

Request #7, NRC SIT Question#1 Information

1. Provide de-tensioning sequence in R16 for the construction opening. Provide procedure?
 - a. Did anyone hear anything?

Enclosed in this folder in response to the above question:

- R16 Tendon Detensioning sequence.pdf: {E-mail from the SGR Tendon Field Engineer on the detensioning sequence.}
- Containment Opening - Tendon Removal Timeline.xlsx: {Spreadsheet containing some interview questions and responses as well as some plant shutdown/mode times and tendon detensioning sequence information.}
- Z23R5 PSC Field and Quality Control Manual1.pdf: {PSC Procedures [ALL], F&Q 8.0, 8.1, and 10.0 specifically address Tendon Detensioning/Removal, Plasma Tendon Detension, and Tendon Removal}

From: [Peters, Cliff](#)
To: [Portmann, Rick](#)
Subject: FW: Tendon Detensioning sequence
Date: Friday, October 16, 2009 2:52:50 PM

From: Peters, Cliff
Sent: Friday, October 16, 2009 11:44 AM
To: Holliday, John
Subject: Tendon Detensioning sequence

Vertical

34V8 - 9/26/09 Plasma cut
34V9 - 9/26/09 Plasma cut
34V10 - 9/27/09 Plasma cut
34V11 - 9/27/09 Plasma cut
34V12 - 9/26/09 Ram De-tension
34V13 - 9/26/09 Ram De-tension
34V14 - 9/27/09 Plasma cut
34V15 - 9/27/09 Plasma cut
34V16 - 9/27/09 Plasma cut
34V17 - 9/28/09 Plasma cut

Note: We de-tensioned 34V12 & 34V13 at the same time that the we started at 34V8 & worked counter clockwise to 34V17.

Horizontal

42H27 - 9/26/09	53H27 - 9/27/09
42H28 - 9/27/09	53H28 - 9/28/09
42H29 - 9/28/09	53H29 - 9/29/09
42H30 - 9/28/09	53H30 - 9/29/09
42H31 - 9/29/09	53H31 - 9/30/09
42H32 - 9/29/09	53H32 - 9/30/09
42H33 - 9/29/09	53H33 - 9/30/09
42H34 - 9/30/09	53H34 - 10/1/09
	53H35 - 10/1/09

Note: All horizontal tendons were de-tensioned by plasma cutting starting at the bottom working toward the top.

Vertical

34V12 - 9/26/09 Ram De-tension

34V13 - 9/26/09 Ram De-tension

34V8 - 9/26/09 Plasma cut

34V9 - 9/26/09 Plasma cut

34V10 - 9/27/09 Plasma cut

34V11 - 9/27/09 Plasma cut

34V14 - 9/27/09 Plasma cut

34V15 - 9/27/09 Plasma cut

34V16 - 9/27/09 Plasma cut

34V17 - 9/28/09 Plasma cut

Note: We de-tensioned 34V12 & 34V13 at the same time that the we started at 34V8 & worked counter clockwise to 34V17.

Horizontal

Note: All horizontal tendons were de-tensioned by plasma cutting starting at the bottom working toward the top.

42H27 - 9/26/09

42H28 - 9/27/09

42H29 - 9/28/09

42H30 - 9/28/09

42H31 - 9/29/09

42H32 - 9/29/09

42H33 - 9/29/09

42H34 - 9/30/09

53H27 - 9/27/09

53H28 - 9/28/09

53H29 - 9/29/09

53H30 - 9/29/09

53H31 - 9/30/09

53H32 - 9/30/09

Start of Hydro-Dem. 9/30/09

Per Jon Burchett, Hydro-Dem began at the bottom of the opening with 2 horizontal tendons at the top left to detension.

53H33 - 9/30/09

53H34 - 10/1/09

Vertical

34V12 - 9/26/09 Ram De-tension

34V13 - 9/26/09 Ram De-tension

34V8 - 9/26/09 Plasma cut

34V9 - 9/26/09 Plasma cut

34V10 - 9/27/09 Plasma cut

34V11 - 9/27/09 Plasma cut

34V14 - 9/27/09 Plasma cut

34V15 - 9/27/09 Plasma cut

34V16 - 9/27/09 Plasma cut

34V17 - 9/28/09 Plasma cut

Note: We de-tensioned 34V12 & 34V13 at the same time that the we started at 34V8 & worked counter clockwise to 34V17.

Horizontal

Note: All horizontal tendons were de-tensioned by plasma cutting starting at the bottom working toward the top.

42H27 – 9/26/09

42H28 – 9/27/09

42H29 – 9/28/09

42H30 – 9/28/09

42H31 – 9/29/09

42H32 – 9/29/09

42H33 – 9/29/09

42H34 – 9/30/09

53H27 – 9/27/09

53H28 – 9/28/09

53H29 – 9/29/09

53H30 – 9/29/09

53H31 – 9/30/09

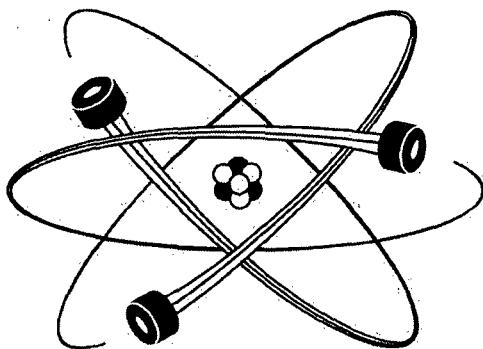
53H32 – 9/30/09

Start of Hydro-Dem. 9/30/09

Per Jon Burchett, Hydro-Dem began at the bottom of the opening with 2 horizontal tendons at the top left to detension.

53H33 – 9/30/09

53H34 – 10/1/09

**PSC****Precision Surveillance Corporation**3468 Watling Street
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CONTROLLED MANUAL NO: N1013-

POST TENSIONING SYSTEM
FIELD AND QUALITY CONTROL PROCEDURE MANUAL

FOR

PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

CONTAINMENT BUILDING TENDON INSTALLATION

REVISION

0

AUGUST 29, 2008

REVISION

1

JUNE 24, 2009

REVISION

2

AUGUST 19, 2009

REVISION

3

SEPTEMBER 16, 2009

Prepared by

QA MANAGER

Title

09/16/09

Date

Approved by

PROJECT MANAGER, P.E.

Title

09/16/09

Date

Approved by

PRESIDENT

Title

09/16/09

Date

FIELD AND QUALITY CONTROL PROCEDURE MANUAL
ACKNOWLEDGEMENT OF RECEIPT FORM

August 29, 2008

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Revision 0

Revision 2. 8/19/2009

Revision 3. 9/16/2009

This page shall be removed, and mailed or faxed to:

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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
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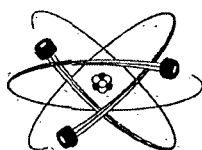
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For more information regarding responsibility of the attendant of this manual, refer to the Manual Control Policy Statement.

Field and Quality Control Procedure
Manual

Issue Date 08-29-08

Revision  09-16-09



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Precision Surveillance Corporation

FIELD AND QUALITY CONTROL PROCEDURE MANUAL

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August 29, 2008

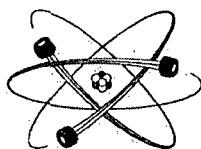
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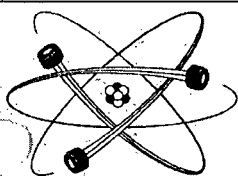
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FIELD AND QUALITY CONTROL PROCEDURE MANUAL

DEFINITIONS

August 29, 2008

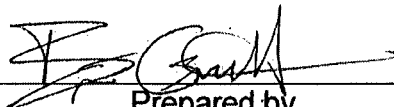
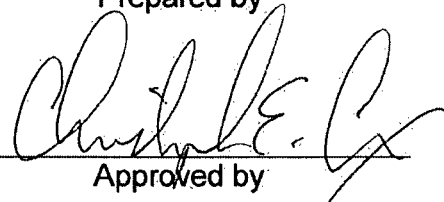
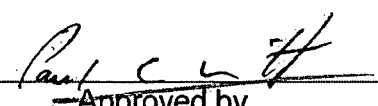
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Revision 0

PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

DEFINITIONS

 Prepared by	<u>LEVEL II Q.C.</u> Title	<u>08/29/08</u> Date
 Approved by	<u>PROJECT MANAGER, P.E.</u> Title	<u>08/29/08</u> Date
 Approved by	<u>PRESIDENT</u> Title	<u>08/29/08</u> 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.

ANCHORAGE (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 prestressed 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.

CORROSION PROTECTION MEDIUM (Grease, Casing Filler): Grease injected into tendon duct and anchorage cans 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 can, anchorage components, shim gaps, or tendon duct.

GREASE CAP: Steel container bolted to the bearing plate or anchorhead. A grease can 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 7 mm (0.27559") diameter wire is 240,000 pounds per square inch or 14,316 pounds.



JACK (Ram): A cylindrical, hydraulic device 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. For Crystal River Unit 3 the force levels for this average prestress condition are 1215 kips for the dome tendon group, 1149 kips for the vertical tendon group, and 1252 kips for the hoop tendon group.

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 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 11,452 pounds for each 7 mm diameter wire.

POST TENSIONING: A method of prestressing concrete in which the tendons are tensioned after the concrete has cured.

PREDICTED FORCE: The precalculated 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 required to achieve 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.

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 anchorage after stressing and is not seated against the anchorage. 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)

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. This may be for internal or external threaded anchorheads.

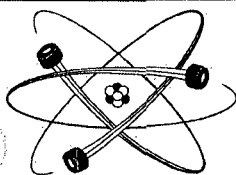
TENDON: A separate continuous multiwire tensioned element anchored at both ends to an end anchorage assembly. An assembly of prestressing steel and anchorage components which imparts prestressing forces to concrete.

TENDON END ANCHORAGE ASSEMBLY: 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.

TENDON TYPE: A tendon type is defined by its geometry and position in the containment structure; e.g., horizontal (hoop), vertical, and dome.

TENDON LOCATION NUMBER: The identity of a tendon with regard to it's location in the structure.

WIRE: 7 mm diameter wire manufactured to ASTM A421.

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Precision Surveillance Corporation

FIELD AND QUALITY CONTROL PROCEDURE MANUAL

PERSONNEL SAFETY

August 29, 2008

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Revision 0

PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

PERSONNEL SAFETY

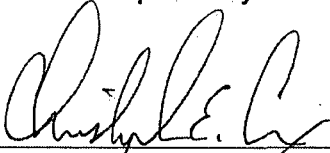

Prepared by

LEVEL II Q.C.

Title

08/29/08

Date


Approved by

PROJECT MANAGER, P.E.

Title

08/29/08

Date


Approved by

PRESIDENT

Title

08/29/08

Date



1.0 PURPOSE

- 1.1 The purpose of this document is to create awareness for those safety considerations that must be observed by those 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 WIRE

- 3.1.1 The wire used for fabricating the tendons has a minimum breaking strength of 240,000 pounds per square inch. This means that each 7mm diameter wire is capable of withstanding a minimum breaking load of 14,316 pounds per wire. Multiply this by the number of wires in a tendon and you are dealing with forces in excess of 2 million pounds for a 163 wire tendon.

- CAUTION: Never connect a welding ground, perform welding on, or strike an arc near a stressed tendon.

- CAUTION: Never apply an open flame to the button heads, the wires or anchorages of a stressed tendon. (Unless the tendon end is being Plasma Cut)

- CAUTION: Never strike the button heads, the wires or the anchorheads of a stressed tendon with a hammer or any other metal object.

- 3.1.2 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 of 4 inches in thickness, about the equivalent of a .32 caliber bullet.



3.2 STRESSING OPERATIONS

3.2.1 During de-tensioning or stressing operations the following cautions SHALL be observed.

- CAUTION: Never exceed the overstress force or pressure - 80% of tendon GUTS for a 163 wire tendon (or 11.452 kips per effective wire).
- CAUTION: DO NOT stand behind the jack when it is under load.
- CAUTION: Keep fingers out of any pinch areas.
- CAUTION: 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.

- CAUTION: Ensure the stressing adaptor (coupler) is fully engaged with the anchorage before applying any load, regardless of how small that load might be.



3.4 GREASING OPERATIONS

- 3.4.1 During greasing operations the grease may be pumped under pressure and may have temperatures in excess of 150°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. Exercise caution when climbing tendon buttress and gallery 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 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.
- 3.4.3 Belt heaters draw large amounts of current, ensure that power supply and any extension cords used are suitable for the power requirements.
- 3.4.4 CAUTION: During greasing, be aware that the grease is HOT and may be pumped under pressure.

3.5 CONSTRUCTION SAFETY

- CAUTION: DO NOT stand under loads while stationary or during hoisting.

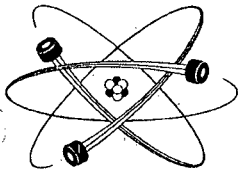
- CAUTION: DO NOT permit others to stand under loads.

- CAUTION: DO NOT throw or drop object from the scaffold.

- 3.5.1 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 All CR03 Accident Prevention Procedures SHALL be rigidly adhered to, to the total satisfaction of the site safety department.



- 3.5.3 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 detensioning rams or other heavy surveillance equipment.
- 3.5.4 If required notify the site safety organization to obtain air samples in the tendon gallery prior to entry into the gallery. Enter gallery only upon site safety approval.
- 3.5.5 If there are any doubts or questions concerning a point of operation or safety, refer to the 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.

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 1.0

PURPOSE

August 29, 2008

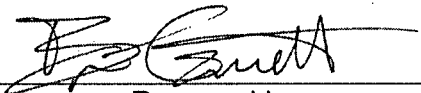
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Revision 0

PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

PURPOSE

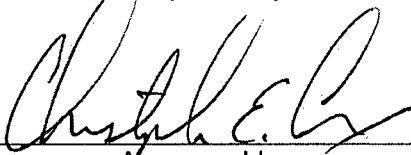

Prepared by

LEVEL II Q.C.

08/29/08

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Date


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PROJECT MANAGER, P.E.

08/29/08

Title

Date


Approved by

PRESIDENT

08/29/08

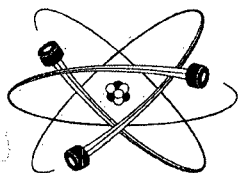
Title

Date



1.0 PURPOSE

- 1.1 The purpose of this Field and Quality Control Manual is to provide those procedures that will be necessary to perform the required vertical and horizontal Post Tensioning System Tendon work during the Steam Generator Replacement Project at Crystal River Unit 3.
- 1.2 These procedures shall be used for the required Field Operations and Inspections of selected Vertical and Horizontal Tendons of CR03 as shown in PSC Procedure F&Q 2.0 or as determined by owner approved Work Package.
- 1.3 In addition, each procedure provides as necessary, the reporting responsibilities for notification of unacceptable conditions that may have been detected as a result of the Field Operations or Inspections.
- 1.4 This Field and Quality Control Manual has been developed in accordance with owner requirements.
- 1.5 The instructions provided in this Field and Quality Control Manual contain instructions on construction methods and good practices and quality inspection requirements to perform work on post tensioned tendons. The Quality Control Documentation (QCD) instructions are quality inspection points, hold points and/or documentation points required to control critical activities. Work shall not progress through these points without a release from the Inspector or Field Engineer as outlined in the QCD. Data Sheets are provided within each F&Q document where QCD activities require written authorization or collection of critical data. At no time will these QCD activities be deviated from without prior authorization by owner.
- 1.6 The methods and practices other than QCD's contain construction related activities which may vary depending upon field conditions. In the event that one of these methods or practices is required to be performed out of sequence or in a different manner, variations require prior written authorization by owner.

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 2.0

SCOPE

August 29, 2008

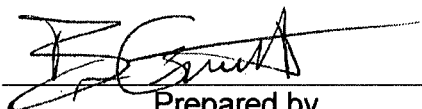
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Revision 0

PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

SCOPE


Prepared by

LEVEL II Q.C.

Title

08/29/08

Date


Approved by

PROJECT MANAGER, P.E.

Title

08/29/08

Date


Approved by

PRESIDENT

Title

08/29/08

Date



1.0 GENERAL:

1.1 A construction opening is required in the containment wall for the Crystal River Unit 3 (CR03) Steam Generator Replacement Project. In order to accomplish this task a total of 65 tendons will have to be removed or fully de-tensioned as determined by the owner.

The services to be provided are applicable to Crystal River Unit 3.

1.2 Generally, the scope of the work involves:

1.2.1 Plasma cut de-tension and removal of selected Vertical Tendons.

1.2.2 Plasma cut de-tension and removal of selected Horizontal Tendons.

1.2.3 After completion of all generator moving activities fully ram de-tension selected Vertical and Horizontal Tendons.

1.2.4 Installation of new Vertical and Horizontal Tendons for those removed.

1.2.5 Once released by Owner re-stress all replaced new Vertical and Horizontal Tendons and the Vertical and Horizontal Tendons fully de-tensioned.

1.2.6 Install replacement tendon grease.

2.0 SCOPE:

2.1 There are 10 Vertical Tendons and 17 Horizontal Tendons to be removed and replaced with new tendons.

2.2 There are 20 Vertical Tendons and 18 Horizontal Tendons to be fully de-tensioned.

2.3 Removal Tendons

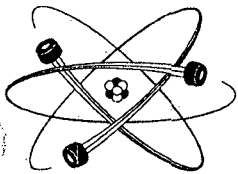
Vertical Tendon No.	Horizontal Tendon No.	Horizontal Tendon No.
34V8	42H27	53H27
34V9	42H28	53H28
34V10	42H29	53H29
34V11	42H30	53H30
34V12	42H31	53H31
34V13	42H32	53H32
34V14	42H33	53H33
34V15	42H34	53H34
34V16		53H35
34V17		



2.4

Detension Tendons

Vertical Tendon No.	Vertical Tendon No.		Horizontal Tendon No.	Horizontal Tendon No.
45V22	34V18		42H22	
45V23	34V19		42H23	53H23
45V24	34V20		42H24	53H24
34V1	34V21		42H25	53H25
34V2	34V22		42H26	53H26
34V3	34V23			
34V4	34V24		42H35	
34V5	23V1		42H36	53H36
34V6	23V2		42H37	53H37
34V7	23V3		42H38	53H38
			42H39	53H39

**PSC**

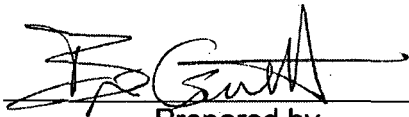
Precision Surveillance Corporation

PSC PROCEDURE F&Q 3.0
RECEIVING, HANDLING AND STORAGE
August 29, 2008
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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

RECEIVING, HANDLING AND STORAGE

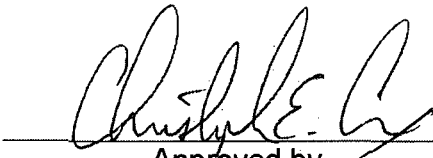

Prepared by

LEVEL II Q.C.

Title

08/29/08

Date

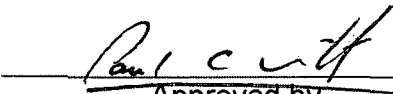

Approved by

PROJECT MANAGER, P.E.

Title

08/29/08

Date


Approved by

PRESIDENT

Title

08/29/08

Date

**1.0 PURPOSE**

- 1.1 This procedure will establish the requirements for the receiving, storage and handling of materials and quality control inspections/data recording for the vertical and horizontal tendon work during the Steam Generator Replacement Project at Crystal River unit 3.

2.0 SCOPE

- 2.1 Equipment and material shall be received by owner, unloaded by owner and stored at an area at the jobsite as designated. Material must be released by owner prior to shipment and receipt inspected by owner.
- 2.2 The materials shall be received, stored and handled in accordance with ANSI N45.2.2. All instrumentation shall be classified Level B. Sheathing filler material, replacement tendon shipping containers, removed tendons and anchor heads and shims shall be Level C. All other materials and equipment shall be Level D. Owner will establish and maintain appropriate storage areas and levels while onsite.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities associated with this procedure.
- 3.2 Owner Quality Control Personnel to perform all inspections and data recording.

4.0 QUALIFICATIONS

- 4.1 Owner Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.
- 4.2 Owner Quality Control Personnel shall be qualified to a minimum of Level II capability in accordance with the requirements of ANSI N45.2.6.

5.0 EQUIPMENT

- 5.1 Cranes, forklifts as needed.
- 5.2 Miscellaneous shackles, slings, etc.



6.0 PRECAUTIONS

- 6.1 Respect for the safety and well-being of the other trades and personnel in the area must be observed, especially during hoisting operations.

CAUTION

DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING. DO NOT PERMIT OTHERS TO STAND UNDER LOADS.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS

- 7.1 All Quality Control Documentation (QCD) points noted in this procedure are HOLD POINTS. The work shall not progress past or through a QCD without a verbal release from the Inspector.

CAUTION: Never connect a welding ground, perform welding on, or strike an arc near a stressed tendon.

8.0 PREREQUISITES

- 8.1 None.

9.0 PROCEDURE

9.1 RECEIVING

- 9.1.1 QCD - Notification - Unload material using appropriate equipment, slings, chains, etc. for the type of material received.

9.2 STORAGE AND HANDLING GREASE (SHEATHING FILLER)

- 9.2.1 QCD - Notification - Grease (sheathing filler) when received in bulk tanker trucks shall be offloaded into onsite storage tank provided by PSC. During offloading two one quart samples of the grease shall be obtained by the Owner Inspector identified and turned over for testing if needed.

- 9.2.1.1 The temperature in the storage tank can be maintained up to 250°F while product is being actively used, and dropped down to 150°F or heat turned off when product will not be used at Owner Supervision's determination. Product in the tank must be above the coils when the heat is turned off so the product can be easily reheated, otherwise new hot material may have to be added to get the system activated to heat up. Temperature of product should not exceed 250°F during storage.



9.2.1.2 Grease from the storage tank may be transferred to 55 gal. drums or other containers for possible hand pumping and pouring of grease into some of the tendon void ends. If this is done containers should be clean (free of dirt, debris, water and any other possible source on contamination) and be protected from the elements after filling to prevent contamination by chlorides, sulfides, nitrates, and water.

9.2.2 If drums of grease are received they shall be stored on dunnage in a well drained area and be covered with plastic or tarps to protect them from the environment.

9.3 STORAGE AND HANDLING INSTRUMENTATION

9.3.1 All instrumentation except hydraulic rams when not in use shall be stored in tool trailers or indoor office space to protect from environmental and possible accidental damage.

9.3.1.1 The hydraulic rams when not in use may be stored on dunnage and placed to prevent accidental damage.

9.4 STORAGE AND HANDLING TENDONS, ANCHOR HEADS AND SHIMS

9.4.1 Tendons and anchorage hardware when removed from the containment shall be stored at the jobsite until scrapped or shipped offsite in accordance with the requirements of Owners applicable procedures.

9.4.1.1 Minimum storage for new material at the jobsite is to be in a well drained area with the items placed on pallets, racks or in boxes or on dunnage and covered to provide protection from the weather and possible contamination including exposure to direct sunlight.

9.4.1.2 All material will be handled using appropriate equipment, slings, chains, etc. to prevent damage or contamination.

10.0 DOCUMENTATION

10.1 The items requiring documentation in this procedure shall be documented by the Owner Quality Control Inspector on Data Sheet F&Q 3.0 or, Data Sheet F&Q 3.0A attached to this procedure or Owner Receipt/Storage Inspection Forms.

11.0 QUALITY CONTROL

11.1 For materials received, a preliminary visual inspection or examination shall be performed prior to unloading or placing into storage to determine if any damage occurred during shipping. Observations for unusual conditions shall include:

11.1.1 Fire - Charred paper, wood or paint indicating exposure to fire or high temperature.



- 11.1.2 Excessive Exposure - Weather-beaten, frayed, rusted, or stained containers indicating prolonged exposure during transit.
- 11.1.3 Environmental Damage - Water or oil marks, damp conditions, dirty areas, or salt film (indicating exposure to sea water or winter road salt chemicals).
- 11.1.4 Tie Down Failure - Shifted, broken, loose or twisted shipping ties, and worn material under ties, indicating improper blocking and tie down during shipment.
- 11.1.5 Rough Handling - Splintered, torn, or crushed containers indicating improper handling.
- 11.2 Any deficiencies found as a result of the inspections above will be immediately recorded on Receipt/Storage Inspection Forms. At the jobsite it will not be necessary to open any containers unless shipping damage is evident.
 - 11.2.1 Receiving Inspections will be documented by the Inspector on Receipt/Storage Inspection Forms.
- 11.3 Once a tendon or anchorage hardware storage container is opened the visible areas of the tendon or anchorage hardware will be inspected for damage and corrosion condition per attached Specification EW101 Evaluative Criteria and results documented on Data Sheet F&Q 3.0A.
 - 11.3.1 Anchor heads, bushing and shims will be checked for obvious damage and any deficiencies found as a result of inspection will be immediately corrected or appropriate corrective action proposed.
- 11.4 After storage inspection, bare metal areas of tendons if in evidence are to be coated with corrosion protection grease (1601 Amber or 2090P-4 or Owner approved equivalent).
- 11.5 Results of inspections are to be documented on Receipt/Storage Inspection Forms.
- 12.0 NOTIFICATION**
 - 12.1 Work shall not proceed beyond a QCD point, until Quality Control Inspector is notified.
 - 12.2 Owner is to be notified of any reject conditions.
- 13.0 ATTACHMENTS**
 - 13.1 Data Sheet F&Q 3.0
 - 13.2 Data Sheet F&Q 3.0A
 - 13.3 Specification EW101 Evaluative Criteria



PSC PROCEDURE F&Q 3.0
RECEIVING, HANDLING AND STORAGE
DATA SHEET F&Q 3.0
August 29, 2008
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PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

DATE OF RECEIVING INSPECTION: _____

[illegible]

IF MATERIAL IS FOUND DAMAGED OR REQUIRES RECONDITIONING, STATE THE PROBLEM BELOW AND CORRECTIVE ACTION PERFORMED.

Q.C. INSPECTOR SIGNOFF: _____ LEVEL: _____ DATE: _____
Q.C. REVIEW: _____ LEVEL: _____ DATE: _____



PSC PROCEDURE F&Q 3.0
RECEIVING, HANDLING AND STORAGE
DATA SHEET F&Q 3.0A
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STORAGE INSPECTION DOCUMENTATION

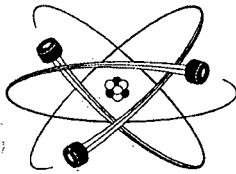
PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

DATE OF STORAGE INSPECTION: _____

[illegible]

IF MATERIAL IS FOUND DAMAGED OR REQUIRES RECONDITIONING, STATE THE PROBLEM BELOW AND CORRECTIVE ACTION PERFORMED.

Q.C. INSPECTOR SIGNOFF: _____ LEVEL: _____ DATE: _____
Q.C. REVIEW: _____ LEVEL: _____ DATE: _____

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 3.1
EQUIPMENT PROOF TEST
August 29, 2008
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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

EQUIPMENT PROOF TEST

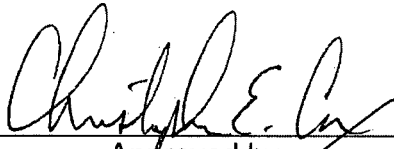

Prepared by

LEVEL II Q.C.

Title

08/29/08

Date


Approved by

PROJECT MANAGER, P.E.

Title

08/29/08

Date


Approved by

PRESIDENT

Title

08/29/08

Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for the proof testing of tensioning equipment and quality control inspections/data recording for the vertical and horizontal tendon work during the Steam Generator Replacement Project for Crystal River Unit 3. The proof-test shall demonstrate that the equipment functions safely under the most severe anticipated field conditions, and under maximum possible load, eccentricity, and misalignment.

2.0 SCOPE

- 2.1 Each set of tensioning equipment shall be proof tested and after proof testing shall be inspected prior to delivery to the jobsite.
- 2.2 Owner should be notified 14 days prior to the test so that they have the option to witness the test.

3.0 RESPONSIBILITY

- 3.1 Precision Surveillance Corporation Shop Personnel shall be responsible for the physical activities associated with this procedure.
- 3.2 Precision Surveillance Corporation, Quality Control or Engineering Personnel to perform all inspections and data recording.

4.0 QUALIFICATIONS

- 4.1 Precision Surveillance Corporation Shop Personnel shall be fit by skill, training and/or experience to perform these duties.
- 4.2 Precision Surveillance Corporation Quality Control Personnel shall be qualified to a minimum Level II capability in accordance with the requirements of ANSI N45.2.6.
- 4.3 Precision Surveillance Corporation Engineering Personnel shall have a four year degree from an accredited institution.

5.0 EQUIPMENT

- 5.1 Ram Calibration Stand
- 5.2 Hydraulic Pump
- 5.3 Hydraulic Ram with jack chair, pullrod with nut, and rod adaptor.
- 5.4 Hydraulic Pressure Gauge.
- 5.5 Miscellaneous hoses and connections.



6.0 PRECAUTIONS

- 6.1 Respect for the safety and well being of other personnel in the area must be observed.
- 6.2 Prior to applying any force to the tensioning equipment assure that all load bearing threaded connections are fully engaged.
- 6.3 During proof testing the following cautions shall be observed.

CAUTION

DO NOT STAND BEHIND THE RAM WHEN IT IS UNDER LOAD
KEEP FINGERS OUT OF ANY PINCH AREAS

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS

- 7.1 All Quality Control Documentation (QCD) points noted in this procedure are HOLD POINTS. The work shall not progress past or through a QCD without a verbal release from the Inspector or Engineer.

8.0 PREREQUISITES

- 8.1 Owner should have been notified 14 days prior to the test so that they have the option to witness the test.
- 8.2 Prior to performing this proof-test the tensioning equipment will have been calibrated in accordance with PSC Procedure QA 12.8.G-W.

9.0 PROCEDURE

- 9.1 **QCD-HOLD POINT-** Set up the ram assembly so that the ram is out of alignment with the test stand by 3/16". (The test may also be performed by butting two ram assemblies together and obtaining the 3/16" misalignment in this way two ram assemblies are tested at the same time.)
 - 9.1.1 This eccentric position of the ram is the maximum that can occur in the field when the ram is positioned on the tendon bearing plate.
- 9.2 **QCD-HOLD POINT-** The ram will be pressurized to a force of 1979KIPS and held at that force for approximately 5 seconds.
 - 9.2.1 This 1979 KIPS is 106 percent of the maximum working load of 1867 KIPS for a 163 wire tendon.
- 9.3 **QCD-HOLD POINT-** While at maximum pressure, from a safe vantage point, inspect ram for hydraulic fluid leaks.



- 9.4 **QCD-HOLD POINT-** After testing the ram shall be removed from the test stand or from the other ram and all components visually inspected for damage or defects.

10.0 DOCUMENTATION

- 10.1 The items requiring documentation in this procedure shall be documented by the PSC Quality Control Inspector or Engineer on Data Sheet F&Q 3.1 attached to this procedure.

11.0 QUALITY CONTROL

- 11.1 Document date of proof test.
- 11.2 Document acceptance of 3/16" eccentric alignment.
- 11.3 Document acceptance of 1979 KIPS force being held for 5 seconds.
- 11.4 Document no hydraulic fluid leaks at pressure.
- 11.5 Document the identity number of the ram, stressing rod, pull rod, pull rod nut and jack chair as applicable being proof tested.
- 11.6 Document the acceptance of visual examinations after proof test.

12.0 NOTIFICATION

- 12.1 PSC Quality Control Inspector or Engineer must be notified prior to working through a QCD-HOLD POINT.

13.0 ATTACHMENTS

- 13.1 Data Sheet F&Q 3.1



TENSIONING EQUIPMENT PROOF TEST DOCUMENTATION

PROJECT: CRYSTAL RIVER UNIT 3

STEAM GENERATOR REPLACEMENT PROJECT

DATE OF PROOF TEST: _____

(9.1) 3/16" ECCENTRIC ALIGNMENT: ☐ ACCEPTABLE

(9.2) 1979 KIPS HELD FOR 5 SECONDS: ☐ ACCEPTABLE

(9.3) NO OBSERVABLE HYDRAULIC FLUID LEAKS: ☐ ACCEPTABLE

RESULTS OF VISUAL INSPECTION

RAM IDENTITY NO. _____ ☐ ACCEPTABLE

STRESSING ROD IDENTITY NO. _____ ☐ ACCEPTABLE

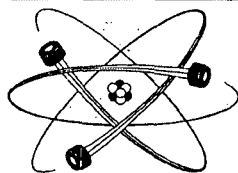
PULL ROD IDENTITY NO. _____ ☐ ACCEPTABLE

PULL ROD NUT IDENTIY NO. _____ ☐ ACCEPTABLE

JACK CHAIR IDENTITY NO. _____ ☐ ACCEPTABLE

QC INSP.
 or ENGINEER SIGNOFF _____ LEVEL _____ DATE _____

QC REVIEW _____ LEVEL _____ DATE _____




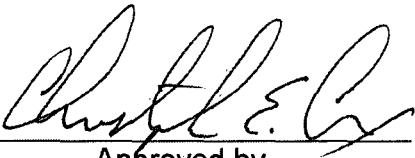
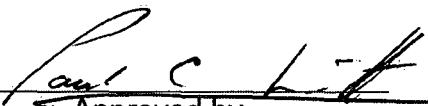
PSC
Precision Surveillance Corporation

PSC PROCEDURE F&Q 5.0
TENDON INITIAL DEGREASING AND CAP REMOVAL
August 29, 2008
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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

TENDON INITIAL DEGREASING AND CAP REMOVAL

 Prepared by	QA MANAGER Title	08/19/09 Date
 Approved by	PROJECT MANAGER, P.E. Title	08/19/09 Date
 Approved by	PRESIDENT Title	08/19/09 Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for the initial degreasing of tendons and quality control inspections/data recording during grease cap removal at Crystal River Unit 3 for the vertical and horizontal tendon work during the Steam Generator Replacement Project.

2.0 SCOPE

- 2.1 The tendons to be initially degreased to the extent possible before tendon work begins are those vertical tendons to be removed, and vertical tendons to be detensioned but not removed as specified in PSC Procedure F&Q 2.0 or Owner Work Package. However, only tendons being detensioned and NOT removed, both vertical and horizontal, shall have grease quantity capture recorded for evaluation against replaced quantities.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities associated with this procedure.

4.0 QUALIFICATIONS

- 4.1 Owner Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.

5.0 EQUIPMENT

- 5.1 Miscellaneous Tools, wrenches, ratchets, sockets, shackles, come-alongs, etc.
- 5.2 Plastic bags, plastic sheeting (Visqueen), rags, buckets or drums for waste grease.
- 5.3 Device to depress end cap check valve.
- 5.4 A source of dry air (if required).
- 5.5 Air hose and fittings (if required).

6.0 PRECAUTIONS

- 6.1 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.
- 6.2 A tendon grease cap weighs in excess of 100 pounds and may contain about 100 pounds of grease. Be prepared to support this weight when the grease cap is unbolted and removed.



- 6.3 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.
- 6.4 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.

CAUTION NEVER STRIKE THE BUTTONHEADS, THE WIRES, OR THE ANCHORAGES OF A STRESSED TENDON WITH A HAMMER OR ANY OTHER OBJECT UNLESS AUTHORIZED.

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.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS

- 7.1 None.

8.0 PREREQUISITES

- 8.1 Assure this tendon is scheduled to have its grease removed.

9.0 PROCEDURE

9.1 INITIAL VERTICAL TENDON DEGREASING

- 9.1.1 In the tendon gallery locate the grease cap of the tendon to be degreased, place visqueen on the floor and up the walls to desired height and secure with tape.
- 9.1.2 Place an empty 55 gallon drum under the cap.
- 9.1.3 Remove the plug from the grease cap and attach device to depress end cap check valve. Have the plug from the top grease cap removed to allow the tendon to gravity drain. At the field superintendent's option for those tendons being removed the grease cap in the gallery may be removed to assist draining.
- 9.1.4 Note for those tendons not to be removed and replaced care should be taken to prevent rain or contamination from entering the cap while the plug is removed.
- 9.1.5 Full drums are replaced with another empty drum until the tendon is drained.
- 9.1.6 If it is determined that enough of the grease has not been removed by gravity draining an air hose may be attached to the top grease cap inlet and air pressure (not to exceed 100 psig) may be used to further degrease the tendon void. Be sure that adequate communication is provided at each end of the tendon so that each crew will know what actions are taking place.
- 9.1.7 Replace the grease cap plugs on both ends of the tendon after the tendon is degreased and identify on each grease cap that the tendon has been degreased.



- 9.1.8 On tendons to be removed bottom anchorages can be covered with a bag for protection instead of replacing the cap.
- 9.1.9 Remove waste grease drums for disposal offsite in accordance with the requirements of Owners applicable procedures and clean up any spilled grease.
- 10.0 REMOVAL OF GREASE CAP (VERTICAL OR HOOP)**
- 10.1 Position platforms, if required, at the end of the tendon to have the cap removed.
- 10.2 Place a container and/or a protective cover under the tendon grease cap to protect adjacent areas from dripping grease.
- 10.3 Remove the bulk filler plug from the tendon end cap and depress the check valve to allow any excess pressure and/or bulk filler grease to escape. Reinstall plug after depressurization.
- 10.4 Remove the three (3) nuts and washers holding the end cap to the bearing plate ensuring that the end cap is fully supported as the nuts are being removed.
- 10.5 Carefully, remove the grease cap to prevent any foreign matter from dropping into the grease in that cap. Remove the three 3/4" x 4-1/2" studs.
- 10.6 Clean and collect the grease from the grease cap.
- 10.7 For detensioned and not removed tendons only, determine the amount of grease that may have been lost during removal of the grease cap, plus the amount of grease removed from the anchorage during cleaning and record on Data Sheet F&Q 5.0.
- 11.0 DOCUMENTATION**
- 11.1 The items requiring documentation in this procedure shall be documented by the assigned field construction person of the working crew on Data Sheet F&Q 5.0 attached to this procedure or the documentation provided in the Owner Work Package.
- 12.0 QUALITY CONTROL**
- 12.1 None.
- 13.0 NOTIFICATION**
- 13.1 Owner Field Supervision to be notified if any problems are encountered during the degreasing operations.
- 14.0 ATTACHMENTS**
- 14.1 Data Sheet F&Q 5.0.



PSC PROCEDURE F&Q 5.0
TENDON INITIAL DEGREASING AND CAP REMOVAL
DATA SHEET F&Q 5.0
August 29, 2008
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GREASE REMOVAL DOCUMENTATION

PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

TENDON NO.: _____

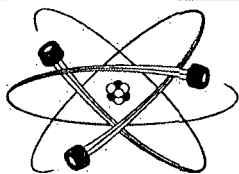
END IDENTIFICATION: _____ QUANTITY REMOVED: _____ GAL.

END IDENTIFICATION: _____ QUANTITY REMOVED: _____ GAL.

DATE: _____



SUPERINTENDENT (OR) CIVIL FIELD ENGINEER: _____

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 6.0
TENDON DETENSIONING/REMOVAL FOR POSSIBLE REUSE

September 16, 2009

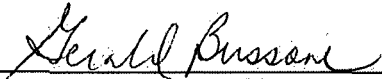

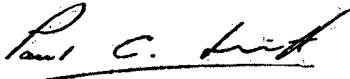
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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

TENDON DETENSIONING/REMOVAL FOR POSSIBLE REUSE

 Prepared by	QA MANAGER Title	09/16/09 Date
 Approved by	PROJECT MANAGER, P.E. Title	09/16/09 Date
 Approved by	PRESIDENT Title	09/16/09 Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for hydraulic ram de-tensioning and removal of tendons for possible reuse at Crystal River Unit 3 during the Steam Generator Replacement Project.

2.0 SCOPE

- 2.1 The vertical tendons to be de-tensioned by hydraulic ram and removed shall be as specified in Owner Work Package. Vertical tendons shall be de-tensioned from the top end as specified in the Owner Work Package.
- 2.2 Prior to de-tensioning a tendon a full visual inspection shall be performed on each tendon end and documented per PSC Procedure F&Q 15.1 and F&Q 15.2 or on Owner Work Package documentation.
- 2.3 The de-tensioning sequence shall be as specified on the Owner Work Package.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities and recording of documentation associated with this procedure.

4.0 QUALIFICATIONS

- 4.1 Owner Construction Personnel shall be fit by skill, training and experience to perform these duties and PSC tendon training program.

5.0 EQUIPMENT

- 5.1 Hydraulic ram (calibrated) and pump with appropriate hoses and fittings.
- 5.2 Hydraulic pressure gauge (calibrated).
- 5.3 Miscellaneous Tools, wrenches, ratchets, sockets, shackles, come-alongs, etc.
- 5.4 Plastic bags, plastic sheeting (Visqueen), rags, buckets or drums for waste grease.

6.0 PRECAUTIONS

- 6.1 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.



CAUTION

**DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING.
DO NOT PERMIT OTHERS TO STAND UNDER LOADS.
DO NOT THROW OR DROP OBJECTS.**

- 6.2 The wire used for the tendons has a minimum breaking strength of 240,000 pounds per square inch. This means that each 7mm diameter wire is capable of withstanding a minimum breaking load of 14,317 pounds. Multiply this by 163 wires in a tendon and you are dealing with forces in excess of two million pounds per tendon.

CAUTION

(When using rams or on a tendon not being removed.)

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 ANCHORAGES OF A STRESSED TENDON.

NEVER STRIKE THE BUTTONHEADS, THE WIRES OR THE ANCHORAGES OF A STRESSED TENDON WITH A HAMMER OR ANY OTHER METAL OBJECT.

- 6.3 Prior to applying ANY FORCE to the tendon, the stressing coupler must be fully engaged with the anchorage to be de-tensioned. Also check that the locking bolts on stressing rod (top part of two piece stressing rod) and coupler are present and fastened.

CAUTION

BE SURE THE STRESSING ROD IS FULLY ENGAGED WITH THE ANCHORAGE BEFORE APPLYING ANY LOAD, REGARDLESS OF HOW SMALL THAT LOAD MIGHT BE.



- 6.4 During de-tensioning operations the following cautions shall be observed.

CAUTION

NEVER EXCEED THE OVERSTRESS FORCE OR PRESSURE - 80% (1867 kips for a 163 wire tendon) or 11.46 kips FOR THE AMOUNT OF EFFECTIVE WIRES IN A TENDON.

DO NOT STAND BEHIND THE JACK WHEN IT IS UNDER LOAD.

KEEP HANDS AND FINGERS OUT OF ANY PINCH AREAS.

BE ALERT DURING SHIM PLACEMENT AND REMOVAL.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS

- 7.1 **HOLD POINT** - Prior to de-tensioning a tendon the tendon owner inspector is to be notified to perform visual inspections and document IAW PSC Procedure F&Q 15.1 and 15.2.

8.0 PREREQUISITES

- 8.1 Prior to removing tendon grease will be drained.
- 8.2 Perform visual inspections IAW PSC Procedure F&Q 15.1 and F&Q 15.2.
- 8.3 Record on Data Sheet F&Q 6.0 or Owner Work Package documentation the information required for tendon number, tendon end and date of de-tensioning.

9.0 PROCEDURE

- 9.1 If not previously done, remove the grease cap or end protection from the end being de-tensioned.

9.2 ANCHORAGE CLEANUP

- 9.2.1 Grease shall be removed from the tendon end using clean non-metallic devices. Bristle brushes and rags with suitable quantities of Viscosity Oil, Viscor Industrial No. 16A solvent or Owner approved solvent to dilute and wash away the grease may also be required. This cleanup must be sufficient to permit engagement of the anchorage threads with the stressing rod threads.



9.3 TENDON DE-TENSIONING

9.3.1 HOLD POINT - Prior to de-tensioning a tendon a full visual inspection shall be performed on each tendon end and documented per PSC Procedure F&Q 15.1 and F&Q 15.2 or on Owner Work Package documentation.

9.3.1.1 De-tensioning of vertical tendons shall be performed on the top end as specified in Owner Work Package.

9.3.1.2 Align the ram stressing rod with the anchorage and the jack chair with the bearing plate. Ensure that the ram is in alignment within 1/8 inch. Record on Data Sheet F&Q 6.0 or Owner Work Package documentation the ram and gauge identification.

9.3.1.2.1 The stressing rod and coupler is now screwed onto the anchorage. (Rotate rod counter clockwise several revolutions to align threads, then clockwise to attach).

CAUTION

VERIFY RAM WILL NOT LOAD SUPPORT RIGGING WHEN PRESSURIZING RAM.

9.3.1.3 Before de-tensioning be sure opposite end of tendon is clear and not being worked on. Pressurize the ram until the shims under the anchorage become loose and can be removed.

9.3.1.3.1 NOTE: A tendon shall never be stressed beyond 80% of the Minimum Guaranteed Ultimate Tensile Strength (GUTS) of the effective wires in that tendon. A 163 wire tendon shall not exceed a force of 1867 kips. For a tendon with missing wires, the maximum tensile force shall be reduced accordingly by 11.46 kips/wire.

9.3.1.4 Remove all shims from between the anchorage and bearing plate. Reduce the ram pressure until the load is reduced to zero.

9.3.1.5 Set the anchorhead down on one 3" pair of shims.

9.3.1.6 The ram shall be uncoupled from the anchorage.

9.4 TENDON END CUTTING

9.4.1 On the top end bolt the pulling plate to the anchor head.

9.4.2 If lower anchorage is not loose couple pulling plate to coiler or crane, lift anchor head to allow removal of shims then lower tendon into void.



- 9.4.3 With all shims removed in the gallery and adequate tendon length exposed push gallery anchor head up to bearing plate exposing approximately 2 feet of wire.
- 9.4.4 Cut off buttonheads with hand grinder right behind the buttonheads ensuring a clean square cut.
- 9.4.5 Remove anchor head.
- 9.5 **TENDON LENGTH VERIFICATION**
 - 9.5.1 Lift tendon with coiler or crane and place on 3" pair of shims.
 - 9.5.2 Remove pulling plate.
 - 9.5.3 Locate any outside wire and pry up to allow attachment of tendon wire puller (figure 1.0).
 - 9.5.4 Pull the wire completely through the tendon duct.
 - 9.5.4.1 After 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 Specification EW101 in PSC Procedure F&Q 13.0. Solvent cleaning may be performed to facilitate cleaning before inspection.
 - 9.5.4.1.1 Document the Category of Corrosion rating on Data Sheet 6.1, for every 10 feet of length.
 - 9.5.4.1.2 If the Category of Corrosion has progressed beyond Condition "C" as defined in Specification EW101, Progress Energy Engineering shall be notified for disposition.
 - 9.5.4.2 After the tendon wire has been pulled through, it shall be measured for length.
 - 9.5.4.2.1 Document the total length of wire on Data Sheet 6.1.
 - 9.5.4.3 After the tendon wire has been pulled, it may be cleaned of excess grease and coiled into coil form of approximately five-foot diameter. Secure the coil from unwinding.
- 9.6 **TENDON REMOVAL**
 - 9.6.1 Re-attach pulling plate on anchor head.
 - 9.6.2 For vertical tendon attach 5/16 inch cable only to cut end to facilitate cleaning at a latter date. Alternatively, a cable can be dropped down the void for cleaning after tendon removal at Owner Field Construction Personnel discretion.



- 9.6.3 Expand the coiler hub and attach the cable from the field coiler to the tendon end anchor head plate, bolt and apply a light tension on the cable with the coiler.
- 9.6.4 Coil the tendon placing a $\frac{3}{4}$ " band approximately every 5' to ensure wires remain in a manageable bundle.
- 9.6.5 Coil the tendon on the coiler, using extra care as the anchor head enters the coiler. Place two bands on the tendon anchor head after the first revolution. After, band the tendon coils in the coiler for every new loop of the tendon as it is coiled (stagger the placement of the banding). The closer to the end of the tendon the more banding of the coils are needed in the coiler.
- 9.6.6 Carefully coil the tendon to ensure no crimped or bent wires.
- 9.6.7 Field Engineer to inspect tendon as it is removed for corrosion, water or other deleterious conditions.
- 9.6.8 Reverse the operation of the coiler and retract the hub to loosen the pulling cable and detach the pulling cable from the tendon end.
- 9.6.9 Hoist the tendon out of the uncoiler, wrap in plastic and lower it to the ground for storage.
- 9.6.10 If the tendon voids are to be cleaned at this time refer to PSC Procedure F&Q 11.0, if not protect the void end.
- 9.6.11 Since these tendon ends will have further work performed on them at a later date, the following methods of tendon end protection shall be used. The tendon end may be covered with a plastic bag or sheeting and taped to provide protection from the elements, or the grease cap may be replaced using the old gaskets.
- 9.6.12 Shims removed from a tendon shall be kept in matched pairs and protected from the elements by covering with plastic or placing in a temporary storage container until sent to storage.

10.0 DOCUMENTATION

- 10.1 The items requiring documentation in this procedure shall be documented by the Superintendent or Field Engineer on Data Sheet F&Q 6.0 and F&Q 6.1 attached to this procedure or Work Package documentation.

11.0 QUALITY CONTROL

- 11.1 None.

12.0 NOTIFICATION

- 12.1 Owner Site Shift Superintendent shall be notified of any problems encountered.



13.0 ATTACHMENTS

- 13.1 Data Sheet F&Q 6.0.
- 13.2 Data Sheet F&Q 6.0A.
- 13.3 Figure 1.0 – Tendon Wire Puller



PSC PROCEDURE F&Q 6.0
TENDON DETENSIONING/REMOVAL FOR POSSIBLE REUSE
DATA SHEET F&Q 6.0
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RAM TENDON DETENSIONING DOCUMENTATION

PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

TENDON NO.: _____ TENDON END _____

DATE OF DETENSIONING: _____

ANCHORAGE ID/HEAT CODE: _____

NUMBER OF EFFECTIVE BUTTONHEADS: _____

RAM ID _____

GAUGE ID _____

De-tensioning Sequence Verification: _____

SUPERINTENDENT (OR) CIVIL FIELD ENGINEER: _____



PSC PROCEDURE F&Q 6.0
TENDON DETENSIONING/REMOVAL FOR POSSIBLE REUSE
 DATA SHEET F&Q 6.0A
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Project: CRYSTAL RIVER UNIT 3 – SGR

Tendon No.: _____ Tendon End: _____

Removal Date: _____ Inspection Date: _____

WIRE REMOVAL INSPECTION

CORROSION INSPECTION @ LENGTH INTERVALS

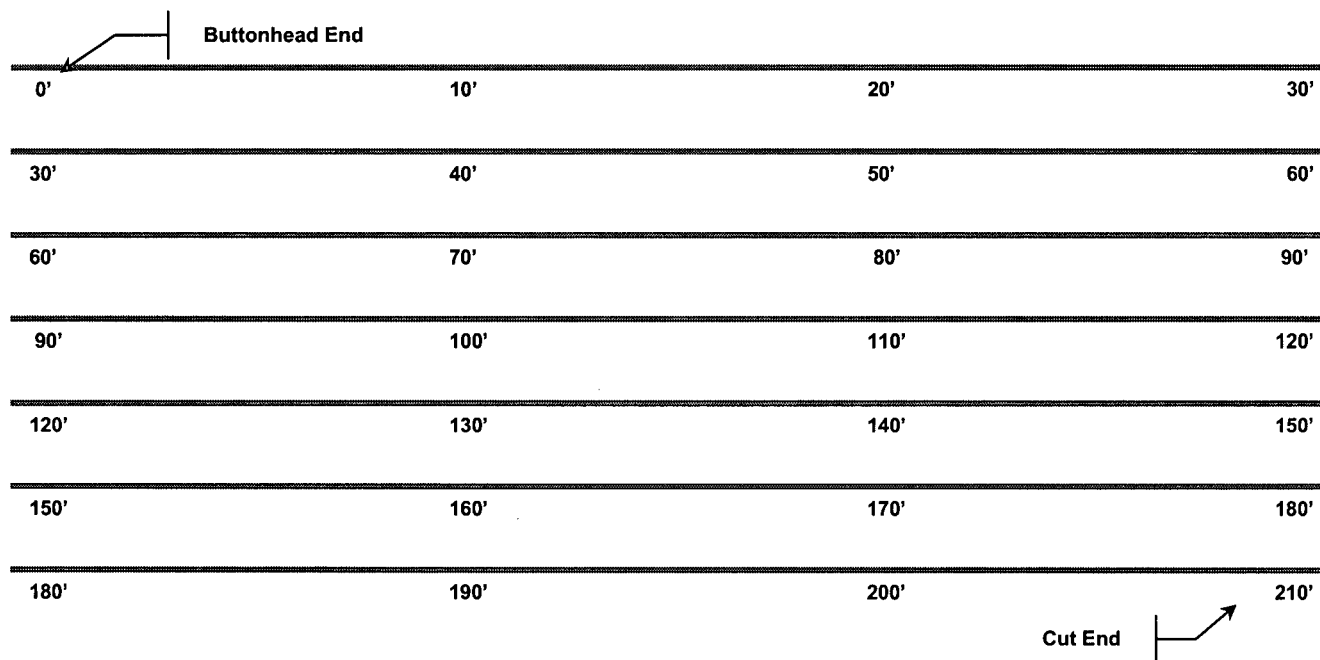
(8.5.4.1) Document the Corrosion Category for each 10' of wire in the increments below. Use Categories described in EW101.

(8.5.4.2) For Corrosion Levels D and E notification required.

Req'd: ☐ NO ☐ YES

(8.5.4.3.1) Document the total length of the wire on the diagram below.

Completed: ☐ NO ☐ YES



COMMENTS _____

CIVIL FIELD ENGINEER: _____ DATE: _____

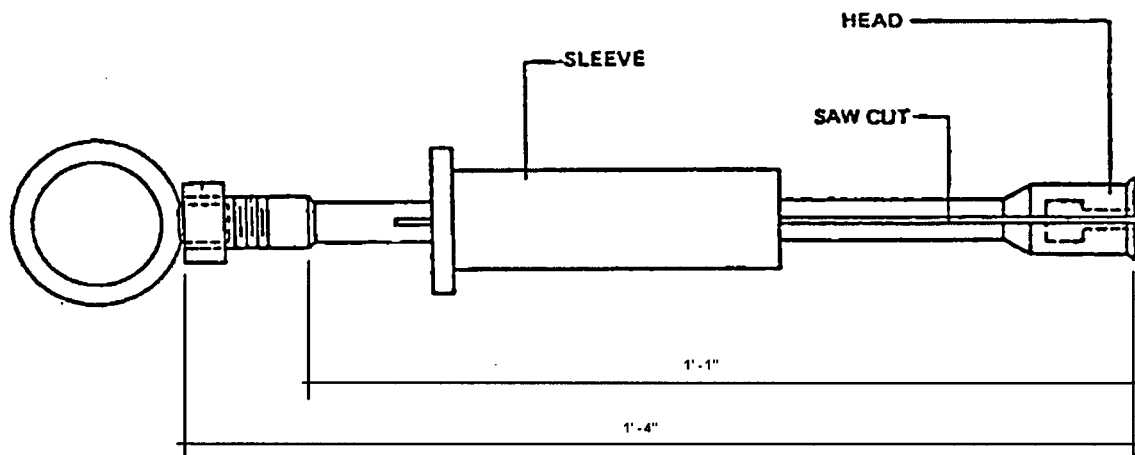


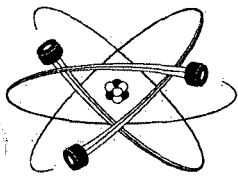
PSC PROCEDURE F&Q 6.0
TENDON DETENSIONING/REMOVAL FOR POSSIBLE REUSE

Figure 1.0
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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.



**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 8.0
PLASMA CUTTING TENDON DETENSIONING
August 29, 2008
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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

PLASMA CUTTING TENDON DETENSIONING

Prepared by

LEVEL II Q.C.

Title

08/29/08

Date

Approved by

PROJECT MANAGER, P.E.

Title

08/29/08

Date

Approved by

PRESIDENT

Title

08/29/08

Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for plasma cutting de-tensioning of tendons at Crystal River Unit 3 for the vertical and horizontal tendon work during the Steam Generator Replacement Project.

2.0 SCOPE

- 2.1 The tendons to be de-tensioned by plasma cutting shall be as specified in PSC Procedure F&Q 2.0 or Owner Work Package.
- 2.2 The de-tensioning sequence shall be as specified in Owner Work Package.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities and recording of documentation associated with this procedure.

4.0 QUALIFICATIONS

- 4.1 Owner Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.

5.0 EQUIPMENT

- 5.1 Plasma cutting equipment.
- 5.2 Shim, anchor head and button head catcher.
- 5.3 Miscellaneous Tools, wrenches, ratchets, sockets, shackles, come-alongs, etc.
- 5.4 Plastic bags, plastic sheeting (Visqueen), rags, buckets or drums for waste grease.

6.0 PRECAUTIONS

- 6.1 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.
- 6.2 During plasma cutting operations, care should be taken to wear prescribed protective equipment such as proper eye protection, gloves, and to avoid burns from the plasma cutting and electrical shock.
- 6.3 Grease is flammable, during plasma cutting operations all Fire Watch restrictions and precautions are to be followed.



- 6.4 During plasma cutting operations, at the end of the tendon being cut a shim and button head catcher is to be in place as directed by the Owner Site Shift Superintendent to catch any projectile button heads.
- 6.5 On the opposite end of a tendon end that is being plasma cut care should be taken when the grease cap is removed as it could contain loose shims which could fall when the cap is removed.

CAUTION

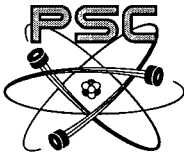
DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING.
DO NOT PERMIT OTHERS TO STAND UNDER LOADS.
DO NOT THROW OR DROP OBJECTS.
DURING PLASMA CUTTING WEAR PROTECTIVE EQUIPMENT, AVOID BURNS
AND ELECTRICAL SHOCK.

- 6.6 The wire used for the tendons has a minimum breaking strength of 240,000 pounds per square inch. This means that each 7mm diameter wire is capable of withstanding a minimum breaking load of 14,317 pounds. Multiply this by 163 wires in a tendon and you are dealing with forces in excess of two million pounds per tendon.

CAUTION

(When plasma cutting on a tendon to be removed and scrapped)
NEVER CONNECT A WELDING GROUND, PERFORM WELDING ON, OR STRIKE
AN ARC NEAR A STRESSED TENDON WHICH IS NOT BEING SCRAPPED.
NEVER APPLY AN OPEN FLAME TO THE BUTTONHEADS, THE WIRES OR
ANCHORAGES OF A STRESSED TENDON EXCEPT FOR THE END OF THE
TENDONS THAT ARE TO BE PLASMA CUT AND SCRAPPED.
NEVER STRIKE THE BUTTONHEADS, THE WIRES OR THE ANCHORAGES OF A
STRESSED TENDON WITH A HAMMER OR ANY OTHER METAL OBJECT.

- 6.7 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 of 4 inches in thickness, about the equivalent of a .32 caliber bullet.
- 7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS**
- 7.1 There are no Quality Control Documentation (QCD) points or HOLD POINTS in this procedure.



8.0 PREREQUISITES

- 8.1 Prior to removing a grease cap/tendon end protection assure that the proper tendon is being worked on.
- 8.2 Prior to de-tensioning vertical tendons that are to be removed from the void, grease is to have been drained and or blown from the tendon.
- 8.3 On the opposite end of the tendon to be plasma cut the grease cap is to be removed. The grease cleaned out of the cap and from around the anchorage and shims. A keeper plate is installed to the anchor head to hold the button heads in place during plasma cutting. The grease cap is replaced and tightened down. Care should be taken when this grease cap is removed after plasma cutting as it could contain loose shims which could fall when the cap is removed.

9.0 PROCEDURE

- 9.1 If not previously done, remove the grease cap or end protection from the end being de-tensioned.

9.2 ANCHORAGE CLEANUP

- 9.2.1 Grease shall be removed from the tendon end. Bristle brushes and rags with suitable quantities of Viscosity Oil, Viscor Industrial No. 16A solvent or Owner approved equivalent to dilute and wash away the grease may also be required. This cleanup must be sufficient to permit plasma cutting of button heads as verified by Superintendent.

9.3 TENDON DE-TENSIONING

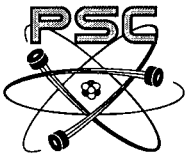
- 9.3.1 During plasma cutting the grease cap at the other end not being cut is to remain on. The button heads of the tendon are to be plasma cut one at a time, if possible, until all the button heads are cut.

9.4 TENDON SHIM PROTECTION

- 9.4.1 Shims removed from a tendon shall be kept in matched pairs and protected from the elements by covering with plastic or placing in a temporary storage container until sent to storage.

10.0 DOCUMENTATION

- 10.1 The items requiring documentation in this procedure shall be documented by the assigned field construction person of the working crew on Data Sheet F&Q 8.0 attached to this procedure or as required by Owner Work Package.



11.0 QUALITY CONTROL

11.1 There is no quality control inspection or documentation required by this procedure.

12.0 NOTIFICATION

12.1 Owner Shift Superintendent shall be notified if there are any problems encountered with the plasma cutting operations.

13.0 ATTACHMENTS

13.1 Data Sheet F&Q 8.0.



PSC PROCEDURE F&Q 8.0
PLASMA CUTTING TENDON DETENSIONING
DATA SHEET F&Q 8.0
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PLASMA CUTTING TENDON DETENSIONING DOCUMENTATION

PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

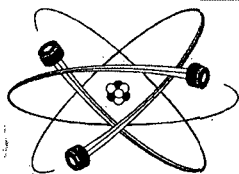
TENDON NO.: _____

DATE OF DETENSIONING: _____

De-tensioning Sequence Verification: _____



SUPERINTENDENT (OR) CIVIL FIELD ENGINEER: _____

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 8.1
RAM TENDON DETENSIONING

August 29, 2008

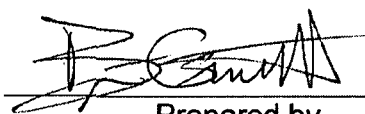
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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

RAM TENDON DETENSIONING



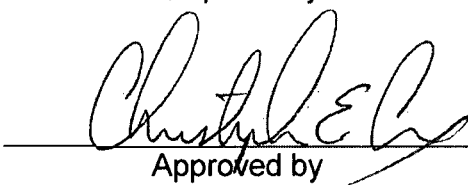
Prepared by

LEVEL II Q.C.

Title

08/29/08

Date



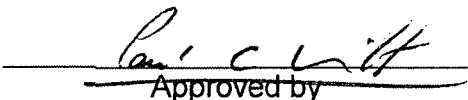
Approved by

PROJECT MANAGER, P.E.

Title

08/29/08

Date



Approved by

PRESIDENT

Title

08/29/08

Date

**1.0 PURPOSE**

- 1.1 This procedure will establish the requirements for hydraulic ram de-tensioning of tendons and de-tensioning documentation at Crystal River Unit 3 for tendon work during the Steam Generator Replacement Project.

2.0 SCOPE

- 2.1 The tendons to be de-tensioned by hydraulic ram shall be as specified in Owner Work Package. Tendons can be de-tensioned from both ends or can be de-tensioned from one end as specified in the Owner Work Package.
- 2.2 Prior to de-tensioning a tendon the anchor head, shims, bearing plate and button heads are to be visually inspected and documented per PSC Procedure F&Q 15.1 or on Owner Work Package documentation.
- 2.3 The de-tensioning sequence shall be as specified on the Owner Work Package.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities and recording of documentation associated with this procedure.

4.0 QUALIFICATIONS

- 4.1 Owner Construction Personnel shall be fit by skill, training and experience to perform these duties and PSC tendon training program.

5.0 EQUIPMENT

- 5.1 Hydraulic ram (calibrated) and pump with appropriate hoses and fittings.
- 5.2 Hydraulic pressure gauge (calibrated).
- 5.3 Miscellaneous Tools, wrenches, ratchets, sockets, shackles, come-alongs, etc.
- 5.4 Plastic bags, plastic sheeting (Visqueen), rags, buckets or drums for waste grease.

6.0 PRECAUTIONS

- 6.1 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.



CAUTION

DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING.
DO NOT PERMIT OTHERS TO STAND UNDER LOADS.
DO NOT THROW OR DROP OBJECTS.

- 6.2 The wire used for the tendons has a minimum breaking strength of 240,000 pounds per square inch. This means that each 7mm diameter wire is capable of withstanding a minimum breaking load of 14,317 pounds. Multiply this by 163 wires in a tendon and you are dealing with forces in excess of two million pounds per tendon.

CAUTION

(When using rams or on a tendon not being removed.)

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 ANCHORAGES OF A STRESSED TENDON.
NEVER STRIKE THE BUTTONHEADS, THE WIRES OR THE ANCHORAGES OF A STRESSED TENDON WITH A HAMMER OR ANY OTHER METAL OBJECT.

- 6.3 Prior to applying ANY FORCE to the tendon, the stressing coupler must be fully engaged with the anchorage to be de-tensioned. Also check that the locking bolts on stressing rod (top part of two piece stressing rod) and coupler are present and fastened.

CAUTION

BE SURE THE STRESSING ROD IS FULLY ENGAGED WITH THE ANCHORAGE BEFORE APPLYING ANY LOAD, REGARDLESS OF HOW SMALL THAT LOAD MIGHT BE.



6.4 During de-tensioning operations the following cautions shall be observed.

CAUTION

NEVER EXCEED THE OVERSTRESS FORCE OR PRESSURE - 80% (1867 kips for a 163 wire tendon) or 11.46 kips FOR THE AMOUNT OF EFFECTIVE WIRES IN A TENDON.

DO NOT STAND BEHIND THE JACK WHEN IT IS UNDER LOAD.

KEEP HANDS AND FINGERS OUT OF ANY PINCH AREAS.

BE ALERT DURING SHIM PLACEMENT AND REMOVAL.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS

7.1 **HOLD POINT** - Prior to de-tensioning a tendon Owner Inspector to be notified to perform a visual inspection and documentation of the anchor head, shims, bearing plate and button heads per PSC Procedure F&Q 15.1.

8.0 PREREQUISITES

8.1 Prior to removing a grease cap/tendon end protection or placing the jack on a tendon assure that proper tendon is being worked on. Record on Data Sheet F&Q 8.1 or Owner Work Package documentation the information required for tendon number, tendon end and date of de-tensioning.

8.2 The tendon anchorage end should be visually inspected per PSC Procedure F&Q 15.1 prior to de-tensioning.

9.0 PROCEDURE

9.1 If not previously done, remove the grease cap or end protection from the end being de-tensioned.

9.2 ANCHORAGE CLEANUP

9.2.1 Grease shall be removed from the tendon end using clean non-metallic devices. Bristle brushes and rags with suitable quantities of Viscosity Oil, Viscor Industrial No. 16A solvent or Owner approved solvent to dilute and wash away the grease may also be required. This cleanup must be sufficient to permit engagement of the anchorage threads with the stressing rod threads. Record on Data Sheet F&Q 8.1 the anchorage heat codes and amount of effective wires/button heads on tendon end.



9.3 TENDON DE-TENSIONING

9.3.1 HOLD POINT - Prior to de-tensioning a tendon Owner Inspector to be notified to perform a visual inspection and documentation of the anchor head, and for vertical tendons the bottom end plates, shims, bearing plate and button heads per PSC Procedure F&Q 15.1.

9.3.1.1 De-tensioning of tendons can be performed on both ends of the tendon in a simultaneous and controlled manner or on one tendon end for a vertical tendon as specified in Owner Work Package.

9.3.1.2 Align the ram stressing rod with the anchorage and the jack chair with the bearing plate. Ensure that the ram is in alignment within 1/8 inch. Record on Data Sheet F&Q 8.1 or Owner Work Package documentation the ram and gauge identification.

9.3.1.2.1 The stressing rod and coupler is now screwed onto the anchorage. (Rotate rod counter clockwise several revolutions to align threads, then clockwise to attach).

CAUTION

VERIFY RAM WILL NOT LOAD SUPPORT RIGGING WHEN PRESSURIZING RAM.

9.3.1.3 Before de-tensioning be sure opposite end of tendon is not being worked on. If opposite end of tendon is being worked on, coordinate with the opposite crew and continue. Pressurize the ram until the shims under the anchorage become loose and can be removed.

9.3.1.3.1 NOTE: A tendon shall never be stressed beyond 80% of the Minimum Guaranteed Ultimate Tensile Strength (GUTS) of the effective wires in that tendon. A 163 wire tendon shall not exceed a force of 1867 kips. For a tendon with missing wires, the maximum tensile force shall be reduced accordingly by 11.46 kips/wire.

9.3.1.4 Remove all shims from between the anchorage and bearing plate. Reduce the ram pressure until the load is reduced to zero. The ram shall be uncoupled from the anchorage.

9.4 TENDON END PROTECTION

9.4.1 Since these tendon ends will have further work performed on them at a later date, the following methods of tendon end protection shall be used. The tendon end may be covered with a plastic bag or sheeting and taped to provide protection from the elements, or the grease cap may be replaced using the old gaskets.



9.4.2 Shims removed from a tendon shall be kept in matched pairs and protected from the elements by covering with plastic or placing in a temporary storage container until sent to storage.

10.0 DOCUMENTATION

10.1 The items requiring documentation in this procedure shall be documented by the assigned field construction person of the working crew on Data Sheet F&Q 8.1 attached to this procedure or Work Package documentation.

11.0 QUALITY CONTROL

11.1 There is no quality control inspection or documentation required by this procedure.

12.0 NOTIFICATION

12.1 Owner Site Shift Superintendent shall be notified of any problems encountered.

13.0 ATTACHMENTS

13.1 Data Sheet F&Q 8.1.



PSC PROCEDURE F&Q 8.1
RAM TENDON DETENSIONING
DATA SHEET F&Q 8.1
August 29, 2008
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RAM TENDON DETENSIONING DOCUMENTATION

PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

TENDON NO.: _____ TENDON END _____

DATE OF DETENSIONING: _____



ANCHORAGE ID/HEAT CODE: _____

NUMBER OF EFFECTIVE BUTTONHEADS: _____

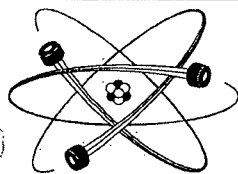
RAM ID _____

GAUGE ID _____

De-tensioning Sequence Verification: _____



SUPERINTENDENT (OR) CIVIL FIELD ENGINEER: _____

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 10.0

TENDON REMOVAL

August 29, 2008

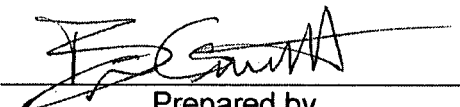
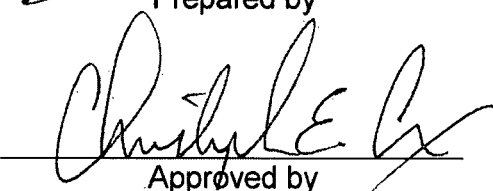

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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

TENDON REMOVAL

 Prepared by	<u>LEVEL II Q.C.</u> Title	<u>08/29/08</u> Date
 Approved by	<u>PROJECT MANAGER, P.E.</u> Title	<u>08/29/08</u> Date
 Approved by	<u>PRESIDENT</u> Title	<u>08/29/08</u> Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for the removal of tendons from tendon voids at Crystal River Unit 3 for the vertical and horizontal tendon work during the Steam Generator Replacement Project.

2.0 SCOPE

- 2.1 The tendons to be removed from the tendon voids shall be as specified in the Owner Work Package. Vertical Tendons shall be removed from the top, horizontal tendons shall be removed from the buttress as per the Owner Work Package.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities associated with this procedure.

4.0 QUALIFICATIONS

- 4.1 Owner Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.

5.0 EQUIPMENT

- 5.1 Tendon Field Coiler.
- 5.2 Cleaning waffle, splice chucks and cables.
- 5.3 Miscellaneous Tools, wrenches, ratchets, sockets, shackles, come-alongs, banders and banding materials, etc.
- 5.4 Plastic bags, plastic sheeting (Visqueen), rags, buckets or drums for waste grease.

6.0 PRECAUTIONS

- 6.1 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. The area in the tendon gallery where a tendon is being removed from the void is to be roped off and personnel are to be kept away from that area during tendon removal.

CAUTION: DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING.

DO NOT PERMIT OTHERS TO STAND UNDER LOADS.

DO NOT THROW OR DROP OBJECTS.

STAY AWAY FROM THE AREA IN THE TENDON GALLERY WHILE A TENDON IS BEING REMOVED



6.2 Use care when coiling the tendon, it tends to be quite springy and can cause injury if not properly restrained.

6.3 Waste grease from the voids could be a slipping safety hazard, during all operations it should be cleaned up and placed in waste drums.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS

7.1 There are no Quality Control Documentation (QCD) points or HOLD POINTS in this procedure.

8.0 PREREQUISITES

8.1 Prior to implementing this procedure the field anchor head cut off operations on the tendon must have been performed as per PSC Procedure F&Q 8.0. If shims have not been removed from under a anchor head they are to be removed, kept in matched pairs and protected from the elements by covering with plastic or placing in a temporary storage container until sent to storage.

9.0 PROCEDURE

9.1 TENDON REMOVAL

9.1.1 Remove tendon end protection from each end of the tendon.

9.1.2 On the cut end of the horizontal tendon attach a minimum 5/16 inch cable with a void cleaning waffle to one of the cut wires using a wire/cable chuck. This cable will be pulled into the tendon void as the tendon is removed and may be left in the void for later use or removed. The cleaning waffle will remove all excess grease from the void.

9.1.3 The trumplet will have excess grease removed after tendon removal with manual degreasing devices.

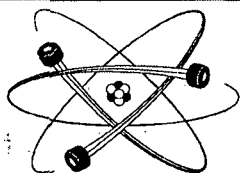
9.1.4 For vertical tendon attach 5/16 inch cable only to cut end to facilitate cleaning at a latter date. If used, secure cable to top bearing plate. Alternatively, a cable can be dropped down the void for cleaning after tendon removal at Owner Field Construction Personnel discretion.

9.1.5 Expand the coiler hub and attach the cable from the field coiler to the tendon end anchor head plate, bolt and apply a light tension on the cable with the coiler.

9.1.6 Coil the tendon on the coiler, using extra care as the anchor head enters the coiler. Place two bands on the tendon anchor head after the first revolution. After, band the tendon coils in the coiler for every new loop of the tendon as it is coiled (stagger the placement of the banding). The closer to the end of the tendon the more banding of the coils are needed in the coiler.



- 9.1.7 Detach the waffle cleaner or 5/16 inch cable, if present, from the wire at the cut end of the tendon and secure the cable.
- 9.1.8 Reverse the operation of the coiler and retract the hub to loosen the pulling cable and detach the pulling cable from the tendon end.
- 9.1.9 Hoist the tendon out of the uncoiler, wrap in plastic and lower it to the ground for storage and subsequent scraping.
- 9.1.10 If the tendon voids are to be cleaned at this time refer to PSC Procedure F&Q 11.0, if not protect the void end as per Section 9.2 of this Procedure.
- 9.2 VOID END PROTECTION**
- 9.2.1 After the tendon is removed from the void, the tendon void end may be covered with plywood or by attaching a temporary bearing plate cover to the bearing plate, or the grease cap may be replaced using the old gaskets to provide the voids protection from the elements.
- 10.0 DOCUMENTATION**
- 10.1 There is no documentation required by this procedure.
- 11.0 QUALITY CONTROL**
- 11.1 There is no quality control inspection or documentation required by this procedure.
- 12.0 NOTIFICATION**
- 12.1 Owner Site Shift Superintendent or Field Engineer shall be notified if any areas of rust, water coating, damage or other types of deterioration are found on tendon wires.
- 13.0 ATTACHMENTS**
- 13.1 None.

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 11.0

TENDON VOID CLEANING

August 29, 2008

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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

TENDON VOID CLEANING

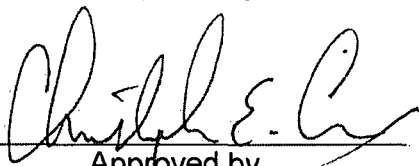

Prepared by

LEVEL II Q.C.

Title

08/29/08

Date


Approved by

PROJECT MANAGER, P.E.

Title

08/29/08

Date


Approved by

PRESIDENT

Title

08/29/08

Date

**1.0 PURPOSE**

- 1.1 This procedure will establish the requirements for the cleaning of tendon voids at Crystal River Unit 3 for the vertical and horizontal tendon work during the Steam Generator Replacement Project.

2.0 SCOPE

- 2.1 The tendon voids to be cleaned of excess grease are for those tendons that have been removed and are to be replaced as specified in the Owner Work Package.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities associated with this procedure.

4.0 QUALIFICATIONS

- 4.1 Owner Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.

5.0 EQUIPMENT

- 5.1 Lengths of 5/16" minimum cable.
- 5.2 Cleaning Waffles: A void cleaning device with attachment eyes on each end to accommodate the 5/16" minimum cable.
- 5.3 Walkie-Talkies: Or field phones for communications from one end of the void to the other.
- 5.4 Plastic bags, plastic sheeting (Visqueen), rags, buckets or drums for waste grease.

6.0 PRECAUTIONS

- 6.1 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.

CAUTION

DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING.

DO NOT PERMIT OTHERS TO STAND UNDER LOADS.

DO NOT THROW OR DROP OBJECTS.



- 6.2 Waste grease from the voids could be a slipping safety hazard, during all operations it should be cleaned up and placed in waste drums.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS

- 7.1 There are no Quality Control Documentation (QCD) points or HOLD POINTS in this procedure.

8.0 PREREQUISITES

- 8.1 Prior to implementing this procedure the Tendon must have been removed from the void as per PSC Procedure F&Q 10.0.
- 8.2 Adequate communication must be maintained between both ends of the tendon void.

9.0 PROCEDURE

- 9.1 Remove tendon end protection from each end of the tendon sheath.
- 9.2 At the top end of the vertical tendon sheath or one end of the horizontal tendon sheath attach one end of a cleaning waffle to the 5/16" minimum cable that was left in the void from tendon removal. All connections between the cables and the cleaning waffle shall be made in a streamline fashion so that it does not pose a snagging hazard to the sheathing material.
- 9.3 Pull the 5/16" minimum cable into the void until another 5/16" minimum cable can be attached to the other end of the cleaning waffle. At this point there should be two 5/16" minimum cables attached to the cleaning waffle.
- 9.4 From the bottom end of the vertical tendon sheath or the other end of the horizontal tendon sheath pull the 5/16" minimum cable until the cleaning waffle is reached and disconnected and the remaining cable is removed from the sheath, clean up excess grease removed. Manually clean trumpet area of excess grease.
- 9.5 CAUTION: If the cleaning waffle becomes blocked in the void during cleaning of tendon voids and are not able to be pulled back by hand with the 5/16" minimum cable the Owner Site Shift Superintendent shall be notified for determination of additional action.
- 9.6 Once the cleaning is completed the tendon void ends will be protected by applying a temporary cover or grease cap attached to the bearing plate.

**10.0 DOCUMENTATION**

10.1 There is no documentation required by this procedure.

11.0 QUALITY CONTROL

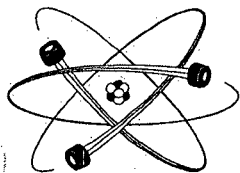
11.1 There is no quality control inspection or documentation required by this procedure.

12.0 NOTIFICATION

12.1 Owner Site Shift Superintendent shall be notified when there is any blockage in the tendon void preventing the cleaning waffle from being pulled through the sheathing.

13.0 ATTACHMENTS

13.1 None

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 13.0

TENDON INSTALLATION

August 29, 2008

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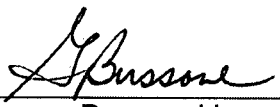
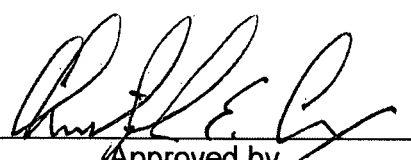
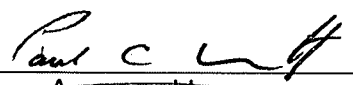
Revision 0

Revision 1, 6/24/09

PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

TENDON INSTALLATION

 Prepared by	QA MANAGER Title	06/24/09 Date
 Approved by	PROJECT MANAGER, P.E. Title	06/24/09 Date
 Approved by	PRESIDENT Title	06/24/09 Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for the installation of tendons and quality control inspections/data recording at Crystal River Unit 3 for the vertical and horizontal tendon work during the Steam Generator Replacement Project.

2.0 SCOPE

- 2.1 The tendons to be installed are those removed from the tendon voids as specified in the Owner Work Package. Vertical Tendons shall be installed from the top, horizontal tendons shall be installed from the buttress as per the Owner Work Package

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities associated with this procedure.
- 3.2 Owner Quality Control Personnel to perform all inspections and data recording.

4.0 QUALIFICATIONS

- 4.1 Owner Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.
- 4.2 Owner Quality Control Personnel shall be qualified to a minimum of Level II capability in accordance with the requirements of ANSI N45.2.6.

5.0 EQUIPMENT

- 5.1 Tendon Field Coiler, tendon puller (tugger).
- 5.2 Miscellaneous Tools, wrenches, ratchets, sockets, shackles, come-alongs, etc.
- 5.3 Plastic bags, plastic sheeting (Visqueen), rags, buckets or drums for waste grease.
- 5.4 Walkie-Talkies: Or field phones for communications from one end of the void to the other.

6.0 PRECAUTIONS

- 6.1 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.

**CAUTION**

DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING.

DO NOT PERMIT OTHERS TO STAND UNDER LOADS.

DO NOT THROW OR DROP OBJECTS.

6.2 Use care when uncoiling the tendon and installing it in the void. The tendon has considerable spring force and must be prevented from uncoiling violently.

6.3 If tendon becomes stuck do not exceed a pulling force of 35,000 lbs. on the tendon tugger.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS

7.1 All Quality Control Documentation (QCD) points noted in this procedure are **HOLD POINTS**.

8.0 PREREQUISITES

8.1 Tendon void cleaning has been performed per PSC Procedure F&Q 11.0.

8.2 Verify sheathing is installed and braced to accept loads imposed during installation.

8.3 Verify correct tendon has been selected for installation into the selected tendon void.

9.0 PROCEDURE

9.1 If the pulling device, which is used to control the twists in the tendon and to assist with tendon insertion was not applied during storage, it will now be attached using the following steps:

9.1.1 Approximately the first three to four feet of the free end of the tendon will be solvent cleaned with Viscosity Oil, Viscor Industrial No. 16A solvent or Owner approved equivalent to remove the grease compound. This will allow placement of the grip assist material and placement of the Kellum's Grip.

9.1.2 About three to four feet of the tendon will be wrapped with a grip assisting material such as strips of rubber and tape, that will enhance the gripping properties of the Kellum's Grip. A nose cone will be added over the taped end, with a Kellum's Grip placed over the nose cone and grip assist material, and secured with tape, wire, or bands. This encasement shall be installed in a streamline fashion with no sharp edges, abrupt changes in geometry, etc.

9.1.3 Attach the pull back eyebolt to the shop anchor head if required.



- 9.2 Hoist the tendon with one sling and place it in the uncoiler.
- 9.2.1 With the tendon in the uncoiler, align the free end of the tendon with the exit/feed opening of the uncoiler. The uncoiler will provide the control for uncoiling and placing the tendon into the tendon void.
- 9.2.2 The pull back eyebolt is secured to the spindle of the uncoiler. This will keep the shop anchor head securely out of the way during uncoiling.
- 9.2.3 Expand the coiler hub and install the tendon retention braces.
- 9.2.4 At any time prior to pulling in the tendon a tendon puller, also called a "tugger" may be attached to the bearing plate at the pulling end of the tendon void or a puller cable may be positioned at this end. Tendon feed-in guide rolls may be attached to the bearing plate at the feed-in end of the tendon void.
- 9.2.5 A length of 1/4 inch wire or trailer cable will be placed in the void to use as a "messenger" through the sheath and hook up the tendon puller cable. Pull back the cable with the wire or cable and once out at the feed-in end, hook up the cable to the tendon.
- 9.2.6 The outer bands holding the tendon in a coil shape can now be cut. Do not cut all coil holding bands. Do not cut the bands holding the wires in a bundle. Coil bands are cut to free up the coil as the tendon is being pulled into the void.
- 9.2.7 Gradually rotate the uncoiler while placing the tendon into the void with the tendon puller cable.
- 9.2.7.1 Regulate the speed of the uncoiler while maintaining communications with the placing crews at each end of the tendon void, so that the bands holding the wire in a bundle can be cut and removed just before entering the tendon void. The remaining coil holding bands will be cut as the tendon is being placed.
- 9.2.8 If the tendon is to be button headed at a later time, be certain the protective cap or plate over the shop anchor head is still in position. At this time, place the tendon such that the free wire end is protruding approximately 3 to 4 feet beyond the face of the bearing plate. The threaded bolt/eye bolt inserted onto the shop anchor head is used to guide the shop anchor head into the trumpet.
- 9.2.9 The grip assisting material and kellum's grip and nose cone may be removed at this time or later before button heading.
- 9.2.10 If button heading is not to be performed at this time, the following methods of tendon end protection may be used on the ends at the discretion of the Owner Site Superintendent. The tendon end may be covered with a plastic bag or sheeting and taped to provide protection from the elements, or the grease cap may be replaced using the old gasket.

**10.0 DOCUMENTATION**

- 10.1 The items requiring documentation in this procedure shall be documented by the Owner Quality Control Inspector on Data Sheet F&Q 13.0 attached to this procedure or on documentation provided in Work Packages.

11.0 QUALITY CONTROL

- 11.1 **QCD** - Inspector to document on Data Sheet F&Q 13.0 the information required for tendon number and date of installation.
- 11.2 **QCD** - During tendon installation, as it is being pulled into the void, the Inspector shall inspect the visible portion of the tendon wires for corrosion condition observing the requirements of attached Specification EW101 - Evaluative Criteria and document the wire condition rating.
- 11.3 Any other damage or adverse conditions noted by the Inspector are to be noted in the comments area of Data Sheet F&Q 13.0 or on documentation provided in Owner Work Packages.

12.0 ATTACHMENTS

- 12.1 Data Sheet F&Q 13.0
- 12.2 Specification EW101 - Evaluative Criteria



PSC PROCEDURE F&Q 13.0
TENDON INSTALLATION
DATA SHEET F&Q 13.0
August 29, 2008
Page 1 of 1
Revision 0

TENDON INSTALLATION DOCUMENTATION

PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

TENDON LOCATION NO.: _____

TENDON IDENTIFICATION NO. (FROM TAG) _____

WIRE CORROSION CONDITION: A or B or C or D or E
(CIRCLE ONE)

COMMENTS: _____

QC INSP. SIGNOFF _____ LEVEL _____ DATE _____

QC REVIEW _____ LEVEL _____ DATE _____



SPECIFICATION EW101 - EVALUATIVE CRITERIA

The following criteria shall be used for evaluation during visual inspection of tendon wire. Wire in Condition Rating A, B or C is considered acceptable. Owner shall be notified of any evaluation classified as either "D" or "E". Sandpaper cleaning, as noted below, is only a means of evaluating the true condition of the wire and will be done only at the discretion and approval of the Quality Control Inspector.

1. **A = EXCELLENT CONDITION**

Bright, uniformly colored wire; no foreign matter, visible rust or pitting. No cleaning for inspection is required. Two heavy passes with 100 grit sandpaper to bright metal.

2. **B = GOOD CONDITION**

Partial loss of color; little foreign matter and a small quantity of light rust may be present; no pitting. The oxide coat will be more discernable when viewed parallel to the length of the wire. Rag wipe cleaning may be required for inspection. Five heavy passes with 100 grit sandpaper to bright metal. NOTE: ANY FOREIGN MATTER OR LIGHT RUST FOUND IS TO BE REMOVED.

3. **C = FAIR CONDITION**

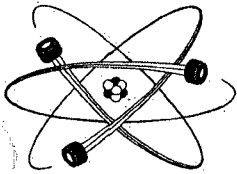
Major loss of color; some foreign matter and a large quantity of light rust may be present; no pitting. Rag cleaning or steel wool may be required for inspection. Ten heavy passes with 100 grit sandpaper to bright metal. NOTE: ANY FOREIGN MATTER OR LIGHT RUST FOUND IS TO BE REMOVED.

4. **D = UNUSABLE CONDITION**

Almost total loss of color; much foreign matter and small quantities of heavy rust in the form of red oxide dust; no pitting. Rag wiping, steel wool and sandpaper cleaning will be required for inspection. Twenty heavy passes with 100 grit sandpaper to bright metal.

5. **E = REJECTED CONDITION**

Area of hard, crusty, scaly red oxide, when cleaned show definite signs of pitting. Pits are defined as indentations of a depth of 1/64" or deeper and a minimum of 1/32" in diameter. Anytime pitting is in evidence, the material shall be graded as rejected. Thirty or more passes with 100 grit sandpaper to bright metal.

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 14.0

TENDON BUTTONHEADING

August 29, 2008

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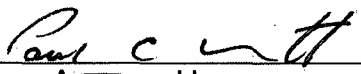
Revision 0

Revision 1, 6/24/09

PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

TENDON FIELD ANCHOR HEAD AND BUTTONHEADING APPLICATION

 _____ Prepared by	QA MANAGER _____ Title	06/24/09 _____ Date
 _____ Approved by	PROJECT MANAGER, P.E. _____ Title	06/24/09 _____ Date
 _____ Approved by	PRESIDENT _____ Title	06/24/09 _____ Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for the application of field anchor heads to tendons and field buttonheading of the tendons along with quality control inspections/data recording at Crystal River Unit 3 for the vertical and horizontal tendon work during the Steam Generator Replacement Project.

2.0 SCOPE

- 2.1 The tendons to have the field anchor head and buttonheads applied shall be for those tendons removed as specified in the Work Package. Vertical Tendons shall have the button heads and anchor head applied to the bottom (tendon gallery) end of the tendon wires. Horizontal tendons shall have the button heads and field anchor head applied at the buttress as per the Work Package.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities associated with this procedure.
- 3.2 Owner Quality Control Personnel to perform all inspections and data recording.

4.0 QUALIFICATIONS

- 4.1 Owner Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.
- 4.2 Owner Quality Control Personnel shall be qualified to a minimum of Level II capability in accordance with the requirements of ANSI N45.2.6.

5.0 EQUIPMENT

- 5.1 B-End Device.
- 5.2 Tendon Field Button header.
- 5.3 Button head GO, No-Go Gauge, Feeler Gauges, Optical Comparator, Eccentricity Gauge.
- 5.4 Miscellaneous Tools, wrenches, ratchets, sockets, shackles, come-alongs, etc.
- 5.5 Plastic bags, plastic sheeting (Visqueen), rags, buckets or drums for waste grease.



6.0 PRECAUTIONS

- 6.1 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.

CAUTION

DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING.

DO NOT PERMIT OTHERS TO STAND UNDER LOADS.

DO NOT THROW OR DROP OBJECTS.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS



- 7.1 All Quality Control Documentation (QCD) points noted in this procedure are HOLD POINTS.

8.0 PREREQUISITES

- 8.1 The tendon will have been installed in the void.

9.0 PROCEDURE

9.1 APPLYING ANCHORHEAD

- 9.1.1 Prepare the field end by removing any protective coverings or pulling devices.
- 9.1.2 Make sure the end of the tendon protrudes beyond the bearing plate about 3-4 feet.
- 9.1.3 If needed, clean the individual wires with #16A Solvent or Owner approved equivalent about 18 inches from the end.
- 9.1.4 Position the anchor head into the tendon button heading frame or holder making sure the buttonhead bearing side of the anchor head faces away from the bearing plate.
- 9.1.5 With the anchor head properly placed in the holder, run it back toward the bearing plate until the wire ends would extend about 2 inches into the anchor head.



9.1.6 Place each wire into the anchor head by slightly bowing it and allowing it to snap into the wire hole. Place the bottom wires of the tendon into the lower quadrant holes of the anchor head, keeping the wires as parallel as possible to prevent wire crossing. Do not miss holes while placing the wires, as it will be very difficult to place a missed wire in the center wire holes when all the surrounding holes are filled.

9.1.6.1 If a hole is missed, it may be necessary to remove some placed wires to allow placement of the missed wires.

9.1.7 After all the wires are placed, push the anchor head back towards the bearing plate to allow free wire length for buttonheading operations. The tendon is now ready to be buttonheaded.

9.2 BUTTONHEADING MACHINE and OPERATOR QUALIFICATION

9.2.1 Prior to forming any buttonheads on a tendon, the buttonhead machine and operator will be tested for the ability to form acceptable buttonheads, observing the requirements of this procedure.

9.2.2 As a minimum, the machine shall be qualified whenever another machine is substituted; whenever the machine has had mechanical repairs or parts replacement that would influence the forming of the buttonhead; or whenever the machine is determined to be responsible for forming unacceptable buttonheads.

9.2.3 Each machine or operator qualification shall be by forming buttonheads on each end of three sample wires about 12 inches in length.

9.2.4 **QCD Notification** - The buttonheads shall be inspected for acceptability observing the requirements of PSC Buttonhead Specification BHCR3, seen attached to this Procedure. The buttonhead diameter shall be checked with a Go No-Go Gauge or micrometer, with visual inspection for splits and eccentricity. If the visually inspected buttonheads appear to exceed the acceptance criteria, they shall be mechanically checked with the appropriate gauge for the suspect deficiency.

9.2.5 If all the buttonheads are acceptable, that machine and operator is therefore qualified for the forming of buttonheads.

9.2.6 Machines that do not form acceptable buttonheads, excluding problems with the wire, shall not be used in the forming of buttonheads until that machine is repaired and qualified or replaced by a qualified machine. Operators that do not form acceptable buttonheads shall not form buttonheads in production until qualified.

9.2.7 The qualification of each machine and operator tested shall be documented on the Buttonheading Machine Qualification Sheet by the QC Inspector.



9.3 FIELD BUTTONHEADING

9.3.1 Be sure the wire ends are clean and dry. Remove any built-up corrosion protection material from approximately the first 12 inches of the wire.

9.3.2 Set up the buttonheader and pump for access to the tendon to be buttonheaded. Generally, if the buttonheader is suspended from an overhead support and at the level of the tendon end, it can be swung back and forth with relative ease.

9.3.3 Buttonhead each wire in the tendon by sliding the wire into the buttonheader. Push the buttonheader against the wire until the wire is seated all the way into the header against the heading die. Be sure the wire is centered in the jaws of the header. Actuate the header and form a buttonhead on each wire.

9.3.3.1 During the course of the button heading operations the production person forming the button heads shall make the following checks:

9.3.3.1.1 100% of the buttonheads should be visually checked for splits and eccentricity.

9.3.3.1.1.1 Buttonheads that appear to have large splits, or appear to be eccentric will be tagged with a piece of tape wrapping for further evaluation by the QC Inspector at a later time. If a total of 4 button heads are tagged for large splits or eccentric heads, the buttonheading operation on the tendon will stop and the Owner Site Superintendent, QC Inspector, and Field Engineer is to be notified.

9.3.3.1.2 As work progresses a random sampling 10% diameter check of the buttonheads shall be performed, using the Go No-Go Gauge.

9.3.3.1.2.1 If a buttonhead is found unacceptable it will be tagged with a piece of tape wrapping for further evaluation by the QC Inspector at a later time. The production person forming the buttonheads should check the next 5 buttonheads formed using the Go No-Go Gauge and if 2 of them are unacceptable, the buttonheading operation on the tendon will stop and the Owner Site Superintendent and QC Inspector is to be notified.

9.3.3.2 Based on the above inspections:

9.3.3.2.1 For three or less rejectable buttonheads, the tendon will be considered acceptable for stressing operations.

9.3.3.2.2 For number of rejectable buttonheads greater than three rejected button heads shall be cut off and re-buttonheaded.

9.3.3.2.3 If four or more buttonheads are rejected after re-buttonheading in step 9.3.3.2.2, all 163 buttonheads shall be cut off and re-buttonheaded.



9.3.3.2.4 When less than all 163 wires are to be cut, each wire shall not be shortened by more than 3/4", measured from the outer end of the button head, unless approved by Responsible Engineer.

9.3.3.2.5 Individual buttonhead wires may be cut off more than once if the total shortening, relative to the length of the majority of wires, is not more than 3/4".

9.4 QCD-Notification-REGREASING THE SHOP HEAD

9.4.1 After the buttonheading and the QC Inspector's buttonhead inspection is completed smear on or brush on a light coating of grease onto the wires so the wires are greased inside the anchor head holes. Retract the field applied anchor head away from the bearing plate seating as many of the buttonheads as possible.

9.4.1.1 Smear on or brush a light coating of grease onto the button heads, wires and anchorage.

9.4.2 If re-stressing of the tendon is not to be performed at this time, the following methods of tendon end protection must be used on the ends at the discretion of the Owner Site Superintendent. The tendon end must be covered with a plastic bag or sheeting and taped to provide protection from the elements, or the grease cap may be replaced using the old gaskets.

10.0 DOCUMENTATION

10.1 The items requiring documentation in this procedure shall be documented by the Owner Quality Control Inspector on Data Sheet F&Q 14.0 attached to this procedure or documentation provided in the Work Package.

11.0 QUALITY CONTROL

11.1 Inspector to document on Data Sheet F&Q 14.0 or documentation provided in the Work Package the information required for tendon number, field anchor head identification and date of buttonheading.

11.2 The Inspector will check buttonheads formed during Buttonheading Machine and Operator Qualification and document on Buttonheading Machine Qualification Sheet or documentation provided in the Work Package.

11.3 After buttonheading is complete and before the field anchor head is pulled back the following buttonhead inspection are to be performed by the Inspector and documented on Data Sheet F&Q 14.0 or documentation provided in the Work Package.

11.3.1 100% of the buttonheads shall be visually checked for splits and eccentricity.



- 11.3.1.1 Buttonheads that appear to be at or near the limiting criteria for splits and/or eccentricity, will be further evaluated for acceptability by using the appropriate mechanical gauging device.
- 11.3.2 A random sampling 10% check of the buttonheads should be performed, using the Go No-Go Gauge.
- 11.3.2.1 If a buttonhead is found unacceptable, all adjacent buttonheads, those surrounding the unacceptable head, will be checked. This secondary check will not be counted as part of the 10% check. If no additional unacceptable heads are found, that tendon will be accepted. If one or more additional heads are found to be unacceptable, 100% of the buttonheads on that tendon will be checked.
- 11.3.2.2 Buttonheads that do not pass the Go portion of the Go No-Go Gauge and where splits are in evidence, may be further evaluated by visually examining or physically measuring the split to verify that it does not exceed the acceptance criteria of BHCR3. If the split is within the parameters of BHCR3, then the button head will be measured with a micrometer or caliper at a point perpendicular to the split. This measurement will not exceed 0.475 of an inch.
- 11.3.2.2.1 The geometric function of an acceptable size split on a button head, near or at the 0.475 of an inch limit, will have a tendency to elongate the button head, so that it might not pass through the Go portion of the Go No-Go Gauge.
- 11.3.2.3 Double buttonheads are acceptable provided they pass the Go No-Go Gauge for size conformity and visual check for splits and eccentricity. All double headed buttonheads should be checked as noted above and will not be counted as part of the normal 10% check.
- 11.3.3 A minimum of 5 buttonheads shall be checked for eccentricity with the appropriate mechanical device to the acceptance criteria stated in BHCR3. Buttonheads outside the acceptable tolerance shall be marked as rejectable with tape and evaluated per Section 12.3.
- 11.3.4 Whenever a "secondary check" or 100% check for buttonhead size has been performed it will be noted as "secondary check" or "100% check" in the comments area of Data Sheet F&Q 14.0.

12.0 NOTIFICATION

- 12.1 Owner Site Superintendent and QC Inspector to be notified if splits or unacceptable sized buttonheads are encountered as defined in sections 9.3.3.1.1.1 and 9.3.3.1.2.1.



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TENDON BUTTONHEADING

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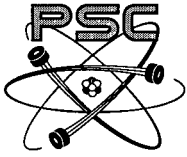
12.2 Owner to be notified for disposition if 4 or more buttonheads on a tendon are found to be reject during QC Inspector's buttonhead inspection.

13.0 ATTACHMENTS

13.1 Data Sheet F&Q 14.0.

13.2 Buttonheading Machine/Operator Qualification Sheet.

13.3 Button head Specification BHCR3.



PSC PROCEDURE F&Q 14.0
TENDON BUTTONHEADING
 DATA SHEET F&Q 14.0
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TENDON BUTTON HEADING DOCUMENTATION

PROJECT: CRYSTAL RIVER UNIT 3
 STEAM GENERATOR REPLACEMENT PROJECT

TENDON NO.: _____ FIELD HEAD (END PLATE) ID: _____

DATE OF BUTTON HEADING: _____

BUTTON HEADING MACHINE NO.: _____

MACHINE OPERATOR QUALIFIED?: _____

<u>INSPECTIONS</u>	<u>ACCEPTABLE</u> (CHECK)	<u>REJECTABLE</u>
GO, NO-GO	(OK) _____	_____
SPLITS	(OK) _____	_____
ECCENTRICITY	(OK) _____	_____
TOTAL UNACCEPTABLE HEADS		_____

QC GAUGES USED:

GO, NO-GO _____ Recal. Date _____

ECCENTRICITY _____ Recal. Date _____

FEELER GAUGE OR OPTICAL COMPARATOR _____ Recal. Date _____

COMMENTS _____

QC INSP. SIGNOFF _____ LEVEL _____ DATE _____

QC REVIEW _____ LEVEL _____ DATE _____



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TENDON BUTTONHEADING
B.H. MACH/OPER. QUAL SHT.
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Precision Surveillance Corporation

BUTTON HEADING MACHINE/OPERATOR QUALIFICATION SHEET

PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

BUTTON HEADING MACHINE ID: _____

DATE: _____

SHIFT: _____

OPERATOR: _____

INSPECTOR: _____

INSPECTION CHECKS:

Indicated in-tolerance dimension by check mark.

	Wire #1	Wire #2	Wire #3
1. Head diameter:	_____	_____	_____
2. Head height:	_____	_____	_____
3. Head eccentricity:	_____	_____	_____
4. Split/Crack criteria:	_____	_____	_____

Remarks of general appearance check (Visual):



BUTTON HEAD SPECIFICATION BHCR3

The following describes the characteristics and acceptance criteria that have been established for Buttonheads. This procedure is based on Inryco Button head Specification BH102.

1. INTRODUCTION:

The ultimate strength of wires with upset button heads, as used for the Post Tensioning method, depends on the following factors:

- Hardness of the anchor head
- Dimensions of borehole in the anchor head
- Button head dimensions
- Button head eccentricity

For button heads on stress relieved wire corresponding to ASTM A421 Type BA, to 0.2756 inch diameter, to develop the ultimate strength of wire, the following standards must be met:

2. Dimensions of Wire Hole

For the most effective performance of the button head, the bore through the base material must be .286" to .300". The corners at the button head bearing surface will be broken to .015" chamfer + .010", - .005".

3. Button head Dimensions

4.1. Diameter: 0.410 inch minimum to 0.450 inch maximum

4. Button head Defects

5.1. Fissures in Button heads

5.1.1. Splits are defined as fissures with their larger dimension oriented within $\pm 50^\circ$ to the wire axis. Split width is the dimension perpendicular to larger dimension.

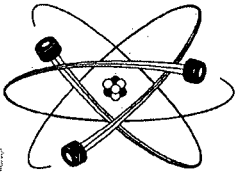
- a. Maximum split width allowed for any one split: 0.060 inches.
- b. A button head may have several splits, maximum 4 per buttonhead.
- c. Button heads with splits which bisect the button head shall be rejected.
- d. Splits shall not intersect.



5. Eccentricity of Button heads

Button head eccentricity is defined as a lack of alignment between the axis of the button head with the axis of the wire.

Maximum allowable eccentricity: 0.010 inches.

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Precision Surveillance Corporation

PSC PROCEDURE F&Q 15.0

TENDON RESTRESSING

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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

TENDON RESTRESSING

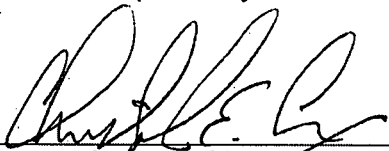

Prepared by

QA MANAGER

Title

06/24/09

Date


Approved by

PROJECT MANAGER, P.E.

Title

06/24/09

Date


Approved by

PRESIDENT

Title

06/24/09

Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for the re-stressing of tendons and quality control inspections/data recording at Crystal River Unit 3 for the vertical and horizontal tendon work during the Steam Generator Replacement Project.

2.0 SCOPE

- 2.1 The tendons to be re-stressed are those new tendons installed to replace those removed from the tendon voids and those de-tensioned but not removed as specified in the Work Package. Vertical tendon stressing shall be performed from the top of the containment. Horizontal tendon stressing shall be performed from both ends.
- 2.2 The re-stressing sequence shall be as specified in Work Package.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities associated with this procedure.
- 3.2 Owner Quality Control Personnel to perform all inspections and data recording.

4.0 QUALIFICATIONS

- 4.1 Owner Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.
- 4.2 Owner Quality Control Personnel shall be qualified to a minimum of Level II capability in accordance with the requirements of ANSI N45.2.6.

5.0 EQUIPMENT

- 5.1 Hydraulic ram (calibrated) and pump with appropriate hoses and fittings.
- 5.2 Hydraulic pressure gauge (calibrated).
- 5.3 0.030" feeler gauges or shim stock.
- 5.4 Miscellaneous Tools, wrenches, ratchets, sockets, shackles, come-alongs, etc.
- 5.5 Plastic bags, plastic sheeting (Visqueen), rags, buckets or drums for waste grease.



6.0 PRECAUTIONS

- 6.1 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.

CAUTION

DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING.

DO NOT PERMIT OTHERS TO STAND UNDER LOADS.

DO NOT THROW OR DROP OBJECTS.

- 6.2 The wire used for the tendons has a minimum breaking strength of 240,000 pounds per square inch. This means that each 7mm diameter wire is capable of withstanding a minimum breaking load of 14,317 pounds. Multiply this by 163 wires in a tendon and you are dealing with forces in excess of two million pounds per tendon.

CAUTION

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 ANCHORAGES OF A STRESSED TENDON.

NEVER STRIKE THE BUTTONHEADS, THE WIRES OR THE ANCHORAGES OF A STRESSED TENDON WITH A HAMMER OR ANY OTHER METAL OBJECT.

- 6.3 Prior to applying ANY FORCE to the tendon, the stressing rod and coupler must be fully engaged with the anchorage.

CAUTION

BE SURE THE STRESSING ROD IS FULLY ENGAGED WITH THE ANCHORAGE BEFORE APPLYING ANY LOAD, REGARDLESS OF HOW SMALL THAT LOAD MIGHT BE.



6.4 During stressing operations the following cautions shall be observed.

CAUTION

NEVER EXCEED THE OVERSTRESS FORCE OR PRESSURE - 80% (1867 kips for a 163 wire tendon) or 11.46 kips FOR THE AMOUNT OF EFFECTIVE WIRES IN A TENDON.

DO NOT STAND BEHIND THE JACK WHEN IT IS UNDER LOAD.

KEEP FINGERS OUT OF ANY PINCH AREAS.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS



7.1 All Quality Control Documentation (QCD) points noted in this procedure are **HOLD POINTS**.

8.0 PREREQUISITES

8.1 For tendons with 162, 161 or 160 effective wires, the force as shown on Work Package shall be prorated as follows:

8.1.1 Number of **EFFECTIVE WIRES** divided by 163 **STANDARD** times Pre-Tensioning Force (PTF) equals Prorated Pre-Tensioning Force

8.1.2 Number of **EFFECTIVE WIRES** divided by 163 **STANDARD** times Overstress Force (OSF) equals Prorated Overstress Force

8.1.3 Number of **EFFECTIVE WIRES** divided by 163 **STANDARD** times Lock-Off Force equals Prorated Lock-Off Force.

9.0 PROCEDURE

9.1 Remove tendon end protection.

9.2 **QCD - Notification -** Grease shall be removed from the tendon end using clean non-metallic devices. Bristle brushes and rags with suitable quantities of Viscosity Oil, Viscor Industrial No. 16A solvent or Owner approved equivalent to dilute and wash away the grease may also be required. This cleanup must be sufficient to permit engagement of the anchorage threads with the stressing rod threads.

9.3 Align the jack coupler with the anchorage and the jack chair with the bearing plate.

9.4 The coupler is pressed against the anchorage and is now screwed onto the anchorage. (Rotate coupler or rod counter clockwise several revolutions to align threads, then clockwise to attach).



- 9.5 Approximately equalize the anchor head distance from the bearing plate on both ends of a horizontal tendon, adjust anchor head location if necessary.
- 9.6 NOTE: Vertical tendons are only stressed from one end, from the top of the containment.
- 9.7 **QCD - HOLD POINT** - Rams shall be pressurized to a Pre-tensioning Force (PTF), that force necessary to bring the tendon into a lightly stressed condition to remove slack and seat the button heads. This force establishes the base for Elongation Measurement. This force shall be shown on Work Package to remove slack from the tendon. Record pressure and elongation. (NOTE: The elongation can be measured with the bearing plate and anchor head as a reference point. The methodology to be used is to select a reference based on field conditions.)
- 9.7.1 Verify that the equipment and tendon are stable. Verify that anchor heads are parallel to the base plates to within +/- 1/8 inches and that all button heads are seated properly. For this and following steps the stressing crews shall be in continuous contact during the performance of the work.
- 9.7.2 Ram pressures shall be maintained within 1,000 psi of each other. At final lock-off values the ends of double end stressed tendons should be adjusted if needed to be so that gap between bearing plate and anchor head at each end be within 1 inch of each other.
- 9.8 **QCD - HOLD POINT** - Rams shall be pressurized to the Overstress Force (OSF) shown on Owner Work Package unless a prorated Overstress Force is required by section 8.1, hold for 1 minute verifying that all load induced movements have ceased, record pressure and elongation.
- 9.8.1 If it is necessary to go beyond the maximum travel of the ram, fill the space between the bearing plate and anchor head with shims, transfer load to shims, lower piston to bottom of travel, screw jack rod nut down tight against piston, then continue to stress.
- 9.9 Compare measured elongation to the target value listed in the Owner Work Package. If the measured value deviates from the target value by more than $\pm 10\%$ the tendon can be de-stressed and restressed starting from zero pressure follow the instructions in Steps 9.7 and 9.8 as applicable.
- 9.9.1 If measured elongation deviates from the target value by more than 10%, reduce jacking force to zero and repeat instructions in Sections 9.7 and 9.8 above. However, do not re-stress the tendon more than twice following the initial trial unless directed to do so by Owner Engineering. If elongation within the plus or minus 10% acceptance range is not achieved after three trials, notify Owner Engineering.



9.10 Shim Placement:

9.10.1 At any point prior to or during stressing, the field crew will prepare shim stacks of uniform thickness, so that when the shims are placed, there will not be more than a 1/16 inch height differential between the total of each shim stack. The largest shim should be against the bearing plate with the next largest shim thickness against the anchor head bearing face, unless approved otherwise by Owner Engineering.

9.11 Reduce pressure on the ram to a few hundred psi above lock-off (seating) point.

9.11.1 The shims will be placed between the bearing plate and anchor head in matched diametrically opposite pairs. The shim gap will be filled to the nearest 1/8" increment. While the shims are being placed, the gap between shims shall be minimized and in no case shall exceed a space of 1/4 inch for the first shims in direct contact with the anchor head and 1/2 inch for the remaining shims in the stack.

9.11.1.1 Shims are to be installed in tight alignment so as not to interfere with installation of the grease caps.

9.11.2 Insert a feeler gauge or shim stock of 0.030 inches in thickness into each shim stack at two points located approximately 180 degrees apart and approximately centered.

9.11.3 De-pressurize the ram to set the anchor head onto the shims. It shall not be necessary to return to zero gauge pressure but at least 2000 psi below anticipated liftoff on the gauge with a minimum of 1500psig.

9.11.4 No portion of the bearing surface of the anchor head shall overhang the shim stack.

9.12 **QCD - HOLD POINT** - To assure that the correct forces have been applied to the tendon, lift-off stress measurement will now be performed. NOTE: This may be performed independently of the other end.

9.12.1 Gradually pressurize the ram while pulling the feeler gauges. The point at which the second feeler gauge becomes loose is the lift-off stress.

9.12.2 Repeat Sections 9.11.3 through 9.12.1 until 3 consecutive lift-offs have been taken. These lift-offs shall be within 40 kips of each other. If this is not achieved the feeler gauges may be repositioned and the lift-offs repeated until 3 consecutive results fall within the range criteria.



- 9.12.3 If the average of the three lift-offs are within the minus (-)0% and plus (+)4% range of the final calculated values provided in Owner Work Package, the tendon re-stressing is now complete. Readings falling outside the range shall be adjusted by adding or removing shims. If, after adjustment trying the minimum available shim sizes, readings still fall outside the acceptable range it shall be reported to Owner.
- 9.12.4 The ram force shall be reduced to zero. The ram shall be uncoupled from the anchorage.
- 9.13 At this time perform detailed visual inspection of as left anchorage per PSC Procedure F&Q 15.1. If inspection is not to be performed at this time anchorage shall be smeared with a light coating of grease and protected.
- 9.13.1 If final installation of the grease cap is to be performed refer to PSC Procedure F&Q 16.0.
- 9.13.2 The following methods of tendon end protection may be used at the discretion of the Owner Site Superintendent. The tendon end may be covered with a plastic bag or sheeting and taped to provide protection from the elements, or the grease cap may be replaced using the old gaskets.

10.0 DOCUMENTATION

- 10.1 The items requiring documentation in this procedure shall be documented by the Owner Quality Control Inspector on Data Sheet F&Q 15.0 or Data Sheet F&Q 15.0A (both attached to this procedure) or Owner Work Package Documentation. After the tendon has been re-stressed the amount of seated button heads, are to be inspected and recorded on data sheet F&Q 15.0.

11.0 QUALITY CONTROL

- 11.1 Inspector to document on Data Sheet F&Q 15.0 or Owner Work Package Documentation the information required for tendon number, tendon end and date of stressing.
- 11.2 Document the ram and gauge identification.
- 11.3 Note: The following are instructions for PSC F&Q 15.0 Data Sheet Documentation.
- 11.4 Document on Line 1 of Data Sheet F&Q 15.0 the calculated pressure. Document on Line 1.1 the actual pressure and elongation at PTF.
- 11.5 Document on Line 2 of Data Sheet F&Q 15.0 the calculated pressure. Document on Line 2.1 the actual pressure and elongation at OSF.
- 11.6 Document on Line 3 of Data Sheet F&Q 15.0 the calculated elongation. Document on Line 3.1 the actual measured elongation (Line 2.1 minus Line 1.1).



- 11.7 The Total measured elongation for the tendon shall be within plus or minus 10% of calculated values.
- 11.8 Document on Line 4 of Data Sheet F&Q 15.0 the calculated lift-off.
- 11.9 Document on Data Sheet F&Q 15.0A the pressure for the second shim stock to become loose for each Lift-Off and average the readings as required on the Data Sheet.
- 11.10 Transfer the Averaged Lift-Off reading from Data Sheet F&Q 15.0A to Line 4.1 of Data Sheet F&Q 15.0.
- 11.11 The lift-offs shall be within the minus (-)0 and plus (+)4 percentage ranges of the final calculated values provided.
- 11.12 Document on Line 5 of Data Sheet F&Q 15.0 the actual shims installed.
- 11.13 Document on Line 6 the number of seated button heads after stressing.
- 11.14 Document on Line 7 of Data Sheet F&Q 15.0 the anchor head identification.

**12.0 NOTIFICATION**

- 12.1 Owner is to be notified if elongation is not within the plus or minus 10% after three attempts at elongation or if the lock-offs are not within the minus (-)0 and plus (+)4 percentage ranges, of the values provided.

13.0 ATTACHMENTS

- 13.1 Data Sheet F&Q 15.0
- 13.2 Data Sheet F&Q 15.0A



PSC PROCEDURE F&Q 15.0

TENDON RESTRESSING

DATA SHEET F&Q 15.0

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TENDON STRESSING DOCUMENTATION

PROJECT: **CRYSTAL RIVER UNIT 3**
STEAM GENERATOR REPLACEMENT PROJECT

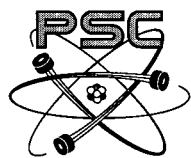
TENDON NO.: _____ CIRCLE ONE: Removed & Replaced Tendon or Restress Only Tendon

CIRCLE ONE: Single End Stress Tendon or Double End Stress Tendon

EFFECTIVE WIRES: _____ DO NOT EXCEED: 80% OF GUTS: _____ KIPS

STRESSING SEQUENCE VERIFIED:

	TENDON END: _____			TENDON END: _____		
	RAM NO.: _____			RAM NO.: _____		
	RAM AREA: _____ K = _____			RAM AREA: _____ K = _____		
	GAUGE NO.: _____			GAUGE NO.: _____		
	KIPS	PSI	ELONGATION	KIPS	PSI	ELONGATION
1.0 CALCULATED (PTF)						
1.1 ACTUAL (PTF)						
2.0 CALCULATED (OSF)						
2.1. ACTUAL (OSF)						
3.0 CALCULATED ELONGATION OVER (PTF)						
3.1. ACTUAL MEASURED ELONGATION (2.1 MINUS 1.1) (+/-10% of calculated elongation)						
3.2. TOTAL TENDON ELONGATION						
4.0 CALCULATED LIFT-OFF						
4.1. ACTUAL LIFT-OFF (-, +% of calculated lift-off)						
ACTUAL LIFT-OFF in kips (1/2 sum of individual forces)						
5.0 ACTUAL SHIMS INSTALLED						
6. # seated Buttonheads after stressing:						
7.	ANCHOR HEAD ID _____			ANCHOR HEAD ID _____		
PSI = $\frac{(KIPS - K) \times 1000}{RAM\ AREA}$	KIPS = $\frac{RAM\ AREA \times PSI}{1000} + K$					
COMMENTS: _____						
QC INSP. SIGNOFF: _____ LEVEL: _____ DATE: _____						
QC REVIEW: _____ LEVEL: _____ DATE: _____						



PSC PROCEDURE F&Q 15.0

TENDON LOCK-OFF

DATA SHEET F&Q 15.0A

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TENDON STRESSING DOCUMENTATION**TENDON LOCK-OFF STRESS MEASUREMENT DOCUMENTATION**

PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

TENDON NO.: _____ TENDON END: _____

RAM NO.: _____ GAUGE NO.: _____

RAM AREA: _____ K = _____

MEASUREMENT #	Gauge Pressure (PSI) Feeler Gauge Withdrawal	Average Pressure/ Force (kips) [Ave of Measurements 1,2,3]
	2 nd . Gauge	
1		
2		
3		
		_____ PSI/ _____ KIPS

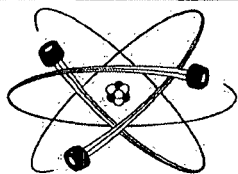
$$\text{PSI} = \frac{(\text{KIPS} - \text{K}) \times 1000}{\text{RAM AREA}}$$

$$\text{KIPS} = \frac{\text{RAM AREA} \times \text{PSI}}{1000} + \text{K}$$

COMMENTS _____

QC INSP. SIGNOFF _____ LEVEL _____ DATE _____

QC REVIEW _____ LEVEL _____ DATE _____

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PSC PROCEDURE F&Q 15.1

ANCHORAGE INSPECTION

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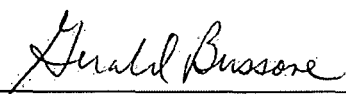
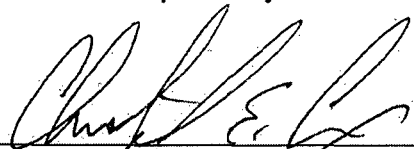
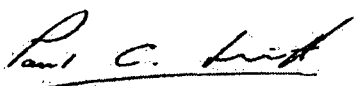
Revision 0

Revision 1. 09/16/09

PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

ANCHORAGE INSPECTION OF STRESSED TENDON

 Prepared by	<u>LEVEL II Q.C.</u> Title	<u>09/16/09</u> Date
 Approved by	<u>PROJECT MANAGER, P.E.</u> Title	<u>09/16/09</u> Date
 Approved by	<u>PRESIDENT</u> Title	<u>09/16/09</u> Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for a detailed visual inspection of the anchor head, shims, bearing plate and wire button heads on each end of a tendon at Crystal River Unit 3 for the vertical and horizontal tendon work during the Steam Generator Replacement Project.
- 1.2 Inspection shall be performed in accordance with the requirements of 2001 Edition and 2003 Addenda of the ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWL.
- 1.3 A detailed visual inspection is to be performed prior to de-tensioning for those tendons to be de-tensioned but not removed as specified in the Work Package.
- 1.4 Also a detailed visual inspection is to be performed on those re-stressed new tendons installed to replace those removed from the tendon voids and those de-tensioned but not removed as specified in the Work Package.

2.0 RESPONSIBILITY

- 2.1 Owner Quality Control Personnel to perform all inspections and data recording.

3.0 QUALIFICATIONS

- 3.1 The inspector performing this inspection is to be qualified as a Level II per PSC Procedure or as qualified by Progress Energy.

4.0 EQUIPMENT

- 4.1 Magnifying Glass with suitable illumination.
- 4.2 Optical Comparator with 0.005 inch (min.) Measuring Reticle.
- 4.3 Steel Ruler.
- 4.4 Light Meter.

5.0 QUALITY CONTROL

- 5.1 All Quality Control Documentation (QCD) points noted in this procedure are Hold Points. The work shall not progress past or through a QCD without a verbal release from the Inspector. The required information or evaluative data shall be documented on Data Sheet F&Q 15.1 or Work Package Documentation.



6.0 PRECAUTIONS

- 6.1 CAUTION - NEVER STRIKE THE BUTTON HEADS, THE WIRES OR THE ANCHOR HEAD OF A STRESSED TENDON WITH A HAMMER OR ANY OTHER METAL OBJECT.
- 6.2 CAUTION - IF AT ANY TIME A CRACKED OR BROKEN ANCHOR HEAD IS DETECTED AS A RESULT OF INSPECTION, ALL WORK SHALL STOP. ALL PERSONNEL SHALL BE MOVED AWAY FROM THAT AREA AND THE OWNER CONSTRUCTION SUPERVISOR SHALL BE NOTIFIED. THE WORK AND/OR INSPECTIONS SHALL CONTINUE ONLY AFTER A SAFETY EVALUATION HAS BEEN MADE AND ONLY AT THE DIRECTION AND CONTROL OF THE OWNER CONSTRUCTION SUPERVISOR.

7.0 PREREQUISITES

- 7.1 The tendon will be in a stressed condition.
- 7.2 The anchor head, shims, bearing plate and wire button heads are to be cleaned to permit inspection.

8.0 ANCHORAGE INSPECTION

- 8.1 The tendon anchorage, including the anchor head, bearing plate, stressing shims and button heads of all selected tendons shall be visually inspected for signs of corrosion, cracks, missing wires, broken/damaged or protruding wires and malformed button heads.
- 8.2 These inspections are to be performed with light conditions supplemented by auxiliary light sources if needed to attain a minimum illumination level of 50 foot-candles (fc) as verified by a light meter provided by owner. The light meter ID with its calibration due date and a description of any auxiliary lighting used is to be documented on Data Sheet F&Q 15.1 or Work Package Documentation.

8.3 CORROSION INSPECTION

8.3.1 BUTTON HEADS


- 8.3.1.1 The Category of Corrosion that could be seen on Button heads or Tendon Wire will be described in PSC Specification EW101 of PSC Procedure F&Q 13.0. As the tendon is still in a stressed condition, there will not be much area to review for Category of Corrosion, therefore only the exposed, visible portions of the button heads shall be evaluated.

- 8.3.1.1.1 **QCD-** Document the Category of Corrosion of the Button heads on Data Sheet F&Q 15.1 or Work Package Documentation.





8.3.2 ANCHOR HEAD, SHIMS, BEARING PLATE

 8.3.2.1 The Category of Corrosion that could be seen on Anchor Head, Shims, or Bearing Plates will be described in PSC Specification EW101 of PSC Procedure F&Q 13.0. As the tendon is still in a stressed condition, the areas to be reviewed will be somewhat limited, therefore only the exposed, visible portions of the anchor head, shims and bearing plate shall be evaluated.

8.3.2.1.1 **QCD-** Document the Category of Corrosion of each item on Data Sheet F&Q 15.1 or Work Package Documentation.

8.3.3 CRACKS

8.3.3.1 The Anchor Head, Shims and Bearing Plates shall be visually inspected for signs of Cracks.

8.3.3.1.1 **QCD-** If there are no signs of Cracks present, "None" shall be entered into the "Cracks" area of Data Sheet F&Q 15.1 or Work Package Documentation for each item as it occurs.

8.3.3.1.2 **QCD-** If signs of Cracks are present in any item, regardless of size, the crack shall be sketched on Sketch Sheet F&Q 15.1 or Work Package Documentation and identified with a Sketch Number, which shall be entered into the "Cracks" area of Data Sheet F&Q 15.1 or Work Package Documentation.

8.3.4 BUTTON HEAD PHYSICAL INSPECTION

8.3.4.1 While the tendon is in a Stressed Condition, it shall be necessary to inspect the button heads/wires for those button heads/wires that may be missing, damaged or protruding/unseated. The button heads shall be inspected for obvious gross deficiencies as part of the Off-size Button head Inspection.

8.3.4.2 All conditions for button heads and wires, whether missing or defective, shall be documented.

8.3.4.3 Wire and button heads shall be inspected for the following information and documented by the appropriate code on Data Sheet F&Q 15.1 or Work Package Documentation. The circle represents the button head location on the anchor head. To correctly orient the button head on the anchorage, it shall be necessary to accurately locate the anchorage Heat or Code Number on the Anchorage Sketch with respect to the hole pattern alignment, on Data Sheet F&Q 15.1 or Work Package Documentation.



8.3.4.3.1

 = Off-size button head

8.3.4.3.1.1

Malformed button heads shall be documented as Off-size button heads, with no other distinguishing Category Codes.

8.3.4.3.2

 = Protruding/Unseated Wire/Button head.

8.3.4.3.2.1

Place an arrow pointing at the protruding button head, with the distance of protrusion above the other button heads at the tail end and in such a location so as not to obscure information.


8.3.4.3.3

 = Broken/Missing Wire/Button head


8.3.4.3.3.1

This code shall be used to identify occurrences for this inspection. See section 8.3.4.3.5 for Code if wire is removed.

8.3.4.3.4

 = Previously Identified As Missing; whether a result of a previous inspection or as a result of the installation.

8.3.4.3.5

 = A discontinuous wire that was removed during this inspection and previously identified as Broken/Missing.

8.3.4.4

QCD- Document the Button head Inspection on the Sketch shown on Data Sheet F&Q 15.1 or Work Package Documentation in accordance with the Button head Code shown of Data Sheet F&Q 15.1 or Work Package Documentation.

8.3.4.5

QCD- Document the Anchor Head ID and Heat Number Code Identification Number for each anchorage component on Data Sheet F&Q 15.1 or Work Package Documentation.

8.3.4.6

IF any missing, broken and/or damaged wires are detected, THEN check the installation records, i.e., the button heading records, stressing records or reports, to determine if the missing, broken, and/or damaged wires were previously noted.

9.0 NOTIFICATION

9.1

Owner should be formally notified when each one or more of the following conditions are detected as a result of the inspection of a tendon. Notification should be by a nonconformance report or a formal letter.



- 9.1.1 CATEGORY OF CORROSION D, or E - when detected for Button heads or Wires, Owner should be notified.
- 9.1.2 CATEGORY OF CORROSION D, or E - when detected for Anchor Heads, Shims, or Bearing plates, Owner should be notified.
- 9.1.3 CRACKS - no matter how small, when detected for Anchor Heads, Shims and/or Bearing Plates, Owner should be notified.
- 9.1.4 OFFSIZE BUTTON HEADS - when detected for Button heads, document on Data Sheet F&Q 15.1A or 15.1B as applicable or Work Package Documentation.
- 9.1.5 PROTRUDING WIRES - when detected for Button head/Wires the quantity and length of protrusion of each Button head shall be reported and Owner should be notified.
- 9.1.6 MISSING OR BROKEN WIRES/BUTTON HEADS - when detected and not previously documented, Owner should be notified.

10.0 DOCUMENTATION

- 10.1 The items in this procedure requiring documentation shall be documented on Data Sheet F&Q 15.1 or Work Package Documentation.
- 10.2 The Data Sheet references the applicable section number of the procedure for each QCD point.
- 10.3 Sketch Sheet F&Q 15.1 or Work Package Documentation accompanies this procedure and shall be filled in for the required information if applicable.

11.0 ATTACHMENTS

- 11.1 DATA SHEET F&Q 15.1
- 11.2 SKETCH SHEET F&Q 15.1



PSC PROCEDURE F&Q 15.1
ANCHORAGE INSPECTION
DATA SHEET F&Q 15.1

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Project: CRYSTAL RIVER UNIT 3 – SGR

M&TE:

ITEM:

ID:

DUE:

Tendon No.:

Tendon End:

ITEM:

ID:

DUE:

ITEM:

ID:

DUE:

ANCHORAGE INSPECTION CRITERIA

☐ As-Found☐ Post Re-Tensioning

Q.C. Signoff

CORROSION & CRACK INSPECTION(8.3.1.1.1) Buttonheads Level: ⁽¹⁾(8.3.3.1.1) Cracks ☐ Yes ⁽²⁾ ☐ No(8.3.2.1.1) Anchorhead Level: ⁽¹⁾(8.3.3.1.1) Cracks ☐ Yes ⁽²⁾ ☐ No(8.3.2.1.1) Shims Level: ⁽¹⁾(8.3.3.1.1) Cracks ☐ Yes ⁽²⁾ ☐ No(8.3.2.1.1) Bearing Plate Level: ⁽¹⁾(8.3.3.1.1) Cracks ☐ Yes ⁽²⁾ ☐ No⁽¹⁾ – Corrosion Levels of "D" and "E" required an NCR.⁽²⁾ – Compose a sketch of the cracks on Sketch Sheet 8.0 and initiate an NCR.**8.3.4.4 - BUTTONHEAD INSPECTION**☐ Offsize (Malformed)☐ Protruding/unseated wire/buttonheads.☐ Broken/missing wire/buttonheads.☐ Previously identified as missing☒ Discontinuous – removed

(8.3.4.5) Anchorhead I.D.

Located on Sketch: ☐ Yes ☐ No

(8.3.4.5) Heat Code

Located on Sketch: ☐ Yes ☐ NoOffsize Buttonhead Totals Missing Buttonheads: ☐ Yes ☐ No; Quantity: Protruding BH: Missing BH: Total (Protruding+Missing): Total # of Effective Buttonheads Seated: Overall Results ☐ Acceptable ☐ Un-AcceptableOwner Notified NCR#: QC Reviewed: Level: Date:

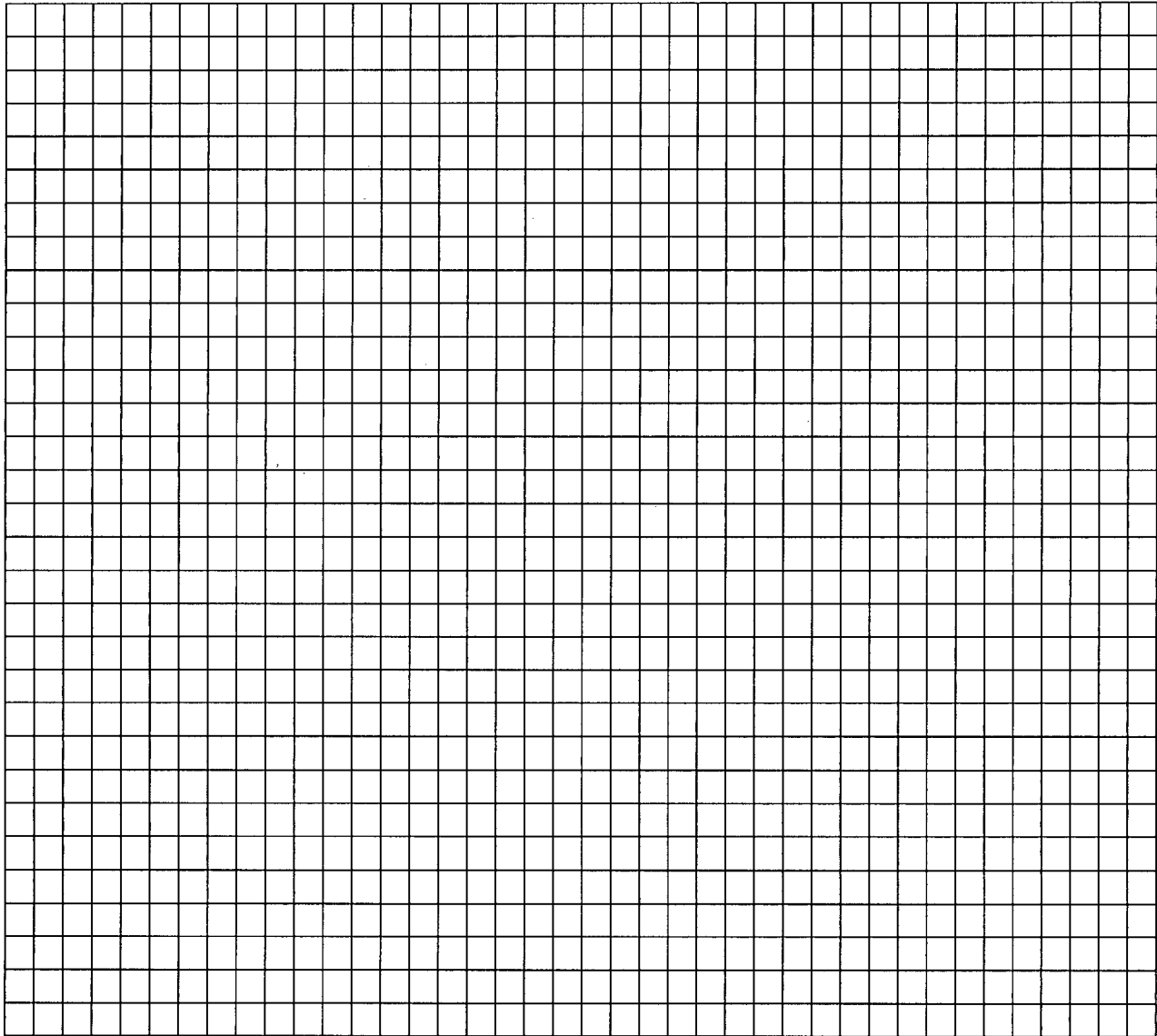


PSC PROCEDURE F&Q 15.1
ANCHORAGE INSPECTION
SKETCH SHEET F&Q 15.1
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PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

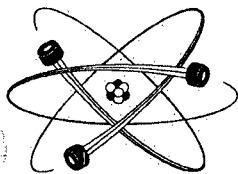
TENDON NO.: _____ TENDON END/BUTTRESS No: _____

Sketch each crack as it appears in the Anchorage, Shims or Bearing Plate. Identify each item by name; apply the heat code identification if available and locate that identification on the sketch. Use as many Sketch Sheets as necessary being sure to list the page number below and to apply a Sketch Number to each item with cracks.



Inspected By: _____ Date: _____

Reviewed By: _____ Date: _____

**PSC**

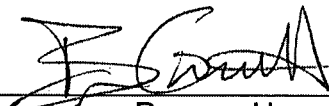
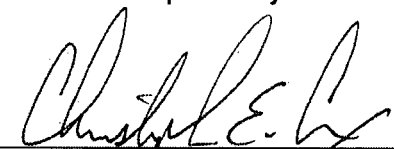
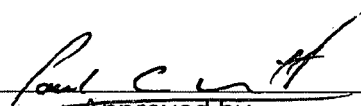
Precision Surveillance Corporation

PSC PROCEDURE F&Q 15.2
BEARING PLATE CONCRETE INSPECTION
August 29, 2008
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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

BEARING PLATE CONCRETE INSPECTION

 Prepared by	<u>LEVEL II Q.C.</u> Title	<u>08/29/08</u> Date
 Approved by	<u>PROJECT MANAGER, P.E.</u> Title	<u>08/29/08</u> Date
 Approved by	<u>PRESIDENT</u> Title	<u>08/29/08</u> Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for a detailed visual inspection of the concrete around/adjoining each end of a tendon prior to detensioning and after re-stressing the tendon at Crystal River Unit 3 for the vertical and horizontal tendon work during the Steam Generator Replacement Project.
- 1.2 Inspection shall be performed in accordance with the requirements of 2001 Edition and 2003 Addenda of the ASME Boiler and Pressure Vessel Code, Section XI, Subsection IWL.
- 1.3 The tendons to have a detailed visual inspection performed on them are those new tendons installed to replace those removed from the tendon voids and those de-tensioned but not removed as specified in the Work Package.

2.0 RESPONSIBILITY

- 2.1 Owner Quality Control Personnel to perform all inspections and data recording.

3.0 QUALIFICATIONS

- 3.1 The inspector performing this inspection is to be qualified as a Level II per PSC Procedure or as approved by the Owner's IWL Responsible Engineer, or by an IWL Responsible Engineer accepted by the Owner.

4.0 EQUIPMENT

- 4.1 Optical Comparator with 0.005 inch (min.) Measuring Reticle.
- 4.2 Feeler Gauges.
- 4.3 Steel Ruler.
- 4.4 Light Meter.

5.0 QUALITY CONTROL

- 5.1 There are no hold points for this operation. Quality Control Inspectors shall perform the inspections that are described in this procedure and document those results on Data Sheet F&Q 15.2 or Work Package Documentation.

6.0 PREREQUISITES

- 6.1 The tendon will be in a stressed condition.
- 6.2 The Grease Cap may or may not have been installed.
- 6.3 The tendon may or may not have been re-greased.



7.0 CONCRETE INSPECTION

- 7.1 The concrete adjoining the bearing plate (within 2 feet of the edge of the bearing plate, unless 2 feet is not accomplished due to bearing plate location) of each selected tendon shall be inspected for cracks or any other abnormal material behavior.
- 7.2 This inspection is to be performed with light conditions supplemented by auxiliary light sources if needed to attain a minimum illumination level of 50 foot-candles (fc) as verified by a light meter. The light meter ID with its calibration due date and a description of any auxiliary lighting used is to be documented on Data Sheet F&Q 15.2 or Work Package Documentation.
- 7.2.1 **QCD-** Any crack that is 0.010" in width or wider shall be documented on Data Sheet F&Q 15.2 or Work Package Documentation.
- 7.2.1.1 The full length and width of each crack shall be documented as well as sketching the crack pattern.

8.0 NOTIFICATION - UNACCEPTABLE CONDITIONS

- 8.1 Owner should be notified when any crack width or gaps greater than 0.010" in width are detected.

9.0 DOCUMENTATION

- 9.1 Data Sheet F&Q 15.2 or Work Package Documentation shall be used for documenting the requirements of this inspection.

10.0 ATTACHMENTS

- 10.1 Data Sheet F&Q 15.2.



PSC PROCEDURE F&Q 15.2
BEARING PLATE CONCRETE INSPECTION
DATA SHEET F&Q 15.2

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PROJECT: CRYSTAL RIVER UNIT 3
 STEAM GENERATOR REPLACEMENT PROJECT

TENDON NO.: _____ ☐ As-Found ☐ Post Re-Tensioning

TENDON END: _____ BEARING PLATE I.D. NO.: _____

The bearing plate shall be oriented as shown below. Place the location of the bearing plate identification on the sketch below. Sketch all visible concrete cracks and/or other abnormal indications.

For Horizontal Tendon
 this edge is up.

For Vertical Tendon this is toward
 reactor or center of containment

For above inspection:

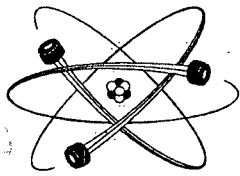
Light Conditions 50fc or greater? circle one: YES or NO

Light Meter ID: _____ Date due calibration: _____

Auxiliary Light Source used? Describe: _____

Q.C. Signoff _____ Level _____ Date _____

Q.C. Review _____ Level _____ Date _____

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PSC PROCEDURE F&Q 16.0
GREASE CAP REPLACEMENT

August 29, 2008

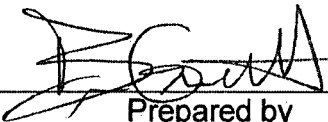
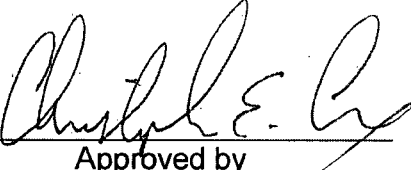
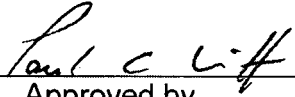
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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

GREASE CAP REPLACEMENT

 Prepared by	LEVEL II Q.C. Title	08/29/08 Date
 Approved by	PROJECT MANAGER, P.E. Title	08/29/08 Date
 Approved by	PRESIDENT Title	08/29/08 Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for the final placement of grease caps after all other work has been completed (except re-greasing) for the vertical and horizontal tendon work during the Steam Generator Replacement Project at Crystal River Unit 3.

2.0 SCOPE

- 2.1 This procedure applies to those new tendons installed to replace those removed from the tendon voids and those de-tensioned but not removed as specified in the Work Package. This procedure may also be used for any other tendon as needed by Owner.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities and recording of documentation associated with this procedure.

4.0 QUALIFICATIONS

- 4.1 Owner Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.

5.0 EQUIPMENT

- 5.1 Miscellaneous Tools, wrenches, ratchets, sockets, etc.

6.0 PRECAUTIONS

- 6.1 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.
- 6.2 Be prepared to support the weight of the grease cap.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS

- 7.1 There are no Quality Control Documentation (QCD) points or HOLD POINTS in this procedure.

8.0 PREREQUISITES

- 8.1 All other work has been completed on this tendon with the exception of Grease Replacement.



9.0 GREASE CAP REPLACEMENT

- 9.1 Only minor cleaning and brushing may be necessary to prepare the bearing plate and grease cap for remounting to the bearing plate.
- 9.2 Inspect and 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:
 - 9.2.1 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.
 - 9.2.1.1 Take precautions to keep dirt and other foreign material out of the tendon, and from the inside of the trumpet and conduit.
 - 9.2.2 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.
 - 9.2.2.1 Remove sharp edges, and smooth down remaining mill scale to a "feather-edge".
- 9.3 At the discretion of the Owner's Representative fill scratches, nicks, and other sharp depressions in the gasket bearing surface with nonmetallic epoxy, such as "Belzona" epoxy. Use of epoxy shall be according to manufacture's application instructions.
 - 9.3.1 Smooth out epoxy to prevent grease leakage under the gasket.
- 9.4 Remove all dust and loose matter from the vicinity of the tendon and entrance to the trumpet.
- 9.5 Clean any foreign material from the three threaded bearing plate grease can mounting holes.
- 9.6 Smear, swab or brush a coating of grease over all the exposed portions of the anchor head, bearing plate, shims, buttonheads and wires.
- 9.7 A 3/4" thread chaser or tap may be required to clear the threads of the bearing plate's grease cap mounting holes so that the mounting studs can be sufficiently tightened to bottom in the threaded holes.
- 9.8 Thread the three 3/4" studs in the three mounting holes of the bearing plate.
- 9.9 Clean and dry the flange and gasket sealing surface of the grease cap.

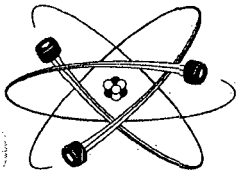
**PSC PROCEDURE F&Q 16.0
GREASE CAP REPLACEMENT**

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- 9.10 With the grease cap on end, apply adhesive to the grease cap gasket flange groove, in such quantity so as to hold the gasket in position. Place the gasket onto the groove and allow it to dry for a few minutes. Pliobond or a similar industrial adhesive shall be used for gluing. Water soluble adhesives shall not be used.
- 9.10.1 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.
- 9.11 Lift the grease cap and slide it onto the three mounting studs. For Hoop 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.
- 9.12 Be sure the gasket is in the groove of the flange and is seated against the bearing plate. Install the three washers and the three nuts to the mounting studs.
- 9.13 Tighten each nut with a wrench, equalizing the load on each nut as well as possible. Tighten each nut in a gradual and even manner to allow the gasket to deform evenly until compressed and snug tight.
- 9.14 If new studs, nuts, and washers are used, or grease caps and/or bearing plates are scratched, then the exposed surfaces shall be touched up with Carbo Zinc 11 (or approved equal) per the manufacture's application instructions.
- 9.15 The replacement is now complete and regreasing can be performed observing the requirements of PSC Procedure F&Q 17.0.
- 10.0 DOCUMENTATION**
- 10.1 None required.
- 11.0 ATTACHMENTS**
- 11.1 None

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE F&Q 17.0

GREASE REPLACEMENT

August 29, 2008


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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
FIELD AND QUALITY CONTROL PROCEDURE

GREASE REPLACEMENT


Prepared by

LEVEL II Q.C.

08/29/08

Title

Date


Approved by

PROJECT MANAGER, P.E.

08/29/08

Title

Date


Approved by

PRESIDENT

08/29/08

Title

Date



1.0 PURPOSE

- 1.1 This procedure will establish the requirements for the replacement of grease (sheathing filler) into the voids of tendons after all other work has been completed for the vertical and horizontal tendon work during the Steam Generator Replacement Project at Crystal River Unit 3.

2.0 SCOPE

- 2.1 This procedure applies to those new tendons installed to replace those removed from the tendon voids and those de-tensioned but not removed as specified in the Work Package. This procedure may also be used for any other tendon as needed by Owner.

3.0 RESPONSIBILITY

- 3.1 Owner Field Construction Personnel shall be responsible for the physical activities associated with this procedure.
- 3.2 Owner Quality Control Personnel to perform all inspections and data recording.

4.0 QUALIFICATIONS

- 4.1 Owner Field Construction Personnel shall be fit by skill, training and/or experience to perform these duties.
- 4.2 Owner Quality Control Personnel shall be qualified to a minimum of Level II capability in accordance with the requirements of ANSI N45.2.6.

5.0 EQUIPMENT

- 5.1 Grease heating and storage system
- 5.2 Grease pumping system, miscellaneous grease hoses and fittings.
- 5.3 Y-Devices
- 5.4 Thermometers
- 5.5 Miscellaneous Tools, wrenches, ratchets, sockets, shackles, come-alongs, etc.
- 5.6 Plastic bags, plastic sheeting (Visqueen), rags, buckets or drums for waste grease.



6.0 PRECAUTIONS

- 6.1 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. When grease is under pressure, personnel will wear face shields, coveralls, and gloves if within 10 (ten) feet of the process.
- 6.2 During Grease Replacement, the grease may be pumped under pressure with an exit temperature of 140°F or higher. It is therefore essential to avoid direct contact with the hot grease and to make sure all connections are secure.

CAUTION

DURING GREASING THE GREASE IS HOT AND MAY BE PUMPED UNDER PRESSURE. ALL FITTINGS AND FIXTURES THROUGHOUT THE SYSTEM WILL BE HOT AND COULD CAUSE INJURY.

- 6.3 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.
- 6.4 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.

7.0 QUALITY CONTROL DOCUMENTATION AND HOLD POINTS

- 7.1 All Quality Control Documentation (QCD) points noted in this procedure are Hold Points. The work shall not progress past or through a QCD without a verbal release from the Inspector.

8.0 PREREQUISITES

- 8.1 All other work has been completed on this tendon and the grease caps have been installed.

9.0 PROCEDURE

9.1 COMPLETE TENDON VOID REFILLING

- 9.1.1 The pumping pressure for complete tendon void refilling shall not exceed 100 psig at the point of installation for hoop tendons and 150 psig for vertical tendons.

- 9.1.1.1 Notification - Remove grease cap pipe plug from each end of the tendon and attach to the operating shaft of the Y-device. The Y-device will be similar as seen in Sketch 8-1.



- 9.1.2 Connect the Y-device to the tendon end grease cap filler bushing on each end of the tendon, at outlet end push Y-device plunger in to open internal valve.
- 9.1.2.1 The Y-device at the pumping end (inlet end) to have grease hose attached, the Y-device at the opposite end (outlet end) to have waste line attached.
- 9.1.3 A grease control station shall be set up near the tendons to be filled and a communications network established so that the personnel at the furthest end of the tendon to be filled, will be able to communicate with the crew leader or control station attendant.
- 9.1.4 CAUTION: Operation of the system pressurizes the grease lines. Assure proper PPE. Re-check Y-plunger has opened the internal valve on the outlet by listening or feeling for air exiting during initial operation.
- 9.1.5 The grease will be pumped through the void at a temperature of 220⁰ to 260⁰F at the point of injection until it exits from the waste line and emerges clean and essentially free of air bubbles.
- 9.1.5.1 QCD – Exit grease verified free of air bubbles onto Data Sheet F&Q 17.0 or Work Package Documentation.
- 9.1.5.2 QCD – Exit grease temperature (140⁰F minimum) and M&TE data onto Data Sheet F&Q 17.0 or Work Package Documentation.
- 9.1.6 Shut valve on the Y-device and when greasing is complete tighten grease cap pipe plug (the plug threads when replaced shall have an Owner approved thread sealant applied) and remove the Y-device.
- 9.1.7 During tendon grease replacement, if the condition develops where there is no grease exiting the Outflow from the Opposite End of a Horizontal Tendon, or the Top End of a Vertical Tendon, Stop Work, notify the Owner for additional direction.
- 9.1.8 Clean-up any grease spillage and greasing is now complete on this tendon. Vented, spilled or waste grease shall not be reused.
- 9.1.8.1 QCD - The amount of grease pumped into the tendon less any vented, waste or spillage to be recorded by the Inspector onto Data Sheet F&Q 17.0 or Work Package Documentation.

10.0 DOCUMENTATION

- 10.1 The items requiring documentation in this procedure shall be documented by the Owner Quality Control Inspector on Data Sheet F&Q 17.0 or Work Package Documentation.

**11.0 QUALITY CONTROL**

- 11.1 Inspector to document on Data Sheet F&Q 17.0 or Work Package Documentation the information required for unit number, tendon number and date of greasing.
- 11.2 Document that the exiting grease is clean and does not have air bubbles greater than 1/4 inch in diameter.
- 11.3 Document the amount of grease pumped into the tendon less any vented, waste or spillage.
- 11.4 Verify and document that no grease are leaking from the caps, that they are leak tight.

12.0 NOTIFICATION

- 12.1 Work shall not proceed beyond a QCD, until Quality Control Inspector is notified.

13.0 ATTACHMENTS

- 13.1 Data Sheet F&Q 17.0
- 13.2 Sketch 8-1



PSC PROCEDURE F&Q 17.0
GREASE REPLACEMENT
Data Sheet F&Q 17.0
August 29, 2008
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TENDON GREASE REPLACEMENT DOCUMENTATION

PROJECT: CRYSTAL RIVER UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

TENDON NO.: _____

DATE OF GREASING: _____

EXIT GREASE CLEAN AND FREE OF AIR BUBBLES (Check) _____

GREASE TEMPERATURE
(At exit/outlet end) _____ °F Thermometer I.D. _____ Recal. Date _____
(140°F minimum)

AMOUNT OF GREASE PUMPED INTO TENDON (less waste and spillage): _____ GAL.

CAPS LEAK TIGHT (Check) Pumping End _____ Exit/Outlet End _____

COMMENTS:

Q.C. INSPECTOR SIGNOFF: _____ LEVEL: _____ DATE: _____

Q.C. REVIEW: _____ LEVEL: _____ DATE: _____



PSC PROCEDURE F&Q 17.0

GREASE REPLACEMENT**Sketch 8-1**

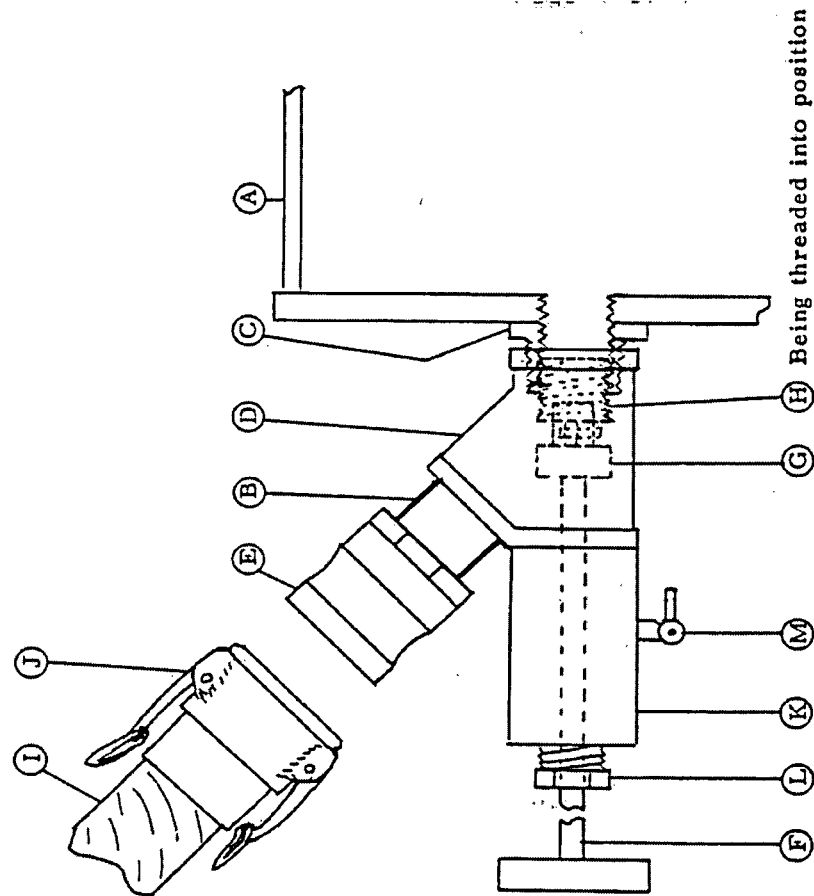
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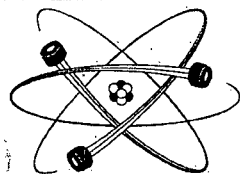
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Sketch 8-1. – PSC “Y-Device”

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

**PSC**

Precision Surveillance Corporation

PSC PROCEDURE QA10.0

CALIBRATION

August 29, 2008

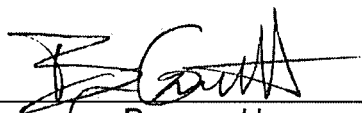

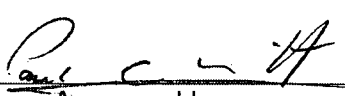
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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
QUALITY ASSURANCE PROCEDURE

CALIBRATION OF MEASURING AND TEST EQUIPMENT

 Prepared by	LEVEL II Q.C. Title	08/29/08 Date
 Approved by	PROJECT MANAGER, P.E. Title	08/29/08 Date
 Approved by	PRESIDENT Title	08/29/08 Date



1.0 PURPOSE

- 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 field operation 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, De-tensioning or Re-tensioning operations for 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 transmitted to Progress Energy per the requirements of the contract documents.

2.11 Equipment used to measure tendon force shall be calibrated prior to performing post-tensioning operations and within 3 months following completion of post-tensioning operations. Accuracy of the calibration shall be within 1.5% of the specified minimum ultimate strength of the tendon. If the calibration results following post-tensioning operations differ by more than the specified accuracy tolerance from the pretest calibrations, the accuracy of the post-tensioning operations shall be evaluated.

3.0 OUT OF CALIBRATION

3.1 Devices out of calibration shall be processed as non-conformances. Devices out of calibration that are determined to have an adverse effect on quality shall have copies of that nonconformance report submitted to PSC 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 Progress Energy Procedures.

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 of 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 field operations or are used to calibrate devices that will be used during the field operations. 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 field operations, will accompany this procedure in the Field 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.

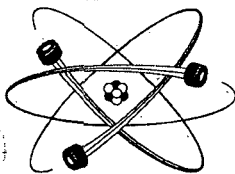


5.2 EQUIPMENT LIST

DEVICE	FREQUENCY	ACCURACY
Load Cell (3000 Kips)	5 Years	$\pm .1\%$ Entire System
Load Cell (Approx. 50 Kips)	8 Years	$\pm .1\%$ Entire System
Rams/Jacks (Stressing, Testing, etc.)	Beginning & End (B & E) of Project	Calculated to within $\pm 0.01"$ for Ram Area
Dead Weight Tester	5 Years	$\pm 0.10\%$
Heise Digital Gauge	3 Years	$\pm 0.10\%$
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		$\pm 0.0001"$
<u>Thickness (Feeler) Gauge</u>		
Under 0.005"	6 months	$\pm 0.0005"$ *
0.005" and Over	6 months	$\pm 0.0010"$
(* Verified with a 0.0001" micrometer)		
Steel Ruler	1 Year	$\pm 0.0100"$
Steel Tapeline	1 Year	$\pm 1/16"/100'$ of lgth.
Thermometer	1 Year	± 1 DISS
Optical Comparator (0.005")	1 Year	$\pm 0.0010"$
Dial Indicator	1 Year	± 1 DISS

6.0 DOCUMENTATION

- 6.1.1 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.

**PSC**


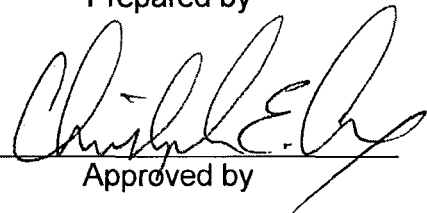
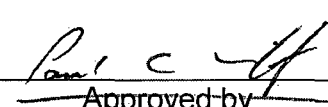
Precision Surveillance Corporation

PSC PROCEDURE QA 10.1
CALIBRATION VERIFICATION
August 29, 2008
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PROGRESS ENERGY FLORIDA, INC.
CRYSTAL RIVER NUCLEAR UNIT 3
STEAM GENERATOR REPLACEMENT PROJECT

PRECISION SURVEILLANCE CORPORATION
QUALITY ASSURANCE PROCEDURE

VERIFICATION OF CALIBRATED STATUS
OF HYDRAULIC PRESSURE GAUGES

 Prepared by	LEVEL II Q.C. Title	08/29/08 Date
 Approved by	PROJECT MANAGER, P.E. Title	08/29/08 Date
 Approved by	PRESIDENT Title	08/29/08 Date



1.0 FIELD VERIFICATION OF PRESSURE GAUGES

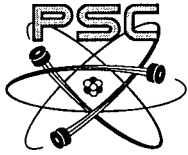
- 1.1 The following procedure shall be used to verify the calibration of hydraulic pressure gauges during field operations. These gauges may be used in stressing operations with the rams or other devices that require a measure of accuracy to produce quality results. Frequency and Accuracy of Calibration shall be controlled as stated in Section 5.2 of Procedure QA 10.0 Equipment List.

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 field operations, 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 with a dead weight tester traceable to NIST.
- 2.3 Owner 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 De-tensioning or Re-tensioning (Stressing) tendons of Post-Tensioning Tendon Systems 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 Owner 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 3.6.1 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, De-tensioning or Re-tensioning operations of the Post-Tensioning Tendon System.
- 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 3.6.2 or 3.7.2 after being used for Stressing or De-tensioning operations, it shall be necessary to contact the Client and draft a Nonconformance Report in accordance with the PSC requirements, to control that Gauge and any Tendons worked with that Gauge.



4.1.1 Any Pressure Gauge not capable of meeting the stated accuracy requirements of Section 3.6.2 or 3.7.2 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.

4.1.2 ZERO ALIGNMENT (Zero Beating)

4.1.2.1 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 3.6.2 and 3.7.2 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.

5.1.1 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.

5.1.1.1 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

5.1.1.2 The requirements for Stressing or De-tensioning Tendons do not require the Pressure to be read any finer than 10 psi during the Inspections. The Hydraulic Ram Calibration Procedure takes the reading error into account for Stressing or De-tensioning 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



PSC PROCEDURE QA10.1
GAUGE CALIBRATION RECORD FORM
 August 29, 2008
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Project: CRYSTAL RIVER UNIT 3 – SGR

Job # _____

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED _____
 GAUGE I.D. _____
 MASTER GAUGE I.D. _____
 REMARKS _____

MASTER GAUGE (PSI)	JACK GAUGE (PSI)

Project: CRYSTAL RIVER UNIT 3 – SGR

Job # _____

GAUGE CALIBRATION VERIFICATION RECORD

DATE CHECKED _____
 GAUGE I.D. _____
 MASTER GAUGE I.D. _____
 REMARKS _____

MASTER GAUGE (PSI)	JACK GAUGE (PSI)