENGINEER: [signature] DATE 2/9/11

PREPARED BY LABORATORY TECHNICIAN:_______________ DATE_______________

VERIFIED BY LABORATORY SUPERVISOR: See PSC Jack Calibration Records DATE_______________

ENCLOSURE 1
Data Sheet
Stressing Ram Calibration

RAM DESCRIPTION PINE 850Ton #6002

LOAD CELL CONSTANT 10.0031

RAM TARGET LOAD (KIPS)	CALCULATED TARGET PRESS. (PSIG)	AT 25% = ____IN LOADING #1		AT 50% = ____IN LOADING #2		AT 75% = ____IN LOADING #3		AVERAGE LOAD (KIPS)
		LOAD CELL	(KIPS)*	LOAD CELL	(KIPS)*	LOAD CELL	(KIPS)*	
150K								
300K								
500K								
600K								
700K								
800K								
900K								
1000K								
1100K								
1200K								
1300K								
1400K								
1500K								
1600K								

See PSC Jack Calibration Records

RAM CALIBRATION CONSTANTS DETERMINED FROM SLOPE AND INTERCEPT OF STRAIGHT LINE FITTED TO AVERAGE LOAD AND PRESSURE DATA USING THE METHOD OF LEAST SQUARES. AREA____IN^2 INTERNAL RESISTANCE(K)____KIP *LOAD CELL X LOAD CELL CONSTANT
ATTACH CERTIFICATIONS OF NIST TRACEABILITY FOR TESTING APPARATUS

APPROVED BY COGNIZANT MECH/STRUCT ENGINEER: [signature] DATE 2/9/11

PREPARED BY LABORATORY TECHNICIAN:________ DATE________

VERIFIED BY LABORATORY SUPERVISOR: See PSC Jack Calibration Records DATE________

ENCLOSURE 1
Data Sheet
Stressing Ram Calibration

RAM DESCRIPTION MAGNUS 1000Ton #9400

LOAD CELL CONSTANT 10.0031

RAM TARGET LOAD (KIPS)	CALCULATED TARGET PRESS. (PSIG)	AT 25% = ____IN LOADING #1		AT 50% = ____IN LOADING #2		AT 75% = ____IN LOADING #3		AVERAGE LOAD (KIPS)
		LOAD CELL	(KIPS)*	LOAD CELL	(KIPS)*	LOAD CELL	(KIPS)*	
150K								
300K								
500K								
600K								
700K								
800K								
900K								
1000K								
1100K								
1200K								
1300K								
1400K								
1500K								
1600K								

See PSC Jack Calibration Records

RAM CALIBRATION CONSTANTS DETERMINED FROM SLOPE AND INTERCEPT OF STRAIGHT LINE FITTED TO AVERAGE LOAD AND PRESSURE DATA USING THE METHOD OF LEAST SQUARES. AREA_____IN^2 INTERNAL RESISTANCE(K)_____KIP *LOAD CELL X LOAD CELL CONSTANT
ATTACH CERTIFICATIONS OF NIST TRACEABILITY FOR TESTING APPARATUS

APPROVED BY COGNIZANT MECH/STRUCT ENGINEER: [signature] DATE 2/9/11

PREPARED BY LABORATORY TECHNICIAN:_____ DATE_____

VERIFIED BY LABORATORY SUPERVISOR: See PSC Jack Calibration Records DATE_____

HYDRAULIC JACK CALIBRATION
Jack Calibration Record

Precision Surveillance Corporation

DOCUMENT NO:	
DOCUMENT TYPE:	ENG
REVISION #:	0
SAFETY RELATED	X
NON-SAFETY RELATED	
PAGE 1 OF 3	

COMPUTED BY: DJM DATE: 09/29/10 REVIEWED BY: BAG DATE: 09/29/10

Project: POST WOLF CREEK Contract No: N1054

Jack Description: PINE Size: 850 Tons Register No: 6001

Theoretical Ram Area: 190.45 sq. in. Max Pressure: 8500 psi

Calibrating Device Used: MOREHOUSE Register No: 61195 Constant: 10.0031

Calibrating Gauge Used: HEISE Register No: 44084 Due Date: 07/28/12

Raw Data By: DANNY O'SHEA Date: 09/29/10

Mean Ram Area: 191.181 sq. in. K= -8.352 kips

Computed By: DAVID MALDONADO

Title: FIELD ENGINEER Date: 09/29/10

Witness: N/A

Agency: N/A Date: N/A

QC Check: ABussone

Title: QA Manager Date: 9/29/10

Target Pressure (PSI)	Gauge Reading (PSI)	Load Cell Readout	Comments
1000	1003	18720.00	RUN: 1 POSITION: 1.5"
2000	2004	37610.00	
3000	3002	56610.00	
4000	4005	75710.00	
5000	5000	94745.00	
6000	6004	114015.00	
7000	7002	133155.00	
8000	8009	152340.00	
8500	8512	161960.00	
1000	1000	18415.00	RUN: 2 POSITION: 3"
2000	2001	37130.00	
3000	3004	56185.00	
4000	4004	75485.00	
5000	5006	94615.00	
6000	6000	113645.00	
7000	7006	132825.00	
8000	8003	151825.00	
8500	8504	161410.00	
1000	1003	18745.00	RUN: 3 POSITION: 4.5"
2000	2004	37655.00	
3000	3008	56770.00	
4000	4002	75750.00	
5000	5003	94935.00	
6000	6004	114130.00	
7000	7001	133120.00	
8000	8000	152215.00	
8500	8502	161835.00	

PSC Precision Surveillance Corporation	# HYDRAULIC JACK CALIBRATION ## Linear Regression Analysis	DOCUMENT NO:
		DOCUMENT TYPE: ENG
		REVISION # 0
		SAFETY RELATED X
		NON-SAFETY RELATED
		PAGE 2 OF 3

COMPUTED BY:	DJM	DATE:	09/29/10	REVIEWED BY:	BAG	DATE:	09/29/10

Project: POST WOLF CREEK — Contract No: N1054
Jack Description: PINE — Size: 850 Tons — Register No: 6001
Theoretical Ram Area: 190.45 sq. in. — Max Pressure: 8500 psi
Calibrating Device Used: MOREHOUSE — Register No: 61195 — Constant: 10.0031
Calibrating Gauge Used: HEISE — Register No: 44084 — Due Date: 07/28/12

Actual Gauge Reading (psi)	Load Cell Readout	Computed Force (kips)
1003	18720.00	187.258 *
2004	37610.00	376.217
3002	56610.00	566.275
4005	75710.00	757.335
5000	94745.00	947.744
6004	114015.00	1140.503
7002	133155.00	1331.963
8009	152340.00	1523.872
8512	161960.00	1620.102
1000	18415.00	184.207
2001	37130.00	371.415
3004	56185.00	562.024
4004	75485.00	755.084
5006	94615.00	946.443
6000	113645.00	1136.802
7006	132825.00	1328.662
8003	151825.00	1518.721
8504	161410.00	1614.600
1003	18745.00	187.508 *
2004	37655.00	376.667
3008	56770.00	567.876
4002	75750.00	757.735
5003	94935.00	949.644
6004	114130.00	1141.654
7001	133120.00	1331.613
8000	152215.00	1522.622
8502	161835.00	1618.852

* Indicates these readings have been omitted from thefinal computations

Errors In Jack Calibration
- Error In Standard .... 0.0100 ksi
- Interpolation in Gauge .... 0.0000 ksi
- Accuracy of Gauge .... 0.0000 ksi

Errors In Gauge Calibration
- Interpolation in Master .... 0.0000 ksi
- Interpolation in Field Gauge .... 0.0050 ksi
- Accuracy of Master .... 0.0100 ksi
- Accuracy of Field Gauge .... 0.0275 ksi

Errors In Field Use of Gauge
- Interpolation Error .... 0.0050 ksi
- Accuracy Error .... 0.0275 ksi

Maximum Gauge Reading Used .... 8.5120 ksi

FORCE (kips) = 191.181 (in^2) X GAUGE READING (ksi) + -8.352 (kips)

Correlation = 0.99999088 — N/NO = 0.9259 (Not < 0.66667)
Maximum Error Ratio In Jack 0.0075
Maximum Error Ratio In Gauge 0.0049
Maximum Total Error Ratio 0.0090

PSC Precision Surveillance Corporation	HYDRAULIC JACK CALIBRATION Comparison With Previous Calibration	DOCUMENT NO:	
		DOCUMENT TYPE:	ENG
		REVISION #	0
		SAFETY RELATED	X
		NON-SAFETY RELATED	
		PAGE 3 OF 3	

COMPUTED BY:	DJM	DATE:	09/29/10	REVIEWED BY:	BAG	DATE:	09/29/10

Project: POST WOLF CREEK		Contract No: N1054	
Jack Description: PINE	Size: 850 Tons	Register No: 6001	
Theoretical Ram Area: 190.45 sq. in.		Max Pressure: 8500 psi	
Calibrating Device Used: MOREHOUSE	Register No: 61195	Constant: 10.0031	
Calibrating Gauge Used: HEISE	Register No: 44084	Due Date: 07/28/12	

Data From Current Calibration

Area (A_f): 191.181 sq.in.

Constant (C_f): -8.352 kips

Max Pressure (P): 8500 psi

Data From Previous Calibration

Area (A_i): 190.250 sq.in.

Constant (C_i): -3.155 kips

$$\frac{i-f}{i} x100\% = -0.168\%$$

WHERE:

$$i = (A_i \times P) + (C_i * 1000)$$

$$f = (A_f \times P) + (C_f * 1000)$$

PSC Precision Surveillance Corporation	HYDRAULIC JACK CALIBRATION Jack Calibration Record	DOCUMENT NO:	
		DOCUMENT TYPE:	ENG
		REVISION #	0
		SAFETY RELATED	X
		NON-SAFETY RELATED	
		PAGE 1	OF 3

COMPUTED BY: DJM DATE: 11/03/10 REVIEWED BY: BAG DATE: 11/03/10

Project: POST TMI Contract No: N1063

Jack Description: PINE Size: 850 Tons Register No: 6001

Theoretical Ram Area: 190.45 sq. in. Max Pressure: 8500 psi

Calibrating Device Used: MOREHOUSE Register No: 61195 Constant: 10.0031

Calibrating Gauge Used: HEISE Register No: 44084 Due Date: 07/28/12

Raw Data By: DAVE PRITT Date: 11/03/10 Witness: N/A

Mean Ram Area: 190.734 sq. in. K= -7.929 kips Agency: N/A Date: N/A

Computed By: DAVID MALDONADO QC Check: GBussone

Title: FIELD ENGINEER Date: 11/03/10 Title: QA Manager Date: 11/3/10

Target Pressure (PSI)	Gauge Reading (PSI)	Load Cell Readout	Comments
1000	1039	19145	RUN: 1 POSITION: 1.5"
2000	2040	38140	
3000	3013	56485	
4000	4024	75865	
5000	5017	94780	
6000	6010	113775	
7000	7020	133065	
8000	8008	151905	
8500	8519	161580	
1000	1027	18980	RUN: 2 POSITION: 3"
2000	2014	37525	
3000	3014	56570	
4000	4040	76255	
5000	5004	94660	
6000	6023	114090	
7000	7022	133050	
8000	8008	151895	
8500	8518	161605	
1000	1006	18440	RUN: 3 POSITION: 4.5"
2000	2015	37525	
3000	3014	56590	
4000	4012	75735	
5000	5010	94820	
6000	6024	114130	
7000	7036	133445	
8000	8022	152205	
8500	8507	161495	

PSG Precision Surveillance Corporation	**HYDRAULIC JACK CALIBRATION** Linear Regression Analysis	DOCUMENT NO:		
		DOCUMENT TYPE:	ENG	
		REVISION #:	0	
		SAFETY RELATED	X	
		NON-SAFETY RELATED		
		PAGE	2 OF	3

COMPUTED BY: DJM DATE: 11/03/10 REVIEWED BY: BAG DATE: 11/03/10

Project: POST TMI — Contract No: N1063

Jack Description: PINE — Size: 850 Tons — Register No: 6001

Theoretical Ram Area: 190.45 sq. in. — Max Pressure: 8500 psi

Calibrating Device Used: MOREHOUSE — Register No: 61195 — Constant: 10.0031

Calibrating Gauge Used: HEISE — Register No: 44084 — Due Date: 07/28/12

Actual Gauge Reading (psi)	Load Cell Readout	Computed Force (kips)
1039	19145.00	191.509
2040	38140.00	381.518
3013	56485.00	565.025
4024	75865.00	758.885
5017	94780.00	948.094
6010	113775.00	1138.103
7020	133065.00	1331.063
8008	151905.00	1519.521
8519	161580.00	1616.301
1027	18980.00	189.859
2014	37525.00	375.366
3014	56570.00	565.875
4040	76255.00	762.786
5004	94660.00	946.893
6023	114090.00	1141.254
7022	133050.00	1330.912
8008	151895.00	1519.421
8518	161605.00	1616.551
1006	18440.00	184.457
2015	37525.00	375.366
3014	56590.00	566.075
4012	75735.00	757.585
5010	94820.00	948.494
6024	114130.00	1141.654
7036	133445.00	1334.864
8022	152205.00	1522.522
8507	161495.00	1615.451

* Indicates these readings have been omitted from thefinal computations

Errors In Jack Calibration

Error In Standard	0.0100	ksi
Interpolation In Gauge	0.0000	ksi
Accuracy of Gauge	0.0000	ksi

Errors In Gauge Calibration

Interpolation in Master	0.0000	ksi
Interpolation in Field Gauge	0.0050	ksi
Accuracy of Master	0.0100	ksi
Accuracy of Field Gauge	0.0275	ksi

Errors In Field Use of Gauge

Interpolation Error	0.0050	ksi
Accuracy Error	0.0275	ksi
Maximum Gauge Reading Used	8.5190	ksi

FORCE (kips) = 190.734 (in^2) X GAUGE READING (ksi) + -7.929 (kips)

Correlation = 0.99999859 — N/NO = 1.0000 (Not < 0.66667)

Maximum Error Ratio In Jack 0.0101

Maximum Error Ratio In Gauge 0.0049

Maximum Total Error Ratio 0.0113

HYDRAULIC JACK CALIBRATION Comparison With Previous Calibration			
DOCUMENT NO:			
DOCUMENT TYPE:	ENG		
REVISION #	0		
SAFETY RELATED	X		
NON-SAFETY RELATED			
PAGE	3	OF	3

COMPUTED BY:	DJM	DATE:	11/03/10	REVIEWED BY:	BAG	DATE:	11/03/10

Project:	POST TMI			Contract No:	N1063
Jack Description:	PINE	Size:	850 Tons	Register No:	6001
Theoretical Ram Area:	190.45 sq. in.			Max Pressure:	8500 psi
Calibrating Device Used:	MOREHOUSE	Register No:	61195	Constant:	10.0031
Calibrating Gauge Used:	HEISE	Register No:	44084	Due Date:	07/28/12

Data From Current Calibration			Data From Previous Calibration		
Area (A_f):	190.734	sq.in.	Area (A_i):	191.181	sq.in.
Constant (C_f):	-7.929	kips	Constant (C_i):	-8.352	kips
Max Pressure (P):	8500	psi			

$$\frac{i-f}{i} x100\% = 0.209\%$$

WHERE:

$$i = (A_i \times P) + (C_i * 1000)$$

$$f = (A_f \times P) + (C_f * 1000)$$

HYDRAULIC JACK CALIBRATION
Jack Calibration Record

DOCUMENT NO:	
DOCUMENT TYPE:	ENG
REVISION #	0
SAFETY RELATED	X
NON-SAFETY RELATED	
PAGE 1 OF 3	

COMPUTED BY: DJM DATE: 10/07/10 REVIEWED BY: BAG DATE: 10/07/10

Project: POST WOLF CREEK Contract No: N1054
Jack Description: PINE Size: 850 Tons Register No: 6002
Theoretical Ram Area: 190.45 sq. in. Max Pressure: 8500 psi
Calibrating Device Used: MOREHOUSE Register No: 61195 Constant: 10.0031
Calibrating Gauge Used: HEISE Register No: 44084 Due Date: 07/28/12

Raw Data By: DANIEL P. O'SHEA Date: 10/07/10
Mean Ram Area: 191.381 sq. in. K= -8.275 kips
Computed By: DAVID MALDONADO
Title: FIELD ENGINEER Date: 10/07/10

Witness: N/A
Agency: N/A Date: N/A
QC Check: JBussone
Title: QA Manager Date: 10/8/10

Target Pressure (PSI)	Gauge Reading (PSI)	Load Cell Readout	Comments
1000	1000	18420.00	RUN: 1 POSITION: 1.5"
2000	2015	37440.00	
3000	3002	56290.00	
4000	4000	75480.00	
5000	5009	94880.00	
6000	6005	113880.00	
7000	7005	133005.00	
8000	8001	152060.00	
8500	8506	161705.00	
1000	1000	18370.00	RUN: 2 POSITION: 3"
2000	2007	37570.00	
3000	3002	56550.00	
4000	4006	75790.00	
5000	5004	94920.00	
6000	6003	114090.00	
7000	7006	133270.00	
8000	8000	152260.00	
8500	8503	161890.00	
1000	1001	18505.00	RUN: 3 POSITION: 4.5"
2000	2003	37600.00	
3000	3004	56750.00	
4000	4006	75980.00	
5000	5003	95030.00	
6000	6001	114170.00	
7000	7000	133260.00	
8000	8002	152455.00	
8500	8501	162005.00	

PSC Precision Surveillance Corporation	# HYDRAULIC JACK CALIBRATION ## Linear Regression Analysis	DOCUMENT NO:	
		DOCUMENT TYPE:	ENG
		REVISION #	0
		SAFETY RELATED	X
		NON-SAFETY RELATED	
		PAGE 2 OF 3	

COMPUTED BY: DJM DATE: 10/07/10 REVIEWED BY: BAG DATE: 10/07/10

Project: POST WOLF CREEK | Contract No: N1054
Jack Description: PINE | Size: 850 Tons | Register No: 6002
Theoretical Ram Area: 190.45 sq. in. | Max Pressure: 8500 psi
Calibrating Device Used: MOREHOUSE | Register No: 61195 | Constant: 10.0031
Calibrating Gauge Used: HEISE | Register No: 44084 | Due Date: 07/28/12

Actual Gauge Reading (psi)	Load Cell Readout	Computed Force (kips)
1000	18420.00	184.257
2015	37440.00	374.516
3002	56290.00	563.074
4000	75480.00	755.034
5009	94880.00	949.094
6005	113880.00	1139.153
7005	133005.00	1330.462
8001	152060.00	1521.071
8506	161705.00	1617.551
1000	18370.00	183.757
2007	37570.00	375.816
3002	56550.00	565.675
4006	75790.00	758.135
5004	94920.00	949.494
6003	114090.00	1141.254
7006	133270.00	1333.113
8000	152260.00	1523.072
8503	161890.00	1619.402
1001	18505.00	185.107
2003	37600.00	376.117
3004	56750.00	567.676
4006	75980.00	760.036
5003	95030.00	950.595
6001	114170.00	1142.054
7000	133260.00	1333.013
8002	152455.00	1525.023
8501	162005.00	1620.552

* Indicates these readings have been omitted from thefinal computations

Errors In Jack Calibration

Error In Standard	0.0100	ksi
Interpolation In Gauge	0.0000	ksi
Accuracy of Gauge	0.0000	ksi

Errors In Gauge Calibration

Interpolation in Master	0.0000	ksi
Interpolation in Field Gauge	0.0050	ksi
Accuracy of Master	0.0100	ksi
Accuracy of Field Gauge	0.0275	ksi

Errors In Field Use of Gauge

Interpolation Error	0.0050	ksi
Accuracy Error	0.0275	ksi
Maximum Gauge Reading Used	8.5060	ksi

FORCE (kips) = 191.381 (in^2) X GAUGE READING (ksi) + -8.275 (kips)

Correlation = 0.99999468 N/NO = 1.0000 (Not < 0.66667)

Maximum Error Ratio In Jack 0.0099
Maximum Error Ratio In Gauge 0.0049
Maximum Total Error Ratio 0.0110

Precision Surveillance Corporation	HYDRAULIC JACK CALIBRATION Comparison With Previous Calibration	DOCUMENT NO:	
		DOCUMENT TYPE:	ENG
		REVISION #	0
		SAFETY RELATED	X
		NON-SAFETY RELATED	
		PAGE 3 OF 3	

COMPUTED BY: DJM DATE: 10/07/10 REVIEWED BY: BAG DATE: 10/07/10

Project: POST WOLF CREEK		Contract No: N1054	
Jack Description: PINE	Size: 850 Tons	Register No: 6002	
Theoretical Ram Area: 190.45 sq. in.		Max Pressure: 8500 psi	
Calibrating Device Used: MOREHOUSE	Register No: 61195	Constant: 10.0031	
Calibrating Gauge Used: HEISE	Register No: 44084	Due Date: 07/28/12	

Data From Current Calibration

Area (A_f): 191.381 sq.in.

Constant (C_f): -8.275 kips

Max Pressure (P): 8500 psi

Data From Previous Calibration

Area (A_i): 190.932 sq.in.

Constant (C_i): -7.789 kips

$$\frac{i-f}{i} x100\% = -0.206\%$$

WHERE:

$$i = (A_i \times P) + (C_i * 1000)$$

$$f = (A_f \times P) + (C_f * 1000)$$

PSC Precision Surveillance Corporation	**HYDRAULIC JACK CALIBRATION** Jack Calibration Record	DOCUMENT NO:	
		DOCUMENT TYPE:	ENG
		REVISION #	0
		SAFETY RELATED	X
		NON-SAFETY RELATED	
		PAGE 1 OF 3	

COMPUTED BY: DJM DATE: 11/03/10 REVIEWED BY: BAG DATE: 11/03/10

Project: POST TMI Contract No: N1063

Jack Description: PINE Size: 850 Tons Register No: 6002

Theoretical Ram Area: 190.45 sq. in. Max Pressure: 8500 psi

Calibrating Device Used: MOREHOUSE Register No: 61195 Constant: 10.0031

Calibrating Gauge Used: HEISE Register No: 44084 Due Date: 07/28/12

Raw Data By: DAVE PRITT Date: 11/03/10 Witness: N/A

Mean Ram Area: 191.019 sq. in. K= -5.932 kips Agency: N/A Date: N/A

Computed By: DAVID MALDONADO QC Check: G Bussone

Title: FIELD ENGINEER Date: 11/03/10 Title: QA Manager Date: 11/3/10

Target Pressure (PSI)	Gauge Reading (PSI)	Load Cell Readout	Comments
1000	1016	18925	RUN: 1 POSITION: 1.5"
2000	2006	37580	
3000	3017	56875	
4000	4006	75850	
5000	5020	95245	
6000	6015	114290	
7000	7027	133645	
8000	8024	152630	
8500	8511	161890	
1000	1032	19275	RUN: 2 POSITION: 3"
2000	2003	37745	
3000	3021	57050	
4000	4013	76045	
5000	5011	95110	
6000	6016	114345	
7000	7011	133370	
8000	8025	152680	
8500	8517	162155	
1000	1014	18845	RUN: 3 POSITION: 4.5"
2000	2031	38135	
3000	3021	56050	
4000	4017	76010	
5000	5027	95285	
6000	6025	114375	
7000	7019	133455	
8000	8003	152210	
8500	8518	162080	

HYDRAULIC JACK CALIBRATION
Linear Regression Analysis

Precision Surveillance Corporation

DOCUMENT NO:	
DOCUMENT TYPE:	ENG
REVISION #	0
SAFETY RELATED	X
NON-SAFETY RELATED	

COMPUTED BY: DJM DATE: 11/03/10 REVIEWED BY: BAG DATE: 11/03/10

Project: POST TMI
Contract No: N1063
Jack Description: PINE Size: 850 Tons
Register No: 6002
Theoretical Ram Area: 190.45 sq. in.
Max Pressure: 8500 psi
Calibrating Device Used: MOREHOUSE Register No: 61195
Constant: 10.0031
Calibrating Gauge Used: HEISE Register No: 44084
Due Date: 07/28/12

Actual Gauge Reading (psi)	Load Cell Readout	Computed Force (kips)
1016	18925.00	189.309
2006	37580.00	375.916
3017	56875.00	568.926
4006	75850.00	758.735
5020	95245.00	952.745
6015	114290.00	1143.254
7027	133645.00	1336.864
8024	152630.00	1526.773
8511	161890.00	1619.402
1032	19275.00	192.810
2003	37745.00	377.567
3021	57050.00	570.677
4013	76045.00	760.686
5011	95110.00	951.395
6016	114345.00	1143.804
7011	133370.00	1334.113
8025	152680.00	1527.273
8517	162155.00	1622.053
1014	18845.00	188.508
2031	38135.00	381.468
3021	56050.00	560.674 *
4017	76010.00	760.336
5027	95285.00	953.145
6025	114375.00	1144.105
7019	133455.00	1334.964
8003	152210.00	1522.572
8518	162080.00	1621.302

* Indicates these readings have been omitted from thefinal computations

Errors In Jack Calibration

Error In Standard	0.0100	ksi
Interpolation in Gauge	0.0000	ksi
Accuracy of Gauge	0.0000	ksi

Errors In Gauge Calibration

Interpolation in Master	0.0000	ksi
Interpolation In Field Gauge	0.0050	ksi
Accuracy of Master	0.0100	ksi
Accuracy of Field Gauge	0.0275	ksi

Errors In Field Use of Gauge

Interpolation Error	0.0050	ksi
Accuracy Error	0.0275	ksi
Maximum Gauge Reading Used	8.5180	ksi

FORCE (kips) = 191.019 (in^2) X GAUGE READING (ksi) + -5.932 (kips)

Correlation = 0.99999866 N/NO = 0.9630 (Not < 0.66667)

Maximum Error Ratio In Jack 0.0084
Maximum Error Ratio In Gauge 0.0049
Maximum Total Error Ratio 0.0098

HYDRAULIC JACK CALIBRATION
Comparison With Previous Calibration

DOCUMENT NO:	
DOCUMENT TYPE:	ENG
REVISION #	0
SAFETY RELATED	X
NON-SAFETY RELATED	
PAGE	3 OF 3

COMPUTED BY:	DJM	DATE:	11/03/10	REVIEWED BY:	BAG	DATE:	11/03/10

Project: POST TMI		Contract No: N1063	
Jack Description: PINE	Size: 850 Tons	Register No: 6002	
Theoretical Ram Area: 190.45 sq. in.		Max Pressure: 8500 psi	
Calibrating Device Used: MOREHOUSE	Register No: 61195	Constant: 10.0031	
Calibrating Gauge Used: HEISE	Register No: 44084	Due Date: 07/28/12	

Data From Current Calibration

Area (A_f): 191.019 sq.in.

Constant (C_f): -5.932 kips

Max Pressure (P): 8500 psi

Data From Previous Calibration

Area (A_i): 191.381 sq.in.

Constant (C_i): -8.275 kips

$$\frac{i - f}{i} x100\% = 0.045\%$$

WHERE:

$$i = (A_i \times P) + (C_i * 1000)$$

$$f = (A_f \times P) + (C_f * 1000)$$

DOCUMENT NO:	
DOCUMENT TYPE:	ENG
REVISION #:	0
SAFETY RELATED	X
NON-SAFETY RELATED	
PAGE 1 OF 3	

Precision Surveillance Corporation

HYDRAULIC JACK CALIBRATION
Jack Calibration Record

COMPUTED BY: DJM DATE: 10/07/10 REVIEWED BY: BAG DATE: 10/07/10

Project: PRE TMI Contract No: N1063
Jack Description: MAGNUS Size: 1000 Tons Register No: 9400
Theoretical Ram Area: 235.62 sq. in. Max Pressure: 8500 psi
Calibrating Device Used: MOREHOUSE Register No: 61195 Constant: 10.0031
Calibrating Gauge Used: HEISE Register No: 44084 Due Date: 07/28/12

Raw Data By: DANIEL O'SHEA Date: 10/07/10
Mean Ram Area: 235.787 sq. in. K= -6.961 kips
Computed By: DAVID MALDONADO
Title: FIELD ENGINEER Date: 10/07/10

Witness: N/A
Agency: N/A Date: N/A
QC Check: G Bussone
Title: QA Manager Date: 10/8/10

Target Pressure (PSI)	Gauge Reading (PSI)	Load Cell Readout	Comments
1000	1003	22960.00	RUN: 1 POSITION: 4"
2000	2003	46475.00	
3000	3004	70075.00	
4000	4002	93635.00	
5000	5005	117330.00	
6000	6004	140890.00	
7000	7010	164865.00	
8000	8001	188250.00	
1000	1010	23150.00	RUN: 2 POSITION: 8"
2000	2007	46430.00	
3000	3003	70140.00	
4000	4003	93805.00	
5000	5004	117335.00	
6000	6008	140815.00	
7000	7013	164640.00	
8000	8006	188005.00	
1000	1001	22890.00	RUN: 3 POSITION: 12"
2000	2004	46560.00	
3000	3007	70290.00	
4000	4005	93650.00	
5000	5002	117160.00	
6000	6003	140640.00	
7000	7000	164110.00	
8000	8006	187600.00	

PSG Precision Surveillance Corporation	**HYDRAULIC JACK CALIBRATION** Linear Regression Analysis	DOCUMENT NO:	
		DOCUMENT TYPE:	ENG
		REVISION #	0
		SAFETY RELATED	X
		NON-SAFETY RELATED	
		PAGE 2	OF 3

COMPUTED BY: DJM DATE: 10/07/10 REVIEWED BY: BAG DATE: 10/07/10

Project: PRE TMI Contract No: N1063
Jack Description: MAGNUS Size: 1000 Tons Register No: 9400
Theoretical Ram Area: 235.62 sq. in. Max Pressure: 8500 psi
Calibrating Device Used: MOREHOUSE Register No: 61195 Constant: 10.0031
Calibrating Gauge Used: HEISE Register No: 44084 Due Date: 07/28/12

Actual Gauge Reading (psi)	Load Cell Readout	Computed Force (kips)
1003	22960.00	229.671
2003	46475.00	464.894
3004	70075.00	700.967
4002	93635.00	936.640
5005	117330.00	1173.664
6004	140890.00	1409.337
7010	164865.00	1649.161
8001	188250.00	1883.084
1010	23150.00	231.572
2007	46430.00	464.444
3003	70140.00	701.617
4003	93805.00	938.341
5004	117335.00	1173.714
6008	140815.00	1408.587
7013	164640.00	1646.910
8006	188005.00	1880.633
1001	22890.00	228.971
2004	46560.00	465.744
3007	70290.00	703.118
4005	93650.00	936.790
5002	117160.00	1171.963
6003	140640.00	1406.836
7000	164110.00	1641.609
8006	187600.00	1876.582

* Indicates these readings have been omitted from thefinal computations

Errors In Jack Calibration

Error In Standard	0.0100	ksi
Interpolation in Gauge	0.0000	ksi
Accuracy of Gauge	0.0000	ksi

Errors In Gauge Calibration

Interpolation in Master	0.0000	ksi
Interpolation in Field Gauge	0.0050	ksi
Accuracy of Master	0.0100	ksi
Accuracy of Field Gauge	0.0275	ksi

Errors In Field Use of Gauge

Interpolation Error	0.0050	ksi
Accuracy Error	0.0275	ksi
Maximum Gauge Reading Used	8.0060	ksi

FORCE (kips) = 235.787 (in^2) X GAUGE READING (ksi) + -6.961 (kips)

Correlation = 0.99999592 N/NO = 1.0000 (Not < 0.66667)
Maximum Error Ratio In Jack: 0.0039
Maximum Error Ratio In Gauge: 0.0052
Maximum Total Error Ratio: 0.0065

PSC Precision Surveillance Corporation	HYDRAULIC JACK CALIBRATION Comparison With Previous Calibration			DOCUMENT NO:			
				DOCUMENT TYPE:			ENG
				REVISION #			0
				SAFETY RELATED			X
				NON-SAFETY RELATED			
				PAGE	3	OF	3
	COMPUTED BY: DJM	DATE: 10/07/10		REVIEWED BY: BAG		DATE: 10/07/10	

Project: PRE TMI			Contract No: N1063
Jack Description: MAGNUS	Size: 1000 Tons		Register No: 9400
Theoretical Ram Area: 235.62 sq. in.			Max Pressure: 8500 psi
Calibrating Device Used: MOREHOUSE	Register No: 61195		Constant: 10.0031
Calibrating Gauge Used: HEISE	Register No: 44084		Due Date: 07/28/12

Data From Current Calibration			Data From Previous Calibration		
Area (A_f):	235.787	sq.in.	Area (A_i):	232.058	sq.in.
Constant (C_f):	-6.961	kips	Constant (C_i):	1.679	kips
Max Pressure (P):	8500	psi			

$$\frac{i-f}{i} x100\% = -1.168\%$$

WHERE:

$$i = (A_i \times P) + (C_i * 1000)$$

$$f = (A_f \times P) + (C_f * 1000)$$

Precision Surveillance Corporation

HYDRAULIC JACK CALIBRATION
Jack Calibration Record

DOCUMENT NO:	
DOCUMENT TYPE:	ENG
REVISION #	0
SAFETY RELATED	X
NON-SAFETY RELATED	
PAGE 1 OF 3	

COMPUTED BY: DJM DATE: 11/03/10 REVIEWED BY: BAG DATE: 11/03/10

Project: POST TMI Contract No: N1063

Jack Description: MAGNUS Size: 1000 Tons Register No: 9400

Theoretical Ram Area: 235.62 sq. in. Max Pressure: 8500 psi

Calibrating Device Used: MOREHOUSE Register No: 61195 Constant: 10.0031

Calibrating Gauge Used: HEISE Register No: 44084 Due Date: 07/28/12

Raw Data By: DANIEL O'SHEA Date: 11/03/10

Mean Ram Area: 235.377 sq. in. K= -12.166 kips

Computed By: DAVID MALDONADO

Title: FIELD ENGINEER Date: 11/03/10

Witness: N/A

Agency: N/A Date: N/A

QC Check: GBussone

Title: QA Manager Date: 11/3/10

Target Pressure (PSI)	Gauge Reading (PSI)	Load Cell Readout	Comments
1000	1015	22865	RUN: 1 POSITION: 4"
2000	2017	46275	
3000	3015	69745	
4000	4016	93410	
5000	5011	116900	
6000	6022	140780	
7000	7026	164445	
8000	8034	188060	
1000	1009	22620	RUN: 2 POSITION: 8"
2000	2013	46105	
3000	3012	69640	
4000	4010	93170	
5000	5007	116710	
6000	6009	140210	
7000	7012	163735	
8000	8012	187315	
1000	1010	22560	RUN: 3 POSITION: 12"
2000	2015	45990	
3000	3011	69360	
4000	4009	92850	
5000	5013	116630	
6000	6023	140360	
7000	7013	163565	
8000	8016	187025	

Precision Surveillance Corporation

HYDRAULIC JACK CALIBRATION
Linear Regression Analysis

DOCUMENT NO:	
DOCUMENT TYPE:	ENG
REVISION #	0
SAFETY RELATED	X
NON-SAFETY RELATED	
PAGE 2 OF 3	

COMPUTED BY: DJM DATE: 11/03/10 | REVIEWED BY: BAG DATE: 11/03/10

Project: POST TMI Contract No: N1063
Jack Description: MAGNUS Size: 1000 Tons Register No: 9400
Theoretical Ram Area: 235.62 sq. in. Max Pressure: 8500 psi
Calibrating Device Used: MOREHOUSE Register No: 61195 Constant: 10.0031
Calibrating Gauge Used: HEISE Register No: 44084 Due Date: 07/28/12

Actual Gauge Reading (psi)	Load Cell Readout	Computed Force (kips)
1015	22865.00	228.721
2017	46275.00	462.893
3015	69745.00	697.666
4016	93410.00	934.390
5011	116900.00	1169.362
6022	140780.00	1408.236
7026	164445.00	1644.960
8034	188060.00	1881.183
1009	22620.00	226.270
2013	46105.00	461.193
3012	69640.00	696.616
4010	93170.00	931.989
5007	116710.00	1167.462
6009	140210.00	1402.535
7012	163735.00	1637.858
8012	187315.00	1873.731
1010	22560.00	225.670
2015	45990.00	460.043
3011	69360.00	693.815
4009	92850.00	928.788
5013	116630.00	1166.662
6023	140360.00	1404.035
7013	163565.00	1636.157
8016	187025.00	1870.830

* Indicates these readings have been omitted from thefinal computations

Errors In Jack Calibration

Error In Standard	0.0100	ksi
Interpolation In Gauge	0.0000	ksi
Accuracy of Gauge	0.0000	ksi

Errors In Gauge Calibration

Interpolation In Master	0.0000	ksi
Interpolation in Field Gauge	0.0050	ksi
Accuracy of Master	0.0100	ksi
Accuracy of Field Gauge	0.0275	ksi

Errors In Field Use of Gauge

Interpolation Error	0.0050	ksi
Accuracy Error	0.0275	ksi
Maximum Gauge Reading Used	8.0340	ksi

FORCE (kips) = 235.377 (in^2) X GAUGE READING (ksi) + -12.166 (kips)

Correlation = 0.99999425 N/NO = 1.0000 (Not < 0.66667)

Maximum Error Ratio In Jack	0.0087
Maximum Error Ratio In Gauge	0.0052
Maximum Total Error Ratio	0.0102

PSC Precision Surveillance Corporation	HYDRAULIC JACK CALIBRATION Comparison With Previous Calibration	DOCUMENT NO:	
		DOCUMENT TYPE:	ENG
		REVISION #	0
		SAFETY RELATED	X
		NON-SAFETY RELATED	
		PAGE 3 OF 3	

COMPUTED BY:	DJM	DATE:	11/03/10	REVIEWED BY:	BAG	DATE:	11/03/10

Project: POST TMI		Contract No: N1063	
Jack Description: MAGNUS	Size: 1000 Tons	Register No: 9400	
Theoretical Ram Area: 235.62 sq. in.		Max Pressure: 8500 psi	
Calibrating Device Used: MOREHOUSE	Register No: 61195	Constant: 10.0031	
Calibrating Gauge Used: HEISE	Register No: 44084	Due Date: 07/28/12	

Data From Current Calibration		Data From Previous Calibration	
Area (A_f):	235.377 sq.in.	Area (A_i):	235.787 sq.in.
Constant (C_f):	-12.166 kips	Constant (C_i):	-6.961 kips
Max Pressure (P):	8500 psi		

$$\frac{i-f}{i} x100\% = 0.435\%$$

WHERE:

$i = (A_i \times P) + (C_i * 1000)$

$f = (A_f \times P) + (C_f * 1000)$

	TMI - Unit 1 Surveillance Procedure	Number **1301-9.1**
Title **RB Structural Integrity Tendon Surveillance**		Revision No. **21**

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20 OCT 10

Review / Acceptance of Contractor Procedures

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SQ1.0/SURVEILLANCE PURPOSE	0		19 OCT 10
SQ2.0/SURVEILLANCE SCOPE	1		19 OCT 10
SQ3.0/CONSTRUCTION EQUIPMENT LIST	0		19 OCT 10
SQ4.0/QUALITY CONTROL EQUIPMENT LIST	0		19 OCT 10
SQ5.0/INSPECTION PRE-REQUISITE CHECKLIST	0		19 OCT 10
SQ6.0/GREASE CAP REMOVAL	0		19 OCT 10
SQ6.1/INSPECT FOR WATER	0		19 OCT 10
SQ6.2/WATER SAMPLE ANALYSIS	0		19 OCT 10
SQ7.0/SHEATHING FILLER ANALYSIS	0		19 OCT 10
SQ7.1/THREAD MEASUREMENT OF ANCHORAGES	0		20 OCT 10
SQ9.1/PRESTRESS FORCES	1		20 OCT 10
SQ10.2/TEST WIRE REMOVAL	0		20 OCT 10
SQ10.3/TESTING TENDON WIRES	0		20 OCT 10
SQ10.5/CONTINUITY TEST	0		20 OCT 10
SQ11.1/PSC ENGINEERING DATA	1		20 OCT 10
SQ12.0/GREASE CAP REPLACEMENT	0		20 OCT 10
SQ12.1/GREASE REPLACEMENT	0		20 OCT 10
SQ12.2/GREASE VOLUMES	1		20 OCT 10
QA1.0/PROGRAM PURPOSE	0		20 OCT 10
QA2.0/PROGRAM SCOPE	0		20 OCT 10

	TMI - Unit 1 Surveillance Procedure	Number 1301-9.1
Title **RB Structural Integrity Tendon Surveillance**		Revision No. **21**

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Review / Acceptance of Contractor Procedures

Procedure Number / Title	Revision	Reviewed/Accepted by	Date
QA 3.0 / Quality Organization	0	[signature]	20 Oct 10
QA 4.0 / Quality Control Responsibility	0	[signature]	20 Oct 10
QA 4.1 / Personnel Qualifications	1	[signature]	20 Oct 10
QA 5.0 / Personnel Training	0	[signature]	20 Oct 10
QA 6.0 / Procurement	0	[signature]	20 Oct 10
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QA 8.0 / Document Control	0	[signature]	20 Oct 10
QA 8.1 / Revision Control	0	[signature]	20 Oct 10
QA 9.0 / Nonconformances	0	[signature]	20 Oct 10
QA 10.0 / Calibration	0	[signature]	20 Oct 10
QA 10.1 / Calibration Verification	0	[signature]	20 Oct 10
QA 11.0 / Quality Control Inspection	0	[signature]	20 Oct 10
QA 12.0 / Audits	0	[signature]	20 Oct 10

PSC

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CONTROLLED MANUAL NO: N1043-

POST TENSIONING SYSTEM IN-SERVICE INSPECTION MANUAL

FOR

EXELON
THREE MILE ISLAND
UNIT 1 (35^{TH} YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

REVISION	0	July 31, 2009
REVISION	1	November 6, 2009
REVISION	2	October 13, 2010
REVISION	3	October 15, 2010

G Bussone	*QA MANAGER*	10/15/10
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	10/15/10
Approved by	Title	Date
Paul C. [illegible]	*PRESIDENT*	10/15/10
Approved by	Title	Date

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Precision Surveillance Corporation
Quality Assurance
3468 Watling Street
East Chicago, IN 46312

Phone: 219-397-5826
Fax: 219-397-5867

The return of this Acknowledgement form from Control Manual Number: ____________________

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Company:	EXELON
Project:	TMI 35TH YEAR TENDON SURVEILLANCE AND 2010 AUGMENTED SCOPE
Contract:	N1043 & N1063

In-Service Inspection Manual	
Issue Date	07/31/09
Revision	3 10/15/10

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
TENDON SURVEILLANCE PROGRAM

MANUAL CONTROL POLICY

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C. Witt	*PRESIDENT*	07/31/09
~~Approved by~~	Title	Date

1.0 Controlled copies of this manual SHALL be submitted for review and approval according to the distribution and quantity requirements established by the Contract Documents. Where this is not specified, Precision Surveillance Corporation SHALL submit a minimum of one controlled Manual. Where applicable, an uncontrolled copy may be submitted to assist in the review process. To avoid fabrication or construction delays, a line of communication should be established with the personnel responsible for initiating approval for the Manual or Revisions thereto, rather than incurring the delay for gravitation to that level.

2.0 Acknowledgement of Receipt is mandatory upon receiving a Controlled Manual and a form is supplied to facilitate this response. This form or a copy, SHALL be filled in with the information requested and returned in order to activate the Control status of this Manual, otherwise it will be treated as an uncontrolled manual and no attempt SHALL be made to keep it in a current condition.

3.0 The responsibility for keeping the uncontrolled Manuals up to date SHALL be incumbent on the person acknowledging receipt of the Controlled Manual.

4.0 Reproduction of the Manual <u>IS NOT AUTHORIZED</u>, except for copies made by Exelon for internal distribution review and use, without the expressed written consent of the Precision Surveillance Corporation Quality Assurance Section responsible for the maintenance of the Manual.

5.0 Where required, uncontrolled manuals SHALL be submitted at the pre-bid stage of the project. In the event of non-award of the project to Precision Surveillance Corporation, the uncontrolled Manual SHALL be returned to the Quality Assurance Section.

6.0 <u>INTERNAL</u>

6.1 Those Precision Surveillance Corporation personnel receiving Controlled Manuals or revisions thereto, SHALL be responsible for reviewing and understanding those portions of the Quality Program that they and their subordinates are responsible for. The return of the Acknowledgement of Receipt SHALL constitute certification that the person receiving that Program/Revision has reviewed the contents and has taken appropriate action to notify or train those personnel under his control that are affected by that document or the revisions thereto.

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REVISION CONTROL SHEET

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Project: TMI – 35th Year Tendon Surveillance   Revision # 3

REVISION CONTROL SHEET

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Revision No.	Date	Revision Description	Revision By:	Date Approved

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
TENDON SURVEILLANCE PROGRAM

DEFINITIONS

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C ...	*PRESIDENT*	07/31/09
Approved by	Title	Date

ACTIVE CORROSION: Corrosion on a component that exhibits metal loss that has occurred since fabrication or construction, and/or exhibits pitting visible to the naked eye. Active corrosion usually is a reddish/rust color.

ANCHORHEAD (Stressing Washer): The round machined components at the end of each end of the tendon through which tendon wires are passed.

BEARING PLATE (Baseplate, Trumplate): The steel plate at the end of the tendon, embedded in the concrete. The tendon is passed through the hole in the plate and the anchorhead bears against the plate or shim which in turn transfers the load to the concrete.

BROKEN WIRE: A wire within a tendon assembly that is broken and not capable of accepting post tensioned load. Wires that excessively protrude from the anchorage components are suspected to be broken.

BUTTONHEAD: The end of the tendon wire that was mechanically deformed during construction, which seats on each anchorage.

CONTINUITY TEST: A method of determining if wires are intact and not broken within a tendon. This is an optional test that may be recommended as a corrective action if abnormal degradation is identified.

CORROSION PROTECTION MEDIUM (Grease, Casing Filler): Grease injected into tendon duct and anchorage caps for corrosion protection. Also referred to as grease or sheathing filler grease.

EFFECTIVE WIRE: Tendon wire capable of maintaining required post tensioned force.

ELONGATION: The distance a tendon/wire stretches while under stress.

FEELER GAUGE METHOD: The method used to determine lift off during a test that utilizes the placement of feeler gauges within the anchorage components while the tendon is under jack/ram load.

FIELD END: The end of the tendon on which buttonheads are formed after the tendon is installed. The field end usually does not have a bushing.

FREE WATER: Any quantity of water collected from a tendon grease cap, anchorage components, shim gaps, or tendon duct.

GREASE CAP: Steel container bolted to the bearing plate or anchorhead. A grease cap encases the anchorage assembly to provide permanent corrosion protection.

GUARANTEED MINIMUM ULTIMATE TENSILE STRENGTH (GUTS): The tensile strength of the tendon assembly based upon the tensile strength of the wire used in construction and the quantity of effective wires. The minimum Guaranteed Ultimate Tensile Strength of 0.250 inch (6.35 mm) diameter wire is 240,000 pounds per square inch or 11,781 pounds per wire.

INSPECTION PERIOD: The period in which an inspection is completed at a specific site.

JACK (Ram): A cylindrical, hydraulic piston used to stress the tendon. Also referred to as a "Ram".

JACK CHAIR: That device attached to the front of the ram and bears against the bearing plate, which provides the lift height for the tendon as it is being stressed.

LIFT OFF FORCE: The actual force or pressure required to lift the anchor head off the tendon anchorage assembly shim stack.

LOCK OFF FORCE: The final seating force of a tendon after tensioning during construction or retensioning thereafter.

MINIMUM DESIGN FORCE (kips): The minimum acceptable average prestress force for a tendon or group of tendons to maintain the design basis of the containment structure.

MISSING WIRE: A wire that is identified as missing from the tendon.

MONITORING OF FORCE: That series of operations that determine the force or prestress remaining in the tendon.

NET DUCT (GREASE VOID) VOLUME: The volume within a tendon duct that is capable of being filled with corrosion protection medium. This is the gross duct volume minus the volume taken by the tendon wires and components.

OVERSTRESS FORCE: The maximum force that can be applied to a tendon during lift off testing and retensioning. This force is 80% of the tendon's ultimate tensile strength. For wire specification ASTM A421, 80% of the minimum Guaranteed Ultimate Tensile Strength of the wire is 9,423 pounds for each 0.25 inch diameter wire.

POST TENSIONING: A method of prestressing concrete in which the tendons are tensioned after the concrete has cured.

PREDICTED FORCE: The pre-calculated force (in kips) based upon the measurement of the prestressing forces during installation minus the losses in prestressing forces that were predicted to have occurred since that time because of material and structural characteristics. This is the calculated minimum force that should be achieved during lift off. This value is the acceptance criteria for measuring pre-stress forces. The as-found value should be equal to or exceed this value.

PRESTRESSED CONCRETE: Reinforced concrete in which internal stresses have been introduced in such magnitude and distribution that the stresses resulting from loads are counteracted to a desired degree.

PRETENSIONING FORCE: The force achieved during retensioning where the slack and mechanical clearances have been removed.

PROTRUDING OR UNSEATED WIRE: A wire within a tendon assembly that is extending beyond a tendon anchorhead face after stressing and is not seated against the anchorhead. The wire must be evaluated.

PUMP: A mechanical device used to pump hydraulic fluid into the jack and apply the force required to stress the tendon.

RAM: Synonym for Jack. (See Jack)

REGRESSION ANALYSIS: The determination, based upon evaluation of measured forces, of the capability of a tendon or group of tendons to maintain the minimum design prestress force(s) until the next scheduled inspection or beyond.

RESPONSIBLE ENGINEER: A Registered Professional Engineer (RPE) experienced in evaluating the in-service condition of structural concrete. The RPE shall have knowledge of the design and construction codes and other criteria used in the design and construction of concrete containment structures in nuclear power plants.

SHEATHING (Conduit, Duct): The thin-walled tubular steel used for creating a void in the concrete through which the tendon is passed. (Also referred to as : duct, conduit.)

SHIM STACK: A series of steel shims installed between the anchor head and bearing plate so that the desired prestress force is obtained.

SHOP END: The end of a tendon on which the buttonheads are formed prior to installation. These buttonheads are formed in a shop environment and not in the field.

STRESSING: Connecting the ram to the tendon and pulling until a predetermined force and elongation is achieved.

STRESSING ADAPTOR (Coupler): That threaded device attached to the pull-rod of the ram, which couples with the anchorhead to be stressed.

<u>TENDON:</u> A separate continuous multi-wire tensioned element anchored at both ends to an end anchorage assembly. An assembly of prestressing steel and anchorage components which imparts prestressing forces to concrete.

<u>TENDON END ANCHORAGE ASSEMBLY:</u> That portion of the tendon which extends beyond the bearing plate while in a stressed condition which consists of the bearing plate, shim stack, anchor head and wire.

<u>TENDON GROUP (TYPE):</u> Groups based upon geometry and position in the containment structure. Horizontal, vertical, and dome tendon groups are applicable to TMI Unit 1.

<u>TENDON LOCATION NUMBER:</u> The identity of a tendon with regard to it's location in the structure.

<u>WIRE:</u> 0.250 inch (6.35 mm) diameter wire manufactured to ASTM A421.

EXELON
THREE MILE ISLAND
UNIT 1 (35^{TH} YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

PERSONNEL SAFETY

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C Witt	*PRESIDENT*	07/31/09
~~Approved by~~	Title	Date

1.0 PURPOSE

1.1 The purpose of this document is to create an awareness for those safety considerations that must be observed by personnel working around or directly involved in Post-Tensioning System operations.

2.0 GENERAL

2.1 All personnel directly involved with the Post-Tensioning System operations shall be made aware of the magnitude of the working forces and safety requirements for the various operations.

3.0 SAFETY

3.1.1 <u>WIRE</u>

3.1.2 The wire used for fabricating the tendons has a minimum breaking strength of 240,000 pounds per square inch. This means that each ¼" diameter wire is capable of withstanding a minimum breaking load of 11,781 pounds. Multiply this by the number of wires in a tendon and you are dealing with forces of almost 2 million pounds for a 169 wire tendon.

> NEVER CONNECT A WELDING GROUND, PERFORM WELDING ON, OR STRIKE AN ARC NEAR A STRESSED TENDON.
>
> NEVER APPLY AN OPEN FLAME TO THE BUTTONHEADS, THE WIRES OR ANCHORHEADS OF A STRESSED TENDON.
>
> NEVER STRIKE THE BUTTONHEADS, THE WIRES OR THE ANCHORHEADS OF A STRESSED TENDON WITH A HAMMER OR ANY OTHER OBJECT.

3.1.3 The above actions could cause a button head or wire to fail. During tendon tensile testing, broken wires or button heads have been observed to penetrate hard lumber in excess or 4 inches in thickness, about the equivalent of a .32 caliber bullet.

3.2 <u>STRESSING OPERATIONS</u>

3.2.1 During de-tensioning or stressing operations the following cautions shall be observed.

> NEVER EXCEED THE OVERSTRESS FORCE OR PRESSURE - 80% OF TENDON GUTS FOR THE AMOUNT OF EFFECTIVE WIRES IN A TENDON. (1592 kips FOR A 169 WIRE TENDON.)

DO NOT STAND BEHIND THE JACK WHEN IT IS UNDER LOAD.

KEEP FINGERS OUT OF ANY PINCH AREAS.

BE ALERT DURING SHIM PLACEMENT AND REMOVAL.

3.3 STRESSING ADAPTOR (COUPLER)

3.3.1 Prior to applying ANY FORCE to the tendon, the stressing adaptor, coupler, must be fully engaged with the anchorage to be stressed or de-tensioned. No more than 3/8 of an inch of the anchorage shall protrude beyond the bottom face of the stressing adaptor, to constitute full engagement.

3.3.2 During coupling and uncoupling of the stressing adaptor with the bushing and the small anchor head, and especially where some difficulty is encountered with the actual coupling, there is a possibility that the small anchor head may become partially or completely unthreaded from the bushing. Therefore, where any difficulty has been encountered in coupling the adaptor to any anchorage, especially where repeated thread-on and unthreading is noted, before any load or jacking force is applied to that tendon, the proper engagement of the shop anchor head to the bushing shall be checked. This shall be done visually verifying that the small anchor head does not protrude beyond the bottom face of the bushing. The uncoupling could occur as a result of tight, sticking or slightly damaged threads.

3.4 GREASING OPERATIONS

DURING GREASING, BE AWARE THAT THE GREASE IS HOT AND MAY BE PUMPED UNDER PRESSURE.

3.4.1 During greasing operations the grease may be pumped under pressure and will have temperatures in excess of 200°F and injury could occur through carelessness. It is therefore essential to avoid direct contact with the hot grease and to make sure all connections are secure.

3.4.2 Exercise caution when climbing ladders. The potential for slippery surfaces created by grease on shoes exists. Ladder rung, etc. shall be wiped clean if coated in grease.

3.4.2.1 During heating of grease be aware that belt heaters are hot and could cause injury if touched. It is also essential to ensure that no flammable materials are allowed to touch belt heaters when in operation.

3.4.2.2 Belt heaters draw large amounts of current, ensure that power supply and any extension chords used are suitable for the power requirements.

3.5 CONSTRUCTION SAFETY

DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING.

DO NOT PERMIT OTHERS TO STAND UNDER LOADS.

DO NOT THROW OR DROP OBJECTS FROM THE SCAFFOLD.

3.5.1 All Exelon Accident Prevention Procedures shall be rigidly adhered to, to the total satisfaction of the site safety department. As in other heavy construction, care should be exercised while working from scaffolds, platforms, ladders, high or restricted access locations. Respect for the safety and well-being of the other trades and personnel in the area must be observed, especially during hoisting operations.

3.5.2 Some work may be near plant equipment required for safe shutdown and/or may cause shutdown if plant equipment is damaged. Use special care therefore when suspending or moving de-tensioning rams or other heavy surveillance equipment.

3.5.3 If required notify site safety organization to obtain air samples in the tendon gallery prior to entry into the gallery. Enter gallery only upon site safety approval.

3.5.4 If there are any doubts or questions concerning a point of operation or safety, refer to the PSC Construction Supervisor before starting that operation or proceeding any further. Refer to the Quality Control personnel any questions about quality before starting operations or proceeding any further.

3.5.5 For surveillances during plant operation, special precautions must be taken to avoid work in hazardous areas resulting from plant operating conditions.

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

SURVEILLANCE PURPOSE

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. C[illegible]	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C [illegible]	*PRESIDENT*	07/31/09
~~Approved by~~	Title	Date

1.0 PURPOSE

1.1 The Purpose of the Tendon Surveillance Program is to demonstrate the integrity of the containment pre-stressing system, including containment tendons, tendon end anchorage hardware and adjacent concrete integrity, and evaluation of the corrosion protective (grease) system. Individual inspections of selected tendons, as well as grease sample testing are performed to evaluate the overall integrity of the pre-stressing system.

1.2 Tendon surveillance is required at 1, 3, 5, and 10 years after the Initial Containment Structural Integrity Test and is to be performed every 5 years thereafter for the life of the plant.

1.3 The purpose of this Surveillance Quality Control Manual is to provide those procedures that will be necessary to perform the Unit 1 Physical 35th Year In-Service Inspection (Surveillance) of the Reactor Building Post-Tensioning System Tendons for Exelon's Three Mile Island Nuclear Plant.

1.3.1 The surveillance must conform to the requirements of TMI Procedure 1301-9.1.

1.3.2 The SQ procedures provide additional detailed instructions for certain surveillance activities.

1.3.3 In the event of conflict between 1301-9.1 and an SQ, the former governs.

1.3.4 Procedures shall be used as shown in PSC Procedure SQ 2.0.

1.3.5 In addition, each procedure provides as necessary, the reporting responsibilities for PSC Personnel for notification to TMI Engineering in writing of unacceptable conditions that may have been detected as a result of the Inspections, Tests or Evaluations.

1.4 It shall be the responsibility of Exelon to evaluate the seriousness of the unacceptable condition and to formulate, with the assistance of the PSC Engineering Department as required, or if needed, a means of corrective action.

1.4.1 It shall further be Exelon's responsibility to draft and submit a formal report to the United States Nuclear Regulatory Commission describing the unacceptable condition and the required corrective action.

1.5 This Surveillance Quality Control Manual has been developed in accordance with Exelon's Procedures 1301-9.1 Rev 20, ER-AA-335-018 and ASME Section XI, Subsection IWL, 2001 Edition with 2003 Addenda and the applicable amendments as specified in 10CFR50.55a, Codes and Standards.

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

SURVEILLANCE SCOPE

G Bussone	*QA MANAGER*	10/13/10
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	10/13/10
Approved by	Title	Date
Paul C. [illegible]	*PRESIDENT*	10/13/10
Approved by	Title	Date

1.0 CONTAINMENT ARRANGEMENT

1.1 The Three Mile Island Unit 1 containment building is a post-tensioned and reinforced concrete structure comprised of a vertical cylinder with hemispherical dome roof. It is supported on a conventional reinforced concrete foundation slab. The containment structure post-tensioning systems provide sufficient external pressure load to balance the internal pressure of the structure as well as the design basis accident internal containment pressure. The post-tensioning system consist of:

1.2 Approximately 166 vertical tendons in the cylinder walls anchored at the top surfaces of the ring girders and at the bottom of the base slabs;

1.3 Approximately 330 hoop tendons in the cylinder wall. Each tendon encloses 120 degrees of arc and is anchored at two of the six vertical buttresses;

1.4 Three groups of 49 dome tendons (total 147 tendons) alternately oriented at 120 degrees to each other and anchored at the vertical faces of the ring girders.

1.5 Each tendon consists of nominally 169 – ¼" diameter high strength wires with buttonhead anchorages. The vertical and hoop tendons are housed in individual spirally wrapped, corrugated, thin wall sheet metal sheathing connected to steel bearing plates and trumplets at each end. The dome ducts are 5" schedule 40 pipe. The sheathing (pipe) is cast into each containment structures' concrete walls and dome. The tendons are capped at each anchorage with a sheathing filler cap and the tendon sheathing and caps are filled with corrosion preventing grease.

2.0 UNIT 1 SCOPE OF WORK

2.1 The required Inspections, Testing and evaluation of the Post-Tensioning System of Exelon's Three mile Island Nuclear Plant – Unit 1 during the 35th Year surveillance, and additional SGR scope, shall be performed for the tendons (selected by TMI Engineering) and types of activities shown in table Table 2-1.

2.1.1 The surveillance must conform to the requirements of TMI Procedure 1301-9.1.

2.1.2 The SQ procedures provide additional detailed instructions for certain surveillance activities.

2.1.3 In the event of conflict between 1301-9.1 and an SQ, the former governs.

Table 2-1 : TMI – 35th Year Surveillance Scope – Surveillance Tendons Unit 1										
TENDON	END	VISUAL			PHYSICAL					COMMENTS
		SQ6.0	SQ6.1	SQ7.0	1301-9.1	SQ10.2	SQ10.3	1301-9.1	SQ12.1	
H13-41	BT1 & BT3	●	●	●	●				●	
H24-33	BT2 & BT4	●	●	●	●				●	
H46-50	BT4 & BT6	●	●	●	●				●	
H51-49	BT1 & BT5	●	●	●	●	●	●	●	●	DETENSION
H62-26	BT2 & BT6	●	●	●	●				●	COMMON
V-11	TOP/BOT	●	●	●	●				●	
V-32	TOP/BOT	●	●	●	●				●	COMMON
V-90	TOP/BOT	●	●	●	●	●	●	●	●	DETENSION
V-132	TOP/BOT	●	●	●	●				●	
D-122	NE & SW	●	●	●	●				●	
D-225	NW & SE	●	●	●	●				●	COMMON
D-322	NW & SE	●	●	●	●	●	●	●	●	DETENSION
D-342	NW & SW	●	●	●	●				●	COMMITMENT FROM 30TH YEAR

LEGEND

SQ 6.0 – GREASE CAP REMOVAL
SQ 6.1 – INSPECTION FOR WATER
SQ 7.0 – GREASE SAMPLE ANALYSIS
1301-9.1 – TMI PROCEDURES
SQ 10.2 – TENDON WIRE INSPECTION
SQ 10.3 – TESTING TENDON WIRES
1301-9.1 – RETENSION TENDONS
SQ 12.1 – GREASE REPLACEMENT

Table 2-2a : TMI – Added SGR Scope – Surveillance Tendons Unit 1										
TENDON	END	VISUAL			PHYSICAL					COMMENTS
		SQ6.0	SQ6.1	SQ7.0	1301-9.1	SQ10.2	SQ10.3	1301-9.1	SQ12.1	
H46-39	BT4 & BT6	●	●	●	●	●	●	●	●	DETENSION
H46-41	BT4 & BT6	●	●	●	●				●	
V-118	TOP/BOT	●	●	●	●	●	●	●	●	DETENSION
V-134	TOP/BOT	●	●	●	●				●	

3.0 EXPLANATION

3.1.1 "V" are Vertical Tendons, "H" are Hoop Tendons and "D" are Dome Tendons.

3.1.2 "•" - means the tendon shown shall be Inspected for the stated requirements during this Surveillance.

EXELON
THREE MILE ISLAND
UNIT 1 (35^{TH} YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

CONSTRUCTION EQUIPMENT LIST

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C Waff	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 EQUIPMENT

1.1 The following list of equipment should be available for use during the Surveillance operations. This list is only intended as a guide.

1.2 Miscellaneous shackles, hooks, chain hoists, Come-A-longs, hoisting slings.

1.3 Banding equipment.

1.4 Communications equipment - Walkie Talkies or Sound Powered Phones.

1.5 Buckets, pails, rags, brushes.

1.6 Miscellaneous Tools, hammers, wrenches, ratchets, sockets, bundling wire, screw drivers, pliers, heavy duty wire cutters, files, pry bars, etc.

1.7 Miscellaneous nuts, bolts, pins, washers, wooden blocks, rags, lights, extension cords, tape, etc.

1.8 Platforms, scaffolding, ladders, man-lifts, cable, ropes, etc.

1.9 Plastic Bags, Plastic Sheeting (Visqueen).

1.10 Band or Drum heaters.

1.11 Fluid Pump for drum.

1.12 Empty 55 Gallon drums.

1.13 Grease can gaskets.

1.14 55 Gallon drums of Viscosity Oil Visconorust 2090P-4 (Certified).

1.15 55 Gallon drums of Viscosity Oil Viscor #16A Solvent or equal (Certified).

PSC
Precision Surveillance Corporation

EXELON
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PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

QUALITY CONTROL EQUIPMENT LIST

Gerald Bussone	*Q.A. MANAGER*	07/31/09
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[signature]	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
[signature]	*PRESIDENT*	07/31/09
~~Approved by~~	Title	Date

1.0 INSPECTION EQUIPMENT

1.1 The following items shall be required for the inspections stated in each procedure. Each piece of testing and measuring equipment shall be in a currently calibrated condition. Items in excess of those shown as being required for that procedure, and being used during the Inspections of that procedure, shall be documented on the appropriate Data Sheet where they were used for: Name, Identification and Recalibration Date.

2.0 SQ 6.0

2.1 Surface Thermometer.

2.2 Pocket-Probe Thermometer.

2.3 Sample of new 2090P-4 grease in a closed container (for Color Match).

3.0 SQ 6.1

3.1 Suitable quantities of clean, unused non-metallic containers for obtaining water samples.

3.2 Clean unused rags or wipers.

3.3 Indelible permanent marking devices and/or labels for the sample containers.

3.4 Flashlights and batteries.

3.5 Pens; Markers; Data Sheets; Tendon Inspection List.

4.0 SQ 7.0

4.1 Suitable quantities of clean, unused 1 quart containers; plastic or steel.

5.0 SQ 7.1

5.1 Standard Outside Measuring Micrometer capable of reading to 0.001" or better.

5.2 Standard Inside Measuring Micrometer capable of reading to 0.001" or better.

5.3 Special Pitch Diameter Go and No-Go Thread Plug Gauges.

5.4 A set of three hardened standard stub ACME thread wires (diameter 0.129" to 0.162").

5.5 Shims, used in the three-wire method of measurement.

6.0 1301-9.1

6.1 Magnifying Glasses with suitable illumination.

6.2 Optical Comparator with 0.005" Measuring Reticle.

6.3 Steel Ruler, Steel Tapeline.

6.4 400 Grit Wet or Dry Sandpaper.

6.5 Steel Wool - Medium Coarseness.

6.6 Feeler Gauges.

6.7 Stressing Jacks.

6.8 Pressure Gauges.

6.9 Caliper. (Optional)

6.10 Heise Digital Gauge (Verification of Pressure Gauge Calibration, refer to Procedure QA 10.1).

6.11 Surface Thermometer.

6.12 Tendon Wire Pulling Ram. (Optional)

6.13 1" O.D. Micrometer.

6.14 Wire Test Apparatus.

6.15 Pressure Gauge, if used with the hydraulic pump for the Apparatus.

7.0 SQ 12.1

7.1 Surface Thermometer.

7.2 Pocket-Probe Thermometer.

Precision Surveillance Corporation

EXELON
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UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

INSPECTION PREREQUISITE CHECKLIST

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Approved by	Title	Date
Paul C	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 CHECKLIST

1.1 The following items should be checked prior to beginning work. This is not a Quality Control Documentation requirement and is only presented as a reminder list to those personnel who will be dependent on these items.

1.2 Verify that all the Construction Equipment cited in PSC Procedure SQ 3.0 has been prepared or arrangements made for acquisition.

1.3 Verify that the Quality Control Equipment cited in PSC Procedure SQ 4.0 has been ordered or is available for use.

1.4 Verify that the Grease Testing Laboratory has been qualified and ready to receive the grease samples.

1.5 Verify that suitable quantities of the data sheets are available or the means to generate a suitable quantity is available on site.

1.6 Verify that controlled copies of the PSC Quality Assurance Manual and the PSC Surveillance Quality Control Manual are available.

1.7 Verify that each item supplied as Quality Control Equipment has been calibrated and that suitable documentation accompanies each item.

1.8 Verify that all Field Quality Control Personnel are qualified and that copies of certifications exist for each Inspector.

1.9 Verify that the Construction Personnel are familiar with the operating manuals for the equipment and that suitable training has been provided to familiarize them with the Surveillance requirements.

1.9.1 Verify that the Construction Personnel are familiarized with the Safety Comments for the Surveillance.

1.9.2 Verify that the Construction Personnel have been familiarized with the OSHA safety requirements and any selective safety measures imposed by Exelon.

1.9.3 Verify that the On-Site Radiological Safety Training requirements have been completed if required.

1.10 Verify that the identity and location of each tendon to be inspected is correct.

1.11 Verify that suitable quantities of 2090P-4 grease and Viscor #16A Solvent or equivalent are available with the required documentation.

CHECKLIST

ITEM		STATUS	SIGNED	DATE
1.2	Verify that all the Construction Equipment cited in PSC Procedure SQ 3.0 has been prepared or arrangements made for acquisition.	☐ Yes ☐ N/A		
1.3	Verify that the Quality Control Equipment cited in PSC Procedure SQ 4.0 has been ordered or is available for use.	☐ Yes ☐ N/A		
1.4	Verify that the Grease Testing Laboratory has been qualified and ready to receive the grease samples.	☐ Yes ☐ N/A		
1.5	Verify that suitable quantities of the data sheets are available or the means to generate a suitable quantity is available on site.	☐ Yes ☐ N/A		
1.6	Verify that controlled copies of the PSC Quality Assurance Manual and the PSC Surveillance Quality Control Manual are available.	☐ Yes ☐ N/A		
1.7	Verify that each item supplied as Quality Control Equipment has been calibrated and that suitable documentation accompanies each item.	☐ Yes ☐ N/A		
1.8	Verify that all Field Quality Control Personnel are qualified and that copies of certifications exist for each Inspector.	☐ Yes ☐ N/A		
1.9	Verify that the Construction Personnel are familiar with the operating manuals for the equipment and that suitable training has been provided to familiarize them with the Surveillance requirements.	☐ Yes ☐ N/A		
1.9.1	Verify that the Construction Personnel are familiarized with the Safety Comments for the Surveillance.	☐ Yes ☐ N/A		
1.9.2	Verify that the Construction Personnel have been familiarized with the OSHA safety requirements and any selective safety measures imposed by Exelon.	☐ Yes ☐ N/A		
1.9.3	Verify that the On-Site Radiological Safety Training requirements have been completed if required.	☐ Yes ☐ N/A		
1.10	Verify that the identity and location of each tendon to be inspected is correct.	☐ Yes ☐ N/A		
1.11	Verify that suitable quantities of 2090P-4 grease and Viscor #16A Solvent or equal are available with the required documentation.	☐ Yes ☐ N/A		

EXELON
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CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

GREASE CAP REMOVAL

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Approved by	Title	Date
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~~Approved by~~	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the requirements for the removal of Grease Caps (End Caps) for purposes of evaluation and visual inspection during In-Service-Inspection (surveillance) of the Post-Tensioning System Tendons at Exelon's Three Mile Island Nuclear Plant - Unit 1.

2.0 RESPONSIBILITY

2.1 As stated in PSC Procedure QA 4.0.

3.0 QUALIFICATION

3.1 As stated in PSC Procedure QA 4.1.

4.0 EQUIPMENT

4.1 The equipment necessary for the Quality Control activities will be itemized in PSC Procedure SQ 4.0.

5.0 QUALITY CONTROL

5.1 This procedure contains ***QCD*** points. The work shall not progress past or through a ***QCD*** without a sign-off or verbal approval from the QC Inspector. All Quality Control Documentation (***QCD***) points shall only require documentation of information or evaluation data. The sign-offs and required information or evaluation data shall be documented on Data Sheet 6.0.

6.0 PRECAUTIONS

6.1 A tendon grease cap weighs in excess of 50 pounds and may contain 50 pounds of grease. Be prepared to support this weight when the grease cap is unbolted and removed.

6.2 The sheathing filler (grease) may be in liquid, gel or solid form. Tendons in the area of steam or feed penetrations in operating plants, may contain hot grease and some caution should be exercised. It is not necessary to drain all the grease from a tendon void and is to be avoided if possible.

CAUTION: NEVER STRIKE THE BUTTONHEADS, THE WIRES, OR THE ANCHORAGES OF A STRESSED TENDON WITH A HAMMER OR ANY OTHER OBJECT.

HAVE SUFFICIENT QUANTITIES OR SIZES OF CONTAINERS ON HAND TO CATCH THE GREASE, AS IT MAY FALL FROM THE TENDON VOID, ANCHORAGE OR GREASE CAP.

IF AT ANY TIME A CRACKED OR BROKEN ANCHORHEAD IS DETECTED AS A RESULT OF THESE INSPECTIONS, ALL WORK SHALL STOP. ALL PERSONNEL SHALL BE MOVED AWAY FROM THAT AREA. THE PSC CONSTRUCTION SUPERVISOR SHALL BE NOTIFIED. THE CONDITION SHALL BE FORMALLY DOCUMENTED BY A NONCONFORMANCE REPORT. THE WORK AND/OR INSPECTIONS SHALL CONTINUE AFTER A SAFETY EVALUATION HAS BEEN MADE AND ONLY AT THE DIRECTION AND CONTROL OF THE PSC CONSTRUCTION SUPERVISOR AND TMI ENGINEERING.

6.3 Provide protection during inclement weather to prevent entry of moisture into the end anchorage.

6.4 Use wooden or plastic paddles or spatulas to scoop out bulk filler grease from around the anchorage. No metal implements are permitted.

7.0 PREREQUISITES

7.1 Position platforms, as required, at the end of the tendon to be inspected.

7.2 ***QCD*** – Document the tendon identification, Unit # and tendon end on Data Sheet 6.0

7.3 Provide support for the Grease Cap. Be prepared to catch any grease that may fall during loosening and removal.

7.4 It may be advantageous to pack the outside of the grease cap with dry ice to further solidify the grease column. TMI Engineering shall be notified prior to performing any dry ice packing.

7.4.1 Once the grease cap has been removed, the tendon end anchorage and shims may be packed with dry ice to further solidify the grease column. TMI Engineering shall be notified prior to performing any dry ice packing.

7.5 ***QCD*** – Document the date can removal started on Data Sheet 6.0.

7.6 ***QCD*** – Document the use of dry ice to solidify the grease column on Data Sheet 6.0, for each occurrence.

7.7 ***QCD*** – Document the ambient temperature as well as the temperature of the concrete surface near the tendon within a 3 foot radius of the center of the grease cap or tendon void, on Data Sheet 6.0. The temperature shall be taken of the normal concrete. It shall not be necessary to take the temperature again, if dry ice is used. Document the thermometer identification number and recalibration due date for each instrument used.

7.8 Care shall be exercised to avoid splashing or spilling grease on concrete and other surfaces. Spilled grease shall be removed and cleaned using Viscosity Oil, Viscor #16A industrial solvent or equivalent, by scrubbing with brushes and wiping the excess with rags. It may be advantageous to tape plastic sheeting around the bearing plate and concrete to lessen the effect of spilled grease.

8.0 REMOVAL OF GREASE CAP

8.1 Place a container and/or a protective cover under the tendon grease cap to protect adjacent areas from dripping grease.

8.2 Remove the bolts and washers holding the end cap to the bearing plate ensuring that the end cap is fully supported as the bolts are being removed.

8.3 Carefully, remove the grease cap to prevent any foreign matter from dropping into the grease in that cap.

8.4 ***QCD*** – Detect and record the anchorhead ID#. This ID# should be compared and verified to the original data, providing original data is available.

8.5 ***QCD*** – Observe the coating of grease on the inside of the grease cap, on the bearing plate, shims, anchorhead and buttonheads. Note the completeness of the grease coverage on each item and document that evaluation accordingly on Data Sheet 6.0.

8.5.1 Where the coverage is complete, check as Complete coverage.

8.5.2 Where the coverage is incomplete and bare metal is visible, check as Partial coverage and estimate the Percentage of Uncoated metal for each item.

8.5.2.1 Uncoated metal is defined as that area that is dry and without any coating of grease. Some care should be used in judging uncoated metal, as the thickness of the coating has no bearing on acceptability. Very thin coatings will be slightly tacky and will readily hold fingerprints.

8.6 ***QCD*** – Any other unusual conditions shall be documented on Data Sheet 6.0, such as: water or other liquid present or draining during grease cap removal as well as the quantity of liquid (refer to Procedure SQ 6.1); quantities of dirt or other foreign matter in or around the tendon end or grease cap, etc.

8.7 ***QCD*** – The color of the grease on or around the tendon shall be compared to a sample of new unused grease for color or other variations from the new sample. While color is not a factor requiring acceptance, significant variations in color could be a sign of degradation of the protection medium. Document the comparison on Data Sheet 6.0.

8.7.1 If the colors of the samples are reasonably close to each other, check the Match area on Data Sheet 6.0 and identify the color.

8.7.2 If the colors vary greatly, check the No Match area and identify the color and variation, i.e., medium brown, darker than new sample. Document if any of the following items are observed during visual inspection of the grease:

8.7.2.1 Extreme discoloration.

8.7.2.2 Presence of corrosive particles and/or dirt mixed within the grease, indicating adjacent metal pitting and metal breakdown.

8.7.2.3 Signs of moisture within the bulk filler (grease).

8.7.2.4 Other signs of grease deterioration.

8.8 ***QCD*** – If required per SQ2.0, two-one quart samples of grease shall be taken from each end of the tendon prior to cleaning the anchorage and grease cap or using solvent cleaner. It is preferred that the grease be taken from the area of the anchorage, but may also be taken from the grease cap or tendon void. Document the amount of samples taken and the location of removal on Data Sheet 6.0. Refer to PSC Procedure SQ 7.0 for grease sample testing.

8.8.1 Each sample can shall be identified by plant name, unit number, tendon number, tendon end, sample number and date.

8.8.2 Refer to SQ7.0 for sample storage and retention requirements.

8.9 ***QCD*** – Determine the amount of grease that may have been lost during removal of the grease cap on Data Sheet 6.0. The Grease Loss from the tendon duct shall be kept separate and posted as required of Section 10.4 of this procedure.

8.9.1 ***QCD*** – If the grease in the grease cap is in satisfactory condition, it may be reused at the discretion of the QC Inspector. If it is to be disposed of, document quantity of grease that is removed from the grease cap on Data Sheet 6.0.

9.0 ANCHORAGE CLEANUP

9.1 When the tendon is to be visually inspected it will be necessary to perform a cleanup of the tendon end anchorage assembly to permit inspection.

9.2 Any grease removal shall be performed in such a manner to prevent damage, such as scratches on the anchorage or tendon wires. The removal process shall not add any contaminants to the remaining grease or the grease which could be taken for chemical analysis.

9.3 Excess grease shall be removed from the tendon anchorage threads using clean non-metallic devices. Use bristle brushes of medium stiffness or rags with suitable quantities of solvent to dilute and wash away the grease. This cleanup must be sufficient to provide satisfactory condition for thread inspection.

9.4 Continue the cleanup of the remaining portions of the tendon end, to include the shims, buttonheads, anchorage and bearing plate as necessary.

9.5 Viscosity Oil, Viscor #16A industrial solvent or equal shall be used to complete whatever cleanup may be necessary to perform subsequent activities.

9.6 ***QCD*** – Document the quantity of grease removed from the anchorage on Data Sheet 6.0.

9.7 ***QCD*** – Document and describe damage (if any) caused by the removal of the grease cap or cleaning of the anchorage assembly on Data Sheet 6.0.

10.0 TENDON PROTECTION

10.1 All tendon ends and anchorages shall be protected by covering with a plastic bag or sheeting whenever the tendon is not being worked on. Smear or brush a light coating of grease onto the wires, buttonheads and anchorhead prior to covering.

10.2 It will be acceptable to replace the grease caps as a temporary measure, using the old gaskets, until that tendon inspection can be completed.

10.3 ***QCD*** – Document the method of tendon protection on Data Sheet 6.0. If the grease cap is temporarily installed, note if a new gasket or old gasket was used.

10.4 ***QCD*** – Document the grease losses that are detected from the tendon duct itself. These losses shall be kept separate from the losses that occur from the tendon end anchorage assembly and the grease cap. This total shall not be finalized until the grease cap is installed permanently, as additional grease may be lost after the initial inspection.

10.5 ***QCD*** – Total the grease loss from previous sections in order to calculate the total amount of grease lost from this end of the tendon and document on Data Sheet 6.0.

11.0 DOCUMENTATION

11.1 The items requiring documentation in this procedure shall be documented on Data Sheet 6.0 included with this procedure.

11.1.1 The Data Sheet references the applicable Section or Step number of the procedure for each ***QCD***.

11.1.2 ***QCD*** – Post the calculated total grease loss (10.5) from this end to Data Sheet 12.1.

12.0 ATTACHMENTS

12.1 Data Sheet 6.0.

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☐ UNIT 1

(7.2) Tendon No.: ________ Tendon End: ________ ☐ Shop ☐ Field

Grease Cap Removal

	Q.C. Signoff
(7.5)Date Removal Started: ________	
(7.6) Dry Ice Used on Grease Cap and/or Anchorage ☐ Yes ☐ No	
(7.7) Temp. of Concrete: ____ °F Thermometer No.: ____ Re-Cal Date: ____	
Ambient Temp.: ____ °F Thermometer No.: ____ Re-Cal Date: ____	
(8.4) Anchorhead I.D. : ________ Anchorhead Verification: ☐ Match ☐ No-Match	
(8.5) Grease Coating	
Grease Cap - Complete ____ Partial ____ Uncoated ____ %	
Buttonheads - Complete ____ Partial ____ Uncoated ____ %	
Anchorhead - Complete ____ Partial ____ Uncoated ____ %	
Shims - Complete ____ Partial ____ Uncoated ____ %	
Bearing Plate – (1) Complete ____ Partial ____ Uncoated ____ %	
(1) - *Limited within the inside diameter of the grease cap.*	
(8.6) Unusual Conditions: ________	
(8.7) Grease Color Match: ☐ Yes ☐ No Grease Color: ________	
Comments: ________	
(8.8) Quantity of Samples ____ Quart Samples identified per Step 8.8.1? ☐ Yes ☐ No	
Location of Removal ☐ A.H. ☐ B.P. ☐ Shims ☐ Cap ☐ Duct	
(8.9) Qty. of Grease lost during removal of cap: ____ gal.	
(8.9.1) Grease from cap to be reused? ☐ Yes ☐ No Qty. of Grease removed from cap: ____ gal.	
(9.6) Qty. of Grease removed from anchorage: ____ gal.	
(9.7) Damage during cap removal or anchorage cleaning? ☐ Yes ☐ No Describe: ________	
(10.3) Method of Tendon Protection: ________	
(10.4) Amount of Grease Loss from Tendon duct: ____ gal.	
(10.5) Total quantity of lost grease (below):	
(8.8) ____ + (8.9) ____ + (8.9.1) ____ + (9.6) ____ + (10.4) ____ = ______ TOTAL	
(11.1.2) Document TOTAL grease lost on Data Sheet 12.1, GREASE REPLACEMENT. ☐ Yes ☐ No	

QC Reviewed: ________ Level: ____ Date: ____

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CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

INSPECT FOR WATER

Gerald Bussone	*Q.A. MANAGER*	07/31/09
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Approved by	Title	Date
Paul C [illegible]	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the requirements for performing an inspection of the Post-Tensioning Tendon System for evidence of water during In-Service-Inspection (surveillance) of the Post-Tensioning System Tendons at Exelon's Three Mile Island Nuclear Plant - Unit 1.

2.0 SCOPE

2.1 This procedure will be limited to performing and documenting the inspection for water from the tendon void or around the tendon anchorage assembly, including the grease cap. This inspection shall be performed just prior to removal of the grease cap and during the physical inspection of the tendon anchorage assembly.

3.0 RESPONSIBILITY

3.1 As stated in PSC Procedure QA 4.0.

4.0 QUALIFICATION

4.1 As stated in PSC Procedure QA 4.1.

5.0 EQUIPMENT

5.1 The equipment necessary for the Quality Control activities will be itemized in PSC Procedure SQ 4.0.

6.0 PRECAUTIONS

6.1 Review the I.S.I. Tendon Surveillance Program Safety Comments for the items that shall apply both for tendon force control and personnel safety.

7.0 QUALITY CONTROL

7.1 This procedure contains no ***HOLD POINTS***. All Quality Control Documentation (***QCD***) points shall only require documentation of information or evaluation data. The required information or evaluation data shall be documented on Data Sheet 6.1.

7.2 The Quality Control Inspector shall be responsible for properly identifying any water samples that may have been collected. The Inspector shall also be responsible for controlling those samples until they are turned over to Exelon or sent out for testing.

8.0 PREREQUISITES

8.1 ***QCD*** – Document the Unit #, tendon identification and tendon end on Data Sheet 6.1.

8.2 Provide support for the Grease Cap. Be prepared to catch any grease that may fall during loosening and removal.

8.3 Care shall be exercised to avoid splashing or spilling grease on concrete and other surfaces. Spilled grease shall be removed and cleaned using Viscosity Oil, Viscor #16A industrial solvent or equivalent. It may be advantageous to tape plastic sheeting around the bearing plate and concrete to lessen the effect of spilled grease.

8.4 This inspection will be performed during and after the removal of the grease cap. It is expected that all the tools and preparation for the removal of the grease cap will be in place or have been performed. As the main purpose of this procedure is to detect the presence of water in the tendon void, the Inspector shall be afforded access to the tendon during loosening of the grease cap bolts to see if water is present.

9.0 GREASE CAP REMOVAL

IF UPON REMOVAL OF THE GREASE CAP, IT IS DETERMINED THAT THE ANCHORHEAD IS BROKEN, ALL WORK SHALL STOP ON THAT TENDON AND ALL PERSONNEL SHALL LEAVE THE AREA OF THE TENDON. THE PSC CONSTRUCTION SUPERVISOR SHALL BE NOTIFIED. THE CONDITION SHALL BE FORMALLY DOCUMENTED BY A NONCONFORMANCE REPORT. THE WORK AND/OR INSPECTIONS SHALL CONTINUE AFTER A SAFETY EVALUATION HAS BEEN MADE AND ONLY AT THE DIRECTION AND CONTROL OF THE PSC CONSTRUCTION SUPERVISOR AND TMI ENGINEERING.

9.1 Position platform, as required, at the end of the tendon to be inspected. (As part of Grease Cap Removal Procedure, SQ 6.0)

9.2 Place a container and/or a protective cover under the tendon grease cap to protect adjacent areas from dripping grease. (As part of Grease Cap Removal Procedure, SQ 6.0)

9.3 Have a clean dry plastic container available for catching water samples.

9.4 As the main purpose of this procedure is to determine the presence of water in the grease cap or around the anchorhead, the Inspector shall be alert to obtain samples of that water as the cap is loosened and removed and to estimate the quantity detected.

9.5 Remove the bolts holding the grease cap to the bearing plate. The grease cap must be fully supported as the bolts are being removed. Care should be taken when removing the end cap since the bulk filler may drop off or drip as a liquid of medium viscosity. Allow the Inspector the opportunity to obtain water samples, if any water is present. (As part of Grease Cap Removal Procedure, SQ 6.0)

9.5.1 ***QCD*** – Document if water was detected, the quantity of water detected and if a sample was collected during removal of the grease cap. In addition, document the distinguishing characteristics of any water detected in accordance with Section 10.0. Also document any other relevant comments.

9.6 Carefully remove the grease cap to avoid spilling the contents. The Inspector shall inspect the interior of the cap for the presence of water and if possible collect a sample of that water.

9.6.1 ***QCD*** – Document if water was detected, the quantity of water detected and if a sample was collected from inside the grease cap. In addition, document the distinguishing characteristics of any water detected in accordance with Section 10.0. Also document any other relevant comments.

9.7 Inspect the tendon anchorage assembly, shims, bearing plate, anchorhead and buttonheads for the presence of water.

9.7.1 ***QCD*** – Document if water was detected, the quantity of water detected and if a sample was collected from around the tendon anchorage components. In addition, document the distinguishing characteristics of any water detected in accordance with Section 10.0. Also document any other relevant comments.

9.8 Work shall continue for the In-Service Inspection as regularly scheduled or as required by the Procedures in the Surveillance Program Quality Control Manual.

9.9 The next point that water could be encountered would be during or just after Detensioning the Tendon. Therefore, the Inspector shall be especially vigilant during this portion of the In-Service Inspection to detect the presence of water. Inspect for the presence of water during or after Detensioning the Tendon.

9.9.1 ***QCD*** – Document the quantity of water detected and if a sample was collected.

10.0 DISTINGUISHING CHARACTERISTICS

10.1 The quantity of water observed in or on the tendon will be described based on the following terms.

10.1.1 OBSERVABLE MOISTURE

10.1.1.1 "Observable Moisture" is defined as that quantity of water which has been immediately observed by the Inspector to be concentrated, collected or draining out from the grease cap or tendon anchorage assembly. While this is intended to describe that moisture condition associated with condensation, it could be present in quantities of less than 8 ounces.

10.1.2 SIGNIFICANT MOISTURE

10.1.2.1 "Significant Moisture" is defined to be a quantity of water 1/2 pint (8 ounces) or more which has collected, concentrated or observed to be draining out of the tendon anchorage assembly or grease cap. This quantity is considered to be from a condition other than water formed through condensation.

11.0 NOTIFICATION

11.1 ***QCD*** – Exelon shall be notified with a formal letter within 24 hours when water, regardless of quantity, has been detected during the In-Service Inspection. This Notification shall define the condition detected referencing Section 10 of this Procedure and the specific quantity detected.

11.2 Exelon shall be responsible for any corrective action and/or Notification to the NRC should that be required.

11.3 The work and inspection shall continue until completed or formal notification by Exelon to halt the work is received.

12.0 SAMPLE RETENTION/TESTING

12.1 The samples shall be temporarily retained by the PSC Quality Control Inspector until such time that they are sent out for pH testing per PSC Procedure SQ 6.2.

12.2 ***QCD*** – Verify that the water samples are adequately identified. Identification includes: Plant Name, Unit #, Tendon Number, Tendon End, and date.

12.3 ***QCD*** – Document the location of storage for the samples.

13.0 DOCUMENTATION

13.1 The items in this procedure requiring documentation shall be documented on Data Sheet 6.1.

13.2 The Data Sheet references the applicable section number of the procedure for each ***QCD*** Point.

14.0 ATTACHMENTS

14.1 Water Notification Letter

14.2 Data Sheet 6.1

To: ______________________________

____

Subject: PSC Procedure SQ 6.1: Inspect for Water

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☐ UNIT 1

Tendon No: ____________ Tendon End: ____________ ☐ Shop ☐ Field

Notification of Water

Per PSC Procedure SQ 6.1 Section 11, "Exelon shall be notified with a formal letter within 24 hours when water, regardless of quantity, has been detected during the In-Service Inspection. This Notification shall define the condition detected referencing Section 10 of this Procedure and the specific quantity detected."

This letter is to notify you that water was found in the tendon mentioned above.

Quantity of Sample obtained: ______________________

Description of Condition: ______________________________

____

____

Per PSC Procedure 6.1 Section 10, the observed water is categorized as follows:

☐ Section 10.1.1 – OBSERVABLE MOISTURE

"Observable Moisture" is defined as that quantity of water which has been immediately observed by the Inspector to be concentrated, collected or draining out from the grease cap or tendon anchorage assembly. While this is intended to describe that moisture condition associated with condensation, it could be present in quantities of less than 8 ounces.

☐ Section 10.1.2 – SIGNIFICANT MOISTURE

"Significant Moisture" is defined to be a quantity of water 1/2 pint (8 ounces) or more which has collected, concentrated or observed to be draining out of the tendon anchorage assembly or grease cap. This quantity is considered to be from a condition other than water formed through condensation.

Signature: ______________________ Level: __________ Date: __________

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☐ UNIT 1

(8.1) Tendon No.: ____________ Tendon End: ________ ☐ Shop ☐ Field

(9.5.1) DURING REMOVAL OF GREASE CAP

Water Detected: ☐ Yes ☐ No Quantity: ________ Sample Taken: ☐ Yes ☐ No ☐ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable

Comments: ____________________

(9.6.1) INSIDE GREASE CAP

Water Detected: ☐ Yes ☐ No Quantity: ________ Sample Taken: ☐ Yes ☐ No ☐ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable

Comments: ____________________

(9.7.1) AROUND TENDON ANCHORAGE COMPONENTS

Water Detected: ☐ Yes ☐ No Quantity: ________ Sample Taken: ☐ Yes ☐ No ☐ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable

Comments: ____________________

(9.9.1) DURING DETENSIONING

Water Detected: ☐ Yes ☐ No Quantity: ________ Sample Taken: ☐ Yes ☐ No ☐ N/A

Moisture Description: ☐ Observable Moisture ☐ Significant Moisture ☐ Not Applicable

Comments: ____________________

(11.1) NOTIFICATION

Exelon Notified: ☐ Yes ☐ No Individual Name: ____________ Date: ________

SAMPLE IDENTIFICATION AND STORAGE

(12.2) Samples adequately identified: ☐ Yes ☐ No

(12.3) Samples stored at: ____________________

QC Signoff: ____________ Level: ________ Date: ________

QC Reviewed: ____________ Level: ________ Date: ________

PSC
Precision Surveillance Corporation

EXELON
THREE MILE ISLAND
UNIT 1 (35^{TH} YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

WATER SAMPLE ANALYSIS

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
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Approved by	Title	Date
Paul C Smith	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the requirements for laboratory pH analysis of Water samples taken during the 35th Year In-Service-Inspections (surveillance) of the Post-Tensioning System Tendons of Exelon's Three Mile Island Nuclear Plant - Unit 1.

2.0 RESPONSIBILITY

2.1 The laboratory that performs the testing/analysis shall be responsible for controlling the samples, performing the analysis, documenting the analysis on Laboratory letterhead stationery and submitting the reports to:

PRECISION SURVEILLANCE CORPORATION

3468 Watling Street

East Chicago, IN 46312

Attention: Quality Assurance

2.1.1 The Laboratory shall further be responsible to utilize trained personnel for the analysis and maintain the calibrated status, traceable to the NIST as applicable, for all test or measuring devices that may be used in providing test results.

2.1.2 The Laboratory shall provide open access for inspection, survey or audit, as the need might arise, to PSC or its customers.

2.2 The PSC Quality Assurance Section shall be responsible for the qualification of Laboratory sources.

2.3 Where specified in the Contract Documents, Exelon shall have the right of approval for Laboratory sources.

2.4 The PSC Quality Control and/or Engineering Department shall review the reports for accuracy and content.

2.4.1 This report shall be submitted to Exelon with the final Surveillance Report.

3.0 SAMPLES

3.1 The Water Samples shall be sent to the Laboratory by any convenient mode of transportation. The samples will have been marked to show the plant name, unit number, tendon number and the tendon end or buttress identification. The sample shall be securely closed to prevent leakage and packaged to prevent damage.

3.2 The samples shall maintain a form of identification throughout testing that will provide traceability to the original sample identification.

3.3 The Laboratory shall notify PSC if it appears that the sample container has been damaged, tampered with, or any other occurrence that could contaminate the water sample.

4.0 TEST DESCRIPTIONS

4.1 Each sample of Water shall be analyzed for pH

5.0 TEST METHOD

5.1 Each sample of Water shall be tested by the following test method: "pH by ASTM D-1293 or EPA 150.1 or equivalent"

6.0 REPORT

6.1 A copy of the report for the analysis of water shall be submitted to PSC.

6.2 The report shall bear the date of testing and sample identification as it appears on each sample container.

6.3 The report shall be signed by the Laboratory Manager, who shall ultimately be responsible for the content.

7.0 SAMPLE DISPOSAL

7.1 The remaining water samples may be scrapped 30 days after the issue of the report, unless the Laboratory is requested in writing to hold the samples for a longer period of time.

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

SHEATHING FILLER ANALYSIS

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Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C Smith	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the requirements for laboratory chemical analysis of Sheathing Filler (Grease) samples taken during the 35th Year In-Service-Inspections (surveillance) of the Post-Tensioning System Tendons of Exelon's Three Mile Island Nuclear Plant - Unit 1.

2.0 RESPONSIBILITY

2.1 The laboratory that performs the testing/analysis shall be responsible for controlling the samples, performing the analysis, documenting the analysis on Laboratory letterhead stationery and submitting the reports to:

PRECISION SURVEILLANCE CORPORATION

3468 Watling Road

East Chicago, IN 46312

Attention: Quality Assurance

2.1.1 The Laboratory shall further be responsible to utilize trained personnel for the analysis and maintain the calibrated status, traceable to the NIST, for all test or measuring devices that may be used in providing test results.

2.1.2 The Laboratory shall provide open access for inspection, survey or audit, as the need might arise, to PSC or its customers.

2.2 The PSC Quality Assurance Section shall be responsible for the qualification of Laboratory sources.

2.3 Where specified in the Contract Documents, Exelon shall have the right of approval for Laboratory sources.

2.4 The PSC Quality Control and/or Engineering Department shall review the reports for accuracy and content as required by this procedure and for evaluation of the acceptability of those results according to the requirements of this procedure.

2.4.1 This report shall be submitted to Exelon with the Final Report.

3.0 SAMPLES

3.1 Sample #1 shall be sent to the testing laboratory for analysis in accordance with this procedure upon project completion unless otherwise notified by TMI Engineering. Sample #2 may be turned over to Exelon to be held in reserve in the event of loss, retesting or for verification of the results of the original testing. Exelon may be responsible for the control and disposal of Sample #2. It is unlikely that a suitable quantity of Sample #1 shall remain after the original tests to perform supplemental tests, therefore any remainder of Sample #1 will be scrapped.

3.2 In the event that the test results for Sample #1 do not meet the stated requirements of Section 8.0 of this Procedure, Exelon shall be immediately notified of the deficiency, with a formal letter to follow shortly thereafter. Sample #2 shall then be sent to the testing laboratory for confirmation analysis in accordance with this procedure.

3.3 If PSC is required to test Sample #2 and that sample fails to meet the requirements of Section 8.0 of this Procedure, Exelon shall be immediately notified of the deficiency, with a letter to follow shortly thereafter.

3.4 The sample cans will have been marked to show the plant name, unit number, tendon number, and the tendon end or buttress identification and sample number. The can shall be securely closed to prevent leakage and packaged to prevent damage.

3.5 The samples shall maintain a form of identification throughout testing, which will provide traceability to the original sample identification.

3.6 The Laboratory shall notify PSC if it appears that the sample container has been damaged, tampered with, or any other occurrence that could contaminate the grease sample.

4.0 TEST DESCRIPTIONS

4.1 Each sample of Grease (Sheathing Filler) shall be analyzed for Chemical Properties and Physical Properties as specified in the following sections 5.0 and 6.0.

5.0 TEST METHOD - CHEMICAL PROPERTIES

5.1 Each sample of Grease shall be mixed and tested as follows:

5.2 Water Soluble Impurities (ASME Section XI Table IWL 2525-1)

5.3 A water extraction of each sample of grease shall be made and tested as follows:

5.3.1 Using a spatula, coat the inside, bottom and sides, of a one liter glass beaker with 100 (plus or minus 10) grams of the grease.

5.3.2 The coated beaker shall be filled with about 900 ml of distilled water at room temperature.

5.3.3 Heat the filled beaker in an oven or by use of an immersion heater to 100°F (37.80°C) plus or minus 20°F for 4 hours. DO NOT HEAT ON A HOT PLATE.

5.3.4 Run a blank on distilled water. If titrate use a microburet, 1 ml or 5 ml with 0.01 - 0.05 ml graduation levels.

5.3.5 Decant water and analyze for soluble ions. Test only for salts in leached water.

5.3.6 The water extraction shall be tested by the below cited test procedures for the appropriate water soluble ions. The results shall be reported as parts per million (ppm) in the extracted water.

5.3.6.1.1 Chlorides (Cl) by ASTM D-512

5.3.6.1.2 Nitrates (NO_3) by ASTM D-992

5.3.6.1.3 Sulfides (S) by APHA 427C "Methylene Blue Method"-(APHA 427C 15th Edition replaced by APHA 4500-S2D 17th Edition)

6.0 TEST METHOD - PHYSICAL PROPERTIES

6.1 Each sample of Grease shall be tested as follows:

6.2 Moisture Content by ASTM D-95

6.3 Neutralization No. by ASTM D-974 Modified

6.3.1 The Neutralization Number (Reserve Alkalinity/Total Base Number) shall be performed in accordance with ASTM D-974 and the following modification (per ASME Section XI, Table IWL-2525-1):

6.3.1.1 Place 10 g of sample in a 500 ml Erlenmeyer flask. Add 10 cc isopropyl alcohol and 5 cc toluene. Heat until sample goes into solution.

6.3.1.2 Add 90 cc Distilled water and 20 cc 1N H_2SO_4.

6.3.1.3 Place in a steam bath for one-half hour. Stir well.

6.3.1.4 Add a few drops of indicator (1% phenolphthalein) and titrate with 1N NaOH until the lower layer just turns pink.

6.3.1.5 If acid or base solutions are not exactly 1N, the exact normalities should be used when calculating the base number.

6.3.1.6 The Total Base Number (TBN), expressed as milligrams of KOH per gram of sample, is calculated as follows:

$$TBN = \frac{[(20)x(NA) - (B)x(NB)]}{W} x56.1$$

where

B = milliliters NaOH

NA = normality of H_2SO_4 solution

NB = normality of NaOH solution

W = weight of sample in grams

7.0 REPORT

7.1 Two copies of each report for the analysis of grease shall be submitted to PSC.

7.2 Each report shall bear the date of testing and sample identification as it appears on each can.

7.3 Each report shall be signed by the Laboratory Manager, who shall ultimately be responsible for the content.

7.4 Accuracy

7.4.1 The concentration of water soluble chlorides, nitrates and sulfides shall be reported within an accuracy of 0.1 ppm.

7.4.2 The concentration of water shall be reported within an accuracy of 0.1 percent of dry weight of grease.

7.4.3 The Neutralization Number shall be reported within an accuracy of 0.01 mg. reagent per gram of grease.

8.0 ACCEPTANCE OF ANALYSIS

8.1 The chemical analysis of the grease samples only concern the concentration of water soluble impurities, water in the samples and where required Reserve Alkalinity (Base Number).

8.2 <u>The following concentrations shall not be exceeded:</u>

8.2.1 Water soluble Chlorides - 10 ppm

8.2.2 Water soluble Nitrates - 10 ppm

8.2.3 Water soluble Sulfides - 10 ppm

8.2.4 Water Content (H_2O) - 10% dry weight of filler

8.2.5 <u>Reserve Alkalinity</u>

8.2.5.1 (Base number) - Shall be at least 50% of the as-installed value, unless the as-installed value is 5 or less, in which case the base number shall be no less than zero. If the tendon duct is filled with a mixture of materials having various as-installed base numbers, the lowest number shall govern acceptance. The tendons at Exelon's TMI plant were filled with 2090P-2 grease so the 50% value is a minimum of 0 mg KOH/g.

9.0 NOTIFICATION NON-ACCEPTANCE

9.1 In the event that Sample #2 does not meet the required controls of Section 8.0 above, Exelon shall be formally notified by PSC Personnel for those unacceptable results after reviewing the reports. If PSC Quality Control is still on site when the tests have been completed, Exelon shall be notified of this deficiency with a nonconformance report.

9.2 Exelon shall be responsible for evaluating the significance of the deficiency and to determine if corrective measures are required.

10.0 SAMPLE DISPOSAL

10.1 The remaining sample grease may be scrapped 30 days after the issue of the report, unless the Laboratory is requested in writing to hold the samples for a longer period of time.

10.2 The PSC Quality Control Department shall retain the option of disposing of the samples in less than 30 days if the results of the grease analysis are acceptable.

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
TENDON SURVEILLANCE PROGRAM

THREAD MEASUREMENT OF ANCHORAGES

Gerald Bussone	*QA MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C ...	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 PURPOSE

1.1 This procedure will be used as the means of measuring anchorage thread diameters to assure that the external threads of a tendon anchorage meet a minimum strength requirement of 120% of the minimum Guaranteed Ultimate Tensile Strength (GUTS) of a tendon, when coupled with a specific Stressing Adaptor.

2.0 SCOPE

2.1 This procedure shall address only those anchorages that have a 4 pitch stub ACME Thread (Class 2G). Design drawings show that the anchorages are a Grade 4140 steel, heat treated to a Brinell Hardness of 355 to 401. Furthermore, this procedure shall be limited to those anchorages of tendons to be monitored or detensioned and retensioned.

2.2 If the anchorage material is not of the type mentioned above, then the thread strength prediction equations shall be adjusted accordingly by the PSC Engineering Department.

3.0 RESPONSIBILITY

3.1 A PSC Quality Control Inspector shall be responsible for taking thread measurements. The PSC Manager of Engineering, or his designee, shall be responsible for generating tables listing allowable external thread diameters for a specific Stressing Adaptor.

4.0 DOCUMENTATION

4.1 All measurements shall be recorded, signed and dated by the Inspector on the form provided with this procedure. The only Hold Point in this procedure is the acceptability of the measurements and acceptable match up with a stressing adaptor.

4.2 **QCD-** All measurements, gauge identification and calibration status shall be documented on Data Sheet 7.1 as required.

5.0 MEASURING INSTRUMENTS

5.1 The following instruments shall be necessary for thread measurements.

5.1.1 Standard Outside Measuring Micrometer capable of reading to 0.001" or better.

5.1.2 Standard Inside Measuring Micrometer capable of reading to 0.001" or better.

5.1.3 Special Pitch Diameter Go and No-Go Thread Plug Gauges.

5.1.4 A set of three hardened standard stub ACME thread wires (diameter 0.129" to 0.162").

5.1.5 Shims, used in the three-wire method of measurement.

6.0 MEASURING THREAD DIAMETERS

6.1 Two readings in perpendicular directions shall be taken for each thread measured. A centering head and rule should be used to assure that the readings are perpendicular to each other. Crayon or soapstone can be used to mark locations, but care should be taken so as not to place the marks exactly where readings are taken, which would interfere with the accuracy of the measurements.

6.2 EXTERNAL MAJOR DIAMETERS

6.2.1 External Major Diameters shall be measured for the 3rd, 6th and 9th threads. Measurements shall be made with an Outside Micrometer as shown in Figure 1 of Appendix 1.

6.2.1.1 The Major Diameter is given directly by the micrometer reading.

6.3 EXTERNAL PITCH DIAMETERS

6.3.1 External Pitch Diameters shall be measured for the 3rd and 9th threads. Measurements shall be made with an Outside Micrometer and three stub ACME thread wires of equal diameters as shown in Figure 2 of Appendix 1. Standard stub ACME thread wires of diameters ranging from 0.129" to 0.162" shall be used. Wire diameters shall be selected such that: (1) the wire rests on the tapered sides of the thread, not on the root flat, and (2) the wire protrudes beyond the crest of the thread as shown in Figure 2 of Appendix 1.

6.3.1.1 The Pitch Diameter Constant dimension shall be determined from Appendix 2 for the wire diameter used. The shim thickness shall be added to the constant and the total subtracted from the micrometer reading to give the pitch diameter.

6.4 EXTERNAL MINOR DIAMETERS

6.4.1 External Minor Diameters shall be measured for the 3rd and 9th threads. Measurements shall be made with an Outside Micrometer and three wires of equal diameters as shown in Figure 3 of Appendix 1. Wire diameter shall be selected such that: (1) the wire rests on the root flat, not on the tapered sides of the thread, and (2) the wire protrudes beyond the crest of the thread as shown in Figure 3 of Appendix 1.

6.4.1.1 The sum of twice the selected wire diameter and shim thickness shall be subtracted from the micrometer reading to give the minor diameter.

6.5 INTERNAL MAJOR DIAMETERS

6.5.1 Internal Major Diameters shall be measured for the 3rd and 9th threads. Measurements shall be made with an Inside Micrometer with needle points as shown in Figure 4 of Appendix 1. Precautions shall be taken to reduce the angularity of the micrometer to a minimum, as shown. The angular reading overestimates the diameter by 0.00013" or less. This small discrepancy shall be ignored.

6.5.1.1 The Major Diameter is given directly by the micrometer reading.

6.6 INTERNAL PITCH DIAMETERS

6.6.1 Internal Pitch Diameters shall not be measured. However, a check shall be made using Go and No-Go Plug Gauges to ensure that pitch diameters fall within specified limits. If the Go gauge does not go, or the No-Go gauge goes, that fact shall be recorded.

6.7 INTERNAL MINOR DIAMETERS

6.7.1 Internal Minor Diameters shall be measured for the 3rd, 6th and 9th threads. Measurements shall be made with an Inside Micrometer as shown in Figure 5 of Appendix 1.

6.7.1.1 The Minor Diameter is given directly by the micrometer reading.

7.0 ANCHORAGE DISPOSITION

7.1 STRESSING ADAPTOR (INTERNAL THREADS)

7.1.1 The Stressing Adaptor shall have been accepted by PSC based on acceptance of the NO-GO thread plug gauge test fit. Actual major and minor thread diameters shall be documented.

7.2 BUSHING, FIELD ANCHORHEAD (EXTERNAL THREADS)

7.2.1 For purposes of expediency the bushing or field anchorhead external threads shall be identified as external threads in this section of the procedure since the measurements and requirements are identical, but shall be documented for specific identity.

7.2.2 Once an adaptor has been measured, the PSC Engineering Department shall generate a Stressing Adaptor Disposition Table for that Adaptor. These tables list allowable external thread diameters for a bushing or field anchorhead to be coupled to a specific adaptor and still meet the minimum strength requirements.

7.2.2.1 These tables are based on calculations that consider that it shall be necessary to maintain full engagement with the adaptor and external thread (bushing or field anchorhead) at all times during stressing or detensioning operations.

7.2.3 Select a stressing adaptor and external thread to be dispositioned.

7.2.4 Select the Stressing Adaptor Disposition Table, Appendix 4, for the adaptor to be evaluated. The Adaptor Identification will appear near the top of the table.

7.2.5 Using the major diameter of the external thread and referring to the columns under the heading Major Ranges, within the first two lines representing the range of major dimensions, locate that range into which the major dimension of the external thread will fall. This shall establish the Major control vertical column for that external thread.

7.2.6 With the pitch diameter of the external thread and using the Pitch Range column at the left edge of the table, read down to that range of dimensions into which the pitch diameter measurement of the external thread will fall. This shall establish the Pitch control horizontal line for that external thread.

7.2.7 The intersection of the Pitch control horizontal line with the Major control vertical column shall provide the Minor diameter control dimension.

7.2.7.1 If the Minor diameter control is less than the measured minor dimension of the external thread, then that combination of external thread and stressing adaptor is acceptable.

7.2.7.2 If the Minor diameter control dimension is greater than the measured minor dimension of the external thread, that combination is not acceptable and another stressing adaptor shall be selected to be mated to the external thread. Therefore, Section 7.2.6. shall be repeated until acceptable matches are provided.

8.0 DOCUMENTATION

8.1 The items requiring documentation in this Procedure shall be documented on Data Sheet 7.1 as each might apply.

9.0 ATTACHMENTS

9.1 Data Sheet 7.1

9.2 Appendix 1 - Figures for Thread Diameter Measurements (These figures are used to illustrate the manner of measuring thread diameters.)

9.3 Appendix 2 - Pitch Diameter Constant For 3 Wire Method(This table lists the pitch diameter constant dimensions necessary for calculating an external pitch diameter.)

9.4 Appendix 3 - NBS Allowable Diameter Ranges(This is a computer generated table of allowable external and internal diameter ranges for 4 pitch stub ACME threads (Class 2G) as specified by Federal Standard Publication FED-STD-H28/13.)

9.5 Appendix 4 - Stressing Adaptor Disposition Tables (These tables shall be used for dispositoning a bushing or field anchorhead paired with a specific Stressing Adaptor. One table shall be computer generated for each Adaptor. Since these tables cannot be generated until the Adaptors are measured, it is likely these tables will be added to this procedure at a later date than initial submittal of this procedure. However, these tables shall be supplied as soon as possible.)

Project: TMI – 35th YEAR TENDON SURVEILLANCE

Tendon No.: ______________ Tendon End/Buttress No.: ______________

Anchorage ID.: ______________ Adaptor ID: ______________

EQUIPMENT	MICROMETER		WIRE		SHIMS	
Thread	Mic ID	Recal Date	ID No.	Recal Date	ID No.	Recal Date
Ext. Major						
Ext. Pitch						
Ext. Minor						
Int. Major	N/A	N/A				
Int. Minor	N/A	N/A				

MEASUREMENTS		THREAD			Average	Wire Constant	Wire Diameter	Shim Size	Average Diameter
Thread	Read	3rd	6th	9th					
Ext. Major	1								
	2								
Ext. Pitch (1)	1								
	2								
Ext. Minor (2)	1								
	2								
Int. Major	1	N/A		N/A					
	2	N/A		N/A					
Int. Minor	1	N/A	N/A	N/A					
	2	N/A	N/A	N/A					

Int. Pitch	Go Gauge ID: N/A	Recal Date: N/A	Result: N/A
	No-Go Gauge ID: N/A	Recal Date: N/A	Result: N/A

Notes: (1) External Pitch Diameter = [Average] – [Wire Constant] – [Shim Size]
(2) External Minor Diameter = [Average] – [2 X Wire Diameter] – [Shim Size]

DISPOSITION

	Trial 1	Trial 2	Trial 3	Trial 4
Adaptor Mark				
Min. Minor Diameter from Adaptor Table				
Acceptable? (Yes or No)				

QC Signoff: ______________ Level: ______________ Date: ______________

QC Reviewed: ______________ Level: ______________ Date: ______________

Appendix 1 – Figures for Thread Diameter Measurements

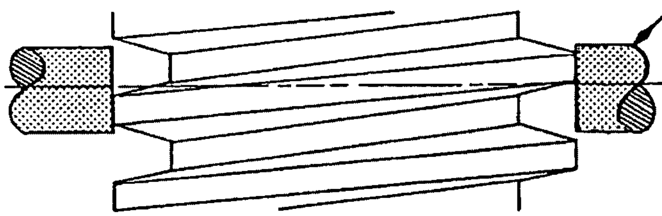

FIG. 1 EXTERNAL MAJOR DIAMETER

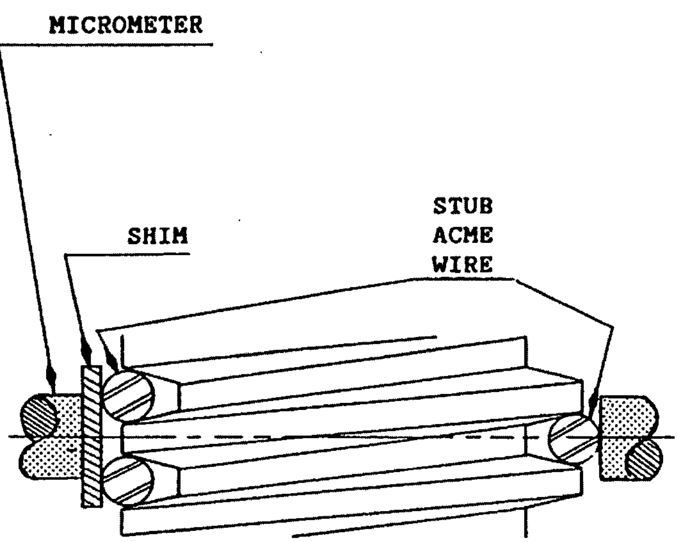

FIG. 2 EXTERNAL PITCH DIAMETER
(NOTE WIRES REST ON SIDE OF THREAD AND PROTRUDE BEYOND CREST)

FIG. 3 EXTERNAL MINOR DIAMETER
(NOTE WIRES REST ON ROOT AND PROTRUDE BEYOND CREST)

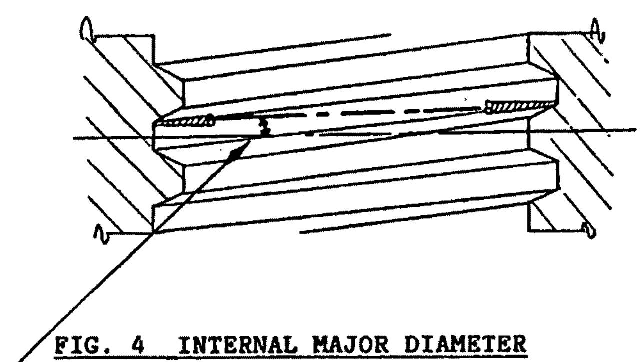

FIG. 4 INTERNAL MAJOR DIAMETER
(NOTE DIAMETER MEASURED WITH MINIMUM ANGULARITY)

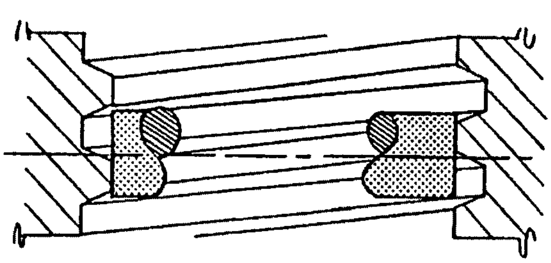

FIG. 5 INTERNAL MINOR DIAMETER

Appendix 2 – Pitch Diameter for 3 Wire Method

From Federal Standard H28/13 C = *w*(1 + cosec *a*) - (cot *a*) 2/*n* gives CON = 4.993929(*W*) –0.483392

WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.
.1290	.161	.1325	.178	.1360	.196	.1395	.213	.1430	.231
.1291	.161	.1326	.179	.1361	.196	.1396	.214	.1431	.231
.1292	.162	.1327	.179	.1362	.197	.1397	.214	.1432	.232
.1293	.162	.1328	.180	.1363	.197	.1398	.215	.1433	.232
.1294	.163	.1329	.180	.1364	.198	.1399	.215	.1434	.233
.1295	.163	.1330	.181	.1365	.198	.1400	.216	.1435	.233
.1296	.164	.1331	.181	.1366	.199	.1401	.216	.1436	.234
.1297	.164	.1332	.182	.1367	.199	.1402	.217	.1437	.234
.1298	.165	.1333	.182	.1368	.200	.1403	.217	.1438	.235
.1299	.165	.1334	.183	.1369	.200	.1404	.218	.1439	.235
.1300	.166	.1335	.183	.1370	.201	.1405	.218	.1440	.236
.1301	.166	.1336	.184	.1371	.201	.1406	.219	.1441	.236
.1302	.167	.1337	.184	.1372	.202	.1407	.219	.1442	.237
.1303	.167	.1338	.185	.1373	.202	.1408	.220	.1443	.237
.1304	.168	.1339	.185	.1374	.203	.1409	.220	.1444	.238
.1305	.168	.1340	.186	.1375	.203	.1410	.221	.1445	.238
.1306	.169	.1341	.186	.1376	.204	.1411	.221	.1446	.239
.1307	.169	.1342	.187	.1377	.204	.1412	.222	.1447	.239
.1308	.170	.1343	.187	.1378	.205	.1413	.222	.1448	.240
.1309	.170	.1344	.188	.1379	.205	.1414	.223	.1449	.240
.1310	.171	.1345	.188	.1380	.206	.1415	.223	.1450	.241
.1311	.171	.1346	.189	.1381	.206	.1416	.224	.1451	.241
.1312	.172	.1347	.189	.1382	.207	.1417	.224	.1452	.242
.1313	.172	.1348	.190	.1383	.207	.1418	.225	.1453	.242
.1314	.173	.1349	.190	.1384	.208	.1419	.225	.1454	.243
.1315	.173	.1350	.191	.1385	.208	.1420	.226	.1455	.243
.1316	.174	.1351	.191	.1386	.209	.1421	.226	.1456	.244
.1317	.174	.1352	.192	.1387	.209	.1422	.227	.1457	.244
.1318	.175	.1353	.192	.1388	.210	.1423	.227	.1458	.245
.1319	.175	.1354	.193	.1389	.210	.1424	.228	.1459	.245
.1320	.176	.1355	.193	.1390	.211	.1425	.228	.1460	.246
.1321	.176	.1356	.194	.1391	.211	.1426	.229	.1461	.246
.1322	.177	.1357	.194	.1392	.212	.1427	.229	.1462	.247
.1323	.177	.1358	.195	.1393	.212	.1428	.230	.1463	.247
.1324	.178	.1359	.195	.1394	.213	.1429	.230	.1464	.248

Pitch Diameter for 3 Wire Method

From Federal Standard H28/13 C = *w*(1 + cosec *a*) - (cot *a*) 2/*n* gives CON = 4.993929(*W*) –0.483392

WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.
.1465	.248	.1500	.266	.1535	.283	.1570	.301	.1605	.318
.1466	.249	.1501	.266	.1536	.284	.1571	.301	.1606	.319
.1467	.249	.1502	.267	.1537	.284	.1572	.302	.1607	.319
.1468	.250	.1503	.267	.1538	.285	.1573	.302	.1608	.320
.1469	.250	.1504	.268	.1539	.285	.1574	.303	.1609	.320
.1470	.251	.1505	.268	.1540	.286	.1575	.303	.1610	.321
.1471	.251	.1506	.269	.1541	.286	.1576	.304	.1611	.321
.1472	.252	.1507	.269	.1542	.287	.1577	.304	.1612	.322
.1473	.252	.1508	.270	.1543	.287	.1578	.305	.1613	.322
.1474	.253	.1509	.270	.1544	.288	.1579	.305	.1614	.323
.1475	.253	.1510	.271	.1545	.288	.1580	.306	.1615	.323
.1476	.254	.1511	.271	.1546	.289	.1581	.306	.1616	.324
.1477	.254	.1512	.272	.1547	.289	.1582	.307	.1617	.324
.1478	.255	.1513	.272	.1548	.290	.1583	.307	.1618	.325
.1479	.255	.1514	.273	.1549	.290	.1584	.308	.1619	.325
.1480	.256	.1515	.273	.1550	.291	.1585	.308	.1620	.326
.1481	.256	.1516	.274	.1551	.291	.1586	.309	.1621	.326
.1482	.257	.1517	.274	.1552	.292	.1587	.309	.1622	.327
.1483	.257	.1518	.275	.1553	.292	.1588	.310	.1623	.327
.1484	.258	.1519	.275	.1554	.293	.1589	.310	.1624	.328
.1485	.258	.1520	.276	.1555	.293	.1590	.311	.1625	.328
.1486	.259	.1521	.276	.1556	.294	.1591	.311	.1626	.329
.1487	.259	.1522	.277	.1557	.294	.1592	.312	.1627	.329
.1488	.260	.1523	.277	.1558	.295	.1593	.312	.1628	.330
.1489	.260	.1524	.278	.1559	.295	.1594	.313	.1629	.330
.1490	.261	.1525	.278	.1560	.296	.1595	.313	.1630	.331
.1491	.261	.1526	.279	.1561	.296	.1596	.314	.1631	.331
.1492	.262	.1527	.279	.1562	.297	.1597	.314	.1632	.332
.1493	.262	.1528	.280	.1563	.297	.1598	.315	.1633	.332
.1494	.263	.1529	.280	.1564	.298	.1599	.315	.1634	.333
.1495	.263	.1530	.281	.1565	.298	.1600	.316	.1635	.333
.1496	.264	.1531	.281	.1566	.299	.1601	.316	.1636	.334
.1497	.264	.1532	.282	.1567	.299	.1602	.317	.1637	.334
.1498	.265	.1533	.282	.1568	.300	.1603	.317	.1638	.335
.1499	.265	.1534	.283	.1569	.300	.1604	.318	.1639	.335

Appendix 3 – NBS Allowable Diameter Ranges

4 Pitch Stub ACME Threads < Class 2G

EXTERNAL THREADS						INTERNAL THREADS							
MAJOR DIAMETER MAX	MAJOR DIAMETER MIN	PITCH DIAMETER MAX	PITCH DIAMETER MIN	MINOR DIAMETER MAX	MINOR DIAMETER MIN	MAJOR DIAMETER MIN	MAJOR DIAMETER MAX	PITCH DIAMETER MIN	PITCH DIAMETER MAX	MINOR DIAMETER MIN	MINOR DIAMETER MAX	STRESS AREA	SHEAR AREA
0.2500	0.2375	0.1710	0.1530	0.0800	0.0620	0.2700	0.2880	0.1750	0.1930	0.1000	0.1125	0.0091	0.2605
0.3750	0.3625	0.2951	0.2764	0.2050	0.1863	0.3950	0.4137	0.3000	0.3187	0.2250	0.2375	0.0420	0.4692
0.5000	0.4875	0.4193	0.4001	0.3300	0.3108	0.5200	0.5392	0.4250	0.4442	0.3500	0.3625	0.0992	0.6774
0.6250	0.6125	0.5437	0.5239	0.4550	0.4353	0.6450	0.6647	0.5500	0.5697	0.4750	0.4875	0.1806	0.8850
0.7500	0.7375	0.6681	0.6479	0.5800	0.5598	0.7700	0.7902	0.6750	0.6952	0.6000	0.6125	0.2864	1.0922
0.8750	0.8625	0.7925	0.7719	0.7050	0.6844	0.8950	0.9156	0.8000	0.8206	0.7250	0.7375	0.4164	1.2988
1.0000	0.9875	0.9170	0.8960	0.8300	0.8090	1.0200	1.0410	0.9250	0.9460	0.8500	0.8625	0.5708	1.5050
1.1250	1.1125	1.0415	1.0202	0.9550	0.9336	1.1450	1.1664	1.0500	1.0714	0.9750	0.9875	0.7495	1.7107
1.2500	1.2375	1.1661	1.1443	1.0800	1.0583	1.2700	1.2917	1.1750	1.1967	1.1000	1.1125	0.9526	1.9160
1.3750	1.3625	1.2906	1.2686	1.2050	1.1830	1.3950	1.4170	1.3000	1.3220	1.2250	1.2375	1.1801	2.1208
1.5000	1.4875	1.4152	1.3929	1.3300	1.3077	1.5200	1.5423	1.4250	1.4473	1.3500	1.3625	1.4319	2.3253
1.6250	1.6125	1.5398	1.5172	1.4550	1.4324	1.6450	1.6676	1.5500	1.5726	1.4750	1.4875	1.7082	2.5293
1.7500	1.7375	1.6644	1.6415	1.5800	1.5571	1.7700	1.7929	1.6750	1.6979	1.6000	1.6125	2.0088	2.7330
1.8750	1.8625	1.7890	1.7658	1.7050	1.6818	1.8950	1.9182	1.8000	1.8232	1.7250	1.7375	2.3338	2.9363
2.0000	1.9875	1.9137	1.8902	1.8300	1.8065	2.0200	2.0435	1.9250	1.9485	1.8500	1.8625	2.6833	3.1393
2.1250	2.1125	2.0383	2.0146	1.9550	1.9313	2.1450	2.1687	2.0500	2.0737	1.9750	1.9875	3.0571	3.3419
2.2500	2.2375	2.1630	2.1390	2.0800	2.0560	2.2700	2.2940	2.1750	2.1990	2.1000	2.1125	3.4554	3.5441
2.3750	2.3625	2.2877	2.2634	2.2050	2.1808	2.3950	2.4192	2.3000	2.3242	2.2250	2.2375	3.8780	3.7461
2.5000	2.4875	2.4124	2.3879	2.3300	2.3055	2.5200	2.5445	2.4250	2.4495	2.3500	2.3625	4.3251	3.9477
2.6250	2.6125	2.5370	2.5123	2.4550	2.4303	2.6450	2.6697	2.5500	2.5747	2.4750	2.4875	4.7967	4.1490
2.7500	2.7375	2.6617	2.6368	2.5800	2.5551	2.7700	2.7949	2.6750	2.6999	2.6000	2.6125	5.2926	4.3499
2.8750	2.8625	2.7864	2.7613	2.7050	2.6798	2.8950	2.9202	2.8000	2.8252	2.7250	2.7375	5.8130	4.5506
3.0000	2.9875	2.9111	2.8858	2.8300	2.8046	3.0200	3.0454	2.9250	2.9504	2.8500	2.8625	6.3578	4.7510
3.1250	3.1125	3.0359	3.0103	2.9550	2.9294	3.1450	3.1706	3.0500	3.0756	2.9750	2.9875	6.9271	4.9511
3.2500	3.2375	3.1606	3.1348	3.0800	3.0542	3.2700	3.2958	3.1750	3.2008	3.1000	3.1125	7.5208	5.1509
3.3750	3.3625	3.2853	3.2593	3.2050	3.1790	3.3950	3.4210	3.3000	3.3260	3.2250	3.2375	8.1389	5.3504
3.5000	3.4875	3.4100	3.3838	3.3300	3.3038	3.5200	3.5462	3.4250	3.4512	3.3500	3.3625	8.7815	5.5496
3.6250	3.6125	3.5348	3.5083	3.4550	3.4286	3.6450	3.6714	3.5500	3.5764	3.4750	3.4875	9.4485	5.7486

Appendix 3 – NBS Allowable Diameter Ranges

4 Pitch Stub ACME Threads < Class 2G

v

EXTERNAL THREADS						INTERNAL THREADS							
MAJOR DIAMETER MAX	MAJOR DIAMETER MIN	PITCH DIAMETER MAX	PITCH DIAMETER MIN	MINOR DIAMETER MAX	MINOR DIAMETER MIN	MAJOR DIAMETER MIN	MAJOR DIAMETER MAX	PITCH DIAMETER MIN	PITCH DIAMETER MAX	MINOR DIAMETER MIN	MINOR DIAMETER MAX	STRESS AREA	SHEAR AREA
3.7500	3.7375	3.6595	3.6329	3.5800	3.5534	3.7700	3.7966	3.6750	3.7016	3.6000	3.6125	10.1400	5.9473
3.8750	3.8625	3.7843	3.7574	3.7050	3.6782	3.8950	3.9218	3.8000	3.8268	3.7250	3.7375	10.8559	6.1457
4.0000	3.9875	3.9090	3.8820	3.8300	3.8030	4.0200	4.0470	3.9250	3.9520	3.8500	3.8625	11.5963	6.3438
4.1250	4.1125	4.0338	4.0066	3.9550	3.9278	4.1450	4.1722	4.0500	4.0772	3.9750	3.9875	12.3611	6.5418
4.2500	4.2375	4.1585	4.1311	4.0800	4.0526	4.2700	4.2974	4.1750	4.2024	4.1000	4.1125	13.1503	6.7394
4.3750	4.3625	4.2833	4.2557	4.2050	4.1775	4.3950	4.4225	4.3000	4.3275	4.2250	4.2375	13.9640	6.9368
4.5000	4.4875	4.4080	4.3803	4.3300	4.3023	4.5200	4.5477	4.4250	4.4527	4.3500	4.3625	14.8022	7.1340
4.6250	4.6125	4.5328	4.5049	4.4550	4.4271	4.6450	4.6729	4.5500	4.5779	4.4750	4.4875	15.6648	7.3309
4.7500	4.7375	4.6576	4.6295	4.5800	4.5519	4.7700	4.7981	4.6750	4.7031	4.6000	4.6125	16.5519	7.5276
4.8750	4.8625	4.7823	4.7541	4.7050	4.6768	4.8950	4.9232	4.8000	4.8282	4.7250	4.7375	17.4635	7.7240
5.0000	4.9875	4.9071	4.8787	4.8300	4.8016	5.0200	5.0484	4.9250	4.9534	4.8500	4.8625	18.3995	7.9202
5.1250	5.1125	5.0319	5.0033	4.9550	4.9264	5.1450	5.1736	5.0500	5.0786	4.9750	4.9875	19.3599	8.1162
5.2500	5.2375	5.1567	5.1279	5.0800	5.0513	5.2700	5.2987	5.1750	5.2037	5.1000	5.1125	20.3449	8.3119
5.3750	5.3625	5.2815	5.2525	5.2050	5.1761	5.3950	5.4239	5.3000	5.3289	5.2250	5.2375	21.3543	8.5074
5.5000	5.4875	5.4062	5.3772	5.3300	5.3009	5.5200	5.5491	5.4250	5.4541	5.3500	5.3625	22.3881	8.7027
5.6250	5.6125	5.5310	5.5018	5.4550	5.4258	5.6450	5.6742	5.5500	5.5792	5.4750	5.4875	23.4464	8.8978
5.7500	5.7375	5.6558	5.6264	5.5800	5.5506	5.7700	5.7994	5.6750	5.7044	5.6000	5.6125	24.5292	9.0927
5.8750	5.8625	5.7806	5.7511	5.7050	5.6755	5.8950	5.9245	5.8000	5.8295	5.7250	5.7375	25.6365	9.2873
6.0000	5.9875	5.9054	5.8757	5.8300	5.8003	6.0200	6.0497	5.9250	5.9547	5.8500	5.8625	26.7682	9.4817
6.1250	6.1125	6.0302	6.0004	5.9550	5.9252	6.1450	6.1748	6.0500	6.0798	5.9750	5.9875	27.9244	9.6759
6.2500	6.2375	6.1550	6.1250	6.0800	6.0500	6.2700	6.3000	6.1750	6.2050	6.1000	6.1125	29.1050	9.8699
6.3750	6.3625	6.2798	6.2497	6.2050	6.1749	6.3950	6.4251	6.3000	6.3301	6.2250	6.2375	30.3101	10.0637
6.5000	6.4875	6.4046	6.3743	6.3300	6.2997	6.5200	6.5503	6.4250	6.4553	6.3500	6.3625	31.5397	10.2573
6.6250	6.6125	6.5294	6.4990	6.4550	6.4246	6.6450	6.6754	6.5500	6.5804	6.4750	6.4875	32.7938	10.4507
6.7500	6.7375	6.6542	6.6236	6.5800	6.5494	6.7700	6.8006	6.6750	6.7056	6.6000	6.6125	34.0723	10.6439
6.8750	6.8625	6.7790	6.7483	6.7050	6.6743	6.8950	6.9257	6.8000	6.8307	6.7250	6.7375	35.3753	10.8369
7.0000	6.9875	6.9038	6.8730	6.8300	6.7991	7.0200	7.0509	6.9250	6.9559	6.8500	6.8625	36.7028	11.0296
7.1250	7.1125	7.0286	6.9976	6.9550	6.9240	7.1450	7.1760	7.0500	7.0810	6.9750	6.9875	38.0548	11.2222

Appendix 3 – NBS Allowable Diameter Ranges

4 Pitch Stub ACME Threads < Class 2G

V

<--- EXTERNAL THREADS					--->	<--- INTERNAL THREADS					--->		
MAJOR DIAMETER MAX	MAJOR DIAMETER MIN	PITCH DIAMETER MAX	PITCH DIAMETER MIN	MINOR DIAMETER MAX	MINOR DIAMETER MIN	MAJOR DIAMETER MIN	MAJOR DIAMETER MAX	PITCH DIAMETER MIN	PITCH DIAMETER MAX	MINOR DIAMETER MIN	MINOR DIAMETER MAX	STRESS AREA	SHEAR AREA
7.2500	7.2375	7.1535	7.1223	7.0800	7.0488	7.2700	7.3012	7.1750	7.2062	7.1000	7.1125	39.4312	11.4146
7.3750	7.3625	7.2783	7.2470	7.2050	7.1737	7.3950	7.4263	7.3000	7.3313	7.2250	7.2375	40.8321	11.6068
7.5000	7.4875	7.4031	7.3717	7.3300	7.2986	7.5200	7.5514	7.4250	7.4564	7.3500	7.3625	42.2575	11.7988
7.6250	7.6125	7.5279	7.4963	7.4550	7.4234	7.6450	7.6766	7.5500	7.5816	7.4750	7.4875	43.7073	11.9906
7.7500	7.7375	7.6527	7.6210	7.5800	7.5483	7.7700	7.8017	7.6750	7.7067	7.6000	7.6125	45.1817	12.1822
7.8750	7.8625	7.7776	7.7457	7.7050	7.6732	7.8950	7.9268	7.8000	7.8318	7.7250	7.7375	46.6805	12.3737
8.0000	7.9875	7.9024	7.8704	7.8300	7.7980	8.0200	8.0520	7.9250	7.9570	7.8500	7.8625	48.2038	12.5649
8.1250	8.1125	8.0272	7.9951	7.9550	7.9229	8.1450	8.1771	8.0500	8.0821	7.9750	7.9875	49.7515	12.7560
8.2500	8.2375	8.1520	8.1198	8.0800	8.0478	8.2700	8.3022	8.1750	8.2072	8.1000	8.1125	51.3238	12.9469
8.3750	8.3625	8.2768	8.2445	8.2050	8.1726	8.3950	8.4274	8.3000	8.3324	8.2250	8.2375	52.9205	13.1375
8.5000	8.4875	8.4017	8.3692	8.3300	8.2975	8.5200	8.5525	8.4250	8.4575	8.3500	8.3625	54.5417	13.3281
8.6250	8.6125	8.5265	8.4939	8.4550	8.4224	8.6450	8.6776	8.5500	8.5826	8.4750	8.4875	56.1874	13.5184
8.7500	8.7375	8.6513	8.6186	8.5800	8.5473	8.7700	8.8027	8.6750	8.7077	8.6000	8.6125	57.8575	13.7086
8.8750	8.8625	8.7762	8.7433	8.7050	8.6721	8.8950	8.9279	8.8000	8.8329	8.7250	8.7375	59.5522	13.8985
9.0000	8.9875	8.9010	8.8680	8.8300	8.7970	9.0200	9.0530	8.9250	8.9580	8.8500	8.8625	61.2713	14.0883
9.1250	9.1125	9.0258	8.9927	8.9550	8.9219	9.1450	9.1781	9.0500	9.0831	8.9750	8.9875	63.0149	14.2780
9.2500	9.2375	9.1507	9.1174	9.0800	9.0468	9.2700	9.3032	9.1750	9.2082	9.1000	9.1125	64.7830	14.4674
9.3750	9.3625	9.2755	9.2421	9.2050	9.1716	9.3950	9.4284	9.3000	9.3334	9.2250	9.2375	66.5756	14.6567
9.5000	9.4875	9.4003	9.3668	9.3300	9.2965	9.5200	9.5535	9.4250	9.4585	9.3500	9.3625	68.3926	14.8458
9.6250	9.6125	9.5252	9.4916	9.4550	9.4214	9.6450	9.6786	9.5500	9.5836	9.4750	9.4875	70.2342	15.0347
9.7500	9.7375	9.6500	9.6163	9.5800	9.5463	9.7700	9.8037	9.6750	9.7087	9.6000	9.6125	72.1002	15.2235
9.8750	9.8625	9.7749	9.7410	9.7050	9.6711	9.8950	9.9289	9.8000	9.8339	9.7250	9.7375	73.9907	15.4121
10.0000	9.9875	9.8997	9.8657	9.8300	9.7960	10.0200	10.0540	9.9250	9.9590	9.8500	9.8625	75.9057	15.6006
10.1250	10.1125	10.0245	9.9905	9.9550	9.9209	10.1450	10.1791	10.0500	10.0841	9.9750	9.9875	77.8452	15.7888
10.2500	10.2375	10.1494	10.1152	10.0800	10.0458	10.2700	10.3042	10.1750	10.2092	10.1000	10.1125	79.8091	15.9769
10.3750	10.3625	10.2742	10.2399	10.2050	10.1707	10.3950	10.4293	10.3000	10.3343	10.2250	10.2375	81.7976	16.1649
10.5000	10.4875	10.3991	10.3646	10.3300	10.2956	10.5200	10.5544	10.4250	10.4594	10.3500	10.3625	83.8105	16.3526
10.6250	10.6125	10.5239	10.4894	10.4550	10.4204	10.6450	10.6796	10.5500	10.5846	10.4750	10.4875	85.8480	16.5403

Appendix 3 – NBS Allowable Diameter Ranges

4 Pitch Stub ACME Threads <Class 2G

V

EXTERNAL THREADS						INTERNAL THREADS							
MAJOR DIAMETER MAX	MAJOR DIAMETER MIN	PITCH DIAMETER MAX	PITCH DIAMETER MIN	MINOR DIAMETER MAX	MINOR DIAMETER MIN	MAJOR DIAMETER MIN	MAJOR DIAMETER MAX	PITCH DIAMETER MIN	PITCH DIAMETER MAX	MINOR DIAMETER MIN	MINOR DIAMETER MAX	STRESS AREA	SHEAR AREA
10.7500	10.7375	10.6488	10.6141	10.5800	10.5453	10.7700	10.8047	10.6750	10.7097	10.6000	10.6125	87.9099	16.7277
10.8750	10.8625	10.7736	10.7388	10.7050	10.6702	10.8950	10.9298	10.8000	10.8348	10.7250	10.7375	89.9963	16.9150
11.0000	10.9875	10.8985	10.8636	10.8300	10.7951	11.0200	11.0549	10.9250	10.9599	10.8500	10.8625	92.1072	17.1021
11.1250	11.1125	11.0233	10.9883	10.9550	10.9200	11.1450	11.1800	11.0500	11.0850	10.9750	10.9875	94.2425	17.2891
11.2500	11.2375	11.1482	11.1130	11.0800	11.0449	11.2700	11.3051	11.1750	11.2101	11.1000	11.1125	96.4024	17.4759
11.3750	11.3625	11.2730	11.2378	11.2050	11.1698	11.3950	11.4302	11.3000	11.3352	11.2250	11.2375	98.5867	17.6626
11.5000	11.4875	11.3979	11.3625	11.3300	11.2947	11.5200	11.5553	11.4250	11.4603	11.3500	11.3625	100.7956	17.8491
11.6250	11.6125	11.5227	11.4873	11.4550	11.4195	11.6450	11.6805	11.5500	11.5855	11.4750	11.4875	103.0289	18.0354
11.7500	11.7375	11.6476	11.6120	11.5800	11.5444	11.7700	11.8056	11.6750	11.7106	11.6000	11.6125	105.2867	18.2216
11.8750	11.8625	11.7724	11.7368	11.7050	11.6693	11.8950	11.9307	11.8000	11.8357	11.7250	11.7375	107.5690	18.4077
12.0000	11.9875	11.8973	11.8615	11.8300	11.7942	12.0200	12.0558	11.9250	11.9608	11.8500	11.8625	109.8758	18.5936
12.1250	12.1125	12.0221	11.9863	11.9550	11.9191	12.1450	12.1809	12.0500	12.0859	11.9750	11.9875	112.2071	18.7793
12.2500	12.2375	12.1470	12.1110	12.0800	12.0440	12.2700	12.3060	12.1750	12.2110	12.1000	12.1125	114.5629	18.9649
12.3750	12.3625	12.2719	12.2358	12.2050	12.1689	12.3950	12.4311	12.3000	12.3361	12.2250	12.2375	116.9432	19.1503
12.5000	12.4875	12.3967	12.3605	12.3300	12.2938	12.5200	12.5562	12.4250	12.4612	12.3500	12.3625	119.3479	19.3356
12.6250	12.6125	12.5216	12.4853	12.4550	12.4187	12.6450	12.6813	12.5500	12.5863	12.4750	12.4875	121.7772	19.5207
12.7500	12.7375	12.6464	12.6100	12.5800	12.5436	12.7700	12.8064	12.6750	12.7114	12.6000	12.6125	124.2309	19.7057
12.8750	12.8625	12.7713	12.7348	12.7050	12.6685	12.8950	12.9315	12.8000	12.8365	12.7250	12.7375	126.7092	19.8906
13.0000	12.9875	12.8962	12.8595	12.8300	12.7934	13.0200	13.0566	12.9250	12.9616	12.8500	12.8625	129.2119	20.0752
13.1250	13.1125	13.0210	12.9843	12.9550	12.9183	13.1450	13.1817	13.0500	13.0867	12.9750	12.9875	131.7391	20.2598
13.2500	13.2375	13.1459	13.1090	13.0800	13.0432	13.2700	13.3068	13.1750	13.2118	13.1000	13.1125	134.2908	20.4442
13.3750	13.3625	13.2707	13.2338	13.2050	13.1681	13.3950	13.4319	13.3000	13.3369	13.2250	13.2375	136.8670	20.6284
13.5000	13.4875	13.3956	13.3586	13.3300	13.2930	13.5200	13.5570	13.4250	13.4620	13.3500	13.3625	139.4677	20.8126
13.6250	13.6125	13.5205	13.4833	13.4550	13.4179	13.6450	13.6821	13.5500	13.5871	13.4750	13.4875	142.0929	20.9965
13.7500	13.7375	13.6453	13.6081	13.5800	13.5428	13.7700	13.8072	13.6750	13.7122	13.6000	13.6125	144.7426	21.1804
13.8750	13.8625	13.7702	13.7329	13.7050	13.6677	13.8950	13.9323	13.8000	13.8373	13.7250	13.7375	147.4168	21.3640
14.0000	13.9875	13.8951	13.8576	13.8300	13.7926	14.0200	14.0574	13.9250	13.9624	13.8500	13.8625	150.1155	21.5476
14.1250	14.1125	14.0199	13.9824	13.9550	13.9175	14.1450	14.1825	14.0500	14.0875	13.9750	13.9875	152.8386	21.7310

Appendix 3 – NBS Allowable Diameter Ranges

4 Pitch Stub ACME Threads < Class 2G >

<---- EXTERNAL THREADS					---->	<---- INTERNAL THREADS					---->		
MAJOR DIAMETER		PITCH DIAMETER		MINOR DIAMETER		MAJOR DIAMETER		PITCH DIAMETER		MINOR DIAMETER		STRESS	SHEAR
MAX	MIN	MAX	MIN	MAX	MIN	MIN	MAX	MIN	MAX	MIN	MAX	AREA	AREA
14.2500	14.2375	14.1448	14.1072	14.0800	14.0424	14.2700	14.3076	14.1750	14.2126	14.1000	14.1125	155.5863	21.9142
14.3750	14.3625	14.2697	14.2319	14.2050	14.1673	14.3950	14.4327	14.3000	14.3377	14.2250	14.2375	158.3584	22.0974
14.5000	14.4875	14.3945	14.3567	14.3300	14.2922	14.5200	14.5578	14.4250	14.4628	14.3500	14.3625	161.1551	22.2803
14.6250	14.6125	14.5194	14.4815	14.4550	14.4171	14.6450	14.6829	14.5500	14.5879	14.4750	14.4875	163.9762	22.4632
14.7500	14.7375	14.6443	14.6062	14.5800	14.5420	14.7700	14.8080	14.6750	14.7130	14.6000	14.6125	166.8219	22.6459
14.8750	14.8625	14.7691	14.7310	14.7050	14.6669	14.8950	14.9331	14.8000	14.8381	14.7250	14.7375	169.6920	22.8284
15.0000	14.9875	14.8940	14.8558	14.8300	14.7918	15.0200	15.0582	14.9250	14.9632	14.8500	14.8625	172.5867	23.0109
15.1250	15.1125	15.0189	14.9806	14.9550	14.9167	15.1450	15.1833	15.0500	15.0883	14.9750	14.9875	175.5058	23.1932
15.2500	15.2375	15.1438	15.1053	15.0800	15.0416	15.2700	15.3084	15.1750	15.2134	15.1000	15.1125	178.4494	23.3753
15.3750	15.3625	15.2686	15.2301	15.2050	15.1665	15.3950	15.4335	15.3000	15.3385	15.2250	15.2375	181.4175	23.5574
15.5000	15.4875	15.3935	15.3549	15.3300	15.2914	15.5200	15.5586	15.4250	15.4636	15.3500	15.3625	184.4102	23.7392
15.6250	15.6125	15.5184	15.4797	15.4550	15.4163	15.6450	15.6837	15.5500	15.5887	15.4750	15.4875	187.4273	23.9210
15.7500	15.7375	15.6433	15.6044	15.5800	15.5412	15.7700	15.8088	15.6750	15.7138	15.6000	15.6125	190.4689	24.1026
15.8750	15.8625	15.7681	15.7292	15.7050	15.6661	15.8950	15.9339	15.8000	15.8389	15.7250	15.7375	193.5350	24.2841
16.0000	15.9875	15.8930	15.8540	15.8300	15.7910	16.0200	16.0590	15.9250	15.9640	15.8500	15.8625	196.6256	24.4655

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Allowable External Diameter Ranges

Minimum Minor Diameter

DOCUMENT NO:	TM-N1063-002		
DOCUMENT TYPE:			ENG
REVISION #			0
SAFETY RELATED			
NON-SAFETY RELATED			
PAGE	1	OF	3

PREPARED BY: DJM DATE: 10/08/10 | REVIEWED BY: BAG DATE: 10/08/10

INPUT

PLANT: TMI UNIT: 1 SURVEILLANCE NUMBER: 1st YEAR: 1st

NOMINAL DIAMETER 9.375 *in.* MINIMUM YIELD STRENGTH 150 *ksi*

ENGAGEMENT LENGTH 3.00 *in.* REQUIRED LOADING 120 *% G.U.T.S.*

NUMBER OF WIRES 170 *in.*

INTERNAL THREAD (STRESSING ADAPTER) INFORMATION

IDENTIFICATION MARK C6001

MAJOR DIAMETER 9.4150 *in.* MINOR DIAMETER 9.2230 *ksi*

EXTERNAL THREAD (ANCHORHEAD) RANGE INFORMATION

SMALLEST MAJOR DIAMETER 9.345 *in.* MAJOR DIA. INCREMENT 0.01 *in.*

SMALLEST PITCH DIAMETER 9.15 *in.* PITCH DIA. INCREMENT 0.014 *in.*

OUTPUT

PITCH DIAMETER RANGES \ MAJOR DIAMETER RANGES	9.345 9.354	9.355 9.364	9.365 9.374	9.375 9.384	9.385 9.394	9.395 9.404	9.405 9.414	9.415 9.424	9.425 9.434	9.435 9.444
9.150 9.163	8.884	8.853	8.822	8.790	8.757	8.724	8.691	8.657	8.622	8.587
9.164 9.177	8.799	8.764	8.729	8.694	8.659	8.623	8.588	8.553	8.517	8.482
9.178 9.191	8.782	8.746	8.709	8.673	8.636	8.599	8.563	8.526	8.489	8.452
9.192 9.205	8.765	8.727	8.690	8.652	8.614	8.575	8.537	8.499	8.461	8.423
9.206 9.219	8.748	8.709	8.670	8.631	8.591	8.552	8.512	8.473	8.433	8.393
9.220 9.233	8.732	8.691	8.650	8.610	8.569	8.528	8.487	8.446	8.405	8.364
9.234 9.247	8.715	8.673	8.631	8.589	8.547	8.504	8.462	8.420	8.377	8.335
9.248 9.261	8.698	8.655	8.612	8.568	8.525	8.481	8.437	8.394	8.350	8.306
9.262 9.275	8.682	8.637	8.592	8.547	8.502	8.458	8.412	8.367	8.322	8.277
9.276 9.289	8.665	8.619	8.573	8.527	8.481	8.434	8.388	8.341	8.295	8.248
9.290 9.303	8.649	8.601	8.554	8.506	8.459	8.411	8.363	8.315	8.268	8.220
9.304 9.317	8.633	8.584	8.535	8.486	8.437	8.388	8.339	8.290	8.240	8.191
9.318 9.331	8.616	8.566	8.516	8.466	8.415	8.365	8.314	8.264	8.213	8.163
9.332 9.345	8.600	8.548	8.497	8.445	8.394	8.342	8.290	8.238	8.186	8.134
9.346 9.359	8.584	8.531	8.478	8.425	8.372	8.319	8.266	8.213	8.159	8.106

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DOCUMENT NO:	TM-N1063-002
DOCUMENT TYPE:	ENG
REVISION #	0
SAFETY RELATED	
NON-SAFETY RELATED	
PAGE	2 OF 3

Allowable External Diameter Ranges

Minimum Minor Diameter

PREPARED BY: DJM DATE: 10/08/10 | REVIEWED BY: BAG DATE: 10/08/10

INPUT

PLANT: TMI UNIT: 1 SURVEILLANCE NUMBER: 1st YEAR: 1st

NOMINAL DIAMETER 9.375 *in.* MINIMUM YIELD STRENGTH 150 *ksi*

ENGAGEMENT LENGTH 3.00 *in.* REQUIRED LOADING 120 *% G.U.T.S.*

NUMBER OF WIRES 170 *in.*

INTERNAL THREAD (STRESSING ADAPTER) INFORMATION

IDENTIFICATION MARK C6002

MAJOR DIAMETER 9.4150 *in.* MINOR DIAMETER 9.2270 *ksi*

EXTERNAL THREAD (ANCHORHEAD) RANGE INFORMATION

SMALLEST MAJOR DIAMETER 9.345 *in.* MAJOR DIA. INCREMENT 0.01 *in.*

SMALLEST PITCH DIAMETER 9.15 *in.* PITCH DIA. INCREMENT 0.014 *in.*

OUTPUT

MAJOR DIAMETER RANGES (columns); PITCH DIAMETER RANGES (rows)

PITCH DIAMETER RANGES	9.345 9.354	9.355 9.364	9.365 9.374	9.375 9.384	9.385 9.394	9.395 9.404	9.405 9.414	9.415 9.424	9.425 9.434	9.435 9.444
9.150 9.163	8.943	8.917	8.890	8.862	8.834	8.806	8.778	8.749	8.719	8.689
9.164 9.177	8.822	8.787	8.752	8.717	8.683	8.648	8.613	8.578	8.543	8.508
9.178 9.191	8.805	8.769	8.733	8.697	8.661	8.624	8.588	8.552	8.515	8.479
9.192 9.205	8.789	8.751	8.714	8.676	8.639	8.601	8.563	8.526	8.488	8.450
9.206 9.219	8.773	8.734	8.695	8.656	8.617	8.578	8.539	8.499	8.460	8.421
9.220 9.233	8.756	8.716	8.676	8.635	8.595	8.555	8.514	8.474	8.433	8.392
9.234 9.247	8.740	8.699	8.657	8.615	8.573	8.532	8.490	8.448	8.406	8.364
9.248 9.261	8.724	8.681	8.638	8.595	8.552	8.509	8.465	8.422	8.379	8.335
9.262 9.275	8.708	8.664	8.619	8.575	8.530	8.486	8.441	8.396	8.352	8.307
9.276 9.289	8.692	8.646	8.601	8.555	8.509	8.463	8.417	8.371	8.325	8.279
9.290 9.303	8.676	8.629	8.582	8.535	8.487	8.440	8.393	8.345	8.298	8.250
9.304 9.317	8.660	8.612	8.563	8.515	8.466	8.418	8.369	8.320	8.271	8.222
9.318 9.331	8.645	8.595	8.545	8.495	8.445	8.395	8.345	8.295	8.245	8.194
9.332 9.345	8.629	8.578	8.526	8.475	8.424	8.373	8.321	8.270	8.218	8.166
9.346 9.359	8.613	8.561	8.508	8.456	8.403	8.350	8.297	8.245	8.192	8.139

1

DOCUMENT NO:	TM-N1063-002	
DOCUMENT TYPE:		ENG
REVISION #		0
SAFETY RELATED		
NON-SAFETY RELATED		
PAGE	3 OF	3

Allowable External Diameter Ranges

Minimum Minor Diameter

PREPARED BY: DJM DATE: 10/08/10 | REVIEWED BY: BAG DATE: 10/08/10

INPUT

PLANT: TMI UNIT: 1 SURVEILLANCE NUMBER: 1st YEAR: 1st

NOMINAL DIAMETER 9.375 *in.* MINIMUM YIELD STRENGTH 150 *ksi*

ENGAGEMENT LENGTH 3.00 *in.* REQUIRED LOADING 120 *% G.U.T.S.*

NUMBER OF WIRES 170 *in.*

INTERNAL THREAD (STRESSING ADAPTER) INFORMATION

IDENTIFICATION MARK D2

MAJOR DIAMETER 9.3980 *in.* MINOR DIAMETER 9.2280 *ksi*

EXTERNAL THREAD (ANCHORHEAD) RANGE INFORMATION

SMALLEST MAJOR DIAMETER 9.345 *in.* MAJOR DIA. INCREMENT 0.01 *in.*

SMALLEST PITCH DIAMETER 9.15 *in.* PITCH DIA. INCREMENT 0.014 *in.*

OUTPUT

PITCH DIAMETER RANGES \ MAJOR DIAMETER RANGES	9.345 9.354	9.355 9.364	9.365 9.374	9.375 9.384	9.385 9.394	9.395 9.404	9.405 9.414	9.415 9.424	9.425 9.434	9.435 9.444
9.150 9.163	8.956	8.931	8.905	8.878	8.852	8.824	8.797	8.769	8.740	8.712
9.164 9.177	8.827	8.793	8.758	8.723	8.689	8.654	8.619	8.584	8.549	8.514
9.178 9.191	8.811	8.775	8.739	8.703	8.667	8.631	8.594	8.558	8.522	8.485
9.192 9.205	8.795	8.757	8.720	8.682	8.645	8.607	8.570	8.532	8.494	8.457
9.206 9.219	8.779	8.740	8.701	8.662	8.623	8.584	8.545	8.506	8.467	8.428
9.220 9.233	8.762	8.722	8.682	8.642	8.602	8.561	8.521	8.480	8.440	8.399
9.234 9.247	8.746	8.705	8.663	8.622	8.580	8.538	8.496	8.455	8.413	8.371
9.248 9.261	8.730	8.688	8.645	8.602	8.559	8.515	8.472	8.429	8.386	8.342
9.262 9.275	8.715	8.670	8.626	8.582	8.537	8.493	8.448	8.404	8.359	8.314
9.276 9.289	8.699	8.653	8.607	8.562	8.516	8.470	8.424	8.378	8.332	8.286
9.290 9.303	8.683	8.636	8.589	8.542	8.495	8.447	8.400	8.353	8.305	8.258
9.304 9.317	8.667	8.619	8.570	8.522	8.473	8.425	8.376	8.328	8.279	8.230
9.318 9.331	8.652	8.602	8.552	8.502	8.452	8.402	8.353	8.302	8.252	8.202
9.332 9.345	8.636	8.585	8.534	8.483	8.431	8.380	8.329	8.277	8.226	8.174
9.346 9.359	8.620	8.568	8.516	8.463	8.411	8.358	8.305	8.253	8.200	8.147

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

PRESTRESS FORCES

G Bussone	*QA MANAGER*	10/13/10
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	10/13/10
Approved by	Title	Date
Paul C. [illegible]	*PRESIDENT*	10/13/10
Approved by	Title	Date

1.0 PURPOSE

1.1 The purpose of this procedure is to provide in table form the predicted lift-off forces for the 35th Year In-Service Inspection (surveillance) at Exelon's Three Mile Island Nuclear Plant.

2.0 SURVEILLANCE TENDON DATA

2.1 The lower limit lift-off forces, 95% lift-off force, 90% lift-off force and Normalization Factor have been obtained from Exelon.

2.2 The predicted lower limit (PLL), 90% of predicted lower limit (.9 PLL), 95% of predicted lower limit (.95PLL) and Normalization Factor forces to be used during the 2010 Augmented inspection are listed below for each UNIT 1 tendon scheduled for monitoring of force. The same information is provided for the adjacent tendons.

Table 2-3 : TMI – SQ 9.1: Liftoff Calculations – Unit 1 Augmented Tendons

TENDON	LOWER LIMIT LIFTOFF FORCE (PLL)	95% LOWER LIMIT LIFTOFF FORCE (.95PLL)	90% LOWER LIMIT LIFTOFF FORCE (.90PLL)	NORMALIZATION FACTOR	TENDON	LOWER LIMIT LIFTOFF FORCE (PLL)	95% LOWER LIMIT LIFTOFF FORCE (.95PLL)	90% LOWER LIMIT LIFTOFF FORCE (.90PLL)	NORMALIZATION FACTOR
H46-37	1312	1246	1181	n/a	V-117	1330	1264	1197	n/a
H46-38	1239	1177	1115	n/a	**V-118**	**1340**	**1273**	**1206**	**n/a**
H46-39	**1316**	**1250**	**1184**	**n/a**	V-119	1308	1243	1177	n/a
H46-40	1218	1157	1096	n/a	V-133	1352	1284	1217	n/a
H46-41	**1314**	**1248**	**1183**	**n/a**	**V-134**	**1332**	**1265**	**1199**	**n/a**
H46-42	1222	1161	1100	n/a	V-135	1356	1288	1220	n/a

N/A- NORMALIZATION NOT REQUIRED

PSC
Precision Surveillance Corporation

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

TEST WIRE REMOVAL

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C [illegible]	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the requirements for removing a sample wire to be used for physical testing, during the 35th Year In-Service-Inspections (surveillance) of the Post-Tensioning System Tendons of Exelon's Three Mile Island Nuclear Plant - Unit 1.

1.2 One continuous and any other discontinuous tendon wires will be removed from the designated tendons to have wire removed. Do not remove more than three wires from any one tendon during this surveillance period without TMI Engineering approval.

2.0 RESPONSIBILITY

2.1 As stated in PSC Procedure QA 4.0.

3.0 QUALIFICATIONS

3.1 As stated in PSC Procedure QA 4.1.

4.0 EQUIPMENT

4.1 Quality Control gauges or test equipment will not be required for this activity, except where hydraulic devices and gauges are used.

5.0 QUALITY CONTROL

5.1 This procedure contains ***HOLD POINTS***. The work shall not progress past or through a ***HOLD POINT*** without a sign-off from the QC Inspector. All Quality Control Documentation (***QCD***) points shall only require documentation of information or evaluation data. The sign-offs and required information or evaluation data shall be documented on Data Sheet 10.2 or Data Sheet 8.0 of PSC Procedure SQ 8.0.

6.0 PRECAUTIONS

6.1 When pulling individual wires, never exceed the yield strength of that wire when pulling with the pulling device - 9,425 pounds.

6.2 Discontinuous wires shall not be used to satisfy the requirements for the physical testing of this procedure.

6.3 If other Broken/Missing Wires are found in this tendon as a result of this inspection or previous inspections, it shall be necessary to select a wire from this tendon that would tend to balance the forces in that tendon anchorage and try to maintain symmetry with the missing wires in the hole pattern.

- BE SURE THAT THE CORRECT WIRE HAS BEEN LOCATED BEFORE CUTTING.
- BE SURE THAT THIS TENDON REQUIRES SAMPLE WIRE REMOVAL.
- USE CARE TO AVOID DAMAGING OTHER WIRES OR BUTTONHEADS.
- AVOID UNNECESSARY MARKS OR DAMAGE TO THE WIRE WHILE REMOVING.
- USE CARE WHEN COILING THE WIRE AND SECURING IT INTO A COIL. THIS WIRE HAS CONSIDERABLE SPRING FORCE AND MUST BE PREVENTED FROM UNCOILING VIOLENTLY.

7.0 PREREQUISITES

7.1 The anchorage inspection will be complete and Data Sheet 8.0 available.

7.2 The tendon will be detensioned; monitoring of forces has been completed.

8.0 WIRE REMOVAL

8.1 A wire shall be selected, preferable from the two outer rows of the anchorage hole pattern.

8.2 The Tendon Surveillance Wire Puller shown in Figure 1 of PSC Procedure SQ 10.5 shall be attached to the selected wire.

8.3 The wire shall be pulled with the Wire Puller using as little force as possible.

8.3.1 If the wire cannot be moved by hand, it shall be acceptable to use any mechanical device to accomplish that purpose, such as a "Come-A-long", "Chain-Hoist", "Chain Pawl" or hydraulic ram.

8.3.1.1 It is unlikely that anything but the hydraulic ram will be able to exert such an amount of force so as to yield or break the wire. Therefore hydraulic devices shall be controlled for force through a calibrated gauge or controlled for maximum force through a locking valve to control the amount of pressure to be exerted.

8.3.1.2 There remains a possibility that a limited force might not move the wire. It shall be necessary to abandon that wire and select a new wire, continuing this process until a wire can be moved. All abandoned wires shall be identified on Data Sheet 8.0 of Procedure 8.0. All wires shall be considered effective wires provided the yield strength of the wire was not exceeded.

8.4 Once a tendon wire is located that can be moved, it shall be witnessed for that movement at the opposite end of the tendon to verify that this is a continuous wire.

8.5 Prepare to cut the wire at the opposite end of the tendon from where the wire is to be pulled.

8.5.1 ***QCD*** – Document the location of wire removal on Data Sheet 8.0 of Procedure SQ 8.0. Once this is posted, document that action on Data Sheet 10.2 of this Procedure.

8.5.2 Measure back from the buttonhead 1 inch plus or minus 1/16 inch and mark or scribe a line; it shall be acceptable to notch the wire with a file.

8.5.3 Cut the wire somewhere between the buttonhead and the marked line, but not on the line.

8.5.4 Pull the wire completely through the tendon duct.

8.5.4.1 While pulling, the entire length of the tendon wire shall be visually inspected for pitting, corrosion, or other signs of deterioration and evaluated in accordance with TMI Procedure 1301-9.1.

8.5.4.1.1 ***HOLD POINT*** – Document the Category of Corrosion rating on Data Sheet 10.2, for every 10 feet of length.

8.5.4.1.2 If the Category of Corrosion is found to be active as defined in TMI Procedure 1301-9.1, TMI Engineering shall be notified with a nonconformance report. TMI Engineering shall provide the final corrective action, which could include removing additional wires and performing Physical Testing.

8.5.4.2 While the tendon wire is being pulled, it may be cleaned of excess grease and coiled into coil form of approximately five-foot diameter. Secure the coil from unwinding. Solvent cleaning may be performed to facilitate cleaning before inspection.

8.5.4.2.1 It shall be acceptable to cut the wires into 10 foot lengths if coiling is impractical. The cut wires shall be identified as required of Section 8.5.5 of this procedure.

8.5.4.3 After the tendon wire has been pulled through, it shall be measured for length.

8.5.4.3.1 ***QCD*** – Document the total length of wire on Data Sheet 10.2. Remember to include the length of wire that was cut from the opposite end.

8.5.4.4 WIRE SAMPLE QUANTITY AND LOCATION REQUIREMENTS

8.5.4.4.1 ACCEPTABLE WIRE

8.5.4.4.1.1 Three specimens shall be tested. One sample shall be taken from approximately the middle of the tendon wire length, with the two remaining samples being taken, one from approximately each end of the tendon wire.

8.5.4.4.2 BROKEN WIRE

8.5.4.4.2.1 If Broken Wires require testing, three specimens shall be tested. One sample shall be taken from the wire length about one foot from either side of the break. The two remaining samples shall be taken, one from approximately each end of the tendon wire.

8.5.4.4.3 UNACCEPTABLE CATEGORY OF CORROSION CONDITION

8.5.4.4.3.1 If Unacceptable Category of Corrosion Condition Wires require testing, at least one specimen shall be tested, with that sample being taken from what is judged to be the worst representative section of the wire length. Other samples may be selected and/or tested at the request of TMI Engineering.

8.5.4.5 If the wire testing is to be performed on site, it shall be acceptable to cut the 3 sample wires while the wire is being pulled out and coiled. Refer to PSC Procedure SQ 10.3 for the control and documentation requirements. The sample shall be cut from each end and the middle of the wire and as cited in Section 8.5.4.4.1.1 above and shall be about 10' long, unless the wires are to be cut to the required testing length.

8.5.4.6 Sample selection shall include areas representative of the most significant Category of Corrosion if this condition exists on the removed wire. Provide samples of this condition in addition to the original 3 samples required. Samples shall not contain gripper marks from the pulling device.

8.5.4.6.1 As a note of caution, be sure that the wire is moving freely before cutting. Otherwise there could be difficulty in removing the wire, requiring assist devices that could leave surface marks on the wire.

8.5.4.6.2 ***QCD*** – When the wire is cut for samples, document the area of removal on Data Sheet 10.2 for later transfer to Data Sheet 10.3 of PSC Procedure SQ 10.3. Document each location of sample removal and tag each cut length for area of removal, tendon identification, pulling direction, date, and plant name and unit.

8.5.5 Attach a tag to the end of the wire being pulled that identifies the tendon, end of removal, pulling direction, date, and plant name and unit. If the wire is cut for samples during removal, the cut lead or front end of the wire shall be identified by tendon number, end of removal, and location in the total length of the test wire to permit reconstruction of that wire as it existed in the tendon.

8.5.6 The coiled wire, whether a single piece or cut pieces, shall be securely tied and covered with plastic sheeting or a plastic bag to protect the wire from inclement conditions.

8.6 If it becomes necessary to remove any additional wires from a tendon for physical testing, this procedure shall be followed to include the additional documentation. For example, Broken Wires or wires with Active Corrosion may be instructed to be removed by TMI Engineering.

8.7 ***QCD*** – Each wire that has been removed for physical testing during this surveillance shall be documented for location of removal on Data Sheet in TMI Procedure 1301-9.1, using the appropriate Code Symbol. Document the posting of this information on Data Sheet 10.2.

8.8 ***QCD*** – Document the identification and recalibration date of the measuring device and the wire Pulling Ram, if used, on Data Sheet 10.2.

9.0 DOCUMENTATION

9.1 The items requiring documentation in this procedure shall be documented on Data Sheet 10.2.

9.2 Some information documented on Data Sheet 10.2 shall require subsequent posting to Data Sheet in TMI Procedure 1301-9.1 and to Data Sheet 10.3 of PSC Procedure SQ 10.3.

9.3 The Data Sheet references the applicable Section or Step number of the procedure for each ***QCD*** or ***HOLD POINT***.

10.0 ATTACHMENTS

10.1 Data Sheet 10.2

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☐ UNIT 1

Tendon No.: ____________ Tendon End: ____________ ☐ Shop ☐ Field

Removal Date: ____________ Inspection Date: ____________

WIRE REMOVAL INSPECTION

CORROSION INSPECTION @ LENGTH INTERVALS

(8.5.4.1.1) Document the Corrosion Category for each 10' of wire in the increments below. Use Categories described in PSC SQ 8.0.

For Corrosion Level E document condition on an NCR. NCR Req'd: ☐ NO ☐ YES NCR# ________

(8.5.4.3.1) Document the total length of the wire on the diagram below. Completed: ☐ NO ☐ YES

Buttonhead End

0'	**10'**	**20'**	**30'**
30'	**40'**	**50'**	**60'**
60'	**70'**	**80'**	**90'**
90'	**100'**	**110'**	**120'**
120'	**130'**	**140'**	**150'**
150'	**160'**	**170'**	**180'**
180'	**190'**	**200'**	**210'**
210'	**220'**	**230'**	**240'**
240'	**250'**	**260'**	**270'**
270'	**280'**	**290'**	**300'**
300'	**310'**	**320'**	**330'**

Cut End

(8.5.4.6.2) Was the wire cut for samples: , ☐ NO ☐ YES document the area of removal above using symbol ✕.

(8.7) Document the location of wire removed on Data Sheet 8.0, ANCHORAGE INSPECTION: ☐ Completed

(8.8) Measuring Device: ____________ ID Number: ____________ Recal Date: ____________

(8.8) Wire Pull Ram ID Number: ____________

Q.C Inspector: ____________ Level: ________ Date: ________

QC Reviewed: ____________ Level: ________ Date: ________

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

TESTING TENDON WIRES

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C [illegible]	*PRESIDENT*	07/31/09
~~Approved by~~	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the requirements for the Physical Testing of tendon wires removed from Post-Tensioning System Tendons, during the 35th Year In-Service-Inspections (surveillance) of the Post-Tensioning System Tendons of Exelon's Three Mile Island Nuclear Plant - Unit 1.

2.0 SCOPE

2.1 The intention of this procedure is to provide the means of physically testing an Acceptable Wire removed from a tendon. However, this Procedure shall also apply for the physical testing of wires which may have been found to be Broken or in an Unacceptable Category of Corrosion.

3.0 RESPONSIBILITY

3.1 As stated in PSC Procedure QA 4.0.

4.0 QUALIFICATIONS

4.1 As stated in PSC Procedure QA 4.1.

5.0 EQUIPMENT

5.1 Steel tapeline, steel ruler, 1" O.D. Micrometer, Wire Test Apparatus, Pressure Gauge, dial indicator.

6.0 QUALITY CONTROL

6.1 This procedure contains no hold points. All Quality Control Documentation (***QCD***) points shall only require documentation of information or evaluation data. The required information or evaluation data shall be documented on Data Sheet 10.3.

7.0 PRECAUTIONS

7.1 Stay clear of the test apparatus while the wire is being tensioned.

7.2 Always maintain identification control of the samples including tendon and end identification, plant name and unit, the direction of removal of the wire and the location of that sample as it was removed from the tendon wire.

7.2.1 As a means of maintaining consistency for testing, the end of the sample that is tagged (closest to pulling or buttonhead end) shall always be placed into the Wire Test Apparatus (Figure D 1) opposite or away from the ram end.

8.0 PHYSICAL TESTING

8.1 The following steps shall be used to test any tendon wire removed from the tendon, whether that is an acceptable wire, a broken wire or a wire of an unacceptable category of corrosion.

8.2 The specimen wires will be cut to a length of 108" plus or minus 1/4", after being removed during the performance of PSC Procedure SQ 10.2. Develop a separate Data Sheet for each sample tested. It will be acceptable to cut the sample to the Buttonheading Length of 101 inches plus or minus one inch. (See Section 8.7 of this Procedure.)

8.3 <u>ACCEPTABLE WIRE</u>

8.3.1 Three specimens shall be tested. One sample shall be taken from approximately the middle of the tendon wire length, with the two remaining samples being taken, one from approximately each end of the tendon wire.

8.4 <u>BROKEN WIRE</u>

8.4.1 If broken wires require testing, three specimens shall be tested. One sample shall be taken from the wire length about one foot from either side of the break. The two remaining samples shall be taken, one from approximately each end of the tendon wire.

8.5 <u>UNACCEPTABLE CATEGORY OF CORROSION CONDITION</u>

8.5.1 If unacceptable category of corrosion condition wires require testing, at least one specimen shall be tested, with that sample being taken from the worst representative section of the wire length. Other samples may be selected and/or tested at the request of Exelon.

8.5.2 ***<u>QCD</u>*** – Document the sample number, wire identification, location of removal and overall length on Data Sheet 10.3 from Data Sheet 10.2 of PSC Procedure SQ 10.2.

8.6 Measure the diameter of the wire test sample in 3 locations, each end and the middle.

8.6.1 ***<u>QCD</u>*** – Document the measurement of the wire test sample and the measuring device on Data Sheet 10.3. Calculate and document the average of the 3 measurements.

8.7 Cut each wire test sample to 101" plus or minus 1" long; this must be a square, neat cut to permit buttonheading.

8.8 Slide two Wire Test Stressing Washers (see Figure D 2) onto the wire, making sure the chamfered seats face to the outside of the wire.

8.9 Buttonhead both ends of the wire.

8.9.1 ***QCD*** – Document the acceptance of the buttonheads on Data Sheet 10.3 using the buttonhead acceptance criteria shown in PSC Procedure SQ 8.0.

8.10 Measure the Gauge length of the wire from inside of the buttonhead at one end to the inside of the buttonhead at the other end within an accuracy of plus or minus 0.05".

8.10.1 ***QCD*** – Document the Gauge length of the wire and the identification and recalibration date for the measuring device.

8.11 Place the specimen into the Wire Test Apparatus and check for proper seating of the Stressing Washers in the pulling adaptors.

8.12 Preload the wires to about 2.45 kips +0/-10% to seat the buttonheads in the Stressing Washers.

8.12.1 ***QCD*** – Document the preloading pressure and force, the identification and recalibration date of the Wire Test Apparatus components.

8.12.2 To obtain pressure when the force is specified: $F = \frac{P \times A}{1000} + K$

8.13 Reduce the preload force to 0 kips.

8.13.1 ***QCD*** – Document the release of the preload force.

8.14 Load the wire to 1.42 kips plus or minus 5%. This will provide 0.1% elongation.

8.14.1 ***QCD*** – Document the initial loading of the wire in force, pressure and actual elongation at this point. Elongation shall be measured to an accuracy of 0.05".

8.15 Preset the Dial Indicator on the Wire Test Apparatus to measure 0.9% elongation. (0.9” for a sample length of 100")

8.15.1 ***QCD*** – Document the setting of the Dial Indicator as well as the indicator id and calibration due date.

8.16 Load the wire until the Dial Indicator shows signs of movement, signaling the 0.9% elongation (pressure at 1% elongation).

8.16.1 ***QCD*** – Document the force and pressure at 1% elongation.

8.17 Remove the Dial Indicator.

8.17.1 ***QCD*** – Document the "Rule" dimension reading at 1% elongation (approximately 1") to an accuracy of 0.05".

8.18 Continue to load the wire to failure.

8.18.1 ***QCD*** – Document the maximum elongation measurement from the "Rule" to accuracy of 0.05".

8.18.2 ***QCD*** – Document the maximum force and pressure reading at failure.

8.19 Remove the sample wire (two pieces) and remove the Stressing Washers.

8.20 ***QCD*** – Document the type of failure, ductile or brittle, and the location of the wire break from the tagged end of the wire (opposite the ram).

8.21 Calculate the following and document on Data Sheet 10.3.

8.21.1 ***QCD*** – Calculate the ultimate stress.

8.21.1.1 Stress in KSI is calculated by dividing the Force in KIPS by the wire Area (when the Force in KIPS is derived by the formula: Ram Area in square inches, multiplied by Gauge Pressure in psi and dividing by 1000 and adding the RAM "K" Factor.)

8.21.1.2 Stress (ksi) = Force (kips) ÷ Area (in^2)

8.21.2 ***QCD*** – Calculate yield stress from the pressure reading at 1% elongation.

8.21.3 ***QCD*** – Calculate the percent of elongation under load at the point of failure, based on the actual Gauge length of the wire.

8.21.4 ***QCD*** – Document the acceptability of the wire test in accordance with the criteria specified below in Section 9.0.

9.0 NOTIFICATION - UNACCEPTABLE CONDITIONS

9.1 Exelon shall be notified with a nonconformance report when each one or more of the following unacceptable conditions are detected as a result of the inspection or Physical Testing of a Tendon Wire.

9.2 The diameter of the wire is less than 0.248 in or greater than 0.252 in.

9.3 The Category of Corrosion of the wire is "Active" as described in TMI Procedure 1301-9.1.

9.4 The wire fails to meet the ultimate strength of 240,000 psi.

9.5 The elongation at failure of a tendon wire test is less than 4%.

10.0 DOCUMENTATION

10.1 The items in this procedure requiring documentation shall be documented on Data Sheet 10.3.

10.2 The Data Sheet references the applicable section number of the procedure for each ***QCD*** Point.

10.3 Some information from Data Sheet 10.2 of PSC Procedure SQ 10.2 shall require posting to Data Sheet 10.3.

11.0 ATTACHMENTS

11.1 Data Sheet 10.3

11.2 Figure D.1

11.3 Figure D.2

Project: TMI 35TH YEAR TENDON SURVEILLANCE ☐ UNIT 1

Tendon No.: ____________

WIRE TEST DOCUMENTATION

(8.5.2) Sample No.: ____________

Wire ID and Location of removal: ____________ feet Length: ________ in.

(8.6.1) Wire Diameters: Tag End ________ in. Middle ________ in. Ram End ________ in. Avg. ________ in.

Measuring Device ID: ____________ Recal Date: ____________

(8.9.1) Buttonhead Inspection: Tag End ____________ Ram End ____________

(8.10.1) Gauge Length of Wire: ________ in. Measuring Device ID: ____________ Recal Date: ________

(8.12.1) Preload force: ________ kips

Preload pressure: ________ psi Pressure Gauge ID: ____________ Recal Date: ________

Ram ID: ________ Ram Area: ________ in^2 K = ________ kips Recal Date: ________

(8.13.1) Force reduced to zero (0): ________

(8.14.1) Initial load of wire force: ________ kips (0.1% elongation)

Initial load of pressure: ________ psi Elongation: ________ in.

(8.15.1) Preset Dial Indicator: ________ (0.9% elongation) Indicator ID: ________ Recal Date: ________

(8.16.1) Force at 1% elongation: ________ kips Pressure: ________ psi

(8.17.1) "Rule" reading measurement at 1% elongation: ________ in.

(8.18.1) Maximum elongation at failure, from "Rule" reading: ________ in.

(8.18.2) Maximum force at failure: ________ kips Pressure: ________ psi

(8.20) Type of break: ____________ Location of break: ________ in.

CALCULATIONS:

(8.21.1) Ultimate Stress: ________ ksi Stress (ksi) = Force (kips) ÷ [π (dia^2) ÷ 4] (in^2)

(8.21.2) Yield Stress @ 1% elongation: ________ ksi Stress (ksi) = Force (kips) @ 1% ÷ [π (dia^2) ÷ 4] (in^2)

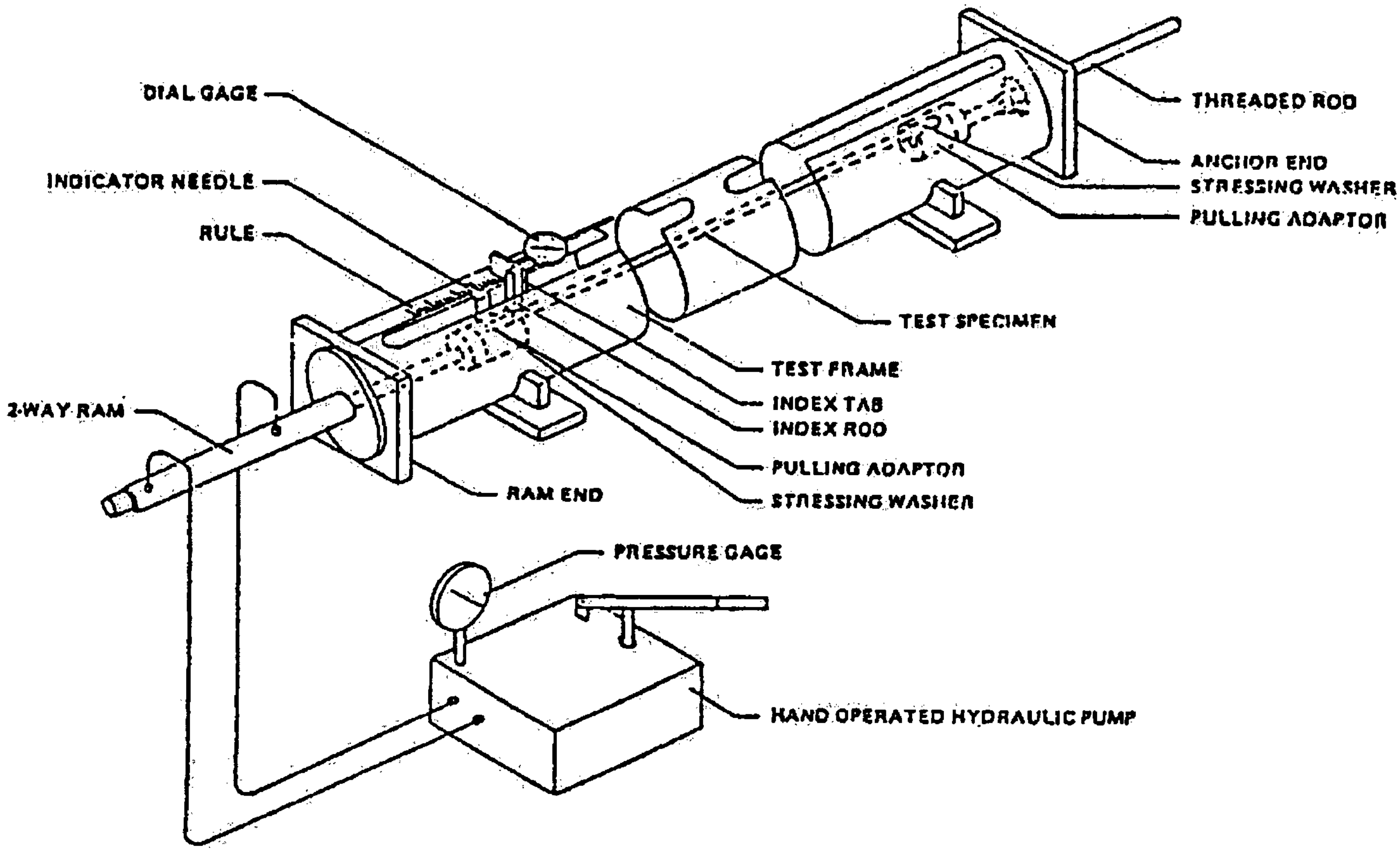
(8.21.3) % elongation @ failure: ________ % [1 in. + ("Rule" Dimension @ Failure – "Rule" Dimension @ 1%)]

(8.21.4) Results: ☐ Acceptable ☐ Unacceptable Customer Notified NCR No.: ________

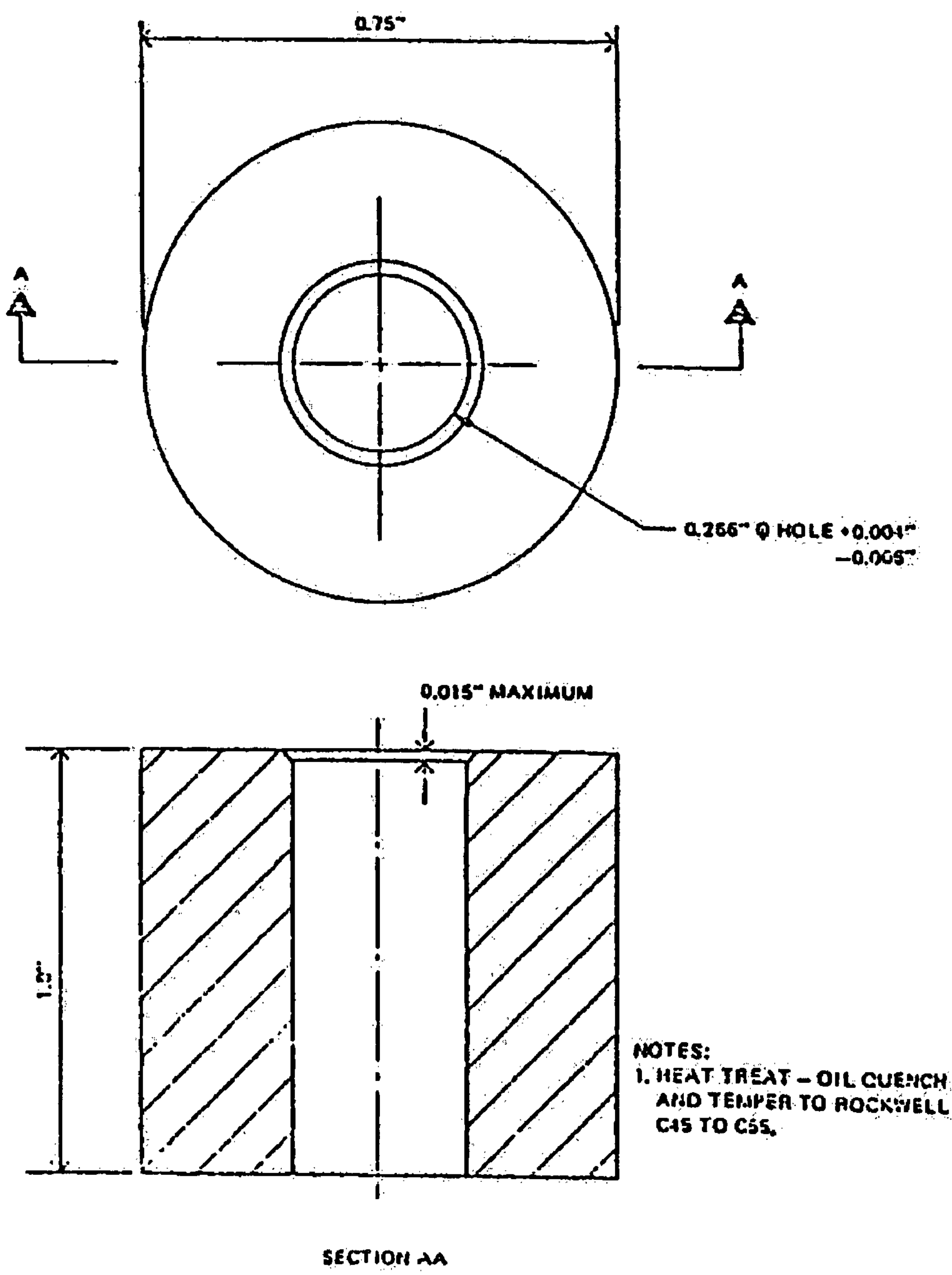
QC Inspector: ____________ Level: ________ Date: ________

QC Reviewed: ____________ Level: ________ Date: ________

Wire Test Apparatus – Figure D.1



Wire Test Stressing Washer – Figure D.2



EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

CONTINUITY TEST

Gerald Busson	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C. ...	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the requirements for performing a Continuity Test of tendon wires for purposes of visual inspection and evaluation of, usually, Protruding/Unseated tendon wires for Post-Tensioning System Tendons, during the 25th Year In-Service-Inspections (surveillance) of the Post-Tensioning System Tendons of Exelon's Three Mile Island Nuclear Plant - Unit 1.

2.0 SCOPE

2.1 The Continuity Test may be performed at the request of TMI Engineering if additional tendon wires are found to be Protruding/Unseated since the original installation or previous surveillance during the Buttonhead Inspection of PSC Procedure SQ 8.0.

3.0 RESPONSIBILITY

3.1 As stated in PSC Procedure QA 4.0.

4.0 QUALIFICATIONS

4.1 As stated in PSC Procedure QA 4.1.

5.0 QUALITY CONTROL

5.1 This procedure contains no ***HOLD POINTS***. All Quality Control Documentation (***QCD***) points shall only require documentation of information or evaluation data. The required information or evaluation data shall be documented on Data Sheet 10.5.

6.0 EQUIPMENT

6.1 A tapeline shall be the only equipment required to perform the Continuity Test, except where calibrated hydraulic devices and gauges are used.

7.0 PRECAUTIONS

- CAUTION - WHEN PULLING INDIVIDUAL WIRES, NEVER EXCEED 80% OF THE GUARANTEED MINIMUM ULTIMATE STRENGTH OF THAT WIRE WHEN PULLING WITH THE PULLING DEVICE – 9,425 POUNDS.

8.0 PREREQUISITES

8.1 The Grease Cap will be removed and grease samples taken.

8.2 The Anchorage Inspection will be complete, with protruding wires in evidence.

8.3 The tendon will be detensioned; it has been monitored for forces.

8.4 Each wire that was determined to be Protruding/Unseated as a result of the Buttonhead Inspection of TMI Procedure 1301-9.1 will be adequately identified either by marking, tagging or reference to Data Sheet.

8.5 The anchorages at each end of the tendon will be pushed back about 12 inches.

8.6 ***QCD*** – Document the tendon identification, Unit # and tendon end on Data Sheet 10.5.

9.0 CONTINUITY TEST

9.1 The Protruding/Unseated wire shall be located.

9.1.1 ***QCD*** – Document the location of each wire by marking it on the appropriate anchorhead sketch. Number each mark corresponding with the wire numbers in the table so as to identify which data is for each wire tested. If more wires need to be tested on one tendon than will fit on Data Sheet 10.5 it will be acceptable to use additional sheets and continue the sequential numbering so as not to reuse any numbers.

9.2 The Tendon Surveillance Wire Puller shown in Figure 1 of this procedure shall be attached to the wire to be tested.

9.3 The wire shall be pulled with the Wire Puller using as little force as possible, but not to exceed 9,425 pounds.

9.3.1 If the wire cannot be moved by hand, it shall be acceptable to use any mechanical device to accomplish that purpose, such as a "Come-A-long", "Chain-Hoist", "Chain-Pawl" or hydraulic cylinder.

9.3.2 It is unlikely that anything but the hydraulic cylinder will be able to exert such an amount of force so as to yield or break the wire. Therefore, hydraulic devices shall be controlled for force through a calibrated gauge or controlled for maximum force through a locking valve to control the amount of pressure to be exerted.

9.3.3 There remains a possibility that a limited force might not move the wire. It may be possible to break that wire loose with force in excess of 9,425 pounds. This attempt shall only be undertaken with the mutual consent of TMI Engineering responsible for the In-Service Inspection and the PSC Construction Manager.

9.3.3.1 If it is decided to exceed the control force, the amount of force used to move that wire shall be documented and evaluated for impact on the strength of the wire and the force to be applied to the Retensioning of the tendon.

9.3.3.2 ***QCD*** – Document the maximum force used to move the wire on Data Sheet 10.5, if over 9,425 pounds.

9.4 The wire shall be considered continuous if it can be observed to move at the opposite end of the tendon.

9.4.1 ***QCD*** – Document that wire as continuous on Data Sheet 10.5.

9.5 If the wire cannot be observed to be moving, it could be broken and the pulling shall continue until that wire is removed.

9.5.1 ***QCD*** **–** Document that wire as discontinuous on Data Sheet 10.5. As the wire is drawn it shall be checked for corrosion condition and to determine the cause of breakage, if possible. Document the Category of Corrosion of the wire using TMI Procedure 1301-9.1. Also document, where possible, the reason for breaking.

9.5.2 ***QCD*** – If the wire is broken, it shall be shown as broken on Data Sheet 8.0 and added to the total of Broken/Missing Wires and the Code Symbol modified to reflect that fact.

9.5.2.1 If any or all of the Protruding/Unseated wires since the original installation or previous surveillance are found to be broken and when added to the amount of Broken/Missing Wires on Data Sheet totals 1 or more, it shall be necessary to notify TMI Engineering of this condition in accordance with the requirements of TMI Procedure 1301-9.1. It shall be acceptable to continue working and notify TMI Engineering at the earliest opportunity, but within 24 hours of discovery.

9.5.2.2 If any or all the Protruding/Unseated wires have been determined to be continuous, each shall be re-inspected for Protrusion after Retensioning to see if they have seated themselves. An evaluation of that condition shall be performed after Retensioning.

9.5.2.3 ***QCD*** **–** If any or all the Protruding/Unseated wires remain unseated after Retensioning, it shall be reported as required of TMI Procedure 1301-9.1.

9.6 ***QCD*** **–** Document any comments identifying any nonconforming or adverse observations or conditions

10.0 DOCUMENTATION

10.1 The items requiring documentation shall be documented on Data Sheet 10.5 or to TMI Data Sheet of TMI Procedure 1301-9.1.

11.0 ATTACHMENTS

11.1 Data Sheet 10.5

11.2 Figure 1.0 – Tendon Wire Puller

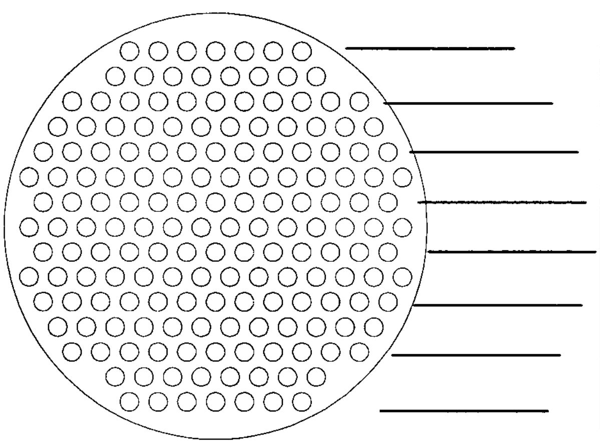
Project: TMI 35TH YEAR TENDON SURVEILLANCE ☐ UNIT 1

(8.6)Tendon No.: ____________ Tendon End: ____________ ☐ Shop ☐ Field

CONTINUITY TEST DOCUMENTATION

(9.1.1) Wire No.	(9.3.3.2) Force if greater than 9,425 lbs	Continuous (9.4.1) Yes	Continuous (9.5.1) No	(9.5.2) Corrosion Condition	(9.5.2.3) Broken & Posted to D.S. 8.0	(9.6) Comments	QC Signoff

Identify each wire to be tested by labeling it on one of the sketches below. Mark each wire with a number corresponding to the rows above.
Orient the anchorage sketch with the Anchorhead ID. The Comments area is to be used to identify any nonconforming conditions.



Row	Wires
1	7
2	8
3	11
4	12
5	13
6	14
7	13
8	14
9	13
10	14
11	13
12	12
13	11
14	8
15	7

This form can be used to verify up to 17 individual wires in columnar fashion. If more than 17 are to be verified or if the entire row is to be verified, then a row by row inspection shall be performed.

Orient the anchorage sketch with the Heat Code Identification and note the wire number as it appears in each row starting from the left side of each row.

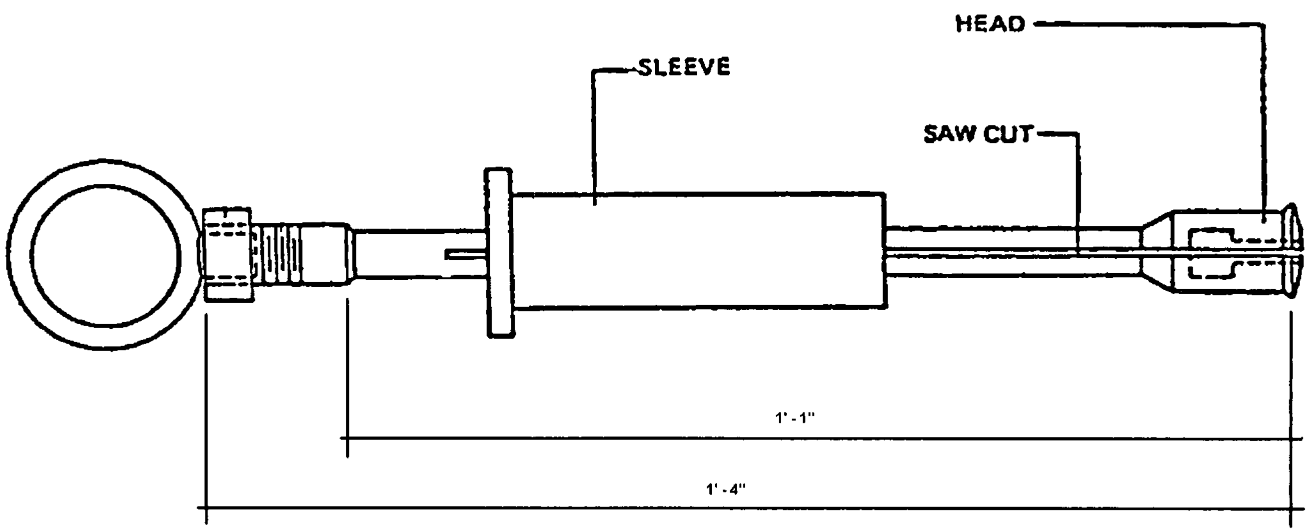
The comment area shall be used to identify particular wires or provide inspection remarks.

Q.C Inspector Level: Date

QC Reviewed ____________ Level: ____________ Date ____________

Figure 1.0 – Tendon Wire Puller

Figure 1.0 is a represented sample of a wire puller and is not a quality controlled device. The actual wire puller may vary somewhat from this configuration.



EXELON
THREE MILE ISLAND
UNIT 1 (35^{TH} YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

PSC ENGINEERING DATA

	QA MANAGER	10/13/10
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	10/13/10
Approved by	Title	Date
	PRESIDENT	10/13/10
Approved by	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the PSC Engineering requirements for the Retensioning of Tendons after the tendon has been Detensioned for purposes of Anchorage Inspection and Sample Wire Removal from the Post-Tensioning System Tendons of Exelon's Three Mile Island Nuclear Plant - Unit 1.

2.0 SCOPE

2.1 The requirements for the Retensioning of Tendons have been described in TMI Procedure 1301-9.1. While there was some mention of the force values to be applied to a tendon in that Procedure, that was only intended as general information. This Procedure will provide the required Engineering Data for the Retensioning operation.

2.2 The data shown herein shall establish the requirements for tendon elongation, PTF and OSF for tendon elongation during the Retensioning of Tendons and the Predicted Forces that affect each Surveillance Tendon.

2.2.1 PRETENSIONING FORCE (PTF)

2.2.1.1 The Pretensioning Force (PTF) removes the slack from the tendon and provides a baseline number for elongation measurement. The Table seen in Section 3 of this Procedure will provide the required data for the Retensioning of Tendons

2.2.2 OVERSTRESS FORCE (OSF) - FOR ELONGATION

2.2.2.1 The Overstress Force for Elongations is that force which must be achieved in order to develop the final elongation measurement used in the comparison of actual tendon elongation to the original or calculated tendon elongation. This might not be the same Overstress Force identified as the "DO NOT EXCEED FORCE". The Overstress Force for this surveillance will be the same as used for the Original Installation and shall be based on the remaining Effective Wires.

2.2.3 OVERSTRESS FORCE - DO NOT EXCEED

2.2.3.1 At no time shall any tendon be subjected to an Overstress Force which exceeds 1592 Kips for a 169 wire tendon. Tendons with less than 169 wires shall be reduced in force by 9.425 Kips for each wire less than 169.

3.0 RETENSIONING DATA

Table 3-1: TMI – SQ 11.1 Restressing Data – Unit 1

TENDON	PREVIOUSLY			AT RETENSIONING					ORIGINAL ELONGATION (in.)
	NUMBER OF WIRES	ORIG PTF (kips)	ORIG OSF (kips)	NUMBER OF WIRES	NEW PTF (kips)	NEW OSF (kips)	650 kips (in)	1100 kips (in)	
H51-49	169	208.3	1564	168	207	1555	3.32	6.69	10.1
				167	206	1545	3.35	6.74	
				166	205	1536	3.38	6.79	
V-90	169	208.3	1478	168	207	1469	4.33	8.74	12.35
				167	206	1460	4.37	8.80	
				166	205	1452	4.41	8.87	
D-322	169	208.3	1537	168	207	1528	3.59	7.23	10.7
				167	206	1519	3.62	7.29	
				166	205	1510	3.65	7.34	
V-118	169	199.2	1581.9	168	198.0	1572.5	4.60	9.19	14.00
				167	196.8	1563.2	4.64	9.25	
				166	195.7	1553.8	4.68	9.32	
H46-39	169	200.0	1588.6	168	198.8	1579.2	3.45	6.89	10.56
				167	197.6	1569.8	3.48	6.94	
				166	196.4	1560.4	3.51	7.00	

1

3.1 NOTES CONCERNING ELONGATION DATA

3.1.1 The tendons for this project were based on 169 wires.

3.1.2 Pretensioning Force (PTF) for purposes of elongation shall be as shown in the table above for a 168 or less wire tendon. For each wire less than shown above, reduce PTF proportionately for each tendon using the formula shown in Section 3.2.2 of this procedure.

3.1.3 Overstress Force (OSF) for purposes of elongation shall be as shown in the table above for a 168 wire or less wire tendon. For each wire less than shown above, reduce OSF proportionately for each tendon using the formula shown in Section 3.2.1 of this Procedure.

3.1.4 The Overstress (OSF) Elongation shown above is the Total Elongation for the tendon from Installation or Previous Surveillance. The total elongation from Installation or Previous Surveillance shall be compared to the Total Actual Measured Elongation during this Surveillance.

3.2 FORCES DURING SURVEILLANCE

3.2.1 Overstress (OSF) during Retensioning:

$$\frac{(\text{OSF at Installation}) \times (\text{\# of Wires during Retension})}{\text{\#of Wires during Installation}}$$

3.2.2. Pre-Tensioning (PTF) during Retensioning:

$$\frac{(\text{PTF at Installation}) \times (\text{\# of Wires during Retension})}{\text{\#of Wires during Installation}}$$

3.3 USE OF "K" (CONSTANT)

3.3.1 With the use of regression analysis for the calibration of ram area, as seen in the PSC Ram Calibration Procedure where error calculation is also considered within the computer program, the ram area no longer reflects the ram size, but instead provides an area measurement with a correction factor related to pressure. This correction factor becomes a "Constant" (K), related only to that ram being calculated for area. The constant is a factor that considers the amount of force necessary to overcome internal resistance. This Constant will vary from ram to ram and could be positive or negative; that is, it may have to be added or subtracted from the total force to provide the true actual force measurement, whether that force is Pre Tensioning Force, Over-Stress Force, or Lock-Off Force.

3.4 FORMULA AND WORKING RELATIONSHIPS

3.4.1 The basic formula for determining stressing force or stressing pressure when three factors are known is:

$$F = \frac{A \times P}{1000} + K$$

Key: F = Force (kips)
A = Ram Area (in^2)
P = Gauge Pressure (psi)
K = Constant factor (kips)
(**CAUTION**: "K" constants can be either positive or negative.)

3.4.2 Only P or F could be unknown and remain to be determined. The other three factors will always be provided before beginning the calculations.

PSC
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EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

GREASE CAP REPLACEMENT

Gerald Bussone	*QA MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C. [signature]	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the requirements for the Replacement of Grease Caps after visual inspection and evaluation has been completed for the tendon end anchor head, shims, bearing plates and wires during In-Service Inspections (surveillance) of Post-Tensioning System Tendons of Exelon's Three Mile Island Nuclear Plant - Unit 1.

2.0 RESPONSIBILITY

2.1 Precision Surveillance Corporation Field Construction Personnel shall be responsible for the physical activities and recording of documentation associated with this procedure, as an option a Precision Surveillance Corporation QC Inspector may record the documentation.

3.0 QUALIFICATIONS

3.1 Precision Surveillance Corporation Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.

4.0 EQUIPMENT

4.1 There is no need for Quality control equipment for this procedure.

5.0 QUALITY CONTROL

5.1 There are no Quality Control Documentation (QCD) points or HOLD Points in this procedure.

6.0 PRECAUTIONS

6.1 Be prepared to support the weight of the grease cap.

7.0 PREREQUISITES

7.1 All other work, inspections and evaluations shall be completed with the exception of Grease Replacement.

7.2 Prior to replacement of grease caps record on Data Sheet SQ 12.0 the information required for tendon number, tendon end and date of grease cap replacement.

8.0 GREASE CAP REPLACEMENT

8.1 Tendon end caps are being installed per TMI Procedure 1410-Y-83.

8.2 Only minor cleaning and brushing should be necessary to prepare the bearing plate and grease cap for remounting to the bearing plate or anchorage.

8.3 Prepare bearing plate surface by cleaning with rags and solvent. If detrimental foreign matter such as mill scale, rust, and dirt is detected on the gasket bearing surface of the plate, and power tool cleaning is required, then:

8.3.1 Make suitable provisions to protect the tendon wires and anchor head threads from accidental rubbing, cutting, or scratching by coming into contact with the power tool's rotating wire brushes and/or abrasive disks. Sheet metal shrouds around the tendon and end anchorage may be necessary.

8.3.2 Take precautions to keep dirt and other foreign material out of the tendon, and from the inside of the trumpet and conduit.

8.3.3 Power tools should remove loose mill scale, loose rust, loose or flaking paint, etc. Surfaces must be clean and smooth but not necessarily burnished after using power tools.

8.3.4 Remove sharp edges, and smooth down remaining mill scale to a "feather-edge".

8.4 Fill scratches, nicks, and other sharp depressions in the gasket bearing surface with nonmetallic epoxy, such as "Belzona" epoxy if approved by TMI Engineering. Use of epoxy shall be according to manufacture's application instructions.

8.4.1 Smooth out epoxy to prevent grease leakage under the gasket.

8.5 Remove all dust and loose mater from the vicinity of the tendon and entrance to the trumplet.

8.6 Clean any foreign material from the threaded bearing plate grease cap mounting holes.

8.7 Smear, swab or brush a coating of grease over all the exposed portions of the anchor head, bearing plate, shims, buttonheads and wires, if not previously done in another operation or if needed.

8.8 A thread chaser or tap may be required to clear the threads of the bearing plate's grease cap mounting holes so that the bolts can be sufficiently tightened to bottom in the threaded holes.

8.9 Clean and dry the flange and gasket sealing surface of the grease cap.

8.10 Record on Data Sheet SQ 12.0 that the bearing plate, grease cap, and gasket mating surfaces and bolt holes have been properly prepared and that foreign material has been controlled so as not to enter the tendon void.

8.11 On hoop and dome caps where the original through-cap mounting bolting is being replaced with hold down clamps the through-cap holes shall be plugged with Pop-A-Plugs.

8.12 With the grease cap on end, place a new gasket on the grease cap. Pliobond or a similar industrial adhesive, as approved by TMI Engineering, may be used to hold the gasket in place.

8.13 New gaskets shall be used in the final placement of the grease cap. Old or used gaskets may be used during temporary placement of the grease caps.

8.14 Place the gasket retainer (verticals only) and grease cap over the tendon end and align the cap by placing it over the two 1" aligning pins. If slotted aligning pins are used, insert the tapered wedges through the slots in the aligning pins to hold the cap in place. Be sure the gasket is in place and not pinched between the gasket retainer and the bearing plate. For vertical tendons, the wedges and pins need not always be used. The grease cap bolts may be used at this time while using a hoisting device to hold the cap in place temporarily.

8.15 Place 1 washer, standard or hardened, over each of the 1" bolts and put the bolts into the 2 remaining holes of the bearing plate. Tighten by hand until seated. Remove the aligning pins and replace them with two bolts and washers.

8.16 Tighten each bolt with a wrench, equalizing the load on each bolt as well as possible. Tighten until there is evidence of metal to metal contact all around between the flange, gasket retainer, and bearing plate.

8.17 For Horizontal tendons and Dome tendons, the grease cap shall be placed so that the bushing (inlet, outlet) is oriented in its highest altitude or toward the top of the containment.

8.18 After aligning the cap and placing over the anchorage install the four tendon end cap holding down clamps with bolts and washers to the bearing plate and hand tighten them.

8.19 Reckeck that the gasket has not slipped or become crimped and that the tendon end cap and hold down bolts are aligned properly.

8.20 Tighten each bolt, equalizing the load on each as much as possible, to evenly compress the gasket by approximately 1/8".

8.21 Apply a new wrapping of teflon tape to the grease cap filler bushing prior to final insertion and tightening.

8.22 Record on Data Sheet SQ 12.0, the completeness of the installation and that the bolts were tightened in incremental passes.

8.23 The replacement is now complete and re-greasing can be performed observing the requirements of PSC Procedure SQ 12.1.

9.0 DOCUMENTATION

9.1 The items requiring documentation in this procedure shall be documented by the assigned field construction person of the working crew on Data Sheet SQ 12.0 attached to this procedure, as an option a Precision Surveillance Corporation QC Inspector may record the documentation.

10.0 NOTIFICATION

10.1 PSC Site Superintendent shall be notified if any problems are encountered during the replacement of grease caps.

11.0 ATTACHMENTS

11.1 Data Sheet SQ 12.0.

Project: TMI 35TH YEAR TENDON SURVEILLANCE

Tendon No.: ____________ Tendon End: ____________ ☐ Shop ☐ Field

ANCHORAGE INSPECTION CRITERIA

BEARING PLATE SURFACE PROPERLY PREPARED:	☐ YES	☐ NO
GREASE CAP SURFACE PROPERLY PREPARED:	☐ YES	☐ NO
GASKET MATING SURFACE PROPERLY PREPARED:	☐ YES	☐ NO
STUD/BOLT HOLES PROPERLY PREPARED:	☐ YES	☐ NO
FOREIGN MATERIAL EXCLUSION CONTROLLED:	☐ YES	☐ NO

COMMENTS

CREW FOREMAN SIGNOFF ____________________ Date: ________

QC Reviewed: ____________________ Level: ________ Date: ________

EXELON
THREE MILE ISLAND
UNIT 1 (35^{TH} YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

GREASE REPLACEMENT

Gerald Brossone	*QA MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. C	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C	*PRESIDENT*	07/31/09
~~Approved by~~	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the requirements for the Replacement of Grease in the tendon duct after scheduled inspections and evaluation during the 35th Year In-Service-Inspections (surveillance) of the Post-Tensioning System Tendons of Exelon's Three Mile Island Nuclear Plant - Unit 1.

2.0 SCOPE

2.1 This procedure is intended to provide the Grease Replacement requirements for the wire post-tensioning system. This procedure requires that all tendons worked on shall be full of grease at the end of the project.

3.0 RESPONSIBILITY

3.1 As stated in PSC Procedure QA 4.0.

4.0 QUALIFICATIONS

4.1 As stated in PSC Procedure QA 4.1.

5.0 EQUIPMENT

5.1 The gauges and test equipment necessary for the Quality Control activities will be itemized in PSC Procedure SQ 4.0.

6.0 QUALITY CONTROL

6.1 This procedure contains Quality Control Documentation (***QCD***) points. The work shall not progress past or through a ***QCD*** without a sign-off or verbal approval from the QC Inspector. The sign-off's and required information or evaluation data shall be documented on Data Sheet 12.1. It shall be necessary to acquire the Total Grease Loss for the tendon from the Data Sheets 6.0 of PSC Procedure SQ 6.0 for each end, if applicable.

7.0 PRECAUTIONS

7.1 During Grease Replacement, the grease may be very hot and pumped under pressure. It is therefore essential to avoid direct contact with the hot grease and to make sure all connections are secure.

CAUTION - DURING GREASING, BE AWARE THAT THE GREASE IS HOT AND MAY BE PUMPED UNDER PRESSURE.

7.2 Spilled grease from hoses and voids could be a slipping safety hazard, during all operations it should be cleaned up and placed in waste drums.

7.3 Pumping of grease should be stopped immediately if it is suspected or known that the grease is going somewhere else besides the immediate tendon void.

8.0 PREREQUISITES

8.1 All Inspections, if required per SQ2.0, will be complete.

8.2 The tendon will be in a stressed condition.

8.3 The Grease Cap shall be ready to be installed or already have been installed.

8.4 ***QCD*** – Document the type of grease (corrosion inhibitor) being used for the greasing of this tendon. The requirements for acceptable corrosion inhibitor are listed in section 9.1.2 of this procedure.

8.5 ***QCD*** – Enter the tendon end designation and quantity of total grease loss from Data Sheet 6.0 for one end of the tendon, if applicable

8.6 ***QCD*** – Enter the tendon end designation and the quantity of total grease loss from Data Sheet 6.0 for the other end of the tendon, if applicable.

8.7 ***QCD*** – Enter the tendon end designation and any estimated grease loss that may have occurred as a result of leaks from the grease cap or gasket since the original installation or previous surveillance for the first end of the tendon.

8.8 ***QCD*** – Enter the tendon end designation and any estimated grease loss that may have occurred as a result of leaks from the grease cap or gasket since the original installation or previous surveillance for the second end of the tendon.

8.9 ***QCD*** – Calculate the total tendon grease loss by adding 8.5 + 8.6 + 8.7 + 8.8 and document the total tendon grease loss on Data Sheet 12.1.

9.0 CONTROLS FOR REFILLING THE TENDON VOID

9.1 All Tendons

9.1.1 The replacement of grease shall be performed prior to demobilization of the tendon surveillance equipment and personnel.

9.1.2 Tendons shall be filled with Tendon Corrosion Inhibitor (Certified) issued by the Utility Quality Program OR drained grease removed from the system ONLY after acceptable sample testing per Section SQ 7.0 OR upon written approval by Exelon.

9.1.3 Grease Temperature required at grease cap inlet: *180°F min., 250°F* max.

9.1.4 Required grease to be drain for Thermal Expansion upon successful pump through: *1 gallon*. This will curtail any excess pressure build up which may lead to gasket failure.

9.1.5 Required hold time at full pressure: *30 minutes.*

9.1.6 Pumping shall be stopped immediately if it is suspected or known that the grease is going somewhere else besides the immediate tendon void.

9.2 <u>Hoop and DomeTendons</u>

9.2.1 Maximum pressure at grease cap inlet when pressure pumping: *100 psig*

9.2.2 If less than 5 gallons of grease has been lost from the tendon void (duct) at each end of the tendon, each end shall be poured or hand pumped with hot grease until full.

9.2.3 If more than 5 gallons of grease has been lost from the tendon void (duct) at either end of the tendon, the tendon shall be pressure pumped with hot grease from one end until it exits the Opposite End.

9.2.3.1 Where there is no grease exiting from the opposite end of a hoop or dome tendon, it shall be necessary to hand pump hot grease into the opposite end grease cap until full.

9.3 <u>Vertical Tendons</u>

9.3.1 Maximum pressure at grease cap inlet when pressure pumping: *110 psig* (may be pulsated up to *150 psig* to clear any blockage)

9.3.2 If more than 10 gallons of grease has been lost from the tendon void (duct) at the lower end, the tendon shall be pressure pumped with hot grease from the bottom end until it exits the Top End.

9.3.2.1 Where there is no grease exiting from the top end of a vertical tendon, it shall be necessary to pour or hand pump hot grease into the top end grease cap until full.

10.0 MEASUREMENT OF GREASE REPLACEMENT

10.1 The grease may be in a large storage container or in 55-gallon drums. The large storage container shall have an automatic thermostat control for temperature, while drum heaters shall be used to heat the grease in drums.

10.2 The grease shall be monitored for quantity by measuring the quantity of grease remaining in the drum or by measuring the drum to determine the quantity that has been pumped out.

10.3 To provide a grease volume number in gallons based on a standard 55 gallon drum, divide the 55 gallons by the usable height of the drum (31 inches). This provides a figure of 1.77 gallons per inch of drum height. Note that a typical 55 gallon drum is 34 inches high, but based on actual observation, grease shrinkage and the depressed lid take up 3 inches of height.

10.4 Take a measurement of the height of the grease in the drum with a clean measuring device before installing any grease. It will be acceptable to take the measurement from the top of the grease in the drum to the top edge of the drum. Document the grease height dimension to the nearest 1/8 of an inch.

10.5 Take a measurement of the height of the grease in the drum after installing the grease. Document the final grease height dimension to the nearest 1/8 of an inch.

10.6 Calculate and document the Total Quantity of grease replaced into the cap to the nearest tenth (0.1) of a gallon.

10.6.1 *EXAMPLE*: If the initial grease height was 25-1/2" and the final grease height was 6-1/4", this is a 19-1/4" reduction multiplied by 1.77 gallons per inch which equals 34.1 gallons pumped in.

$$(25\tfrac{1}{2}"-6\tfrac{1}{4}")\times 1.77 = 34.1Gal$$

10.7 The same methodology may be used for containers of different size or configuration.

11.0 MEASUREMENT OF GREASE WASTE

11.1 When it becomes necessary to determine the volume of grease that was pumped into the tendon void, it will be necessary to subtract the waste grease outflow, spillage, grease remaining in the pump-in hose, grease remaining in the waste line hose from the grease volume that was pumped from the drum into that tendon.

11.2 The 1 gallon of grease drained from the inlet end after a successful pump through shall be considered waste grease if it is not drained back into the original drum.

11.3 If the waste grease is pumped into a 55 gallon drum, then each inch of drum height will equal to 1.77 gallons.

11.4 Smaller containers should be evaluated for size to determine the capacity. These types of containers would only require a simple estimate for the waste grease contained therein.

11.5 Before pumping any waste grease into a container, always verify the quantity within that container prior to pumping.

12.0 PRESSURE PUMPING

12.1 The grease replacements described in this procedure are for both ends of a tendon. The terms tendon void, tendon conduit, and tendon duct are synonymous.

12.2 If more than 5 gallons of grease has been lost from the tendon void (duct) at either end of a hoop or dome tendon, the tendon shall be pressure pumped with hot grease from one end until it exits the opposite end.

12.3 If more than 10 gallons of grease has been lost from the tendon void (duct) at the lower end of a vertical tendon, the tendon shall be pressure pumped with hot grease from the bottom end until it exits the top end.

12.4 Remove the grease cap plug; attach the "Y-Device" to the end of the grease cap to be pumped. Connect the Y-Device, if necessary, and waste outflow hose to the opposite end of the tendon. Be sure to have a suitable quantity of waste containers on hand to collect the waste.

12.5 Be sure that adequate communication is provided at each end of the tendon so that the crew at each end of the tendon will know what actions are taking place.

12.6 ***QCD*** – Document the ambient temperature near the tendon, as well as the Thermometer Identification and Recalibration Date.

12.7 ***QCD*** – Document the inlet temperature of the grease as well as the thermometer identification and its recalibration date.

12.8 Prior to attaching the inlet greasing hose to the Y-Device, circulate hot grease through the system to ensure the grease is at sufficient temperature prior to pumping into the tendon void. Pressure pump and greasing hose should be fully primed prior to connecting to the Y-Device.

12.9 ***QCD*** – Document the initial grease height dimension to the nearest 1/8 of an inch. Refer to Section 10.0 for further explanation of grease measurement.

12.10 Commence pressure pumping grease into the tendon in accordance with the controls stated in Section 9.0.

12.11 If the grease exits the opposite end of a dome tendon, pumping shall continue until a minimum of 1 gallon of clean grease has exited from the opposite end with a temperature of 140^{0}F. The opposite end Y-Device shall then be closed and pressure pumping from the inlet end will continue until maximum pressure is achieved. Upon achievement of maximum pressure, stop pumping and drain 1 gallon of grease from the inlet end.

12.12 When pump through is not achieved on the initial attempt, the following actions should take place in order to maximize the effort of filling the tendon void.

12.12.1 Build pressure to the maximum pressure at the grease cap inlet in accordance with Section 9.3.1.

12.12.2 Hold pressure for a minimum of 30 minutes. This may require additional pumping in order to remain at the desired maximum pressure.

12.12.3 If pump through is achieved, continue with step 12.11.

12.12.4 If pump through is still not successful pumping from this end shall be complete. It shall be necessary to hand pump the opposite end of the tendon by following the steps in Section 13.0

12.13 Release any pressure from the inlet end before disconnecting any of the hoses from the Y-Device. Ensure all shut-off valves are closed before disconnecting any grease connections at either end.

12.14 ***QCD*** – Once the tendon end has been completed, document the final grease height dimension to the nearest 1/8 of an inch. Refer to Section 10.0 for further explanation of grease measurement.

12.15 Remove grease hoses and Y-Devices from both ends and replace the grease cap plugs on both ends of the tendon.

12.16 ***QCD*** – Calculate and document the quantity of hot grease pressure pumped into this tendon end in accordance with Section 10.6. Also, document the tendon end identification, either shop/field and/or nearest buttress number to the tendon end being pumped.

12.17 ***QCD*** – Document whether successful pump through was achieved via exiting grease at the other end of the tendon. If exit was not achieved, document the pressure and time held in order to attempt pump through.

12.18 ***QCD*** – Document the quantities of waste grease if any, including any exiting outflow grease. Refer to Section 11.0 of this procedure for explanation on calculating waste grease.

12.19 ***QCD*** – Calculate and document the total amount of grease replaced through the current inlet end of the tendon by subtracting the amount of any waste grease from the quantity of hot grease pressure pumped into this tendon end.

12.20 Continue to Section 14.0 for final calculation of quantity of grease replaced if pump through was successful.

13.0 POURING AND HAND PUMPING

13.1 The grease replacements described in this procedure are for one end of a tendon, however both ends of the tendon will be documented on the same data sheet. The terms tendon void, tendon conduit, and tendon duct are synonymous.

13.2 If less than 5 gallons of grease has been lost from the tendon void (duct) at each end of a hoop or dome tendon, each end shall be poured or hand pumped with hot grease until full.

13.3 If less than 10 gallons of grease has been lost from the tendon void (duct) at the lower end, hot grease shall be poured or hand pumped into the top end until full.

13.4 If pressure pumping is unsuccessful from the end of any tendon hot grease shall be poured or hand pumped into the opposite end until full.

13.5 Remove the grease cap plug; attach the "Y-Device" to the end of the grease cap to be pumped or poured. It shall be acceptable to hand pump or pour grease directly into the grease cap without the use of a "Y-Device" if the grease cap configuration will allow this.

13.6 ***QCD*** – Document the ambient temperature near the tendon, as well as the Thermometer Identification and Recalibration Date.

13.7 ***QCD*** – Document the inlet temperature of the grease as well as the thermometer identification and its recalibration date.

13.8 Prior to attaching the inlet greasing hose to the Y-Device or grease cap, circulate hot grease through the system to ensure the grease is at sufficient temperature prior to pumping into the tendon void. Hand pump and greasing hose should be fully primed prior to connecting to the Y-Device. This step is not necessary if grease is being poured into the grease cap.

13.9 ***QCD*** – Document the initial grease height dimension to the nearest 1/8 of an inch. Refer to Section 10.0 for further explanation of grease measurement.

13.10 If grease is being hand pumped, commence pumping grease into the tendon in accordance with the controls stated in Section 9.0.

13.11 If grease is being poured, transfer grease into secondary (smaller) container and pour into the Y-Device or grease cap until full. Grease replacement must be in accordance with controls outlined in Section 9.0.

13.12 ***QCD*** – Once the tendon end has been completed, document the final grease height dimension to the nearest 1/8 of an inch. Refer to Section 10.0 for further explanation of grease measurement.

13.13 Remove grease hoses and Y-Devices as necessary from both ends and replace the grease cap plugs on both ends of the tendon. Verify no grease is leaking.

13.14 ***QCD*** – Calculate and document the quantity of hot grease hand pumped or poured into this tendon end in accordance with Section 10.6. Also, document the tendon end identification, either shop/field and/or nearest buttress number to the tendon end being pumped.

13.15 ***QCD*** – Document whether grease replacement was accomplished by hand pumping or pouring.

13.16 ***QCD*** – Document the quantities of waste grease if any. Refer to Section 11.0 of this procedure for explanation on calculating waste grease.

13.17 ***QCD*** – Calculate and document the total amount of grease replaced through the current inlet end of the tendon by subtracting the amount of any waste grease from the quantity of hot grease hand pumped or poured into this tendon end.

13.18 Repeat the steps in Section 13.0 for the other end of a hoop or dome tendon if applicable.

13.19 Continue to Section 14.0 for final calculation of quantity of grease replaced when grease replacement is complete.

14.0 CALCULATION OF GREASE REPLACEMENT

14.1 ***QCD*** – Calculate the total tendon grease replaced by adding the quantities of grease replaced by pressure pumping each end (combination of 12.19 and 13.17 as applicable).

14.2 ***QCD*** – Obtain the calculated net volume of the tendon void from PSC Procedure SQ12.2 and post it on Data Sheet 12.1

14.3 ***QCD*** – Compare the total tendon grease replaced (14.1) to the total tendon grease loss (8.9). Calculate the percent difference by the following formula:

$$\frac{[\mathit{TOTAL\ TENDON\ QUANTITY\ REPLACED}\ (14.1)] - [\mathit{TOTAL\ TENDON\ GREASE\ LOSS}\ (8.9)]}{\mathit{NET\ VOLUME\ TENDON\ VOID}\ (\mathit{SQ}\ 12.2)} \times 100\%$$

14.4 ***QCD*** – Verify that no grease is leaking. If there is some leakage, the deficiency shall be corrected and cleanup performed. Document the acceptance of leak tightness.

14.5 ***QCD*** – Document the acceptability of the refilling. An acceptable refilling is one in which the percent difference from Section 14.3 of this procedure does not exceed 10% and there are no leaks.

14.6 ***QCD*** – Document any pertinent comments, unusual occurrences or references that could assist in evaluating the refill or for future surveillances.

15.0 NOTIFICATION

15.1 If the absolute difference between the amount of grease removed from the tendon and the amount of grease replaced exceeds 10% of the net duct volume, it shall be necessary to notify TMI Engineering with a nonconformance report within 24 hours.

16.0 DOCUMENTATION

16.1 The items requiring documentation shall be documented on Data Sheet 12.1a or 12.1b as necessary. Data Sheet 12.1a shall be used when a tendon is pressure pumped and 12.1b shall be used when a tendon is hand pumped from both ends.

16.2 Some information shall be posted from Data Sheet 6.0 of PSC Procedure SQ 6.0 onto Data Sheet 12.1a or 12.1b as applicable.

16.3 The Data Sheets reference the applicable Section or Step number of the procedure for each ***QCD*** point.

17.0 ATTACHMENTS

17.1 Figure 1.0 – PSC "Y" Device

17.2 Data Sheet 12.1a – Pressure Pumping

17.3 Data Sheet 12.1b – Hand Pumping

TYPICAL HOOK-UP FOR FILLING TENDON VOIDS

A - Grease Can Body
B - Pipe
C - Grease Can Filler Bushing
D - Y-Device Body
E - Male Quick Coupler
F - Operating Shaft & Handle
G - Square Male Pipe Plug Wrench
H - Pipe Plug
I - Casing Filler Hose
J - Female Quick Coupler
K - Packing Box
L - Packing Box Gland
M - Relief Valve - Optional

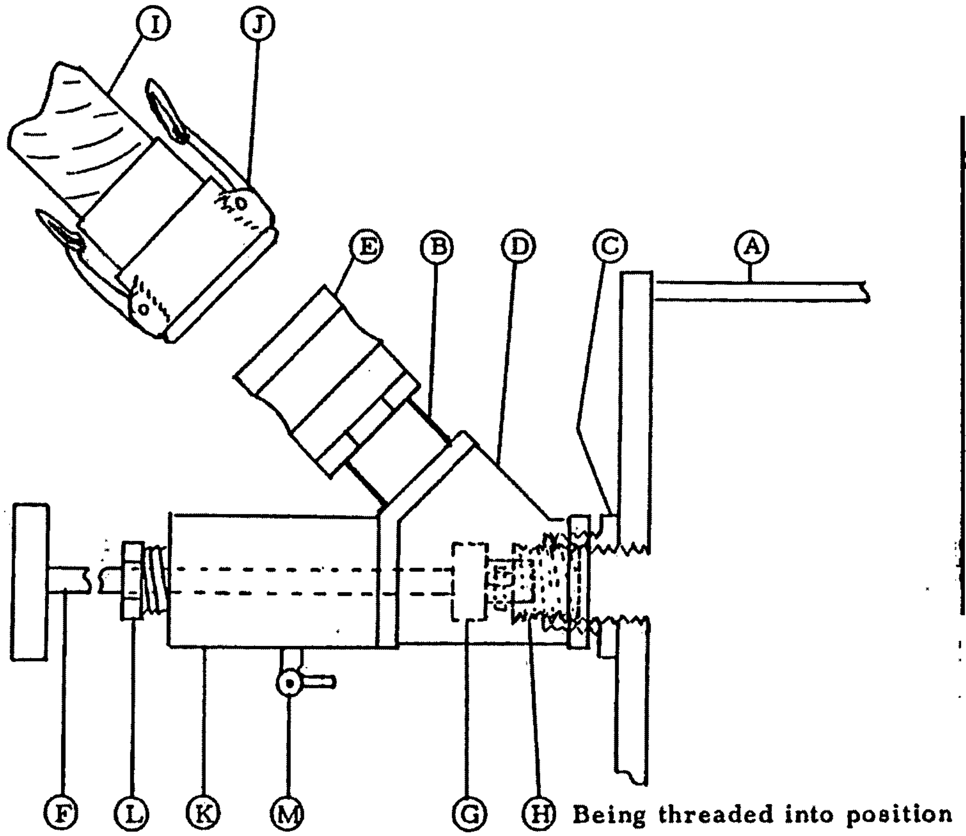

Figure 1.0 – PSC "Y-Device"

PSC PROCEDURE SQ 12.1
GREASE REPLACEMENT
Figure 1.0 – PSC "Y" - Device
July 31, 2009
Page 1 of 1
Revision 0

Project: TMI 35th YEAR TENDON SURVEILLANCE ______ Tendon No.: ______

GREASE REPLACEMENT — QC SIGNOFFS

(8.4) Grease Used ☐ NEW ☐ OLD - TEST DATE: ☐ ACCEPTABLE ☐ APPROVAL LETTER DATED:

8.0 PREREQUISITES

(8.5) Total Grease Loss from Data Sheet 6.0 for ______ tendon end: ______ gal.

(8.6) Total Grease Loss from Data Sheet 6.0 for ______ tendon end: ______ gal.

(8.7) Estimated grease losses from leaks for ______ tendon end: ______ gal.

(8.8) Estimated grease losses from leaks for ______ tendon end: ______ gal.

(8.9) TOTAL Tendon Grease Loss: ______ gal.

12.0 INITIAL PRESSURE PUMPING

(12.6) Ambient Temp.: ______ °F Thermometer ID: ______ Recal Date: ______

(12.7) Grease Temp.: ______ °F Thermometer ID: ______ Recal Date: ______

(12.9) **Initial** Grease Height (a) ______ in. (12.14) **Final** Grease Height (b) ______ in.

(12.16) Total amount of Grease **Pumped**: ______ gal. (a – b) x 1.77 into the ______ end

(12.18) Quantity of Waste Grease: ______ gal. (12.17) Was Exit Achieved? ☐ Yes ☐ No

(12.19) Total Grease **Replaced** this end: ______ gal. If no, Pressure Held for ______ psi ______ min

13.0 HAND PUMPING – SECOND END (if necessary)

(13.6) Ambient Temp.: ______ °F Thermometer ID: ______ Recal Date: ______

(13.7) Grease Temp.: ______ °F Thermometer ID: ______ Recal Date: ______

(13.9) **Initial** Grease Height (a) ______ in. (13.12) **Final** Grease Height (b) ______ in.

(13.14) Total amount of Grease added: ______ gal. (a – b) x 1.77 into the ______ end

(13.16) Quantity of Waste Grease: ______ gal. (13.15) ☐ Poured ☐ Hand Pumped

(13.17) Total Grease **Replaced** this end: ______ gal.

14.0 CALCULATION OF PRESSURE PUMPING

(14.1) Total **Tendon** Grease Replaced: ______ gal. *(12.19 + 13.17)*

(14.2) Net Tendon Duct Grease Volume: ______ gal. *Refer to SQ 12.2 – GREASE VOLUMES, for the Tendon Net Duct Volume*

(14.3) Percent Difference: $\frac{\text{Total Tendon Replaced (14.1) - Total Tendon Loss (8.9)}}{\text{Net Tendon Duct Grease Volume (14.2)}} \times 100 =$ ______ % Difference

(14.4) Grease Leaks: ☐ Yes ☐ No

(14.5) Refill Acceptable: ☐ Yes *(less than 10%)* ☐ No *(greater than 10%)*

If No – Customer Notified NCR No.: ______

(14.6) Comments: ______

QC Reviewed: ______ Level: ______ Date: ______

Project: TMI 35th YEAR TENDON SURVEILLANCE Tendon No.: ____

GREASE REPLACEMENT QC SIGNOFFS

(8.4) Grease Used ☐ NEW ☐ OLD - TEST DATE: ☐ ACCEPTABLE ☐ APPROVAL LETTER DATED:

8.0 PREREQUISITES

(8.5) Total Grease Loss from Data Sheet 6.0 for ____ tendon end: ____ gal.

(8.6) Total Grease Loss from Data Sheet 6.0 for ____ tendon end: ____ gal.

(8.7) Estimated grease losses from leaks for ____ tendon end: ____ gal.

(8.8) Estimated grease losses from leaks for ____ tendon end: ____ gal.

(8.9) TOTAL Tendon Grease Loss: ____ gal.

13.0 POURING AND HAND PUMPING – FIRST END

(13.6) Ambient Temp.: ____ °F Thermometer ID: ____ Recal Date: ____

(13.7) Grease Temp.: ____ °F Thermometer ID: ____ Recal Date: ____

(13.9) **Initial** Grease Height (a) ____ in. (13.12) **Final** Grease Height (b) ____ in.

(13.14) Total amount of Grease added: ____ gal. (a – b) x 1.77 into the ____ end

(13.16) Quantity of Waste Grease: ____ gal. (13.15) ☐ Poured ☐ Hand Pumped

(13.17) Total Grease **Replaced** this end: ____ gal.

13.0 HAND PUMPING – SECOND END

(13.6) Ambient Temp.: ____ °F Thermometer ID: ____ Recal Date: ____

(13.7) Grease Temp.: ____ °F Thermometer ID: ____ Recal Date: ____

(13.9) **Initial** Grease Height (a) ____ in. (13.12) **Final** Grease Height (b) ____ in.

(13.14) Total amount of Grease added: ____ gal. (a – b) x 1.77 into the ____ end

(13.16) Quantity of Waste Grease: ____ gal. (13.15) ☐ Poured ☐ Hand Pumped

(13.17) Total Grease **Replaced** this end: ____ gal.

14.0 CALCULATION OF PRESSURE PUMPING

(14.1) Total **Tendon** Grease Replaced: ____ gal. *(13.17 + 13.17)*

(14.2) Net Tendon Duct Grease Volume: ____ gal. *Refer to SQ 12.2 – GREASE VOLUMES, for the Tendon Net Duct Volume*

(14.3) Percent Difference: $\frac{\text{Total Tendon Replaced (14.1) - Total Tendon Loss (8.9)}}{\text{Net Tendon Duct Grease Volume (14.2)}} \times 100 =$ ____ % Difference

(14.4) Grease Leaks: ☐ Yes ☐ No

(14.5) Refill Acceptable: ☐ Yes *(less than 10%)* ☐ No *(greater than 10%)*

If No – Customer Notified NCR No.: ____

(14.6) Comments: ____

QC Reviewed: ____ Level: ____ Date: ____

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

GREASE VOLUMES

	QA MANAGER	10/13/10
Prepared by	Title	Date
	PROJECT MANAGER, P.E.	10/13/10
Approved by	Title	Date
	PRESIDENT	10/13/10
Approved by	Title	Date

1.0 PURPOSE

1.1 This procedure will establish the Net Tendon Duct Grease Volumes to be observed during the refilling of the Post-Tensioning System Tendons with Corrosion Protection Material (Grease) during the 35th Year In-Service-Inspection (surveillance) of the Post-Tensioning System at Exelon's Three Mile Island - Unit 1 as provided by TMI Engineering.

2.0 SCOPE

2.1 This procedure shall apply to PSC Procedure SQ 12.1.

2.2 Unit 1 Volume Table

Table 2-1 : TMI – SQ 12.1: Grease Void Volumes – Unit 1

TENDON	NET DUCT VOLUME (GALLONS)	10% DUCT VOLUME (GALLONS)	TENDON	NET DUCT VOLUME (GALLONS)	10% DUCT VOLUME (GALLONS)	TENDON	NET DUCT VOLUME (GALLONS)	10% DUCT VOLUME (GALLONS)
D-121	118.5	11.85	**H13-40**	103.5	10.35	**V10**	124.8	12.48
D-122	118.7	11.87	**H13-41**	103.5	10.35	**V11**	123.8	12.38
D-123	118.8	11.88	**H13-42**	103.3	10.32	**V12**	124.6	12.46
D-224	119.8	11.98	**H24-32**	102.9	10.29	**V31**	124.8	12.48
D-225	119.9	11.99	**H24-33**	103.2	10.32	**V32**	125.2	12.52
D-226	119.9	11.99	**H24-34**	103.3	10.33	**V33**	125.0	12.50
D-321	120.3	12.03	**H46-49**	103.4	10.34	**V89**	124.8	12.48
D-322	120.2	12.02	**H46-50**	103.4	10.34	**V90**	124.9	12.49
D-323	120.6	12.06	**H46-51**	103.6	10.36	**V91**	125.0	12.50
D-341	109.5	10.95	**H51-48**	103.3	10.33	**V131**	124.7	12.47
D-342	107.8	10.78	**H51-49**	103.4	10.34	**V132**	124.2	12.42
D-343	106.1	10.61	**H51-50**	103.4	10.34	**V133**	123.9	12.39
			H62-25	103.4	10.34			
			H62-26	103.2	10.32			
			H62-27	103.3	10.33			
			H46-38	115.17		**V117**	129.86	12.99
			H46-39	115.26		**V118**	129.61	12.96
			H46-40	115.04		**V119**	129.60	12.96
			H46-41	114.86		**V133**	131.00	13.10
			H46-42	114.89		**V134**	131.62	13.16
						V135	132.08	13.21
= ADJACENT TENDON								

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

PROGRAM PURPOSE

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C. Wolff	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 PURPOSE

1.1 This section of the Surveillance Quality Control Manual shall outline the Quality Assurance/Quality Control activities necessary to insure that the In-Service Inspection operations are performed in accordance with approved procedures and provide the required quality level, consistent with the project specifications, industry standards, regulatory code requirements and the Precision Surveillance Corporation Quality Assurance Program.

Precision Surveillance Corporation

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

PROGRAM SCOPE

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Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
	PRESIDENT	07/31/09
~~Approved by~~	Title	Date

1.0 SCOPE

1.1 The Quality Assurance Procedures within this Section of the Surveillance Program Quality Control Manual are intended to be supplemental to the Precision Surveillance Corporation (PSC) Quality Assurance Manual. They are not intended to replace any Criteria of the Quality Assurance Manual. The Quality Assurance Manual remains as the highest category of document within the Quality Assurance Program hierarchy of documents.

PSC
Precision Surveillance Corporation

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

QUALITY ORGANIZATION

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
	PRESIDENT	07/31/09
Approved by	Title	Date

1.0 ORGANIZATION

1.1 PSC Field Quality Control Inspectors operate under the immediate direction of the Lead Field Quality Control Inspector, who in turn reports to the PSC Manager, Quality Control.

1.2 The Field Quality Control Inspectors shall have full authority and responsibility in all matters pertaining to or affecting the quality control function for the Surveillance of the Post-Tensioning System. These Inspectors shall have the authority to accept, reject, or recommend changes to the field operations or performance.

1.3 The Field Quality Control Inspectors, and the Quality Assurance personnel shall have the authority to issue a "Stop Work Order" for any activity, material, or procedure not in conformance with the project specifications, the Quality Assurance Manual or the Surveillance Quality Control Manual. The stop work action shall be coordinated through the PSC Manager of Quality Assurance.

1.4 The Quality Control Procedures section of this manual shall serve to further outline the duties and responsibilities of those personnel engaged in performing the quality control functions for the Surveillance of the Post-Tensioning System.

1.5 All personnel engaged in those activities that affect the quality function for the Surveillance operations, shall be qualified by experience or training, prior to the initial performance of their assignments.

1.6 Documentation of qualification and/or training shall be maintained in the quality files on site for those personnel engaged in quality activities.

EXELON
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UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

QUALITY CONTROL RESPONSIBILITY

Gerald Bussone	*Q.A. MANAGER*	07/31/09
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Approved by	Title	Date
Paul C. Smith	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 QUALITY CONTROL RESPONSIBILITY

1.1 The responsibility for the Quality Assurance and Quality Control functions for this project shall be incumbent on those organizations performing that portion of the work described within the various sections of this manual, or as otherwise agreed to in the contract documents.

1.2 Portions of the work not performed by PSC, but where PSC supplies only the equipment or material, shall be subject to the quality requirements specified within the applicable PSC Quality Manual, where that Quality Manual has been developed to comply with the project specifications or contract documents.

1.2.1 The development of the Quality Assurance and Quality Control procedures for the Surveillance operations shall be the responsibility of those organizations performing that portion of the work, unless otherwise agreed to in the contract documents.

1.3 PSC Field Quality Control Personnel shall provide the Quality Control actions for that portion of the work, where PSC or its subcontractors are performing the work or as agreed to in the project specifications or contract documents. All subcontractors performing work as an agent of PSC, shall be subject to the Quality requirements of the project specifications and the applicable PSC Quality Program.

1.4 PSC and its subcontractors and vendors, shall maintain open access for Inspection, Survey and Audit by Exelon or his authorized agent for all portions of the work being performed for the project.

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

PERSONNEL QUALIFICATIONS

G Bussone	*Q.A. MANAGER*	11/06/09
Prepared by	Title	Date
Christopher E. C	*PROJECT MANAGER, P.E.*	11/06/09
Approved by	Title	Date
Paul C	*PRESIDENT*	11/06/09
Approved by	Title	Date

1.0 QUALIFICATIONS

1.1 QUALITY CONTROL INSPECTORS

1.2 All Quality Control Inspectors performing Inspections and Tests shall be qualified to minimum of Level II capability in accordance with the requirements of ANSI N45.2.6-1978. Inspectors performing General or detailed visual examinations (formally VT-1, VT-1C or VT-3C) are to be qualified as a Level II examiner as set forth in the 2001 Edition and 2003 Addenda of the ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWL as defined in PSC's written certification practice or as qualified by Exelon.

1.2.1 All Lead Field Quality Control Inspectors shall be qualified to a minimum of Level II capability in accordance with the requirements of ANSI N45.2.6-1978.

1.2.2 All Field Quality Control Inspectors performing reviews of Quality Control Documentation for the various procedures in the PSC Surveillance Quality Control Manual shall be qualified to a minimum of Level II in accordance with the requirements of ANSI N45.2.6-1978.

1.2.3 All Quality Control Inspectors shall be certified to specific skill Levels by a Quality Control Inspector who has been qualified as Level III in accordance with the requirements of ANSI N45.2.6-1978.

1.3 CONSTRUCTION PERSONNEL

1.3.1 Precision Surveillance Corporation Field Construction Personnel shall be responsible for the physical activities associated with the Surveillance of Post-Tensioning System Tendons. Construction Personnel shall be fit by skill, training and/or experience to perform these activities.

1.4 CONSTRUCTION SUPERVISION

1.4.1 PSC Supervisory and Field Representative Personnel shall be responsible for administering the progress of the work and directing PSC Field Construction Personnel as necessary. These Personnel shall be fit by skill, training and/or experience to perform these duties.

1.4.2 Construction Personnel or Construction Supervision need not be qualified to ANSI N45.2.6 as they are supervised or overseen by a qualified individual participating in the inspection, examination, or test.

1.5 AUDITORS

1.6 PSC Personnel performing audits of field operations shall be qualified as auditors in accordance with the requirements of ANSI N45.2.23-1978.

2.0 DOCUMENTATION

2.1 Records of training and personnel skill certifications shall be documented in accordance with the requirements of the governing ANSI N45.2 or daughter specifications and shall be retained on site for those personnel so certified and/or trained.

3.0 ATTACHMENTS

3.1 Training Verification Letter dated 11/06/09

Precision Surveillance Corporation

3468 Watling Street
East Chicago, IN 46312
Email: info@psctendon.com

Phone: (219) 397-5826
Fax: (219) 397-5867
http://www.psctendon.com

November 6, 2009

QUALITY REVIEW MEMO: TRAINING VERIFICATION

After a review of training and certification requirements for Quality Control Inspectors it is concluded that training to the 2001 Edition; 2003 Addenda of ASME Section XI, IWA-2350, "Limited Certification", and the 1995 Edition of CP-189 meets or exceeds the requirements of the 1992 Edition of the same documents.

Personnel successfully trained to the above requirements have the knowledge, insight and training to inspect post–tensioning components as described in Precision Surveillance Corporation's limited scope training procedure. This training is relevant to IWL inspections for 1992 Edition and latter Editions up to and including 2001 with 2003 Addenda.

Paul C Smith

Paul C. Smith
President

Precision Surveillance Corporation

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

PERSONNEL TRAINING

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. C.	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C.	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 TRAINING

1.1 Precision Surveillance Corporation personnel on site involved in the Surveillance of the Post-Tensioning System, shall be qualified and experienced in all phases of Post-Tensioning operations.

1.2 All training activities shall be conducted and coordinated by qualified, experienced, PSC personnel.

1.3 At the start of the work and usually at the beginning of each new phase of the Post-Tensioning operations, the field crews shall be instructed to perform the work in a safe manner and in accordance with the approved surveillance procedures manual. They shall further, be trained in the use of the Post-Tensioning equipment for the operation for which they are being qualified, and for any subsequent actions during those operations that may affect the quality or integrity of the Post-Tensioning System.

1.4 The duration of the training period shall not be of a predetermined period of time, but shall instead be of such a length of time, that the PSC training personnel feel confident that the personnel being trained are sufficiently knowledgeable in the methods and procedures of the operation for which they are being trained. Each trainee shall be oriented by on-the-job training prior to the initial performance of any quality oriented function and each time he performs a different job assignment not previously trained or qualified for.

1.5 A list of the trained and qualified personnel shall be maintained on site, indicating the training received and the dates of training. Newly trained personnel shall be added to the list as the training is completed. This list shall be reviewed and controlled by PSC Field Quality Control personnel. Crew proficiency shall be verified during the progress of the work, through the mediums of inspection, surveillance or audit.

1.6 Procedures shall be used for training those personnel not familiar with Post-Tensioning Systems or Surveillance activities.

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QUALITY CONTROL PROCEDURE

PROCUREMENT

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C [signature]	*PRESIDENT*	07/31/09
~~Approved by~~	Title	Date

1.0 PROCUREMENT

1.1 SAFETY – RELATED

1.2 The purchase of any safety-related material or service to be used for the Post-Tensioning System or surveillance operation shall be performed by the Procurement Section of the Precision Surveillance Corporation in accordance with the requirements of the Quality Assurance Program requirements in effect at that time and the requirements stated below.

1.2.1 Field personnel shall initiate a procurement request by a written or verbal order to the Construction or Project Management Section.

1.2.2 A requisition shall be prepared and submitted to the PSC Quality Assurance Section for attachment of applicable quality documents and/or comments and returned to the Project Management Section.

1.2.3 The requisition shall be sent to the Procurement Section for drafting of the purchase order, pricing, vendor selection, etc.

1.2.4 The purchase order shall be submitted to the Quality Assurance Section for review of quality content, approved vendor selection and sign-off. Other pertinent quality documents may be attached or referenced and then the purchase order shall be returned to the Procurement Section.

1.2.5 The purchase order shall be submitted to the vendor and copies of the order distributed to appropriate personnel.

1.2.6 Changes to the original purchase order shall be provided through the use of a Supplemental Purchase Order, which shall be subject to the same review and control process as the original purchase order.

1.3 NON-SAFETY-RELATED

1.3.1 Miscellaneous non-safety-related field purchases may be initiated by the field personnel or Procurement Section within the confines of the operating procedures established by the Operating or Construction Departments, independent of this manual.

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IN-SERVICE INSPECTION
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FIELD CHANGE REQUEST

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C ...	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 FIELD CHANGE REQUEST

1.1 The Field Change Request shall be the mechanism for requesting rapid evaluation and approval for those operations that must be changed to accommodate field conditions. The FCR shall be approved by Exelon prior to that change being put into effect.

1.2 Field Changes that take place prior to the approval of the FCR shall be documented by a Nonconformance Report and subject to a "STOP WORK" order, depending on the magnitude of the change and the impact on the quality program. It shall not be necessary to generate an NCR where it has become necessary to return or move to a safe condition of the tendon or personnel.

1.3 Revisions to this manual shall be performed according to the Revision Control procedure found in the prologue of the Surveillance Manual. The following information will supplement those procedures for Field Change Request Activity.

1.3.1 When field operating procedures, as stated in this manual, become impractical to follow exactly for any reason, that portion, and any other affected portion of the manual shall be revised to provide the appropriate procedures. Where possible, revisions shall be made prior to performing the work.

1.3.2 When revisions become necessary, they shall be formally drafted by the PSC Quality Assurance Section and submitted to Exelon for formal approval. Where applicable, the responsible PSC Field Quality Control Personnel shall prepare a Field Change Request document to expedite approval from Exelon's Field Quality Organization, Maintenance Engineer or such other authority as designated by Exelon, in order to continue operations without extraordinary delays. The change document may then be transmitted to Exelon for formal approval or to issue a change order notice type of document.

1.3.3 Approval of the Field Change Request or emergency revision shall be obtained from the appropriate Site Quality Assurance Authority representing Exelon, before starting any Field Changes or Revisions.

1.3.4 Copies of the Field Change Request shall be submitted to the PSC Quality Assurance Section for review and where necessary for development of formal procedures to be included in the Surveillance Quality Control Manual.

1.3.5 The approval of the FCR shall be considered as the acceptance for the Revised Procedures unless gross changes occur during the Revision drafting, that affect other portions of the Surveillance Manual.

1.3.5.1 If gross changes occur, the Surveillance Quality Control Manual affected procedures shall be submitted for formal review and approval. Otherwise, the FCR Revision shall be considered as approved and submitted on a controlled basis for inclusion in the Surveillance Manual.

1.3.6 As the PSC Quality Assurance Section and the Engineering Department are responsible for drafting Revisions, whether a result of the FCR process or Specification Changes, it shall not be necessary for either function to provide a formal review and signoff. It shall be necessary for the Originator or PSC Field Quality Control personnel to call the PSC Home Office to acquire agreement and acceptance of the FCR before submitting it to Exelon. This way Quality Assurance and Engineering can evaluate the impact of the FCR on Quality Control, Engineering features and other subsequent Surveillance activities.

1.3.6.1 The Originator or PSC Quality Control personnel shall document the review and acceptance of the PSC Home Office personnel by printing the name of the person accepting that FCR and the date of acceptance at the bottom of the Recommended Change area on the FCR form.

1.3.7 The original FCR shall be maintained with the Field Quality Control records.

1.3.7.1 The remaining distribution shall be completed, using the Distribution Listing shown at the bottom of the FCR form once the FCR is formally approved by PSC and Exelon.

1.3.7.2 The FCR shall be entered into the FCR Index Log for

1.3.7.2.1 FCR Number

1.3.7.2.2 Brief Description

1.3.7.2.3 Date Written

1.3.7.2.4 Date Approved

1.3.7.2.5 Date of Revision (to Surveillance Manual, if applicable)

1.4 <u>DOCUMENTATION</u>

1.4.1 Included with this procedure are the various forms and control sheets described in this procedure.

2.0 ATTACHMENTS

2.1 Field Change Request Form

2.2 Field Change Request Index Log

SPECIAL FIELD REVISION CONTROL FIELD CHANGE REQUEST NO.: FCR ____________

REQUEST BY: ____________ TITLE: ____________ DATE: ____________

ORIGINATOR: ____________ TITLE ____________ DATE: ____________

PROCEDURE NUMBER: ____________ REV NO.: ____ PROCEDURE TITLE ____________

AFFECTED SECTION: ____________ REVISION TO MANUAL REQUIRED: ☐ YES ☐ NO

NCR REQUIRED: ☐ YES ☐ NO NCR NUMBER: ____________ HOLD TAG NO.: ____________

DETAILED DESCRIPTION OF EXISTING CONDITION: (USE EXTRA PAGES OR WRITE ON BACK)

RECOMMENDED CHANGE:

PSC APPROVAL SIGN & DATE:	QA	QC	ENGINEERING

EXELON APPROVAL OR COMMENTS:

APPROVED SITE QA AUTHORITY: ____________ TITLE: ____________ DATE: ____________

DISPOSITION PSC QC: HOLD TAG APPLIED: ____________ HOLD TAG REMOVED: ____________

QC INSPECTOR: ____________ DATE: ____________

DISTRIBUTION

☐ EXELON QA
☐ QA PSC
☐ ENGINEERING PSC
☐ EXELON ENGINEERING
☐ PROJECT MGR. PSC
☐ EXELON QC
☐ QC PSC
☐ ____________
☐ ____________

Project: TMI NUCLEAR PLANT - UNIT 1 – 35th Year

FIELD CHANGE REQUEST INDEX LOG

FCR#	DESCRIPTION	DATE WRITTEN	DATE APPROVED	DATE REV.

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PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

DOCUMENT CONTROL

Gerald Brassone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
	PRESIDENT	07/31/09
Approved by	Title	Date

1.0 DOCUMENT CONTROL

1.1 The responsibility for control and retention of all documentation and records, related to the quality control functions for the project within the limitations of the contract documents shall be incumbent on those organizations performing that portion of the work and as further stated in PSC Procedure QA 3.0.

1.2 All documentation, which includes inspections, tests, certifications, drawings, purchase orders, specifications, procedures, correspondence and audits, etc. shall be prepared in accordance with the procedures as described in the applicable job related manuals and procedures.

1.3 All inspection records shall be reviewed, initialed or signed and dated by the personnel responsible for the quality control functions.

1.4 All quality related documents pertaining to the project shall be retained in the field office file, jobsite vault, or both and maintained in such a manner so as to permit retrieval and prevent loss.

1.5 Document distribution or retention shall be in accordance with the requirements of the project specifications, or as agreed to in the contract documents.

1.5.1 All documents such as Data Sheets, Nonconformances, verification records, calibration records, certified mill test reports, engineering analyses, etc. generated during the course of the In-Service Inspection, shall be included in the Final Report or appended to that Final Report.

1.6 Copies of Non-Conformance Reports shall be distributed in accordance with the project specifications or as noted on the Non-Conformance/Corrective Action form; refer to PSC Procedure QA 9.0.

1.7 All records shall be sent to the responsible Quality Control Section for further distribution in accordance with the project specifications, or as agreed to in the contract documents, or the PSC Quality Assurance Manual.

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REVISION CONTROL

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Approved by	Title	Date
Paul C	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 GENERAL

1.1 The statements within this Manual are representative of the Precision Surveillance Corporation quality program activities in effect at the time of issue. The construction phase of the project and other delays have a direct influence on the amount of time that will transpire between the actual startup of fabrication and termination of the construction life of the contract. It may therefore become necessary to review and upgrade or revise the various quality procedures or manuals, as a means of accommodating changes in the specifications, codes, operating procedures, material procurement, or as a means of transmitting intent, information or clarification. Correction of misspelled words or typographical errors that do not affect intent, shall not be considered as revisions.

2.0 TRANSMITTAL

2.1 Submittal of revisions to Exelon shall be in conformance with Criteria VI, Document Control, of the Quality Assurance Manual.

3.0 REVISION CONTROL

3.1 If a revision is submitted where a Quality Control Manual has been issued, only those procedures being revised shall be affected for approval status. The remainder of the Quality Control Manual shall still remain approved. The original or previous revision of the affected procedure shall remain in effect, unless unworkable, until the revised procedure has been approved.

3.2 When a revision is submitted, the entire manual shall then become "Revision One" for example. Included in the revision package are all those documents required to bring the original version of that manual to "Revision One" status.

3.3 A Revision Control Sheet shall show all the documents being submitted, with the correct revision status of each page. The Revision Control Sheet provides a chronological history of development for the manual while the Index Status Sheet indicates all the original documents contained within the original submittal of the manual.

3.4 The Index Status Sheet shall not be revised to any extent greater than to show a date and revision number in the Revision Status column on the Index Status Sheet.

3.5 It is unlikely that any document within any PSC Quality Manual shall be of an unrevised status or of the same revision status as the Manual itself. Therefore, the document and manual revision numbers will not be the same. The Index Status Sheet will establish the revision status of each Manual or document issued.

3.6 When a revision is made to a procedure, the entire procedure will revert to that revision number, even if there are no editorial or format changes to that page.

3.6.1 Revisions to a Section/Paragraph of a procedure will be identified with a triangle appearing at the left edge of the page near the Section/Paragraph which has been affected and revised. Inside the triangle will appear the revision number for that current change. The triangle will appear only for those Sections/Paragraphs that have changed.

3.6.2 It will not be necessary to delete the triangle from the previous revision, even though it is generally recommended that signs of a previous revision be removed to avoid confusion. It will be acceptable to erase, white-out, or tape over signs of the previous revision, where that page has not been revised and is not being reproduced as a new document.

3.6.3 It will not be necessary to apply a revision number to the top of each of those pages that comprise the body of the procedure. The revision number and date need only appear at the top of the Title Page and Data Sheets.

3.6.4 No Change will be taken to mean, that no changes have occurred to that page and that the revision number indicates the current status of that page. No dates other than the original effective date will appear on individual pages. Only the Title Page and Data Sheets shall show revision status and date of that revision, along with the triangle at the bottom of the page.

3.6.5 No Editorial Change or Format Change will be taken to mean, that the text of that procedure has not changed and that the change affects the page number, section/paragraph number or that information has shifted from one page to another. This will be noted along side the triangle at the bottom of the page.

3.7 Where drawings are included in the manual, such as post-tensioning fabricated components, these drawings shall be controlled through the quality manual for that product, except where otherwise agreed to in writing. This system utilizes the drawings and procedures from a controlled quality manual for fabrication and inspection control of that component and shall accompany the purchase order to the vendor, where applicable.

4.0 RESPONSE

4.1 Once the revision is received by Exelon the Acknowledgement of Receipt or a facsimile, shall be returned to the Precision Surveillance Corporation, Quality Assurance Section.

4.2 Exelon comments shall be referred to the PSC Quality Assurance Section or those personnel responsible for contract coordination.

4.3 Exelon approval without comments shall be transmitted in writing to either party noted in Section 4.2 above, however verbal approval shall be sufficient to start work using the approved revision.

4.3.1 Section 4.2 or 4.3 above, may be replaced by other means of control which have been established and formally agreed to by PSC and Exelon.

5.0 EXELON CONTROL (SUGGESTED)

5.1 As a means of maintaining the controlled manual and revisions at Exelon's facility, it is recommended that the submitted documents be verified for accuracy of inclusion, by comparing them to the Revision Control Sheet. PSC is not immune to errors, regardless of the amount of controls imposed or implied.

6.0 EXPEDITING CONSTRUCTION

6.1 In order to expedite the construction schedule and with Exelon's approval, it may become necessary or advantageous to fabricate materials prior to the approval of the revision. All materials fabricated in this situation shall be tagged "Hold" and retained on that status until approval of the revision. At the time of approval the "Hold" tag shall be removed. Also see Criteria II Quality Assurance Program, Section 3.4.

6.2 If, for some reason, the revision is not approved, the material fabricated or installed under the controls of the revised procedure shall be maintained on Hold status until the revision is approved. Adjustments to the material shall be made, where required, after approval.

7.0 VOID DOCUMENTS

7.1 Once approved, the document being revised shall be marked void and dated to reflect the revision date. This void copy will be removed from the manual and placed into a dead or void file for retention as part of the Quality Assurance records.

7.2 As a temporary measure, the void copy may be turned backwards in the manual, until removal to the file.

7.3 Items fabricated or installed with the use of the previous revisions will not require any subsequent change once fabricated or installed. The date of the document approval shall determine the point of fabrication change over and therefore, the applicable quality requirements.

7.4 PSC does not require that void documents be returned.

8.0 FORMS/DATA SHEETS

8.1 Any of the forms contained in this Manual or any Quality Control Procedure used as a means of providing quality control or inspection documentation, are subject to change at any time without prior approval of Exelon, providing that the amount of information shown on the original form is not diminished in any way.

8.2 These revised forms shall be submitted for approval at the convenience of PSC with the next revision of that procedure that effects the change, but in no case later than 30 days from the first use of that form.

8.3 If the information required of the original or previous revision of that form is to be diminished in any way, that form shall be submitted for approval prior to use.

8.4 Forms may be provided at any time where not shown in any procedure in order to provide the required quality control or inspection documentation, without prior approval and at the option of the PSC Quality Control or Quality Assurance Sections.

9.0 ATTACHMENTS

9.1 Revision Control Sheet

Project: TMI NUCLEAR PLANT - UNIT 1 - 35th Year Revision # ___________

REVISION CONTROL SHEET

Procedure #	Page #	Revision/ Date	Submitted Date	Procedure #	Page #	Revision/ Date	Submitted Date

Revision No.	Date	Revision Description	Revision By:	Date Approved

EXELON
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UNIT 1 (35TH YEAR) PHYSICAL
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PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

NONCONFORMANCES

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C. Orff	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 NONCONFORMANCE REPORTING

1.1 Any item, service, activity or procedure not conforming to the approved drawings, specifications, instructions or other project requirements as related to the PSC contract for the project, shall be documented as a nonconformance. A non-conformance report shall be written by the authority responsible for quality, discovering the nonconformance, regardless of the location where the deficiency was discovered or the source of origin.

1.1.1 This reporting shall be completed on a timely basis, preferably immediately upon discovery and consultation. The reporting action should be within one working day from discovery.

1.2 All nonconforming items shall be removed to a segregated area.

1.3 The nonconformance report shall be distributed to the appropriate parties noted on the distribution list shown on the PSC Nonconformance/Corrective Action Report Form, which is shown at the end of this procedure. A typical Nonconformance Report Index shall also be seen.

1.3.1 Exelon shall receive copies of those nonconformance reports that indicate a loss of control for the manufacturing process, field construction, or quality control system and where it has been determined by PSC Quality Assurance, Quality Control, and/or possibly Exelon, that a measure of input shall be required by Exelon to resolve the deficiency.

1.3.1.1 The Recommended Corrective Action for the nonconformance reports noted in Section 1.3.1 above, shall be submitted to Exelon for review and approval prior to the execution of that action, for all items to be dispositioned as "Repair" or Use-As-Is.

1.3.1.2 All nonconformance reports shall be submitted to Exelon, whether for review and/or approval.

1.4 Acceptance of the nonconforming item, after completion of the corrective action, shall be by inspection.

1.5 Once the corrective action has been determined, the Quality Control or Quality Assurance personnel shall make arrangements for the completion of the nonconformance, including verification. The completion of this action shall be documented in the Disposition area provided on the NC/CA Report Form.

1.5.1 Once the nonconformance has been corrected and the disposition completed on the NC/CA Report Form, the formal close-out of that report shall be documented in the NCR Index Log. All nonconformance reports shall be closed-out.

1.5.2 In some circumstances, the corrective action may be completed on another document, such as an Exelon nonconformance report. In that case, the PSC NC/CA Report may be closed-out immediately as a result of Exelon's document, and shall be so noted in the Index Log.

1.6 Only Quality Control or Quality Assurance personnel shall have the authority to return the nonconforming item to inventory or service, once disposition of the corrective action has been completed and accepted by that Quality authority.

1.7 In addition to the normal reporting system for Nonconforming Material and Services, supplemental reports shall be submitted for deficiencies whether a result of design, conformance, fabrication, or performance, that represent a significant breakdown in the Quality Assurance Program and, were they to remain uncorrected, could adversely affect the operation of the item at any time throughout the expected lifetime of the item. These written reports shall be prepared by the PSC Quality Assurance, Quality Control, and/or Engineering Department and submitted to Exelon documenting the cause of the deficiency and the formal corrective action to prevent repetition.

1.8 The Nonconformance Reports shall be retained in the appropriate Quality file on site.

2.0 DRAFTING THE REPORT

2.1 The following outline shall be used as a guide for developing the Nonconformance Report. Refer to the example at the end of this procedure.

2.2 The Nonconformance Report shall indicate the identification of the nonconforming item, the deficiency noted, preferably with reference to the requirement in violation, in the area marked Nonconformance on the NC/CA Report Form.

2.3 The Apparent Cause Known shall be entered onto the form, if it can be readily discerned. Overly restrictive or unworkable procedures or specifications may be listed as the cause, as well as changes in working conditions not considered by the procedures or specifications. If this cannot be satisfactorily resolved by the initiator of the report, then it shall be completed by Quality Assurance, Quality Control or the Engineering Department.

2.4 The area marked Recommended Corrective Action on the NC/CA Report Form shall indicate the action necessary to immediately correct the deficiency. Usually noted as Use-As-Is; Repair; Rework; Scrap; and any appropriate commentary to substantiate that action.

2.4.1 Where nonconforming items are to be corrected by repairing the stated deficiency, the repairs shall be accomplished through the use of an approved repair procedure. This may be shown directly on the NC/CA Report Form or attached to it as a separate document.

2.4.2 Nonconforming items shall be rejected, repaired, reworked or accepted for corrective action after evaluation by the PSC Quality Assurance, Quality Control, Engineering and/or Exelon.

2.5 Where possible, the Corrective Action to Prevent Recurrence area of the NC/CA Report Form, shall provide the long range action that may be instrumental in preventing recurrence of that deficiency entered onto the form.

2.6 The determination of Significant Condition status shall be performed by the Quality Assurance, Quality Control and/or the Engineering Department. The identification of significant conditions adverse to quality, their cause and the appropriate corrective action to resolve the condition shall be documented on the NC/CA Report Form or in a separate report as noted in Section 1.7 of this procedure.

2.6.1 A significant condition adverse to quality shall exist if one or more of the following elements are required:

2.6.1.1 A significant investigation is necessary to determine the cause.

2.6.1.2 Significant redesign, repair or rework of the item.

2.6.1.3 A significant evaluation of the QA/QC Program implementation.

2.6.1.4 Significant evaluation for determining generic implication.

3.0 NONCONFORMANCE REPORT NUMBERING

3.1 All Nonconformance Report Numbers shall be prefixed with the PSC project Contract Number.

3.2 All Field originated NCR's shall prefix the project Contract Number with the letter "F".

3.3 Non-project oriented NCR's shall be prefixed with QA and shall only be issued through the Quality Assurance Section.

3.4 All NCR's shall be assigned a sequential control number, to follow the prefix number, which shall be applied in ascending order from the previous report and originating with the number "1".

4.0 PROCESSING NONCONFORMANCE REPORTS

4.1 This is intended to provide PSC Field Quality Control personnel with the means of approving processing or closing out NCR's where they are not in close proximity to the home office.

4.2 The report may be drafted by independent action or with the assistance of the Engineering or Quality Assurance Sections. Where input has been provided by the assistance of others, the Quality Control person drafting the report shall print the name of that person assisting and the date in the respective area of that Section of the Nonconformance/Corrective Action Report Form. The report should be distributed as soon as it is drafted, unless the disposition of the corrective action takes place within 5 days after discovery of the deficiency; in this instance, the distribution will probably take place after the disposition is complete.

4.3 The PSC Approval for QA, QC and/or Engineering may be communicated by telephone to expedite corrective action. In which case the Quality Control person on site would print the name of the person approving that action and the date. Those NCR's could be initialed at a later date to formally complete the approval actions.

5.0 DOCUMENTATION

5.1 Included with this procedure are the various tags and control sheets described in this procedure.

6.0 ATTACHMENTS

6.1 Tags and Sample Logs (Example)

6.2 Sample NC/CA Report

6.3 NC/CAR Form

6.4 NCR Index Form

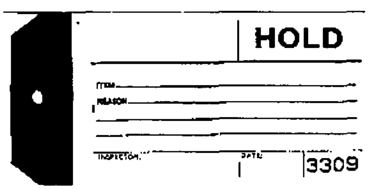
6.5 Hold Tag Index Log

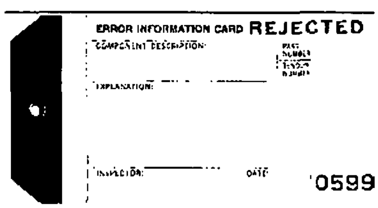
6.6 Reject Tag Index Log

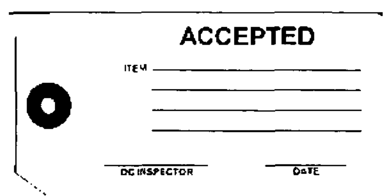
NONCONFORMING MATERIALS, PARTS OR COMPONENTS

TAGS

Shown below are typical examples of Hold, Reject and Acceptance tags. They may vary in appearance but, are representative of the format and information to be provided. All but the Acceptance tag, are two-part tags.







SAMPLE LOG ENTRIES

Shown below are typical examples of entries made into each respective log. Note that some are cross-referenced such as HOLD 1100 to Reject 1700; and HOLD 1103 to Reject 1701.

QUALITY ASSURANCE PROGRAM
HOLD TAG LOG

Project:

Tag No	Date Issued	Description of Condition	Date Removed	QC Signoff
1100	5-1-05	ANCHOR RZ101 DAMAGED	5-2-05	CB
1101	5-6-05	DOCUMENTATION INCOMPLETE -RT1036	5-8-05	DMW
1102	6-4-05	TENDON AC101 - FIELD END CUTOFF	6-10-05	CB
1103	6-15-05	RUSTY TENDON V135	6-16-05	JWK
1104	7-2-05	UNABLE TO COUPLE TO TENDON V141		

QUALITY ASSURANCE PROGRAM
REJECT TAG LOG

Project:

Tag No	Date Issued	Description of Condition	Date Removed	QC Signoff
1700	5-2-05	SEE HOLD TAG 1100 - SCRAP HEAD	5-4-05	JWK
1701	6-16-05	SEE HOLD TAG 1103 - SCRAP TENDON	6-30-05	DMW
1702	6-21-05	DRUM OF GREASE CONTAMINATED - SCRAP	6-22-05	CB
1703	6-30-05	ANCHOR HU203 DAMAGED - SCRAP	6-30-05	CB
1704	7-2-05	SHIMS DAMAGED - HT#43691 - SCRAP	7-2-05	CB

NONCONFORMANCE/CORRECTIVE ACTION REPORT FORM - SAMPLE

NONCONFORMANCE / CORRECTIVE ACTION REPORT FORM

HOLD TAG NO.: ____________ NC / CA NO.: ____________

NONCONFORMANCE:

Enter the nonconformance preferable referencing the quality program requirement that has bee

Refer to Section 2.1 of Procedure QA 9.0.

APPARENT CAUSE KNOWN: ☐ YES ☐ NO **IF YES, DESCRIBE:**

May require consultation with QA, QE and/or Engineering. Refer to Section 2.2 of Procedure 9

RECOMMENDED CORRECTIVE ACTION:

The immediate corrective action that will be taken to correct the stated nonconformance. One of the following dispositions shall be noted for the deficiency as it applies: "Use-As-Is", "Repair", "Rework", or "Scrap".

Refer to Section 2.3 of Procedure 9.0.

ANY NONCONFORMING ITEM TO BE REPAIRED SHALL HAVE AN APPROVED REPAIR PROCEDURE.

CORRECTIVE ACTION TO PREVENT RECURRENCE:

The long range corrective action that may be useful in eliminating the deficiency or reducing the frequency. Refer to Section 2.4 of Procedure 9.0.

INITIATOR: ____________ TITLE ____________ DATE:

SIGNIFICANT CONDITION: ☐ YES ☐ NO IF YES, REFER TO QAM SECTION 4 CRIT

APPROVAL COMMENTS:

Enter any comments that might be pertinent to effecting the approval of the corrective action. Refer to Section 25. of Procedure 9.0.

PSC APPROVAL SIGN & DATE:	QC	QA	ENGINEE

OWNER / AGENT APPROVAL REQUIRED ☐ YES ☐ NO

ENGINEER ____________ QA ____________

DATE ____________ DATE ____________

COMMENTS:

This area to be input only by the Owner or his agent. Refer to Section 1.3.1.1 of Procedure 9.0.

DISTRIBUTION

☐ QA SECTION ☐ VICE PRESIDENT ☐ VENDOR
☐ QE SECTION ☐ CONTR. MGMT. ☐ ____
☐ ENGINEERING ☐ OWNER/AGENT ☐ ____

DISPOSITION COMPLETED

SIGNED: ____________
TITLE: ____________
DATE: ____________

Enter NCR Number here and also into NCR Index Log. The NCR Number is the Project Number, prefixed with an "F" (e.g. FN123-001).

Enter the Hold Tag No., if applicable. If a tag was applied, note it's removal in the Disposition Completed block.

A "Yes" only by or with an evaluation and consultation with QA, QE and/or Engineering.

To be signed by Dept. indicated. May be signed by Initiator only if the Dept. designee was notified.

To be signed by Initiator or designee based on completion of Corrective Actions. Ensure NCR Index Log is updated to reflect closeout.

NONCONFORMANCE / CORRECTIVE ACTION REPORT FORM

HOLD TAG NO.: ____________________ NC / CA NO.: ____________________

NONCONFORMANCE:

APPARENT CAUSE KNOWN: ☐ YES ☐ NO **IF YES, DESCRIBE:**

RECOMMENDED CORRECTIVE ACTION:

ANY NONCONFORMING ITEM TO BE REPAIRED SHALL HAVE AN APPROVED REPAIR PROCEDURE.

CORRECTIVE ACTION TO PREVENT RECURRENCE:

INITIATOR: TITLE **DATE:**

SIGNIFICANT CONDITION: ☐ YES ☐ NO **IF YES, REFER TO QAM SECTION 4 CRITERIA XV.**

APPROVAL COMMENTS:

PSC APPROVAL SIGN & DATE:	***QC***	***QA***	**ENGINEERING**

EXELON APPROVAL REQUIRED ☐ YES ☐ NO ENGINEER ____________________ DATE ____________________

QA ____________________ DATE ____________________

COMMENTS:

DISTRIBUTION			DISPOSITION COMPLETED
☐ QA SECTION	☐ VICE PRESIDENT	☐ VENDOR	**SIGNED:** ____________________
☐ QE SECTION	☐ CONTR. MGMT.	☐ __________	**TITLE:** ____________________
☐ ENGINEERING	☐ EXELON	☐ __________	**DATE:**

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year

NONCONFORMANCE REPORT INDEX LOG

NCR#	DESCRIPTION	DATE WRITTEN	DATE SUBMITTED	DATE APPROVED	DATE COMPLETE

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year

HOLD TAG INDEX LOG

TAG#	DATE ISSUED	DESCRIPTION OF CONDITION	DATE REMOVED	QC SIGNOFF

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year

REJECT TAG INDEX LOG

TAG#	DATE ISSUED	DESCRIPTION OF CONDITION	DATE REMOVED	QC SIGNOFF

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

CALIBRATION OF MEASURING AND TEST EQUIPMENT

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cy	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul Smith	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 CALIBRATION REQUIREMENTS

1.1 This procedure will establish the requirements for calibration of the Quality Control Test and Measuring Equipment to be used for inspection, testing and evaluation, during In-Service Inspections (surveillance) of the Post-Tensioning System Tendons.

2.0 CONTROLS

2.1 All calibrated test and measuring equipment shall be controlled for issue by the PSC Quality Control or Quality Assurance Section. The area of issue shall be indicated on the calibration records. The calibration records shall be maintained by the PSC Quality Control or Quality Assurance Section.

2.2 PSC Quality Control personnel shall maintain a file or list of in-service devices requiring calibration, and periodically review those records to prevent any lapse in calibration.

2.3 The Quality Assurance Section shall review calibration records during audits of that operation being audited.

2.4 All calibrated equipment shall be documented and identified by a label, tag, or log sheet indicating the status of calibration. The control device shall identify the equipment, the date of calibration, date due for recalibration and the signature or initials of the person performing or verifying the calibration.

2.5 The identification control of the calibrated equipment shall be of such a nature so that the specific traceability of that device will not be lost; usually engraved or marked with a Quality Control code number.

2.6 Any calibrated device that has been damaged, adjusted or repaired before the recalibration due date, shall be recalibrated before initial use, to assure the prescribed accuracy.

2.7 There is no intent to apply calibration requirements on those devices such as rulers, tapelines, levels, etc. where normal commercial practices provide adequate accuracy, or where there is no need for accuracy.

2.8 Procedures shall be provided for the calibration of special testing, measuring, inspection devices or other equipment requiring calibration and shall be controlled by the Quality Assurance Section or included in the Quality Manual for the project.

2.9 The Rams which have been used for Monitoring Force, Detensioning or Retensioning operations for the In-Service Inspection of the Post-Tensioning System Tendons shall be verified for calibrated status after the completion of the work.

2.10 The documents for the calibration of Rams prior to starting the work and after completing the work shall be included with the Final Report for the In-Service Inspection.

3.0 OUT OF CALIBRATION

3.1 Devices out of calibration shall be processed as nonconformances. Devices out of calibration that are determined to have an adverse effect on quality shall have copies of that nonconformance report submitted to Executive Management for review, and comments where applicable.

3.1.1 Nonconformance Reports shall be drafted, submitted and distributed in accordance with the requirements of PSC Procedure QA 9.0.

3.2 Instruments that are found to be out of calibration shall be re-calibrated and a comparison made of the results of the new calibration and the out-of-calibration variance, if any. If no significant variation exists, the instrument shall be put back into service. In the event that a discrepancy exists, then the Engineering and/or Quality Assurance and Quality Control Sections shall make an evaluation of the discrepancy and the possible effect on the items processed with the out-of-calibration device, with regard to quality, accuracy or reliability. If it is determined that a serious problem exists, then the Quality Assurance Section shall determine what items checked with the out-of-calibration device shall be rechecked with an effective calibrated device.

3.3 Instruments that are found to be in excess of the required accuracy or tolerance band after being returned from Field Service, shall be controlled with Nonconformance Reports as required of Sections 3.1 and 3.2 of this Procedure.

4.0 TOOL AND GAUGE CONTROL

4.1 The calibration standards used to calibrate measuring and test equipment shall be traceable to the National Institute of Standards and Technology (NIST) formerly National Bureau of Standards (NBS) and shall be controlled to an accuracy not to exceed a limit of 0.25% of the tolerance of the equipment being calibrated or the smallest used division of that instrument's scale, unless otherwise limited by "State-of-the Art" conditions. Pressure Gauges used for Post-Tensioning System operations shall be excluded from this requirement and shall be defined for accuracy in separate procedures.

4.1.1 For example, a micrometer that has a smallest scale reading of 0.001" shall be calibrated with a standard or device that has been calibrated to an accuracy or 0.00025" or less.

4.2 All measuring and test equipment used for Quality Control Inspections shall have subdivisions or increments for measurements that are equal to or smaller than the tolerance of the parameter being measured.

4.2.1 For example, a part needs to be controlled to a dimension of 9.365" with a tolerance of plus or minus 0.001". It would therefore be acceptable to perform that measurement with a device that is capable of measuring to 0.001" or smaller.

4.3 Calibrated Devices may be extended for the stated period of frequency, where that device has been calibrated and placed into storage, rather than into service. The original frequency period stated in Section 5.2, Equipment List, shall always be observed.

5.0 EQUIPMENT

5.1 The Equipment List shown in Section 5.2 of this Procedure contains those devices that are required for the In-Service Inspection or are used to calibrate devices that will be used during the In-Service Inspection. The required accuracy and frequency of calibration are stated for each device. It should be noted that the accuracy requirement is meant to be the tolerance band to which the device is being calibrated and not the original accuracy or the accuracy between calibration frequencies.

5.1.1 The term "DISS" in the Accuracy Column is defined as "Division of that Instrument's Smallest Scale".

5.1.2 Where an asterisk "*" follows the accuracy dimension, this is meant to be that the dimension shown shall be verified with a Micrometer that reads to 0.0001".

5.1.3 The procedures that are used to calibrate the various types of equipment, gauges or instruments used during the In-Service Inspection, will accompany this procedure in the Surveillance Program Quality Control Manual. These procedures provide information relative to the calibration of each device and may be used for purposes of calibrating these devices in the field, should that become necessary.

5.2 EQUIPMENT LIST

DEVICE	FREQUENCY	ACCURACY
Load Cell (3000 Kips)	5 Years	± .1% Entire System
Load Cell (Approx 50 Kips)	8 Years	± .1% Entire System
Rams/Jacks (Stressing, Testing, etc.	Beginning & End (B & E) of Project	Calculated to within ± 30 kips
Dead Weight Tester	5 Years	± 0.10%
Heise Digital Gauge	3 Years	± 0.10%
Pressure Gauge-Master (1/4%)	B & E of Project	± 30 psi
Pressure Gauge-Stressing (1/4%)	B & E of Project	± 30 psi of Heise
Pressure Gauges (1/2%) (Not used for Stressing)	1 Year	± 55 psi of Heise
Micrometer	6 months	± 1 DISS
Micrometer-Checking Bar Standard	1 Year	± 0.0001"
Thickness (Feeler) Gauge		
Under 0.005"	6 months	± 0.0005"*
0.005" and Over	6 months	± 0.0010"
(* Verified with a 0.0001" micrometer)		
Steel Ruler	1 Year	± 0.0100"
Steel Tapeline	1 Year	± 1/16"/100' of lgth.
Thermometer	1 Year	± 1 DISS
Optical Comparator	1 Year	± 0.0010"
Dial Indicator	1 Year	± 1 DISS

6.0 DOCUMENTATION

6.1 The various types of documents generated for calibration and/or status of calibrations will be described in the General Procedures for Calibration or contained within that procedure for a particular device. Others may be added as the need arises. Quality Control personnel shall prepare or assist in the preparation of these records. A copy of the calibration record shall accompany the calibrated device to the field.

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Precision Surveillance Corporation

EXELON
THREE MILE ISLAND
UNIT 1 (35TH YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

VERIFICATION OF CALIBRATION STATUS OF HYDRAULIC PRESSURE GAUGES

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C. [illegible]	*PRESIDENT*	07/31/09
~~Approved by~~	Title	Date

1.0 FIELD VERIFICATION OF PRESSURE GAUGES

1.1 The following procedure shall be used to verify the calibration of hydraulic pressure gauges during field operations. These gauges may be used in stressing operations with the rams or other devices that require a measure of accuracy to produce quality results. Frequency and Accuracy of Calibration shall be controlled as stated in Section 5.2 of Procedure QA 10.0 Equipment List. The Verification frequency shall be controlled as stated in Section 1.5 of this Procedure, while the Verification Accuracy shall be controlled as stated in Sections 2.6 or 2.7.

2.0 GENERAL

2.1 Prior to being used for any work, all gauges shall be calibrated with the use of a Dead Weight Tester or the Heise Digital electronic pressure indicator.

2.2 In addition to the pressure gauges used during the surveillance, one gauge, designated as the Master Gauge or a Heise Digital Gauge, shall be set aside for purposes of Calibration Verification during the process of the work. Prior to use the Master Gauge or Heise Digital Gauge used for Calibration Verification shall have been calibrated per PSC Procedure Q12.8.C-W with a dead weight tester traceable to the NBS.

2.3 PSC Quality Control personnel shall maintain the controls for distribution and recall of each Pressure Gauge being used on site.

2.4 A Pressure Gauge may be verified for calibration or accuracy at shorter frequencies than stated in Section 5.2 of Procedure QA 10.0. It is important that verification be performed any time that the gauge has been damaged, subjected to some physical abuse or there is some reason to suspect its accuracy.

2.5 Pressure Gauges used for Detensioning or Retensioning (Stressing) tendons of Post-Tensioning Tendon Systems during In-Service Inspections of Nuclear Power Plants, shall be Verified for Calibrated status at least once a day during the operational use of those gauges.

3.0 VERIFICATION OF CALIBRATION

3.1 Clean and remove any dirt, grease or residue that could affect the accuracy of the calibration or use of the pressure gauge.

3.2 At the option of the PSC Quality Control Section it shall be acceptable to use a Heise Digital Pressure Indicating Gauge for Calibration Verification of Pressure Gauges, rather than a Master Gauge.

3.3 Attach the Pressure Gauge to the Calibration Pump of the Heise Indicator or Master Gauge.

3.4 Close the back pressure valves before pressurizing the system.

3.5 Increase the hydraulic pressure to the point of the desired reading on the Pressure Gauge, usually 1,000 psi plus or minus 100 psi increments. Take a reading of the Pressure Gauge and the Heise Indicator and document both on the Pressure Gauge Calibration Form.

3.6 MASTER GAUGE (1/4% Accuracy)

3.6.1 Where a Master gauge is used for verification of calibration, the master gauge and field gauge to be calibrated shall be connected to a common line (manifold) on a hydraulic pump. The pump shall be pressurized in no greater than 1,000 psi increments, plus or minus 100 psi, to the highest overstress pressure that shall be encountered during stressing activities; for example, 7,600 psi overstress will require calibration on that gauge to at least 7,600 psi. It shall be acceptable to go to 8,000 psi.

3.6.2 The accuracy of a gauge verified in this manner shall be acceptable, if it reads to within 50 psi of any reading on the Master Gauge.

3.7 HEISE DIGITAL GAUGE

3.7.1 A Pressure Gauge may be verified for calibration by connecting that gauge and the Heise Digital Gauge to a common line, which is in turn connected to a hydraulic pump and pressurized to the same values noted in 2.6.1 above.

3.7.2 The verification accuracy of that Pressure Gauge shall be acceptable if it reads to within 30 psi of the Heise Digital Gauge reading for a 1/4 percent accuracy gauge or 55 psi for 1/2 percent accuracy gauge. As a 1/2 percent gauge cannot be accurately interpolated to increments of 5 psi it will be acceptable to take the reading to some point equal to or above 50 psi but not to exceed 60 psi.

3.7.3 Pressure Gauges with an accuracy of 1/2 percent or greater shall not be used for Monitoring Force, Detensioning or Retensioning operations of the Post-Tensioning Tendon System during In-Service Inspections.

3.8 With the Verification and Documentation of the Pressure Gauge being acceptable, the pump and gauge shall be depressurized and prepared for disassembly.

4.0 UNACCEPTABLE CONDITIONS

4.1 If a Pressure Gauge fails to meet the accuracy requirements of Section 2.6.2 or 2.7.2 after being used for Stressing or Detensioning operations, it shall be necessary to draft a Nonconformance Report in accordance with the requirements of Section 3 of Procedure QA 10.0, to control that Gauge and any Tendons worked with that Gauge.

4.2 Any Pressure Gauge not capable of meeting the stated accuracy requirements of Section 2.6.2 or 2.7.2 for the method of calibration being used, shall be returned to the PSC shop for adjustment or repair. Any repaired or adjusted Gauge shall be recalibrated before use.

4.3 ZERO ALIGNMENT (Zero Beating)

4.3.1 On occasion, the Pressure Gauge Indicating Needle may not be in precise alignment with the Zero mark on the Gauge Face, necessitating realignment. Before calibration the needle is to be realigned to the zero mark, with the realignment completed the Verification shall be performed and documented.

5.0 ACCURACY VARIATIONS

5.1 Even though Pressure Gauges that have been calibrated or verified for calibration, variations in excess of the requirements of Sections 2.6.2 and 2.7.2 may be detected between calibrations or verifications. In an effort to explain and control this deficiency, this Section shall be reviewed before the Verification of any Pressure Gauges.

5.2 The accuracy of the calibration of Pressure Gauges or the verification of calibration is highly dependent on the accuracy of the reading of the location of the Pressure Indicating Needle on the Gauge Face. While there is an attempt to precisely align the needle with the Gauge Face Indicating Line, it is nearly impossible to maintain that control. In an effort to explain any variations that could be noted between calibrations or verifications, it is recommended that a notation be added to the Calibration Document to signify that the intended increment was not precisely obtained. At that increment it would be noted that the value actually achieved was plus or minus an extrapolated pressure noted during the calibration.

5.2.1 For example: If the target increment on the gauge Face was intended to be 2,000 psi and the Indicating Needle was somewhat over the 2,000 psi line, perhaps enough to interpret as 10 psi, the notation on the Calibration Record would read:

2,000 psi +10

5.2.2 The requirements for Stressing or Detensioning Tendons do not require the Pressure to be read any finer than 10 psi during the In-Service Inspections. The Hydraulic Ram Calibration Procedure takes the reading error into account for Stressing or Detensioning along with any other errors that may occur as a result of calibration or gauge reading, thereby maintaining the accuracy or integrity of the work being performed. It is therefore necessary to document any minor variations during calibration or verification activities, so as to maintain the integrity of the accuracy of the Pressure Gauges.

6.0 DOCUMENTATION

6.1 A gauge Calibration Record form shall be prepared for each gauge being calibrated or verified. All pertinent information as required by the form shall be posted during calibration or verification.

6.2 Calibration or verification documents shall be retained in the appropriate jobsite Quality file.

7.0 ATTACHMENTS

7.1 Gauge Calibration Record Form.

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year   Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED ____________
GAUGE I.D. ____________
MASTER GAUGE I.D. ____________
REMARKS ____________

QC SIGN OFF ____________

MASTER GAUGE (PSI)	JACK GAUGE (PSI)

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year   Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED ____________
GAUGE I.D. ____________
MASTER GAUGE I.D. ____________
REMARKS ____________

QC SIGN OFF ____________

MASTER GAUGE (PSI)	JACK GAUGE (PSI)

EXELON
THREE MILE ISLAND
UNIT 1 (35^{TH} YEAR) PHYSICAL
CONTAINMENT BUILDING TENDON SURVEILLANCE

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

QUALITY CONTROL INSPECTION

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C. Witt	*PRESIDENT*	07/31/09
Approved by	Title	Date

1.0 QUALITY CONTROL INSPECTIONS

1.1 Where Precision Surveillance Corporation is not acting as the General Contractor for the Post-Tensioning operations, Quality Control Inspections shall be performed by the organization responsible for the quality control function of that portion of the work they are performing, as stated in PSC Procedure QA 4.0 of this manual, or as agreed to in the contract documents.

1.2 It is PSC's intent to provide the Quality Control activities for the Surveillance Inspection of the Post-Tensioning Tendon System as agreed to in the contract documents and as stated in the Surveillance Quality Control Manual.

1.3 Quality Control documents shall NOT BE SIGNED until all information for the inspections or tests for which that document is being generated have been entered onto that document.

1.3.1 Partially completed inspection or tests, those where the operation cannot be completed on the same day, shall be initialed and dated by the Inspector for those items that have been completed and require documentation.

1.3.2 Partially completed inspections or tests, those where the operation is interrupted by a temporary condition such as lunch or a break and where the operation shall be completed the same day, may be initialed completed by the Inspector to that point, for those items that have been completed and require documentation.

1.4 Quality Control documents that are being reviewed for completeness but were not witnessed by the reviewer shall be signed for that review ONLY AFTER completion of the review and NOT BEFORE.

1.5 A Quality Control document is defined as any document or record that contains a Quality Control Inspector signature requirement.

1.6 All inspections shall be documented on the appropriate inspection form for those operations witnessed on that day. All inspection documents shall be signed or initialed, dated and retained in the appropriate Quality file at the jobsite.

1.7 Quality Control Documentation shall be completed and turned in for review as soon as possible after completion of that Inspection Test or Evaluation.

1.8 Reviews of Quality Control Documentation should be completed within 24 hours of receipt or sooner to verify that the information is accurate and complete. Errors or deficiencies shall be resolved without delay.

1.9 There are a number of Quality Control Documents that may not be completed in one day or require posting to another document. It is advisable to make reproductions of these documents and use these to complete whatever actions are necessary, while retaining the original document, even though incomplete, in a Quality Control file. The additional information can be entered onto the original document until completed. Leave the reproduced copies attached to the back of that document until the review is completed, at which time the reproductions may be disposed of.

1.10 It may be necessary to generate more than one original copy of a Quality Control Document for an Inspection or Test on a tendon. This shall be acceptable just so the total quantity of pages and the page number appear on each document.

2.0 INSPECTION

2.1 The term Inspection is meant to include:

2.2 The witnessing of an operation that generates Quality Control Data which is documented by the Inspector.

2.3 The performance of some operation by the Inspector, such as measuring or other Quality Control Data, which is documented by the Inspector.

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QUALITY CONTROL PROCEDURE

AUDITS

Gerald Bussone	*Q.A. MANAGER*	07/31/09
Prepared by	Title	Date
Christopher E. Cox	*PROJECT MANAGER, P.E.*	07/31/09
Approved by	Title	Date
Paul C Ott	*PRESIDENT*	07/31/09
~~Approved by~~	Title	Date

1.0 AUDITS

1.1 Surveillance operations shall be audited as required by the project specifications or as agreed to in the contract documents, to verify conformance with the approved job related manuals and procedures.

1.2 Audits shall be performed by qualified personnel of the Precision Surveillance Corporation Quality Assurance Section and who shall be independent of the area being audited.

1.3 Audits shall be performed using a checklist prepared prior to the audit, with the results documented on a Jobsite Audit Summary Sheet and a commentary noted on an Audit Finding Report form or similar type documents.

1.4 Audits shall be performed on a random basis and shall be scheduled when a variety of operations are being performed or as a specific activity occurs.

1.5 Subsequent audits shall provide a review of previously noted deficiencies or program non-compliance to ensure appropriate action has been taken to resolve those areas of concern.

1.6 Copies of the audit report shall be maintained in the appropriate jobsite quality files and distributed in accordance with the project specifications or distribution list on the audit checklist.

1.7 The audits shall be performed as early in the life of the In-Service Inspection, as is practical, and must consider the limitations of the scaffolding or platforms.

1.8 The elements to be audited shall be commensurate with the status and importance associated with the In-Service Inspection activities.

1.9 Exelon has the right of access for the performance of quality audit.

1.9.1 Any findings noted as a result of a Exelon audit shall be addressed by Precision Surveillance Corporation on a timely basis with corrective action as approved by Exelon.

Exelon Nuclear	TMI - Unit 1 Surveillance Procedure	Number **1301-9.1**
Title **RB Structural Integrity Tendon Surveillance**		Revision No. **21**
Applicability/Scope TMI Division	**USAGE LEVEL** **1**	Effective Date **10/18/10**

This document is within QA plan scope	X	Yes		No
50.59 Applicable	X	Yes		No

List of Effective Pages

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28	21	68	21				
29	21	69	21				
30	21	70	21				
31	21	71	21				
32	21	72	21				
33	21	73	21				
34	21	74	21				
35	21	75	21				
36	21	76	21				
37	21	77	21				
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1.0 PURPOSE

1.1 To provide instructions and acceptance criteria for RB tendon inspections as required by TMI-1 Technical Specification, Section 4.4.2. **(CM-1, CM-2)**

1.2 To provide instructions and acceptance criteria for RB concrete inspections as required by TMI-1 Technical Specification, Section 4.4.2.

1.3 Tendon surveillance is performed at intervals after initial containment Structural Integrity Test (SIT), as follows:

a. One (1) year after SIT. Completed 1975.

b. Three (3) years after SIT. Completed 1977.

c. Five (5) years after SIT. Completed 1980.

d. At successive 5-year intervals for remaining station life.

> **NOTE**
>
> 21 tendons were inspected at each of first three surveillance periods; see Table 1 of Enclosure 2. Prior to Cycle 7, and for subsequent periods, 12 tendons were selected in order to comply with Table IWL-2521-1. Enclosure 2, Tables 1 and 2, and Enclosure 9, Tables 1 and 2, provides identification of tendons for each inspection period. Tendon selection is random and meets the requirements of NRC R.G. 1.35 Rev. 3 and IWL 2520. In the event that a randomly selected tendon becomes inaccessible, it shall become exempt. Exempt tendons shall be inspected per IWL-2524 and IWL-2525. Substitute tendons shall be selected per IWL-2521.1(b).

1.4 A special one-time event-related tendon surveillance is performed within one year (plus/minus 3 months per ASME Code Section XI, 2004 Edition Table IWL-2521-2 requirements) following the completion of the Reactor Building Containment Opening post-tensioning tendon system repair/replacement activities of ECR 06-00816 in support of the steam generator replacements scheduled in T1R18 2009 refueling outage (SGRP Containment Opening). This special surveillance, which is limited in scope as defined in Section 8.9, satisfies an NRC recommendation from the NRC SER of Tech. Spec. Amendment #259 approving deferral of the ILRT Performance until 2009. This surveillance also maintains compliance with ASME code section XI, 1992 edition with 1992 addenda.

2.0 REFERENCES

2.1 TMI Unit 1 Technical Specifications Section 4.4.2, "Structural Integrity"

2.2 SA-AA-0301, Exelon Nuclear Industrial Safety Pocket Guide

2.3 NO-AA-10, Quality Assurance Topical Report

2.4 RP-AA-403, Administration of the Radiation Work Permit Program

2.5 1001J.1, Surveillance Testing Program

2.6 OP-AA-201-009, Control of Transient Combustible Material

2.7 MA-AA-716-100, Maintenance Alterations Process

2.8 MA-AA-716-025, Scaffold Installation Modification and Removal Request Process

2.9 Inryco, Reactor Building Tendons, VM-TM-2485

2.10 IEN 85-10 and Supplement 1 to same, entitled Post Tensioned Containment Tendon Anchorhead Failure; date February 6, 1985

2.11 SP-1101-23-007, Latest Revision, RB Tendon Surveillance Specification

2.12 TMI-1 Operating manuals and calibration charts for hydraulic stressing jack, pumps, and controls (supplied by vendor).

2.13 Building Pre-Stressing System Tendon History, including Tendon Pulling, Buttonheading, and Stressing Records (cards).

2.14 Reports from previous surveillance

- ❶ 1974 Structural Integrity Test - GAI Report 1838
- ❷ 1975 Tendon Surveillance - 1301-9.1 - GAI Report 1880
- ❸ 1977 Tendon Surveillance - 1301-9.1 - Report GQL 0204
- ❹ 1980 Tendon Surveillance - 1301-9.1 - TDR 229
- ❺ 1985 Tendon Surveillance - 1301-9.1 - Topical Report 025
- ❻ 1990 Tendon Surveillance - 1301-9.1 - Topical Report 069
- ❼ 1995 Tendon Surveillance - 1301-9.1 & Topical Report 093
- ❽ 1999 Tendon Surveillance - 1301-9.1 and Topical Report 136
- ❾ 2004 Tendon Surveillance – 1301-9.1 and Topical Report 183
- 2009 Tendon Surveillance – 1301-9.1 and Topical Report 203
- ❿ 1977 RB Ring Girder Surveillance Three Years After S.I.T. - 1303-8.2

2.15 1410-Y-83, RB Tendon End Cap Installation

2.16 1440-Y-23, RB Concrete Surface Crack Repairs

2.17 GAI DC-5390-225.01-SE and GAI DC-5390-225.02-SE, TMI-1 Reactor Building Post-Tensioning System Tendon Selection and Force vs. Time Curves Surveillances 6 through 10.

2.18 Regulatory Guide 1.35, Rev. 3, Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containments.

2.19 G/C Calculation 1:01:01.01, "Structural Design Review Book 1" (Source Document)

2.20 MA-AA-716-021, Rigging and Lifting Program

2.21 AD-AA-2001, Management and Oversight of Supplemental Workforce

2.22 10CFR 50.55a, Codes and Standards

2.23 EN-MA-501, Controlled Materials and Hazard Communication Program

2.24 ASME XI 1992 Edition through 1992 Addenda, Subsection IWL

2.25 ACI 201.1R-92, "Guide for Making a Condition Survey of Concrete In Service"

2.26 ACI 349.3R-96, "Evaluation of Existing Nuclear Safety Related Concrete Structures"

2.27 TMI-1 C-1101-153-E410-031, 032, and 033, Tendon Grease Void Calculations for Vertical, Horizontal, and Dome Tendons, respectively

2.28 TMI-1 Relief request Nos. RR-1 thru RR-7, Implementation of Subsections IWE and IWL, Letter No. 5928-00-30179, Dated 4/27/00

2.29 Reactor Building Drawings TMI 1-0014/0015/0016, IWE Component Rollout-Outside Containment Concrete

2.30 ER-AA-330-006, Inservice Inspection and Testing of the Pre-stressed Concrete Containment Post Tensioning System

2.31 ER-AA-330-005, Visual Examination of Section XI Class CC Concrete Containment Structures

2.32 ER-AA-335-018, Detailed General VT-1 VT-1C VT-3 and VT-3C Visual Examination of ASME Class MC and CC Containment Surfaces and Components

2.33 ASME XI 2004 Edition (No Addenda)

2.34 TMI UFSAR, current revision, Chapter 5

2.35 ECR 06-00816

2.36 1997 Universal Building Code (UBC 97)

2.37 Commitments

CM-1 Action Tracking Item AR 603573.25.06, License Renewal Aging Management ASME Section XI, Subsection IWL. (Step 1.1)

CM-2 Action Tracking Item AR 603573.38.04, License Renewal Aging Management Concrete Containment Tendon Prestress. (Step 1.1)

3.0 **PLANT STATUS**

3.1 Operating or Shutdown.

> **NOTE**
>
> RB entry not necessary for tendon or concrete inspection.

3.2 For safety reasons, during plant operation no tendons with end caps located above steam safety valves are to be scheduled for surveillance.

4.0 **PREREQUISITES**

4.1 TENDON SURVEILLANCE CONTRACTOR (CONTRACTOR) shall perform tendon surveillance in accordance with this procedure.

4.1.1 CONTRACTOR shall have a quality assurance program in place which meets requirements of 10 CFR 50, Appendix B. This program and associated QA/ISI procedures shall have been submitted to TMI for review/approval prior to commencement of work.

4.1.2 CONTRACTOR shall be on TMI Evaluated Vendors List (EVL).

4.2 CONTRACTOR shall ensure TESTING LABORATORY equipped to perform following services shall be available for this surveillance:

4.2.1 Inspection of removed wires for corrosion and other defects, and to perform required tensile tests. (See Enclosure 4.)

4.2.2 Inspection of bulk filler grease samples and test for chlorides, sulfides, nitrates, base number and moisture content. (See Enclosure 3.)

4.2.3 Calibration (traceable to NIST) of all hydraulic rams and gauges to be used.

4.2.3.1 Stressing ram shall be calibrated per Enclosure 1 or CONTRACTOR may propose an alternative method. **IF** alternative used, CONTRACTOR should submit method for TMI-1 approval at least 30 days prior to start of tendon surveillance and procedure must then be included in CONTRACTOR report.

4.2.3.2 Calibrate equipment used to measure tendon force within 3 months prior to the first tendon force measurement and within 3 months following the final tendon force measurement of the inspection period (IWL-2522(b)).

4.2.3.3 CONTRACTOR's QA program shall be imposed on Testing Laboratory.

4.3 CONTRACTOR shall ensure all necessary inspection, detensioning/retensioning/greasing equipment is obtained and calibrated as specified herein.

4.3.1 CONTRACTOR shall ensure detailed operating instructions and calibration documentation are supplied with rams.

4.3.2 CONTRACTOR should submit calibration records to OWNER at least 15 days prior to start of tendon surveillance work and again within 15 days after demobilization from TMI-1. In no case shall work be allowed to start without TMI approval of calibration records.

4.4 CONTRACTOR shall field verify proposed stressing rams are of proper configuration for TMI-1 dome tendons.

4.5 CONTRACTOR must perform and document training of supervisory personnel with respect to this procedure prior to starting work.

4.6 CONTRACTOR shall verify communication equipment (i.e., headsets, walkie talkies) for use in communication between work crews is operable.

4.7 CONTRACTOR QC/QV personnel should report to Site Nuclear Oversight and to NDE Manager.

4.8 **IF** lifting and handling equipment is to be used, CONTRACTOR shall ensure rigging and lifting devices have been inspected/approved for use per Reference 2.20.

4.9 OWNER shall verify calibration documentation is acceptable for calibrated inspection and stressing equipment.

4.10 COGNIZANT WORK COORDINATOR (per Reference 2.21) or designated alternate shall notify on-shift TMI-1 Shift Management of work scope to be performed by CONTRACTOR at beginning of each work day of Tendon Surveillance or related activities.

4.11 **IF** working on or in radiologically controlled area, initiate RWP, per Reference 2.4.

4.12 Install required scaffolding per Reference 2.8.

4.13 Work Coordinator shall ensure ANII is notified prior to start of work.

4.14 Work Coordinator shall ensure required indoctrination and training of CONTRACTOR per Reference 2.21 is conducted prior to start of work.

4.15 CONTRACTOR Examiner shall use a visual VT-1/VT-3/VT-1C/VT-3C examination procedure(s) qualified to meet the distance and illumination requirements contained in the Code (Ref. 2.32), or in any TMI relief requests from the Code requirements. TMI and the ANII shall approve the qualification of the procedure.

4.16 COGNIZANT WORK COORDINATOR verify that Exelon has assigned a Responsible Engineer who meets the requirements identified in the 1992 Edition (with 1992 Addenda) of the ASME Boiler and Pressure Vessel Code, Section XI, Par. IWL-2320 and 2004 edition with no addenda.

4.17 COGNIZANT WORK COORDINATOR verify that the experience and training of Contractor personnel performing visual examinations satisfy the requirements established by the Responsible Engineer. Verify that these individuals are identified on Data Sheet 12 and that the appropriate approvals are obtained.

4.18 Document review and acceptance of applicable contractor procedures on Data Sheet 13.

5.0 LIMITS AND PRECAUTIONS

5.1 Conduct this procedure in accordance with Reference 2.5 and 2.7.

5.1.1 **IF** AS FOUND conditions do not meet acceptance criteria, notify COGNIZANT MECHANICAL/STRUCTURAL ENGINEER as soon as practical and initiate Surveillance Deficiency Report (SDR) per Reference 2.5.

5.2 Ensure all work is performed in accordance with Exelon Nuclear Industrial Safety Pocket Guide.

5.2.1 CONTRACTOR shall report IMMEDIATELY to COGNIZANT WORK COORDINATOR, any working condition which appears to be unsafe.

5.3 Some work may be near plant equipment required for safe shutdown or which may CAUSE shutdown if damaged. Use special care when suspending or moving stressing rams (jacks) or other heavy surveillance equipment.

5.3.1 TMI WORK COORDINATOR should work with CONTRACTOR FOREMAN to predict such hazards, and shall keep Operations Shift Management informed when working in such vital areas.

5.3.2 Discuss all lifting arrangements inside plant buildings with COGNIZANT WORK COORDINATOR and obtain approval to ensure no damage to plant equipment.

5.3.3 Discuss routes for transporting heavy equipment through plant buildings with COGNIZANT WORK COORDINATOR and obtain approval.

5.4 Protect all roof surfaces from grease, oil, and debris, as spillage will result in roof degradation. Use drop cloths or similar covering to prevent roof damage.

5.5 Protect all built-up roof surfaces when erecting scaffolding, moving or storing heavy equipment, tool boxes, etc., by installing planking on roof surface.

5.6 Minimize transient combustibles per Reference 2.6. Clearly label all receptacles containing combustibles such as grease, solvent, used rags, etc.

5.7 All chemicals utilized shall be controlled and evaluated per Reference 2.23.

6.0 DESCRIPTION AND LOCATION OF SYSTEM/ASSEMBLY

6.1 RB tendons located within concrete shell of Reactor Building. Access to tendons is from outside of RB.

6.2 Layout of tendon system, location and identification can be found in VM-TM-2485. (Ref. 2.9)

> **NOTE**
>
> Testing of tendons around Main Steam Safety Valve exhaust area shall not be scheduled during plant operation due to personnel safety concerns. (Refer to Enclosure 8 Guidelines.)

7.0 SPECIAL TOOLS, MATERIALS AND PERSONNEL QUALIFICATIONS

7.1 General

NOTE

CONTRACTOR must document any substitution of materials along with TMI-1 COGNIZANT MECHANICAL/STRUCTURAL ENGINEER approval.

7.1.1 (2) - powered staging platforms consisting of roof trolley and working platform with hoisting equipment for jack handling. Platforms will provide access to tendon ends being inspected and will support jacks during lift off measurement at each end.

7.1.1.1 As temporary structures, these exterior platforms do not have specific design criteria for seismic and wind loading. 90 mph wind loading and seismic loading from UBC 97 shall be used in the design of these platforms.

7.1.2 Permanent 460 volt electrical outlets on top surface of ring girder for miscellaneous uses.

7.1.3 115 volt outlets on working platform to power hydraulic stressing jack, pumps, and other electrically-powered equipment.

7.1.4 Electrical cables or heavy duty extension cords as necessary for lights, hydraulic stressing jack pumps, and other miscellaneous power tools.

7.1.5 Lift for two (2) men and hand tools.

7.1.6 Portable work platforms for use inside buildings.

7.1.7 Communications equipment for work crew communications.

7.1.8 Miscellaneous hand tools.

7.1.9 Solvent - for removing grease from around tendon anchorage and cleaning any stained concrete (CRC Natural Degreaser Aerosol <u>or</u> EPA 2000). Viscosity/Oil Industrial Solvent #16 may only be used if MSDS has been specifically approved for TMI use.

7.1.10 Cleaning rags - approximately 3 bales.

7.1.11 Ambient temperature monitoring equipment.

7.2 **Detensioning/Retensioning Equipment**

7.2.1 (2) - tendon stressing rams (jacks) with 1600 KIPS or greater capacity.

❶ Rams body configuration must not conflict with ring girder cut-outs and must have a stroke of at least 6 inches unless clearance and/or weight restrictions require the use of a ram with a shorter stroke.

❷ Ram heads (stressing ram adapters) must mate with Inland Ryerson 170 wire threaded anchor head.

❸ Ram must have a longer than standard chair piece to fit TMI dome tendons.

❹ Ram chair shall have access openings at 180° to permit installation and removal of feeler gauges at about 180° apart under the stressing washer to obtain lift-off readings.

NOTE

Considerable critical path time was spent by CONTRACTOR during inspection number 2 and 3 to modify Ft. St. Vrain rams.

To avoid personnel or equipment hazards, all equipment provided must be in good condition and designed as suitable for the purpose.

7.2.2 Pumps, hoses, pressure gauges, controls, hydraulic fluid, etc. as required for use of stressing ram.

7.2.3 Files for dressing threads on damaged anchorage heads.

7.2.4 Shims - 170 wire split type of various thicknesses, such as 1/8", 1/4", 1/2", 3/4", and 1", (5) sets or more of each thickness, as required (Inland-Ryerson part No. 101006-8, 101006-5, 6, 7, and 1 respectively).

❶ Specifications for replacement shims shall require certificate of compliance to ASTM A36 with S2 requirements (material to be silicon-killed fine grain practice) and certified mill test reports showing chemical and physical test results.

7.2.5 Wooden or plastic paddles or spatulas to scoop out bulk filler grease from around anchorage assembly.

7.3 **Inspection Equipment**

NOTE

Calibration Documentation required for all measuring equipment in this section.

7.3.1 Feeler gages for crack measurements. Required range of blade sizes is 0.005" to 0.010" by 0.001" increments.

7.3.2 Feeler gages for lift-off tests. Gage thickness is 0.030" and width 1/2".

7.3.3 Optical comparators with 0.001" accuracy for measuring crack widths in concrete or buttonheads.

7.3.4 Grid paper for showing concrete crack patterns at vertical and hoop tendons.

7.3.5 Magnifying glass, 5x (minimum)

7.3.6 Wire cutters to cut 1/4 inch diameter, high strength (240,000 PSI) tendon wires.

7.3.7 Extraction tool suitable for removing wires subject to tensile tests.

7.3.8 Come-along hoist, or similar device, for extracting test wires.

7.3.9 Six-foot diameter wire coiler to coil removed wire.

7.3.10 GO/NO-GO thread plug gages for anchorage thread measurement.

7.3.11 Inside and outside micrometers for anchorage thread measurements.

7.3.12 Visual inspection equipment to perform VT-3C and VT-1C exams.

7.4 **Equipment for Greasing and End Cap Replacement**

7.4.1 Grease pump, transmission lines, various fittings mounted on storage tank equipped with heating system to heat grease to between 140°F and 200°F.

❶ Grease pump must be fitted with discharge relief valve set for maximum of 300 PSIG.

7.4.2 (5) - 55-gallon drums of bulk filler grease, Visconorust 2090P4, by Viscosity Oil Co., or EQUAL as approved by the COGNIZANT MECHANICAL/STRUCTURAL ENGINEER.

NOTE
Grease quantity is estimate only. More or less may be required.

❶ Certified test report for grease is required indicating water soluble chloride, sulfide, nitrate, reserve alkalinity and moisture content.

❷ Tests and acceptance limits shall be per Enclosure 3.

7.4.3 (Approx. 6) - 55-gallon capacity drums for holding waste grease. Should be steam cleaned and air dried until no moisture or dirt is observed.

❶ To be clearly labeled on top and side: "WASTE TENDON GREASE <u>ONLY</u>".

7.4.4 (Approximately 10) - 5-gallon capacity cans with bails.

7.4.5 End Cap Consumables and Hardware per 1410-Y-83.

8.0 PROCEDURE

> **NOTE**
>
> The CONTRACTOR may use its own procedures to perform any or all steps of this surveillance. The CONTRACTOR's procedures shall be reviewed and approved by the TMI COGNIZANT MECHANICAL/STRUCTURAL ENGINEER. Data Sheet 13 shall document the review and acceptance of CONTRACTOR's procedures.

8.1 Equipment Setup

8.1.1 Verify all applicable equipment listed in Section 7.0 available.

8.1.2 Verify Operating manuals and calibration charts for hydraulic stressing jack, pumps, and controls available for use.

➊ Verify all personnel familiar with operating manuals of equipment to be used during inspection.

8.1.3 Verify stressing jacks, pressure gages, optical comparators, and all other measuring devices have been calibrated and are in good working condition.

➊ Ensure calibration documentation signed, dated, and traceable to NIST.

➋ Verify stressing jack-pressure gauge system is capable of measuring tendon force within an accuracy of ± 1.5% of the specified minimum ultimate strength of the tendon (± 30 kips or better). Refer to Enclosure 1 for additional calibration details.

➌ During inspection, check pressure gauge calibration daily against a master pressure gauge used only for this purpose. CONTRACTOR shall document this check.

8.1.4 Verify TESTING LABORATORY prepared to receive wire and grease samples.

8.1.5 Complete Data Sheets 1 and 2 for each tendon selected for inspection with:

➊ tendon number,
➋ tendon end (shop/field),
➌ expected lift-off (predicted) force, and
➍ previous shim thickness.

> **NOTE**
>
> Value for Predicted/Expected Lift-Off force is Base Value force obtained from applicable Force versus Time curve contained in DC-5390-225.01-SE or C-1101-153-E410-046 (for SGRP affected tendons).

8.1.6 Complete Rows 1 through 6, 8, 9, 10 and 12 of Data Sheet 4 for tendons to be detensioned.

NOTE

Values to be entered in Rows 1 through 4 of Data Sheet 4 are given in Table 7 of VM-TM-2485.

8.1.7 Enter Normalization Factor (NF) obtained from applicable force versus time curve contained in DC-5390-225.01-SE or C-1101-153-E410-046 (for SGRP affected tendons), on Data Sheet 5 for selected tendons.

8.1.8 Enter predicted force, 0.95 predicted force, and 0.90 predicted force (as documented in DC-5390-225.01-SE or supplementary calculation) for all sample tendons on Data Sheet 2.

8.1.9 **IF** working in areas exposed to steam vents, verify plant is shut down. (Refer to Enclosure 8 area guidelines).

8.2 Hoop and Dome Tendon Inspection

NOTE

Once inspection of a given tendon has started, it should be completed as soon as possible to avoid unnecessary exposure of anchorage head.

8.2.1 Protect roof surface as required prior to starting inspection.

8.2.2 Place platforms in position at ends of tendon to be inspected.

8.2.3 **IF** tendon inspection is not completed during a work shift, protect anchorage area and grease cans from exposure to moisture, dirt and any other potentially damaging materials.

8.2.4 Tendons shall be regreased (filled) within 30 days maximum after removal of an end cap. During the 2009 surveillance, extension of the 30 day maximum may be granted by the Responsible Engineer, as documented in this surveillance package.

8.2.5 Corrosion Protection System

a. Depressurize and remove end caps per 1410-Y-83 and PSC ISI Manual Procedure SQ6.1.

b. Inspect for presence of free water in end cap and at anchorage area per this procedure and PSC ISI Manual Procedure SQ6.1.

c. Enter inspection results on Data Sheet 9.

CAUTION

When removing grease to make visual inspection, use plastic or wood scrapers to avoid scratching/damage to end anchorage components and resultant corrosion.

NOTE

Free water shall not be included in the grease sample (IWL-2525.1[a]).

d. Take a representative one liter grease sample from each end anchorage of selected tendons.

e. When present, free water sample shall be taken where water is present in quantities sufficient for lab analysis. Record quantity of free water and request lab analysis for PH (IWL-2525.2[b]),

f. Have grease sample tested per Enclosure 3.

g. Verify sample meets acceptance criteria specified in Enclosure 3.

h. Remove and collect remaining bulk filler from tendon anchorage area using wooden or plastic scoops and cleanup using solvent and rags. Collect in clean drums or other containers.

i. Record the total amount of bulk filler grease removed up until reinstallation of the end cap per the guidelines of 1410-Y-83. Document on Data Sheet 11.

8.2.6 Inspect Anchorage prior to Lift-Off test.

a. Perform VT-1 inspection of tendon anchorage assemblies and associated hardware (bearing plates, stressing washers, stressing shims, buttonheads, and exposed wires) for signs of corrosion, cracks, missing wires, and broken wires. If broken or damaged wires are detected, the tendon shall be detensioned and the wire removed for testing as specified in Section 8.2.9.

b. Perform VT-1C inspection of the concrete around tendon anchorage area, and for a distance of 2 feet extending outward from the bearing plate for crack width and general cracking pattern and for indications of abnormal material behavior.

c. Complete data sheets in Enclosure 6.

d. **IF** crack widths in concrete > 0.010" are identified, record and report immediately to COGNIZANT MECHANICAL/STRUCTURAL ENGINEER for evaluation and resolution.

NOTE

Crack widths in concrete > 0.010" are potentially reportable per 10 CFR 50.72.

e. **IF** crack widths > 0.05" are identified, record and report immediately to COGNIZANT MECHANICAL/STRUCTURAL ENGINEER for IMMEDIATE evaluation and investigation to determine amount of structural impairment upon containment structure and its continued integrity.

f. **IF** any condition not meeting acceptance criteria in Enclosure 6 is noted, document using sketches, photographs, etc. as applicable and report immediately to Cognizant Mechanical/Structural Engineer.

g. CONTRACTOR shall ensure TMI-1 has evaluated any out-of-specification condition prior to making condition inaccessible. A written evaluation will be provided to CONTRACTOR for his report.

h. Cracks ≥ 0.050" must be repaired after TMI-1 Engineering does an evaluation. Repair will be per 1440-Y-23, "RB Concrete Surface Crack Repairs".

8.2.7 Lift-Off Test

a. Verify that anchor head treads are acceptable per TMI approved vendor procedure. Completion of Data Sheet 8 is at the option of the Responsible Engineer.

b. **IF** an UN-ACCEPTABLE anchor head thread condition exists, immediately notify COGNIZANT MECHANICAL/STRUCTURAL ENGINEER.

c. Record calibration constants, ram area, ram identification number (I.D.) on Data Sheet 1.

d. Measure and record thickness of shim stack on Data Sheet 1.

e. Lubricate anchorage washer threads with a small amount of bulk filler grease as required.

f. Thread ram onto anchorage stressing washer and bearing plate per ram operating instructions.

g. Ensure <u>full</u> thread engagement of the coupler to the stressing washer.

h. Visually examine jack prior to each use for damage or deformation.

WARNING

Jack is being operated up to 1,600 KIPS of force. Exercise extreme caution and strict adherence to all safety regulations as contained in operating manual. DO NOT stand behind hydraulic jack while stressing a tendon. Exercise extreme caution if fingers or hands are required near tendon anchorage head during testing.

CAUTION

DO NOT exceed 80% of ultimate tensile stress (equivalent to a jack force of 1592 KIPS (for a tendon with 169 effective wires) when performing lift-off test.

i. **IF** lift-off is not achieved at jack force of 1592 KIPS, **STOP**, unload jack and immediately notify COGNIZANT MECHANICAL/STRUCTURAL ENGINEER.

j. Observe the position of the anchorhead prior to applying pressure. Count the anchorhead revolutions about the tendon axis, if any, during lift-off. Record the number of revolutions on Data Sheet 1.

k. Begin applying pressure to jack, and continue applying pressure until stressing washer (anchorhead) lifts off shim pack just enough to insert (2) - 0.030" thick feeler gages, located approximately 180 degrees apart, between anchor head and shim pack or shim pack and bearing plate.

l. Reduce jack pressure to achieve corresponding force reduction of approximately 100 KIPS. Obtain relationship between jack pressure and force from Calibration Equation recorded on Data Sheet 1.

m. Slowly increase jack pressure until both feeler gages becomes loose enough to move. When this occurs, STOP increasing jack pressure and record jack pressure reading and corresponding force on Data Sheet 1.

n. Complete Consecutive Three Trial Pressure Spread and Average on Data Sheet 1.

o. Repeat lift-off measurement tests until 3 consecutive force measurements are all within 25 KIPS as recorded on Data Sheet 1.

NOTE

When tests are all within 25 KIPS of each other, official lift-off force for tendon end is the mean of the 3 consecutive force measurements, which is obtained from Data Sheet 1.

p. CONTRACTOR shall record information on Data Sheet 1.

q. Record gage pressure corresponding to official lift-off force on Data Sheet 1.

r. Record official lift-off force on Data Sheet 1.

s. Remove feeler gages and slowly decrease pressure on jack to allow stressing washer to reseat onto shims. No additional shims are to be added at this time.

NOTE
DO NOT detension either end until lift-off has been recorded for both ends.

t. Repeat lift-off test at other end of tendon.

u. Calculate average value of forces required to achieve lift-off of tendon, and enter on Data Sheet 2.

v. Verify force meets Acceptance Criteria specified in Step 9.3.

w. During lift-off testing, record reactor building internal temperature and the temperature of the concrete adjacent to the tendon anchorage on Data Sheet 1.

NOTE
Use value recorded from RTD TE 655I, TE 655U or TE 655P in Control Room for RB internal temperature.

x. Enter As-Found average lift-off force from Data Sheet 2 in Column (1) of Data Sheet 5.

y. After lift-off tests are completed for all selected tendons in a group, e.g., all dome tendons, complete Data Sheet 5. Fill out Data Sheet 6 after all re-tensioned tendon lift-off tests are complete.

z. Verify average of all normalized lift-off forces in a group meets Acceptance Criteria of Step 9.3.

aa. The COGNIZANT MECHANICAL/STRUCTURAL ENGINEER shall review the results and trends of the measured prestress forces from consecutive surveillances for the control tendons and tendons as a group. Perform a statistical analysis of time dependent lift-off force trends and verify that the criteria of Step 9.3 are satisfied. Plot lift-off for control tendons on force vs. time curves.

8.2.8 Detension Tendon

> **CAUTION**
>
> 1. **DO NOT** exceed 70% of ultimate tensile stress (equivalent to a jack force of 1393 KIPS (for a tendon with 169 effective wires) (IWL-2523.3).
> 2. During plant operation, detension ONLY ONE tendon at a time. During the T1R18 steam generator replacement in 2009, special limits on the number of tendons detensioned during power operation had been applied, consistent with the 50.59 evaluation limitations of SE-000153-021.

> **NOTE**
>
> 1. To prevent holding jacks under pressure for periods of time, it is recommended that both ends of tendon be detensioned simultaneously.
> 2. Shims are paired and must be stacked in pairs.

a. Increase pressure to jacks until shims can be removed.

b. Remove split shims from shim stacks.

c. Slowly decrease pressure (rate < 2000 PSIG/MIN) on jacks to completely detension tendon.

> **NOTE**
>
> **DO NOT** uncouple jacks until tendon is completely detensioned.

d. Uncouple jack, while minimizing twisting of tendon to 1/2 of a revolution.

e. Record on Data Sheet 1 the number of revolutions of the anchorhead (if any) during uncoupling.

8.2.9 Remove Wire and Test

a. Perform VT-1 inspection of the detensioned tendon anchorage assembly for missing, broken, and/or damaged wires protruding from the anchorhead.

b. Record results on Data Sheets 1 and 2 in Enclosure 6 specifically noting any results observed after detensioning.

c. Remove a randomly selected wire that had been stressed prior to detensioning from each selected detensioned tendon listed in Enclosure 2, Table 2 and/or Enclosure 9, Table 2.

d. Also remove all broken or damaged wires (if any). Remove enough of each broken or damaged wire to allow tensile testing and visual examination to evaluate the cause of breakage or damage.

e. Follow procedure in Enclosure 4 and PSC ISI Manual Procedure SQ10.3 for testing and examining all removed wires and completing Data Sheets.

8.2.10 Retension Tendon

CAUTION

DO NOT exceed 80% of ultimate tensile stress (equivalent to a jack force of 1593 KIPS (for a tendon with 169 effective wires).

a. Retension both ends of a tendon approximately simultaneously, such that force difference between ends does not exceed 250 KIPS at any time during retensioning.

b. Prior to starting retensioning, enter header information for tendon to be retensioned on Data Sheet 1, and calculate P'_{max} and P'_{min} and enter on Data Sheet 1. Complete Columns 2 through 5 on Data Sheet 6 by recording the following information.

(1) Number of effective wires.

(2) 70% of tendon ultimate strength (8.24 kip x Number of Effective Wires).

(3) Predicted Base Force from DC-5390-225.01-SE or separate calculation.

(4) Target lock-off force; [70% of ultimate strength + Predicted Base Force]÷2.

c. Verify Rows 1, 2, 6 through 9 and 12 of Data Sheet 4 have been completed.

d. At each tendon end, stress tendon to gauge pressure recorded in Row 2 on Data Sheet 4. Record actual pressure in Row 3.

e. Record ram extension in Row 5 of Data Sheet 4.

f. Stress tendon to gauge pressure recorded in Row 9 of Data Sheet 4. Record actual pressure in Row 10.

g. Record ram extension in Row 11 of Data Sheet 4.

h. Stress tendon to gauge pressure recorded in Row 12 of Data Sheet 4. Record actual pressure in Row 13.

i. Record ram extension in Row 14.

j. Stress tendon to gauge pressure recorded in Row 7 of Data Sheet 4. Record actual pressure in Row 15.

k. Record ram extension in Row 17.

l. Record tendon force at overstress in Row 16.

m. Reduce ram pressure to the lesser of the following and insert shims to fill gap (final gap will be less than the thickness of the smallest shim).

   (1) 200 psi above $(P'_{min} + P'_{max})/2$ from data Sheet 1.

   (2) P'_{max} force listed on Data Sheet 1.

n. Perform lift-off to determine actual tendon force and corresponding gauge pressure.

o. Record final lift-off (Lock-Off) force in Column 6 of Data Sheet 6.

p. Verify that final lock-off force is between the Predicted Base Force and 70% of ultimate tendon strength and document verification in Col. (7) of Data Sheet 6.

q. Complete Data Sheet 6 for all detensioned tendons.

r. Record final gauge pressure, force, and shim stack thickness on Data Sheet 1.

s. For comparison of tendon elongations occurring at Original Stressing and Retensioning, complete Data Sheet 4.

t. Verify fractional difference in Row 10 on Part 4 of Data Sheet 4 is within ± 0.1. Indicate whether this criterion has been met on Part 4 of Data Sheet 4.

u. **IF** NOT within ± 0.1, immediately notify COGNIZANT MECHANICAL/STRUCTURAL ENGINEER and investigate to determine if cause is wire failure or slip of wire in anchorage(s). Difference of more than 0.1 requires identification in the ISI Summary Report per IWA-6000 (10CFR50.55a).

v. After all lift-off tests on re-tensioned tendons are complete, fill out Data Sheet 6.

8.2.11 Restore Tendon Force

> **NOTE**
>
> Following steps apply to any tendon which has lift-off force below its specified 90% Base Value, and has not been required to be detensioned.

a. Completely de-tension the tendon and follow the instructions in Par. 8.2.10.

b. Evaluate cause of low force.

c. Retension tendon per the instructions in Para. 8.2.10.

8.2.12 For each tendon, measure the quantity of grease (corrosion protection medium, CPM) replaced and document on Data Sheet 11. Reinstall grease can and regrease per 1410-Y-83.

8.3 Vertical Tendon Inspection

a. Follow same steps for dome and hoop tendons (Section 8.1 and 8.2) with following exceptions:

➊ Working platforms remain stationary during test of one tendon.

➋ Access to opposite end of tendon is from tendon gallery.

➌ Entire column of grease may drain from tendon conduit. Ensure sufficient receptacles available to contain up to 120 gallons of drained grease from each tendon (C-1101-153 - E410-031).

➍ Lift-off, detensioning, and retensioning of vertical tendon will be performed from one end only; i.e., from top of ring girder.

➎ Data to be filled in on Data Sheets 1 and 2.

8.4 Concrete Cracks at Dome Tendon Anchorage Area

a. Visually inspect the 9 dome tendon anchorage areas per Enclosure 6.

b. Complete Data Sheets 8 and 9 of Enclosure 6.

8.5 Perform VT-3C examination of accessible exterior of the containment and document results per instructions in Enclosure 6.

> **NOTE**
>
> This examination is to include the concrete repair from the SGRP Containment Opening.

8.6 Perform 40 Year examinations and tests listed in Enclosure 7 and document results.

8.7 Grease Can Seal Repairs

> **NOTE**
>
> To maintain tendon grease seals, scope of work includes replacement of leaky seals, even on tendons which are not part of surveillance scope listed in Table 1 and Table 2 of Enclosure 2 and Table 1 and Table 2 of Enclosure 9.

8.7.1 Perform repairs per 1410-Y-83 (Reference 2.15).

8.8 Recalibrate all calibrated equipment at end of tendon surveillance.

8.9 Augmented inspection for SGRP Containment Opening

> **NOTE**
>
> This is a one-time augmented inspection following the repair and restoration of the SGRP Containment Opening. The scope of this inspection is limited to the concrete patch, affected tendons and their anchorage areas per Enclosure 6. This augmented inspection does not include 100% examination of accessible concrete nor the full tendon sample of a regularly scheduled inspection.

8.9.1 Perform this one-time inspection 1 year (± 3 months) following repair and restoration of the SGRP Containment Opening.

8.9.2 Augmented tendon inspection for SGRP Containment Opening

8.9.2.1 Follow same steps for hoop and vertical tendons (sections 8.1, 8.2 and 8.3).

8.9.2.2 Inspect SGRP Containment Opening tendons per Enclosure 9.

8.9.3 Augmented concrete inspection

8.9.3.1 Perform VT-3C examination of SGRP Containment Opening concrete repair and concrete around tendon anchorage areas of all tendons listed in Enclosure 9.

8.9.3.2 Document results per Enclosure 6.

9.0 ACCEPTANCE CRITERIA

9.1 Tendon Anchorage and concrete inspection meets criteria specified by Enclosure 6.

9.2 Tendon Wire Physical Condition meets criteria specified by Enclosure 4.

9.3 Tendon Prestress Force Confirmation Test (IWL-3221.1)

9.3.1 The average of all normalized tendon lift-off forces, including those measured in 9.3.2.2, for each type of tendon (original vertical, dome, hoop and SGRP affected vertical and hoop) is equal to or greater than the required minimum average tendon force at the anchorage for that type of tendon.

NOTE

SGRP affected tendons are to be averaged separately from original tendons because the higher forces in the SGRP tendons would introduce a non-conservative bias in the average force calculations of the original tendon populations

NOTE

Required minimum average tendon forces are:

1033 Kips for Vertical Tendons
1064 Kips for Dome Tendons
1108 Kips for Hoop Tendons

9.3.2 The measured force in each individual tendon is not less than 95% of the Predicted Base Value (Predicted Force) obtained from C-1101-153-E410-046, unless the following conditions are satisfied:

9.3.2.1 The measured force in not more than one tendon is between 90% and 95% of the predicted force;

NOTE

Tendons H46-24 and V-31 were de-tensioned during Surveillances 2 and 3, respectively. Also, the V-30 liftoff force was measured during Surveillance 4 and its anchorage force may have been affected during by this activity. To ensure that tendons adjacent to specified sample tendons are also in an undisturbed condition, the following are designated as the adjacent tendons to examine should the need for such examination arise.

V-29 is the designated adjacent tendon located counter-clockwise from specified sample tendon V-32.

H46-23 is the designated adjacent tendon located below specified sample tendon H46-25.

Also, the Responsible Engineer may designate alternatives to the above or to other adjacent tendons as necessary to satisfy accessibility, safety and other significant concerns.

9.3.2.2 The measured forces in two tendons located adjacent to the tendon in 9.3.2.1 are not less than 95% of the predicted forces (Predicted Base Values); and

9.3.2.3 The measured forces in all the remaining sample tendons are not less than 95% of the predicted force.

9.3.3 **IF** the requirements of 9.3.1 and 9.3.2 are not met, extent of investigation into cause, including additional lift-off testing to determine cause and extent of such occurrence, shall be determined by COGNIZANT MECHANICAL/STRUCTURAL ENGINEER.

9.3.4 **IF** average value of selected tendon end forces required for lift-off falls below 90% Base Value, evaluate condition to determine extent of cause of the low lift-off force and to specify additional examinations deemed necessary to demonstrate acceptability of the pre-stressing system.

9.3.5 **IF** minimum group average normalized tendon force is NOT MET on Data Sheet 5, an additional sample of 4% with a minimum of 4 and a maximum of 10, of same group of tendons, should be inspected. (TMI-1 Guidance/not Reg. Guide).

9.3.6 **IF** results of the anchorage force statistical analysis show a significant probability that the mean for any tendon group will fall below the minimum required value prior to the late finish date of next scheduled surveillance, additional lift-off testing to determine the cause and extent of such occurrence shall be done as directed by the COGNIZANT MECHANICAL/STRUCTURAL ENGINEER. This evaluation shall be reported per Engineering Evaluation Report prescribed in IWL-3300.

9.3.7 **IF** total population of each group of sampled tendons meets criteria, structural integrity of containment shall be considered acceptable.

9.3.8 **IF** structural integrity of containment has not been demonstrated to be acceptable within 72 hours, then be in at least HOT STANDBY within next 6 hours and in COLD SHUTDOWN within following 30 hours.

9.4 Corrosion Protection System Inspection.

9.4.1 Grease sample contaminant levels and base numbers meet the criteria specified in Enclosure 3.

9.4.2 Water in grease sample shall be that ratio of water to dry weight does not exceed 10%.

9.4.3 The acceptance criteria limit is that the absolute difference between the amount of grease (CPM) removed from a tendon and the amount replaced shall not exceed 10% of the net duct volume (volume of end cap, trumpet, and duct less that of the tendon, anchor heads, and shims). Engineering evaluation is required if the 10% criteria is exceeded.

9.4.4 Presence of free water.

a. An evaluation per CC-AA-309-101 shall be performed per UFSAR 5.7.5.2.5 if found.

9.4.5 Grease leakage detected during general examination of the containment exterior surface has been evaluated for housekeeping, fire safety and personnel safety concerns.

a. An evaluation per CC-AA-309-101 shall be performed per UFSAR 5.7.5.2.5 if found.

9.5 Post Test Calibration

9.5.1 The post test calibration shall not differ from the pre-test calibration by more than the specified accuracy tolerance of hydraulic rams and gauges (IWL 2522[b]).

9.6 All Data Sheets complete and signed off.

9.7 **IF** the Acceptance Criteria of 9.1, 9.2, 9.3, 9.4 and 9.5 are not met, it shall be considered as a possible abnormal degradation of the containment structure. The condition shall be immediately brought to the attention of, and evaluated by the COGNIZANT MECHANICAL/STRUCTURAL ENGINEER, a Surveillance Deficiency Report (SDR) generated, and addressed in the tendon surveillance report submitted to the NRC.

10.0 REPORTS

10.1 CONTRACTOR should prepare written report of results and conclusions for inspection period for TMI within 30 days of test and inspection completion.

10.1.1 CONTRACTOR shall include pre and post-test calibration records in CONTRACTOR'S final report.

10.2 TMI shall ensure Enclosure 7 is kept updated with extra commitments for inspections as a result of abnormal conditions in each inspection period.

10.3 TMI shall submit a report on tendon surveillance to NRC within 3 months following completion per Tech Specs.

> **NOTE**
>
> In addition to the 3 month report submitted to the NRC, tendon surveillance engineer should provide data listed below to the ISI engineer for the 90 day ISI Summary Report.

10.4 TMI shall submit an ISI Summary Report per IWA-6000. It should include the following conditions, if found (10CFR50.55a).

10.4.1 Sampled sheathing grease contains chemically combined water exceeding 10% by weight or the presence of free water.

10.4.2 The absolute difference between amount of grease removed and amount replaced exceeds 10% of the tendon net duct volume, i.e., 12 gallons for vertical tendons, 11 gallons for hoop tendons, and between 7 gallons and 9 gallons for dome tendons (dependent on length), (Source: C-1101-153-E410-031, 032, and 033, respectively).

10.4.3 Grease leakage is detected during general visual examination of containment surface.

10.4.4 When conditions in accessible areas could indicate the present of, or the result of degradation in inaccessible areas, those inaccessible areas shall be evaluated for --

10.4.4.1 description of the type and extent of degradation, and the conditions that led to the degradation

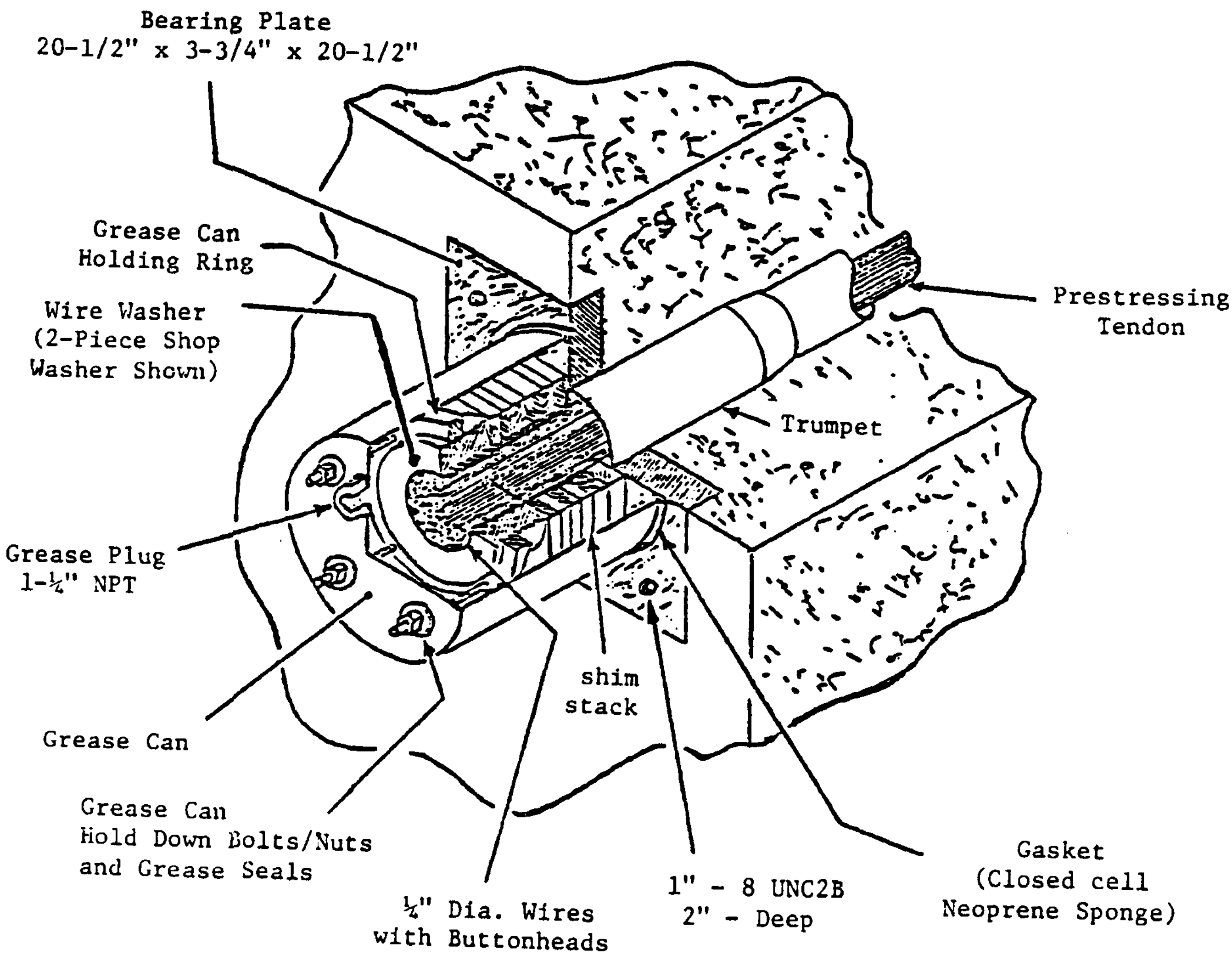
10.4.4.2 an evaluation of each area and results of same

10.4.4.3 a description of necessary corrective actions.

10.4.5 When the elongation corresponding to a specific load (adjusted for effective wires or strands) during retensioning of tendons differs by more than 10 percent from that recorded during the last measurement

FIGURE 1

Tendon Details Typical Hoop/Dome



NOTE
Vertical tendons have a different type of grease can.

DATA SHEET 1
Lift-Off Force Measurement

Surveillance No. ________ Tendon ID ________ Predicted Force (F_p) ________kip Tendon End (Circle One): Shop / Field

Phase (Circle One): As-found / Re-Tension Ram ID ________ Ram Calibration Constants: A = __________ k = __________

Date ________ Temp: RB Interior ________°F / Concrete Surface _______ °F No. Effective Wires, N_w________ Shim Stack Ht. ________in.

CAUTION

DO NOT EXCEEP A RAM PRESSURE OF $[(1,592 \times N_w / 169) - k] \times 1,000 / A$ = __________ psig

Trial	Lift-Off Pressure, psig	Consecutive Three Trial Pressure Spread psi	Consecutive Three Trial Pressure Average p'[1] psig[1,2]
1		N/A	N/A
2		N/A	N/A
3			
4			
5			
6			
7			
8			
9			
10			

Stressing Washer Rotation

	Rotation, Turns CW or CCW
At Feeler Gage Insertion	
At Trial 1	
At Trial 2	
At Trial 3	
At Trial 4	
At Trial 5	
At Trial 6	
At Trial 7	
Sum	

End Lift-Off Force = (A x P' / 1,000) = k = _______kip

For Re-tension Only, List Nominal Thickness of Each Shim Starting at Shim in Contact with Anchorhead
________ in.
________ "
________ "
________ "
________ "
________ "
________ "
________ "
________ "
____

[1] N/A if 3 trial pressure spread > 25,000 / A = ________ psi

[2] Re-tension P' range: $P'_{min} = (F_p - k) \times 1,000 / A$ = ______ psig < P' < $P'_{max} = [(1,394 \times N_w / 169) - k] \times 1,000 / A$ = ________ psig

For Re-Tension Only: F_p < End Lift-Off Force < $1394 \times N_w / 169$; __________ < __________ < __________ Yes / No (Circle One)

Notes:____

Recorded by: Signature ______________________ Date __________ / Reviewed by: Signature ______________________ Date __________
QV

DATA SHEET 2
As-Found Lift-Off Force Summary Results

Group	Tendon ID	As-Found Lift Off Force, kip			Predicted Force, F_P, kip	F_{acc} = 0.95 F_p	F > F_{acc} Circle Yes or No	F_{llim} = 0.90 F_p	F > F_{llim} Circle Yes or No
		Shop End	Field End	Average Force, F					
Hoop							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
Vertical			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
			N/A				Yes / No		Yes / No
Dome							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No
							Yes / No		Yes / No

Notes: (Initial & Date) ____

____

____

DATA SHEET 3

DELETED

DATA SHEET 4

Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID _________ Surveillance No. ____

Part 1
Original Stressing Data

NOTE

PTF force is that equivalent to a ram pressure of 1,000 psi. PTF removes tendon slack and is the starting point for elongation measurements. OSF force is 80% (may be less) of tendon ultimate strength. The tendon is loaded to OSF in order to provide the required force distribution. It is also the force at which final elongation is measured. PTF force / elongation, OSF force / elongation and number of effective wires are documented in construction records.

Table 1

Row, R	Parameter	Value
1	Shop End PTF Force	kip
2	Field end PTF force	kip
3	Mean PTF Force = (R1 + R2) / 2	kip
4	Shop End PTF Reference Distance	in.
5	Field End PTF Reference Distance	in.
6	Net PTF Reference Distance = R4 + R5	in.
7	Shop End OSF Force	kip
8	Field end OSF force	kip
9	Mean OSF Force = (R7 + R8) / 2	kip
10	Shop End OSF Reference Distance	in.
11	Field End OSF Reference Distance	in.
12	Net OSF Reference Distance = R10 + R11	in.
13	Differential Force = R9 – R3	kip
14	Differential Elongation = R12 – R6	in.
15	Number of Effective Wires	
16	Elongation Rate = R14 x R15 / R13	

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID _________ Surveillance No. ____

Part 2

Shop End Re-Tensioning Data

Ram ID ________ Ram Area, A __________ in^2 Ram k _________ kip

NOTE

The number of effective wires entered in R1 must be the same as the number entered for the field end in Table 3. Also, the calculations identified in Rows 4, 16, 18 & 19 (shaded) may be done after stressing work at both ends of the tendon is complete.

Table 2

Row, R	Parameter	Value	Signature	Date
1	Number of Effective Wires			
2	PTF Target Pressure	1,000 psi		
3	PTF Actual Pressure	psi		
4	PTF Actual Force = R3 x A/1000 – k	kip		
5	PTF Reference Distance	in.		
6	OSF Maximum Force = R1 x 9.4	kip		
7	OSF Max. Pressure = 1000 (R6 + k) / A	psi		
8	1/3 Pressure Interval = R7 / 3 – 330	psi		
9	Target 1/3 Pressure = 1,000 + R8	psi		
10	Actual 1/3 Pressure	psi		
11	1/3 Reference Distance	in.		
12	Target 2/3 Pressure = R9 + R8	psi		
13	Actual 2/3 Pressure	psi		
14	2/3 Reference Distance	in.		
15	OSF Actual Pressure	psi		
16	OSF Actual Force = R15 x A/1000 – k	kip		
17	OSF Reference Distance	in.		
18	Differential Force = R16 – R4	kip		
19	Differential Elongation = R17 – R5	in.		

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID _________

Surveillance No. ____

Part 3

Field End Re-Tensioning Data

Ram ID ________ Ram Area, A __________ in^2 Ram k _________ kip

NOTE

The number of effective wires entered in R1 must be the same as the number entered for the shop end in Table 2. Also, the calculations identified in Rows 4, 16, 18 & 19 (shaded) may be done after stressing work at both ends of the tendon is complete.

Table 3

Row, R	Parameter	Value	Signature	Date
1	Number of Effective Wires			
2	PTF Target Pressure	1,000 psi		
3	PTF Actual Pressure	psi		
4	PTF Actual Force = R3 x A/1000 – k	kip		
5	PTF Reference Distance	in.		
6	OSF Maximum Force = R1 x 9.4	kip		
7	OSF Max. Pressure = 1000 (R6 + k) / A	psi		
8	1/3 Pressure Interval = R7 / 3 - 330	psi		
9	Target 1/3 Pressure = 1,000 + R8	psi		
10	Actual 1/3 Pressure	psi		
11	1/3 Reference Distance	in.		
12	Target 2/3 Pressure = R9 + R8	psi		
13	Actual 2/3 Pressure	psi		
14	2/3 Reference Distance	in.		
15	OSF Actual Pressure	psi		
16	OSF Actual Force = R15 x A/1000 – k	kip		
17	OSF Reference Distance	in.		
18	Differential Force = R16 – R4	kip		
19	Differential Elongation = R17 – R5	in.		

DATA SHEET 4
Elongation / Tendon Force Record
Re-Tensioning Data for De-Tensioned Tendons

Tendon ID ________ Surveillance No. ____

Part 4
Elongation Comparison

Table 4		
Row, R	Parameter	Value
1	Shop End Differential Force from Table 2, R18	kip
2	Field End Differential Force from Table 3, R18	kip
3	Average Differential Force = (R1 + R2) / 2*	kip
4	Shop End Differential Elongation from Table 2, R19	in.
5	Field End Differential Elongation from Table 3, R19	in.
6	Total Elongation = R4 + R5**	in.
7	Number of Effective Wires from Table 2, R1	
8	Re-Tensioning Elongation Rate = R6 x R7 / R3	
9	Original Elongation Rate from Table 1, R16	
10	Fractional Difference in Rates = (R8 – R9) / R9	

Absolute value of the above Fractional Difference in Rates ≤ 0.1 Yes _______

No _______

* For vertical tendon = R1
** For vertical tendon = R4

Signature: ______________________________ Date: ______________

DATA SHEET 5
Average of the Normalized Lift Off Force

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes No
Dome Tendons				
1. ______	______	______	______	
2. ______	______	______	______	
3. ______	______	______	______	(Average Equal to or greater than 1064 kips)
4. ______	______	______	______	
5. ______	______	______	______	
6. ______	______	______	______	
______	______	______	______	
		Total	______	
		Average	______	______
Vertical Tendons				
1. ______	______	______	______	
2. ______	______	______	______	(Average Equal to or greater than 1033 kips)
3. ______	______	______	______	
4. ______	______	______	______	
5. ______	______	______	______	
6. ______	______	______	______	
7. ______	______	______	______	
______	______	______	______	
		Total	______	
		Average	______	______
Hoop Tendons				
1. ______	______	______	______	
2. ______	______	______	______	
3. ______	______	______	______	(Average Equal to or greater than 1108 kips)
4. ______	______	______	______	
5. ______	______	______	______	
6. ______	______	______	______	
7. ______	______	______	______	
8. ______	______	______	______	
9. ______	______	______	______	
10. ______	______	______	______	
______	______	______	______	
______	______	______	______	
		Total	______	______
		Average	______	

Cognizant Mech/Struct Engineer
Reviewed By: ______________________________ Date: ______________

Performed By: ______________________________ Date: ______________

DATA SHEET 6
Retensioning Criteria Confirmation

(1) TENDON ID	(2) NUMBER OF EFFECTIVE WIRES	(3) 70 % OF ULTIMATE STRENGTH [8.24 X (2)]	(4) PREDICTED BASE FORCE[1]	(5) AVERAGE [(3)+(4)]÷2	(6) LOCK-OFF FORCE	(7) (4)<(6)<(3) Yes / No
DOME						
_______SHOP END	_______	_______	_______	_______	_____	_______
_______FIELD END	_______	_______	_______	_______	_____	_______
_______SHOP END	_______	_______	_______	_______	_____	_______
_______FIELD END	_______	_______	_______	_______	_____	_______
VERTICAL						
_______SHOP END	_______	_______	_______	_______	_____	_______
_______SHOP END	_______	_______	_______	_______	_______	_______
_______SHOP END	_______	_______	_______	_______	_______	_______
HOOP TENDONS						
_______SHOP END	_______	_______	_______	_______	_______	_______
FIELD END	_______	_______	_______	_______	_______	_______
_______SHOP END	_______	_______	_______	_______	_______	_______
FIELD END	_______	_______	_______	_______	_______	_______
_______SHOP END	_______	_______	_______	_______	_______	_______
FIELD END	_______	_______	_______	_______	_______	_______

Cognizant Mech/Struct Engineer
Reviewed By: ____ Date: ________________

Performed By: ____ Date: ________________

[1] Predicted Base Force from DC-5390-225.01-SE or separate calculation.

DELETED

DATA SHEET 8
Minor, Major, and Pitch Diameter Checks - Anchorage and Ram Adapter

UNIT	IDENTITY OF ANCHORAGE OR ADAPTOR	DIA.	MAJOR O.D. AND MINOR I.D. DIAMETER CHECK 3RD THREAD	6TH THREAD	9TH THREAD	AVERAGE DIA.	C/A	NC/A	NA	MINOR O.D. AND MAJOR I.D. DIAMETER CHECK 3RD THREAD	9TH THREAD	AVERAGE DIA.	C/A	NC/A	NA	PITCH DIAMETER CHECK PITCH DIA.	C/A	NC/A	NA	TOTAL C/A	NC/A	NA	INSP.BY CONTR. FOREMAN	VERIF.BY COGNIZANT QV INSP.
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
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		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						

CALIBRATION CONTROLS: O.D. MICROMETER NO. ______ CAL.DATE ______
I.D. MICROMETER NO. ______ CAL.DATE ______
MICROMETER NO. ______ CAL.DATE ______
SHIM SIZE ______ NO. ______ CAL.DATE ______
WIRE SIZE ______ NO. ______ CAL.DATE ______
WIRE SIZE ______ NO. ______ CAL.DATE ______

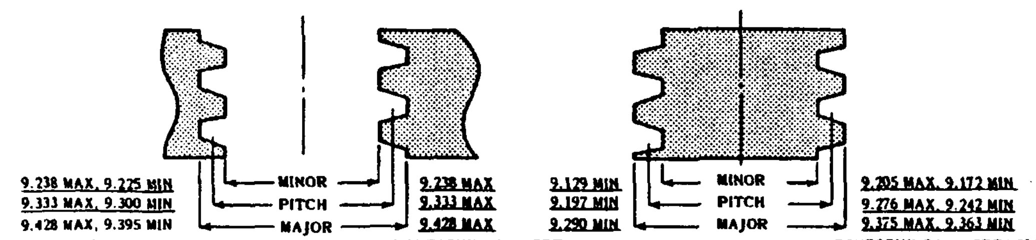
GO-GAUGE NO. ______ CAL.DATE ______
NO GO-GAUGE NO. ______ CAL.DATE ______

NOTE: NOT ACCEPTABLE (NA)

NOTE: Completion of this Data Sheet is at the option of the Responsible Engineer.

RAM ADAPTOR (I.D.)

ANCHORAGE (O.D.)



CONFORMING/ACCEPTABLE (C/A)

NONFORMING/ACCEPTABLE (NC/A)

CONFORMING/ACCEPTACLE (C/A)

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: ______________________

DATE: ______________

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period _______________

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector
Verification By: ____________________ Date: __________

Cognizant Mech/Struct Engineer
Review By: ____________________ Date: __________

DATA SHEET 10
Tendon Anchor Head Rotation Inspection

DELETED

DATA SHEET 11
Tendon Surveillance Program

Inspection Period ______________

		Gallons Removed*				Gallons Replaced*				
	Tendon No.	Shop End	Field End	Sum (Q_1) Shop & Field End	Net Duct Volume, (Q_N), Gallons	Shop End	Field End	Sum (Q_2) Shop & Field End	100 x (Q_2 - Q_1) / Q_N,%	Acceptable (Yes or No)
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

Cognizant QV Inspector
Verification By: ______________________ Date: ______________
Cognizant Mech/Struct Engineer
Review By: ______________________ Date: ______________

DATA SHEET 12

VT-1, VT-3, VT-1C, and VT-3C Examiner Qualification

Name of Examiner	Employer	Method	Level

I have reviewed the records relevant to the experience and training of the above named individuals and have, as necessary, trained these individuals in the requirements applicable to the performance of visual examinations of the containment concrete surface. Based on this review and, if applicable, training, I find that these individuals are qualified to perform said examinations.

Responsible Engineer: Name ____________________

Registration ____________________
State License No. Expiration

Signature ____________________ Date __________

Exelon NDE Services Concurrence ____________________ Date __________

ANII Concurrence ____________________ Date __________

DATA SHEET 13

Review / Acceptance of Contractor Procedures

Procedure Number / Title	Revision	Reviewed/Accepted by	Date

ENCLOSURE 1

Stressing Ram Calibration

170 Wire Stressing Equipment

> **NOTE**
>
> Calibration will demonstrate a ± 1.5% accuracy of complete stressing unit within the calibration range specified in this enclosure.

1. Attach entire stressing system to a 1600 K load cell which has been calibrated traceable to NIST.

2. Check unit at 3 ram extensions of 25%, 50%, and 75% of full extension and at loads specified on attached data sheet.

   2.1 Bring stressing unit to gauge pressures equivalent to pressures listed on Data Sheet of this enclosure, and record actual force as read from load cell.

3. Record and plot values on a Gauge Pressure versus Force Chart to establish current ram calibration constants for each jack.

4. Date all calibrations and paint (or inscribe, attach cal sticker, etc.) calibration date on stressing unit.

5. Maintain 1 copy of current calibration with stressing unit at job site.

6. Include calibration data and certificate in surveillance report.

ENCLOSURE 1
Data Sheet
Stressing Ram Calibration

RAM DESCRIPTION_______________________

LOAD CELL CONSTANT_______________________

RAM TARGET LOAD (KIPS)	CALCULATED TARGET PRESS. (PSIG)	AT 25% = _____IN LOADING #1		AT 50% = _____IN LOADING #2		AT 75% = _____IN LOADING #3		AVERAGE LOAD (KIPS)
		LOAD CELL	(KIPS)*	LOAD CELL	(KIPS)*	LOAD CELL	(KIPS)*	
150K								
300K								
500K								
600K								
700K								
800K								
900K								
1000K								
1100K								
1200K								
1300K								
1400K								
1500K								
1600K								

RAM CALIBRATION CONSTANTS DETERMINED FROM SLOPE AND INTERCEPT OF STRAIGHT LINE FITTED TO AVERAGE LOAD AND PRESSURE DATA USING THE METHOD OF LEAST SQUARES. AREA_____IN^2 INTERNAL RESISTANCE(K)_____KIP

*LOAD CELL X LOAD CELL CONSTANT

ATTACH CERTIFICATIONS OF NIST TRACEABILITY FOR TESTING APPARATUS

APPROVED BY COGNIZANT MECH/STRUCT ENGINEER: ______________________ DATE__________

PREPARED BY LABORATORY TECHNICIAN: ______________________ DATE__________

VERIFIED BY LABORATORY SUPERVISOR: ______________________ DATE__________

ENCLOSURE 2

Scope of Each Regularly Scheduled Surveillance
(Random Selection Per GAI DC-5930-225.02-SE)
For Scope of the 2010 Augmented Surveillance, See Enclosure 9

TABLE 1
Selected Tendons and Corresponding Inspection Periods

VERTICAL TENDONS												
	INSPECTION PERIOD											
Tendon	1	2	3	4	5	6	7	8	9	10	Times Insp.	Comments (Adjacent Tendons)
11									X		1	Done
14				X							1	Done
16	X										1	Done
18			X								1	Done
22					X						1	Done
24		X									1	Done
27	X										1	Done
30				X							1	Done
31			X								1	Done
32				X		X	X	X	X	X	6	29, 33 Control
40							X				1	Done
48		X									1	Done
50					X						1	Done
53								X			1	52, 54
55			X								1	Done
61	X										1	Done
66								X			1	65, 67
72		X									1	Done
78						X					1	Done
84				X	X						2	Done
86	X										1	Done
90									X		1	Done
97		X									1	Done
105			X								1	Done
108										X	1	107, 109
114							X				1	Done
119		X									1	Done
126						X					1	Done
132									X		1	Done
138			X								1	Done
140								X			1	139, 141
146											1	Reference TR 203
152										X	1	151, 153
158	X										1	Done
159										X		Replacement for 146
160					X						1	Done
164							X				1	Done
TOTAL	5	5	5	5	3	3	4	4	4	4	42	X = Lift-Off

X = Lift-Off & Wire Test

ENCLOSURE 2
Table 1 (Cont'd)
Selected Tendons and Corresponding Inspection Periods

HOOP TENDONS												
	INSPECTION PERIOD											
Tendon	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Times Insp.**	**Comments (Adjacent Tendons)**
13-11								X			1	13-10, 13-12
13-28	X										1	Done
13-34	X										1	Done
13-36				X							1	Done
13-41									X		1	Done
13-46	X										1	Done
13-50							X				1	Done
24-19		X									1	Done
24-20			X								1	Done
24-21	X										1	Done
24-23										X	1	24-22, 24-24
24-26				X							1	Done
24-28			X								1	Done
24-30					X						1	Done
24-33									X		1	Done
24-40						X					1	Done
24-47	X										1	Done
24-48		X									1	Done
24-49			X								1	Done
24-50										X	1	24-49, 24-51
24-51					X						1	Done
35-10	X										1	Done
35-11		X									1	Done
35-16			X								1	Done
35-23						X					1	Done
35-26				X							1	Done
35-28	X										1	Done
35-29		X									1	Done
35-33							X				1	Done
35-47						X					1	Done
35-49								X			1	35-48, 35-50

X = Lift-Off

$\boxed{X =}$ Lift-Off & Wire Test

ENCLOSURE 2
Table 1 (Cont'd)
Selected Tendons and Corresponding Inspection Periods

HOOP TENDONS (Cont'd)												
	INSPECTION PERIOD											
Tendon	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Times Insp.**	**Comments (Adjacent Tendons)**
46-24		X									1	Done
46-25								X			1	46-23, 46-26
46-28		X									1	Done
46-30			X								1	Done
46-32			X								1	Done
46-34					X						1	Done
46-37							X				1	Done
46-50									X		1	Done
51-11			X								1	Done
51-12	X										1	Done
51-13		X									1	Done
51-16										X	1	51-15, 51-17
51-43							X				1	Done
51-49									X		1	Done
62-10	X		X								2	Done
62-11		X									1	Done
62-13					X						1	Done
62-16	X										1	Done
62-18								X			1	62-17, 62-19
62-26				X	X	X	X	X	X	X	7	62-25, 62-27 Control
62-28			X								1	Done
62-30				X							1	Done
62-41										X	1	62-40, 62-42
62-47		X									1	Done
62-49						X					1	Done
62-51			X								1	Done
62-53		X									1	Done
TOTAL	10	10	10	5	5	5	5	5	5	5	65	X = Lift-Off

$\boxed{X =}$ Lift-Off & Wire Test

ENCLOSURE 2 (Cont'd)
Table 1 (Cont'd)
Selected Tendons and Corresponding Inspection Periods

DOME TENDONS												
	INSPECTION PERIOD											
Tendon	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**Times Insp.**	**Comments (Adjacent Tendons)**
101	X										1	Done
102							X				1	Done
104							X				1	Done*
116	X										1	Done
122									X		1	Done
130		X									1	Done
131			X								1	Done
133				X							1	Done
141						X					1	Done
143										X	1	142, 144
145					X						1	Done
147			X								1	Done
148		X									1	Done
201	X										1	Done
202		X									1	Done
203			X								1	Done
213								X			1	212, 214
218			X		X						2	Done
219		X									1	Done
220	X										1	Done
225				X		X	X	X	X	X	6	224, 226 Control
230								X			1	229, 231
237										X	1	236, 238
248						X					1	Done
301	X										1	Done
303										[X]	1	302,304
313							X				1	Done
314				X							1	Done
316	X										1	Done
322									X		1	Done
334		X									1	Done
336			X								1	Done
342								[X]	X		1	Done
346			X								1	Done
347					X						1	Done
348		X									1	Done
TOTAL	6	6	6	3	3	3	4	4	3	4	42	X = Lift-Off

X = Lift-Off
$\boxed{X =}$ Lift-Off and Wire Test

[X] = For plant on-line, inspect for corrosion, wire breakage and grease quality on end away from main steam relief valve zone. For plant off-line, perform all inspections including lift off measurements. Plant off-line inspections committed for Inspection Period 9.

* D104 is exempt from detensioning as insufficient clearance from the adjoining vent stack (Buttress 5) to successfully access the tendon end exists. D102 has been selected as D104's (Cycle 7) substitute tendon per IWL-2521.1. D104 shall be examined per Sections 8.2.1 through 8.2.6 and associated enclosures/data sheets completed (IWL-2521.1.[c]).

ENCLOSURE 2 (Cont'd)

Table 2

Tendons Selected for Detensioning and Tendon Wire Removal/Lab Tests

Inspection Period	Tendon Location		
	Vertical	Hoop	Dome
1	V-27	H-35-10	D-301
2	V-119	H-62-47	D-202
3	V-18	H-46-30	D-336
4	V-14	H-35-26	D-314
5	V-50	H-46-34	D-145
6	V-78	H-35-47	D-248
7	V-164	H-13-50	D-102
8	V-140	H-46-25	D-230
9	V-90	H-51-49	D-322
10	V-146	H-24-23	D-237

COLLECTION/LAB ANALYSIS OF FILLER GREASE

PURPOSE: Confirm the ability of filler grease to perform its intended corrosion protection function.

LIMITS AND PRECAUTIONS:

1. Use Wooden or plastic paddles or spatulas to scoop out bulk filler grease from around the anchorage. **DO NOT** use metal implements.

PROCEDURE:

1. Inspection Grease

   1.1 Contact TESTING LABORATORY to determine size of sample required.

   1.2 Take one random sample of bulk filler grease from tendon end and put into clean container supplied either by TESTING LABORATORY or TENDON SURVEILLANCE CONTRACTOR.

   1.3 Attach an identification tag to container with tendon group, tendon number, and tendon end specified. (Example: Dome 105NW)

2. Fresh Grease

   2.1 Commercial Grade Dedication of new bulk filler grease requires that at least 25% of the barrels for each grease lot number be sampled for lab analysis.

   2.2 Attach an identification tag to each sample and corresponding identification on each drum sampled.

3. Old Grease (to be reused)

   3.1 If grease obtained from tendons is intended to be reused to refill tendons (termed "old grease") perform lab analysis on "old grease".

   3.2 Heat each container of old grease to be reused to approximately 150° F to ensure a homogeneous mixture.

   3.3 Attach an identification tag to each sample and corresponding identification to each drum.

4. Package all samples and ship to TESTING LABORATORY in such a way that condition of grease is not adversely affected or altered.

5. Test lab perform corrosion protection medium analysis as follows (excerpt Table IWL-2525-1):

Characteristic	Test Method	Acceptance Limit
Water Content	ASTM D 95	10% by weight
Water Soluble Chlorides	ASTM D 512 (Note [1])	10 ppm maximum
Water soluble nitrates	ASTM D 992 (Note [1])	10 ppm maximum
Water soluble sulfides	APHA 427 (Note [1]) (Methylene Blue)	10 ppm maximum
Reserve Alkalinity (Base Number)	ASTM D 974 Modified (Note [2] and Note [4])	(Note [3])

NOTES:

(1) Water Soluble Ion Tests. The inside (bottom and sides) of a one (1) liter beaker, approximate OD 105 mm, height 145 mm, shall be thoroughly coated with between 90 and 110 grams of the sample. The coated beaker is to be filled with approximately 900 ml of distilled water and heated in an oven at a controlled temperature of 100 degrees F +/- 2 degrees F for 4 hours. Water extraction is tested by the noted test procedures for the appropriate water soluble ions. Results are to be reported as PPM in the extracted water.

(2) ASTM D 974 Modified. Place 10 g of sample in a 500 ml Erlenmeyer flask. Add 10 cc isopropyl alcohol and 5 cc toluene. Heat until sample goes into solution. Add 90 cc distilled water and 20 cc 1NH_2SO4. Place solution on a steam bath for 1/2 hour. Stir well. Add a few drops of indicator (1% phenolphtalein) and titrate with 1NNaOH until the lower layer just turns pink. If acid or base solutions are not exactly 1N, the exact normalities should be used when calculating the base number. The Total Base Number (TBN) expressed as milligrams of KOH per gram of sample, is calculated as follows:

$$TBN = \frac{[(20)(N_A)-(B)(N_B)]56.1}{W}$$

Where,

B = milliliters NaOH
N_A = normality of H_2S04
N_B = normality of NaOH solution
W = weight of sample in grams

(3) The base number shall be at least 50% of the as-installed value, unless the as-installed value is 5 or less, in which case the base number shall be no less than zero. If the tendon duct is filled with a mixture of materials having various as-installed base numbers, the lowest number shall govern acceptance. Two kinds of bulk filler grease were used for the initial fill at TMI-1. These are 2090P and 2090P-2 both by Viscosity Oil Co. The 2090P was essentially neutral with a Base Number of zero. The 2090P-2 has a Base Number of 3. Expected Base Number for 2090P and 2090P-2 is zero or higher with a tolerance of -.5. Since reserve alkalinity was not reported on the certifications for 2090P and 2090P-2, the testing of samples of this grease is primarily to detect significant changes in Base Number over a period of time that might indicate abnormal degradation of the corrosion inhibiting properties, e.g., a trend developing where the grease is progressively becoming acidic over time.

Fresh new grease is 2090P-4 by Viscosity Oil Co. with a Base Number of 35. Acceptance Criteria for the fresh grease before it is mixed with existing grease is a Base Number of 17.5 or higher.

(4) Grease samples which exhibit reserve alkalinity number of <.5 shall be retested per the unmodified version of ASTM D974 Section 9 and an acid number generated for the sample. Both the reserve alkalinity number and the acid numbers shall be reported with the test results when this occurs. Acceptance criteria for Acid Number is that it must be < 1.

ENCLOSURE 3

Data Sheet 1

Laboratory Analysis of Bulk Filler Grease

Dome Tendons

INSPECTION PERIOD____________________

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES(1) (PPM)	NITRATES(1) (PPM)	SULFIDES(1) (PPM)	WATER/DRY WEIGHT (2) %	RESERVE(1) ALKALINITY (BASE NUMBER)
1.______						
2.______						
3.______						
4.______						
5.______						

(1) ACCEPTANCE CRITERION IS GIVEN ON PAGE 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: __________________________ DATE:____________

LABORATORY SUPERVISOR
VERIFIED BY: __________________________ DATE:____________

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: __________________________ DATE:____________

ENCLOSURE 3

Data Sheet 2

Laboratory Analysis of Bulk Filler Grease

Vertical Tendons

INSPECTION PERIOD__________________

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES[1] (PPM)	NITRATES[1] (PPM)	SULFIDES[1] (PPM)	WATER/DRY WEIGHT (2) %	RESERVE[1] ALKALINITY (BASE NUMBER)
1.						
2.						
3.						
4.						
5.						

(1) ACCEPTANCE CRITERION IS GIVEN ON PAGE 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: TOP, BOTTOM

LABORATORY TECHNICIAN
PREPEARED BY: ________________________ DATE:____________

LABORATORY SUPERVISOR
VERIFIED BY: ________________________ DATE:____________

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: ________________________ DATE:____________

ENCLOSURE 3

Data Sheet 3

Laboratory Analysis of Bulk Filler Grease

Hoop Tendons

INSPECTION PERIOD___________________

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES(1) (PPM)	NITRATES(1) (PPM)	SULFIDES(1) (PPM)	WATER/DRY WEIGHT (2) %	RESERVE(1) ALKALINITY (BASE NUMBER)
1.____						
2.____						
3.____						
4.____						
5.____						
6.____						

(1) ACCEPTANCE CRITERION IS GIVEN ON PAGE 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: BUTTRESS NUMBER

LABORATORY TECHNICIAN
PREPEARED BY: ________________________ DATE:__________

LABORATORY SUPERVISOR
VERIFIED BY: ________________________ DATE:__________

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: ________________________ DATE:__________

TENDON RANDOM WIRE REMOVAL/PHYSICAL TESTING

(See Table 2 of Enclosure 2 and Table 2 of Enclosure 9 for tendons which require wire removal).

LIMITS AND PRECAUTIONS

1. Ensure proper identification of tendon before cutting and pulling test wire.

2. Use care to avoid damage to adjoining wires/buttonheads.

3. Avoid unnecessary marks on wire while removing it.

PROCEDURE

1. IDENTIFY ONE PULLABLE WIRE

   Select one of the protruding wires (with tendon totally detensioned) and tap on it, rotate, or pull while observing movement of buttonhead at other end to identify both ends. Confirm wire identification before cutting.

2. CUT

   Cut off button head at opposite end from where puller will be installed.

3. INSTALL PULLER

   Install wire puller and slowly commence pulling. Verify cut end starts moving through end washer.

4. PULL AND COIL

   Use a come-along or some similar method to pull approximately 170 feet of wire. A cable gripper may be used to grip wire but avoid as much as possible making surface marks on the wire.

   While pulling, coil wire to approximately six foot diameter and secure coil from unwinding.

   WARNING

   A coiled tendon wire has considerable spring force. Inadequate binding could result in violent uncoiling which could injure people.

5. TAG

   Attach metal tag at the button headed end indicating following:

   a. Tendon Number

b. Identify the button headed end (tagged) as:

1. TOP for vertical tendons.

2. BUTTRESS NUMBER for hoop tendons.

3. NW, NE, SW, or SE for dome tendons.

6. PACKAGE/STORE/SHIP

Wrap wire with plastic sheeting and tape securely to protect from elements.

7. LABORATORY TESTING

7.1 Clean and carefully inspect entire length of wire for pitting, corrosion, or other signs of deterioration.. Record this information on Data Sheet 1 of this enclosure.

NOTE
Wire tests, and determination of elongation and yield strength, to conform to the requirements of ASTM A421 and, per reference therein, ASTM A370 or technically equivalent requirements.

7.2 CUT SAMPLES

Cut three (3) samples from each wire, one from each end and one from middle. A fourth sample shall be cut from the area of worst corrosion, if any (IWL-2523.2b). Length of each sample shall be maximum length acceptable for test apparatus being used. Areas shall be representative of any significant corrosion or pitting but should not include any cable gripper marks.

7.3 IDENTIFY LOCATION OF SAMPLES

Show on Data Sheet 1 of this enclosure, location along wire length where each sample was taken.

7.4 TENSILE TEST

a. Determine YIELD STRENGTH, ULTIMATE TENSILE STRENGTH, and PERCENT ELONGATION AT ULTIMATE TENSILE STRENGTH.

b. Record this data on the Data Sheet 2 of this enclosure.

c. Produce stress strain curves for each test section.

ACCEPTANCE CRITERIA - TENDON RANDOM WIRE PHYSICAL TESTING

1. No failure below minimum guaranteed ultimate stress of 240,000 psi.

2. Elongation at failure is not less than 4%.

3. Wire shows no evidence of damage or active corrosion.

4. If there is rejectable corrosion on the wire, or the wire fails the tensile test, the Cognizant Mechanical/Structural Engineer must evaluate. Each case shall be treated as an abnormal degradation of the containment structure and reported to the NRC.

ENCLOSURE 4
Data Sheet 1
Tendon Wire Inspection Data

INSPECTION PERIOD________________________________

Tendon Identification:____________________

0 ______________________________ 25'

25' ______________________________ 50'

50' ______________________________ 75'

75' ______________________________ 100'

100' ______________________________ 125'

125' ______________________________ 150'

150' ______________________________ 175'

175' ______________________________ 180'

180' ______________________________ 185'

185' ______________________________ 190'

Sample for Tensile Test(2)	Wire Sample Diameters At 1/4-Points	Wire Sample Diameters At Breaking Points
Sample 1:_____ft to _____ft	_____ _____ _____	__________
Sample 2:_____ft to _____ft	_____ _____ _____	__________
Sample 3:_____ft to _____ft	_____ _____ _____	__________

NOTE

1. Corrosion or any signs of deterioration shall be indicated full length as shown on the above chart.
2. Sample shall include areas representative of significant corrosion or pitting <u>if</u> they exist on removed tendon wire.
3. Diameter at Breaking Point is to be interpolated from 1/4-point diameters on either side of breaking points.

Laboratory Technician prepared by:______________________________Date__________

Laboratory Supervisor Verified by:______________________________Date__________

Cognizant Mech/Struct Engineer Approved by:______________________________Date__________

ENCLOSURE 4
Data Sheet 2
Tendon Wire Test Results

INSPECTION PERIOD ______________________

TENDON WIRE [(1)] SAMPLE NO.	LOCATION [(2)] FROM END OF WIRE	YIELD [(3)] STRESS (ksi)	ULTIMATE STRESS (ksi)	PERCENT [(4)] ELONGATION	COMMENTS (IDENTIFY MOST CORRODED SECTION)
DOME					
1. ________	________	________	________	________	________
2. ________	________	________	________	________	________
3. ________	________	________	________	________	________
VERTICAL					
1. ________	________	________	________	________	________
2. ________	________	________	________	________	________
3. ________	________	________	________	________	________
HOOP					
1. ________	________	________	________	________	________
2. ________	________	________	________	________	________
3. ________	________	________	________	________	________

NOTES:

(1) See Section 7 of this enclosure.
(2) End starts from end of zero length as indicated on Data Sheet 1 of this enclosure.
(3) Yield stress is defined per ASTM A421.
(4) At Ultimate Tensile Strength.

Laboratory Technician
Prepared By: ______________________ Date __________

Laboratory Supervisor
Verified By: ______________________ Date __________

Cognizant Mech/Struct Engineer
Approved By: ______________________ Date __________

ENCLOSURE 5

GREASE CAN REMOVAL/REPLACEMENT/REGREASING

DELETED

Refer to 1410-Y-83 (Reference 2.15)

ANCHORAGE AND CONCRETE INSPECTIONS

A. **NORMAL ANCHORAGE AND CONCRETE INSPECTIONS**

1. PURPOSE

Visual inspection/documentation for free water and of physical condition of anchorage assembly components, i.e., buttonheads, washers, bearing plates.

2. LIMITS AND PRECAUTIONS

WARNING

Each tendon wire is tensioned to nearly 8000 lb. DO NOT strike tendon end assembly with any metal object while tendon is tensioned. Avoid getting in a direct line with the tendon end while it is tensioned.

3. PROCEDURE

3.1 PRIOR TO LIFT-OFF TEST

3.1.1 Examine interior of end cap and anchorage components for the presence of free water. Document any free water found in the Comments area on Data Sheet 4. Collect a sample of the water if present in sufficient quantity to allow this and label container to identify for later laboratory test to determine pH.

3.1.2 Observe each tendon anchorage for buttonheads which are missing or which protrude. Document on Data Sheets 1, 2, 3, and 4 of this enclosure.

3.1.3 Check anchorheads for any sign of cracking or serious degradation. Cracks, resulting in failure of anchorheads, have occurred at other plants. Before applying hydraulic ram the condition of each tendon anchorhead should be inspected to avoid potential personnel hazard. Notify Cognizant Mechanical/Structural Engineer immediately if degradation is noted. Be advised that this has been a problem at other plants in the past.

3.2 WHILE DETENSIONED, IF APPLICABLE

Inspect for buttonheads which protrude much farther than adjoining one. Make note of these on Data Sheet 4 of this enclosure to facilitate location (for reinspection after retensioning).

3.3 AFTER LIFT-OFF TEST AND, IF APPLICABLE, AFTER RETENSIONING

3.3.1 Inspect for buttonheads which are missing or which protrude. Document on the Data Sheet 1, 2, 3, and 4 of this enclosure.

3.3.2 Perform VT-1 inspection of buttonheads. Document active corrosion and damage.

3.3.3 Document buttonhead inspection results on Data Sheets 1, 2, 3, and 4 of this enclosure.

3.3.4 Perform VT-1 inspection of anchorage washer/shims/bearing plates. Document cracks and corrosion on Data Sheets 1, 2, and 3 of this enclosure

3.3.5 Perform VT-1C of concrete for a distance of 2 feet extending outward from the bearing plate, for cracking or voids and for gaps between bearing plate and concrete. Use an optical comparator or feeler gages.

3.3.6 Document findings on Data Sheets 5, 6, or 7 of this enclosure. Use grid paper and Data Sheet 9, of this enclosure as necessary to identify significant crack patterns and widths.

3.3.7 Immediately after inspection of the buttonheads, butter the end of the anchorhead with clean bulk filler grease completely coating all buttonheads to provide temporary corrosion protection until the tendon is bulk filled.

4. ACCEPTANCE CRITERIA

4.1 No evidence of cracking in anchor heads, shims, washers, or bearing plates (IWL 3221.3).

4.2 No anchorage assembly shims, buttonheads or washers with active corrosion.

4.3 Anchorage assembly shims, buttonheads or washers with evidence of active corrosion are subject to rejection and shall be further evaluated by the Cognizant Mechanical/Structural Engineer.

4.4 No bearing plates with active corrosion.

4.5 Bearing plates with evidence of active corrosion are subject to rejection and should be further evaluated by the Cognizant Mechanical/Structural Engineer.

4.6 Cracks in surrounding concrete face greater than 0.010 inch wide shall receive engineering evaluation.

4.7 Cracks in surrounding concrete face greater than/equal to 0.050 inch wide shall be repaired after appropriate engineering evaluation. Repair per TMI-1 approved repair procedure.

4.8 Cracks larger than 0.020 shall be monitored in future Tendon Surveillances until repaired.

4.9 **IF** any missing, broken and/or damaged wires are detected, check inspection reports from previous inspections to determine if damage was noted previously. Record findings on Data Sheets 1, 2, and 3 under "comments" section and on Data Sheet 4 of this enclosure.

4.10 Ensure Data Sheets 1 through 10 of this enclosure are filled out and signed.

B. **CONCRETE CRACKS AT 9 SELECTED DOME TENDON ANCHORAGE AREAS IDENTIFIED ON DATA SHEET 8 of this enclosure (Periods 4, 5 6, and 7)**

1. PURPOSE

Inspection for concrete crack growth at Ring Girder anchorage areas. Required per Tech. Spec. 4.4.1.2.5 and also per report to NRC for 15 year Tendon Surveillance.

2. PROCEDURE

2.1 Perform VT-1C of concrete around dome tendon anchorage areas for crack growth for a distance of 2 feet extending outward from the bearing plate during 10 (Period 4), 15 (Period 5), 20 (Period 6), 25 (Period 7), and 30 (Period 8) year inspections by monitoring cracks greater than 0.005 inch in width.

2.2 Measure width, depth (if depth can be measured with simple existing plant instrument, i.e. feeler gauges, wires) and length of selected cracks by charting, as necessary.

2.3 Use Data Sheets 8 and 9 of this enclosure to document inspection results.

NOTE
Results of crack measurements made during the 3 years after SIT are filed under 1301-8.2, "Ring Girder Surveillance Program". (The procedure has since been cancelled and the procedure number was re-assigned to a different procedure).

3. ACCEPTANCE CRITERIA

3.1 Data Sheets 9 and 10 of this enclosure filled out and signed.

3.2 Submit completed Data Sheets 9 and 10 of this enclosure to Cognizant Mechanical/Structural Engineer for evaluation. This inspection may be discontinued if the concrete cracks show no sign of growth. If, however, these inspections indicate crack growth, an investigation of the causes and safety impact shall be performed.

3.3 Cracks in surrounding concrete face greater than 0.010 inch wide shall receive engineering evaluation.

3.4 Cracks in surrounding concrete face greater than/equal to 0.050 inch wide shall be repaired after appropriate engineering evaluation. Repair per TMI-1 approved repair procedure. (1440-Y-23).

C. VISUAL INSPECTION OF CONTAINMENT

1. PURPOSE

Visual inspection of 100% of all accessible surfaces of the exterior concrete surfaces of containment, and examination of tendon end caps for grease leakage or end cap deformation except for the 1-year follow-up exam of the SGRP opening.

The 1-year follow-up exam of the SGRP opening may be limited to visual inspection of 100% of accessible surfaces of the exterior concrete of the SGRP Containment Opening Concrete Repair, and examination of tendon end caps for grease leakage or end cap deformation during the Augmented Inspection for the SGRP Containment Opening.

NOTE

Accessible surfaces shall be interpreted as defined in ASME Section XI, Subsection IWL-1000.

2. PROCEDURE

NOTE

Areas that have suspect indications or require more sensitivity shall receive a VT-1C inspection. All potentially unacceptable indications shall have a sketch generated detailing the indication's size and location, for trending or Engineering Evaluation purposes.

2.1 Perform VT-3C visual examination of the exterior concrete surface of the containment including the foundation mat around the bottom vertical tendon anchorages noting results of examination on DATA SHEET 10 of this enclosure.

2.2 The VT-3C examination shall detect, describe, and locate evidence of conditions defined in ACI 201.1R-92 and any of the following indications of possible abnormal degradation: Large spall, severe scaling, grease leakage, other surface deterioration.

2.3 Visually inspect all tendon end caps for grease leakage or grease cap deformation. Removal of grease caps is not necessary for this inspection.

2.3.1 If grease cap deformation is noted which is indicative of anchorage hardware deterioration then the grease cap will be removed for further inspection.

NOTE

Areas considered inaccessible, shall be evaluated when conditions exist in accessible areas that indicate the presence of, or result in degradation of inaccessible areas.

3. ACEPTANCE CRITERIA

3.1 Concrete surface indications meeting the surface condition attributes listed in Section 5.1 of ACI 349.3R-96, are generally acceptable without further Engineering Evaluation. Conditions non-compliant with Section 5.1 shall be submitted to Cognizant Mechanical/Structural Engineer in order to ascertain if there is evidence of damage or degradation sufficient to warrant further evaluation or repair.

3.2 Tendon end grease caps shall show no evidence of active grease leakage.

3.3 Tendon end grease caps shall show no evidence of grease cap deformation, which may be indicative of anchorage hardware deterioration.

ENCLOSURE 6

Data Sheet 1
Anchorage Assembly Surveillance Inspection
Dome Tendons

INSPECTION PERIOD________________________

TENDON	END		BUTTONHEADS			STRESSING WASHER & NUT			SHIMS			BEARING PLATE			DATE INSP.	COMMENTS	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV INSP.
I.D. 1	Location 2	Corr. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	CORR. 5	SKETCHED 6	CORR. 7	CRACKS 8	SKETCHED 9	CORR. 10	CRACKS 11	SKETCHED 12	CORR. 13	CRACKS 14	SKETCHED 15	16	17	18	19
1.																		
2.																		
3.																		
4.																		
5.																		
6.																		

LEGEND

GENERAL

Y = YES
N = NO

TENDON END-LOCATION

IDENTIFY TENDON END (SHOP OR FIELD) AND NW, NE, SW, SE

ENCLOSURE 6

Data Sheet 2
Anchorage Assembly Surveillance Inspection
Vertical Tendons

INSPECTION PERIOD________________________

TENDON	END		BUTTONHEADS			STRESSING WASHER & NUT			SHIMS			BEARING PLATE			DATE INSP.	COMMENTS	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV INSP.
I.D. 1	Location 2	Corr. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	CORR. 5	SKETCHED 7	CORR. 8	CRACKS 9	SKETCHED 10	CORR. 11	CRACKS 12	SKETCHED 13	CORR. 14	CRACKS 15	SKETCHED 16	17	18	19	20
1.																		
2.																		
3.																		
4.																		
5.																		
6.																		

LEGEND

GENERAL

Y = YES
N = NO

TENDON END-LOCATION

IDENTIFY TENDON END (SHOP OR FIELD) AND TOP (T) OR BOTTOM (B) OF TENDON

ENCLOSURE 6

Data Sheet 3
Anchorage Assembly Surveillance Inspection
Hoop Tendons

INSPECTION PERIOD________________________

TENDON	END		BUTTONHEADS			STRESSING WASHER & NUT			SHIMS			BEARING PLATE			DATE INSP.	COMMENTS	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV INSP.
I.D.	Location	Corr.	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES	CORR.	SKETCHED	CORR.	CRACKS	SKETCHED	CORR.	CRACKS	SKETCHED	CORR.	CRACKS	SKETCHED				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1.																		
2.																		
3.																		
4.																		
5.																		
6.																		

LEGEND

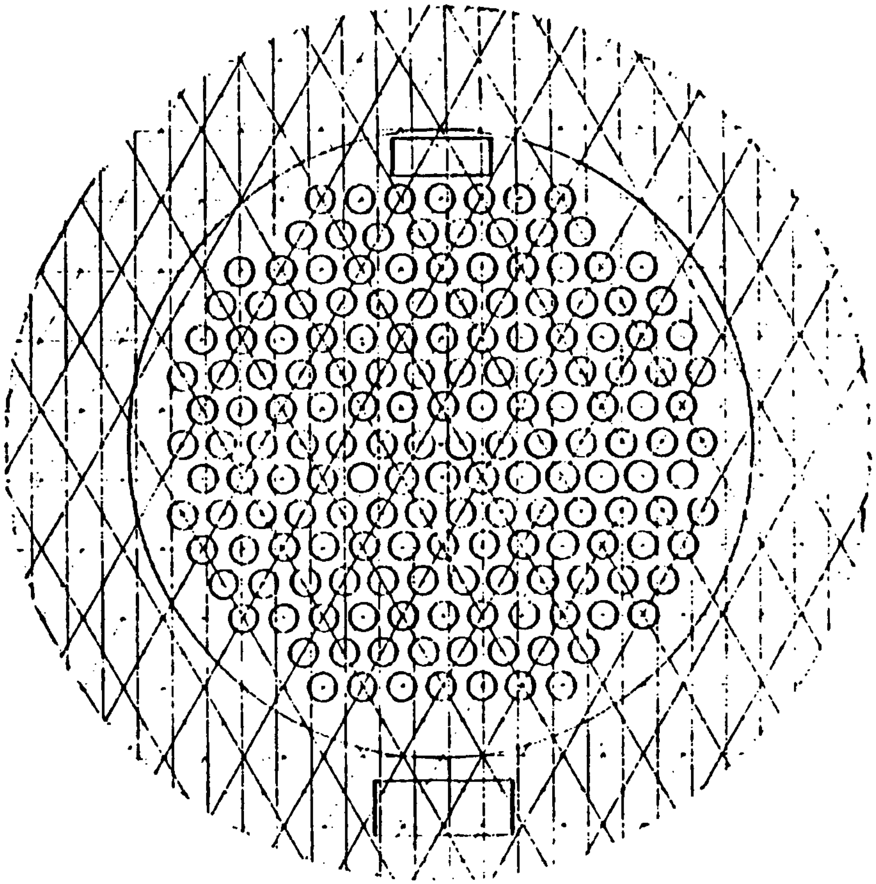
GENERAL

Y = YES
N = NO

TENDON END-LOCATION

IDENTIFY TENDON END (SHOP OR FIELD) AND NUMBER OF BUTTRESS (1 TO 6) AT TENDON END

ENCLOSURE 6
Data Sheet 4
Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT:

INSPECTED BY
CONTRACTOR FOREMAN________________________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR____________________________ Date________
COGNIZANT MECH/STRUCT ENGINEER___________________ Date________
REVIEWED BY

INSPECTION PERIOD_____

Tendon # ______________________
END: FIELD_____(1 piece washer)
SHOP_____(2 piece washer)

ENCLOSURE 6

Data Sheet 5
Tendon Anchorage Area Concrete Crack Inspection
Dome Tendons

Inspection Period ______________________________

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location(A)	Width (IN.)(B)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. ______	______	______	______	______	______	______	______
	______	______	______	______			
2. ______	______	______	______	______	______	______	______
	______	______	______	______			
3. ______	______	______	______	______	______	______	______
	______	______	______	______			
4. ______	______	______	______	______	______	______	______
	______	______	______	______			
5. ______	______	______	______	______	______	______	______
	______	______	______	______			
6. ______	______	______	______	______	______	______	______
	______	______	______	______			

NOTE: (A) Location:

Identify Tendon End (Shop or Field) and NW, NE, SW, SE

(B) If concrete crack width > 0.01", provide sketch

Cognizant Mech/Struct Engineer
Reviewed By: ______________________________ Date: __________

ENCLOSURE 6
Data Sheet 6
Tendon Anchorage Area Concrete Crack Inspection
Vertical Tendons

Inspection Period ______________________________

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location(A)	Width (IN.)(B)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. ______	______	______	______	______	______	______	______
	______	______	______	______			
2. ______	______	______	______	______	______	______	______
	______	______	______	______			
3. ______	______	______	______	______	______	______	______
	______	______	______	______			
4. ______	______	______	______	______	______	______	______
	______	______	______	______			
5. ______	______	______	______	______	______	______	______
	______	______	______	______			
6. ______	______	______	______	______	______	______	______
	______	______	______	______			
7. ______	______	______	______	______	______	______	______
	______	______	______	______			

NOTE: (A) Location:
Identify Tendon End (Shop or Field) and
T or B - Top or Bottom of Vertical Tendon
(B) If concrete crack width > 0.01", provide sketch

Cognizant Mech/Struct Engineer
Reviewed By:______________________________ Date:______________

ENCLOSURE 6
Data Sheet 7
Tendon Anchorage Area Concrete Crack Inspection
Hoop Tendons

Inspection Period ______________________

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location(A)	Width (IN.)(B)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

NOTE: (A) Location:
Identify Tendon End (Shop or Field) and
1 to 6 - Number of Buttress At End of Tendon
(B) If concrete crack width > 0.01", provide sketch

Cognizant Mech/Struct Engineer
Reviewed By:______________________ Date:__________

ENCLOSURE 6

Data Sheet 8
Concrete Crack Growth Inspection
Dome Tendons

Inspection Period ______________________

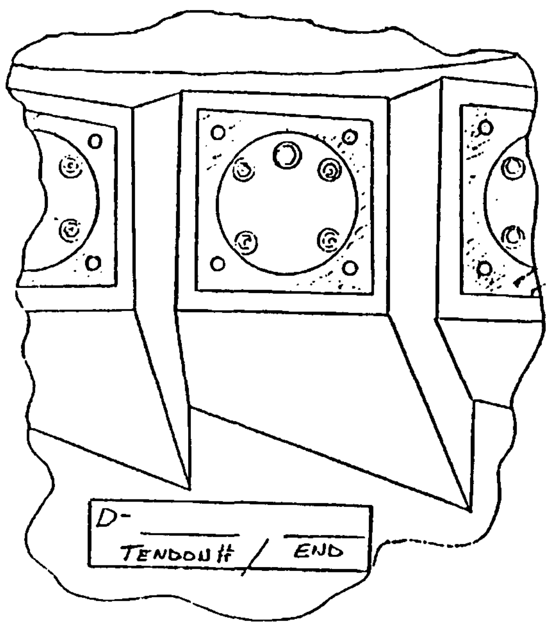
Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location(A)	Width (IN.)(B)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. D-103	NE END						
2. D-118	SW END						
3. D-203	NE END						
4. D-218	SE END						
5. D-225	NW END						
6. D-249	SE END						
7. D-313	SE END						
8. D-329	SW END						
9. D-334	NW END						
10.							
11.							
12.							

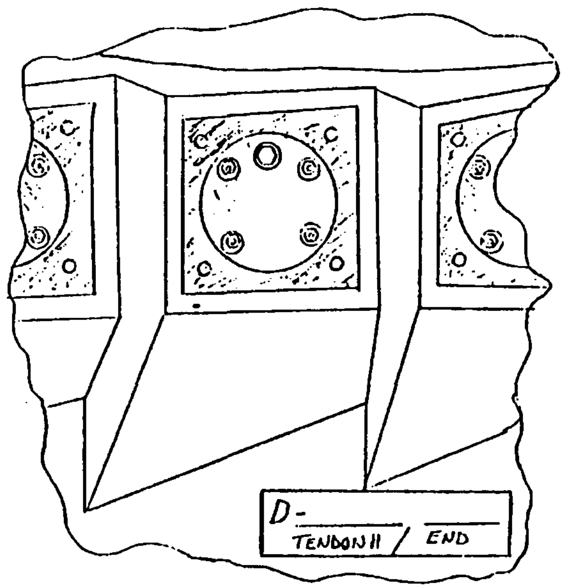
NOTE: (A) Location:

Identify Tendon End (Shop or Field) and
NW, NE, SW, Se
(B) If concrete crack width > 0.01", provide sketch

Cognizant Mech/Struct Engineer
Reviewed By:______________________Date:__________

ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections





Choose the sketch which is most appropriate and plot the observed cracks.

INSPECTED BY CONTRACTOR ________________________ DATE__________

VERIFIED BY COGNIZANT QV INSPECTOR ________________________ DATE__________

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER ________________ DATE__________

Mat Foundation in Tendon Gallery

Tendon Grease Caps

Buttress 1 to 2

Buttress 2 to 3

Buttress 3 to 4

Cognizant Mech/Struct Engineer
Reviewed By: ______________________ Date: __________

Performed By: ______________________ Date: __________

Buttress 4 to 5

Buttress 5 to 6

Buttress 6 to 1

Dome Area

Cognizant Mech/Struct Engineer
Reviewed By: ____________________ Date: __________

Performed By: ____________________ Date: __________

ENCLOSURE 7
Additional Inspection Commitments Due to Abnormalities Previously Documented in 1301-9.1

Inspection Period	Abnormality Noted	Commitment	Comments
1 5/21/75 -7/02/75	NONE	NONE	NONE
2 8/17/77 - 11/11/77	Tendon H-51-13 had numerous cracked buttonheads.	Inspect H-51-13 buttonheads in period 3 to determine if cracking continues.	NONE
3 4/17/80 - 8/6/80	V31 Lift off 3 kips low and adjacent tendons not lifted off. V138 Category 4 Corrosion	Do lift off on V30 and V32 in period 4. Reinspect V138 in period 4 to better document the corrosion and evaluate.	LER 81-010 sub - to document incom-plete inspect. during 1980 surveillance. H-51-13 inspection showed no continued cracking.
4 5/85 - 6/85	NONE	NONE	Lift off of V30 & V32 was performed with acceptable results. The corrosion on V138 was evaluated & found acceptable.
5 10/89 - 1/90	Some cracks appeared to have grown slightly from previous.	During period 6 repeat the concrete cracks inspection as required in Enclosure 6.	NONE
6 9/94 - 11/94 and 9/95	As captured in SDR's 1 through 6	None	All SDR's accept condition(s) found with no further action required
7*	Grout overlay repairs not completely sound (T.R. 136, Sec. 4.3)	Consider performing repairs	30 Year Exam
	SE quad above ring girder - Grout cover coming off & Underlying rebar exposed (T. R. 136, Sec. 4.2)	Reexamine rebar and/or consider grout repair	30 Year Exam
7*	Construction joint above ring girder between D32ONE & D321NE - Crack @ .018" wide (T.R. 136, Sec. 4.5)	reexamine crack & ensure stable	30 Year Exam

* Reference Topical Report (T.R.) No. 136, Tendon Surveillance 25th Year (Period 7) for details surrounding the abnormalities noted and commitments made to the regulator in that Topical Report for Period 7.

Inspection Period	Abnormality Noted	Commitment	Comments
7* (Cont'd)	Crack @ H46-37 @ .013" wide w/in 2' of base plate edge (T.R. 136, Sec. 4.7)	reexamine crack & ensure stable	30 Year Exam
	Some grease samples exhibit Reserve Alkalinity No. < .5	Ensure grease samples w/ <.5 retested per Unmodified Version ASTM D974 Sec. 9 for acid number	30 Year Exam
	V164 field end w/ nitrates @ 10.3 ppm (T.R. 136, Sec. 4.8)	Reexam of 2nd sample found SAT. Resample V164 field end to ensure nitrates stable.	30 Year Exam
	V86 - assurance of complete Tendon void grease fill not satisfied (T. R. 136, Sec. - 4.9)	resample grease @ field end V86 & top off with grease.	30 Year Exam
	Some areas found spalled during IWL exam (T.R. 136, Sec. 4.4)	Reexam spalled areas - ensure stable and/or grout repair	30 Year Exam
	Cracks found over FHB Roof between buttresses 3 & 4 (T.R. 136, Sec. 4.1)	Perform VT-1C exam & ensure stable w/ no active degradation Mechanism	30 Year Exam
8** 2004	Repairs required for grout, concrete cracks, exposed reinforcing steel, vertical tendon upper end bearing plate corrosion as listed in TR-183, Section 5.1	VT-1/VT-1C exams of all repairs listed in TR-183, Section 5.1	35 Year Exam
	Overall concrete surface degraded conditions as listed in TR-183, Section 4.1, 4.2	Re-examine VT-1/VT-1C of all areas previously identified for detailed examination, but not repaired.	35 Year Exam
	D-342 tendon exams limited by location over Main steam Safety Valve Discharge piping	Do full set of tests and examinations, during 2009 Refueling Outage, for D-342	35 Year Exam

* Reference Topical Report (T.R.) No. 136, Tendon Surveillance 25th Year (Period 7) for details surrounding the abnormalities noted and commitments made to the regulator in that Topical Report for Period 7.

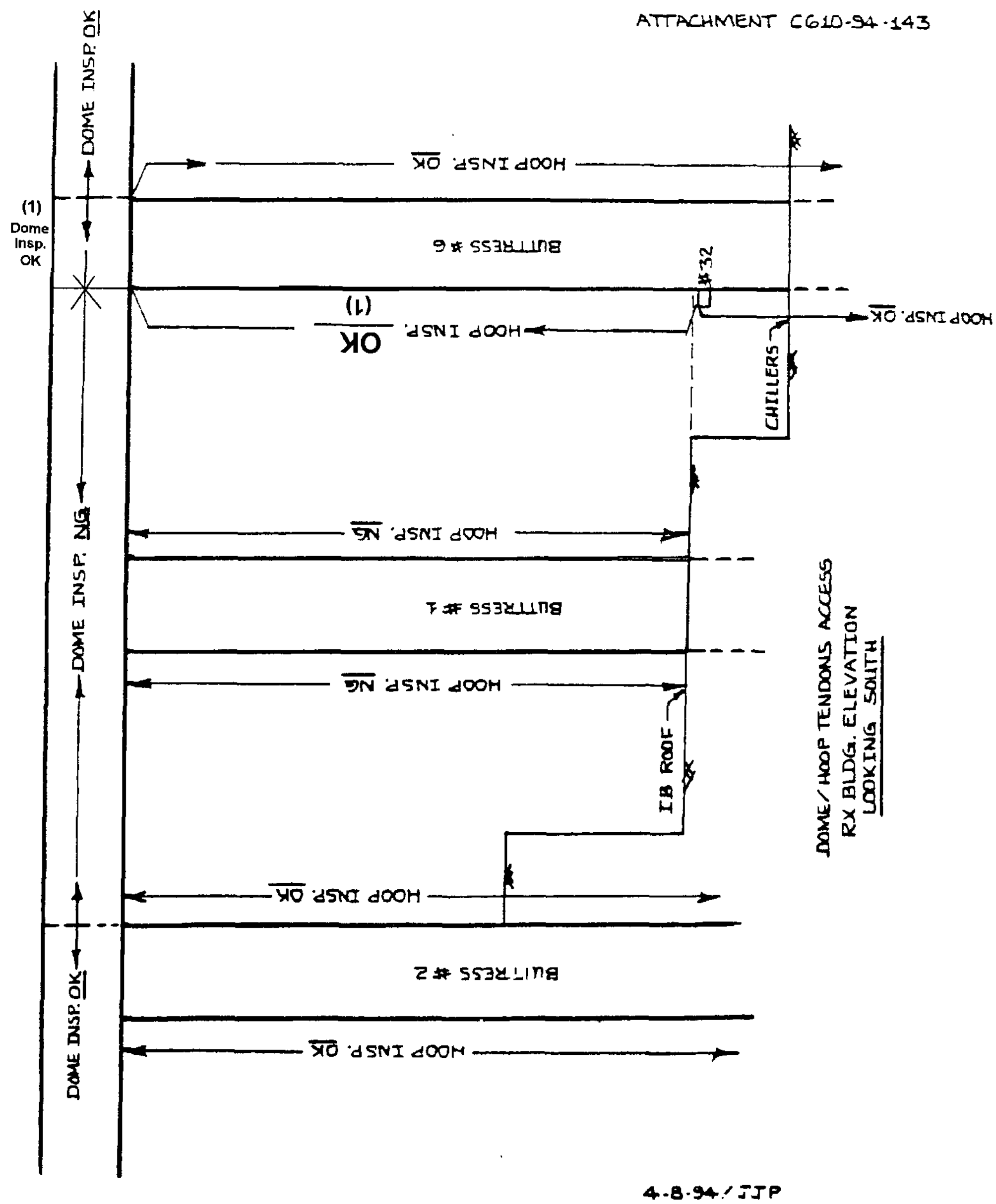
** Reference Topical Report (T.R.) No. 183, Tendon Surveillance 30th Year (Period 8) for details surrounding the abnormalities noted and commitments made to the regulator in that report.

ENCLOSURE 7

Inspection Period	Abnormality Noted	Commitment	Comments
9***	Containment Opening Repair	The surface of new concrete placed in the steam generator opening will be VT-1C examined at the new concrete perimeter and corners for evidence of shrinkage cracks / separation.	1 Year SGRP Follow-up Exam
9***	Containment Opening Repair	The tendon gallery will be examined for evidence of CPM leakage and the effects of ground water seepage.	1 Year SGRP Follow-up Exam
9***	Incomplete pump through of CPM in V157	Verify CPM level and add as necessary to V157	1 Year SGRP Follow-up Exam
9***	Grout overlay of SE quad above ring girder, no deterioration noted	Perform VT-1C exam & ensure stable w/ no active degradation Mechanism	40th Year Exam
9***	CPM leakage in Tendon Gallery Ceiling Area	Perform VT-1C exam of The tendon gallery ceiling area including base mat concrete, tendon bearing plates and tendon end caps for evidence of CPM leakage, effects ground water seepage on concrete and steel items, deterioration of previously documented exposed reinforcing and, other damage / deterioration.	40th Year Exam
9***	CPM seepage through vertical cracks on lower wall above base mat.	Perform VT-1C exam of the lower wall above the base mat to determine whether or not corrosion protection medium seepage through the vertical cracks is increasing as evidenced by CPM accumulation on the top of the base mat.	40th Year Exam
9***	Light, inactive rust noted on V184 bearing plate	Perform VT-1 exam of V84 lower end bearing plate including all surface area visible without de-tensioning of the tendon and removal of shims.	40th Year Exam

***Reference Topical Report (T.R.) No. 203, Tendon Surveillance 35th Year (Period 9) for details surrounding the abnormalities noted and commitments made to the regulator in that report.

ENCLOSURE 8
Safe Access Guidelines for Tendon Work
During Power Operations



NOTE (1) Additional review with Industrial Safety in 2009 expanded the acceptable work zone at power to include these buttress 6 areas.

ENCLOSURE 9
Master List of SGRP Affected Tendons
and Surveillance Scope

Table 1
List and Description of SGRP Affected
Tendons and Corresponding Inspection Periods

HOOP TENDONS								
Tendon	SGRP Impact	Inspection Period					Comments	
		1 Year	10	11	12	13		
46-42	Retensioned							
46-41	Retensioned	X						
46-40	Retensioned							
46-39	Replaced	X						
46-38	Replaced							
46-37	Replaced							
46-36	Replaced							
46-35	Replaced							
46-34	Replaced							
46-33	Replaced							
46-32	Replaced							
46-31	Replaced							
46-30	Replaced							
46-29	Retensioned							
46-28	Retensioned							
51-42	Retensioned							
51-41	Retensioned							
51-40	Retensioned							
51-39	Replaced							
51-38	Replaced							
51-37	Replaced							
51-36	Replaced							
51-35	Replaced							
51-34	Replaced							
51-33	Replaced							
51-32	Replaced							
51-31	Replaced							
51-30	Replaced							
51-29	Replaced							
51-28	Replaced							
Total		2					X	= Lift-off
							X	= Lift-off & Wire Test

ENCLOSURE 9
Master List of SGRP Affected Tendons
and Surveillance Scope

Table 1 (Cont'd)
List and Description of SGRP Affected
Tendons and Corresponding Inspection Periods

Vertical Tendons							
Tendon	**SGRP Impact**	**Inspection Period**					**Comments**
		1 Year	**10**	**11**	**12**	**13**	
V113	Retensioned						
V114	Retensioned						
V115	Retensioned						
V116	Retensioned						
V117	Retensioned						
V118	Retensioned	X					
V119	Retensioned						
V120	Retensioned						
V121	Retensioned						
V122	Retensioned						
V123	Retensioned						
V124	Retensioned						
V125	Retensioned						
V126	Retensioned						
V127	Retensioned						
V128	Retensioned						
V129	Retensioned						
V130	Retensioned						
V131	Replaced						
V132	Replaced						
V133	Replaced						
V134	Replaced	X					
V135	Replaced						
V136	Replaced						
V137	Replaced						
V138	Replaced						
V139	Replaced						
V140	Replaced						
V141	Retensioned						
V142	Retensioned						
V143	Retensioned						
V144	Retensioned						
V145	Retensioned						
V146	Retensioned						
V147	Retensioned						
V148	Retensioned						
V149	Retensioned						
V150	Retensioned						
V151	Retensioned						

ENCLOSURE 9
Master List of SGRP Affected Tendons
and Surveillance Scope

Table 1 (Cont'd)
List and Description of SGRP Affected
Tendons and Corresponding Inspection Periods

Vertical Tendons								
Tendon	**SGRP Impact**	**Inspection Period**					**Comments**	
		1 Year	**10**	**11**	**12**	**13**		
V152	**Retensioned**							
V153	**Retensioned**							
V154	**Retensioned**							
V155	**Retensioned**							
V156	**Retensioned**							
V157	**Retensioned**							
Total		2					**X**	**= Lift-off**
							X	**= Lift-off & Wire Test**

DETAILED, GENERAL, VT-1, VT-1C, VT-3 AND VT-3C VISUAL EXAMINATION OF ASME CLASS MC AND CC CONTAINMENT SURFACES AND COMPONENTS

1. PURPOSE

1.1. This procedure provides the requirements and examiner responsibilities for performing Inservice Inspection (ISI) or Repair Replacement Detailed, General, VT-1, VT-1C, VT-3 and VT-3C Visual Examination on containment surfaces and components, in accordance with Subsections IWE (Class MC) and IWL (Class CC) of the American Society of Mechanical Engineers, Boiler and Pressure Vessel Code (ASME B&PV Code) Section XI, 1992 Edition, 1992 Addenda through 2001 Edition, 2003 Addenda including December 2003 Erratum as modified by Title 10, Code of Federal Regulations (10CFR) 50.55a Paragraphs (b)(2)(viii) and (b)(2)(ix).

1.2. This procedure is also applicable for Stations having authorized or granted Code Relief Requests for the use of portions of this procedure, as applicable.

1.3. The definitions of discontinuities in concrete, coating failures, and post tensioning systems (tendons) indications are provided in Attachments 1, 2, and 3.

2. MATERIALS AND SPECIAL EQUIPMENT

- A near distance vision test chart (Test Card or Illumination Card) in accordance with Table IWA-2210-1, if applicable;
- Calibrated Illumination Light Meter with measurement display capability in foot-candles or lux, if applicable;
  - 1 foot-candle = 10.76391 lux.
  - 1 lux = 0.09290304 foot-candle.
- Mirrors, Binoculars, Telescopes, Borescopes, Closed Circuit Televisions, Cameras, etc., if applicable;
- Flashlight or droplights, if applicable.

2.1. Borescopes, mirrors, telescopes, closed circuit television, cameras or other devices may be used for remote examination, provided such devices or systems have a resolution capability at least equivalent to that attainable by direct visual examination.

2.2. Magnifying glasses, mirrors, depth gages, crack comparators, surface replication techniques and weld gages may be used to supplement direct examination.

2.3. Measuring and Test Equipment (M&TE) or visual aids used shall be recorded on the Work Order (WO) and/or on the applicable Visual Examination NDE Report, (Attachments 4, 5, or 6) or equivalent.

3. PRECAUTIONS, LIMITATIONS, AND PREREQUISITES

3.1. Precautions

3.1.1. Personnel performing examinations shall **ENSURE** that all Site Safety and Radiological Protection Standards are observed.

3.2. Limitations

3.2.1. **ENSURE** that this procedure meets the appropriate code requirements for the scope of examinations to be performed.

3.2.2. **ENSURE** that the requirements and criteria contained in authorized or granted site specific Code Relief Requests are met.

3.3. Prerequisites

3.3.1. Personnel performing Examinations shall be a minimum Level I qualified and certified in accordance with ER-AA-335-001 '*Qualification and Certification of Nondestructive Examination (NDE) Personnel'* or in accordance with an approved vendor qualification and certification procedure.

1. Certified Level I Personnel shall **not** independently **EVALUATE or INTERPRET** the results of an examination. If any conditions exist as listed in the Acceptance Standards/Criteria stated in Paragraphs 4.6. through 4.9, a Certified Level II or III **shall** be contacted to conduct an evaluation or interpretation of the examination results

2. Certified Level I Personnel **shall** be qualified to conduct the following:

   A. **PERFORM** specific equipment set-ups;

   B. **PERFORM** specific calibrations and examination;

   C. **RECORD** data / results to specific written instructions;

   D. **IMPLEMENT** written and verbal instructions under the guidance of a certified Level II or Level III Examiner.

3. Personnel **shall** be certified to a Level II or Level III Examiner to perform review/evaluation of recordable, reportable or unacceptable results from an examination.

4. Additionally, an Engineer **may** perform Detailed or General Visual Examinations.

   A. A Responsible Engineer (RE) with a current Engineering Qualification Card on ASME Class CC (IWL) **may** perform Detailed or General Visual Examinations on IWL containment surfaces and post tensioning systems (tendons).

B. A Responsible Individual (RI) with a current Engineering Qualification Card on ASME Class MC (IWE) and Class CC (IWL) **may** perform Detailed or General Visual Examinations on Class MC and metallic liners of Class CC components.

3.3.2. Procedure Demonstration/Qualification

1. A written procedure and report of examination results is required.

2. For procedure demonstration, a near-distance vision test chart containing text with lower case characters without an ascender or descender (e.g., a, c, e, o) in accordance with ASME Section XI, Table IWA-2210-1 is required.

3. Measurements of the near-distance test chart shall be made once before initial use with an optical comparator (10X or greater) or other suitable instrument to verify that the height of a representative lower case character, for the selected type size, meets the requirements of Table IWA-2210-1.

4. The remote examination procedure shall be demonstrated to resolve the required test chart characters.

3.3.3. Detailed and General Visual Verification of Resolution and Illumination

Examinations shall be performed either directly or remotely with adequate resolution and illumination. Personnel **shall** have visual acuity sufficient to detect evidence of degradation, by line of sight from available viewing angles from floors, platforms, walkways, ladders or other permanent vantage points, unless temporary access is required by the inspection plan.

1. Detailed Visual Examinations (conducted by a Certified VT-1 or VT-1C Examiner or Engineer, as applicable) shall be sufficient to determine the magnitude and extent of any deterioration and distress of the surface/component being examined and on suspect surfaces initially detected by General Visual Examination or structural condition of areas affected by repair/replacement activities.

2. General Visual Examinations (conducted by a Certified VT-3 or VT-3C Examiner or Engineer, as applicable) shall be sufficient to assess the general condition of the surface or component and to identify areas of deterioration and distress on the surface or component being examined.

3.3.4. VT-1/1C and VT-3/3C Verification of Resolution and Illumination

NOTE: As an alternative to the Light Meter Illumination Measurement as described in Paragraph 3.3.4.1 and Sub-Paragraphs, a test chart (Test Card or Illumination Card) in accordance with the requirements of IWA-2210 **shall** be used to determine adequacy of resolution and illumination on the component at the examination site. Ability to discern the lower-case characters on the Test Card or Illumination Card at a maximum distance of 2 feet (609.6 mm) for VT-1 or VT-1C and 4 feet (1219 mm) for VT-3 or VT-3C is a measure of adequate resolution and lighting. This alternative is provided in Engineering Change (EC) 0000365662-000 of 04/27/2007, which documents the approval of the alternative examination technique demonstration for the use of a character card as equivalent for determining adequate lighting per IWA-2210 as required by ASME B&PV Code Section XI Paragraph IWA-2240, 1992 Edition 1992 Addenda through 1995 Edition 1997 Addenda.

1. When performing examinations to Section XI, 1992 Edition with 1992 Addenda through 1995 Edition 1997 Addenda, a test chart (Test Card) in accordance with the requirements of IWA-2210 **may** be used to determine adequacy of resolution on the component at the examination site. Additionally, illumination **shall** be measured in foot-candles on the component at the examination site with a calibrated instrument evidencing the minimum illumination required. Ability to discern the lower-case characters on the Test Card at the minimum illumination level is a measure of adequate resolution and lighting.

   A. When performing direct VT-1 or VT-1C examinations, a minimum illumination of 50 foot-candles (fc) at a maximum distance of 2 feet (609.6 mm) shall be maintained. Calibrated light meters **shall** be used for verification of illumination levels.

   B. When performing direct VT-3 or VT-3C examinations, a minimum illumination of 50 foot-candles (fc) at a maximum distance of 4 feet (1219 mm) shall be maintained. Calibrated light meters **shall** be used for verification of illumination levels.

   C. When performing examinations, a calibrated light meter in accordance with the requirements of IWA-2210 shall be used to determine adequacy of illumination on the component at the examination site.

   D. The qualification shall be demonstrated using a near distance vision test chart containing text with lower case characters without an ascender or descender (e.g., a, c, e, o) with maximum lower case height for VT-1/1C of 0.044 inches (1.1 mm) and for VT-3/3C of 0.105 inches (2.7 mm).

   E. When performing remote VT-1/1C or VT-3/3C visual examinations required by ASME Section XI, Subsection IWE and IWL, the illumination levels may be reduced and the distances may be extended as specified in Paragraphs 3.3.4.1.A. and 3.3.4.1.B, provided that the conditions or indications for which the visual examination is performed can be detected at the chosen distance and illumination and that the system is capable of distinguishing and differentiating between colors applicable to the component.

F. **If** required by the applicable governing code edition and addenda, the adequacy of the illumination levels from battery powered portable lights shall be checked before and after each examination or series of examinations, not to exceed 4 hr between checks.

2. When performing examinations to Section XI, 1998 Edition and later, a test chart (Test Card or Illumination Card) in accordance with the requirements of IWA-2210 **shall** be used to determine adequacy of resolution and illumination on the component at the examination site. Ability to discern the lower-case characters on the Test Card or Illumination Card is a measure of adequate resolution and lighting.

A. When performing direct VT-1 or VT-1C examinations, a minimum illumination of 50 foot-candles (fc) at a maximum distance of 2 feet (609.6 mm) shall be maintained. Calibrated light meters **or** a near distance resolution card (Test Card or Illumination Card) per paragraph 3.3.4.2.C. **shall** be used for verification of illumination levels.

B. When performing direct VT-3 or VT-3C examinations, a minimum illumination of 50 foot-candles (fc) at a maximum distance of 4 feet (1219 mm) shall be maintained. Calibrated light meters **or** a near distance resolution card (Test Card or Illumination Card) per paragraph 3.3.4.2.C **shall** be used for verification of illumination levels.

C. When performing examinations, a test chart (Test Card or Illumination Card) in accordance with the requirements of IWA-2210 shall be used to determine adequacy of resolution and illumination on the component at the examination site.

D. The qualification shall be demonstrated using a near distance vision test chart containing text with lower case characters without an ascender or descender (e.g., a, c, e, o) with maximum lower case height for VT-1/1C of 0.044 inches (1.1 mm) and for VT-3/3C of 0.105 inches (2.7 mm).

E. When performing remote VT-1/1C or VT-3/3C visual examinations required by ASME Section XI, Subsection IWE and IWL, the illumination levels may be reduced and the distances may be extended as specified in Paragraphs 3.3.4.2.A and 3.3.4.2.B, provided that the conditions or indications for which the visual examination is performed can be detected at the chosen distance and illumination and that the system is capable of distinguishing and differentiating between colors applicable to the component.

F. **If** required by the applicable governing code edition and addenda, the adequacy of the illumination levels from battery powered portable lights shall be checked before and after each examination or series of examinations, not to exceed 4 hr between checks. In lieu of using a light meter, these checks may be made by verifying that the illumination is adequate (i.e., no discernable degradation in the visual examination resolution of the procedure demonstration test chart characters).

3.3.5. A Responsible Engineer (RE) shall be a knowledgeable and qualified individual appointed by management. The RE shall be a Registered Professional Engineer with knowledge of the design, construction codes and experience in evaluating inservice conditions of structural concrete. The RE shall be responsible for:

- Development of plans and procedures for examination of ASME Class CC (IWL) containment surfaces and post tensioning systems (tendons);
- Approval, instruction and training of concrete examination personnel;
- Evaluation of examination results;
- Preparation or review of repair/replacement plans and procedures;
- Review of procedures for pressure tests following repair/replacements;
- Submittal of reports to the Owner documenting results of examinations, pressure tests and repairs.

3.3.6. A Responsible Individual (RI) shall be a knowledgeable and qualified individual appointed by management. The RI shall be knowledgeable in the requirements for design, inservice inspection and testing of Class MC (IWE) and metallic liners of Class CC (IWL) components. The RI shall be responsible for:

- Development of plans and procedures for examination of ASME Class MC (IWE) containment surfaces;
- Instruction, training and approval of visual examination personnel;
- Performance or direction of general and detailed visual examinations;
- Evaluation of examination results;
- Submittal of report to the Owner documenting results of examinations.

3.3.7. **VERIFY** that the owner defined/site specific acceptance criteria/standards for IWE and IWL components have been established prior to the conduct of examination.

4. <u>MAIN BODY</u>

4.1. <u>Surface Preparation</u>

4.1.1. If necessary, **REMOVE** dirt, grease, or other foreign matter that would mask indications or interfere with the examination.

4.1.2. **When** a containment vessel or liner is painted or coated to protect surfaces from corrosion, **PERFORM** preservice and inservice visual examinations without the removal of the paint or coating.

4.1.3. **When** removal of paint or coating is required, **REMOVE** it in a manner that will **not** reduce the base metal or weld thickness below the design thickness. Reapplied paint and coating systems shall be compatible with the existing system.

4.2. Illumination

4.2.1. Use same technique to verify illumination as described in Paragraphs 3.3.3 and 3.3.4.

4.2.2. It is **not** necessary to measure illumination level on each examination surface when the same portable light source or similar installed lighting equipment is demonstrated and documented to provide the specified illumination at the maximum examination distance. Battery powered portable lights may be used provided that they meet the maximum distance and minimum illumination level.

4.3. Examination

4.3.1. **PERFORM** Visual Examination by direct or remote visual examination method or a combination thereof.

4.3.2. **USE** mirrors or other optical aids to improve the angle of vision.

4.3.3. DETAILED VISUAL (DV) EXAMINATION

DV Examinations (conducted by a Certified VT-1 or VT-1C Examiner or Engineer, as applicable) are conducted to determine the magnitude and extent of any deterioration and distress of the surface/component being examined and on suspect surfaces initially detected by General Visual Examination or structural condition of areas affected by repair/replacement activities.

4.3.4. GENERAL VISUAL (GV) EXAMINATION

1. In accordance with ASME Section XI, prior to 1998 Edition;

   GV Examinations (performed by a Certified VT-3 or VT-3C Examiner) shall be performed by, or under the direction of, a Registered Professional Engineer or other individual (Certified VT-3 or VT-3C Examiner) knowledgeable in the requirements for design, inservice inspection, and testing of Class MC and metallic liners of Class CC components.

   The examination shall be performed either directly or remotely, by an examiner with visual acuity sufficient to detect evidence of degradation that may affect either the containment structural integrity or leak tightness.

2. In accordance with ASME Section XI, 1998 Edition and later;

A. IWE GV Examinations (conducted by a Certified VT-3 Examiner or Engineer, as applicable) are conducted to access the general condition of containment surfaces.

B. IWL GV Examinations (conducted by a Certified VT-3 or VT-3C Examiner or Engineer, as applicable) are conducted to access the general structural condition of concrete containment surfaces and identify areas of concrete deterioration and distress, such as described in ACI 201.1 R-68 and ACI 349.3R.

4.3.5. VT-1, VISUAL EXAMINATION

VT-1 examinations are conducted to detect discontinuities and imperfections on the surfaces of metallic surfaces, components, supports, and tendon anchorage hardware including such conditions as cracks, wear, corrosion, or erosion and on suspect areas initially detected by VT-3.

4.3.6. VT-3, VISUAL EXAMINATION

VT-3 examinations are conducted to determine the general mechanical and structural condition of metallic surfaces, components, and their supports, by verifying parameters such as clearances, settings, and physical displacements; and to detect discontinuities and imperfections, such as loss of integrity at bolted or welded connections, loose or missing parts, debris, corrosion, wear, or erosion.

4.3.7. VT-1C, VISUAL EXAMINATION

VT-1C examinations are conducted to determine concrete deterioration and distress for suspect areas detected by VT-3C and to determine the condition of concrete extending 2.0 feet beyond the edge of tendon anchorage hardware bearing plates.

4.3.8. VT-3C VISUAL EXAMINATION

VT-3C examinations are conducted to determine the general structural condition of concrete surfaces of containments by identifying areas of concrete deterioration and distress, such as defined in the American Concrete Institute Specifications ACI 201.1 R-68 and ACI 349.3 R.

1. **RECORDABLE INDICATION**: any visually observed abnormal conditions that may potentially impact the integrity of the component design function.

2. **SUSPECT AREA**: an area with a relevant condition that has exceeded the owner defined pre-established acceptance criteria/standards.

3. These conditions are identified as "Recordable Indication Type Codes" in Attachments 4, 5, and 6.

4.4. Direct Examination

4.4.1. **CONDUCT** a direct (near distance) Detailed or General Visual Examination when personnel have visual acuity sufficient to detect evidence of degradation, by line of sight from available viewing angles from floors, platforms, walkways, ladders or other permanent vantage points, unless temporary access is required by the inspection plan.

4.4.2. **CONDUCT** a direct (near distance) VT-1 or VT-1C Visual Examination using a near distance vision test chart (Test Card or Illumination Card) containing text with lower case characters without an ascender or descender (e.g. a,c,e,o) with maximum lower case height of 0.044 inches (1.1 mm) at a maximum distance of 2 feet (609.6 mm) and a minimum illumination of 50 fc.

4.4.3. **CONDUCT** a direct (near distance) VT-3 or VT-3C Visual Examination using a near distance vision test chart (Test Card or Illumination Card) containing text with lower case characters without an ascender or descender (e.g. a,c,e,o) with maximum lower case height of 0.105 inches (2.7 mm) at a maximum distance of 4 feet (1219 mm) and a minimum illumination of 50 fc.

4.4.4. Verification of resolution and illumination **shall** be as qualified in Paragraphs 3.3.3 or 3.3.4.

4.5. Remote Examination

4.5.1. Detailed or General Visual remote examination may be substituted for direct as described in Paragraph 3.3.3.

4.5.2. VT-1/1C or VT-3/3C remote examinations may be substituted for direct examinations as described in Paragraph 3.3.4 provided the remote technique being used has been qualified by use of a Near-Distance Vision Chart (Test Card or Illumination Card) for the maximum distance being viewed and that the system is capable of distinguishing and differentiating between colors applicable to the component.

4.6. Examination of Class MC Components

4.6.1. Examination Boundary

1. In accordance with ASME Section XI, 1992 Edition with 1992 Addenda and prior to 1998 Edition, the examination boundary for components shall **INCLUDE** either the ACCESSIBLE INTERIOR and the EXTERIOR surface areas including welds and base metal.

2. In accordance with ASME Section XI, 1998 Edition and later, the examination boundary for components shall **INCLUDE** all ACCESSIBLE INTERIOR and EXTERIOR surface areas including welds and base metal.

4.6.2. Standards for Examination Category E-A, Containment Surfaces in accordance with ASME Section XI, prior to 1998 Edition;

1. Visual Examination – General

In accordance with 10CFR50.55a(b)(2)(ix)(E), at least once each Inspection Period, **PERFORM** the General Visual Examination (performed by a Certified VT-3 Examiner) by or under the direction of a Registered Professional Engineer or other individual (Certified VT-3 Examiner) knowledgeable in the requirements for design, inservice inspection and testing of Class MC and metallic liners of Class CC components.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** conditions that may affect containment structural integrity or leak-tightness (i.e., have exceeded Acceptance Standards) by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWE-3122.

2. VT-3, Visual Examination on Coated Areas

EXAMINE the area to be inspected, when painted or coated, for evidence of flaking, blistering, peeling, discoloration, and other signs of distress.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** suspect areas by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWE-3122.

D. **When** specified as a result of the engineering evaluation, **PERFORM** supplemental examinations in accordance with IWE-3200.

3. VT-3, Visual Examination on Non-coated Areas

EXAMINE the area to be inspected for evidence of cracking, discoloration, wear, pitting, excessive corrosion, arc strikes, gouges, surface discontinuities, dents, and other signs of surface irregularities.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** suspect areas by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWE-3122.

D. **When** specified as a result of the engineering evaluation, **PERFORM** supplemental examinations in accordance with IWE-3200.

4.6.3. Standards for Examination Category E-A, Containment Surfaces in accordance with ASME Section XI, 1998 Edition and later;

1. Visual Examination of Accessible Surface Areas

   PERFORM a General Visual Examination (conducted by a Certified VT-3 Examiner or Engineer, as applicable) to access the general condition of all Coated and Noncoated Accessible Containment Surface Areas. These areas shall include all accessible interior and exterior surfaces of Class MC components, parts, and appurtenances, and metallic shell and penetration liners of Class CC components.

   A. **RECORD** all indications in accordance with Attachment 4.

   B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

   C. **ACCEPT** conditions that may affect containment surface integrity (i.e., have exceeded Acceptance Standards) by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWE-3122.

2. Visual Examination of Pressure-Retaining Bolted Connections

   PERFORM a VT-3 Visual Examination (as modified by 10CFR50.55a(b)(2)(ix)(G) and (H)) of Item E1.11 *(Pressure-Retaining Bolted Connections, Coated and Noncoated)*, once each interval. Additionally, **PERFORM** a VT-3 Visual Examination on containment bolted connections that are disassembled during the scheduled performance of the examinations of Item E1.11 or whenever containment bolted connections are disassembled for any reason.

   A. **RECORD** all indications in accordance with Attachment 4.

   B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

   C. For any flaws or degradation identified, **PERFORM** a VT-1 Visual Examination (as modified by 10CFR50.55a(b)(2)(ix)(H)).

   D. **CORRECT** conditions that cause bolted connections to violate either containment leak-tight or structural integrity by repair/replacement in accordance with IWE-3122.2.

   E. **CORRECT** loose bolting by corrective measures to the extent necessary to meet the acceptance standards identified in IWE-3122.2.

3. Visual Examination of Wetted Surfaces of Submerged Areas

PERFORM a VT-3 Visual Examination (as modified by 10CFR50.55a(b)(2)(ix)(G)) of Item E1.12 *(Wetted Surfaces of Submerged Areas, Coated and Noncoated)*. These areas shall include all accessible interior and exterior surfaces of Class MC components, parts, and appurtenances, and metallic shell and penetration liners of Class CC components.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** suspect areas by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWE-3122.

D. **When** specified as a result of the engineering evaluation, **PERFORM** supplemental examinations in accordance with IWE-3200.

4. Visual Examination of BWR Vent System Accessible Surface Areas

PERFORM a VT-3 Visual Examination (as modified by 10CFR50.55a(b)(2)(ix)(G)) of Item E1.20 *(BWR Vent System Accessible Surface Areas, Coated and Noncoated)*. These areas shall include all accessible interior and exterior surfaces of Class MC components, parts, and appurtenances, and metallic shell and penetration liners of Class CC components and flow channeling devices within containment vessels.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** suspect areas by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWE-3122.

D. **When** specified as a result of the engineering evaluation, **PERFORM** supplemental examinations in accordance with IWE-3200.

5. Visual Examination of Moisture Barriers

PERFORM a General Visual Examination (conducted by a Certified VT-3 Examiner or Engineer, as applicable) to access the general condition of all accessible Moisture Barriers, Coated and Noncoated. The examination shall include moisture barrier materials intended to prevent intrusion of moisture against inaccessible areas of the pressure retaining metal containment shell or liner at concrete-to-metal interfaces and at metal-to-metal interfaces, which are not seal-welded. Containment moisture barrier materials include caulking, flashing, and other sealants used for this application.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **CORRECT** conditions that may violate containment leak-tight integrity (intrusion of moisture against inaccessible areas of the pressure retaining surfaces of the metal containment shell or liner) by corrective measures in accordance with IWE-3122.2.

4.6.4. Standards for Examination Category E-B, Pressure Retaining Welds in accordance with ASME Section XI, prior to 1998 Edition;

1. VT-1 Visual Examinations on Coated Areas

EXAMINE the area to be inspected, when painted or coated, for evidence of flaking, glistering, peeling, discoloration, and other signs of distress.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** suspect areas by engineering evaluation, **or** **REPAIR/REPLACE** in accordance with IWE-3122.

D. **When** specified as a result of the engineering evaluation, **PERFORM** supplemental examinations in accordance with IWE-3200.

2. VT-1, Visual Examination on Non-coated Areas

EXAMINE the area to be inspected for evidence of cracking, discoloration, wear, pitting, excessive corrosion, arc strikes, gouges, surface discontinuities, dents, and other signs of surface irregularities.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** suspect areas by engineering evaluation, **or** **REPAIR/REPLACE** in accordance with IWE-3122.

D. **When** specified as a result of the engineering evaluation, **PERFORM** supplemental examinations in accordance with IWE-3200.

4.6.5. Standards for Examination Category E-C, Containment Surfaces Requiring Augmented Examination in accordance with ASME Section XI, prior to 1998 Edition;

1. VT-1, Visual Examination on Coated Areas

EXAMINE the area to be inspected, when painted or coated, for evidence of flaking, blistering, peeling, discoloration, and other signs of distress.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** suspect areas by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWE-3122.

D. **When** specified as a result of the engineering evaluation, **PERFORM** supplemental examinations in accordance with IWE-3200.

2. VT-1, Visual Examination on Non-coated Areas

EXAMINE the area to be inspected for evidence of cracking, discoloration, wear, pitting, excessive corrosion, arc strikes, gouges, surface discontinuities, dents, and other signs of surface irregularities.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** suspect areas by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWE-3122.

D. **When** specified as a result of the engineering evaluation, **PERFORM** supplemental examinations in accordance with IWE-3200.

4.6.6. Standards for Examination Category E-C, Containment Surfaces Requiring Augmented Examination in accordance with ASME Section XI, 1998 Edition and later;

1. Visual Examination of Coated Visible Surfaces

PERFORM a VT-1 Visual Examination (as modified by 10CFR50.55a(b)(2)(ix)(G)) of Item E4.11 *(Coated Visible Surfaces)* requiring augmented examination as those identified in IWE-1240 for evidence of flaking, blistering, peeling, discoloration and other signs of distress. Additionally, **PERFORM** a VT-1 Visual Examination to assess the structural condition of areas affected by repair/replacement activities.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** suspect areas by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWE-3122.

D. **When** specified as a result of the engineering evaluation, **PERFORM** supplemental examinations in accordance with IWE-3200.

2. Visual Examination of Noncoated Visible Surfaces

PERFORM a VT-1 Visual Examination (as modified by 10CFR50.55a(b)(2)(ix)(G)) of Item E4.11 *(Noncoated Visible Surfaces)* requiring augmented examination as those identified in IWE-1240 for evidence of cracking, discoloration, wear, pitting, excessive corrosion, gouges, surface discontinuities, dents and other signs of surface irregularities.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **ACCEPT** suspect areas by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWE-3122.

D. **When** specified as a result of the engineering evaluation, **PERFORM** supplemental examinations in accordance with IWE-3200.

4.6.7. Standards for Examination Category E-D, Seals, Gaskets, and Moisture Barriers in accordance with ASME Section XI, prior to 1998 Edition;

1. VT-3, Visual Examination of Seals and Gaskets

EXAMINE the seals and gaskets on airlocks, hatches and other devices for wear, damage, erosion, tears, surface cracks, or other defects that may violate the leak-tight integrity.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **CORRECT** conditions that may violate containment leak-tight by repair or replacement in accordance with IWE-3122.2 or IWE-3122.3 (1992 Edition and 1992 Addenda only).

2. VT-3, Moisture Barriers

EXAMINE the internal and external containment moisture barrier materials at concrete-to-metal interfaces intended to prevent intrusion of moisture against the pressure retaining metal containment shell or liner for wear, damage, erosion, tears, surface cracks, or other defects that may violate the leak-tight integrity.

A. **RECORD** all indications in accordance with Attachment 4.

B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

C. **CORRECT** conditions that may violate leak-tight by repair or replacement IWE-3122.2 or IWE-3122.3 (1992 Edition and 1992 Addenda only).

4.6.8. Standards for Examination Category E-G, Pressure Retaining Bolting in accordance with ASME Section XI, prior to 1998 Edition;

1. VT-1, Visual Examination of Bolted Connections

   EXAMINE the bolts, nuts, bushings, washers and threads in base material and flange ligaments between threaded stud holes.

   A. **RECORD** all indications in accordance with Attachment 4.

   B. **COMPARE** the recorded indications to the owner defined pre-established acceptance criteria/standards.

   C. **CORRECT** conditions that cause bolted connections to violate either containment leak-tight or structural integrity by replacement in accordance with IWE-3122.2 (1998 Edition and later) or IWE-3122.3 (1992 Edition and 1992 Addenda).

4.7. <u>Standards for Examination Category L-A, Class CC Components (Concrete)</u>

4.7.1. Examination Boundary

1. The examination boundary for the concrete shells shall **INCLUDE** the ACCESSIBLE surface areas.

4.7.2. Standards for Examination of Concrete in accordance with ASME Section XI, prior to 1998 Edition;

1. Concrete surface areas, including coated areas, except those exempted by IWL-1220(b), shall be VT-3C visual examined for evidence of conditions indicative of damage or degradation, such as defined in ACI 201.1 R-68 in accordance with IWL-2310(b).

2. Selected areas, such as those that indicate suspect conditions, shall receive a VT-1C examination in accordance with IWL-2310(a).

3. Concrete extending 2'-0" from the bearing plate for tendons selected in accordance with IWL-2520 and IWL-2521 shall receive a VT-1C examination.

4. The examination shall be performed by, or under the direction of, the Responsible Engineer.

5. Visual examinations may be performed from floors, roofs, platforms, walkways, ladders, ground surface, or other permanent vantage point, unless temporary close-in access is required by the inspection plan.

6. **RECORD** all indications in accordance with Attachment 6.

7. The recorded indications are acceptable for continued operation without further corrective actions if accepted by the RE.

8. **ACCEPT** the recorded indications, which have evidence of damage or degradation sufficient to warrant further corrective actions as determined by the RE, by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWL-3210.

4.7.3. Standards for Examination of Concrete in accordance with ASME Section XI, 1998 Edition and later;

1. All Concrete surface areas, including coated areas, except those exempted by IWL-1220(b), shall be General Visual examined (conducted by a Certified VT-3C Examiner or Engineer, as applicable) to assess the general structural condition of containments. **PERFORM** the General Visual examination in sufficient detail to identify areas of concrete deterioration and distress, such as described in ACI 201.1 R-68 and ACI 349.3R in accordance with IWL-2310(a).

2. Selected areas, such as those that indicate suspect conditions, shall receive a Detailed Visual examination (conducted by a Certified VT-1C Examiner or Engineer, as applicable). **PERFORM** the Detailed Visual examination to determine the magnitude and extent of deterioration and distress in accordance with IWL-2310(b).

3. **RECORD** all indications in accordance with Attachment 6.

4. The recorded indications are acceptable for continued operation without further corrective actions if accepted by the RE.

5. **ACCEPT** the recorded indications, which have evidence of deterioration and distress sufficient to warrant further corrective actions as determined by the RE, by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWL-3210.

4.8. <u>Standards for Examination Category L-B Unbonded Post Tensioning Systems (Tendons)</u>

4.8.1. Examination Boundary

The examination boundary shall include containment tendon anchorage hardware including bearing plates, anchor heads, shims, wedges and wire button-heads, as a minimum.

1. Concrete extending 2'-0" from the bearing plate for tendons selected in accordance with IWL-2520 and IWL-2521 shall receive a Detailed Visual examination (conducted by a Certified VT-1C Examiner or Engineer, as applicable). **PERFORM** the Detailed Visual examination to determine the condition (e.g., cracks, wear or corrosion) of tendon wires or strands and anchorage hardware as described in IWL-2524.1.

4.8.2. Standards for Unbonded Post Tensioning System (Tendons) in accordance with ASME Section XI, prior to 1998 Edition;

1. **PERFORM** a VT-1 examination of tendon anchorage components for evidence of free water, active corrosion, broken or protruding wires, missing button-heads, misaligned or displaced shims, and cracks.

    A. **RECORD** all indications in accordance with Attachment 5.

    B. **If** free water is observed, **then QUANTIFY** amount of free water.

    C. The recorded indications are acceptable for continued operation without further corrective actions if accepted by the RE.

    D. **ACCEPT** the recorded indications, which have evidence of damage or degradation sufficient to warrant further corrective actions as determined by the RE, by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWL-3210.

4.8.3. Standards for Unbonded Post Tensioning System (Tendons) in accordance with ASME Section XI, 1998 Edition and later;

1. **PERFORM** a Detailed Visual examination (conducted by a Certified VT-1 Examiner or Engineer, as applicable) to determine the condition (e.g., cracks, wear or corrosion) of tendon wires or strands and anchorage hardware as described in IWL-2524.1.

    A. **RECORD** all indications in accordance with Attachment 5.

    B. **If** free water is observed, **then QUANTIFY** amount of free water.

    C. The recorded indications are acceptable for continued operation without further corrective actions if accepted by the RE.

    D. **ACCEPT** the recorded indications, which have evidence of deterioration and distress sufficient to warrant further corrective actions as determined by the RE, by engineering evaluation, or **REPAIR/REPLACE** in accordance with IWL-3210.

4.9. <u>Examination of reinforced steel of IWL Concrete Containments</u>

4.9.1. Standards for reinforced steel of IWL Concrete Containments in accordance with ASME Section XI, prior to 1998 Edition;

1. Exposed reinforcing steel identified during as found examination or that exposed during concrete repair shall receive a VT-1 examination.

   A. **RECORD** all indications in accordance with Attachment 6.

   B. The recorded indications shall be evaluated by the RE to determine necessary corrective actions.

4.9.2. Standards for reinforced steel of IWL Concrete Containments in accordance with ASME Section XI, 1998 Edition and later;

1. Exposed reinforcing steel identified during as found examination or that exposed during concrete repair shall receive a Detailed Visual Examination(conducted by a Certified VT-1 Examiner or Engineer, as applicable). **PERFORM** a Detailed Visual examination to determine the condition of as found reinforcing steel or that exposed as a result of removal of defective concrete as described in IWL-4220(c).

   A. **RECORD** all indications in accordance with Attachment 6.

   B. The recorded indications shall be evaluated by the RE to determine necessary corrective actions.

4.10. <u>Evaluation</u>

4.10.1. **NOTIFY** the Station RE or RI for evaluation of recordable indications identified during visual examinations of IWE and/or IWL components and for comparison to previously recorded indications.

1. Any recorded indications, discontinuities and/or flaws, **shall** be documented in an Issue Report (IR) and **then** follow the evaluation process specific to the station.

4.11. <u>Reporting</u>

4.11.1. **INCLUDE** as a minimum in the Visual Examination NDE Report the following information. **USE** the applicable Attachment 4, 5, 6 or equivalent, to document examination results. Other equivalent generated forms may be used.

- Station;
- Unit;
- Examination Report number, if applicable;
- Examination Date;
- Examination procedure and revision;
- Examiner/Evaluator printed name, signature, NDE level and date;

- Identification of component (e.g., EIN, EID, System, etc.);
- Type of examination (direct or remote);
- Illumination used;
- M&TE;
- Direct Visual aids used;
- Remote Visual equipment used;
- Examination results;
- **RECORD** location and size of the Recordable Indication (RI) as required, to perform an accurate evaluation and use during subsequent evaluations.
- **ATTACH** a sketch or drawing if required.

4.11.2. **RECORD** on the Visual Examination NDE Report, Attachment 4, 5, or 6 (or equivalent), the Containment Visual Examination results associated with ASME Section XI repairs or replacements. These records shall become part of the final Work Order (WO) documentation.

4.11.3. **RECORD** on Attachment 4, 5, or 6, or equivalent, the Containment Visual Examination performed by the Examiner/Evaluator **and FORWARD** for a Station/Admin Review and Authorized Nuclear Inservice Inspector (ANII) Review, as applicable. **TRANSFER** to the Program Owner/Engineer for inclusion in the ASME Section XI Program and Work Order Package in accordance with the applicable procedures.

1. All Visual Examination NDE Reports identifying a Recordable Indication (RI) or Reportable Indication (RI) and/or an Unacceptable Condition **shall** receive an independent Level III, RE or RI Review for resolution, prior to closure of the task and transferring to ANII for review.

2. An independent review by a Level III, RE or RI and ANII may not be applicable at all stations. If any reviews are not applicable to the specific station, the review/date areas shall be completed by placing N/R (Not Required) on the available line, prior to closure of the task.

4.12. Final Conditions

4.12.1. **LEAVE** the surface of the part or component in a better than found condition.

5. **RETURN TO NORMAL** – None

6. **REFERENCES**

6.1. Commitments – None

6.2. American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section XI, 1992 Edition, 1992 Addenda through 2001 Edition, 2003 Addenda including December 2003 Erratum.

6.3. ER-AA-330-002, Inservice Inspection of Welds and Components.

6.4. ER-AA-330-005, Visual Examination of Section XI Class CC Concrete Containment Structures.

6.5. ER-AA-330-006, Inservice Inspection and Testing of The Pre-Stressed Concrete Containment Post Tensioning Systems.

6.6. ER-AA-330-007, Visual Examination of Section XI Class MC Surfaces and Class CC Liners.

6.7. ER-AA-330-009, ASME Section XI Repair / Replacement Program.

6.8. ER-AA-335-001, Qualification and Certification of Nondestructive Examination (NDE) Personnel.

6.9. The American Concrete Institute Specification ACI 201.1 R-68, 1984 Edition.

6.10. The American Concrete Institute Specification ACI 349.3 R-96, 1996 Edition.

6.11. Title 10, Code of Federal Regulations (10CFR) 50.55a Paragraphs (b)(2)(viii) and (b)(2)(ix).

6.12. Engineering Change (EC) 0000365662-000.

7. ATTACHMENTS

7.1. Attachment 1, Definitions of Discontinuities in Concrete

7.2. Attachment 2, Definitions of Coating Failures

7.3. Attachment 3, Definitions of Post Tensioning System (Tendons) Indications

7.4. Attachment 4, ASME IWE (Class MC) Containment Visual Examination NDE Report

7.5. Attachment 5, ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report

7.6. Attachment 6, ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report

ATTACHMENT 1
Definitions of Discontinuities in Concrete
Page 1 of 6

A.1. **CRACK** - A complete or incomplete separation, of either concrete or masonry, into two or more parts produced by breaking or fracturing.

A.1.1. **CHECKING** - Development of shallow cracks, closely spaced by irregular intervals on the surface of plaster, cement paste, mortar, or concrete.

A.1.2. **CRAZE CRACKS** - Fine random cracks or fissures in a surface of plaster, cement paste, mortar, or concrete.

A.1.2.1. **CRAZING** - The development of craze cracks; the pattern of craze cracks existing in a surface.

A.1.3. **D-CRACKING** - A series of cracks in concrete near and roughly parallel to joints, edges, and structural cracks.

A.1.4. **DIAGONAL CRACK** - In a flexural member, an inclined crack caused by shear stress, usually at about 45 deg to the axis; or a crack in a slab, not parallel to either the lateral or longitudinal directions.

A.1.5. **HAIRLINE CRACKS** - Cracks in an exposed concrete surface having widths so small as to be barely perceptible.

A.1.6. **PATTERN CRACKING** - Fine openings on concrete surfaces in the form of a pattern; resulting from a decrease in volume of the material near the surface, or increase in volume of the material below the surface, or both.

A.1.7. **PLASTIC CRACKING** - Cracking that occurs in the surface of fresh concrete soon after it is placed and while it is still plastic.

A.1.8. **SHRINKAGE CRACKING** - Cracking of a structure or member due to failure in tension caused by external or internal restraints as reduction in moisture content develops, or as carbonation occurs, or both.

A.1.9. **TEMPERATURE CRACKING** - Cracking due to tensile failure, caused by temperature gradient in members subjected to external restraints or by temperature differential in members subjected to internal restraints.

A.1.10. **TRANSVERSE CRACKS** - Cracks that develop at right angles to the long direction of the member.

ATTACHMENT 1
Definitions of Discontinuities in Concrete
Page 2 of 6

A.2. **DETERIORATION** - 1) Physical manifestation of failure of a material (e.g., cracking, delamination, flaking, pitting, scaling, spalling, straining) caused by environmental or internal autogenous influences or hardened concrete as well as other materials. 2) Decomposition of material during either testing or exposure to service.

A.2.1. **ABRASION DAMAGE** - Wearing away of a surface by rubbing and friction.

A.2.2. **BLISTERING** - The irregular raising of a thin layer, frequently 25 to 300 mm in diameter, at the surface of placed mortar or concrete during or soon after completion of the finishing operation; blistering is usually attributed to early closing of the surface and may be aggravated by cool temperatures. Blisters also occur in pipe after spinning or in a finish plastic coat in plastering as it separates and draws away from the base coat.

A.2.3. **CAVITATION DAMAGE** - Pitting of concrete caused by implosion, i.e., the collapse of vapor bubbles in flowing water, which form in areas of low pressure and collapse as they enter areas of higher pressure.

A.2.4. **CHALKING** - Formation of a loose powder resulting from the disintegration of the surface of concrete or of applied coating, such as cement paint.

A.2.5. **CORROSION** - destruction of metal by chemical, electrochemical, or electrolytic reaction with its environment.

A.2.6. **CURLING** - The distortion of an originally essentially linear or planar member into a curved shape such as the warping of a slab due to creep or to differences in temperature or moisture content in the zones adjacent to its opposite faces.

A.2.7. **DEFLECTION** - Movement of a point on a structure or structural element, usually measured as a linear displacement transverse to a reference line or axis.

A.2.8. **DEFORMATION** - A change in dimension or shape.

A.2.9. **DELAMINATION** - A separation along a plane parallel to a surface as in the separation of a coating from a substrate or the layers of a coating from each other, or in the case of a concrete slab, a horizontal splitting, cracking or separation of a slab in a plane roughly parallel to, an generally near, the upper surface; found frequently in bridge decks and other types of elevated reinforced-concrete slabs and may be caused by the corrosion or reinforcing steel; also found in slabs on grade caused by development, during the finishing operation, of a plane of weakness below the densified surface; or caused by freezing and thawing, similar to spalling, scaling, or peeling except that delamination affects large areas and can often be detected by tapping.

ATTACHMENT 1
Definitions of Discontinuities in Concrete
Page 3 of 6

A.2.10. **DISINTEGRATION** - Reduction into small fragments and subsequently into particles.

A.2.11. **DISTORTION** - See Deformation.

A.2.12. **DUSTING** - The development of a powdered material at the surface of hardened concrete.

A.2.13. **EFFLORESCENCE** -A deposit of salts, usually white, formed on a surface, the substance having emerged in solution from within either concrete or masonry and subsequently been precipitated by evaporation.

A.2.14. **EROSION** - Progressive disintegration of a solid by the abrasive or cavitation action of gases, fluids, or solids in motion.

A.2.15. **EXFOLIATION** - Disintegration occurring by peeling off in successive layers; swelling up and opening into leaves or plates like a partly opened book.

A.2.16. **EXUDATION** - A liquid or viscous gel-like material discharged through a pore, crack, or opening in the surface of concrete.

A.2.17. **JOINT SPALL** - A spall adjacent to a joint.

A.2.18. **PITTING** - Development of relatively small cavities in a surface; in concrete, localized disintegration, such as a popout; in steel, localized corrosion evident as minute cavities on the surface.

A.2.19. **PEELING** - A process in which thin flakes of mortar are broken away from a concrete surface, such as by deterioration or by adherence of surface mortar to forms as forms are removed.

A.2.20. **POPOUT** - The breaking away of small portions of a concrete surface due to localized internal pressure, which leaves a shallow, typical conical, depression.

A.2.20.1. **POPOUTS, SMALL** - Popouts leaving holes up to 10 mm in diameter, or the equivalent.

A.2.20.2. **POPOUTS, MEDIUM** - Popouts leaving holes between 10 and 50 mm in diameter, or the equivalent.

A.2.20.3. **POPOUTS, LARGE** - Popouts leaving holes greater than 50 mm in diameter, or the equivalent.

ATTACHMENT 1
Definitions of Discontinuities in Concrete
Page 4 of 6

A.2.21. **SCALING** - Local flaking or peeling away of the near-surface portion of hardened concrete or mortar; also of a layer from metal.

A.2.21.1. **SCALING, LIGHT** - Loss of surface mortar without exposure of coarse aggregate.

A.2.21.2. **SCALING, MEDIUM** - Loss of surface mortar 5 to 10 mm in depth and exposure of coarse aggregate.

A.2.21.3. **SCALING, SEVERE** - Loss of surface mortar 5 to 10 mm in depth with some loss of mortar surrounding aggregate particles 10 to 20 mm in depth.

A.2.21.4. **SCALING, VERY SEVERE** - Loss of coarse aggregate particles as well as mortar, generally to a depth greater than 20 mm.

A.2.22. **SPALL** - A fragment, usually in the shape of a flake, detached from a larger mass by a blow, by the action of weather, by pressure, or by expansion within the large mass.

A.2.22.1. **SMALL SPALL** - A roughly circular depression not greater than 20 mm in depth or 50 mm in any dimension.

A.2.22.2. **LARGE SPALL** - May be roughly circular or oval or in some cases elongated, more than 20 mm in depth and 150 mm in greatest dimension.

A.2.23. **WARPING** - A deviation of a slab or wall surface from its original shape, usually caused by either temperature or moisture differentials or both within the slab or wall.

ATTACHMENT 1
Definitions of Discontinuities in Concrete
Page 5 of 6

A.3. Textural features and phenomena relative to their development.

A.3.1. **AIR VOID** - A space in cement paste, mortar or concrete filled with air; an entrapped air void is characteristically 1 mm or more in size and irregular in shape; an entrained air void is typically between 10 mm and 1 mm in diameter and spherical or nearly so.

A.3.2. **BLEEDING** - The autogenous flow of mixing water within, or its emergence from, newly placed concrete or mortar; caused by the settlement of the solid materials within the mass; also called water gain.

A.3.3. **BUGHOLES** - Small regular or irregular cavities, usually not exceeding 25 mm in diameter, is resulting from entrapment of air bubbles in the surface of formed concrete during placement and consolidation.

A.3.4. **COLD-JOINT LINES** - Visible lines on the surfaces of formed concrete indicating the presence of joints where one layer of concrete had hardened before subsequent concrete was placed.

A.3.5. **DISCOLORATION** - departure of color from that which is normal or desired.

A.3.6. **HONEYCOMB** - Voids left in concrete due to failure of the mortar to effectively fill the spaces among coarse aggregate particles.

A.3.7. **INCRUSTATION** - A crust or coating, generally hard, formed on the surface of concrete or masonry construction or on aggregate particles.

A.3.8. **JOINT** - A physical separation in concrete, whether precast or cast-in-place, including cracks if intentionally made to occur at specified locations; also the region where structural members intersect such as a beam-column joint.

A.3.9. **LAITANCE** - A layer of weak and nondurable material containing cement and fines from aggregates, brought by bleeding water to the top of overwet concrete; the amount is generally increased by overworking or over-manipulating concrete at the surface by improper finishing or by job traffic.

A.3.10. **SAND POCKET** - A zone in concrete or mortar containing fine aggregate with little or no cement.

A.3.11. **SAND STREAK** - A streak of exposed fine aggregate in the surface of formed concrete, caused by bleeding.

A.3.12. **SEGREGATION** - The differential concentration of the components of mixed concrete, aggregate, or the like, results in non-uniform proportions in the mass.

ATTACHMENT 1
Definitions of Discontinuities in Concrete
Page 6 of 6

A.3.13. **STALACTITE** - A downward-pointing deposit formed as an accretion of mineral matter produced by evaporation of dripping water from the surface of concrete, commonly shaped like an icicle.

A.3.14. **STALAGMITE** - An upward-pointing deposit formed as an accretion of mineral matter produced by evaporation of dripping water, projecting from the surface of concrete, commonly conical in shape.

A.3.15 **STRATIFICATION** - The separation of overwet or overvibrated concrete into horizontal layers with increasingly lighter material toward the top; water, laitance, mortar, and coarse aggregate tend to occupy successively lower positions in that order; a layered structure in concrete resulting from placing of successive batches that differ in appearance; occurrence in aggregate stockpiles of layers of differing grading or composition; a layered structure in a rock foundation.

A.3.16 **WATER VOID** - Void along the underside of an aggregate particle or reinforcing steel which formed during the bleeding period; initially filled with bleed water.

ATTACHMENT 2
Definitions of Coating Failures
Page 1 of 1

B.1. **DISCOLORATION** – Change in color of the coating, fading. Cause could be age, heat, dye or pigment bleeding or surface contamination (dye penetration, grease, dirt, etc.)

B.2. **CHIPPING** – Small void in coating system caused by impact from foreign object.

B.3. **CHALKING** – A surface phenomenon that appear soft or powdery. The cause is a breakdown in coating binder, which disintegrates, leaving the surface covered with pigment.

B.4. **CHECKING** – Appears as small breaks in coating surfaces that are formed as coating ages and becomes harder and more brittle. Checking, for the most part, is a formulation related to reaction; were the resins and pigments do not properly combine.

B.5. **CRACKING (COATING)** – Appears as non-linear line running through the coating system. Cracking is caused by expansion or contraction throughout the film layer and the film and substrate (primer or metal surface).

B.6. **FLAKING/PEELING** – Appears as flaking or heavy peels on the surface of the metal. It is generally caused where the tensile strength of the coating is higher than the adhesive strength or bond strength.

B.7. **BLISTERING** – Appears as large or small, round or hemispherical projections of the coating from the surface and are either dry or liquid filled. The usual cause of the condition is the penetration of moisture through an area of poor adhesion.

B.8. **PINPOINT RUST** – Appears as small specks of rust or corrosion. Cause may be lower or the absence of zinc/binder ratio, where pinpoints of rust propagate.

B.9. **UNDERCUTTING** – Appears as a raised coated rust bloom. Undercutting is actually rust forming under the coating and acting as a wedge to push the coating of the metal surface.

B.10. **MINOR RUST** – A degree of in the form of iron oxide formation on steel, where no apparent base metal is lost.

B.11. **MEDIUM RUST** – A degree of in the form of iron oxide formation on steel, where less than 5% of the base metal is lost.

B.12. **MAJOR RUST** – A degree of in the form of iron oxide formation on steel, where more than 5% of the base metal is lost.

ATTACHMENT 3
Definitions of Post Tensioning System (Tendons) Indications
Page 1 of 1

C.1. **ACTIVE CORROSION** -- Corrosion on a component or surface that exhibits metal loss that has occurred since fabrication or construction, and / or exhibits pitting visible to the naked eye. Active corrosion is usually a reddish / rust color.

C.2. **BROKEN WIRE** -- A wire within a tendon assembly that is broken and not capable of accepting pre-stress load. Wires that are excessively protrude from the anchorage components are suspected to be broken.

C.3. **MISSING BUTTON HEAD** -- The end of the deformed portion of a wire that accepts the pre-stressed force is missing. The end of the wire may be visible within the anchorage.

C.4. **PROTRUDING OR UNSEATED WIRE** -- A wire within a tendon assembly that extends beyond a tendon anchorage after stressing and is not seated against the anchorage.

C.5. **EXCESSIVE SHIM GAPS** -- Shims that have slipped out of position leaving gaps in excess of construction tolerances between the halves.

C.6. **UNEVEN SHIM STACK** -- Shims that have shifted out of position creating a condition where the pre stress load is not evenly distributed over the shim stack assembly.

C.7. **FREE WATER** – Water seeping or dripping from tendon anchorage components or within the grease can. Quantify all free water.

ATTACHMENT 4
ASME IWE (Class MC) Containment Visual Examination NDE Report
Page 1 of 1

Station: Unit: Date: Report No:

System: Component WO No(s).:

Location: Building: Elev.: Col.: Row: Azimuth/Radius:

Exam Type: ☐ DV ☐ GV ☐ VT-1 ☐ VT-3 Type Of Exam: ☐ Direct ☐ Remote Matl. Type:

Design Drawing(s) Visual Aids:

Surface: ☐ ID ☐ OD Surface / Components Coated: ☐ YES ☐ NO

M&TE Used: ☐ Test Card UTC or Serial No. Cal. Due Date:

Illumination Used Illumination Verified: Date: Time:

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS			Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
	NI	RI TYPE	IO	

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Wear	G.	Blistering	M.	Missing Components	S.	Deviation From Design Drawing
B.	Corrosion / Pitting	H.	Peeling	N.	Loose Components	T.	Missing Paint Or Coating
C.	Mech. Damage	I.	Discoloration	O.	Tears	U.	Bulges / Deformation
D.	Erosion	J.	Pitting	P.	Coating Damaged	V.	Missing / Incomplete Welds
E.	Cracks	K.	Nicks / Gouges	Q.	Leakage / Moisture	W.	Arc Strikes
F.	Flaking	L.	Dents	R.	Dislodged Seal, Gasket, or Moisture Barrier	Z.	Other (Provide Explanation)

Supplemental Information: ☐ Yes ☐ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☐ Yes ☐ No

EXAMINER/EVALUATOR
(Print & Sign) ______________________ LEVEL ________ DATE ______

STATION/ADMIN REVIEW
(Print & Sign) ______________________ DATE ______

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) ______________________ DATE: ______

ANII REVIEW (as applicable) ______________________ DATE: ______

Page ___ of ___

ATTACHMENT 5
ASME IWL (Class CC) Containment Tendon Anchorage Detailed Visual or VT-1 Visual Examination NDE Report
Page 1 of 1

Station:	Unit:	Date:		Report No:
WO No(s).:		Tendon Anchorage No.:		Tendon End: ☐ Shop ☐ Field
Location: Tunnel, Gallery, Buttress:			Elevation:	Bearing Plate I.D.:
Bearing Plate I.D.	Anchor Head I.D.			Bushing I.D.
Exam Type: ☐ DV ☐ VT-1			Type Of Exam: ☐ Direct ☐ Remote	
☐ As Found Exam	☐ As Left Exam Following Retensioning Of Tendons Which Have Been Detentioned			
Design Drawing(s)		Visual Aids:		
M&TE Used:	☐ Test Card	UTC or Serial No.		Cal. Due Date:
Illumination Used		Illumination Verified:	Date:	Time:
Special / Specific Instructions:				

Component / Item Number and Description	RESULTS			Explanation / Notes (Sketch Shall Be Attached Depicting Location Of All Missing, Protruding, Unseated Wires)
	NI	RI TYPE	IO	

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Missing Wires	H.	Cracks	O.	Other (Explain)
B.	Missing Button Heads	I.	Pitting		
C.	Protruding / Unseated Wires	J.	Nicks, Gouges, Mechanical Damage		
D.	Broken Wires	K.	Uneven Shim Stack		
E.	Active Corrosion	L.	Excessive Shim Gaps		
F.	Other Corrosion	M.	Gasket Seating Surface Damage		
G.	Evidence Of Free Water **(Quantify)**	N.	Surface Discontinuities, Deflections		

Supplemental Information : ☐ Yes ☐ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☐ Yes ☐ No

EXAMINER/EVALUATOR
(Print & Sign) ____________________ LEVEL ______ DATE ______

STATION/ADMIN REVIEW
(Print & Sign) ____________________ DATE ______

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RI REVIEW (as applicable) ____________________ DATE: ______

ANII REVIEW (as applicable) ____________________ DATE: ______

Page ___ of ___

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: Unit: Date: Report No:				
System: Component: WO No(s).:				
Location: Building: Elev.: Col.: Row: Azimuth/Radius:				
Exam Type: ☐ DV ☐GV ☐VT-1C ☐VT-3C Type Of Exam: ☐Direct ☐Remote Matl. Type:				
Design Drawing(s) Visual Aids:				
Surface: ID OD Surface / Components Coated: ☐ YES ☐ NO				
M&TE Used: ☐ Test Card UTC or Serial No. Cal. Due Date:				
Illumination Used Illumination Verified: Date: Time:				
Special / Specific Instructions:				
Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS			Explanation / Notes
	NI	RI TYPE	IO	(As a minimum, Record Location and Size of Recordable Indications as applicable)

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)	G. Settlements Or Deflections	M. Scaling / Dusting
B. Exposed Reinforcing Steel	H. Degraded Patches or Repairs	N. Coating Deterioration
C. Exposed Metallic Items (Other)	I. Popouts , Voids, Honeycomb	O. Abrasion, Cavitation, Wear
D. Evidence Of Grease Leakage	J. Spalls	P. Air Voids / Bug Holes
E. Evidence Of Moisture	K. Cold Joint Lines	Q. Efflorescence
F. Leaching Or Chemical Attack	L. Corrosion Staining	R. Other (Explain)

Supplemental Information : ☐Yes ☐No ☐ Sketch ☐Photo ☐Video ☐ Other (Describe):

Results: Acceptable ☐Yes ☐No

EXAMINER/EVALUATOR
(Print & Sign) ______________________ LEVEL ______ DATE ______

STATION/ADMIN REVIEW
(Print & Sign) ______________________ DATE ______

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) ______________________ DATE: ______

ANII REVIEW (as applicable) ______________________ DATE: ______

Page ___ of ___

AmerGen	TMI - Unit 1 Corrective Maintenance Procedure	Number 1410-Y-83

Title **RB Tendon End Cap Installation**		Revision No. 7
Applicability/Scope TMI Division	USAGE LEVEL 2	Effective Date OCT 4 2000

This document is within QA plan scope	X	Yes		No
Safety Reviews Required	X	Yes		No

List of Effective Pages

Page	Revision	Page	Revision	Page	Revision	Page	Revision
1	7						
2	7						
3	7						
4	7						
5	7						
6	7						
7	7						
8	7						
9	7						
10	7						
11	7						

	Signature	Date
Originator	T. M. Hawkins T.M. Hawkins	10/02/00
Procedure Owner	/s/ R. M. Pierce	09/21/00
PRG	/s/ H. K. Olive for J. S. Schork	10/02/00
Approver	/s/ D. W. Ethridge	09/25/00

1.0 PURPOSE

1.1 This procedure provides guidance for the installation and/or modification of the tendon end caps on the TMI-1 Reactor Building.

2.0 REFERENCES

2.1 1002, "Rules for the Protection of Employees Working on Electrical and Mechanical Apparatus"

2.2 1440-Y-3, "Scaffold Construction/Inspection and Use of Extension Ladders"

2.3 CMR 93-035, "RB Tendon End Cap Modification"

2.4 1301-9.1, "Reactor Building Structural Integrity Tendon Surveillance"

2.5 1410-Y-11, "Threaded Piping and Fitting Maintenance"

2.6 1407-15 "Control and Use of Lifting/Rigging Equipment"

3.0 PLANT STATUS

3.1 Operating or shutdown.

4.0 PREREQUISITES

- Obtain Shift Manager/Control Room Supervisor permission prior to commencing this maintenance and request he specify any Tech. Spec. limitations or limitations due to plant operation applicable during performance of this procedure.
- Initiate RWP if working in a radiologically controlled area.
- If lifting and handling equipment is to be used, ensure rigging and lifting devices have been inspected/approved for use in accordance with procedure 1407-15.

5.0 LIMITS AND PRECAUTIONS

5.1 Tendon end caps located in the vicinity of the Main Steam safety relief valve discharge stacks may not be worked on while the plant is at power.

5.2 Care should be exercised while working from scaffolds, platforms, ladders, high or restricted access locations. Respect for the safety and well-being of other personnel in the area must be observed.

5.3 During grease replacement the grease could be hot and direct contact with the grease should be avoided.

5.4 The grease could be under pressure. Remove plugs and nuts slowly to allow pressure, if any, to vent off.

5.5 Spilled grease could create a slipping safety hazard and damage roof surfaces. During all operations, it should be cleaned up and placed into waste containers.

5.6 Tendons located near hot MS or FW penetrations may contain hot, thin grease which makes end cap work more difficult and possibly hazardous. It may be preferable to work on those during a plant outage, if practical.

5.7 When conditional step(s) do not apply, the performer shall continue to the next numbered step.

6.0 DESCRIPTION AND LOCATION OF SYSTEM/ASSEMBLY

6.1 The original RB tendon end cap design is as shown in Attachment 2.

6.2 The latest RB tendon end cap design is as in Attachment 3.

6.3 All tendon end caps are accessible from outside the Reactor Building. The end caps for the hoop tendons are located on both sides of each of six buttresses evenly spaced around the Reactor Building. The end caps for the dome tendons are located on the outside diameter of the dome. The vertical tendon end caps are located in the lower tendon access gallery under the RB mat and under the removable deck plates on top of the ring girder.

7.0 SPECIAL TOOLS, MATERIALS AND PERSONNEL QUALIFICATIONS

7.1 The supervisory personnel for administering the progress of this work and directing manpower shall be fit by skill, training and/or experience to implement this procedure.

7.2 The craft personnel responsible for the physical activities associated with this procedure shall be fit by skill, training or experience to perform their duties.

7.3 Miscellaneous hand tools.

7.4 Greasing Equipment (only required if end cap is being removed).

7.4.1 Come-alongs and associated rigging. The end caps weigh approximately 200# when filled with grease.

7.4.2 Drum belt heaters.

7.4.3 Hand pump for pumping hot grease from a 55 gallon drum.

7.4.4 Thermometer (calibrated) to measure replacement grease temperature 0-300°F).

7.4.5 Viscosity Oil Co. Visconorust 2090P-4 Casing Filler Grease.

7.5 Plastic bags, plastic sheeting, rags, buckets and drums for waste grease.

7.6 Solvent - for removing grease and cleaning equipment. (EPA 2000 or CRC Natural Degreaser Aerosol is acceptable to TMI).

7.7 Goodyear pliobond adhesive with brush top can or approved equal gasket cement. Commercial grade.

7.8 Spray galvanizing type paint made by LPS Research Laboratories, Inc. or approved EQUAL. Commercial grade.

7.9 Modified 1 1/16" socket sets with body approximately 3" long in order to clear end cap hold-down studs on original type end cap hold-down configuration.

7.10 Cleaning rags.

7.11 Tendon End Cap fasteners, gaskets, and clamps.

7.11.1 Top (Shop End), Vertical End Cap Materials:

- Flat Under-Can Gaskets, 1 per end cap, SS # 286-110-0500-1 (Inland Ryerson Drawing No. 170WAC5) - 1/2 inch thick, closed cell neoprene, 17 1/2" O.D. (+1/16, -0) x 14 1/2" I.D. (+0, -1/16), Manufacturer - Rubatex Corp. or equal.

- Stud Gaskets, 4 per end cap, SS# 929-031-3000-1. 1/8 inch thick neoprene, 3/8" O.D. x 5/8" I.D. Manufacturer - J.D. Rohrback Company of Lancaster or equal.

- Belleville Spring Washers, 4 per end cap, SS# 000-454-4810-1. 5/8" standard, Manufacturer - Rolex Co. Hillside, NJ. or equal.

7.11.2 Bottom (Field End), Vertical End Cap Materials:

- O-Ring Gaskets, 1 per end cap SS# 459-046-7500-1. 5/8" cross-section, 17 1/4" I.D., 60 - 80 durometer neoprene.

7.11.3 Hoop and Dome Tendon End Cap Materials:

- Flat Under-Cap Gaskets, 1 per end cap, SS# 286-110-0500-1 (Inland Ryerson Drawing No. 170WAC5) - 1/2 inch thick, closed cell neoprene, 17 1/2" O.D. (+1/16, -0) x 14 1/2" I.D. (+0, -1/16), Manufacturer - Rubatex Corp. or equal.

- End Cap Pipe Plugs, 4 per end cap, 1/2" NPT Galvanized.

- End Cap Pipe Plugs, 1 per end cap, 1/4" NPT Galvanized.

- Hold-Down Clamps, 4 per end cap, (Ref. P.O. 0436005), Manufacturer - Precision Surveillance or equal.

- Hold-Down Bolts and Washers, 4 per end cap. 1" - 8UNC x 2 1/2" Galvanized.

- POP-A-PLUG, P/N PSC-0750-S, SSN 000-478-0820-1

- POP-A-PLUG Installation Tool

- Teflon tape thread sealant

8.0 PROCEDURE

General:

The RB tendon end caps will be re-installed in one of the following configurations depending upon which tendon group they are in:

- Preferred Configuration for Hoop and Dome (See Attachment 3) The cap is removed and the main gasket is replaced with the conventional Rubatex gasket, The original through-cap mounting bolting is replaced with hold down clamps, and the through-cap holes plugged with Pop-A-Plugs. A 1/4" vent plug is installed. The end cap is then filled with new filler grease.
- Primarily used on the upper end of vertical tendons (See Attachment 2). This alternative makes no changes to the existing design. A Rubatex gasket and "thru-can" bolting are used.
- Used on vertical tendon lower end caps. This makes no modifications to the existing design. An O-ring is installed in the end cap which is bolted directly into the bearing plate.

8.1 On Data Sheet 1, record the tendon identity and the end of the tendon which is having its end cap installed.

8.2 Deleted

8.3 End cap removal and prep (For tendon inspection or for replacement of main gasket).

8.3.1 Vent off pressure by slowly removing the grease inlet plug.

8.3.2 During the removal of the tendon end cap and until the reinstallation of the cap, keep track of the amount of grease lost or scrapped and record this amount on Data Sheet 1 for the tendon end cap being worked.

8.3.3 Remove the four end cap hold down nuts and washer, if they exist. Pull the tendon end cap off and set it down in a secure location.

8.3.4 Remove the hold down studs from the anchorage if they exist. If a stud cannot be removed from the anchorage, the entire ring may be removed although it is preferable to leave the ring in place.

8.3.5 Clean and discard the old grease from the end cap and from the anchorage head and bearing plate as necessary to provide for proper placement of the new gasket or O-ring and retaining plate.

8.3.6 Clean and dry the gasket seating surface of the tendon end cap and bearing plate using approved solvent or other approved cleaner.

8.3.7 Note that this step is not applicable for vertical tendons. If not already installed, in the OD of the cap, approximately 6" from the flange and in line with the fill plug, drill and tap for a 1/4" NPT vent plug.

8.3.8 Using a 1"-8 UNC tap or thread chaser, clean up the four bolt holes in the base plate around the end cap.

8.3.9 If not already done, the four hold down stud holes are to be plugged for hoop and dome tendons. This method of plugging is with Pop-a-plugs, however, 1/2" NPT plugs may be substituted.

8.3.9.1 Prior to installing a Pop-a-Plug, ensure that the hole in the can is free of gouges or scoring that would affect its ability to effect a seal.

8.3.9.2 Install the Pop-a-Plug in accordance with the manufacturer's instructions. Use no pipe sealant.

8.3.9.3 If unable to install a Pop-a-Plug, tap the hole to accept a 1/2" NPT Galvanized Pipe plug. Apply teflon tape and install the plug.

8.4 Installation of replacement Rubatex Gasket configuration for hoop and dome tendons.

8.4.1 Bond the Rubatex gasket to the face of the flange using pliobond.

8.4.2 Align the tendon end cap over the anchorage against the bearing plate using care to avoid damaging or misaligning the gasket which has been glued to the end cap flange.

8.4.3 Secure four tendon end cap hold down clamps with bolts and washers to the bearing plate holes and hand tighten them.

8.4.4 Recheck that the gasket has not slipped or become crimped and that the tendon end cap and hold down clamps are aligned properly.

8.4.5 Tighten each bolt, equalizing the load on each as much as possible, to evenly compress the Rubatex main gasket by approximately 1/8". (No torquing is required)

8.4.6 Heat grease to 140°F to 200°F using a calibrated thermometer to obtain temperature and record on Data Sheet 1.

8.4.7 For horizontal and dome tendons, attach a vendor supplied Y-device to the grease inlet of the tendon end cap and hand pump hot grease (140°F - 200°F) into the tendon end cap until it reaches a level 1 1/2" to 2" below the vent hole to allow for the expansion of the grease. Record grease level on Data Sheet 1

8.4.8 Apply teflon tape to the grease inlet and vent plug threads and install the grease inlet plug and the vent plug and tighten them securely using an approved thread sealant.

8.4.9 Verify that no grease is leaking. If leakage does exist, correct the deficiency.

8.4.10 Record amount of grease added on Data Sheet 1.

8.5 Installation of Rubatex gasket with top (shop end) vertical "through-can" bolting.

8.5.1 Bond the Rubatex gasket to the face of the flange using Pliobond.

8.5.2 Align the tendon end cap over the anchorage against the bearing plate using care to avoid damaging or misaligning the gasket which has been glued to the end cap flange.

8.5.3 Install the four tendon end cap hold down nuts (with gaskets and conical washers) on the studs and hand tighten them.

8.5.4 Recheck that the gasket has not slipped or become crimped and that the tendon end cap is properly aligned.

8.5.5 Tighten each nut, equalizing the load on each stud as much as possible, to evenly compress the Rubatex main gasket by approximately 1/8". (No torquing is required.)

NOTE

Do not overfill if topping off with grease. Maintain 2" to 3" of air gap below top of can.

8.5.6 Refill the tendon end cap as follows:

1. Heat grease to 140°F to 200°F using a calibrated thermometer to obtain temperature and record on Data Sheet 1.
2. Attach a vendor supplied Y-device to the grease inlet of the tendon end cap and hand pump hot grease (140°F to 200°F) into the tendon end cap until it reaches a level 2" to 3" below the vent hole to allow for the expansion of the grease. Record grease level on Data Sheet 1.
3. Apply teflon tape to the grease inlet and vent plug threads and install the grease inlet plug and the vent plug and tighten them securely using an approved thread sealant.
4. Verify that no grease is leaking and record it on Data Sheet 1. If leakage does exist, correct the deficiency.
5. Record amount of grease added on Data Sheet 1.

8.6 Installation of O-Ring gaskets on lower vertical tendons with bearing plate bolting

8.6.1 Bond the O-Ring gasket in place using Pliobond.

8.6.2 Align the tendon end cap over the anchorage against the bearing plate using care to avoid damaging or misaligning the O-ring which has been glued to the end cap.

8.6.3 Install the four tendon end cap hold down bolts and hand tighten them.

8.6.4 Tighten each bolt, equalizing the load on each bolt as much as possible, to evenly compress the O-ring main gasket. The flange should be pulled up tight against the bearing plate. Bring the bolts to a "snug-tight"* condition and then tighten the bolts by an additional 1/4 to 1/3 turn of the bolt head. (*"Snug-tight" is defined as the tightness attained by the full effort of a person using an ordinary spud wrench.)

8.6.5 It is required to refill the tendon duct void from the lower vertical tendon end when most of the tendon has been drained of its grease. The top (shop end) vertical tendon end grease inlet plug shall be removed during filling so that grease passes through the tendon duct void and out the top, until air has been purged from the system. No air gap is required when performing a total refill of the tendon duct void. Record grease temperature on Data Sheet 1.

8.6.6 Verify that no grease is leaking and record it on Data Sheet 1. If leakage does exist, correct the deficiency.

8.6.7 Record amount of grease added on Data Sheet 1.

9.0 ACCEPTANCE CRITERIA

9.1 No grease leakage from the tendon end cap.

9.2 End cap verified to have an air space at the top to allow for expansion of the grease. (8.4.7 and 8.5.6 "Note"))

9.3 The work area has been cleaned of all debris and grease spilled during the work process.

9.4 ...eet 1 (Attachment 1) is completed for each end cap that has had a grease change and is ...uded in the work package. A copy of each data sheet is forwarded to the Lead Mechanical Engineer.

10.0 POST MAINTENANCE TESTING

1. Visual inspection to verify leak tightness. No leakage is acceptable.

11.0 ATTACHMENTS

11.1 Attachment 1 - Data Sheet 1

11.2 Attachment 2 - "Original Can Hold-Down Design"

11.3 Attachment 3 - "Hoop and Dome Tendon End/End Can Assembly Latest Design"

Regreasing of RB Tendon End Caps

8.1 Tendon Identity:______________________ Tendon End:______________________

8.3.2 Amount of grease removed: ______________________gallons

8.4 Hoop and Dome Tendons

8.4.6 Replacement grease temperature: ________________°F (140°F to 200°F)

8.4.7 Grease level below vent hole ______________________inches (1½ to 2")

8.4.9 Grease leaking______________Yes ______________No

8.4.9 Amount of grease added ______________________gallons

8.5 Top Vertical Tendons

8.5.6(1) Replacement grease temperature________________°F (140°F to 200°F)

8.5.6(2) Grease level below vent hole______________________inches (2" to 3")

8.5.6(4) Grease leaking______________Yes ______________No

8.5.6(5) Amount of grease added______________________gallons

8.6 Lower Vertical Tendons

8.6.5 Replacement grease temperature________________°F (140°F to 200°F)

8.6.6 Grease leaking______________Yes ______________No

8.6.7 Amount of grease added______________________gallons

10.0 PMT Sat______________ Unsat______________

Comments:____

____

____

____

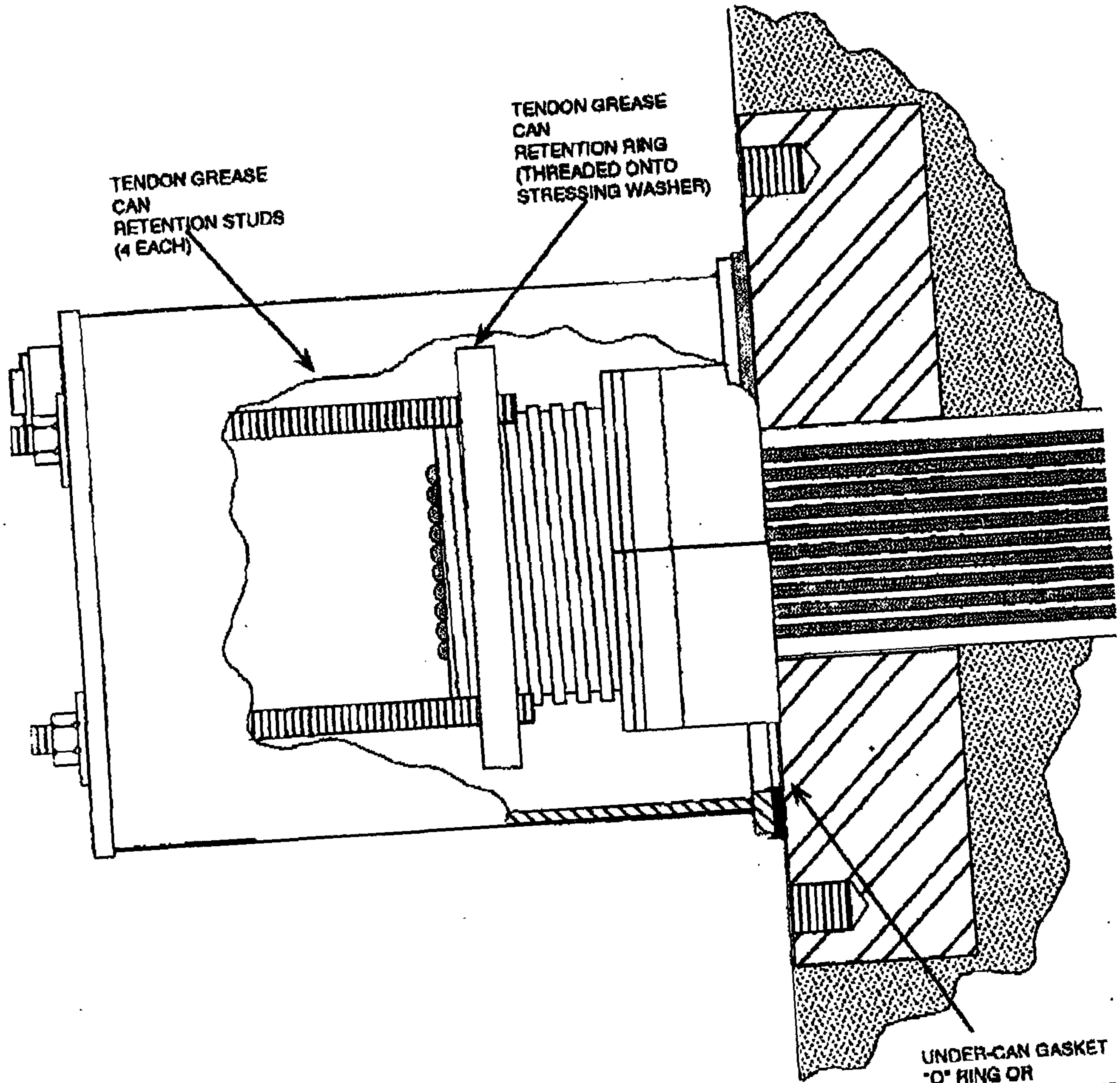
____

Calibrated Test Equip.:______________________________ Cal. Due Date:______________

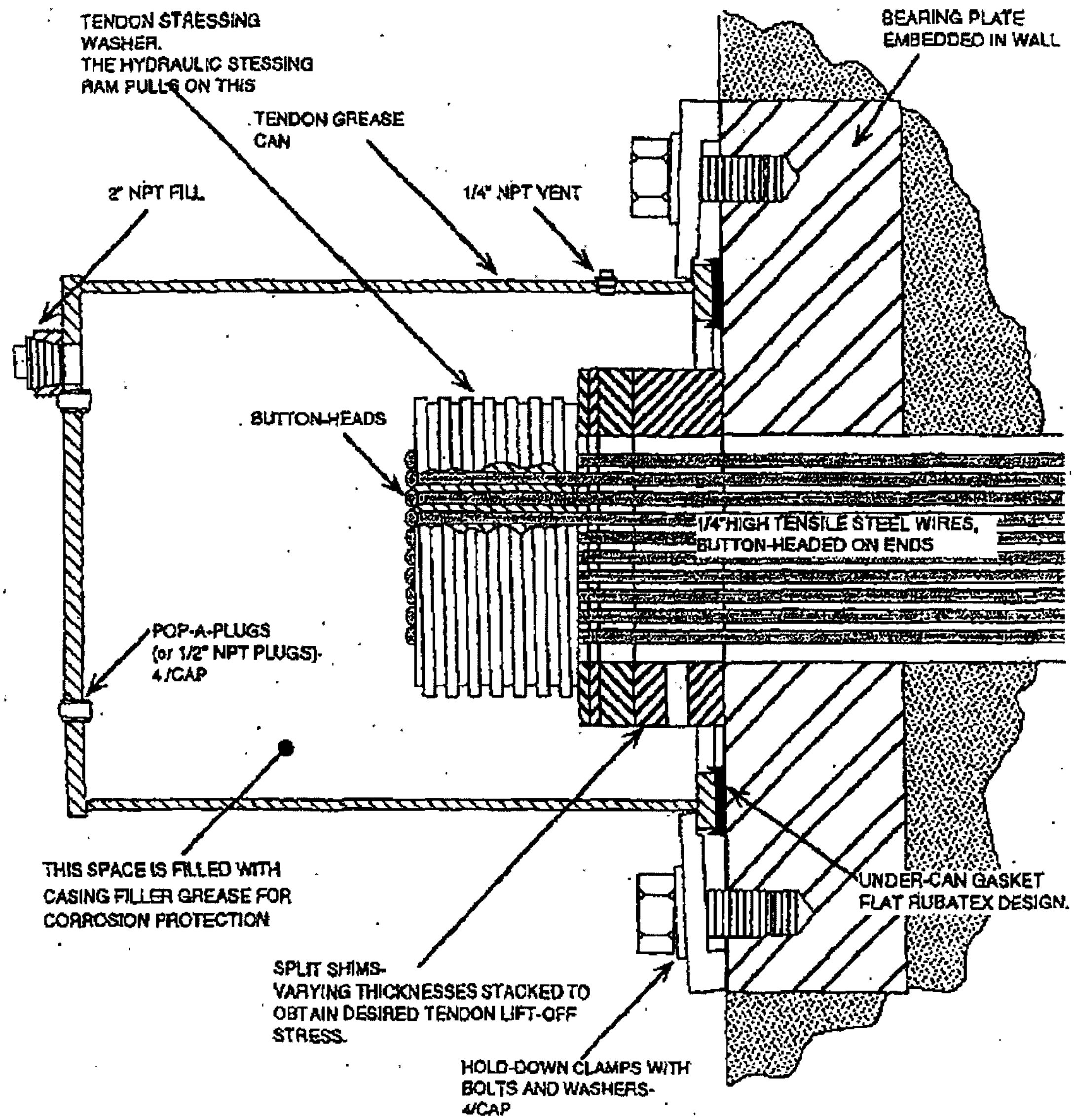
Supervisor Signoff:______________________________ Date:______________

Attach filled out and signed copies of this data sheet to the Job Closeout or Tendon Surveillance Report Package for any end caps which have been removed/regreased.

ATTACHMENT 2



ORIGINAL CAN HOLD-DOWN DESIGN



HOOP & DOME TENDON END/END CAN ASSEMBLY LATEST DESIGN

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year

Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED: 10-19-2010
GAUGE I.D.: A-005
MASTER GAUGE I.D.: 1017880
REMARKS:

QC SIGN OFF: W. Rance Robbins

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2020
3000	3020
4000	4020
5000	5020
6000	6020
7000	7030
8000	8035

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year

Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED: 10-20-10
GAUGE I.D.: A-005
MASTER GAUGE I.D.: 1017880
REMARKS: NONE

QC SIGN OFF: Tim [illegible]

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2020
3000	3020
4000	4020
5000	5020
6000	6020
7000	7030
8000	8030
8500	8530

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year   Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED: 10-20-10
GAUGE I.D.: A-004
MASTER GAUGE I.D.: 1017880
REMARKS: NONE

QC SIGN OFF: [signature]

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
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2000	2020
3000	3020
4000	4020
5000	5020
6000	6020
7000	7000
8000	8000
8500	8500

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year   Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED
GAUGE I.D.
MASTER GAUGE I.D.
REMARKS

QC SIGN OFF

MASTER GAUGE (PSI)	JACK GAUGE (PSI)

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year   Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED: 10-21-2010
GAUGE I.D.: 4004
MASTER GAUGE I.D.: 1017880
REMARKS: NONE

QC SIGN OFF:

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2020
3000	3020
4000	4000
5000	5000
6000	6000
7000	7000
8000	8020
8500	8520

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year   Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED: 10-21-2010
GAUGE I.D.: 4005
MASTER GAUGE I.D.: 1017880
REMARKS: None

QC SIGN OFF:

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
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2000	2000
3000	3020
4000	4020
5000	5020
6000	6025
7000	7025
8000	8020
8500	8520

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year   Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED: 10-22-10
GAUGE I.D.: A-004
MASTER GAUGE I.D.: 1017880
REMARKS: None

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2020
3000	3020
4000	4020
5000	5020
6000	6000
7000	7020

QC SIGN OFF: [signature]

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year   Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED: TCS 102610 ~~A~~ 10-26-10
GAUGE I.D.: A-004
MASTER GAUGE I.D.: 1017880
REMARKS: None

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2020
3000	3020
4000	4000
5000	5000
6000	6000
7000	7002

QC SIGN OFF: [signature]

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year   Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED 10-27-10
GAUGE I.D. A-004
MASTER GAUGE I.D. 1017840
REMARKS None

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2020
3000	3020
4000	4020
5000	5020
6000	6020
7000	7020

QC SIGN OFF [signature]

Project: TMI NUCLEAR PLANT UNIT 1 – 35th Year   Job # N1043

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED
GAUGE I.D.
MASTER GAUGE I.D.
REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)

QC SIGN OFF

Exelon.
Nuclear

Three Mile Island Unit 1
Rt. 441 South
Middletown, PA 17057

October 18th, 2010

MEMO: Acceptance of Tendon Surveillance Manual and Certifications

After review of the PSC Post Tensioning System In-Service Inspection Manual and the QC and VT inspector personnel certifications, we accept the personnel certifications and use of the Inspection Manual for the execution of the Augmented Surveillance of the SGRP affected tendons at Three Mile Island Unit 1.

Tendon Stressing Rams and other M&TE calibration records have also been reviewed and found to be acceptable for use during this surveillance.

Evan Johnson
TMI Engineer

Howard Hill
Responsible Engineer

Exelon. Nuclear

Friday, October 22, 2010

MEMO: Tendon Wire Inspection Scope for V118

As a result of the discovery of two broken wires in tendon V118, TMI requests PSC to perform a continuity test of 100% of the remaining wires in this tendon. The broken wires are to be removed and returned to TMI Engineering for analysis and testing. The planned removal of a surveillance wire from the tendon for tensile testing shall be chosen to be a wire whose button head is on the opposite side of the anchorhead from the broken wire's buttonhead positions. PSC shall perform tensile testing of the surveillance wire as previously planned.

TMI also requests PSC to remove the end caps of the two adjacent vertical tendons and examine the anchorages for any similar conditions.

G. E. Johnson
TMI Engineering

Howard Hill
Responsible Engineer

Exelon.
Nuclear

To: Precision Surveillance Corp.
From: Evan Johnson, TMI-1 Engineering
Date: 24 Oct 10

Subject: TMI-1 2010 Tendon Surveillance / V118 (and other tendons as necessary) Wire Continuity Tests

Tendon V118 wire continuity tests may be done using any technique approved by Exelon Engineering or Responsible Engineer. The following technique is approved.

- Position the tendon and anchor heads to expose several inches of wire below the bottom anchor head.

- Attach a pulling device to the bottom end of each wire in sequence and pull down with a force of 5,500 - 6,000 lb to demonstrate continuity. Use a calibrated dynamometer to verify that a load of 6,000 lb is not exceeded. Continuity is considered to be demonstrated if a wire will carry a 5,500 lb load. Document dynamometer serial number, accuracy and cal due date as well as test results on a continuity test data sheet (to be provided).

- Broken wires will pull out at a lower force. Remove all broken wires from the tendon. Mark and coil or cut removed wires as directed by Engineering or Responsible Engineer. Record the peak force for each removed wire.

Evan Johnson
TMI Engineering

Howard Hill
Responsible Engineer

To: PSC
From: Evan Johnson / TMI Engineering
Date: 26 Oct 10

Subject: Vertical Tendon Shim Arrangement

Vertical tendons require at least one 4 inch shim at the bottom end. Additional shims may be added at the bottom as needed to allow installation of the upper end cap.

Evan Johnson TMI Engineering	Howard Hill Responsible Engineer

From: Evan.Johnson@exeloncorp.com [mailto:Evan.Johnson@exeloncorp.com]
Sent: Thursday, September 16, 2010 3:26 PM
To: Christopher Cox
Cc: Thomas.Geyer3@exeloncorp.com; Bruce.Kaplan@exeloncorp.com
Subject: RE: Tendon ST - Review and Discuss

Chris,

There is no normalization factor used in the SGRP tendon stress calculations. This is a specific attribute of these containment opening tendons. Also, these tendons forces will not be used to compute mean tendon forces for the containment structure. These tendons will have a much higher stress than the remainder of the tendon population and inclusion of these tendon forces in the mean calculations would be non-conservative.

Regards

Evan Johnson
Aging Management Coordinator
Engineering Programs, TMI
(717) 948-8823
Exelon
Nuclear

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-23-2010 Report No:

System: Containment Tendons Component: Containment bldg. Buttress 4 WO No(s).: R2139507

Location: Building: Containment Elev.: Col.: Row: Azimuth/Radius:

Exam Type: ☐ DV ☐ GV ☐ VT-1C ☒ VT-3C Type Of Exam: ☐ Direct ☒ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0015 Visual Aids: Binoculars

Surface: ID OD Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: None ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-23-2010 Time: 1300

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Buttress 4			A	Small cracks
			H	Degraded grout patches
			L	oil stains
			P	small Bug holes
				All general area conditions previously reported, No change.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)	G. Settlements Or Deflections	M. Scaling / Dusting
B. Exposed Reinforcing Steel	H. Degraded Patches or Repairs	N. Coating Deterioration
C. Exposed Metallic Items (Other)	I. Popouts, Voids, Honeycomb	O. Abrasion, Cavitation, Wear
D. Evidence Of Grease Leakage	J. Spalls	P. Air Voids / Bug Holes
E. Evidence Of Moisture	K. Cold Joint Lines	Q. Efflorescence
F. Leaching Or Chemical Attack	L. Corrosion Staining	R. Other (Explain)

Supplemental Information: ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Lance Robbins W. Lance Robbins LEVEL II DATE 10-25-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No No RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) Howard Hill (Howard Hill) DATE: ~~28~~ 29 Oct 10

ANII REVIEW (as applicable) Joseph S. Hubly DATE: 11-4-10

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ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-25-2010 Report No:

System: Containment Tendons Component: Containment bldg. Buttress 5 WO No(s).: R2139507

Location: Building: Containment Elev.: Col.: Row: Azimuth/Radius:

Exam Type: ☐ DV ☐ GV ☐ VT-1C ☒ VT-3C Type Of Exam: ☐ Direct ☒ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0015 Visual Aids: Binoculars

Surface: ID OD Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: None ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Spotlight Illumination Verified: Date: 10-25-2010 Time: 1100

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Buttress 5			A	Small cracks
*Note: The face of buttress 5 is inaccessable due to coverage by a ventilation stack.			H	Degraded grout patches
			L	Oil stains
			P	Small Bugholes
			C	exposed embed plates
				All general area conditions previously reported. No change.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts , Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information : ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-25-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No NO RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) (Howard Hill) DATE: 29 Oct 10

ANII REVIEW (as applicable) DATE: 11-4-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-25-2010 Report No:

System: Containment Tendons Component: Containment bldg. Buttress 6 WO No(s).: R2139507

Location: Building: Containment Elev.: Col.: Row: Azimuth/Radius:

Exam Type: ☐ DV ☐ GV ☐ VT-1C ☒ VT-3C Type Of Exam: ☐ Direct ☒ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0015 Visual Aids: Binoculars

Surface: ID OD Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: None ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Spotlight Illumination Verified: Date: 10-25-2010 Time: 1100

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Buttress 6			A	Small cracks
			H	Degraded grout patches
			L	oil stains
			P	Small bugholes
			C	exposed embed plates.
				All general area conditions previously reported. No change

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)	G. Settlements Or Deflections	M. Scaling / Dusting
B. Exposed Reinforcing Steel	H. Degraded Patches or Repairs	N. Coating Deterioration
C. Exposed Metallic Items (Other)	I. Popouts, Voids, Honeycomb	O. Abrasion, Cavitation, Wear
D. Evidence Of Grease Leakage	J. Spalls	P. Air Voids / Bug Holes
E. Evidence Of Moisture	K. Cold Joint Lines	Q. Efflorescence
F. Leaching Or Chemical Attack	L. Corrosion Staining	R. Other (Explain)

Supplemental Information: ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-25-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No No RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) (Howard Hill) DATE: 29 Oct 10

ANII REVIEW (as applicable) Joseph Atthebly DATE: 11-4-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: Unit 1 Date: 10-23-2010 Report No:

System: Containment Tendons Component: Containment bldg, Buttress 1 WO No(s): R2139507

Location: Building: Containment Elev.: Col.: Row: Azimuth/Radius:

Exam Type: ☐ DV ☐ GV ☐ VT-1C ☒ VT-3C Type Of Exam: ☐ Direct ☒ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0014 Visual Aids: Binoculars

Surface: ID OD Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: None ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Flashlight Illumination Verified: Date: 10-23-2010 Time: 1300

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Buttress 1			A	Small cracks
			H	Degraded grout patches
			L	oil stains
			P	Bug holes (Small)
				General Area Conditions previously reported. No change

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)	G. Settlements Or Deflections	M. Scaling / Dusting
B. Exposed Reinforcing Steel	H. Degraded Patches or Repairs	N. Coating Deterioration
C. Exposed Metallic Items (Other)	I. Popouts , Voids, Honeycomb	O. Abrasion, Cavitation, Wear
D. Evidence Of Grease Leakage	J. Spalls	P. Air Voids / Bug Holes
E. Evidence Of Moisture	K. Cold Joint Lines	Q. Efflorescence
F. Leaching Or Chemical Attack	L. Corrosion Staining	R. Other (Explain)

Supplemental Information : ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-25-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No No RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) (Howard Hill) DATE: 29 Oct 10

ANII REVIEW (as applicable) Joseph [illegible] DATE: 11-4-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI	Unit: 1	Date: 10-19-2010	Report No:
System: Containment Tendons	Component: Dome Area Tendon Trench		WO No(s).: R2139507
Location: Building: Containment	Elev.:	Col.: Row:	Azimuth/Radius: 235° to 340°
Exam Type: ☐ DV ☐ GV ☐ VT-1C ☒ VT-3C	Type Of Exam: ☒ Direct ☐ Remote		Matl. Type: Concrete
Design Drawing(s) TMI 1-0016	Visual Aids: None		
Surface: ID (OD)	Surface / Components Coated: ☐ YES ☒ NO		
M&TE Used: Feeler Gauge FR58845-11 Cal. due ☒ Test Card	UTC or Serial No. N/A		Cal. Due Date: N/A
Illumination Used Spot Light	Illumination Verified: Date: 10-19-2010	Time: 0800	
Special / Specific Instructions:			

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Dome Area Tendon Trench from V-113 to V-157			R	Spall in trench wall, previously reported, repaired and stable.
* Note: This VT-3C exam is being done on detensioned and/or replaced during the SGR. * NOTE: All conditions listed are as previously reported, no change.			R	Bearing plates with corrosion, previously reported, repaired and stable.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)	G. Settlements Or Deflections	M. Scaling / Dusting
B. Exposed Reinforcing Steel	H. Degraded Patches or Repairs	N. Coating Deterioration
C. Exposed Metallic Items (Other)	I. Popouts, Voids, Honeycomb	O. Abrasion, Cavitation, Wear
D. Evidence Of Grease Leakage	J. Spalls	P. Air Voids / Bug Holes
E. Evidence Of Moisture	K. Cold Joint Lines	Q. Efflorescence
F. Leaching Or Chemical Attack	L. Corrosion Staining	R. Other (Explain)

Supplemental Information: ☒ Yes ☐ No ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins [signature] LEVEL II DATE 10-19-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/10

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No No RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) [signature] (Howard Hill) DATE: 29 Oct 10

ANII REVIEW (as applicable) [signature] DATE: 11-4-10

Page 1 of 1

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI	Unit: 1	Date: 10-19-2010	Report No:
System: Containment Tendons	Component: Tendon Gallery Base Mat		WO No(s).: R2139507
Location: Building: Containment	Elev.:	Col.: Row:	Azimuth/Radius: 235° to 340°
Exam Type: ☐ DV ☐GV ☐VT-1C ☒VT-3C	Type Of Exam: ☒Direct ☐Remote		Matl. Type: Concrete
Design Drawing(s) TMI 1-0016	Visual Aids: None		
Surface: ID OD	Surface / Components Coated: ☒ YES ☐ NO		
M&TE Used: Steel Scale R-51 Cal. due 2-24-11 ☒ Test Card	UTC or Serial No. N/A		Cal. Due Date: N/A
Illumination Used Spot Light	Illumination Verified: Date: 10-19-2010 Time: 0800		
Special / Specific Instructions:			

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Tendon Gallery Base Mat from V-113 to V-157.			A	Stress cracks none > than .015".
*Note: This VT-3C exam is being done on the tendons detensioned and/or replaced during the SGR.			Q	Efflorescence on inner and outer walls at base mat.
*Note: All conditions listed are as previously reported, no change.			C/H	Degraded grout patches with exposed metal that apears to be abandoned trumpets at various locations between bearing plates and inner wall with active corrosion.
			C	Exposed embed plate adjacent to V-113 w/active corrosion and pitting < than .010" deep.
			N	Concrete surfaces coated with sealant are peeling in areas throughout gallery.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)	G. Settlements Or Deflections	M. Scaling / Dusting
B. Exposed Reinforcing Steel	H. Degraded Patches or Repairs	N. Coating Deterioration
C. Exposed Metallic Items (Other)	I. Popouts , Voids, Honeycomb	O. Abrasion, Cavitation, Wear
D. Evidence Of Grease Leakage	J. Spalls	P. Air Voids / Bug Holes
E. Evidence Of Moisture	K. Cold Joint Lines	Q. Efflorescence
F. Leaching Or Chemical Attack	L. Corrosion Staining	R. Other (Explain)

Supplemental Information : ☒Yes ☐No ☐ Sketch ☒Photo ☐Video ☐ Other (Describe):

Results: Acceptable ☒Yes ☐No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-19-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No No RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) [signature] (Howard Hill) DATE: 29 OCT 10

ANII REVIEW (as applicable) Joseph [signature] DATE: 11-4-10

Page 1 of 2

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI   Unit: 1   Date: 10-19-2010   Report No:

System: Containment Tendons   Component: Tendon Gallery Base Mat   WO No(s).: R2139587

Location: Building: Containment   Elev.:   Col.:   Row: Azimuth/Radius: 235° to 345°

Exam Type: ☐ DV ☐ GV ☐ VT-1C ☒ VT-3C   Type Of Exam: ☒ Direct ☐ Remote   Matl. Type: Concrete

Design Drawing(s): TMI 1-0016   Visual Aids: None

Surface: ID (OD)   Surface / Components Coated: ☒ YES ☐ NO

M&TE Used: Steel Scale R216 Cal due 6-24-11 ☒ Test Card   UTC or Serial No. N/A   Cal. Due Date: N/A

Illumination Used: Spot light   Illumination Verified: Date: 10-19-2010 Time: 0800

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Tendon Gallery Base Mat from V-113 to V-157			B	Exposed rebar Adjacent to V-143
*Note: This VT-3C exam is being done on the tendons detensi-oned and/or replaced during the SGR. *Note: All conditions listed are as previously reported, no change.			B	Exposed rebar adjacent to V-149

Results Legend:
NI - No Indications   RI - Recordable Indication   IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)	G. Settlements Or Deflections	M. Scaling / Dusting
B. Exposed Reinforcing Steel	H. Degraded Patches or Repairs	N. Coating Deterioration
C. Exposed Metallic Items (Other)	I. Popouts , Voids, Honeycomb	O. Abrasion, Cavitation, Wear
D. Evidence Of Grease Leakage	J. Spalls	P. Air Voids / Bug Holes
E. Evidence Of Moisture	K. Cold Joint Lines	Q. Efflorescence
F. Leaching Or Chemical Attack	L. Corrosion Staining	R. Other (Explain)

Supplemental Information : ☒ Yes ☐ No   ☐ Sketch ☒ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) N. Rance Robbins   W. Rance Robbins   LEVEL II   DATE 10-19-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson   DATE 10/29/10

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No   No RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) (Howard Hill)   DATE: 29 Oct 10

ANII REVIEW (as applicable) Joseph S Mulvey   DATE: 11-4-10

Page 2 of 2

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-22-2010 Report No:

System: Containment Tendons Component: Containment building wall between buttress 5 & 6 WO No(s).: R2139507

Location: Building: Containment Elev.: N/A Col.: N/A Row: N/A Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☐ VT-1C ☒ VT-3C Type Of Exam: ☐ Direct ☒ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0015 Visual Aids: Binoculars

Surface: ID (OD) Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: None ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Sunlight & spotlight Illumination Verified: Date: 10-22-2010 Time: 1130

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Outer surface of the containment building wall between buttresses 5 and 6 Including SGR construction opening patch.*			A H P	General area conditions - shrinkage cracks < than .040", Degraded grout patches on form tie holes, and small bug holes unchanged.
			H	3-areas with degraded grout patches between buttress 5 & 6 32" below ring girder, cold joint adjacent to H5343 6" from the left side of buttress 5, and 2'x5' area 12' above the equipment hatch enclosure are unchanged.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A.	Cracks (Characterize and Size)	G.	Settlements Or Deflections	M.	Scaling / Dusting
B.	Exposed Reinforcing Steel	H.	Degraded Patches or Repairs	N.	Coating Deterioration
C.	Exposed Metallic Items (Other)	I.	Popouts, Voids, Honeycomb	O.	Abrasion, Cavitation, Wear
D.	Evidence Of Grease Leakage	J.	Spalls	P.	Air Voids / Bug Holes
E.	Evidence Of Moisture	K.	Cold Joint Lines	Q.	Efflorescence
F.	Leaching Or Chemical Attack	L.	Corrosion Staining	R.	Other (Explain)

Supplemental Information: ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins [signature] LEVEL II DATE 10-22-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No No RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) [signature] (Howard Hill) DATE: 29 Oct 10

ANII REVIEW (as applicable) [signature] DATE: 11-4-10

Page 1 of 2

*See supplemental VT-1C exam of the SGR construction opening patch.

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI Unit: 1 Date: 10-22-2010 Report No:

System: Containment Tendons Component: Containment building wall between buttresses 5 & 6 WO No(s).: R2139507

Location: Building: Containment Elev.: N/A Col.: N/A Row: N/A Azimuth/Radius: N/A

Exam Type: ☐ DV ☐ GV ☐ VT-1C ☒ VT-3C Type Of Exam: ☐ Direct ☒ Remote Matl. Type: Concrete

Design Drawing(s) TMI 1-0015 Visual Aids: Binoculars

Surface: ID (OD) Surface / Components Coated: ☐ YES ☒ NO

M&TE Used: None ☒ Test Card UTC or Serial No. N/A Cal. Due Date: N/A

Illumination Used Sunlight & Spotlight Illumination Verified: Date: 10-22-2010 Time: 1130

Special / Specific Instructions:

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
Outer surface of the containment building wall between buttresses 5&6 Including SGR construction opening patch.*			C	exposed embed plates 4" wide 2' from left side of buttress 5 and 2' from right side of buttress 6 from the ring girder down, have surface rust with no pitting and degraded grout patches. unchanged from previous exam.
			C WER 10-22-10	Abandoned 3/4" anchor 1 foot from left side ~~of~~ and 3 feet down from top corner of SGR const. opening patch.
			K	Rough finish on cold joint lines at the top of the const. opening patch.
			R	Rough finish on grout at the bottom 1/3 of const. opening.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)	G. Settlements Or Deflections	M. Scaling / Dusting
B. Exposed Reinforcing Steel	H. Degraded Patches or Repairs	N. Coating Deterioration
C. Exposed Metallic Items (Other)	I. Popouts, Voids, Honeycomb	O. Abrasion, Cavitation, Wear
D. Evidence Of Grease Leakage	J. Spalls	P. Air Voids / Bug Holes
E. Evidence Of Moisture	K. Cold Joint Lines	Q. Efflorescence
F. Leaching Or Chemical Attack	L. Corrosion Staining	R. Other (Explain)

Supplemental Information: ☐ Yes ☒ No ☐ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-25-2010

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson DATE 10/29/2010

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No NO RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) (Howard Hill) DATE: 29 OCT 10

ANII REVIEW (as applicable) Joseph A Stebbly DATE: 11-4-10

Page 2 of 2

* See note on page 1.

ATTACHMENT 6
ASME IWE (Class CC) Containment Concrete VT-1C or VT-3C Visual Examination NDE Report
Page 1 of 1

Station: TMI	Unit: 1	Date: 10-22-2010	Report No:
System: Containment Tendons	Component: Containment bldg. wall - SGR const. opening patch	WO No(s).: R2139507	
Location: Building: Containment	Elev.: N/A	Col.: N/A Row: N/A	Azimuth/Radius: N/A
Exam Type: ☐ DV ☐ GV ☒ VT-1C ☐ VT-3C	Type Of Exam: ☒ Direct ☐ Remote	Matl. Type: Concrete	
Design Drawing(s) TMI 1-0015	Visual Aids: None		
Surface: ID (OD)	Surface / Components Coated: ☒ YES see * Notes ☐ NO		
M&TE Used: ☒ Test Card	UTC or Serial No. N/A	Cal. Due Date: N/A	
Illumination Used Sunlight & Spotlight	Illumination Verified: Date: 10-22-10	Time: 11:30	
Special / Specific Instructions:			

Component / Item Number and Description (e.g. EIN, EID, etc.)	RESULTS NI	RI TYPE	IO	Explanation / Notes (As a minimum, Record Location and Size of Recordable Indications as applicable)
SGR construction opening patch and joining concrete. Between buttress 5 & 6.			C	Abandoned 3/4" Anchor bolt 1 foot from the left side, 3' down from the top corner of the construction opening patch.
			K	Rough finish on the cold joint lines at the top of the const. opening patch.
			R	Rough finish on the grout patch at the bottom 1/3 of the const. opening patch.
			R	* The patch is coated with cureing compound it is transparent and does not limit the exam.

Results Legend:
NI - No Indications RI - Recordable Indication IO – Information Only

Recordable Indication Type Codes:

A. Cracks (Characterize and Size)	G. Settlements Or Deflections	M. Scaling / Dusting
B. Exposed Reinforcing Steel	H. Degraded Patches or Repairs	N. Coating Deterioration
C. Exposed Metallic Items (Other)	I. Popouts , Voids, Honeycomb	O. Abrasion, Cavitation, Wear
D. Evidence Of Grease Leakage	J. Spalls	P. Air Voids / Bug Holes
E. Evidence Of Moisture	K. Cold Joint Lines	Q. Efflorescence
F. Leaching Or Chemical Attack	L. Corrosion Staining	R. Other (Explain)

Supplemental Information : ☒ Yes ☐ No ☒ Sketch ☐ Photo ☐ Video ☐ Other (Describe):

Results: Acceptable ☒ Yes ☐ No

EXAMINER/EVALUATOR (Print & Sign) W. Rance Robbins W. Rance Robbins LEVEL II DATE 10-25-10

STATION/ADMIN REVIEW (Print & Sign) Evan Johnson [signature] DATE 10/29/10

This section to be completed only if Examiner/Evaluator notes RI or Unacceptable condition.

RI or Unacceptable results Acceptable ☐ Yes ☐ No No RI

Additional Actions:
(Action Request, Work Order, Issue Report, etc. initiated for Corrective Action)

LEVEL III or RE REVIEW (as applicable) [signature] (Howard Hill) DATE: 29 Oct 10

ANII REVIEW (as applicable) Joseph S Shelby DATE: 11-4-10

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Containment building wall - SGR construction opening patch.

Ring Girder

Inspected by W. Rance Robbins W. Rance Robbins Level II 10-25-10

Note: No cracks found in const. opening patch or Adjoining concrete.