Three Mile Island Unit No. 1

25^{TH} YEAR REACTOR BUILDING TENDON SURVEILLANCE (PERIOD 7)

Topical Report No. 136
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Originator:
John J. Piazza, P.E. Date
PA License No. PE-042110-R

_____ / 18 FEB 00
Originator:
Howard T. Hill, P.E. Date
Calif Civil Cert. No. C22265

_____ / 2-24-2000
Reviewer: Date
Jonq T. Liu

Design Verification Required? Yes X No _____ If Yes, DV No. V-1101-153-045

_____ / 2-24-2000
Design Verification Engineer Date
Jonq T. Liu

25^{TH} YEAR REACTOR BUILDING TENDON SURVEILLANCE (PERIOD 7)

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25TH YEAR REACTOR BUILDING TENDON SURVEILLANCE (PERIOD 7)

1.0 Purpose

1.1 Pursuant to Technical Specification 4.4.2.1.6, this report provides the US Nuclear Regulatory Commission results obtained during the recently performed 25th Year Tendon Surveillance.

1.2 This report also serves to provide the Engineering Evaluation Report required by 10CFR50.55a and ASME XI IWL-3300, when examination results do not meet the acceptance standards of ASME XI IWL-3100 and IWL-3200.

1.3 The ISI Summary Report (IWA-6000) required by 10CFR50.55a, wherein an abstract of the conditions found are noted, and the corrective measures recommended and taken are described, were provided under separate cover. The IWA 6210, NIS-1 and 2 submittal, was provided via reference 6.12.

1.4 During the 20th Year surveillance, the plant was in its mid cycle operating run. As such, access to areas over the Main Steam Relief Valves could not be obtained to perform crack mapping of two (2) of the nine (9) dome tendons. As committed to in our submittal of April 7, 1995 (Letter no. C311-95-2166), in Topical Report 093, those results are being submitted along with the 25th year results (See Attachment 2).

2.0 Work Performed

2.1 All work was performed in accordance with TMI-1 Procedure 1301-9.1, Rev. 14, "RB Structural Integrity Tendon Surveillance" which is compliant with the requirements of ASME XI IWL 1992 edition with the 1992 addenda, and R.G. 1.35 Revision 3, except as follows: Pursuant to 10CFR50.55a(a)(3)(ii), relief was requested from performing the code specified VT-1C and VT-3C illumination and distance requirements of IWL-2310 (a) and (b) along with IWA-2210 and Table IWA-2210-1 Visual Examination of concrete surfaces. The subject relief request was submitted by TMI-1 via Reference 6.13, and is identified as RR-7.

Physical examinations of the pre-stressed post tensioned reinforced concrete containment commenced on 8/27/99 and completed on 10/26/99. The surveillance was considered complete on 12/1/99 upon completion of grease sample analyses.

2.1.1 Visual examinations (VT-1, VT-1C, and VT-3C) to ASME XI IWL 1992 edition with the 1992 addenda, for accessible exterior surfaces of containment and unbonded post-tensioning system were performed. Concrete examinations were performed in accordance with IWL-2510. In addition, grease leakage exams were conducted of the general containment surface in accordance with 10CFR50.55a(b)(2)((ix)(D)(3).

2.1.1.1 Twenty nine (29) vertical tendons were refilled/topped off with grease as they exhibited oil/grease leakage through the RB exterior concrete (shrinkage cracks) in the Upper Tendon Access Gallery. Identification of the specific vertical tendons affected is listed in Table B, attached.

2.1.1.2 All surfaces of the outdoor exterior concrete containment surface were solvent cleaned to remove historic grease leak remnants for baseline purposes and ready grease leakage identification.

2.1.1.3 As part of the grease leakage mitigation effort, remnant grease was removed from the external surfaces of tendon end caps on buttress H24 from Elev. 322' to Elev. 360'+ to determine which, if any, end caps were leaking.

2.1.2 For Inspection Period 7, twelve (12) tendons specified in Enclosure 2, of TMI-1 Procedure 1301-9.1, were surveilled/inspected, i.e. four (4) vertical, five (5) hoop, and three (3) dome tendons. Selection was based on IWL-2521. Listing is attached as Table A, herein.

2.1.2.1 Tendon force measurements were performed in accordance with IWL-2522, and for retensioned tendons, elongations were documented and compared with the limits specified in 10CFR50.55a(b)(2)((ix)(C) and Regulatory Guide 1.35 Rev. 3.

2.1.2.2 Tendon wire sample examination and testing were performed in accordance with IWL-2523.

2.1.2.3 Tendon anchorage areas including bearing plates, anchorheads, buttonheads, shims and the concrete extending outward a distance of 2 feet from the bearing plate edge were examined in accordance with IWL-2524. In addition, free water examination was documented in accordance with IWL-2524.2.

2.1.3 Samples for examination of corrosion protection medium and free water were taken in accordance with IWL-2525, and analyzed in accordance with IWL-2525.2. Corrosion protection medium water content was compared to the acceptance limit stated in 10CFR50.55a(b)(2)((ix)(D)(1).

2.1.4 Removal and replacement of corrosion protection medium was documented in accordance with IWL-2526.

2.1.5 The dome tendons that showed evidence of concrete cracks during earlier surveillances in the area immediately adjoining the baseplate were inspected and crack mapping performed in accordance with Procedure 1301-9.1.

2.1.6 All accessible grease caps were visually examined for leakage and for grease cap deformations in accordance with 10CFR50.55a(b)(2)((ix)(A).

2.1.6.1 Grease leakage mitigation was performed in the Lower Tendon Access Gallery of the vertical tendon end caps listed in attached Table E. These vertical tendons also had grease sampling/testing performed.

2.1.6.2 End cap gasket repairs were performed in accordance with applicable portions of Procedure 1410-Y-83 where active grease leakage was observed. Table D and F attached hereto sets forth those end caps, which required gasket replacement to mitigate grease leakage.

2.1.6.3 Tendon End Caps modifications were performed in accordance with TMI-1 Procedure 1410-Y-83, Revision 4, "RB Tendon End Cap Installation". Table C attached hereto sets forth those end caps, which required modification.

3.0 Evaluation of Results

3.1 As required by IWL-2510 all exterior concrete surfaces of containment were examined, except those areas exempted by IWL-1220(b). At TMI-1, inaccessible areas include interior surfaces of the concrete containment covered by the steel liner, foundation material, backfill, or are otherwise obstructed by adjacent structures, components, parts, or appurtenances. All concrete surfaces were VT-3C examined in order to detect, describe, and locate evidence of concrete deterioration and distress conditions defined in ACI 201.1R-92 and were found to be acceptable. Where areas with potentially unacceptable indications were identified, a VT-1C examination in accordance with IWL-2310 was performed. Acceptance criteria applied for concrete surface indications are published in ACI 349.3R-96 Section 5.1. Indications meeting the acceptance limits of ACI 349.3R-96 Section 5.1 were considered acceptable without further Engineering Evaluation. Areas noted as not meeting ACI 349.3R-96 Section 5.1, were evaluated not to require repair at this time. These areas are discussed in the following sections:

3.1.1 The VT-1C examination of the RB exterior concrete surface area immediately above the Fuel Handling Building Roof between buttresses 3 and 4 revealed spider like cracking. These areas are approximately 80 square inches and 240 square inches in area, respectively. Neither of the areas has cracks greater than .015" (ACI 349.3R-96), however, "surface widening" on the order of .1" to .2" maximum does exist. These wider surface cracks are of no structural significance. However, they will be reexamined during Period 8 Tendon Surveillance to ensure they are stable.

3.1.2 The SE quadrant of the RB exterior above the ring girder has an area where the cosmetic grout cover has fallen off and the underlying rebar is exposed. This is an original construction condition. The rebar in this area has only 1" of cover. ACI 318 requires minimum of 2" of cover. The condition examined in the field does not indicate any active degradation mechanism. No loss of structural integrity or safety function of containment is realized by this finding. However, the area will be reexamined during Period 8 Tendon Surveillance to ensure it has remained stable.

3.1.3 A VT-1C examination of the RB exterior concrete surface area noted a number of locations at and above the ring girder where cosmetic grout overlay was loose and had fallen off. Loose grout was removed and all areas where grout had become dislodged, or was removed, were examined. This condition is of no structural consequence. The underlying concrete was examined and found not to be significantly weathered or deteriorating. No concrete cracks were found where the grout cover had come loose. If the condition does not remain stable, consideration for repair of the grout cover will be exercised during Period 8 Tendon Surveillance, after reexamination.

3.1.4 During conduct of the VT-1C examination of the RB exterior concrete surface, a number of concrete spalls were noted at non-safe guards component supports. These spalls are inconsequential. The concrete structure remains unaffected with regards to structural integrity, and will still perform its safety function. No active degradation mechanisms were found. These areas will be monitored and reexamined during Period 8 Tendon Surveillance. Consideration for repair will occur at that time.

3.1.5 A construction joint above the ring girder between D320NE and D321NE was identified as having a crack width of .018" (exceeds ACI 349.3R-96 crack width of .015"). No active degradation mechanism such as freeze-thaw cycling was evident for the area in question. The crack is less than 32" in length and the containment structure will still perform its safety function without compromise to structural integrity. However, this area will be monitored/reexamined during Period 8 Tendon Surveillance to ensure the crack is stable.

3.1.6 As required by 10CFR50.55a(b)(2)((ix)(D)(3), grease leakage exams of the general containment surface were conducted. During that exam, twenty-nine (29) hairline cracks < .010" in width and varying from 3' to 12' in length were mapped as part of the IWL examination. This is a condition that has existed since original plant construction. The cracks are located in the upper TAG of the Intermediate Building. Table B provides a listing of the affected vertical tendons. The tendon contractor was directed to clean the cracks of grease/oil to ascertain the degree of leakage. Active leakage does exist; it consists primarily of oils separated from the original Viconorust 2090P and 2090P2 grease, and is minor in nature.

All 29 vertical tendons were topped off with 2090P4 grease to ensure full cover of the end anchorage. (Refer to Section 3.2.7.4 for discussion on grease additions). The upper Tendon Access Gallery is an enclosed area and not exposed to weathering or the environment. No compromise to concrete strength is realized due to leakage of the oils through the cracks. NUREG/CR-6598, "An investigation of Tendon Sheathing Filler Migration into Concrete" describes the phenomena in detail and addresses effects of Viconorust series grease leakage through concrete. This NUREG and ACI 515-1R-79, "A Guide to the Use of Waterproofing, Dampproofing, Protective, and Decorative Barrier Systems for Concrete" serve as the basis for concluding that there is no impact on concrete properties. The Viconorust 2090 series corrosion protection medium contains no fatty oils which could be detrimental to concrete engineering properties and performance. The Mechanical/Structural Engineer shall perform continued monitoring of the grease leakage as part of Repetitive Preventive Maintenance Task No. 9641. An internal report will be filed annually as part of that task for grease leak trending purposes.

3.1.7 All surfaces of the outdoor exterior concrete containment surface were solvent cleaned to remove historic grease leak remnants. These old grease leak stains were removed for baseline examination, and for purposes of improving future grease leak identification.

3.1.8 As part of the grease leakage mitigation effort, remnant grease was removed from the external surfaces of tendon end caps on buttress H24 from Elev. 322' to Elev. 360'+ to determine which end caps were leaking. Further evaluation of the buttress, two months after completion of the cleaning, revealed that no active grease leakage exists. It is apparent that the remnant grease was the result of grease spillage from past tendon work. Regardless, Mechanical/Structural Engineer shall perform monitoring of the grease leakage as part of Repetitive Preventive Maintenance Task No. 9641 to ensure no future leakage is occurring.

3.2 As required by ASME XI, IWL Table IWL-2521-1, sampling criteria, four (4) vertical, five (5) hoop, and three (3) dome tendons were examined in accordance with ASME XI IWL.

3.2.1 Table A provides the listing of tendons sampled.

3.2.2 Measured tendon forces in the inspection sample tendons met the acceptance standard of IWL-3221.1. Attachment 1 summarizes the results, procedures utilized, group mean forces, force trends, and elongation.

3.2.3 As required by IWL-3221.2, the sample wire obtained from each detensioned tendon (one per group) was examined and found to be free of physical damage, and had ultimate strength and elongation measurement results meeting/exceeding the minimum specified values.

3.2.4 The tendon anchorage areas were examined and met the requirements of IWL-3221.3 with one exception. A crack in the concrete surface adjacent to the bearing plate of H46-37 exceeded .01" in width. The measured width was .013" wide and 2.5" long. The crack was monitored/measured, prior to, during, and after tendon lift-off. No change in the crack size was detected. The crack will be reexamined during the 30th Year surveillance to ensure that no active degradation mechanism is present.

No evidence of cracking in the anchor heads, shims or bearing plates was noted. No evidence of active corrosion, broken or unseated wires or detached buttonheads not previously identified, was observed. The acceptance criteria of Procedure 1301-9.1 were met for end anchorage examinations.

No free water was observed in any of the base scope sampled tendons. However, vertical tendon V86, examined due to as-found field conditions, did have free water in its bottom end cap. See Section 3.2.7.2 for further discussion regarding V86.

3.2.5 The corrosion protection medium sampling results were obtained and analyzed in accordance with Table IWL-2525.1. With a single exception, the grease samples obtained met the requirements of IWL-3221.4, i.e. reserve alkalinity, water content (10% acceptance standard per 10CFR50.55a(b)(2)((ix)(D)(1), and soluble ion concentrations of all samples met the acceptance limits of Table IWL-2525-1, except for V164 (field end/bottom). One of two grease sample results for V164 (field end/bottom) indicated nitrates exceeding 10 PPM. Nitrate concentration was determined to be 10.3 PPM. However, the back-up grease sample obtained, and later tested, resulted in acceptable nitrates concentration of <.5 PPM. The tendon materials of construction are of carbon steels and are immersed in a corrosion inhibiting grease medium.

In addition, as V164 was the vertical tendon scheduled to be detensioned, it's wire was pulled. No evidence of wire pitting/corrosion was observed, nor was any cracking in the anchor heads, shims or bearing plates noted. Furthermore, no evidence of active corrosion, broken or unseated wires or detached buttonheads not previously identified, was observed. However, in order to ensure that the nitrate concentration noted is stable, an additional grease sample will be obtained from V164 (field end) during the 30th Year Surveillance.

3.2.6 As has been the trend in past surveillances, the dome tendon crack mapping revealed that the cracks were stable with neither evidence of growth nor active degradation mechanism present. The table of those dome tendon ends examined, where crack mapping was performed, is presented in Table G.

3.2.7 All tendon grease end caps were accessible and visually examined for active grease leakage, and for cap deformations in accordance with 10CFR50.55a(b)(2)((ix)(A). All vertical tendon shop (top) end caps were accessed by removing the hold-down bolts securing the deck cover plates. All others were directly accessible. Tendon end cap modifications, end cap gasket replacements, and general grease mitigation were employed. Employing these corrective measures mitigated all active grease leakage. Tables C, D, E, and F provide a listing of tendon ends repaired for grease leakage mitigation.

3.2.7.1 None of the tendon end caps showed any evidence of end cap deformations.

3.2.7.2 V86 vertical tendon (shop end/top) was found with a 1" gap between its end cap and base plate due to excessive past shimming of the shop end (top) anchor head. This condition did not allow the end cap gasket to be compressed, and allowed passage of water into the tendon duct void. This deviation has existed since the 1st Year Surveillance. It was not discovered at an earlier time because the deck cover plates require removal in order to gain access to the shop end (top) of the vertical tendon end caps. As part of the resolution to this non-conformance, the Licensed Professional Engineer responsible for overall conduct of the tendon surveillance and Section XI IWL exams requested the following actions be performed on V86 in accordance with Procedure 1301-9.1:

1) Drain tendon of grease and secure grease sample for testing
2) Perform an ASME Sec. XI - IWL exam of both tendon ends
3) Confirm lift-off and detension
4) Remove a sample wire and test
5) Retension and adjust shim stack to permit end cap reinstallation
6) Install replacement end cap gaskets and reinstall end caps
7) Blow out all moisture and grease with dry air
8) Regrease tendon void

V86 was drained of its grease, free water collected, and grease samples obtained. Grease sampling of V86 revealed the requirements of IWL-3221.4 were met. Reserve alkalinity, water content (10% acceptance standard per 10CFR50.55a(b)(2)((ix)(D)(1)), and soluble ion concentrations of both tendon end samples met the acceptance limits of Table IWL-2525-1. However, free water of approximately 2.5 gallons was drained from the field end (bottom) of the vertical tendon. Free water pH was determined to be 11.67. Lift-off of V86 was conducted. V86 was then detensioned, and a sample wire secured. Measured tendon force met the acceptance standard of IWL-3221.1. VT-1 visual exam showed no evidence of cracking in the anchor heads, shims or bearing plates. No evidence of active corrosion, broken or unseated wires or detached buttonheads not previously identified, was observed.

The wire sample from V86 was examined and found to be free of physical damage, and had ultimate strength and elongation meeting/exceeding the minimum specified values. V86 was then retensioned, moisture and grease removed, and the tendon duct void regreased with 2090P4. In order to ensure grease voids were filled, and as settling is likely to occur, V86 will be topped off with grease during the 30th Year Tendon Surveillance.

3.2.7.3 Since V86 was found with standing water, as a cautionary investigative measure, further grease sampling was directed for V19, V83, V126 and V139. These vertical tendons had also exhibited active leakage at the shop end (top). The grease samples were obtained in the Lower Tendon Access Gallery (bottom end). Reserve alkalinity, water content (10% acceptance standard per 10CFR50.55a(b)(2)((ix)(D)(1)), and soluble ion concentrations of both tendon end samples met the acceptance limits of Table IWL-2525-1. No free water was observed in any of these four sampled tendons.

3.2.7.4 As discussed in Section 3.1.6 of this report - the 29 vertical tendons exhibiting grease leakage through hairline cracks in the concrete exterior surface, were refilled with grease. TMI-1 had committed to add grease to vertical tendons which exhibited grease leakage through vertical hairline cracks in the upper TAG, and to those which exhibited grease can leakage in the lower TAG. That commitment was made in response to NRC Inspection Report 50-289/98-03. During grease filling of some of the vertical tendons, it was determined that the amount of grease required to fill the tendon net duct volume exceeded the 10% absolute difference requirement cited in 10CFR50.55a(b)(2)((ix)(D)(2). A number of vertical tendons exceeded the 1301-9.1 administrative procedural limit of 4 gallons.

Note: The 4 gallon administrative limit established for grease voiding is conservatively selected based on actual tendon net duct volume, i.e. the net duct volume for the vertical tendons is 120 gallons, with the 10% absolute difference requirement (10CFR50.55a(b)(2)((ix)(D)(2)) being 12 gallons. Similarly the hoop tendon net duct volume is 111 gallons yielding the 10% absolute difference requirement being 11 gallons. Finally, the dome tendon net duct volume is based on the shortest and longest duct length and is 76 gallon and 97 gallon, respectively, i.e. 8 gallon minimum, and 10 gallon maximum.

Note: Tendon grease removal/replacement is documented on Data Sheet 11 of Procedure 1301-9.1, and Section 2 Table XIII of the 25th Year Report No. 464 (Attachment 3, attached hereto).

In order to provide further assurance that the vertical tendons are not experiencing corrosion due to incomplete grease inventory, a random sample of eight (8) "virgin" vertical tendons had their end caps removed. The eight tendons represented 5% of the vertical tendon inventory of 166 and had not been inspected since original installation. The tendons sampled were V8, V35, V57, V80, V94, V110, V143 and V156. The following instruction was provided to the tendon contractor:

1) Remove the shop end (top) vertical tendon end cap of the eight random sampled tendons listed above.
2) Obtain a grease sample for testing of each sampled vertical tendon in accordance with Procedure 1301-9.1.
3) Perform an ASME Sec. XI - IWL exam of the sampled vertical tendon end anchorage in accordance with Procedure 1301-9.1.
4) Replace end cap gasket and reinstall end cap in accordance with Procedure
   1301-9.1.
5) Top-off all 166 vertical tendons not worked during this surveillance period with new 2090P4 grease. Record all pertinent grease data in Procedure 1301-9.1.

A VT-1 visual exam of randomly sampled V8, V35, V57, V80, V94, V110, V143 and V156 showed no evidence of cracking in the anchor heads, shims or bearing plates. No evidence of active corrosion, broken or unseated wires or detached buttonheads, not previously identified, was observed. In addition, the grease sample results resulted in reserve alkalinity, water content (10% acceptance standard per 10CFR50.55a(b)(2)((ix)(D)(1),), and soluble ion concentrations of the randomly sampled tendons meeting the acceptance limits of Table IWL-2525-1. No free water was observed in these eight (8) sampled vertical tendons. The end cap gaskets were replaced. All 166 vertical tendons were topped off with new grease. Results are as follows:

The net duct volume at TMI-1 for the vertical tendons is 120 gallons, with the 10% absolute difference requirement, 10CFR50.55a(b)(2)((ix)(D)(2), being 12 gallons.

Of the 166 vertical tendons topped-off with grease, eight (8) vertical tendons had amounts of grease required to fill the tendon net duct volume exceeding the 10% absolute difference requirement cited in 10CFR50.55a(b)(2)((ix)(D)(2). This represents approximately 5% of the vertical tendon population.

The average grease difference amount required to fill the tendon net duct volume was found to be 6.6 gallons for the 166 vertical tendons.

V79 required the greatest amount of grease at 29 gallons. This tendon had shown no evidence of end cap or tendon duct leakage.

The apparent cause of the excessive grease addition is due to vertical tendon duct grease voiding and contraction inherent during/after initial greasing, or from incomplete initial filling, and not due to grease leakage. The tendon grease has a relatively high coefficient of thermal expansion. Inherent in the initial filling of vertical tendons (bottom up), pumping of the grease adds the potential for grease voiding (air pockets) due to the orientation of the tendon (vertical), and configuration of the tendon within the tendon duct.

To date TMI-1 has experienced little to no corrosion on the tendon anchor heads, button heads, baseplates, or sampled wires of vertical tendon components. There is no reason to believe that corrosion is occurring in the 8 vertical tendons, which exceeded the 12-gallon requirement.

4.0 Follow-Up Examinations to be Performed Next Surveillance (30 Year)

4.1 Re-examine the RB exterior concrete surface area immediately above the Fuel Handling Building Roof between buttresses 3 and 4, i.e. spider like cracking approximately 80 square inches and 240 square inches in area, respectively. None of the cracks are greater than .015", however, "surface widening" on the order of .1" to .2" maximum does exist. Inspect during Period 8 Tendon Surveillance to ensure they are stable.

4.2 Re-examine the SE quadrant of the RB exterior above the ring girder. An area where the cosmetic grout cover has fallen off and underlying rebar is exposed exists. This is an original construction disparity. Rebar has only 1" of cover. ACI 318 requires minimum of 2" of cover. The area will be reexamined during Period 8 Tendon Surveillance to ensure there is no active degradation mechanism.

4.3 Re-examine the RB exterior concrete surface area at and above the ring girder, where cosmetic grout overlay was found loose and had fallen off. The underlying concrete was examined and found not to be significantly weathered or deteriorating. No concrete cracks were found where the grout cover had come loose. If the condition does not remain stable, consideration for repair of the grout cover will be exercised during Period 8 Tendon Surveillance, following reexamination.

4.4 Re-examine the RB exterior concrete surface area where a number of concrete spalls were noted at non-safe guards component supports. No active degradation mechanisms were found. These areas will be monitored and reexamined during Period 8 Tendon Surveillance. Consideration for repair will occur at that time.

4.5 Re-examine the construction joint above the ring girder between D320NE and D321 NE. Area was identified as having a crack width of .018" (exceeds ACI 349.3R-96 crack width of .015"). No active degradation mechanism such as freeze-thaw cycling was evident in the area in question. Monitor/reexamine during Period 8 Tendon Surveillance to ensure the crack is stable.

4.6 Continued monitoring of the tendon end cap grease leakage shall be performed as part of Repetitive Preventive Maintenance Task No. 9641. An internal report will be filed annually as part of that task for grease leak trending purposes.

4.7 Re-examine the crack in the concrete adjacent to the bearing plate of H46-37. Exceeded .01" in width. The measured width was .013" wide and 2.5" long. Re-examine during the 30th Year surveillance to ensure that no active degradation mechanism is present.

4.8 Re-sample V164 field end (bottom). Sample results indicated nitrates exceeding 10 PPM. Nitrate level was determined to be 10.3 PPM. However, the back-up grease sample obtained, and later re-tested, resulted in acceptable Nitrates at <.5 PPM. In order to ensure that the nitrate levels noted are stable, an additional grease sample will be obtained from V164 (field end) during the 30th Year Surveillance.

4.9 Top-off V86 with 2090P4 grease, in order to ensure grease voids are filled. Perform during the 30th Year Tendon Surveillance.

5.0 Conclusions

5.1 Based on the examination results, and evaluations presented herein, it is concluded that the pre-stressed post-tensioned containment system is in good condition. Structural integrity of containment remains above established acceptance limits set forth in 10CFR50.55a, and ASME Section XI IWL, or where departures were found, were shown to be acceptable. The system shows no evidence of significant degradation and will continue to perform its required safety function.

6.0 References

6.1 ACI 201.1R-92 and ACI 201.1R-68, "Guide for Making a Condition Survey of Concrete In Service."

6.2 ACI 318-63, "Building Code Requirements for Reinforced Concrete."

6.3 ACI 349.3R-96 Section 5.1, "Evaluation of Existing Nuclear Safety Related Concrete Structures."

6.4 NUREG/CR-6598, "An investigation of Tendon Sheathing Filler Migration into Concrete."

6.5 TMI-1 Procedure 1301-9.1, "RB Structural Integrity Tendon Surveillance", Revision 14.

6.6 TMI-1 Procedure 1410-Y-83, "RB Tendon End Cap Installation", Revision 5.

6.7 Precision Surveillance Corporation Report No. 463, "20th Year Physical Surveillance of the Three Mile Island Unit 1 Containment Building," (Tendon Surveillance Crack Mapping Results (Attachment 2).

6.8 Precision Surveillance Corporation Report No. 464, Twenty-Fifth Year Physical Surveillance of the Three Mile Island Unit 1 Containment Building (Attachment 3).

6.9 NRC Safety Evaluation Review of Twentieth Year Tendon Surveillance, Three Mile Island Unit 1, Docket No. 50-289, dated August 28, 1997.

6.10 GPU Nuclear Topical Report No. 093, letter No. C311-95-2166, dated April 7, 1995, T. G. Broughton to USNRC.

6.11 USNRC Integrated Inspection Report 50-289/98-03, dated September 4, 1998, Michele Evans to James W. Langenbach.

6.12 TMI-1 ISI Summary Report, letter No. 1920-99-20679, dated January 14, 2000, John Cotton to USNRC.

6.13 AmerGen Energy letter to USNRC, letter No. 5928-00-20013, dated January 28, 2000, John Cotton to USNRC (see TMI-1 Relief Request RR-7).

Table A
Period 7 Selected Base Scope Tendons

VERTICAL TENDON	HOOP TENDON	DOME TENDON
V32	H13-50 *	D102 *
V40	H35-33	D104 **
V114	H46-37	D225
V164 *	H51-43	D313
-	H62-26	-

* Tendons detensioned
** Exempt tendon examined in accordance with IWL-2521.1.(c)

Table B
Vertical Tendons Exhibiting Sheathing Filler Migration into Concrete Surface

V1	V17	V31	V54	V135	V153
V3	V21	V32	V59	V137	V155
V5	V23	V41	V131	V138	V159
V6	V26	V46	V132	V139 *	V162
V13	V28	V51	V134	V140	-

* Main Gasket of V139 (Shop End/Top) Replaced

Table C
Tendon End Cap Modifications (Includes Gasket Replacement)

H24-51	H51-4	H62-10
H26-4	H51-13	H62-13
H26-52	H51-14	H62-14
H26-53	H53-11	H62-15
H31-18	H53-13	D145SE
H31-46	H53-25	D147SE
H31-51	H53-44	D317SE
H31-55	H53-48	-

Table D
Grease Leakage Mitigation
Tendon End Cap Gasket Replacements

H13-12
H13-13
H13-21
H15-13
D202NE
D336NW

Table E
Vertical Tendon Field (Bottom) End Cap Grease Leakage Mitigation with Grease Sampling
*****

V72, V73, V74, V75, V76, V136, V146

* Tendon Contractor Examination Yielded Minor Fastener or Drain Plug Tightening – Grease Leakage Mitigated

Table F
Vertical Tendon Shop (Top) End Cap Grease Leakage Mitigation
Gasket Replacements

V19, V83, V86, V126, V139

Table G
Dome Tendon Crack Mapping

D103NE, D118SW, D203NE, D218SE, D225NW, D249SE, D313SE, D329SW, D334NW

TENDON FORCE AND ELONGATION
SURVEILLANCE RESULTS & EVALUATION

Tendon force and elongation are discussed in the following sections. The first summarizes results. The second describes the procedures used to measure tendon force and elongation. The third, fourth, fifth and sixth sections provide detailed discussion of, respectively, individual tendon force, group mean force, force trends and elongation.

All surveillance activities, including force and elongation measurements, were performed in accordance with the detailed instructions provided by TMI-1 Surveillance Procedure 1301-9.1, Revision 14. This procedure incorporates the applicable requirements as set forth in the following documents.

- USNRC Regulatory Guide 1.35, Revision 3.
- Subsection IWL of ASME Boiler & Pressure Vessel Code Section XI, 1992 Edition with Addenda through 1992.
- 10CFR50.55a as amended effective 09 September 1996.
- TMI-1 Technical Specification Section 4.4.2.1

This report includes information as required by the above listed documents. Acceptance limits on current & trended tendon forces and on tendon elongation are as provided by the following.

- Subsection IWL of ASME Boiler & Pressure Vessel Code Section XI, 1992 Edition with Addenda through 1992 (generic lower limits on individual tendon forces).
- Gilbert / Commonwealth Calculation DC-5390-225.01-SE dated 26 April 1994 (numerical limits on individual tendon forces).
- TMI-1 FSAR Par. 5.7.5.2.3.f, Update 14 (lower limits on current and trended tendon group mean forces).
- 10CFR50.55a as amended effective 09 September 1996 (generic limits on tendon elongation).

Other documents used as sources for data and information presented in the following sections are identified at the appropriate points in the text. All documents relevant to the preparation and content of the following sections are included in the References listing.

As discussed in Section 5, tendon forces documented in the reports covering the 10th, 15th & 20th Year Surveillances are adjusted to provide a correct basis for trending. As a result, there are numerous differences between the forces documented in those earlier reports and those used to compute trends in this report. Addendum sheets will be added to the TMI-1 record management file for the 10th, 15th and 20th Year Surveillance reports to clarify this issue. The addendum sheets will refer to this report for correct force values and an explanation of the adjustments.

1. Summary of Results & Conclusions

Forces were determined for 4 vertical, 5 hoop and 3 dome tendons. One tendon in each group was detensioned (for removal of a sample wire) and the elongations of these tendons were measured during subsequent retensioning. Current & trended forces and elongations meet all applicable acceptance criteria as stated below.

- All individual tendon forces are above the minimum required values listed in Gilbert / Commonwealth Calculation DC-5390-225.01-SE.
- Current normalized group (vertical, hoop & dome) mean forces are above the currently applicable minimum required values listed in FSAR Par. 5.7.5.2.3.f and the proposed minimum required values discussed in Subsections 4.3 & 5.4(c) below.
- Vertical, hoop and dome tendon group mean forces projected to March 2005 (the latest date for completion of the next surveillance as stipulated in Reference 2) using log-linear trends based on all accumulated surveillance data are acceptable. Projected forces are above both current, and proposed minimum required values.
- Statistical bounds on vertical, hoop and dome tendon group mean forces determined for March 2005 using the 10th through 25th Year Surveillance results are acceptable. These bounds, determined at the 95% confidence level, are above both current and proposed minimum required values.
- All tendon elongations are within the generic acceptance limits specified in 10CFR50.55a.

The results of the 25th Year Surveillance provide positive assurance that containment prestressing forces are adequate to ensure continued structural integrity at the required level until at least March, 2005 (by which time the next surveillance must be complete per the requirements of Reference 2).

2. Force and Elongation Measurement Procedures

Tendon forces are determined by the feeler gage pull out method in accordance with the instructions given in Reference 7 (Rev. 14) and summarized below.

- Couple a jack to the tendon stressing washer.
- Pressurize the jack until jacking force is sufficient to open a small (just over 0.030 in.) gap in the shim stack.
- Insert a 0.030 in. feeler gage into each side of the shim stack between the stressing washer and the outboard shim pair.
- Reduce jacking force to about 100 kip.
- Slowly increase jacking force until both feeler gages can be moved (which verifies that the shim stack is unloaded) and record jack pressure. The force corresponding to this pressure (computed using jack calibration constants) is called the liftoff force.
- Repeat the above two steps until three consecutive liftoff forces fall within a 25 kip range.
- Calculate end (shop or field) anchorage force as the average of the above three consecutive jacking forces.
- Compute tendon force as the mean of the shop and field (if determined) end forces. Vertical tendon forces are determined by jacking only at the upper (shop) end.

Elongation is determined during retensioning of all tendons that are detensioned. Detailed instructions for retensioning and elongation measurement are provided in Reference 7 (Rev. 14) and summarized below.

- Couple jacks at the upper end (verticals) or both ends (hoops & domes) of the tendon.
- Increase the force applied by each jack to a nominal level of 1 kip per wire to eliminate tendon slack.
- Measure and record the extension of each jack.
- Increase the force applied by each jack a nominal 80% of tendon ultimate strength in three approximately equal steps.
- Measure and record the extension of each jack at each of the above force levels.
- Compute elongation at each end as the difference between final and initial jack extensions.
- Compute tendon elongation as the sum of the individual end elongations.

3. Individual Tendon Force

As noted in the Summary above, all individual tendon forces exceed the minimum acceptable values. The minimum acceptable force level applicable to an individual tendon is 95 % of the force predicted for that tendon at the time of measurement. This acceptance limit is the same as that given in Subsection IWL of the ASME Boiler & Pressure Vessel Code, which is incorporated by reference into 10CFR50.55a (per amendment effective 9 Sep 96). Predicted forces (Base Levels) for the tendons included in the 25th Year Surveillance were determined in a 1994 calculation prepared by Gilbert / Commonwealth (Reference 11).

Forces determined for individual tendons and the corresponding acceptance limits (lower limits) are listed in Table 1 below. The tendon force listed is the mean of the shop and field end values (hoop & dome tendons; vertical tendon forces are measured only at the shop end). End forces are computed as the average of three first consecutive liftoff force measurements that fall within a 25 kip range. Liftoff is the point at which both sides of the shim stack are verified loose by the feeler gage withdrawal method. The feeler gage withdrawal method, the liftoff procedure and the computation of tendon force are defined in detail in Reference 7 (Rev. 14). All liftoff and other data documented during the surveillance are included in Attachment 3 (the surveillance contractor report).

Table 1
Tendon Forces, Acceptance Limits & Margins

Tendon	Shop End Force, kip (Note 1)	Field End Force, kip (Notes 1 & 2)	Tendon Force, kip (Note 3)	Lower Acceptance Limit, kip (Note 4)	Margin, kip (Note 5)
V32	1193.0	N/A	1193	1132	+61
V40	1202.0	N/A	1202	1128	+74
V114	1189.3	N/A	1189	1100	+89
V164	1181.0	N/A	1181	1165	+16
H13-50	1183.0	1135.0	1159	1042	+117
H35-33	1180.7	1158.0	1169	1080	+89
H46-37	1134.3	1123.0	1129	1022	+107
H51-43	1176.0	1163.3	1170	1116	+54
H62-26	1133.0	1138.3	1136	1064	+72
D102	1276.0	1284.0	1280	1053	+227
D225	1118.0	1090.3	1104	1027	+77
D313	1110.0	1129.0	1120	1052	+68

Notes:

1. Rounded to nearest 0.1 kip.
2. Vertical tendon forces measured at upper (shop) end only.
3. Shop end force (vertical tendons) or mean of shop & field end forces (hoop & dome tendons); rounded to the nearest kip.
4. Lower Acceptance Limit is 95% of the Base Level as computed in Reference 11.
5. Margin is tendon force less lower acceptance limit. Positive margin denotes acceptance.

4. Normalization and Group Mean Tendon Force

As noted in the summary above, and as discussed in detail in Subsection 4.2, the mean normalized forces calculated for the vertical, hoop and dome tendon samples are all acceptable.

The primary purpose of measuring tendon forces is to ensure that time dependent force loss is not excessive and that the mean levels of prestressing force in the structure are not below the specified minima. The mean levels of prestressing forces are considered to be acceptable if the averages of normalized sample tendon forces (separate averages are computed for vertical, hoop and dome tendons) are not below the specified group minima.

4.1 Normalization

The force at a tendon end anchorage is a function not only of the time dependent losses (concrete creep, concrete shrinkage and tendon stress relaxation), but also of the initial tendon seating force and the elastic shortening occurring during tendon stressing. Time dependent losses should be similar for all tendons in a group although some differences are expected as a result of variations in initial force level, thermal environment, structural stiffness and possible redistribution (of force along the length of a tendon). Initial seating force and elastic shortening loss vary significantly within each tendon group.

For example, the initial average (both ends) seating forces in hoop tendons, as documented in Reference 12 ranged from 1395 kips to 1461 kips. The mean of all initial hoop tendon seating forces was 1435 kips. As a result, the initial average seating force in any randomly selected hoop tendon may vary from 40 kips below the mean to 26 kips above the mean.

The sequential stressing of tendons causes incremental strains in the concrete and in all tendons already stressed. As a result, the forces in all tendons except the last one stressed are affected by stressing sequence. The final elastic (in contrast to time dependent) hoop strain resulting from stressing all hoop tendons is on the order of -0.0005. As a result of this strain, the force in the first tendon stressed decreases by about 120 kips (-0.0005 strain times 30,000 ksi modulus times 8.3 sq. in. area). This decrease is called elastic shortening loss. The last tendon stressed experiences no elastic shortening loss. The mean elastic shortening loss is about 60 kips. As a result, the elastic shortening loss in any randomly selected hoop tendon may be as little as 60 kips below the mean or as much as 60 kips above the mean.

Therefore, as a result of the combination of the above effects, the force in any randomly selected hoop tendon could be as low as 100 (60 + 40) kips below the mean or as high 86 (60 + 26) kips above the mean. However, actual variations are probably less since the tendons with the extreme initial seating forces are not necessarily at either end of the stressing sequence.

As surveillance samples are small, there is a very low probability that the mean of the forces in the sample tendons is close to the mean force in all tendons. In fact, for hoop tendons, the sample mean could vary from almost 100 kips below to almost 86 kips above the actual group mean. Maximum possible variations for vertical and dome sample means are less but still significant. Individual measured forces can be adjusted to account for the effects of initial seating forces and elastic shortening losses. If this is done, the sample mean can be considered to better represent the group mean. The adjustment process is termed normalization and the adjustment applicable to an individual tendon is called a normalization factor. Computation and application of normalization factors are described in USNRC Regulatory Guide 1.35.1, Determining Prestressing Forces for Inspection of Prestressed Concrete Containments.

Normalization factors applicable to each surveillance tendon were computed by Gilbert / Commonwealth and are documented in Reference 11. These factors, which are added to measured tendon forces, are the summation of the following elements.

- The mean initial seating force for all tendons in the group less the initial seating force for tendon in question.
- The mean elastic shortening loss (a negative number) for the group less the elastic shortening loss (also a negative number) computed for the tendon in question.
- Unit load stress relaxation (a negative number) times the sum of the above two elements.

The last of the above elements accounts for the variation in time dependent loss expected as a result of the variation among the forces in the individual tendons at the time that stressing of the group is complete.

All tendon forces are normalized, per the guidance given in Reg. Guide 1.35.1, so that sample means are more representative of group means. Table 2 below lists measured forces (from Table 1), normalizing factors (from Reference 11) and normalized forces.

Table 2
Measured Forces, Normalizing Factors & Normalized Forces

Tendon	Measured force, kip (Note 1)	Normalizing Factor, kip (Note 2)	Normalized force, kip (Note 3)
V32	1193	-7	1186
V40	1202	-1	1201
V114	1189	27	1216
V164	1181	-42	1139
H13-50	1159	25	1184
H35-33	1169	-15	1154
H46-37	1129	46	1175
H51-43	1170	-53	1117
H62-26	1136	2	1138
D102	1280	18	1298
D225	1104	45	1149
D313	1120	19	1139

Notes:

1. Measured forces from Table 1.
2. Normalizing factors from Reference 11.
3. Normalized force is sum of measured force and normalizing factor.

4.2 Group Mean Tendon Forces

Normalized forces in individual tendons (from Table 2), group mean forces, minimum required group mean forces and margins are listed in Table 3 below. The minimum required group mean forces are as stated in FSAR Par. 5.7.5.2.3.f (Update 14).

As is shown in the table, the vertical, hoop and dome tendon sample means are all above the respective minimum required values. Therefore mean normalized tendon forces, as determined by the results of the 25th Year Surveillance, are acceptable. The final column of the table lists the margin between current group mean and the minimum required value. A positive margin (all are positive) denotes acceptance.

Table 3
Normalized Tendon Forces, Group Means & Margins

Tendon Group	Tendon	Normalized Force, kip (Note 1)	Minimum Required Group Mean Force, kip (Note 2)	Margin, kip (Note 3)
Vertical	V32	1186		
	V40	1201		
	V114	1216		
	V164	1139		
	Vertical Tendon Sample Mean = 1186		1010	+176
Hoop	H13-50	1184		
	H35-33	1154		
	H46-37	1175		
	H51-43	1117		
	H62-26	1138		
	Hoop Tendon Sample Mean = 1154		1121	+33
Dome	D102	1298		
	D225	1149		
	D313	1139		
	Dome Tendon Sample Mean = 1195		1040	+155

Notes:

1. Normalized forces from Table 2.
2. Minimum required values from FSAR Par. 5.7.5.2.3.f (Update 14).
3. Normalized force mean less minimum required. Positive margin denotes acceptance.

4.3 Proposed Minimum Required Group Mean Forces

As discussed in 5.4(c), TMI-1 recently recalculated the minimum required mean forces for all three tendon groups. This calculation is documented in EER JO # 162193 with appended calc C-1101-153-E410-028. These recalculated minima, which are proposed for future use, are listed for information below along with the vertical, hoop and dome sample means. All sample means exceed the proposed minima by significant margins. .

Tendon Group	Sample Mean, kip	Proposed Minimum, kip	Margin, kip
Vertical	1186	1033	153
Hoop	1154	1108	46
Dome	1195	1064	131

5. Tendon Force Adjustment and Group Mean force Trends

As noted in the summary above, vertical, hoop and dome tendon mean forces trended to Year 31 (March 2005, the latest date for completion of the next surveillance as stipulated in Reference 2) are above the minimum required values listed in FSAR Par. 5.7.5.2.3.f. Statistically determined lower bounds (lower 95% confidence limits or LCL's) on mean forces at Year 31 are also above minimum required levels. These minimum required mean force levels are:

- 1010 kips for vertical tendons.
- 1121 kips for hoop tendons.
- 1040 kips for dome tendons.

Log-linear trends are computed using adjusted (as applicable), normalized tendon forces determined during the 1st through 25th Year Surveillances. Lower 95% confidence limits on mean forces at Year 31 are computed using forces determined during the 10th through 25th Year Surveillances only. Early (1st, 3rd & 5th Year Surveillances) results are not used in the statistical computation for two reasons. The first is that the early reports do not provide sufficient information to allow positive interpretation of the forces documented therein (the method of measuring liftoff is not identified). The second, and more significant, reason is that the initial time dependent losses do not necessarily follow the same trend as do the later losses. Incorporating early losses into the calculations can result in confidence limits that are grossly misleading.

Force adjustment and trend computations are discussed in the following subsections.

5.1 Force Adjustment

The 10th, 15th & 20th Year Surveillances were performed per the requirements of Revisions 4, 6, & 9, respectively, of TMI Surveillance Procedure 1301-9.1 (Reference 7). These revisions defined the following process for determining tendon force.

- After coupling the stressing jack to the anchor head, pressurize the jack until there is a small (just over 0.030 in.) gap in the shim stack.
- Insert two 0.030 in. feeler gages approximately 180° apart between the anchor head and the shim stack or between the bearing plate and the shim stack.
- Reduce jacking force to about 100 kip.
- Increase jacking force and record pressures at which the 1st and 2nd feeler gages can be withdrawn.
- Compute liftoff force as the average of the forces calculated from the jack pressures recorded in the previous step.

- Continue the above process until at least three consecutive sets of measurements meet the following criteria.
    - The difference between the forces (in a given set of measurements) at which the 1st and 2nd feeler gages can be withdrawn does not exceed 40 kips.
    - The average forces (average of the forces at which the 1st and 2nd feeler gages can be withdrawn) fall within a 25 kip band.
- Compute end force as the mean of the first three consecutive liftoff forces meeting the above criteria.
- Compute tendon force as the average of the two end (shop and field) forces or as the single end force if jacking is done at only one end.

Liftoff is more correctly defined as the jacking force at which the 2nd feeler gage can be withdrawn. Since this force is generally higher than that at which the 1st gage can be withdrawn, the above process tends to yield an underestimate of tendon force. Revision 14 to Surveillance Procedure 1301-9.1 (the revision used during the 25th Year Surveillance) incorporates the corrected definition of liftoff and eliminates the requirement to record the force at which the first feeler gage can be withdrawn.

Tendon forces reported for the 25th Year Surveillance are correct in that lift off force is computed using the correct process. Those reported for the 10th, 15th & 20th Year Surveillances may be incorrect since, as discussed above, these are generally based on underestimates of liftoff force.

In order to provide a consistent basis for force trending, the tendon forces documented in the 10th, 15th & 20th Year Surveillance reports (References 16, 17 & 18, respectively) are adjusted to reflect the correct liftoffs as defined in Revision 14 to Surveillance Procedure 1301-9.1. The adjustment consists of simply redefining liftoff force as the force at which the second feeler gage can be removed. This force is recorded for all liftoff operations documented in the subject reports.

The 1st, 3rd & 5th Year Surveillances were conducted under Revision 1 to USNRC Regulatory Guide 1.35. The requirements outlined in this early document are considerably less detailed than those in the current revision (Revision 3). Also, many of the requirements given in Revision 1 are significantly changed in Revision 3.

The TMI-1 tendon surveillance procedure (Reference 7) has changed in parallel with regulatory requirements and, from the 10th Year Surveillance forward, has provided much more detailed instructions for measuring and documenting liftoff forces. As a result, all data and related information needed to adjust the 10th, 15th & 20th Year Surveillance tendon forces are available in the applicable reports.

The procedure revisions applicable to the first three surveillances allow the use of several liftoff measurement methods and provide no details on the implementation of these. The reports covering these surveillances (References 13, 14 & 15) do not identify the method(s) used. Therefore, the tendon forces reported for these earlier surveillances cannot be adjusted. However, the Log-linear trend computations use the results of all surveillances since this is the conventional basis for trend presentation. The more meaningful statistical (LCL) determinations of lower bound mean forces at Year 31 use only the 10th through 25th Year Surveillance results for the reasons previously mentioned. The 25th Year Surveillance results are not adjusted since these are obtained using the correct procedure for liftoff determination.

Force adjustments are documented in Tables 4, 5 and 6. The forces at which the 2nd feeler gage can be removed are extracted from the Data Sheet 24 copies included in the subject reports.

These tables also list the previously recorded (in the subject reports) tendon forces and the differences between those and the adjusted forces.

Adjusted forces are generally determined using the same data sets as were used to compute the previously documented forces. However, in several cases, it was necessary to perform more than three liftoff trials before meeting the criteria imposed by the earlier procedure revisions. In these cases, discussed below, adjusted forces are based on different data sets.

During the initial lift off of V84 (10th Year Surveillance), the anchor head rotated and ejected shims. The shim stack was reset, which may have caused some change to the distribution of force in the tendon, and three more liftoff forces were measured. These subsequent liftoff forces were noticeably higher than the first. To ensure a consistent and conservative approach, the adjusted force is based on only the initial liftoff measurement. As a result, the adjusted force is 14 kips below the previously reported force. For all other tendons, the adjusted force is equal to or greater than that previously reported.

Eight liftoff measurements were made at the shop end of H35-23 (20th Year Surveillance). Only the final three satisfied the procedure criterion requiring 3 consecutive measurements with 1st & 2nd feeler gage pull out forces differing by not more than 40 kips. The adjusted shop end force is based on the first 3 measurements.

Seven liftoff measurements were made at the shop end of H62-26 (20th Year Surveillance) for the same reason as above. However, in this case, the shim stack was reset following the 4th measurement and the final three were used to compute shop end force. The adjusted shop end force is based on the first 3 measurements.

Five liftoff measurements were made at the field end of H62-49 (20th Year Surveillance), again for the same reason as above. The shim stack was reset following the 2nd measurement and the final three were used to compute field end force. The adjusted field end force is based on the first 3 measurements.

Tendon D218 was detensioned / retensioned during the 5th Year Surveillance. It was included in the 15th Year Surveillance as a substitute for D318 which is over a main steam vent valve discharge line and could not be safely examined with the plant in operation (as it was during this surveillance). Since D218 was previously detensioned / retensioned, it should not be included in trend or LCL calculations. This tendon is listed in the 15th Year Surveillance table for information but the adjusted force is not used in determining the dome group trend or LCL.

Table 4 10^{th} Year Surveillance - Adjusted Tendon Force, Previously Reported Force & Difference							
Tendon	Shop End Liftoff Force, kip, at 2^{nd} Feeler Gage Withdrawal	Mean Shop End Force, F_s, kip (Note 1)	Field End Liftoff Force, kip, at 2^{nd} Feeler Gage Withdrawal (Note 2)	Mean Field End Force, F_f, kip (Note 1)	Adjusted Tendon Force, F_n, kip (Note 3)	Previously Reported Tendon Force, F_o, kip (Note 4)	$\Delta F = F_n - F_o$, kip (Note 5)
V14	1244		N/A				
	1240		N/A				
	1244	1242.7	N/A	N/A	1243	1243	0
V30	1190		N/A				
	1190		N/A				
	1198	1192.7	N/A	N/A	1193	1193	0
V32	1190		N/A				
	1187		N/A				
	1210	1195.7	N/A	N/A	1196	1196	0
V84	*1189		N/A				
	1202		N/A				
	1202		N/A				
	1206	1189.0*	N/A	N/A	1189	1203	(-)14
V160	1189		N/A				
	1194		N/A				
	1194	1192.3	N/A	N/A	1192	1192	0
H13-35	1215		1179				
	1206		1175				
	1198	1206.3	1175	1176.3	1191	1184	7
H13-36	1198		950				
	1194		940				
	1185	1192.3	930	940.0	1066	1064	2
H13-37	1173		1199				
	1160		1199				
	1164	1165.7	1199	1199.0	1182	1175	7
H24-26	1181		1169				
	1181		1159				
	1189	1183.7	1159	1162.3	1173	1172	1

* The anchor head rotated and ejected shims during the initial liftoff measurement. See discussion in text.

Notes:

1. Mean (rounded to the nearest 0.1 kip) of the first three consecutive liftoff measurements falling within a 25 kip band.
2. Vertical tendon liftoff measured only at top (shop) end.
3. For vertical tendons $F_n = F_s$; for hoop & dome tendons, $F_n = (F_s + F_f) / 2$. F_n is rounded to the nearest kip.
4. Tendon force documented in the 10^{th} Year Surveillance Report.
5. Increase in tendon force resulting from use of the revised procedure (per discussion in text) to determine liftoff force.

Table 4 (cont'd)
10th Year Surveillance - Adjusted Tendon Force, Previously Reported Force & Difference

Tendon	Shop End Liftoff Force, kip, at 2nd Feeler Gage Withdrawal	Mean Shop End Force, F_s, kip (Note 1)	Field End Liftoff Force, kip, at 2nd Feeler Gage Withdrawal (Note 2)	Mean Field End Force, F_f, kip (Note 1)	Adjusted Tendon Force, F_n, kip (Note 3)	Previously Reported Tendon Force, F_o, kip (Note 4)	$\Delta F = F_n - F_o$, kip (Note 5)
H35-26	1143		1172				
	1147		1169				
	1139	1143.0	1165	1168.7	1156	1153	3
H62-26	1122		1169				
	1118		1172				
	1118	1119.3	1172	1171.0	1145	1138	7
H62-30	1135		1175				
	1135		1172				
	1126	1132.0	1169	1172.0	1152	1146	6
D133	1080		1130				
	1092		1130				
	1080	1084.0	1130	1130.0	1107	1100	7
D225	1135		1118				
	1130		1113				
	1143	1136.0	1113	1114.7	1125	1117	8
D314	1301		1286				
	1293		1291				
	1288	1294.0	1282	1286.3	1290	1286	4

Notes:

1. Mean (rounded to the nearest 0.1 kip) of the first three consecutive liftoff measurements falling within a 25 kip band.
2. Vertical tendon liftoff measured only at top (shop) end.
3. For vertical tendons $F_n = F_s$; for hoop & dome tendons, $F_n = (F_s + F_f) / 2$. F_n is rounded to the nearest kip.
4. Tendon force documented in the 10th Year Surveillance Report.
5. Increase in tendon force resulting from use of the revised procedure (per discussion in text) to determine liftoff force.

Table 5
15th Year Surveillance - Adjusted Tendon Force, Previously Reported Force & Difference

Tendon	Shop End Liftoff Force, kip, at 2nd Feeler Gage Withdrawal	Mean Shop End Force, F_s, kip (Note 1)	Field End Liftoff Force, kip, at 2nd Feeler Gage Withdrawal (Note 2)	Mean Field End Force, F_f, kip (Note 1)	Adjusted Tendon Force, F_n, kip (Note 3)	Previously Reported Tendon Force, F_o, kip (Note 4)	$\Delta F = F_n - F_o$, kip (Note 5)
V19	1191		N/A				
	1187		N/A				
	1183	1187.0	N/A	N/A	1187	1186	1
V21	1196		N/A				
	1196		N/A				
	1196	1196.0	N/A	N/A	1196	1185	11
V22	1175		N/A				
	1171		N/A				
	1168	1171.3	N/A	N/A	1171	1169	2
V23	1175		N/A				
	1175		N/A				
	1175	1175.0	N/A	N/A	1175	1175	0
V50	1216		N/A				
	1212		N/A				
	1212	1213.3	N/A	N/A	1213	1209	4
V83	1196		N/A				
	1196		N/A				
	1196	1196.0	N/A	N/A	1196	1193	3
V84	1175		N/A				
	1175		N/A				
	1175	1175.0	N/A	N/A	1175	1169	6
V85	1179		N/A				
	1179		N/A				
	1179	1179.0	N/A	N/A	1179	1179	0
H24-29	1116		1038				
	1105		1038				
	1103	1108.0	1035	1037.0	1072	1068	4

Notes:

1. Mean (rounded to the nearest 0.1 kip) of the first three consecutive liftoff measurements falling within a 25 kip band.
2. Vertical tendon liftoff measured only at top (shop) end.
3. For vertical tendons $F_n = F_s$; for hoop & dome tendons, $F_n = (F_s + F_f) / 2$. F_n is rounded to the nearest kip.
4. Tendon force documented in the 15th Year Surveillance Report.
5. Increase in tendon force resulting from use of the revised procedure (per discussion in text) to determine liftoff force.

Table 5 (cont'd) 15th Year Surveillance - Adjusted Tendon Force, Previously Reported Force & Difference							
Tendon	Shop End Liftoff Force, kip, at 2nd Feeler Gage Withdrawal	Mean Shop End Force, F_s, kip (Note 1)	Field End Liftoff Force, kip, at 2nd Feeler Gage Withdrawal (Note 2)	Mean Field End Force, F_f, kip (Note 1)	Adjusted Tendon Force, F_n, kip (Note 3)	Previously Reported Tendon Force, F_o, kip (Note 4)	$\Delta F = F_n - F_o$, kip (Note 5)
H24-30	1178		1103				
	1174		1103				
	1174	1175.3	1103	1103.0	1139	1135	4
H24-31	1124		1107				
	1124		1107				
	1120	1122.7	1103	1105.7	1114	1108	6
H24-51	1136		1154				
	1132		1154				
	1128	1132.0	1150	1152.7	1142	1140	2
H46-34	1187		1170				
	1183		1170				
	1183	1184.3	1170	1170.0	1177	1172	5
H62-13	1091		1087				
	1083		1090				
	1091	1088.3	1087	1088.0	1088	1087	1
H62-26	1129		1134				
	1121		1134				
	1121	1123.7	1129	1132.3	1128	1122	6
D145	1228		1212				
	1228		1212				
	1228	1228.0	1212	1212.0	1220	1220	0
D218*	1116		1183				
	1116		1175				
	1116	1116.0	1179	1179.0	1148	1148	0
D347	1187		1187				
	1175		1174				
	1196	1186.0	1178	1179.7	1183	1181	2

* Tendon previously detensioned/retensioned. See discussion in text.

Notes:

1. Mean (rounded to the nearest 0.1 kip) of the first three consecutive liftoff measurements falling within a 25 kip band.
2. Vertical tendon liftoff measured only at top (shop) end.
3. For vertical tendons $F_n = F_s$; for hoop & dome tendons, $F_n = (F_s + F_f) / 2$. F_n is rounded to the nearest kip.
4. Tendon force documented in the 15th Year Surveillance Report.
5. Increase in tendon force resulting from use of the revised procedure (per discussion in text) to determine liftoff force.

Table 6
20th Year Surveillance - Adjusted Tendon Force, Previously Reported Force & Difference

Tendon	Shop End Liftoff Force, kip, at 2nd Feeler Gage Withdrawal	Mean Shop End Force, F_s, kip (Note 1)	Field End Liftoff Force, kip, at 2nd Feeler Gage Withdrawal (Note 2)	Mean Field End Force, F_f, kip (Note 1)	Adjusted Tendon Force, F_n, kip (Note 3)	Previously Reported Tendon Force, F_o, kip (Note 4)	$\Delta F = F_n - F_o$, kip (Note 5)
V32	1207		N/A				
	1211		N/A				
	1211	1209.7	N/A	N/A	1210	1204	6
V78	1304		N/A				
	1304		N/A				
	1309	1305.7	N/A	N/A	1306	1289	17
V126	1207		N/A				
	1220		N/A				
	1199	1208.7	N/A	N/A	1209	1205	4
H24-40	1137		1129				
	1133		1129				
	1133	1134.3	1129	1129.0	1132	1128	4
H35-23	1233		1178				
	1222		1171				
	1226	1227.0	1171	1173.3	1200	1184*	16
H35-47	1195		1191				
	1191		1191				
	1191	1192.3	1191	1191.0	1192	1182	10
H62-26	1157		1169				
	1149		1169				
	1151	1152.3	1169	1169.0	1161	1146**	15
H62-49	1180		1156				
	1180		1149				
	1180	1180.0	1135	1146.7	1163	1145**	18

* Based on the last 3 of 8 liftoff measurements (adjusted force based on first 3). See discussion in text.

** Based on final 3 liftoffs (adjusted force based on first 3). See discussion in text.

Notes:

1. Mean (rounded to the nearest 0.1 kip) of the first three consecutive liftoff measurements falling within a 25 kip band.
2. Vertical tendon liftoff measured only at top (shop) end.
3. For vertical tendons $F_n = F_s$; for hoop & dome tendons, $F_n = (F_s + F_f) / 2$. F_n is rounded to the nearest kip.
4. Tendon force documented in the 20th Year Surveillance Report.
5. Increase in tendon force resulting from use of the revised procedure (per discussion in text) to determine liftoff force.

Table 6 (cont'd)
20th Year Surveillance - Adjusted Tendon Force, Previously Reported Force & Difference

Tendon	Shop End Liftoff Force, kip, at 2nd Feeler Gage Withdrawal	Mean Shop End Force, F_s, kip (Note 1)	Field End Liftoff Force, kip, at 2nd Feeler Gage Withdrawal (Note 2)	Mean Field End Force, F_f, kip (Note 1)	Adjusted Tendon Force, F_n, kip (Note 3)	Previously Reported Tendon Force, F_o, kip (Note 4)	$\Delta F = F_n - F_o$, kip (Note 5)
D141	1166		1165				
	1162		1165				
	1164	1164.0	1161	1163.7	1164	1161	3
D225	1119		1124				
	1115		1124				
	1117	1117.0	1124	1124.0	1120	1114	6
D248	1191		1214				
	1191		1214				
	1187	1189.7	1214	1214.0	1202	1188	14

Notes:

1. Mean (rounded to the nearest 0.1 kip) of the first three consecutive liftoff measurements falling within a 25 kip band.
2. Vertical tendon liftoff measured only at top (shop) end.
3. For vertical tendons $F_n = F_s$; for hoop & dome tendons, $F_n = (F_s + F_f) / 2$. F_n is rounded to the nearest kip.
4. Tendon force documented in the 20th Year Surveillance Report.
5. Increase in tendon force resulting from use of the revised procedure (per discussion in text) to determine liftoff force.

5.2 Normalization of 1st Through 20th Year Surveillance Sample Tendon Forces

To ensure a consistent basis for all forces used in the trending and statistical calculations presented in this report, these are normalized per the discussion in 4.1. The process and results are documented in Tables 7 through 12 below. The normalization factors for the 1st through 15th Year Surveillances were obtained from SP 1301-9.1, Revision 6, which includes the values for all tendons examined during those surveillance years. The factors for the 20th and 25th Year Surveillances are extracted from Reference 11. This later document lists the factors for tendons examined during the two most recent surveillances and for tendons included in future surveillance samples.

Table 7
1st Year Tendon Surveillance
Measured Tendon Forces, Normalization Factors & Normalized Forces

Tendon	Measured Force, kip (Note 1)	Normalization Factor, kip (Note 2)	Normalized Force, kip
V16	1348	-11	1337
V27	1285	-26	1259
V61	1306	-22	1284
V86	1285	9	1294
V158	1306	-38	1268
H13-28	1261	29	1290
H13-34	1273	31	1304
H13-46	1260	50	1310
H24-21	1267	41	1308
H24-47	1280	76	1356
H35-10	1259	8	1267
H35-28	1282	-6	1276
H51-12	1293	13	1306
H62-10	1272	-30	1242
H62-16	1253	13	1266
D101	1252	40	1292
D116	1259	-19	1240
D201	1278	-27	1251
D220	1253	9	1262
D301	1269	37	1306
D316	1259	-20	1239

Notes:

1. Average of shop & field end forces except for vertical tendons (only shop end force measured).
2. Normalization factors per SP 1301-9.1, Rev. 6 (Table 5, pp./ 126-128). Factor listed is added to measured force.

Table 8
3rd Year Tendon Surveillance
Measured Tendon Forces, Normalization Factors & Normalized Forces

Tendon	Measured Force, kip (Note 1)	Normalization Factor, kip (Note 2)	Normalized Force, kip
V24	1283	-24	1259
V48	1275	38	1313
V72	1258	10	1268
V97	1258	5	1263
V119	1209	-14	1195
H24-19	1105	20	1125
H24-48	1194	-21	1173
H35-11	1242	-51	1191
H35-29	1219	-43	1176
H46-24	1225	-3	1222
H46-28	1206	8	1214
H51-13	1217	-46	1171
H62-11	1163	62	1225
H62-47	1113	85	1198
H62-53	1177	65	1242
D130	1252	9	1261
D148	1226	10	1236
D202	1273	-45	1228
D219	1226	-41	1185
D334	1247	-11	1236
D348	1226	22	1248

Notes:

1. Average of shop & field end forces except for vertical tendons (only shop end force measured).
2. Normalization factors per SP 1301-9.1, Rev. 6 (Table 5, pp./ 126-128). Factor listed is added to measured force.

Table 9
5th Year Tendon Surveillance
Measured Tendon Forces, Normalization Factors & Normalized Forces

Tendon	Measured Force, kip (Note 1)	Normalization Factor, kip (Note 2)	Normalized Force, kip
V18	1274	-20	1254
V31	1147	0	1147
V55	1211	-7	1204
V105	1253	-44	1209
V138	1211	-40	1171
H24-20	1253	-8	1245
H24-28	1243	-20	1223
H24-49	1191	35	1226
H35-16	1221	0	1221
H46-30	1243	-13	1230
H46-32	1253	-25	1228
H51-11	1243	-57	1186
H62-10	1253*	N/A*	N/A*
H62-28	1243	-16	1227
H62-51	1222	50	1272
D131	1180	-44	1136
D147	1180	-19	1161
D203	1159	-40	1119
D218	1137	20	1157
D336	1221	-15	1206
D346	1169	19	1188

* Tendon H62-10 detensioned/retensioned during 1st Year Surveillance. Not a valid sample for this surveillance. Normalization factors are figured for undisturbed tendons & are meaningless for detensioned/retensioned tendons.

Notes:

1. Average of shop & field end forces except for vertical tendons (only shop end force measured).
2. Normalization factors per SP 1301-9.1, Rev. 6 (Table 5, pp./ 126-128). Factor listed is added to measured force.

Table 10
10^{th} Year Tendon Surveillance
Measured Tendon Forces, Normalization Factors & Normalized Forces

Tendon	Measured Force, kip (Note 1)	Normalization Factor, kip (Note 2)	Normalized Force, kip
V14	1243	-28	1215
V30	1193	-10	1183
V32	1196	-8	1188
V84	1189	-22	1167
V160	1192	-7	1185
H13-35	1191	-60	1131
H13-36	1066	15	1081
H13-37	1182	-45	1137
H24-26	1173	-24	1149
H35-26	1156	17	1173
H62-26	1145	2	1147
H62-30	1152	4	1156
D133	1107	70	1177
D225	1125	45	1170
D314	1290	-54	1236

Notes:

1. Average of shop & field end forces except for vertical tendons (only shop end force measured). Forces are adjusted values as discussed in 5.1 and listed in Table 4.
2. Normalization factors per SP 1301-9.1, Rev. 6 (Table 5, pp./ 126-128). Factor listed is added to measured force.

Table 11
15th Year Tendon Surveillance
Measured Tendon Forces, Normalization Factors & Normalized Forces

Tendon	Measured Force, kip (Note 1)	Normalization Factor, kip (Note 2)	Normalized Force, kip
V19	1187	-9	1178
V21	1196	-40	1156
V22	1171	-7	1164
V23	1175	17	1192
V50	1213	-31	1182
V83	1196	-11	1185
V84	1175*	N/A*	N/A*
V85	1179	4	1183
H24-29	1072	41	1113
H24-30	1139	-36	1103
H24-31	1114	31	1145
H24-51	1142	73	1215
H46-34	1177	-27	1150
H62-13	1088	59	1147
H62-26	1128	2	1130
D145	1220	-34	1186
D218	1148**	N/A**	N/A**
D347	1183	-40	1143

* The V84 shim stack was reset during the 10th Year Surveillance. Not a valid sample for this surveillance. Measured force not included in mean. Normalization factors figured for undisturbed tendons & are meaningless following shim stack reset. See discussion in text.

** Tendon D218 was detensioned/retensioned during the 5th Year Surveillance. Not a valid sample for this surveillance. Normalization factors figured for undisturbed tendons & are meaningless for detensioned/retensioned tendons. See discussion in text.

Notes:

1. Average of shop & field end forces except for vertical tendons (only shop end force measured). Forces are the adjusted values as discussed in 5.1 and listed in Table 5.
2. Normalization factors per SP 1301-9.1, Rev. 6 (Table 5, pp./ 126-128). Factor listed is added to measured force.

Table 12
20th Year Tendon Surveillance
Measured Tendon Forces, Normalization Factors & Normalized Forces

Tendon	Measured Force, kip (Note 1)	Normalization Factor, kip (Note 2)	Normalized Force, kip
V32	1210	-8	1202
V78	1306	-35	1271
V126	1209	19	1228
H24-40	1132	-5	1127
H35-23	1200	-34	1166
H35-47	1192	-39	1153
H62-26	1161	2	1163
H62-49	1163	47	1210
D141	1164	47	1211
D225	1120	45	1165
D248	1202	9	1211

Notes:

1. Average of shop & field end forces except for vertical tendons (only shop end force measured). Forces are the adjusted values as discussed in 5.1 and listed in Table 6.
2. Normalization factors per Reference 11. Factor listed is added to measured force.

5.3 Tabular Summary of Normalized Forces

The adjusted (as applicable) and normalized vertical, hoop and dome tendon forces listed in the preceding tables are summarized in Tables 13, 14 & 15, respectively, which follow. Normalized forces for the 25th Year Surveillance are from Table 2,

The time since the Structural Integrity Test (SIT) shown in the second column of these tables is determined by the number of months from Mar 74 (when the SIT was performed) to the month including the midpoint of the surveillance in question. The surveillance midpoint is considered to be the date midway between the initial and final as-found liftoff dates. Time in years is the number of months divided by 12 and rounded to the nearest 0.1.

Table 13
Summary of Normalized* Vertical Tendon Forces

Surveillance Year	Time since SIT, Years**	Tendon	Normalized* Force, kip
1	1.2	V16	1337
		V27	1259
		V61	1284
		V86	1294
		V158	1268
3	3.6	V24	1259
		V48	1313
		V72	1268
		V97	1263
		V119	1195
5	6.2	V18	1254
		V31	1147
		V55	1204
		V105	1209
		V138	1171
10	11.2	V14	1215
		V30	1183
		V32	1188
		V84	1167
		V160	1185
15	15.6	V19	1178
		V21	1156
		V22	1164
		V23	1192
		V50	1182
		V83	1185
		V85	1183
20	20.6	V32	1202
		V78	1271
		V126	1228
25	25.5	V32	1186
		V40	1201
		V114	1216
		V164	1139

* 10th 15th & 20th Year Surveillance forces are also adjusted per discussion in text.
** Years since SIT determined per discussion in text.

Table 14
Summary of Normalized* Hoop Tendon Forces

Surveillance Year	Time since SIT*	Tendon	Normalized Force, kip
1	1.2	H13-28	1290
		H13-34	1304
		H13-46	1310
		H24-21	1308
		H24-47	1356
		H35-10	1267
		H35-28	1276
		H51-12	1306
		H62-10	1242
		H62-16	1266
3	3.6	H24-19	1125
		H24-48	1173
		H35-11	1191
		H35-29	1176
		H46-24	1222
		H46-28	1214
		H51-13	1171
		H62-11	1225
		H62-47	1198
		H62-53	1242
5	6.2	H24-20	1245
		H24-28	1223
		H24-49	1226
		H35-16	1221
		H46-30	1230
		H46-32	1228
		H51-11	1186
		H62-28	1227
		H62-51	1272

* Years since SIT determined per discussion in text.

Table 14 (cont'd)
Summary of Normalized* Hoop Tendon Forces

Surveillance Year	Time since SIT**	Tendon	Normalized Force, kip
10	11.2	H13-35	1131
		H13-36	1081
		H13-37	1137
		H24-26	1149
		H35-26	1173
		H62-26	1147
		H62-30	1156
15	15.6	H24-29	1113
		H24-30	1103
		H24-31	1145
		H24-51	1215
		H46-34	1150
		H62-13	1147
		H62-26	1130
20	20.6	H24-40	1127
		H35-23	1166
		H35-47	1153
		H62-26	1163
		H62-49	1210
25	25.5	H13-50	1184
		H35-33	1154
		H46-37	1175
		H51-43	1117
		H62-26	1138

* 10th, 15th & 20th Year Surveillance forces are also adjusted per discussion in text.
** Years since SIT determined per discussion in text.

Table 15
Summary of Normalized* Dome Tendon Forces

Surveillance Year	Time since SIT**	Tendon	Normalized* Force, kip
1	1.2	D101	1292
		D116	1240
		D201	1251
		D220	1262
		D301	1306
		D316	1239
3	3.6	D130	1261
		D148	1236
		D202	1228
		D219	1185
		D334	1236
		D348	1248
5	6.2	D131	1136
		D147	1161
		D203	1119
		D218	1157
		D336	1206
		D346	1188
10	11.2	D133	1177
		D225	1170
		D314	1236
15	15.6	D145	1186
		D347	1143
20	20.6	D141	1211
		D225	1165
		D248	1211
25	25.5	D102	1298
		D225	1149
		D313	1139

* 10^{th}, 15^{th} & 20^{th} Year Surveillance forces are also adjusted per discussion in text.
** Years since SIT determined per discussion in text.

5.4 Tendon Force Trends

Figures 1, 2 & 3 are, respectively, plots of vertical, hoop and dome tendon forces vs. the log of time since the Structural Integrity Test (SIT). The SIT date is selected as the starting point for time since both Regulatory Guide 1.35 and Subsection IWL use this date as the basis for scheduling post-tensioning system in-service inspections. The logarithmic scale is used for the horizontal axis since time dependent losses (concrete creep, concrete shrinkage and tendon stress relaxation) are generally postulated to follow exponential relationships. Therefore, tendon force is expected to decrease in a relatively linear fashion with the log of time (but, in fact, does not as discussed below). The numerical data used to construct the plots is that listed in Tables 13, 14 & 15.

The plots include trend lines and lines representing minimum required mean tendon force. The trend lines, provided only for information as discussed in (c) below, are constructed using the method of least squares[1]. The minimum required mean tendon force levels are those listed in FSAR Par. 5.7.5.2.3.f, Update 14.

All of these plots are similar in two major respects. First, the tendon force data is quite scattered. Second, the apparent rate of decrease (kips / log time) in tendon forces between Years 11 and 25 is substantially less than that between Years 1 and 11. The significance of these plot aspects is discussed below.

(a) Data Scatter

The magnitude of the scatter of the individual tendon forces about the fitted trend lines is on the order of the overall decrease in mean forces (based on trend line slopes) over the 24 year period covered by the data. As a result, the 'true' (in the statistical sense) trends have a high probability of deviating significantly from those represented by the fitted lines. Therefore, even if the 'true' trends were known to follow a log-linear relationship, the fitted lines could not be considered accurate representations of those trends.

When scatter is relatively large, as is typically the case when measured tendon forces (adjusted and normalized as necessary) are plotted, statistically determined bounds are generally used to used to define a confidence interval for the 'true' trend. Lower bounds on projected tendon forces are computed later in this Subsection. The procedure used to compute these bounds is described in Reference 20.

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[1] The method of least squares is a statistical procedure for fitting a curve to data points. The user selects the type of curve (a straight line in the present case) and the dependent variable (tendon force in the present case). The statistical procedure is used to determine the parameters of the curve (slope and intercept in the present case) based on the requirement that the variance of the dependent variable about the line is a minimum. The variance is the sum of the squares of the deviations divided by n - 2 where n is the number of data points used in the calculation. Since this quantity is minimized, the procedure is commonly called the method of least squares. The development of the equations used to determine the slope and intercept (or other curve parameters, as applicable) is presented in Reference 20 and in many other statistics texts.

Figure 1
Vertical Tendon Normalized Force Trend

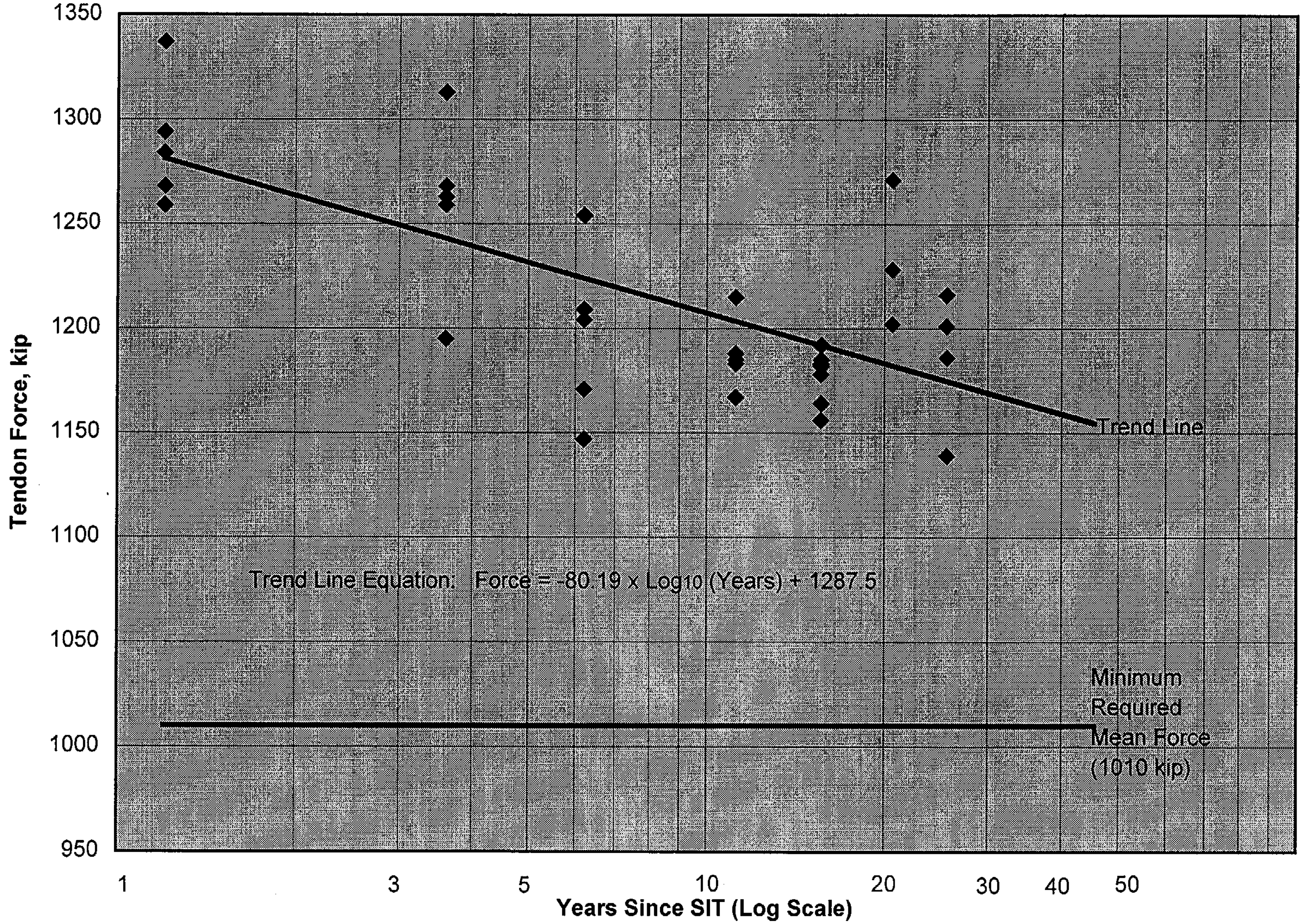


Figure 2
Hoop Tendon Normalized Force Trend

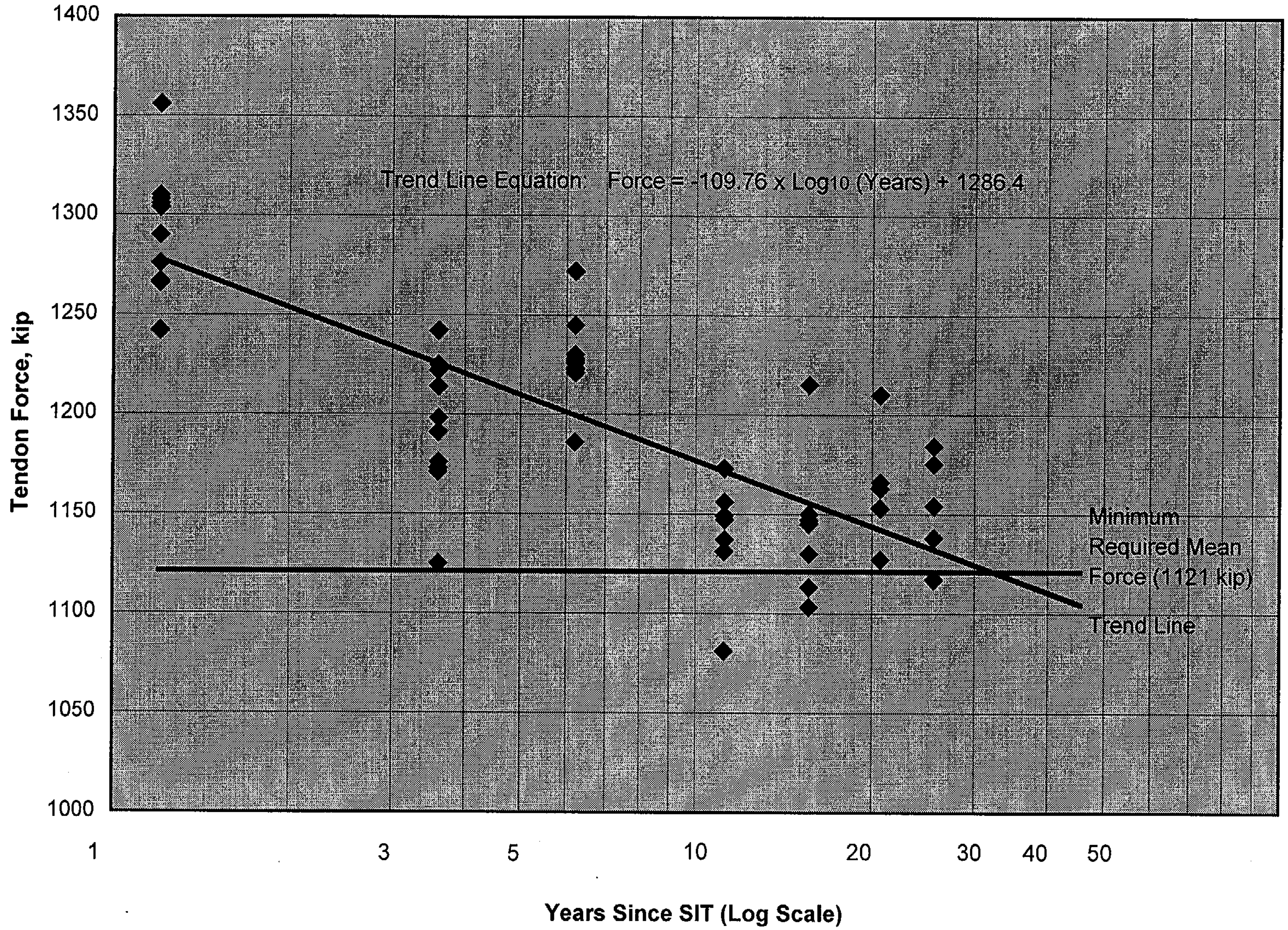
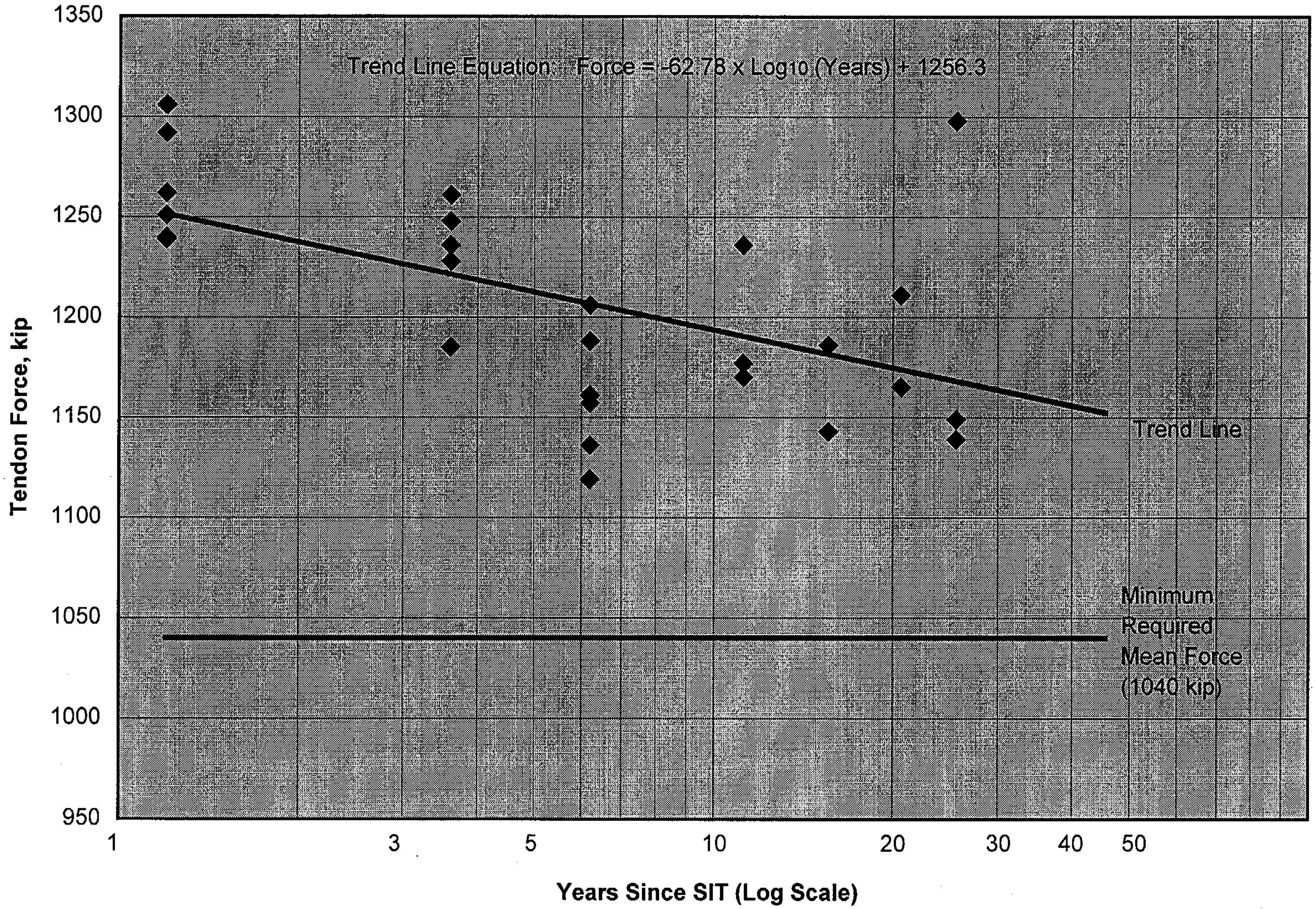


Figure 3
Dome Tendon Normalized Force Trend



(b) Data Trends

A visual examination of data plotted in Figures 1, 2 & 3 can easily lead to the conclusion that the decrease in tendon force is not linear with the logarithm of time. In all three plots, the rate of change of force appears to decrease as the logarithm of time increases. As a result, the trend lines shown on the plots exaggerate the rates of loss in later years (and provide underestimates of the loss rates in early years).

Various curves (exponential and other) could be fitted to the data. Any such curve (which can bend to conform to the data trend) will fit the data better than a straight line in the sense that the variance about the curve will be less than that about the line. However, no such curve will be particularly meaningful since the scatter of the data is so large.

For this reason, specific non-linear relationships between tendon force and the logarithm of time are not considered in this report. Instead, the 'true' trend (an undefined curvilinear relationship) is considered to be closely approximated by a linear relationship over the log time interval from 11 years to 31 years (the latest time for completion of the next surveillance per IWL requirements). Lower bound forces at Year 31 are then computed for a 95% confidence level.

The above procedure and the results are described in subsequent paragraphs. The 11 year (Surveillance Year 10) data is used as the starting point for the linear approximation. This is done since 11 to 25 years (the final data are for Year 25) covers only one fourth of the overall logarithmic interval from 1 to 25 years and there is no marked curvilinear trend to the data over 11 to 25 year time span. The 11 to 25 year interval is still significant since it includes 60% of the total (linear) time spanned by the surveillance data. Also, procedures and results from Surveillance Year 10 forward are fully documented, which ensures a consistent basis for all data used in the linear approximation analysis. Extrapolating the linear approximation to 31 years is reasonable since the Log time increment from 25 to 31 years is only one fourth of the Log time span from 11 to 25 years.

(c) Overall Linear Trends

For the reasons discussed above, the trend lines shown on Figures 1, 2 & 3 are provided for information only. However, this type of log-linear trending is, despite the drawbacks, an accepted method for establishing the future levels of tendon group mean forces. Therefore, the trends shown are discussed below.

Figures 1 & 3 show that all vertical and dome tendon forces measured (and adjusted, as applicable, & normalized) to date are well above the minimum required mean forces specified in FSAR Par. 5.7.5.2.3.f (Update 14). In addition, the trend lines remain well above the applicable minima for many decades after the current TMI-1 operating license expires. It can, therefore, be concluded that the mean levels of force in the vertical and dome tendon groups will not fall below the respective minima prior to the next surveillance or, in fact, prior to any surveillance performed during the period of validity of the current operating license.

Figure 2 shows the mean hoop tendon force falling below the 1121 kip minimum just after Year 32. The computed crossover is at 32.28 years per the trend line equation, Force = 1286.4 - 109.61 Log (Years), where Log is the symbol for a base 10 logarithm. Further, at Year 31 (the latest date for completion of the next surveillance per IWL) the computed hoop tendon mean force is 1123 kip. This projected force is only 2 kips above the 1121 kip minimum. While the computed force is acceptable, it provides little margin.

In anticipation that the 25th Year Surveillance hoop tendon sample mean force could be marginal, TMI-1 recently recalculated the minimum required mean forces for all three tendon groups. This calculation (as documented in EER JO # 162193 with appended calc C-1101-153-E410-028) was considerably more detailed than the original design calculation. It was done to ensure an easily auditable basis for acceptance limits should the mean force levels be close to those limits.

The recalculated minimum required group mean forces differ somewhat from those determined in the original design calculation and currently specified as acceptance limits in FSAR Par. 5.7.5.2.3.f (Update 14). It is expected that the current FSAR acceptance limits will be replaced with the new values. However, since this FSAR change must be submitted to and reviewed by the NRC, it could not be completed in time to apply to the 25th Year Surveillance. Nonetheless, it is reasonable to compare the surveillance results to the proposed new minimum required mean forces. Therefore, the proposed values are listed below for information and reference.

The original and proposed minimum required mean forces are listed in Table 16 below.

Table 16
Minimum Required Group Mean Forces per Original Design & New Calculations

Tendon Group	Minimum Required Mean Force, kip	
	Original Design Calculation	New Calculation (for Information & Reference Only)
Vertical	1010	1033
Hoop	1121	1108
Dome	1040	1064

The newly calculated minimum required vertical and dome group mean forces are somewhat greater than those given in the original design calculation and specified in the FSAR. However, even if the new values are used in Figures 1 & 3, the conclusions regarding trend, as stated above, remain unchanged. Also, the current sample means are still well above the revised minima.

The newly calculated minimum required mean hoop force is 13 kips below the originally determined value. As a result, the Year 31 margin based on the new minimum increases from 2 kips to 15 kips. Also, the trend line intersects the new minimum at 42 years instead of 32 years. Therefore, if the new minimum is applied, hoop tendon mean force trend appears acceptable with ample margin until well beyond the completion deadline for the 30th Year Surveillance.

In summary, it can be concluded that tendon force trends determined by the above conventional approach are acceptable and allow continued plant operation at least until the results of the 30th Year Surveillance are in hand. This conclusion applies for both currently specified and newly calculated acceptance limits.

(d) Statistical Limits on Trended Forces

The conventional approach discussed in (c) above is open to the following technical challenges.

- Close examination of Figures 1, 2 & 3 leads to the conclusion that the rate of tendon force loss decreases as the logarithm of time increases. This suggests that an exponential (or similar) curve would fit the data better than a straight line.

  The least squares fit method can be used to fit any type of curve to a given set of data. The method itself does not determine the type of curve that provides the best fit. The choice of curve must be made by the individual(s) applying the method. The choice can be made based on the appearance of the data or on basic engineering principles.

In the present case, it is concluded that a straight line is not the best curve to represent the change in tendon force with the logarithm of time. Engineering principles may suggest the use of a linear fit. However, the time span covered by the surveillance data is about 24 years. The tests performed on the concrete and steel specimens to establish time dependent material properties (creep, shrinkage and stress relaxation) were completed in a year or less. It is possible that time dependent material properties are not the same in the long and short term. Therefore, the appearance of the data rather than material properties determined by short term tests should guide the selection of curve type.

- The 10th through 25th Year Surveillance data are supported by extensive and complete documentation covering the measurement of liftoff forces. As a result, there is a high degree of assurance that the tendon forces determined during these surveillance years are accurately measured and have a common basis (after the adjustments discussed in Subsection 5.1).

  Documentation covering the first three surveillances is less complete and does not describe the procedure used to determine liftoff force. As a result, there is no assurance that the tendon forces reported for these surveillances conform to the same basis (verification, by the feeler gage method, that both sides of the shim stack are loose) as those reported for the 10th through 25th Year Surveillances.

  Therefore, tendon forces reported for the first three surveillances could introduce errors of unknown magnitude into trend computations. For this reason the 1st, 3rd & 5th Year Surveillance results should not be used in the computation of future force levels.

- The data plotted in Figures 1, 2 & 3 exhibit a relatively high degree of scatter. As a result, the 'true' (in the statistical sense) trend has a relatively high probability of differing significantly from that represented by any fitted line. Since a fitted line has little practical significance when scatter is large, the 'true' trend of scattered data is generally defined by statistically derived bounds.

The statistical bound approach is developed in Section 12.2 of Reference 20 and should be covered in the curve fitting (or regression analysis) section of any similar statistics text . When this approach is used, the value of the dependent variable (in this case, tendon force) is not defined as a specific function of the independent variable (in this case, log time). It is, instead, defined by its probability of falling within (or above or below) computed limits.

The statistical bound approach is currently applied to one aspect of containment safety by 10CFR50, Appendix J. This regulation requires (by a reference to ANSI/ANS 56.8) that containment leakage rate be reported at the upper 95% confidence limit. Thus, the leakage rate reported is neither the 'true' rate, which is unknown, nor the rate determined by the slope of the fitted line. It is, rather, a rate which the 'true' rate has only a 5% probability of exceeding. Or, in other words, there is a 95% probability that the 'true' rate will not exceed the computed upper 95% confidence limit.

Application of the statistical bound approach requires only two assumptions. First, the nature (linear, exponential or other) of the 'true' trend must be specified. Second, the dependent variable is assumed to be normally distributed about the 'true' trend. The first assumption is not a significant limitation if the trend can be approximated as a linear function over some time segment of interest. The second assumption is generally valid if the deviations of the dependent variable are the result of random variations in various uncontrolled parameters.

In the following paragraphs statistical lower bounds for group mean forces at Year 31 are computed using tendon forces determined during the 10^{th}, 15^{th}, 20^{th} and 25^{th} Year Surveillances. While the overall trend of group mean force is considered to be non-linear, that segment of the trend between Years 11 & 31 can be reasonably approximated as a straight line. The results of the 1^{st}, 3^{rd} & 5^{th} Year Surveillances are not used in the computation for the following two reasons.

- As discussed above, the basis for computing the forces documented in the 1^{st}, 3^{rd} & 5^{th} Year Surveillance Reports is not well defined.

- Also, as discussed above, the overall trend is non-linear. However, if the results of the first 3 surveillances are not considered, it should be possible to closely approximate the remaining segment of the trend as a straight line (this region of the data shows no noticeable curvilinear trend in any of the plots). The length of the Log time interval between Years 11 and 25 (the final data are for Year 25) is, in fact, only one fourth of the length of the total Log time interval from Years 1 to 25. Extrapolating the linear assumption to Year 31 increases the length of the Log time segment by a relatively small amount (Log 25 - Log 11 = 0.357 & Log 31 - Log 11 = 0.450). As a result, if the linear approximation is valid from Years 11 to 25, it should be almost equally valid from Years 11 to 31.

Bounds are computed for Year 31 since the next surveillance (30^{th} Year Surveillance) must be completed by this time. Bounds are computed at the 95% confidence level since this level is applied to numerous nuclear plant safety issues and, in particular, to the reporting of containment leakage rate as discussed earlier. The lower bound at the 95% confidence level is subsequently referred to as the LCL (lower 95% confidence limit).

The LCL on mean tendon force at a time T (with $X = Ln_e\ T$) years after the SIT is given by the following expression as developed in Section 12.2 of Reference 20. T is limited to the range of 11 to 31 years in accordance with the assumption that the trend may be approximated by a linear function over this time interval.

$$LCL\ (kips) = a + b \times X - t_{0.05} \times s_e \times \sqrt{[1/n + n \times (X - X_m)^2 / S_{xx}]}$$

where (with all summations from 1 to n):

$a = Y_m - b \times X_m$ is the intercept of the least squares fit trend line
$Y_m = (\Sigma Y_i) / n$
$X_m = (\Sigma X_i) / n$
X_i , Y_i are data sets with $X = Ln_e\ (T)$ and Y = tendon force in kip
T is time in years since the SIT (limited to the range 11 - 31 per linearity assumption)
$b = S_{xy} / S_{xx}$ is the slope of the slope of the least squares fit trend line
$t_{0.05}$ is Student's t statistic[2] for a 95% confidence level and (n-2) degrees of freedom
$s_e = \sqrt{\{[S_{xx} \times S_{yy} - (S_{xy})^2] / [n \times (n - 2) \times S_{xx}]\}}$ is the standard error of estimate
n is the number of data sets used in the LCL calculation
$S_{xx} = n \times \Sigma X_i^2 - (\Sigma X_i)^2$
$S_{yy} = n \times \Sigma Y_i^2 - (\Sigma Y_i)^2$
$S_{xy} = n \times \Sigma (X_i \times Y_i) - (\Sigma X_i) \times (\Sigma Y_i)$

[2] Numerical values for Student's t statistic are given in Table IV of Reference 20 and in many other statistics texts.

Values of the LCL for the vertical, hoop and dome tendons at Year 31 (March 2005) were computed using a short BASIC algorithm and the data for Surveillance Years 10-25 as compiled in Tables 13, 14 & 15. These LCL values and the corresponding acceptance limits are listed in Table 17 below. Both the current (FSAR Par. 5.7.5.2.3.f) and proposed (EER JO # 162193 & Calculation C-1101-153-E410-028) acceptance limits are listed.

Table 17
March 2005 Lower Bound Mean Forces at the 95% Confidence Level

Tendon Group	LCL, kip	Lower Acceptance Limits, kip	
		Current Per FSAR	Proposed (for Information & Reference Only)
Vertical	1175	1010	1033
Hoop	1140	1121	1108
Dome	1138	1040	1064

All lower bound forces are acceptable, using either current or proposed limits, as is shown by the entries in the table.

(e) Control Tendons

All but one of the sample tendons in each group are randomly selected from a population that excludes tendons previously examined. One tendon in each group is retained as a common, or control, tendon. Control tendons are examined during each surveillance (although, in rare instances, plant operating conditions prohibit the examination and require a substitution).

Control tendons are not detensioned unless this is required per IWL-3300, in which case a new control tendon is selected in accordance with the intent of IWL-2521(b). IWL-2521(b) requires control tendons to be selected from the 1st Year Surveillance sample. However, since all sample tendons were detensioned during the 1st, 3rd & 5th Year Surveillances, these cannot be used as control tendons. Therefore, the intent of IWL-2521(b) is followed by selecting control tendons from the 10th Year Surveillance sample.

The current control tendons are V32, H62-26 and D225. V32 was selected as a control tendon during the 20th Year Surveillance to replace previously selected control tendon V84. The force in V84 was found to be below 90% of the base value during the 15th Year Surveillance. As a result, the force in V84 had to be increased to an acceptable level and it could no longer be used as a control tendon. V32 was not examined during the 15th Year Surveillance. Also, D225 was not examined during the 15th Year Surveillance.

Control tendon forces are summarized in Table 18 below.

Table 18
Control Tendon Forces (Adjusted & Normalized), kip

Tendon	Surveillance Year			
	10th	15th	20th	25th
V32	1188	N/A	1202	1186
H62-26	1147	1130	1163	1138
D225	1170	N/A	1165	1149

The tendon forces shown in the table fall within relatively narrow bands. As expected, there is some scatter in the data. The bands are defined primarily by the scatter, which masks the underlying trends. However, since the bands are narrow, it is concluded that the actual trends are such that rates of vertical, hoop and dome tendon force loss are quite low. This reinforces the results of the statistical evaluation performed in (d) above. A similar statistical evaluation of the control tendon data would not be meaningful since there are so few data points.

Figures 4, 5 & 6, which follow, are plots of the vertical, hoop & dome, respectively, control tendon forces. These plots include trend lines and lines representing the predicted base force levels for the tendons. The trend lines are fitted to the log-linear data points by the method of least squares, which is discussed in 5.4. The predicted force lines pass through the Year 10 & Year 40 computed base values tabulated in Reference 11.

These plots confirm the conclusions (stated above) derived from examination of the data presented in Table 18. Vertical and hoop control tendon data are scattered, which obscures the true trends. These trends appear, however, to be relatively flat. The fitted trend lines slope up somewhat, but this is a consequence of scatter and should not be considered representative of true trend directions. Dome control tendon data exhibit relatively little scatter. Therefore, the line fitted to the dome control tendon data may be considered a reasonably good representation of the true trend.

The plotted data indicate that the forces in the control tendons are currently (since Surveillance Year 10) decreasing at rates that are below those predicted. This is consistent with the trends evident in Figures 1, 2 & 3. These show that the current rates of group average force decrease are well below those that would be predicted by extrapolation of the 1st, 3rd, 5th &10th Year Surveillance results.

Figure 4
Vertical Control Tendon (V32) Normalized Force Trend

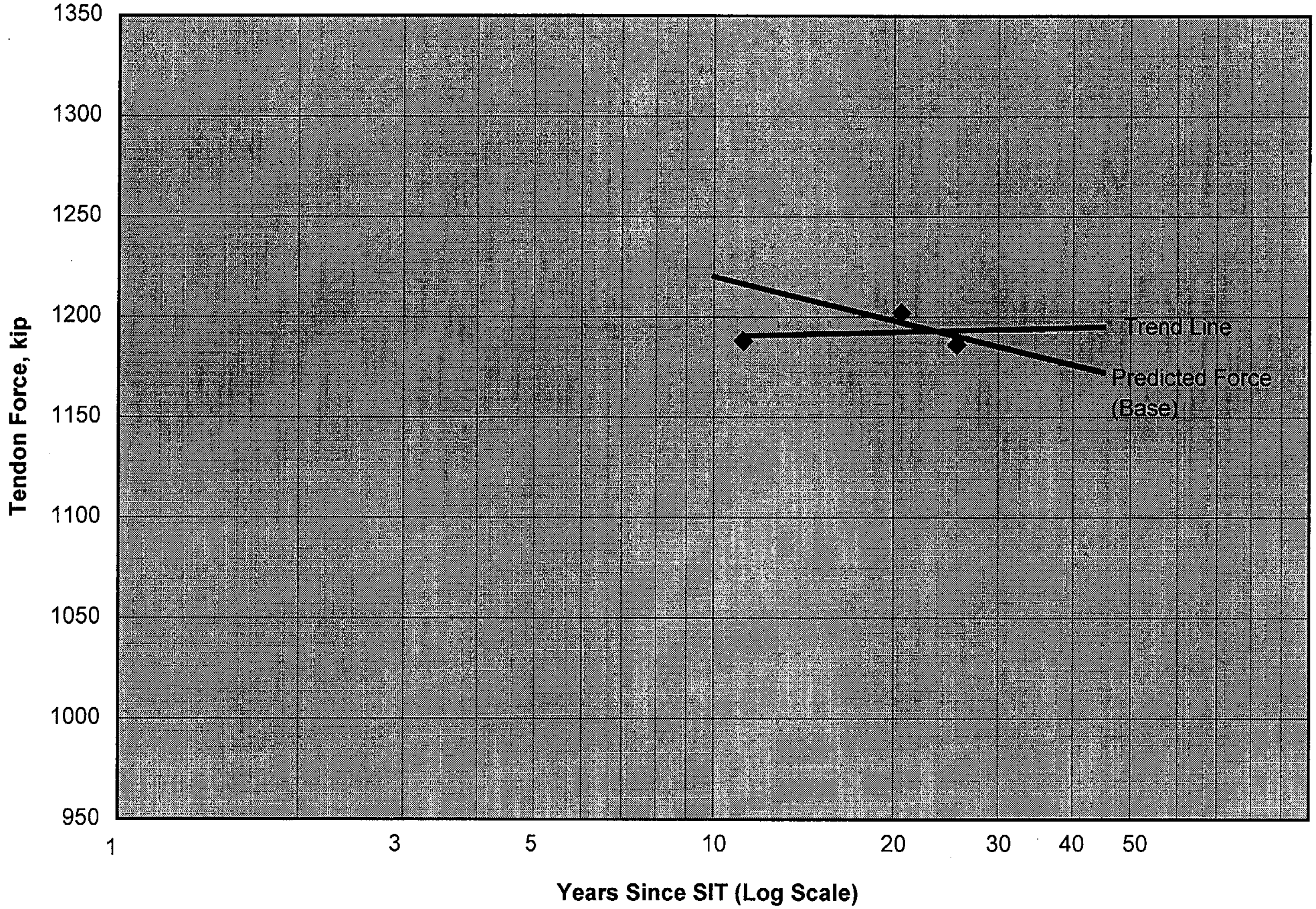


Figure 5
Hoop Control Tendon (H62-26) Normalized Force Trend

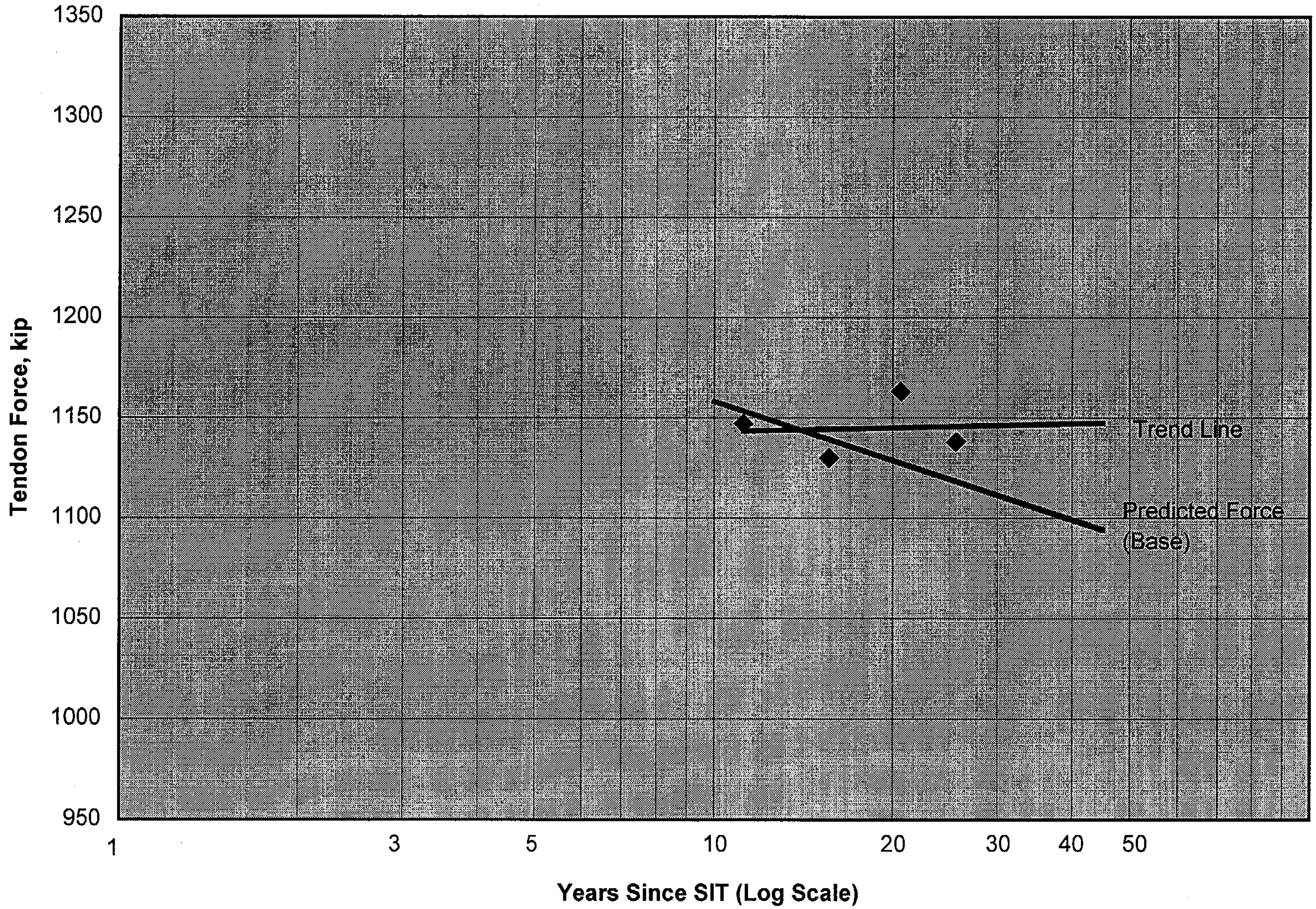
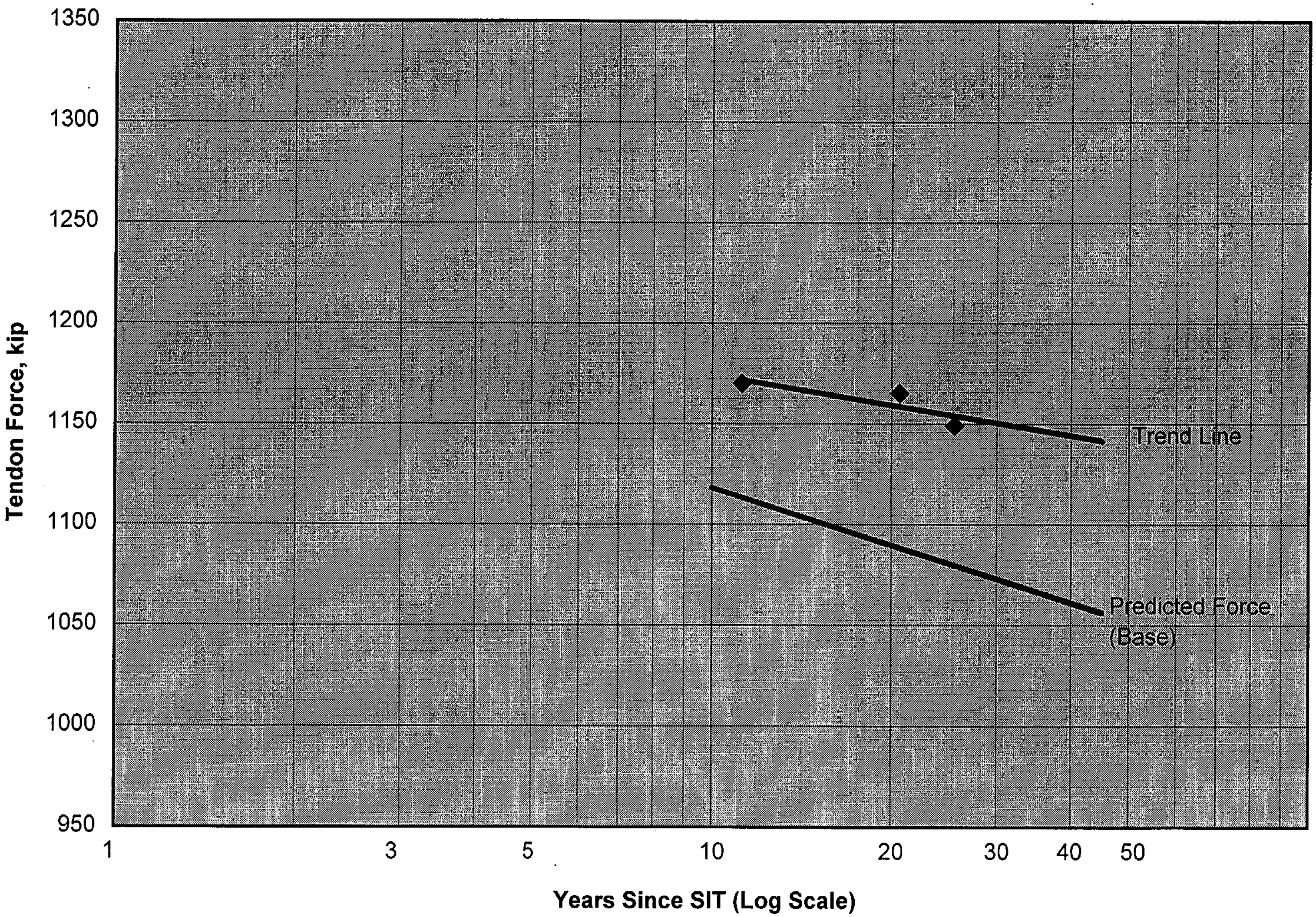


Figure 6
Dome Control Tendon (D225) Normalized Force Trend



6. Tendon Elongation

Both Regulatory Guide 1.35 (Revision 3) and 10CFR50.55a as amended effective 9 Sep 96 require tendon elongation measured during retensioning to be within 10% of that previously measured. Elongation is measured to ensure that there is no evidence of wire slippage or broken / protruding wires.

Elongations of the three tendons (V164, H13-50 and D102) detensioned during the 25th Year Surveillance were measured during retensioning. Attachment 3 documents the elongations measured during retensioning as well as those recorded during construction (the only prior measurements for these tendons). Measurements are summarized in Table 19 below.

Entries in this table are:

- PTF (Pre-Tension Force) is a small force (on the order of 1 kip per wire) applied to ensure that all slack is removed form the tendon and that wires are seated at the face of the stressing washer. The PTF shown is the average of the individual forces applied at the shop and field ends of hoop and dome tendons and is equal to the single force applied at the shop (upper) end of the vertical tendon, which is tensioned only at this end.

- OSF (Over Stress Force) is the maximum load applied to the tendon. It is typically close to 80% of tendon ultimate strength. The OSF shown is the average of the individual forces applied at the shop and field ends of the hoop and dome tendons and is equal to the single force applied at the shop (upper) end of the vertical tendon, which is tensioned only at this end.

- Elongations @ PTF & @ OSF are the sums of the measured distances from the bearing plates to the shop and field (hoop & dome tendons) end jack coupler faces or the single measured distance from the bearing plate to the shop end coupler face (vertical tendon). The separate @ PTF & @ OSF elongations are entered only for the 25th Year Surveillance. Attachment 3 summarizes construction record data and lists only the net elongation (elongation @ OSF less that @ PTF) determined during initial tendon stressing. It does not list the separate @ OSF & @ PTF values. Therefore, for the construction phase, the table lists only the net elongations; the spaces for the separate @ PTF & @ OSF values are marked N/A.

- Net force is the force @ OSF less the force @ PTF.

- Net elongation is the elongation @ OSF less the elongation @ PTF (25th Year Surveillance) or the value reported in Attachment 3 (construction).

For consistency of presentation, all forces are rounded to the nearest kip and all elongations are rounded to the nearest 0.1 inch.

Table 19
Tendon Elongation Summary

Tendon	Phase	Parameter	@ PTF	@ OSF	Net
V164	Construction	Force, kip	210	1479	1269
		Elongation, in	N/A	N/A	12.4
	25th Year Surveillance	Force, kip	168	1584	1416
		Elongation, in	4.9	18.6	13.7
H13-50	Construction	Force, kip	210	1564	1354
		Elongation, in	N/A	N/A	10.6
	25th Year Surveillance	Force, kip	168	1584	1416
		Elongation, in	6.5	17.1	10.6
D102	Construction	Force, kip	210	1472	1262
		Elongation, in	N/A	N/A	6.8
	25th Year Surveillance	Force, kip	168	1584	1416
		Elongation, in	5.4	13.1	7.7

The @ PTF forces applied during construction are uniformly greater (by 42 kips) than those applied during the 25th Year Surveillance. Also, the @ OSF forces applied to the vertical and dome tendons during construction are significantly less (just over 100 kips less) than those applied during the 25th Year Surveillance. As a result, the net forces listed for the construction phase are all less than those listed for the 25th Year Surveillance. To compare net elongations on the same basis, those listed for the construction phase are adjusted for both force differences and the effect of removing a sample wire prior to retensioning. Since elongation is a linear function of jacking force, the adjustment factor is the ratio of the net force applied during the 25th Year Surveillance to the net force applied during construction times the correction factor for the difference in the number of wires. The wire correction factor is 169/168 = 1.006. Table 20 below shows the adjusted construction net elongations and percentage differences between these and the 25th Year Surveillance net elongations.

Table 20
Comparison of Adjusted Elongations

Tendon	Measured Construction Net Elongation, in.	Adjustment Factor (Note 1)	Adjusted Construction Net Elongation, in. (Note 2)	25th Year Surveillance Net Elongation, in.	Percentage Difference (Note 3)
V164	12.4	1416/1269 x 1.006	13.9	13.7	-1%
H13-50	10.6	1416/1354 x 1.006	11.2	10.6	-5%
D102	6.8	1416/1262 x 1.006	7.7	7.7	0%

Notes:

1. Adjustment factor is the ratio of the 25th Year Surveillance net force to the construction net force times 1.006 (correction for removal of one wire during the surveillance).
2. Adjusted construction net elongation is measured construction net elongation times the adjustment factor.
3. Percentage difference is 100 x (SE - CE) / CE

   where: SE is 25th Year Surveillance Net Elongation
   CE is Adjusted Construction Net Elongation

All differences shown in Table 20 are between +10% and -10%. Therefore, per 10CFR50.55a, these are acceptable without further evaluation.

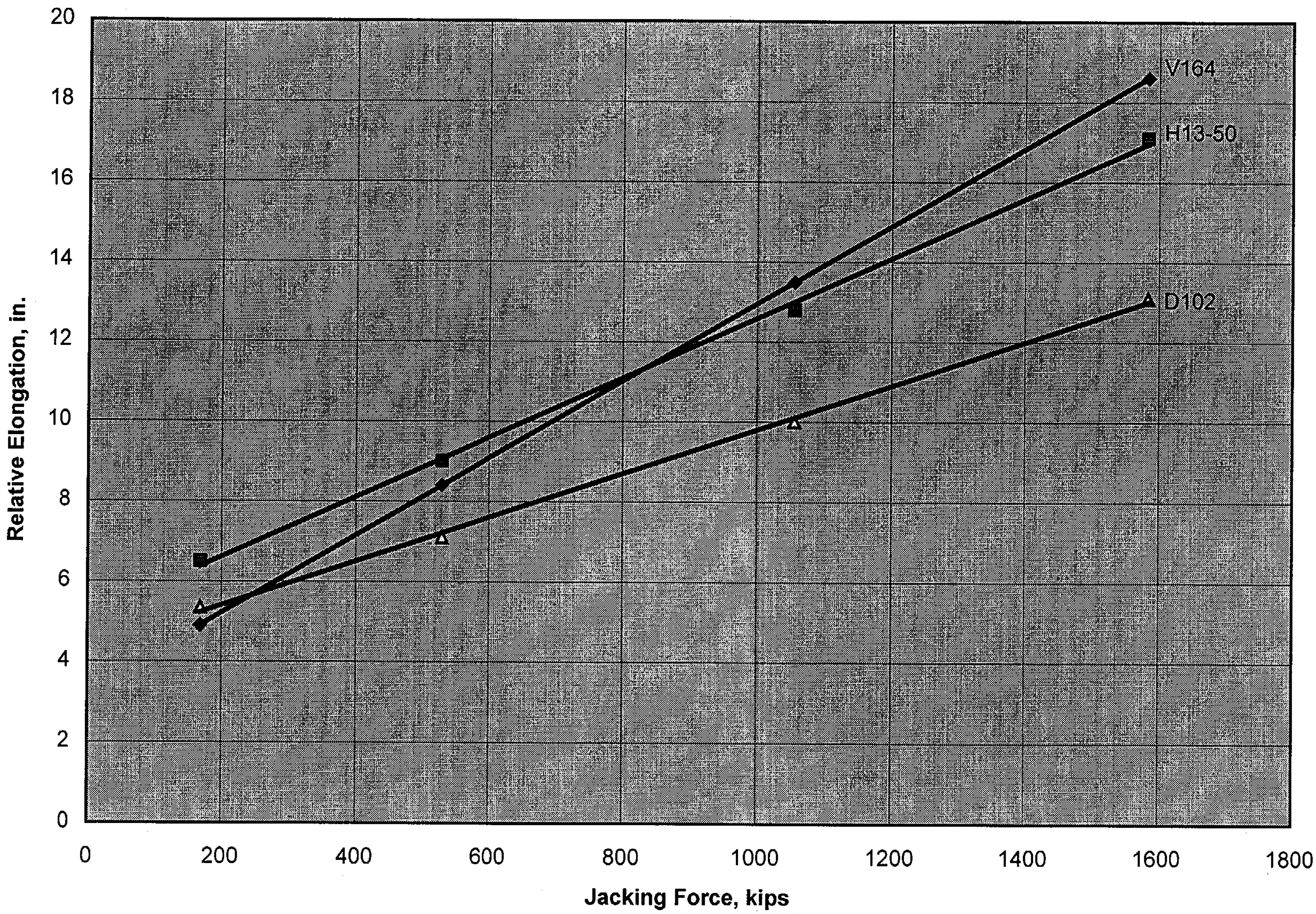
In accordance with the requirements of Reference 3, elongations were measured at two intermediate points between PTF and OSF. This was done to ensure that elongations are linear with force (which is one basis of the containment design calculations). These forces and relative elongations are recorded in Attachment 3 and listed in Table 21 below. Relative elongation is the sum of the distances from the bearing plates to shop and field end coupler faces (hoop & dome tendons) or the distance from the bearing plate to the shop end coupler face (vertical tendon).

Table 21
Incremental Force & Corresponding Relative Elongation Measured During Retensioning

Tendon	Elongation, in.			
	@PTF, 168 kips	@1/3 increment, 528 kips	@2/3 increment, 1055 kips	@OSF, 1583.5 kips
V164	4.90	8.40	13.50	18.60
H13-50	6.50	9.00	12.80	17.10
D102	5.35	7.10	10.00	13.10

Figure 7, which follows, plots the forces and relative elongations tabulated above. A line is fitted to the data for each tendon by the method of least squares (previously discussed). Data points are effectively on the fitted lines which verifies the expected linear relationship between elongation & force.

Figure 7 Tendon Elongation



7. References

The following documents (applicable sections as noted) were used in the preparation of this report and / or are specifically referenced herein.

1. 10CFR50.55a as amended effective 09 Sep 96.

2. ASME Boiler and Pressure Vessel Code (1992 Edition with Addenda through 1992), Section XI, Subsection IWL.

3. USNRC Regulatory Guide 1.35, Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containments, Revisions 1 & 3.

4. USNRC Regulatory Guide 1.35.1, Determining Prestressing Forces for Inspection of Prestressed Concrete Containments, Jul 90.

5. TMI-1 FSAR Section 5.7.5, Update 14.

6. TMI-1 Technical Specification Sections 3.19.1 & 4.4.2.1.

7. TMI-1 Surveillance Procedure 1301-9.1, Revisions 4, 6, 9 & 14.

8. TMI-1 EER JO # 162193, Rx Building Tendons, Minimum Required Prestressing Forces.

9. TMI-1 Calculation C-1101-153-E410-028, Rx Building Tendons, Minimum Required Prestressing Forces, Revision 0.

10. Deleted

11. Gilbert / Commonwealth Calculation DC-5390-225.01-SE, dated 26 Apr 94.

12. Gilbert / Commonwealth Letter (with attachments) G/C/TMI-1CS/16616, dated 27 Dec 88, Transmitting Tendon Stressing Record Data (ECD C-310055).

13. TMI-1, Reactor Containment Building / First Tendon Surveillance Test / One Year After SIT, GAI Report No. 1880, 29 Sep 75.

14. TMI-1, Second Tendon Surveillance Test of Reactor Containment Building / Three Years After SIT, VSL Corp. Report No. GQL 0204, Dec 77.

15. TMI-1, Containment Building Tendon Surveillance Test Report for Third Period (5 Years After SIT), TDR No. 229, 27 Mar 81.

16. TMI-1, Reactor Building Tendon Surveillance Test / Inspection Period 4 (10 Years), TR No. 025, 27 Aug 85.

17. TMI-1, Reactor Building Fifteen Year Tendon Surveillance Test (Inspection Period 5), Topical Report 069, 2 May 90.

18. TMI-1, Reactor Building Twenty Year Tendon Surveillance Test (Inspection Period 6), Topical Report 093, 22 Mar 95.

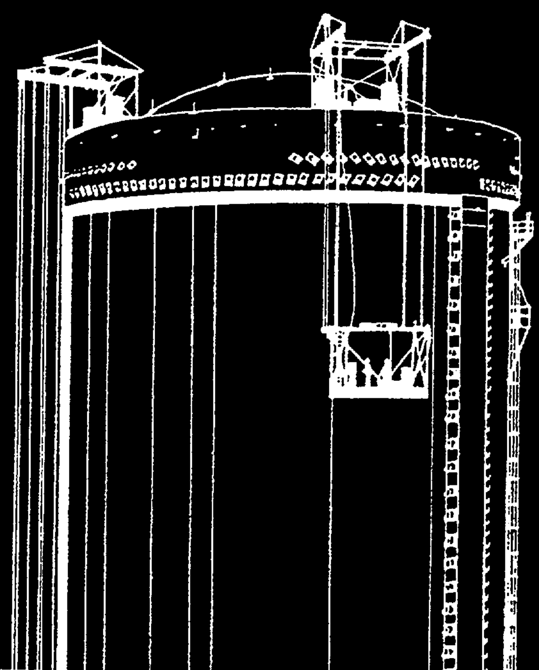
19. Deleted

20. Miller, Irwin & John E. Freund, Probability and Statistics for Engineers. Prentice-Hall, Englewood Cliffs, N. J., 1965.

21. 10CFR50, Appendix J.

22. ANSI / ANS-56.8-1987 (& 1994), Containment System Leakage Testing Requirements.

ATTACHMENT 2
TO
TOPICAL REPORT NO. 136
VOLUME I OF I



PSC
Precision Surveillance Corporation

Dome Crack Mapping Results
Deferred from 20th Year Tendon Surveillance Report (Period 6)

The following Precision Surveillance Corporation (PSC) report, entitled "20th Year Physical Surveillance of the Three Mile Island Unit 1 Containment Building, Post Tensioning Surveillance Report," Engineering File No. 463, presents the findings from the 20th year surveillance inspections of two (2) of the nine (9) dome tendons that were deferred due to the potential risk of personnel injury in performing the inspections during plant operation. The 20th Year Reactor Building Tendon Surveillance was performed while the plant was in its mid cycle operating run and crack mapping in the vicinity of dome tendons D-103 (NE end) and D-334 (NW end) were not inspected due to the proximity of these tendons to the main steam exhaust vents. The April 7, 1995 GPU Nuclear submittal of the 20th Year Tendon Surveillance test results committed to inspect these tendons during the TMI-1 Cycle 11 Refueling (11R) Outage in the fall of 1995 and if the results were essentially the same, the data would be filed in the document control system and the results would be included with the 25th Year Tendon Surveillance Report.

This attachment provides the results from the September 1995 (20th Year) inspections of dome tendons D-103NE and D-334NW where, as has been the trend in past surveillances, the dome tendon crack mapping revealed that the cracks were stable with no evidence of growth, nor active degradation mechanism present. (Refer to Attachment 3 for the recent 25th Year results for dome tendon crack mapping).

ENGINEERING FILE NUMBER: 463

PSC Precision Surveillance Corporation

Main Title	20TH YEAR PHYSICAL SURVEILLANCE OF THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING
Sub-Title	POST TENSIONING SURVEILLANCE REPORT

BY

WRITTEN BY: PAUL C. SMITH

REVIEWED BY: THOMAS J. DOBROWSKI

APPROVED BY: RONALD D. HOUGH, P.E.

ENGINEERING DEPARTMENT

ABSTRACT

This report presents the findings of the 20th year physical surveillance of the Unit 1 Containment Building at Three Mile Island. Based on the results of this surveillance, the conclusion is reached that the post-tensioning system has experienced no significant degradation and is functioning adequately.

REVISION CONTROL LOG

Rev.	Revision Date	By	Approved By	Pages Affected
△				
△ 0	2/22/95	PCS	RDH	Volume I, i thru vii, 1 thru 52, A1 - A280, B1 -B10
△				Volume II, C1 - C20, D1 - D3, E1 - E97, F1 - F285.
△	11-8-95	PCS	RDH	Addendum i-iv, 1-6, A1-A25, B1-B5.
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20TH YEAR PHYSICAL SURVEILLANCE OF THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

SUMMARY

The purpose of this addendum is to present the results of the two crack growth inspections that could not be performed during the 20th year in-service inspection of the Three Mile Island Unit 1 Containment Building post tensioning systems. The results of this investigation are discussed in detail in the body of this report and are summarized as follows:

1. Most of the cracks found had widths less than 0.005". All of the cracks reported that were greater than 0.005" in width were unchanged from the last surveillance. In no case was a significant increase in crack length or width noted.

2. No water was found during the grease leak repairs that were carried out on twenty two tendon ends.

Based on the data gathered during this addendum to the In-Service Inspection of the twentieth year Physical Surveillance of Unit 1 and reported herein, the conclusion is reached that no abnormal degradation of the Containment Building Post tensioning System has occurred for the Three Mile Island Unit 1 Containment.

20TH YEAR PHYSICAL SURVEILLANCE OF
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

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INTRODUCTION

This report section is intended as an addendum to the twentieth year physical surveillance for the Three Mile Island Unit 1 Containment Building Post Tensioning System. The Containment Building surveillance program is a systematic means of assessing the quality and structural performance of the post tensioning system. The twentieth year tendon surveillance was the sixth in the series.

The surveillance was conducted in accordance with GPU Nuclear TMI Surveillance Procedure 1301-9.1, Rev. 12 and Regulatory Guide 1.35, proposed Revision 3, and the latest state-of-the-art engineering, construction and Quality Assurance techniques. A copy of this procedure is included in Section 9, Appendix F of the opriginal report (uncontrolled copy).

Seven dome tendon ends were monitored for concrete crack growth as an ongoing surveillance procedure. This section details the inspection of the two additional tendon ends adjacent to the steam vents which could not be monitored during plant operation.

In addition, 22 tendon end cap clamp and stud arrangements were changed to prevent further grease leakage with 22 main can gaskets being replaced.

20TH YEAR PHYSICAL SURVEILLANCE OF THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

[redacted]

I. CONCRETE CRACK GROWTH

At the time of the twentieth year surveillance seven dome tendons were inspected for concrete crack growth. Due to their proximity to the steam vents tendon ends D-103NE and D-334NW were inspected during the shut down in Sept. 1995. The results of this inspection were recorded on Data Sheets 8 and 9 (Appendix A) and are presented in Table I.

Most of the cracks found had widths less than 0.005". All of the cracks reported that were greater than 0.005" in width were unchanged from the last surveillance. In no case was a significant increase in crack length or width noted.

Precision Surveillance Corporation

20TH YEAR PHYSICAL SURVEILLANCE OF
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

TABLE I: **SUMMARY OF DATA SHEETS GPU 8 AND 9**
CONCRETE CRACK GROWTH FOR DOME TENDONS ADJACENT TO STEAM VENTS
(CRACKS >0.005" ONLY)

TENDON	END	COMMENT	20th YEAR		15th YEAR		10th YEAR	
			LENGTH	MAX. WIDTH (IN)	LENGTH	MAX.	LENGTH	MAX.
D-103	NE	NO CHANGE	7	0.010	7	0.010	7	0.003
D-334	NW	NO CHANGE	——	<0.005	——	<0.005	——	<0.005

II. TENDON GASKET REPAIRS.

During the crack inspection, repairs were conducted to a total of 22 tendon ends where grease leakage was clearly evident. The repairs were conducted in accordance with GPU Procedure 1410-Y-83 Rev. 1 and were all group A repairs with the removal of the end cap to replace the main gasket. No inspection of the anchorage was required.

A Category A repair involved the following:

- Removal of existing hold-down studs
- Removal of the end cap to replace the main gasket
- Threading and plugging of end holes
- Installation of new hold-down clamps
- Regreasing

No water was found during can or stud removal to any type A gasket repair.
After the type A repair gaskets were replaced and the can reinstalled, the necessary amount of sheathing filler (grease) was added. In all cases the amount replace was within the acceptance criteria of Procedure 1301-9.1 Rev. 12 Section 9.4 and therefore acceptable. A summary of the grease replacement amounts can be seen in Table II.

20TH YEAR PHYSICAL SURVEILLANCE OF THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

TABLE II: SUMMARY OF DATA SHEETS GPU 1
GREASE LOSS Vs. GREASE REPLACEMENT TO TYPE 'A' REPAIR TENDONS

TENDON	END	GREASE REMOVED (GAL.)	TOTAL GREASE REMOVED	GREASE REPLACED (GAL.)	TOTAL GREASE REPLACED	TOTAL DIFF. (GAL.)	REPLACE CONFIG.	DIFF. LESS THAN OR EQUAL TO 4 GALLONS
D-101	NE	11	11	12	12	1	PREF.	YES
D-113	NE	12	12	12.5	12.5	0.5	PREF.	YES
D-115	NE	11	11	12	12	1	PREF.	YES
D-116	NE	11	11	12	12	1	PREF.	YES
D-118	NE	10	10	11	11	1	PREF.	YES
D-122	NE	10.5	10.5	11	11	0.5	PREF.	YES
D-123	NE	11	11	12	12	1	PREF.	YES
D-201	NW	11.5	11.5	12	12	0.5	PREF.	YES
D-203	NW	12	12	12.5	12.5	0.5	PREF.	YES
D-301	NE	12	12	14	14	2	PREF.	YES
D-305	NE	14	14	12	12	-2	PREF.	YES

Pref. Config. Can removed, main gasket replaced, hold down clamps installed

20TH YEAR PHYSICAL SURVEILLANCE OF
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

TABLE II: SUMMARY OF DATA SHEETS GPU 1
GREASE LOSS Vs. GREASE REPLACEMENT TO TYPE 'A' REPAIR TENDONS

TENDON	END	GREASE REMOVED (GAL.)	TOTAL GREASE REMOVED	GREASE REPLACED (GAL.)	TOTAL GREASE REPLACED	TOTAL DIFF. (GAL.)	REPLACE CONFIG.	DIFF. LESS THAN OR EQUAL TO 4 GALLONS
D-313	NE	15	15	12.5	12.5	-2.5	PREF.	YES
D-314	NE	14	14	12	12	-2	PREF.	YES
D-315	NE	15	15	12	12	-3	PREF.	YES
D-319	NE	14	14	12	12	-2	PREF.	YES
D-320	NE	11.5	11.5	12	12	0.5	PREF.	YES
D-324	NW	11	11	12	12	1	PREF.	YES
D-325	SW	11	11	12	12	1	PREF.	YES
D-329	SW	11	11	12	12	1	PREF.	YES
D-330	NW	15	15	12	12	-3	PREF.	YES
D-332	NW	11.5	11.5	12.25	12.25	0.75	PREF.	YES
D-334	NW	11	11	12	12	1	PREF.	YES

Pref. Config. Can removed, main gasket replaced, hold down clamps installed

CONCLUSION

Based on the results of the additional crack inspections to the twentieth year physical surveillance reported herein, the conclusion is reached that no abnormal degradation of the Containment Building Structure is indicated for Three Mile Island Unit 1.

ENCLOSURE 6 (Cont'd)

Date Sheet 8
Crack Growth Inspection
Dome Tendons

Inspection Period 6

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location	Cracks with width >0.01" Width (IN.)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QC Insp.
1. D103'	N.E	NO CHANGE	N/A	Ø	9/22/95	[illegible]	[illegible] 11/8/95
2. D3-34	N.W.	NO CHANGE	N/A	Ø	9/23/95	[illegible]	[illegible] 11/8/95
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							

NOTE: Location

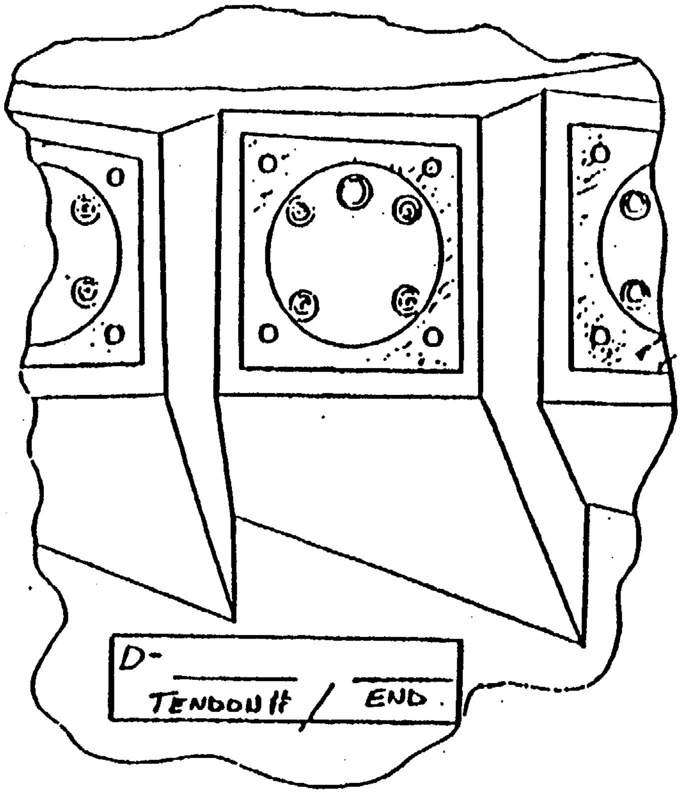
Identify Tendon End (Shop or Field) and
NW, NE, SW, Se

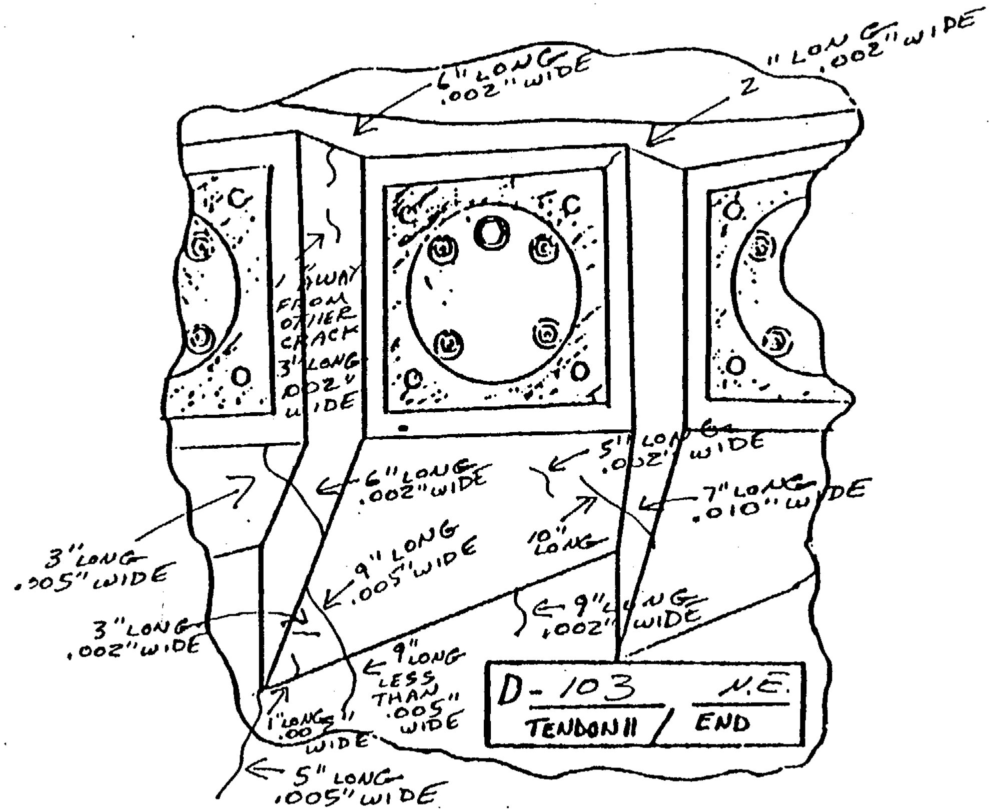
Cognizant QA/QC Manager
Reviewed By: [signature] Date: 11-10-95

A1/A25

1280c

ENCLOSURE 6 (Cont'd)
DATA SHEET 9
Crack Growth Inspections





Choose the sketch which is most appropriate and plot the observed cracks.

INSPECTED BY CONTRACTOR FOREMAN [signature] DATE 9/22/95

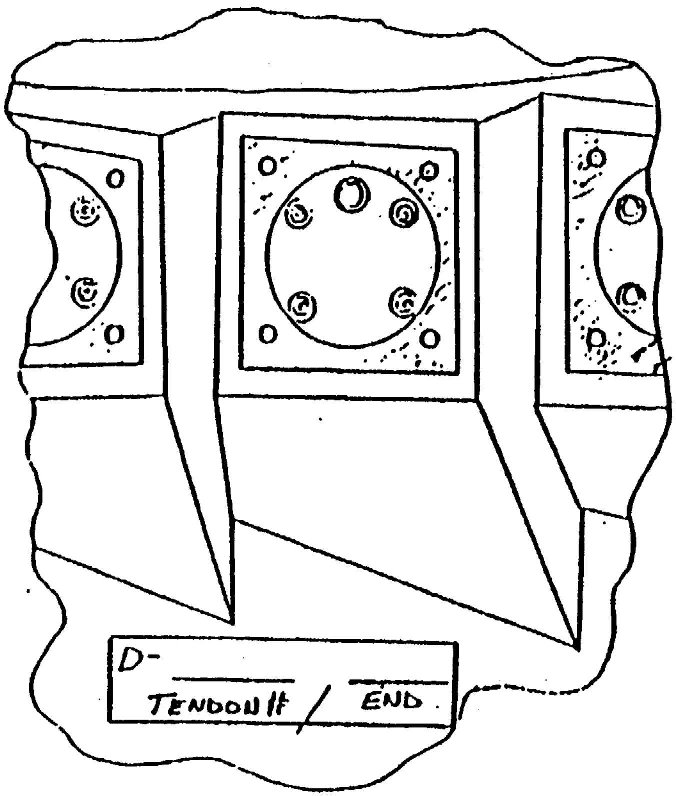
VERIFIED BY COGNIZANT QC INSPECTOR [signature] DATE 9/22/95

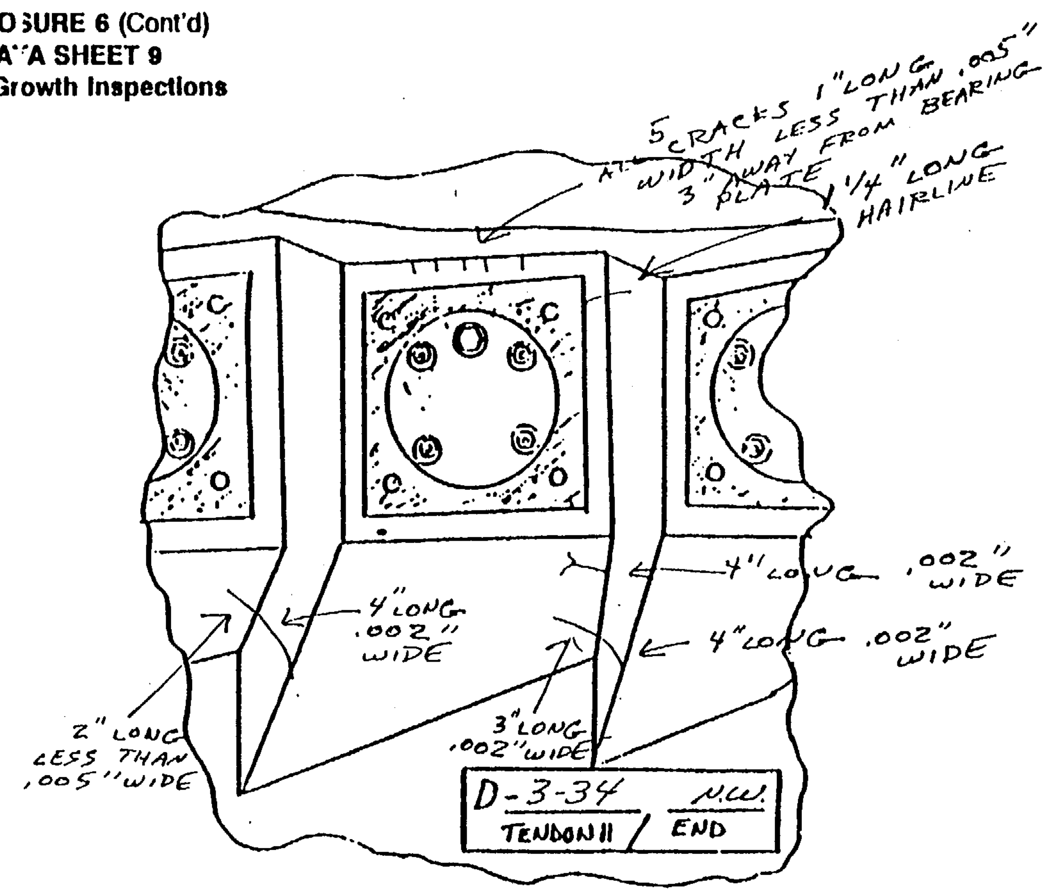
REVIEWED BY COGNIZANT QA/QC MANAGER [signature] DATE 11-10-95

1280c

A2/A25

ENCLOSURE 6 (Cont'd)
DATA SHEET 9
Crack Growth Inspections





Choose the sketch which is most appropriate and plot the observed cracks.

INSPECTED BY CONTRACTOR FOREMAN [signature] DATE 9/23/95

VERIFIED BY COGNIZANT QC INSPECTOR [signature] DATE 9/23/95

REVIEWED BY COGNIZANT QA/QC MANAGER [signature] DATE 11-10-95

A4/A25

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title: RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D101 Tendon End: N.E.

Date End Cap Removed: 9/21/95

8.3.2 Amount of grease removed: 11 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 208 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [illegible]

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat [illegible] Unsat ______

Comments:

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/21/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83 AS/A25

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D113 Tendon End: N.E

Date End Cap Removed: 9/23/95

8.3.2 Amount of grease removed: 12 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 206 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) ER

8.4.9 Amount of grease replaced: 12 1/2 gallons

10.0 P.M.T.: Sat ER Unsat ______

Comments:

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/23/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D115 Tendon End: N.E.

Date End Cap Removed: 9/23/95

8.3.2 Amount of grease removed: 11 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 206 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [initials]

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat [initials] Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/23/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D116 Tendon End: N.E.

Date End Cap Removed: 9/23/95

8.3.2 Amount of grease removed: 11 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 206 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) EM

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat EM Unsat

Comments:

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/23/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

A8/A25

GPU Nuclear

TMI-1
Corrective Maintenance Procedure

Number
1410-Y-83

Title
RB Tendon End Cap Installation

Revision No.
0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D118 Tendon End: N.E.

Date End Cap Removed: 9/26/95

8.3.2 Amount of grease removed: 10 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 206 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) EB

8.4.9 Amount of grease replaced: 11 gallons

10.0 P.M.T.: Sat EB Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/26/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

A9/A25

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D122 Tendon End: N.E.

Date End Cap Removed: 9/26/95

8.3.2 Amount of grease removed: 10 1/2 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 206 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) OM

8.4.9 Amount of grease replaced: 11 gallons

10.0 P.M.T.: Sat OM Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/26/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D123 Tendon End: N.E.

Date End Cap Removed: 9/26/95

8.3.2 Amount of grease removed: 11 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 206 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) EB

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat EB Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/26/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

A1/A25

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D201 NW Tendon End: N.W.

Date End Cap Removed: 9/18/95

8.3.2 Amount of grease removed: 11 1/2 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 210 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [initials]

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat [initials] Unsat ________

Comments: ________

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/20/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

A-2/A-25

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D203 Tendon End: N.W.

Date End Cap Removed: 9/19/95

8.3.2 Amount of grease removed: 12 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 206 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) CB

8.4.9 Amount of grease replaced: 12 1/2 gallons

10.0 P.M.T.: Sat CB ~~Unsat~~

Comments:

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: CMzrooks Date: ~~9/19/95~~ 20 CB 9/20/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

A13/A25

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D301 Tendon End: N.E.

Date End Cap Removed: 9/26/95

8.3.2 Amount of grease removed: 12 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 206 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) EB

8.4.9 Amount of grease replaced: 14 gallons

10.0 P.M.T.: Sat EB Unsat ________

Comments: ________

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/26/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D305 Tendon End: N.E.

Date End Cap Removed: 9/23/95

8.3.2 Amount of grease removed: 14 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 206 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) CB

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat CM Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/23/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D313 Tendon End: N.E

Date End Cap Removed: 9/22/95

8.3.2 Amount of grease removed: 15 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 208 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [illegible]

8.4.9 Amount of grease replaced: 12 1/2 gallons

10.0 P.M.T.: Sat [illegible] Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/22/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

A16/A25

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D314 Tendon End: N.E.

Date End Cap Removed: 9/22/95

8.3.2 Amount of grease removed: 14 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 208 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [initials]

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat [initials] Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/22/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

A17/A25

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D315 Tendon End: N.E.

Date End Cap Removed: 9/21/95

8.3.2 Amount of grease removed: 15 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION.

8.4.8 Replacement grease temperature: 208 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [illegible]

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat [illegible] Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/21/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D319 Tendon End: ~~N.W.~~ N.E eb 9/21/95

Date End Cap Removed: 9/21/95

8.3.2 Amount of grease removed: 14 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 208 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [illegible]

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat [illegible] Unsat ________

Comments: ________

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [illegible signature] Date: 9/21/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number A19/A25 1410-Y-83
Title: RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D320 Tendon End: ~~N.W.~~ N.E eB 9/20/95

Date End Cap Removed: 9/20/95

8.3.2 Amount of grease removed: 11 1/2 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION.

8.4.8 Replacement grease temperature: ~~72~~ 208 °F eB 9/21/95

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) eB

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat eB Unsat _____

Comments: _____

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/21/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

A20/425

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D324 Tendon End: N.W

Date End Cap Removed: 9/20/95

8.3.2 Amount of grease removed: 11 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) EM

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat EM Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/22/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D325 Tendon End: S.W.

Date End Cap Removed: 9/27/95

8.3.2 Amount of grease removed: 11 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) OB

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat OB Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/27/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83 A22/A25

Title

RB Tendon End Cap Installation

Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D329 Tendon End: S.W.

Date End Cap Removed: 9/27/95

8.3.2 Amount of grease removed: 11 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) OK

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat OK Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/27/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

A23 A25

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D330 Tendon End: N.W.

Date End Cap Removed: 9/20/95

8.3.2 Amount of grease removed: 15 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) CM

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat CM Unsat ______

Comments: ______

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/22/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

Any
AIT

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D332 Tendon End: N.W.

Date End Cap Removed: 9/19/95

8.3.2 Amount of grease removed: 11 1/2 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 206 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) EB

8.4.9 Amount of grease replaced: 12 1/4 gallons

10.0 P.M.T.: Sat EB Unsat ________

Comments: ____________________

Calibrated Test Equip.: PK 64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/19/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

dv/Ars

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D334 Tendon End: N.W.

Date End Cap Removed: 9/19/95

8.3.2 Amount of grease removed: 11 gallons

8.4.8 Replacement grease type: PREFERRED CONFIGURATION

8.4.8 Replacement grease temperature: 210 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) ek

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat ek Unsat ________

Comments: ________

Calibrated Test Equip.: PK64 Cal. Due Date: 8/7/96

Supervisor Signoff: [signature] Date: 9/29/95

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

B1/B5

SHIPPING RELEASE AND PACKING LIST FORM SRP-1

QUALITY CONTROL DOCUMENTATION

PSC Formerly Inryco Surveillance

Customer: GPU NUCLEAR CORP.	Shipment No. N/A
Project: TMI	Contract: N514
Prepared by: C. BROOKS	Fabricator: N/A
Inspected by: [signature]	Date: 9/8/95 Page 1 of 1

Documentation to satisfy the Quality Assurance requirements have been reviewed and found acceptable.

SIGNED [signature] DATE 9-8-95
PSC QUALITY ASSURANCE REPRESENTATIVE

QUANTITY	PART NO.	DESCRIPTION
1	N/A	POCKET THERMOMETER PK64
1	N/A	FEELER GAUGE F24
1	N/A	OPTICAL COMPARATOR OCA

3 Total Pieces

N/A Total Weight

32/35

QUALITY ASSURANCE DOCUMENTATION	Precision Surveillance Corporation
CERTIFICATE OF COMPLIANCE	

Project TMI / GPU NUCLEAR CORP. Contract N514 Date 9/8/95

Material Identification SEE ATTACHED SHIPPING RELEASE DATED 9/8/95

Purchase Order No. GPU CONTRACT # 0477013

Specification and Revision No. GPU-1301-9.1 REV. 12

Drawing and Revision No. N/A

Procurement Requirements MET BY CALIBRATION RECORDS

(met by material) N/A

Deviations NONE

Resolution N/A

Disposition N/A

Non-Conformance NONE

Q.A. Release for NCR N/A

Deviations and Non-Conformances shall be attached to this form.
N/A to be written in for Not Applicable; all blanks shall be filled in.

This is to certify that the above material has been fabricated and inspected in compliance with the specified drawings, procedures, specifications, codes, purchase order requirements, PSC Quality Assurance Manual Revision 2 Dated 6-28-91 and the attendant quality programs.

Vendor PRECISION SURVEILLANCE CORP. Authorized Agent H. F. Hendrickson

Date 9-8-95 Title MGR. Q.A.

PSC QUALITY CONTROL ACCEPTANCE

Name & Title [signature] MGR, Q.C. Date 9/8/95

OWNER OR AUTHORIZED AGENT INSPECTION WAIVER

Shipment Final Inspection Waived By N/A Date N/A

Agency N/A Title N/A

Supplier's Authorized Representative N/A

EFFECTIVE DATE 1-1-81	PREV.REV. △	REVISION △	PAGE 1 of 1

QUALITY CONTROL "EXHIBIT C"

CALIBRATION FORM

PSC Formerly
Inryco Surveillance

B3/B5

Project ~~GINNA~~ TMI EB 9/8/95 Contract ~~N580~~ N514 EB 9/8/95 Date 8-7-95

CALIBRATION DATA Recall Date 2-7-~~98~~6 EB 10/2/95

Gauge or Device Name FEELER GAUGE Number F24

Manufacturer STARRETT Type or Model 172-A Range 0.0015-0.015

Master Calibration Device 0-1" MASTER MICROMETER Number MIC-100

Master Device Calibration Date: DUE: 12/9/95

Test Range	Reading	Error
EACH LEAF 0.0015, 0.002, 0.003, 0.004, 0.006,		
0.008, 0.010, 0.012, 0.015 CHECKED, ALL		
LEAFS WITHIN ± 0.0005		

Method of Calibration (Procedure number or describe other)

PER Q12.8.E-W

Comments:

Calibrated By: H.F. Hendrickson Title: MGR., Q.A. Q.C. INSPECTOR, LEVEL III Date: 8-7-95

EFFECTIVE DATE | PREV.REV. △ | REVISION △ | PAGE

QUALITY CONTROL

CALIBRATION FORM "EXHIBIT C"

PSC Formerly Inryco Surveillance

B4/B5

Project ~~GINNA~~ TMI (EB 9/8/95) Contract ~~N550~~ N514 (EB 9/8/95) Date 8-7-95

CALIBRATION DATA Recall Date 8-7-96

Gauge or Device Name OPTICAL COMPARATOR Number OCA

Manufacturer BAUSH + LOMB Type or Model 7X Range 0-.750

Master Calibration Device PREC. GLASS RETICLE CALB. SCALE Number GRCS-1

Master Device Calibration Date: DUE: 6/8/05

Test Range	Reading	Error
0.200	0.200	0
0.300	0.300	0
0.400	0.400	0
0.500	0.500	0
0.600	0.600	0
0.200 THRU 0.600	SAME	0
@ 0.005 GRADS		

Method of Calibration (Procedure number or describe other)

PER Q12.8.P

Comments: USE ONLY BETWEEN 0.200 AND 0.600

Calibrated By: H.F. Hendrickson Title: MGR., Q.A. Q.C. INSPECTOR, LEVEL III Date: 8-7-95

EFFECTIVE DATE	PREV.REV. △	REVISION △	PAGE 1 of 1

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RMOMETER
CALIBRATION
RECORD

"EXHIBIT A"

PSC Formerly
Inryco Surveillance

Customer Name: ~~RG&E~~ GPU eB 9/8/95 | Project Name: ~~GINNA~~ TMI eB 9/8/95 | Contract Number: ~~N570~~ N514

Thermometer I.D. #: PK64 | Date of calibration: 8-7-95 eB 9/7/95

Manufacturer: TAYLOR | Recalibration due date: 8-7-96

Type or model: POCKET | Master thermometer I.D.: 63F, 64F, 65F

Range: 0-220°F | Master calibration due date: 4/23/96

Location: GINNA JOBSITE

CALIBRATION DATA

Master Actual Temperature	Test Reading Temperature
36	38
90	90
160	160

Calibration Method:

Master and test thermometer to be immersed in agitated liquid for at least 3 minutes, and at least 2 inches of sensing or sending unit to be submerged in liquid. Comparison will be made at 3 temperature variances of no less than 50 degrees F.

Accuracy must be within one graduation of the smallest reading on the scale. If not, adjust to same reading as master. If there is no adjustment, thermometer will be returned to Quality Assurance for repair or destruction.

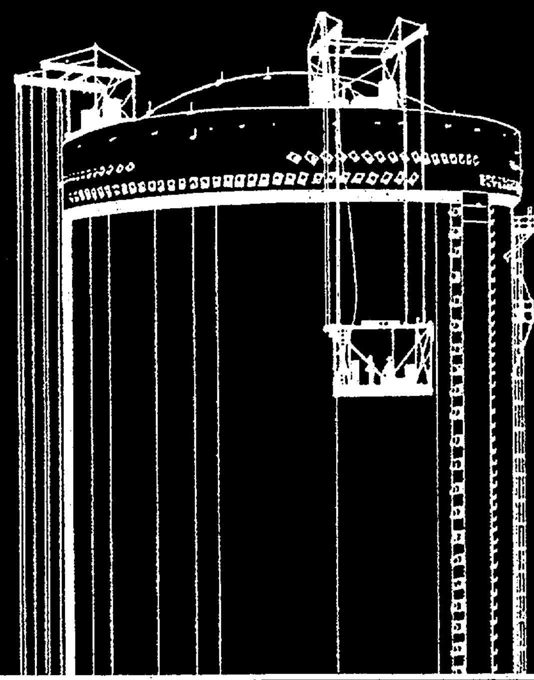
NOTE: Accuracy will be within 1% of the total guage face value or one unit of the smallest scale graduation whichever is smaller.

Condition:

Remarks: PER Q 12.3.D-W

Calibrated By: F. E. Hubulikin Date: 8-7-95 Page 1 of 1 Pages

ATTACHMENT 3
TO
TOPICAL REPORT NO. 136
VOLUME I OF III



PSC
Precision Surveillance Corporation

ENGINEERING FILE NUMBER: 464

PSC

Precision
Surveillance
Corporation

Main Title	TWENTY-FIFTH YEAR PHYSICAL SURVEILLANCE OF THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING
Sub-Title	POST TENSIONING SURVEILLANCE REPORT

BY

PREPARED BY: PAUL C. SMITH

APPROVED BY: RONALD D. HOUGH, P.E.

ENGINEERING DEPARTMENT

ABSTRACT

This report presents the findings of the 25th year physical surveillance of the Unit 1 Containment Building at the Three Mile Island Nuclear Plant. Based on the results of this surveillance, the conclusion is reached that the post tensioning system has experienced no significant degradation and is functioning adequately.

REVISION CONTROL LOG

Rev.	Revision Date	By	Approved By	Pages Affected
△				
△ 0	2/11/00	PCS	RDH	VOLUME I, i through vi, 1 through 68
△		PCS	RDH	VOLUME II, A1 through A424
△		PCS	RDH	VOLUME III, B1-B11, D1-D4, E1-D20, F1-F273, G1-G16
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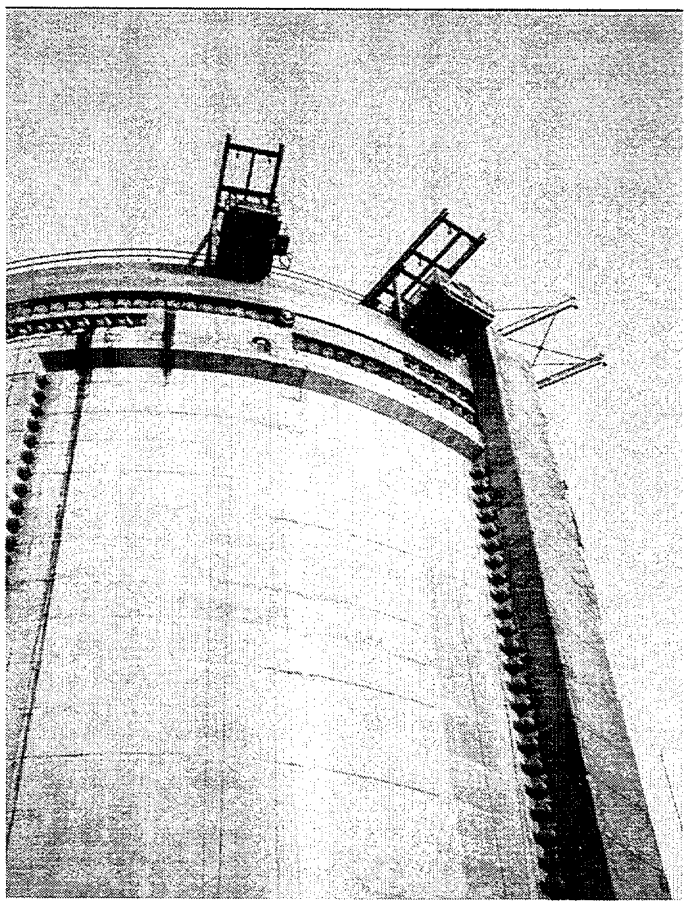
GPU NUCLEAR

25th YEAR PHYSICAL SURVEILLANCE OF UNIT 1 CONTAINMENT BUILDING POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND NUCLEAR PLANT

1999



PRECISION SURVEILLANCE CORP.
3468 WATLING STREET
EAST CHICAGO, IN 46312
(219) 397-5826

PSC
Precision Surveillance Corporation

25TH YEAR SURVEILLANCE OF THE POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

SUMMARY

The purpose of this report is to present the results of the 1999 Physical In-Service Tendon Inspection of the Three Mile Island Unit 1 Containment Building post tensioning system. The results of this investigation are discussed in detail in the body of this report and are summarized as follows:

1. The sheathing filler (grease) samples were tested and found to have acceptable levels of water soluble ions, (Chlorides, Nitrates, and Sulfides) and water content except for V164 field end which exhibited a nitrate level of 10.3ppm. A retest on the second sample from this end tested at <0.50ppm and was considered acceptable. Ten (10) of the samples tested revealed neutralization numbers of <0.50mg KOH/g and additional acid tests were conducted to verify the low numbers. These acid tests produced results <0.18 indicating a near neutral condition, as found in the original 2090-P grease, and therefore indicated no discernable change or deterioration in the grease. All other neutralization numbers were above the IWL requirement of 0mg KOH/g and deemed acceptable. No visible breakdown of the grease was noted to any sample, either by color, or consistency.

2. Only one surveillance, inspection or gasket repair tendon (V86, 2.5 gal.) exhibited water either during removal of the grease can, or around the tendon anchorage. The grease in this tendon was drained and refilled with inspections of the anchorage components and one removed wire showing no signs of deterioration.

3. Acceptable corrosion levels were found to all tendon ends and no cracks were found on any anchorage components. Cracks surrounding the bearing plates were within allowable tolerance of ≤ 0.010" except H46-37 Buttress 6 which had one crack 2.5" long 0.013" wide. The crack was monitored before, during and after liftoff, and was found to be unchanged.

4. No additional broken, missing or protruding wires not previously reported were found on any of the inspected tendons.

5. The hydraulic jacks used for liftoffs, detensioning and retensioning tendons, as well as the ram used for wire testing, were found to be in a properly calibrated status throughout the surveillance.

SUMMARY

6. The tendon liftoffs were found to be above the expected limit in all cases except H51-43 (-0.43%) and V-164 (-3.75%). As the values were above 95% adjacent testing was not required and removal of one wire for inspection from V-164 did not show any corrosion or deterioration. This tendon was retensioned to expected –0%,+5% per procedure.

7. Normalized liftoffs for each group were acceptable and in excess of the minimum force levels.

8. All wire samples were found to be acceptable for diameter and corrosion level. Both the ultimate strength and yield strength exceeded acceptance criteria and all elongations exceeded 4%.

9. All detensioned tendons were retensioned with acceptable elongations. (± 10%). All retensioned tendons were restored to acceptable force levels.

10. All surveillance, inspection and gasket repair tendons were resealed and regreased accepting more grease than was removed except H62-10 (-0.25 gal.) and V-86 (-3.0 gal.). No surveillance tendon accepted greater than 10% net duct volume.

11. Of the total 166 vertical tendons topped off only eight took more than 10% tendon duct volume (greater than 12.0 gallons).

12. All hoop and dome tendons filled took less than 10% of the net tendon duct volume.

13. Crack growth inspections of nine dome tendon ends showed no change from the period 6 inspection.

14. No deleterious condition was noted on any gasket repair or grease can modification tendon.

Based on the data gathered during the 1999 Physical In-Service Inspection and reported herein, the conclusion is reached that no abnormal degradation of the Post Tensioning System has occurred at the Three Mile Island Unit 1 Containment Building.

25TH YEAR SURVEILLANCE OF THE POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

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LIST OF TABLES

INTRODUCTION

This report details the 25th Year Physical Tendon Surveillanc of the Unit 1 Containment Structure Post Tensioning System at the Three Mile Island Nuclear Plant. The Containment Building surveillance program is a systematic means of assessing the quality and structural performance of the post tensioning system. The twenty-fifth year tendon surveillance is the seventh in a series.

The tendon surveillance program consists of a periodic inspection of the physical condition of a selected group of tendons. This program provides confidence in the condition and functional capability of the system, and an opportunity for timely corrective measures if adverse conditions are detected. Physical tendon surveillance consists of sheathing filler inspection, anchorage inspection, tendon liftoff, inspection and tensile test of removed wire samples (for detensioned tendons) and tendon retensioning with the tendons being resealed after completion of all inspections.

The twenty-fifth year tendon surveillance began on 8/27/1999 and was completed in October 1999. The surveillance was conducted in accordance with GPU RB Structural Integrity Tendon Surveillance Procedure 1301-9.1 Rev. 14. A copy of this manual is included in Section 9, Appendix F of this Surveillance Report.

A group of four vertical, five horizontal and three dome tendons were selected for inspection by GPU with one of each group selected for detensioning. In addition, nine dome ends were monitored for concrete crack growth as an ongoing surveillance procedure.

Grease leak mitigation was performed in the lower tendon access gallery to seven vertical tendons where grease sampling and testing was performed. End cap repairs were identified as being required on fifteen tendon ends due to grease leaks from the studs and gaskets with main gasket repairs identified to a further eight.

I. SURVEILLANCE PROCEDURES

Volume 2, Section 9, Appendix F of this 25th Year Physical Surveillance Report contains the detailed procedures for conducting the tendon surveillance. The surveillance consists of the following steps:

1. Visual examination of casing filler grease.
2. Analytical testing of casing filler grease samples.
3. Inspection of the anchor assembly of each of the surveillance tendon ends for deleterious conditions such as corrosion, cracks, broken or missing buttonheads.
4. Inspection of concrete surrounding the bearing plate.
5. Measurement of the liftoff force for each of the surveillance tendons.
6. Removal of one wire from the surveillance tendons which are detensioned for examination and testing.
7. Retensioning of the detensioned tendons and measuring the corresponding tendon elongation.
8. Visual inspection for corrosion, pitting, or any significant physical change of wires removed from the tendons.
9. Testing of wires removed from tendons for diameter, yield strength, ultimate strength, and percentage elongation at failure.
10. Resealing tendon cans and replacement of lost sheathing filler into the tendon duct and grease can.
11. Evaluation of test and inspection results to assess the general condition of the post tensioning system.

II. SHEATHING FILLER ANALYSIS

A sample of sheathing filler (grease) was removed from each end of the surveillance tendons. Chemical tests were performed on each sample by Suburban Laboratories, Inc., the results are presented in Appendix B and are summarized in Table I.

The maximum acceptable limits are 10 percent by weight for water content and 10 parts per million for water-soluble chlorides, nitrates and sulfides. All samples met the acceptance criteria as stated above in all respects except V-164 field (bottom) end which had a nitrate level of 10.3 ppm. A retest on the second sample from that end reported a nitrate level of <0.50 ppm.

Also included was the report of the neutralization number of each grease sample. This test is generally performed by grease manufacturers on new batches of the product. It is a method of determining the overbase additives in the grease. Degradation of the sheathing filler will yield a change in the acidity of the filler material as well as an increase in the ion content. The required neutralization number is >0mg KOH/g per IWL limit. All samples tested reported acceptable levels, however, several of the samples (10) reported a neutralization number of <0.50mg KOH/g. Due to the age of the plant and the mixture of 2090P, 2090P-2 and 2090P-4 grease, the modified test appropriate for the higher base number in 2090P-4 grease does not measure the smaller tolerances appropriate for 2090P grease which had a neutral original base value of 0mg.

An ASTM D-974 standard procedure for testing a weak acid was conducted on the ten samples to look for a change in the acidity of the material. All of these tests reported acidity of <0.18 which is approaching neutral. Both tests run on this material for an acid value and base value were approaching zero or neutral indicating no major change or deterioration from original values.

Water from V86 field end was tested for pH value by EPA 150.1 method with a result of 11.67.

25TH YEAR SURVEILLANCE OF THE
POST-TENSIONING SYSTEM AT THE
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

TABLE I: LABORATORY ANALYSIS OF SHEATHING FILLER TO UNIT 1

TENDON	END	ION CONCENTRATION (PPM)			% WATER	TOTAL	NEUTRAL No.
		CHLORIDE	NITRATE	SULFIDE	CONTENT	ACID No.	mg KOH/g
D-102	SHOP	<0.50	1.27	0.89	<0.10	N/A	0.544
	FIELD	<0.50	3.02	1.54	<0.10	<0.18	<0.50
D-104	SHOP	<0.50	4.44	1.21	<0.10	N/A	3.33
	FIELD	<0.50	3.97	1.00	0.20	N/A	1.63
D-225	SHOP	<0.50	2.70	1.28	0.10	N/A	33.6
	FIELD	<0.50	1.27	1.02	0.20	N/A	55.4
D-313	SHOP	<0.50	1.75	1.10	0.20	N/A	49.3
	FIELD	<0.50	1.27	0.92	0.10	N/A	2.22
H13-50	SHOP	<0.50	2.22	1.00	<0.10	N/A	2.24
	FIELD	<0.50	3.97	1.29	0.10	<0.18	<0.50
H35-33	SHOP	<0.50	6.98	1.43	<0.10	N/A	2.80
	FIELD	<0.50	2.22	1.31	<0.10	<0.18	<0.50
H46-37	SHOP	<0.50	7.78	2.41	<0.10	N/A	2.22
	FIELD	<0.50	9.84	2.87	<0.10	<0.18	<0.50
H51-43	SHOP	<0.50	5.40	0.95	<0.10	<0.18	<0.50
	FIELD	<0.50	2.22	1.28	<0.10	N/A	5.60
H62-26	SHOP	<0.50	1.11	1.10	0.30	N/A	53.2
	FIELD	<0.50	1.11	1.18	<0.10	N/A	54.3

<u>Acceptance Limits</u>

Test	Limits
Water Soluble Chloride	Less than 10.0 ppm
Water Soluble Nitrates	Less than 10.0 ppm
Water Soluble Sulfides	Less than 10.0 ppm
Water Content	Less than 10% Dry Weight
Neutralization No.	Greater than 0 mg KOH/g

25TH YEAR SURVEILLANCE OF THE
POST-TENSIONING SYSTEM AT THE
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

TABLE I: LABORATORY ANALYSIS OF SHEATHING FILLER TO UNIT 1

TENDON	END	ION CONCENTRATION (PPM)			% WATER	NEUTRAL No.
		CHLORIDE	NITRATE	SULFIDE	CONTENT	mg KOH/g
V-32	SHOP/ TOP	<0.50	1.75	1.10	0.20	51.8
	FIELD/ BOTT.	<0.50	4.29	1.57	<0.10	8.32
V-40	SHOP/ TOP	<0.50	4.76	1.91	<0.10	1.06
	FIELD/ BOTT.	<0.50	6.03	2.25	<0.10	0.538
V-114	SHOP/ TOP	<0.50	3.05	1.39	<0.10	1.68
	FIELD/ BOTT.	<0.50	2.06	1.47	<0.10	1.12
V164	SHOP / TOP	<0.50	8.57	2.99	0.30	2.22
	FIELD / BOTT.	<0.50	10.3 *	3.20	0.10	1.08

V164	FIELD / BOTT. Confirmation		<0.50			

* Refer to Topical Report No. 136 for evaluation

Acceptance Limits

Test	Limits
Water Soluble Chloride	Less than 10.0 ppm
Water Soluble Nitrates	Less than 10.0 ppm
Water Soluble Sulfides	Less than 10.0 ppm
Water Content	Less than 10% Dry Weight
Neutralization No.	Greater than 0 mg KOH/g

TABLE I: LABORATORY ANALYSIS OF SHEATHING FILLER TO UNIT 1

TENDON	END	ION CONCENTRATION (PPM)			% WATER	TOTAL	NEUTRAL No.
		CHLORIDE	NITRATE	SULFIDE	CONTENT	ACID No.	mg KOH/g
V-8	SHOP/ TOP	<0.50	1.27	1.08	<0.10	N/A	0.554
V-19	FIELD/ BOTT.	<0.50	2.22	1.20	<0.10	<0.18	<0.50
V-35	SHOP/ TOP	<0.50	2.06	1.36	<0.10	N/A	2.69
V-57	SHOP/ TOP	<0.50	2.86	1.66	0.15	N/A	1.09
V-72	FIELD/ BOTT.	<0.50	2.75	1.16	0.22	N/A	4.39
V-73	FIELD/ BOTT.	<0.50	2.06	1.34	<0.10	N/A	0.544
V-74	FIELD/ BOTT.	<0.50	2.22	1.41	<0.10	N/A	0.523
V-75	FIELD/ BOTT.	<0.50	2.39	1.45	<0.10	N/A	1.67
V-76	FIELD/ BOTT.	<0.50	1.59	1.39	<0.10	N/A	1.09
V-79	FIELD/ BOTT.	<0.50	3.02	1.32	<0.10	N/A	3.89
V-80	SHOP/ TOP	<0.50	4.60	1.60	<0.10	N/A	1.09
V-83	FIELD/ BOTT.	<0.50	4.44	1.18	4.10	N/A	36.4
V-86	FIELD/ BOTT.	<0.50	2.70	1.57	<0.10	<0.18	<0.50
V-94	SHOP/ TOP	<0.50	1.43	1.21	<0.10	<0.18	<0.50
V-110	SHOP/ TOP	<0.50	5.71	1.84	<0.10	N/A	0.544
V-126	FIELD/ BOTT.	<0.50	1.27	1.45	<0.10	<0.18	<0.50
V-136	FIELD/ BOTT.	<0.50	3.49	1.97	<0.10	N/A	0.549
V-139	FIELD/ BOTT.	<0.50	5.23	2.57	<0.10	N/A	1.08
V-143	SHOP/ TOP	<0.50	4.76	1.62	<0.10	N/A	2.19
V-146	FIELD/ BOTT.	<0.50	4.13	2.10	0.10	N/A	4.35
V-156	SHOP/ TOP	<0.50	4.29	1.70	0.25	<0.18	<0.50

WATER TEST — pH

V-86	FIELD/ BOTT.	11.67

Acceptance Limits

Test	Limits
Water Soluble Chloride	Less than 10.0 ppm
Water Soluble Nitrates	Less than 10.0 ppm
Water Soluble Sulfides	Less than 10.0 ppm
Water Content	Less than 10% Dry Weight
Neutralization No.	Greater than 0 mg KOH/g

III. ANCHORAGE COMPONENTS

In the following discussion, all procedures referred to are included in Volume 2, Section 9, Appendix F of this Physical Report while all data sheets are included in Section 4, Appendix A.

Inspection of the anchorage components began with the removal of the grease can. During removal of the grease can and physical inspections of the anchorage assemblies, water was detected during removal of a can, or inside it, on only one tendon end. Tendon V-86 field (bottom) end produced 2.5 gallons of water. No water was detected in any other surveillance or grease gasket repair tendon. Water inspections were recorded on Data Sheet 9 & SQ 6.1 and are summarized in Table II.

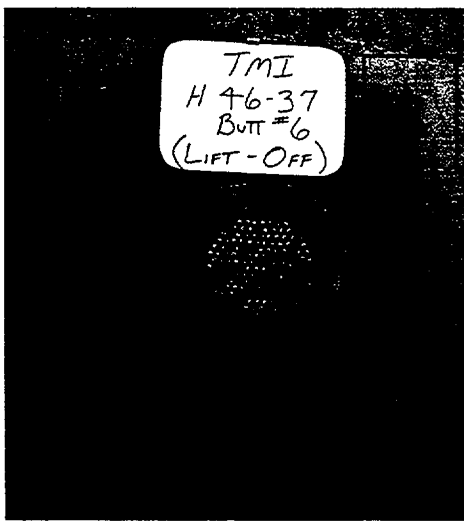
The anchorage components (anchorhead, bushing, shims, and buttonheads) were inspected for corrosion level and cracks per PSC Procedure SQ 8.0 and GPU Procedure 1301-9.1. The results were recorded on Data Sheet SQ 8.0 and Enclosure 6 Data Sheets 1, 2, 3 and 4, and are summarized in Table III. Corrosion levels on all items was either level 1 - “bright metal, no visible oxidation”, or level 2 - “visible oxidation, no pitting”. No evidence of cracking was observed in any of the anchorage components. Bearing plates were also inspected and were found to have corrosion levels of either 7 - “no visible oxidation”, or level 8 - “light pitting”.

The buttonheads were inspected for their physical condition and a count was made of protruding or missing buttonheads. The results of these inspections are recorded on Data Sheet 4, and summarized in Table IV. No additional missing or protruding buttonheads not previously identified were found to any inspected tendon anchorage.

In addition to the surveillance tendons (four vertical, three dome and five hoop) grease leak mitigation was conducted to the seven vertical tendons listed below where oil was found leaking from around the can flange. The can bolts were tightened and grease samples were taken; no water was found in any of the tendons inspected:

V-72	V-73	V-74	V-75
V-76	V-136	V-146	

III. ANCHORAGE COMPONENTS (Continued)



Crack found to H46-37

A VT-1C inspection of the concrete around the bearing plates for cracks was conducted with the results being recorded on Enclosure 6, Data Sheets 5, 6 and 7 and are summarized in Table V. Only one crack that had a width in excess of 0.010" was found on any inspection tendon which was H46-37 buttress 6 end (shown above). A crack 2.5" long with a width of 0.13" was recorded. This crack was monitored before and after liftoff and did not alter in length or width.

III. ANCHORAGE COMPONENTS (Continued)

During the general containment exterior concrete inspection, hairline cracking was noted adjacent to 29 vertical tendons where grease was found leaching from the concrete. All twenty-nine tendons (listed below) were topped off with new grease to ensure full cover of the anchorage assembly.

V-1	V-3	V-5	V-6	V-13	V-17
V-21	V-23	V-26	V-28	V-31	V-32
V-41	V-46	V-51	V-54	V-59	V-131
V-132	V-134	V-135	V-137	V-138	V-139
V-140	V-153	V-155	V-159	V-162	——

Tendon V-86 was found to have a gap between the can and the bearing plate at the top (shop) end where a large shim stack prevented the can compressing the gasket. This tendon was drained of grease, detensioned and a wire removed for testing. Corrosion levels to all anchorage components and the removed wire was acceptable with no cracking to any of the anchorage components found.

As a precaution, four tendons where grease leaking was noted were sampled for grease testing, no water was found during the sampling.

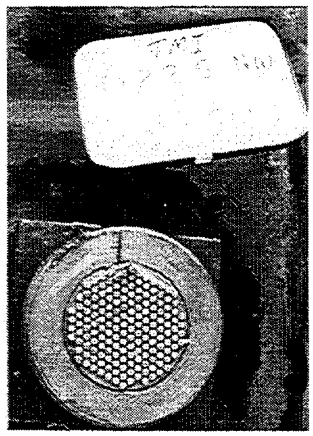
V-19	V-83	V-126	V-139

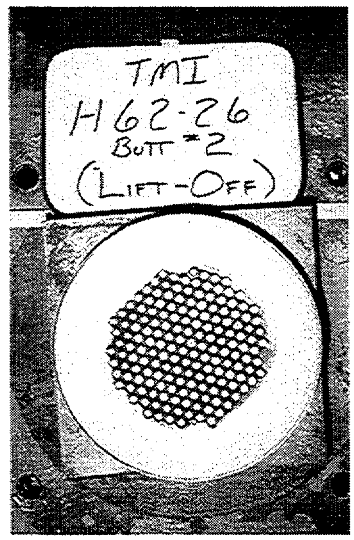
In order to assure that the general vertical population was not experiencing any deterioration due to water or grease migration, eight random tendons that had not previously been tested had their top can removed and the tendon end visually inspected.

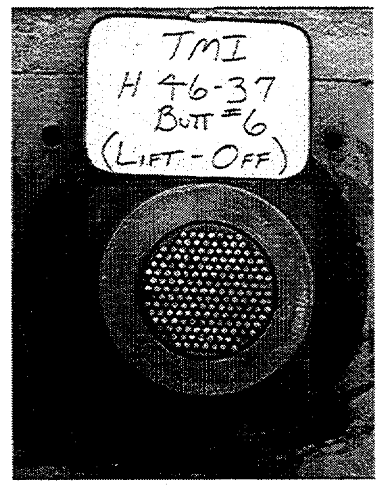
V-8	V-35	V-57	V-80
V-94	V-110	V-143	V-156

No water was found in any of the above tendons and all corrosion levels were acceptable. No cracks were found in any of the anchorage components and no missing buttonheads were found that were not apparent during installation.

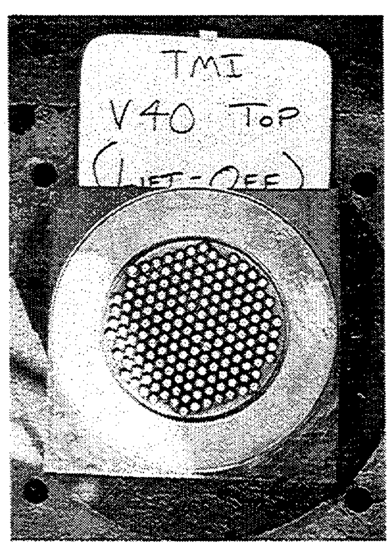
III. ANCHORAGE COMPONENTS (Continued)







All anchorages inspected showed excellent conditions in all respects.



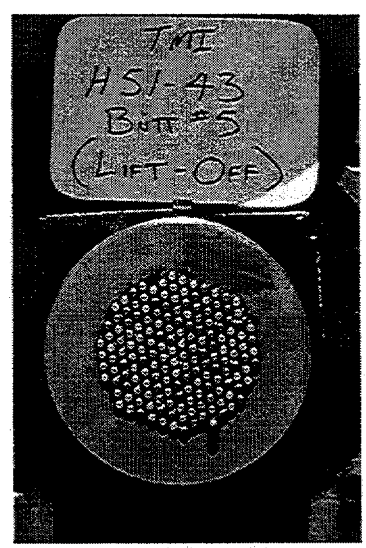


**TABLE II: SUMMARY OF DATA SHEET 9 TO UNIT 1
INSPECT FOR WATER TO SURVEILLANCE VERTICALS.**

TENDON	END	WATER QUANTITY
V32	SHOP/ TOP	NONE
	FIELD/ BOTTOM	NONE
V40	SHOP/ TOP	NONE
	FIELD/ BOTTOM	NONE
V114	SHOP/ TOP	NONE
	FIELD/ BOTTOM	NONE
V164	SHOP/ TOP	NONE
	FIELD/ BOTTOM	NONE

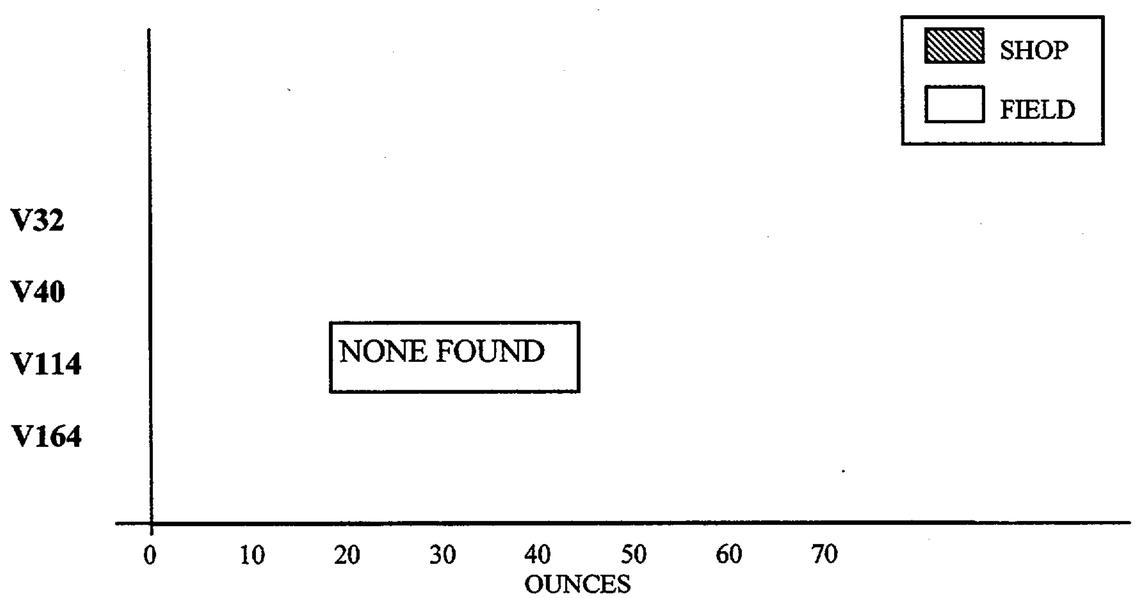
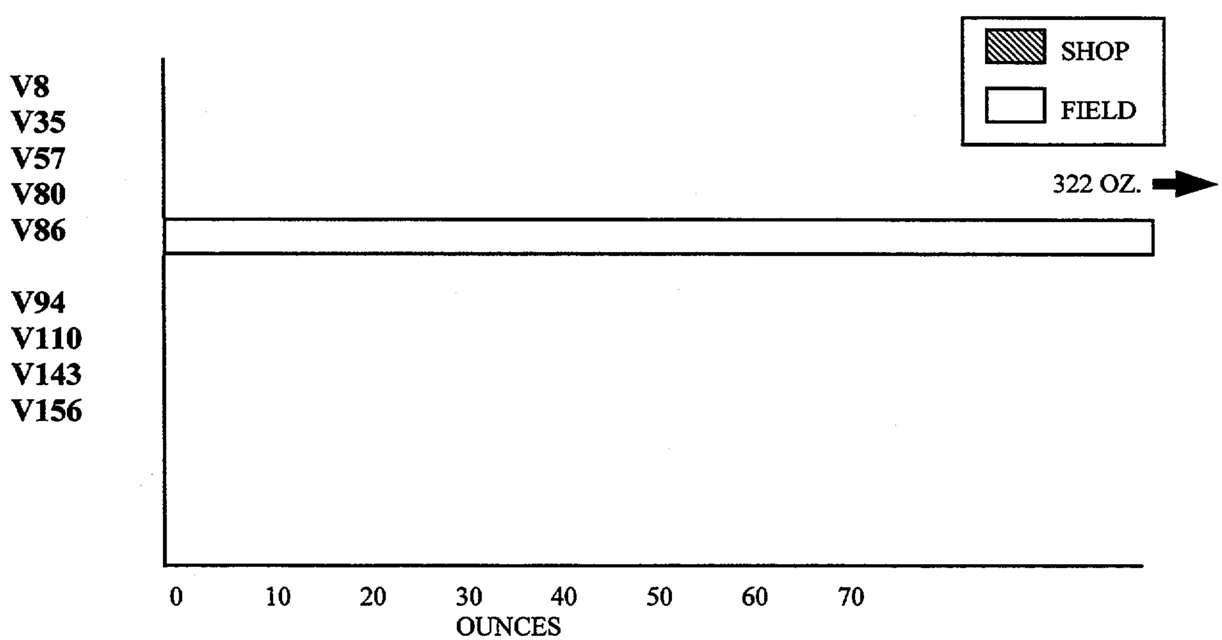


**TABLE II: SUMMARY OF DATA SHEET 9 TO UNIT 1
INSPECT FOR FREE WATER TO ADDITIONAL INSPECTION TENDONS**

TENDON	END	WATER QUANTITY
V72	FIELD/BOT.	NONE
V73	FIELD/BOT.	NONE
V74	FIELD/BOT.	NONE
V75	FIELD/BOT.	NONE
V76	FIELD/BOT.	NONE
V136	FIELD/BOT.	NONE
V146	FIELD/BOT.	NONE

**TABLE II: SUMMARY OF DATA SHEET 9 TO UNIT 1
INSPECT FOR FREE WATER TO ADDITIONAL INSPECTION TENDONS**

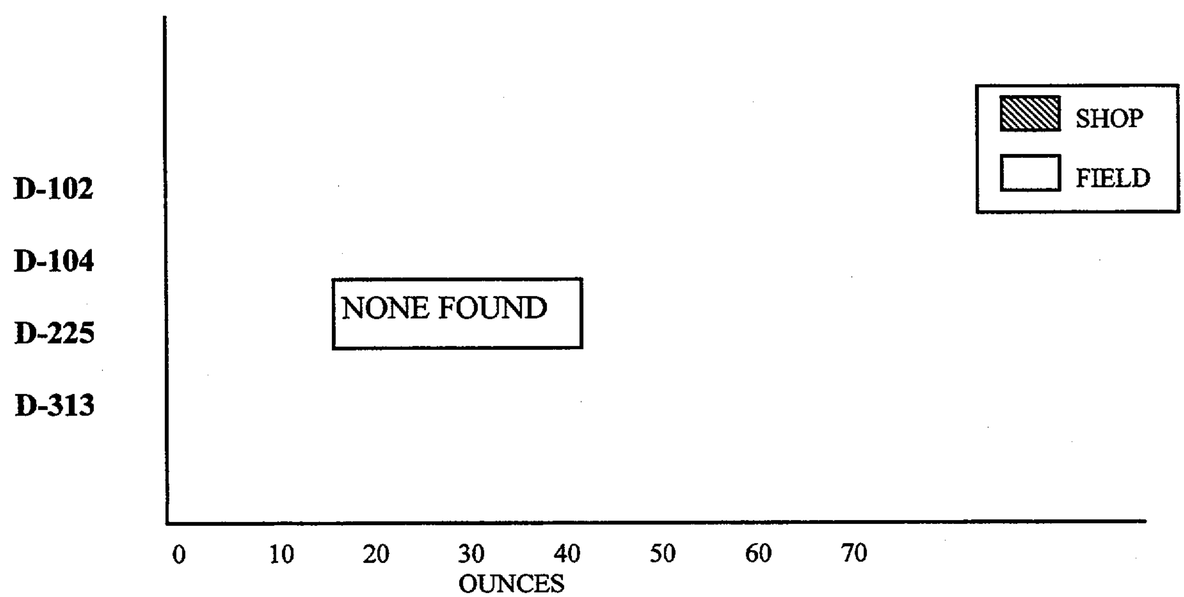
TENDON	END	WATER QUANTITY
V8	SHOP/TOP	NONE
V35	SHOP/TOP	NONE
V57	SHOP/TOP	NONE
V80	SHOP/TOP	NONE
V86	SHOP/TOP	NONE
	FIELD/BOT.	322 oz. (2.5 GALL.)
V94	SHOP/TOP	NONE
V110	SHOP/TOP	NONE
V143	SHOP/TOP	NONE
V156	SHOP/TOP	NONE



25TH YEAR SURVEILLANCE OF THE POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

TABLE II: SUMMARY OF DATA SHEET 9 TO UNIT 1 INSPECT FOR FREE WATER TO DOME TENDONS

TENDON	END	WATER QUANTITY
D-102	NE	NONE
	NW	NONE
D-104	NE	NONE
	NW	NONE
D-225	NW	NONE
	SE	NONE
D-313	NE	NONE
	SE	NONE

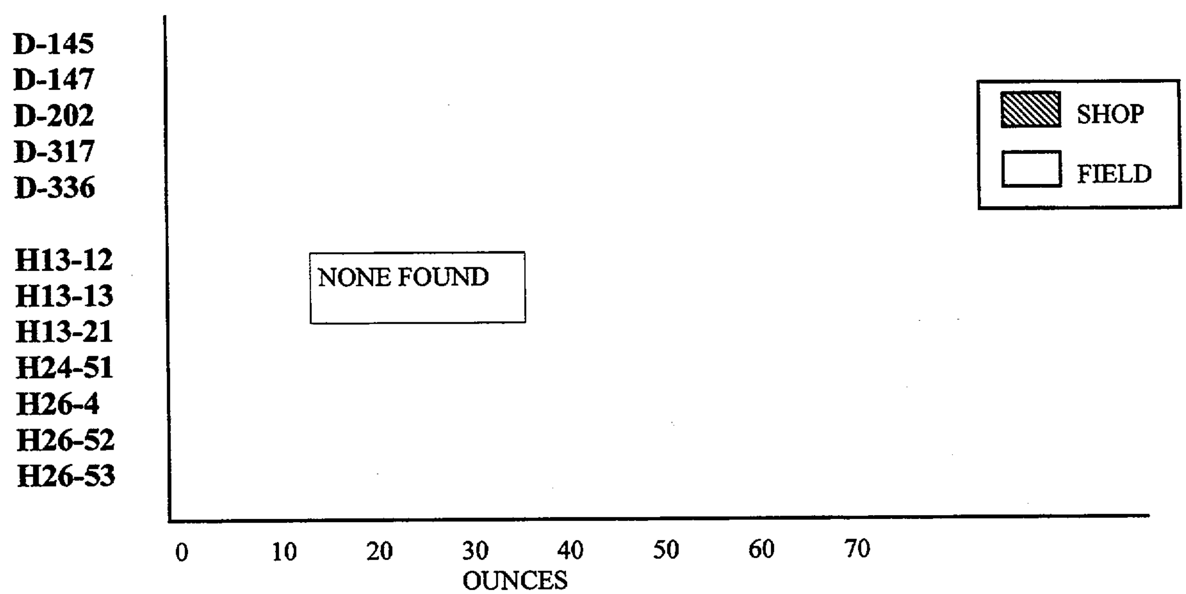


25TH YEAR SURVEILLANCE OF THE POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

GPU NUCLEAR

TABLE II: SUMMARY OF DATA SHEET 9 TO UNIT 1 INSPECT FOR FREE WATER TO GREASE LEAK REPAIRS

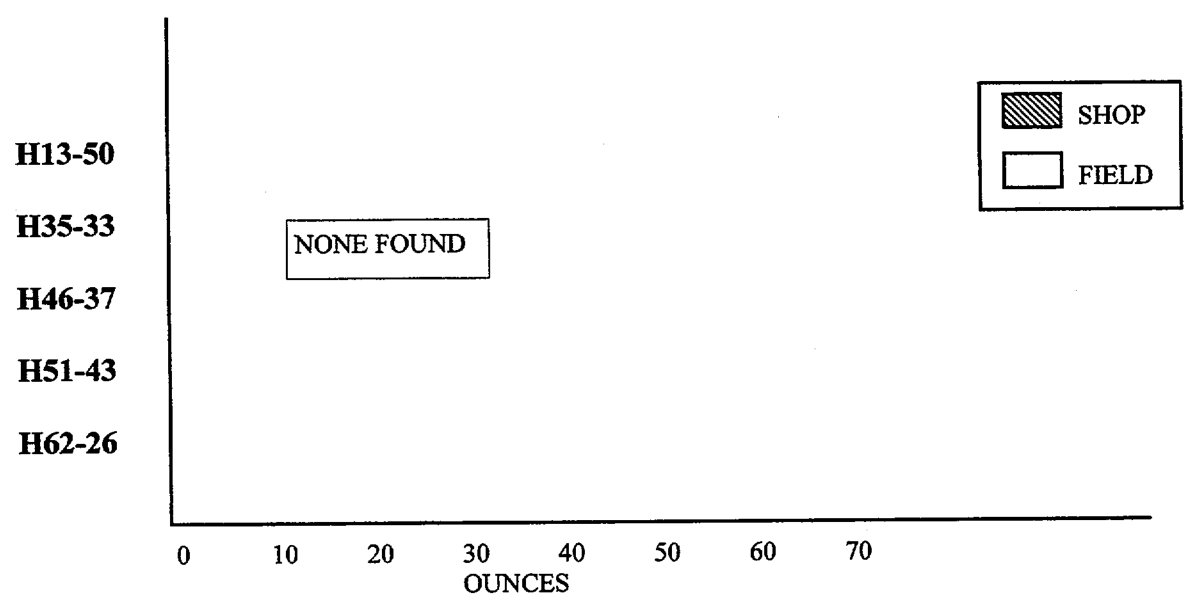
TENDON	END	WATER QUANTITY
D-145	SE	NONE
D-147	SE	NONE
D-202	NE	NONE
D-317	SE	NONE
D-336	NW	NONE
H13-12	BUTT 1	NONE
H13-13	BUTT 1	NONE
H13-21	BUTT 1	NONE
H24-51	BUTT 2	NONE
H26-4	BUTT 2	NONE
H26-52	BUTT 2	NONE
H26-53	BUTT 2	NONE



25TH YEAR SURVEILLANCE OF THE
POST-TENSIONING SYSTEM AT THE
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

TABLE II: SUMMARY OF DATA SHEET 9 TO UNIT 1
INSPECT FOR FREE WATER TO SURVEILLANCE HORIZONTALS

TENDON	END	WATER QUANTITY
H13-50	BUTT 1	NONE
	BUTT 3	NONE
H35-33	BUTT 3	NONE
	BUTT 5	NONE
H46-37	BUTT 4	NONE
	BUTT 6	NONE
H51-43	BUTT 5	NONE
	BUTT 1	NONE
H62-26	BUTT 6	NONE
	BUTT 2	NONE



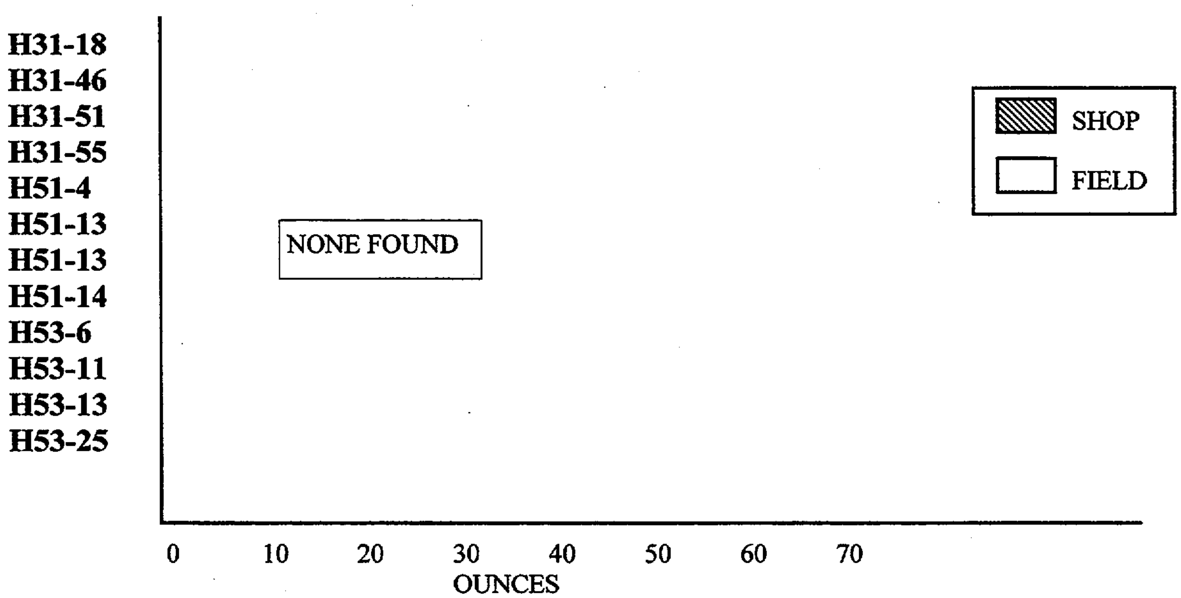
25TH YEAR SURVEILLANCE OF THE POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

GPU NUCLEAR

Precision Surveillance Corporation

TABLE II: SUMMARY OF DATA SHEET 9 TO UNIT 1 INSPECT FOR FREE WATER TO GREASE LEAK REPAIRS

TENDON	END	WATER QUANTITY
H31-18	BUTT 3	NONE
H31-46	BUTT 3	NONE
H31-51	BUTT 3	NONE
H31-55	BUTT 3	NONE
H51-4	BUTT 5	NONE
H51-13	BUTT 5	NONE
H51-13	BUTT 1	NONE
H51-14	BUTT 5	NONE
H53-6	BUTT 5	NONE
H53-11	BUTT 5	NONE
H53-13	BUTT 5	NONE
H53-25	BUTT 5	NONE



PSC Precision Surveillance Corporation

25TH YEAR SURVEILLANCE OF THE POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

GPU NUCLEAR

TABLE II: SUMMARY OF DATA SHEET 9 TO UNIT 1 INSPECT FOR FREE WATER TO GREASE LEAK REPAIRS

TENDON	END	WATER QUANTITY
H53-44	**BUTT 5**	NONE
H62-10	**BUTT 6**	NONE
H62-13	**BUTT 6**	NONE
H62-14	**BUTT 6**	NONE
H62-15	**BUTT 6**	NONE

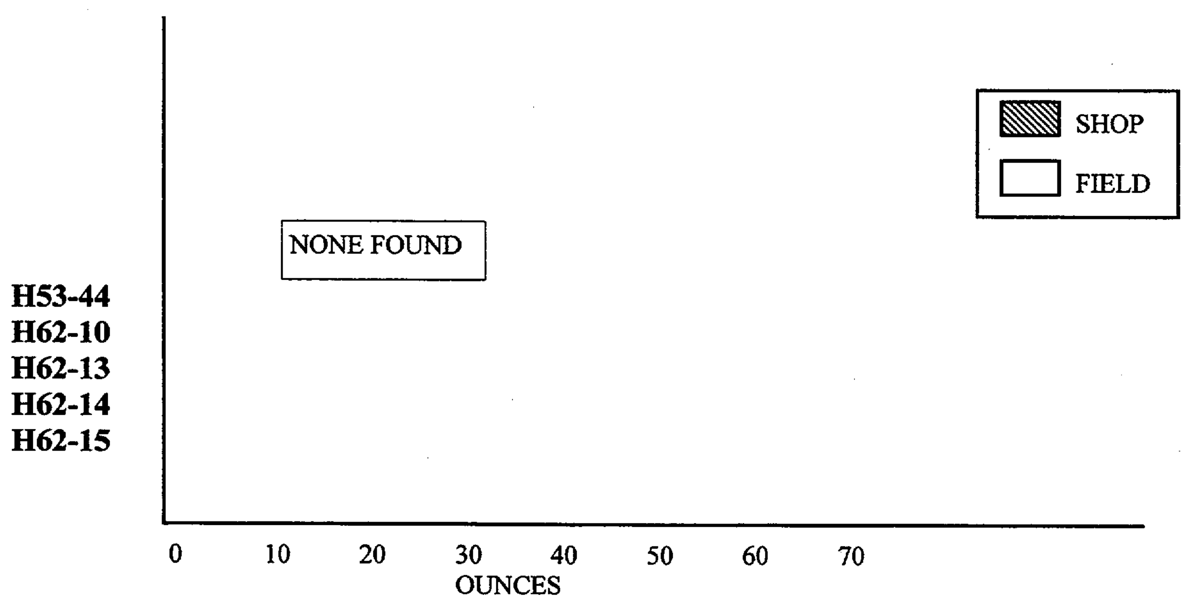


TABLE III: SUMMARY OF DATA SHEET No. 1 TO UNIT 1 ANCHORAGE CORROSION CONDITION—DOME TENDONS

TENDON	END	CORROSION LEVEL, CRACKS			
		BUTTONHEAD CONDITION	STRESSING WASHER & NUT	SHIMS	BEARING PLATE
D-102	NE	1, NONE	1, NONE	2, NONE	7, NONE
	NW	1, NONE	1, NONE	2, NONE	7, NONE
D-104	NE	1, NONE	1, NONE	2, NONE	7, NONE
	NW	1, NONE	1, NONE	2, NONE	7, NONE
D-225	NW	1, NONE	1, NONE	2, NONE	7, NONE
	SE	1, NONE	1, NONE	1, NONE	7, NONE
D-313	SE	1, NONE	1, NONE	1, NONE	7, NONE
	NE	1, NONE	1, NONE	1, NONE	7, NONE

1 Bright metal; no visible oxidation.
2 Visible oxidation; no pitting.
3 Patches of red oxide, ready to start pitting.

7 No visible oxidation

25TH YEAR SURVEILLANCE OF THE
POST-TENSIONING SYSTEM AT THE
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

TABLE III: SUMMARY OF DATA SHEET No. 2 TO UNIT 1
ANCHORAGE CORROSION CONDITION— VERTICAL TENDONS

TENDON	END	CORROSION LEVEL, CRACKS			
		BUTTONHEAD CONDITION	STRESSING WASHER & NUT	SHIMS	BEARING PLATE
V-32	TOP	1, NONE	2, NONE	2, NONE	8, NONE
	BOTTOM	1, NONE	1, NONE	1, NONE	7, NONE
V-40	TOP	1, NONE	1, NONE	2, NONE	8, NONE
	BOTTOM	1, NONE	1, NONE	1, NONE	7, NONE
V-114	TOP	1, NONE	2, NONE	2, NONE	8, NONE
	BOTTOM	1, NONE	1, NONE	1, NONE	7, NONE
V-164	TOP	1, NONE	2, NONE	2, NONE	8, NONE
	BOTTOM	1, NONE	1, NONE	1, NONE	7, NONE

1 Bright metal; no visible oxidation.
2 Visible oxidation; no pitting.
3 Patches of red oxide, ready to start pitting.

7 No visible oxidation
8 Slight pitting

25TH YEAR SURVEILLANCE OF THE
POST-TENSIONING SYSTEM AT THE
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

Precision Surveillance Corporation

GPU NUCLEAR

TABLE III: SUMMARY OF DATA SHEET No. 2 TO UNIT 1 ANCHORAGE CORROSION CONDITION— VERTICAL TENDONS

TENDON	END	CORROSION LEVEL, CRACKS			
		BUTTONHEAD CONDITION	STRESSING WASHER & NUT	SHIMS	BEARING PLATE
V-8	TOP	2, NONE	2, NONE	2, NONE	8, NONE
	BOTTOM	N/A	N/A	N/A	N/A
V-35	TOP	2, NONE	2, NONE	2, NONE	7, NONE
	BOTTOM	N/A	N/A	N/A	N/A
V-57	TOP	2, NONE	2, NONE	2, NONE	7, NONE
	BOTTOM	N/A	N/A	N/A	N/A
V-80	TOP	1, NONE	1, NONE	2, NONE	7, NONE
	BOTTOM	N/A	N/A	N/A	N/A
V-86	TOP	1, NONE	1, NONE	2, NONE	7, NONE
	BOTTOM	1, NONE	1, NONE	2, NONE	7, NONE
V-94	TOP	2, NONE	2, NONE	2, NONE	7, NONE
	BOTTOM	N/A	N/A	N/A	N/A
V-110	TOP	1, NONE	1, NONE	2, NONE	7, NONE
	BOTTOM	N/A	N/A	N/A	N/A
V-143	TOP	1, NONE	2, NONE	2, NONE	7, NONE
	BOTTOM	N/A	N/A	N/A	N/A
V-156	TOP	1, NONE	2, NONE	2, NONE	8, NONE
	BOTTOM	N/A	N/A	N/A	N/A

1 Bright metal; no visible oxidation.
2 Visible oxidation; no pitting.
3 Patches of red oxide, ready to start pitting.

7 No visible oxidation
8 Slight pitting

TABLE III: SUMMARY OF DATA SHEET No. 3 TO UNIT 1 ANCHORAGE CORROSION CONDITION— HOOP TENDONS

TENDON	END	CORROSION LEVEL, CRACKS			
		BUTTONHEAD CONDITION	STRESSING WASHER & NUT	SHIMS	BEARING PLATE
H13-50	BUTT 1	1, NONE	1, NONE	2, NONE	7, NONE
	BUTT 3	2, NONE	2, NONE	2, NONE	7, NONE
H35-33	BUTT 3	1, NONE	1, NONE	2, NONE	7, NONE
	BUTT 5	1, NONE	1, NONE	2, NONE	7, NONE
H46-37	BUTT 4	1, NONE	1, NONE	2, NONE	7, NONE
	BUTT 6	1, NONE	1, NONE	2, NONE	7, NONE
H51-43	BUTT 5	1, NONE	1, NONE	2, NONE	7, NONE
	BUTT 1	1, NONE	1, NONE	2, NONE	7, NONE
H62-26	BUTT 6	1, NONE	1, NONE	2, NONE	7, NONE
	BUTT 2	1, NONE	1, NONE	2, NONE	7, NONE

1 Bright metal; no visible oxidation.
2 Visible oxidation; no pitting.
3 Patches of red oxide, ready to start pitting.

7 No visible oxidation
8 Slight pitting

25TH YEAR SURVEILLANCE OF THE POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

TABLE IV: SUMMARY OF DATA SHEET No. 4 AND SQ8.0 TO UNIT 1 BUTTONHEAD INSPECTION TO SURVEILLANCE TENDONS

TENDON	END	NUMBER OF MISSING, BROKEN BUTTONHEADS	ANCHOR ID	BUSHING ID	COMMENTS
D-102	NE (SHOP)	0	706	788	Wire removed for testing
	#1	0	599	N/A	
D-104	#5 (SHOP)	0	1130	988	
	#1	0	500	N/A	
D-225	NW (SHOP)	0	765	1137	
	SE	0	684	N/A	
D-313	NE (SHOP)	1	708	1081	Wire protruding 0.15", previously reported
	#3 (FIELD)	0	712	N/A	

TENDON	END	NUMBER OF MISSING, BROKEN BUTTONHEADS	ANCHOR ID	BUSHING ID	COMMENTS
V-32	TOP	0	1036	1050	
	BOTTOM	0	657	N/A	
V-40	TOP (SHOP)	1	972	610	Protruding wire 0.7", previously reported
	BOTTOM	1	081	N/A	1 Missing buttonhead previously reported, plus 1 double buttonhead
V-114	TOP	0	900	772	
	BOTTOM	0	720	N/A	1 Double buttonhead
V-164	TOP	0	850	1197	1 Wire removed for testing
	BOTTOM	0	601	N/A	

TABLE IV: SUMMARY OF DATA SHEET No.4 AND SQ8.0 TO UNIT 1 BUTTONHEAD INSPECTION TO ADDITIONAL TENDONS

TENDON	END	NUMBER OF MISSING, BROKEN BUTTONHEADS	ANCHOR ID	BUSHING ID	COMMENTS
V-8	SHOP	**0**	590	1212	
V-35	SHOP	**0**	1065	1049	
V-57	SHOP	**0**	994	1010	
V-80	SHOP	**0**	949	893	
V-86	SHOP	**0**	1063	1085	1 Wire removed for testing
	FIELD	**0**	1086	N/A	
V-94	SHOP	**0**	925	661	
V-110	SHOP	**0**	844	1115	
V-143	SHOP	**1**	858	1055	Protruding butonhead 0.10" previously reported
V-156	SHOP	**1**	595	911	Protruding butonhead 1.10" previously reported

TABLE IV: SUMMARY OF DATA SHEET No. 4 TO UNIT 1
BUTTONHEAD INSPECTION TO SURVEILLANCE TENDONS

TENDON	END	NUMBER OF MISSING, BROKEN BUTTONHEADS	ANCHOR ID	BUSHING ID	COMMENTS
H13-50	BUTT 1	0	563	794	Wire removed for testing
	BUTT 3	0	719	N/A	
H35-33	BUTT 5	0	997	936	
	BUTT 3	0	905	N/A	
H46-37	BUTT 6	0	588	944	
	BUTT 4	0	798	N/A	
H51-43	BUTT 1	0	874	756	
	BUTT 5	0	583	N/A	
H62-26	BUTT 6	0	837	924	
	BUTT 2	0	571	N/A	

TABLE V: SUMMARY OF DATA SHEET 5 TO UNIT 1
TENDON ANCHORAGE AREA CRACK INSPECTION—DOME TENDONS

TENDON	END	BEARING PLATE ID	CRACKS WITH WIDTHS >0.010"		
			QUANTITY	MAX. LENGTH (IN)	MAX. WIDTH (IN)
D-102	NE		*	*	*
	NW		NONE	N/A	N/A
D-104	NE		NONE	N/A	N/A
	NW		NONE	N/A	N/A
D-225	NW		*	*	*
	SE		NONE	N/A	N/A
D-313	SE		*	*	*
	NE		NONE	N/A	N/A

* Cracks are as identified & documented on Enclosure 6 Data Sheets 8 & 9 for crack growth inspection dome tendons. There is no change in crack pattern or size since Period 6.

**TABLE V: SUMMARY OF DATA SHEET 6 TO UNIT 1
TENDON ANCHORAGE AREA CRACK INSPECTION—VERTICAL TENDONS**

TENDON	END	CRACKS WITH WIDTHS >0.010"		
		QUANTITY	MAX. LENGTH (IN)	MAX. WIDTH (IN)
V-32	TOP	NONE	N/A	N/A
	BOTTOM	NONE	N/A	N/A
V-40	TOP	NONE	N/A	N/A
	BOTTOM	NONE	N/A	N/A
V-114	TOP	NONE	N/A	N/A
	BOTTOM	NONE	N/A	N/A
V-164	TOP	NONE	N/A	N/A
	BOTTOM	NONE	N/A	N/A

TABLE V: SUMMARY OF DATA SHEET 6 TO UNIT 1 TENDON ANCHORAGE AREA CRACK INSPECTION—VERTICAL TENDONS

ADDITIONAL TENDONS

TENDON	END	CRACKS WITH WIDTHS >0.010"		
		QUANTITY	MAX. LENGTH (IN)	MAX. WIDTH (IN)
V-8	TOP	NONE	N/A	N/A
	BOTTOM	N/A	N/A	N/A
V-35	TOP	NONE	N/A	N/A
	BOTTOM	N/A	N/A	N/A
V-57	TOP	NONE	N/A	N/A
	BOTTOM	N/A	N/A	N/A
V-80	TOP	NONE	N/A	N/A
	BOTTOM	N/A	N/A	N/A
V-86	TOP	NONE	N/A	N/A
	BOTTOM	NONE	N/A	N/A
V-94	TOP	NONE	N/A	N/A
	BOTTOM	N/A	N/A	N/A
V-110	TOP	NONE	N/A	N/A
	BOTTOM	N/A	N/A	N/A
V-143	TOP	NONE	N/A	N/A
	BOTTOM	N/A	N/A	N/A
V-156	TOP	NONE	N/A	N/A
	BOTTOM	N/A	N/A	N/A

TABLE V: SUMMARY OF DATA SHEET 7 TO UNIT 1 TENDON ANCHORAGE AREA CRACK INSPECTION—HOOP TENDONS

TENDON	END	CRACKS WITH WIDTHS >0.010"		
		QUANTITY	MAX. LENGTH (IN)	MAX. WIDTH (IN)
H13-50	BUTT 1	NONE	N/A	N/A
	BUTT 3	N/A	N/A	N/A
H35-33	BUTT 5	NONE	N/A	N/A
	BUTT 3	N/A	N/A	N/A
H46-37	BUTT 6**	ONE	2.5"	.013"
	BUTT 4	N/A	N/A	N/A
H51-43	BUTT 1	NONE	N/A	N/A
	BUTT 5	N/A	N/A	N/A
H62-26	BUTT 6	NONE	N/A	N/A
	BUTT 2	NONE	N/A	N/A

** Crack was monitored before, during, and after liftoff - did not alter in length or width.

IV. CONCERETE CRACK GROWTH

In addition to the surveillance tendons, nine dome tendons, listed below, were inspected for concrete crack growth. The results of this inspection were recorded on Data Sheets 8 and 9 and presented in Table VI.

D-103NE	D-118SW	D-203NE	D-218SE	D-225NW
D-249SE	D-313SE	D-329SW	D-334NW	

Only three tendons (D-203, D-225 and D-118) showed cracks greater than 0.01" with no change being reported from the Period 6 inspection.

TABLE VI: SUMMARY OF DATA SHEET 8 TO UNIT 1 CRACK GROWTH INSPECTIONS—DOME TENDONS

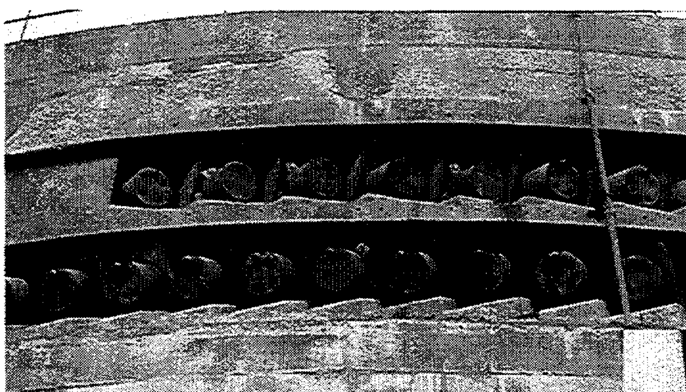
TENDON	END	REMARKS	CRACKS WITH WIDTHS >0.010"		
			QUANTITY	MAX. LENGTH (IN)	MAX. WIDTH (IN)
D-103	NE	NO CHANGE FROM PERIOD 6	NONE	N/A	N/A
D-118	SW	NO CHANGE FROM PERIOD 6	*	*	*
D-203	NE	NO CHANGE FROM PERIOD 6	*	*	*
D-218	SE	NO CHANGE FROM PERIOD 6	NONE	N/A	N/A
D-225	NW	NO CHANGE FROM PERIOD 6	*	*	*
D-249	SE	NO CHANGE FROM PERIOD 6	NONE	N/A	N/A
D-313	SE	NO CHANGE FROM PERIOD 6	NONE	N/A	N/A
D-329	SW	NO CHANGE FROM PERIOD 6	NONE	N/A	N/A
D-334	NW	NO CHANGE FROM PERIOD 6	NONE	N/A	N/A

* See Enclosure 6 Data Sheet 9 (A203, A204 & A208) for location and widths.

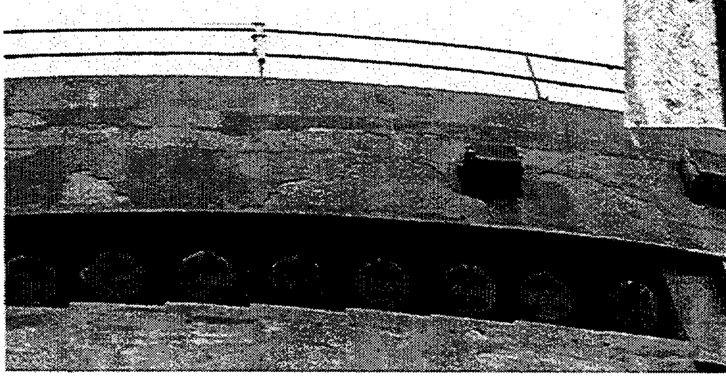
V. GENERAL CONTAINMENT EXTERIOR

A VT-3C examination of the exterior concrete surface of the containment was conducted in order to identify areas of deterioration or distress. If areas with potentially unacceptable conditions were found, a VT-1C examination was performed and documented accordingly. All areas were documented on Enclosure 6 Data Sheet 10 and additional sheets. These sheets can be found in Appendix 4, A209-A257.

Disposition of the items found, some of which are shown in the next few pages, is in Topical Report No. 136.



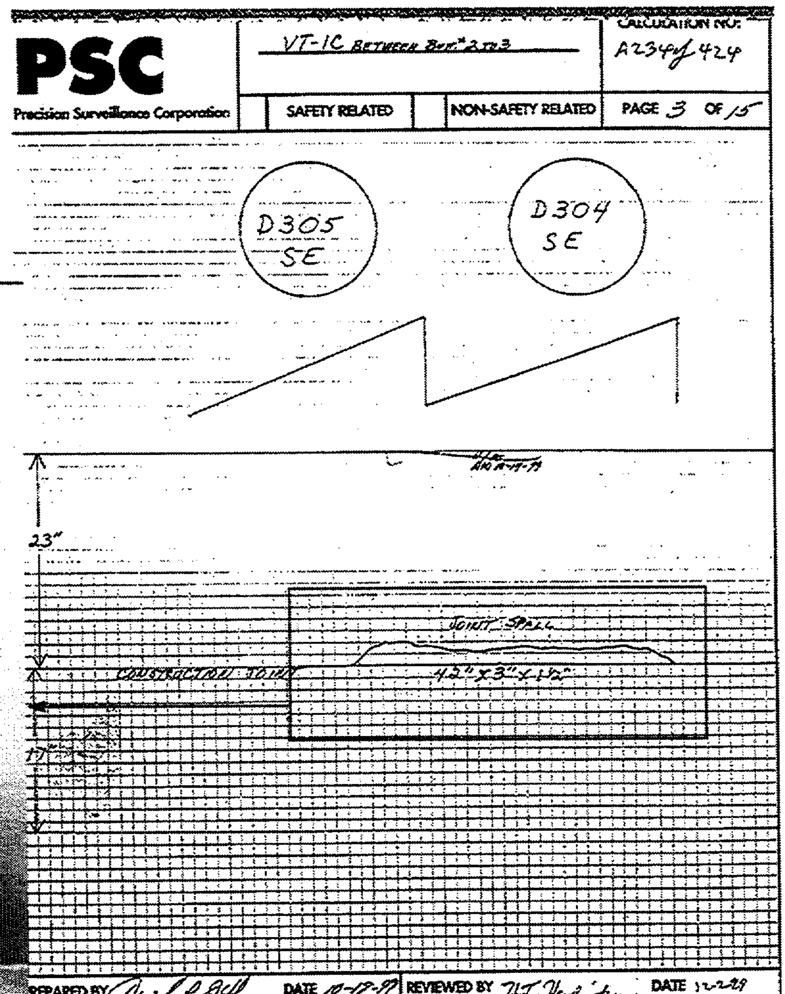
Dome Ring Deterioration



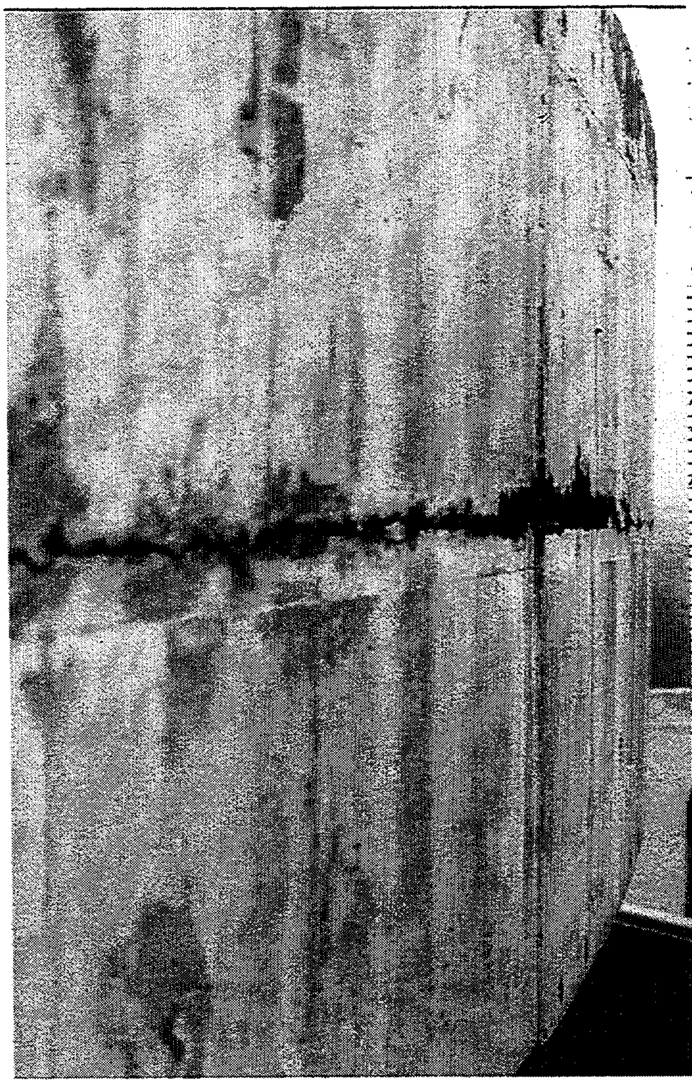
25TH YEAR SURVEILLANCE OF THE POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

GPU NUCLEAR

V. GENERAL CONTAINMENT EXTERIOR (continued)


PSC
Precision Surveillance Corporation
VT-1C
CALCULATION NO:
SAFETY RELATED
NON-SAFETY RELATED
PAGE 3 OF 15

PREPARED BY
DATE 10-17-99
REVIEWED BY
DATE



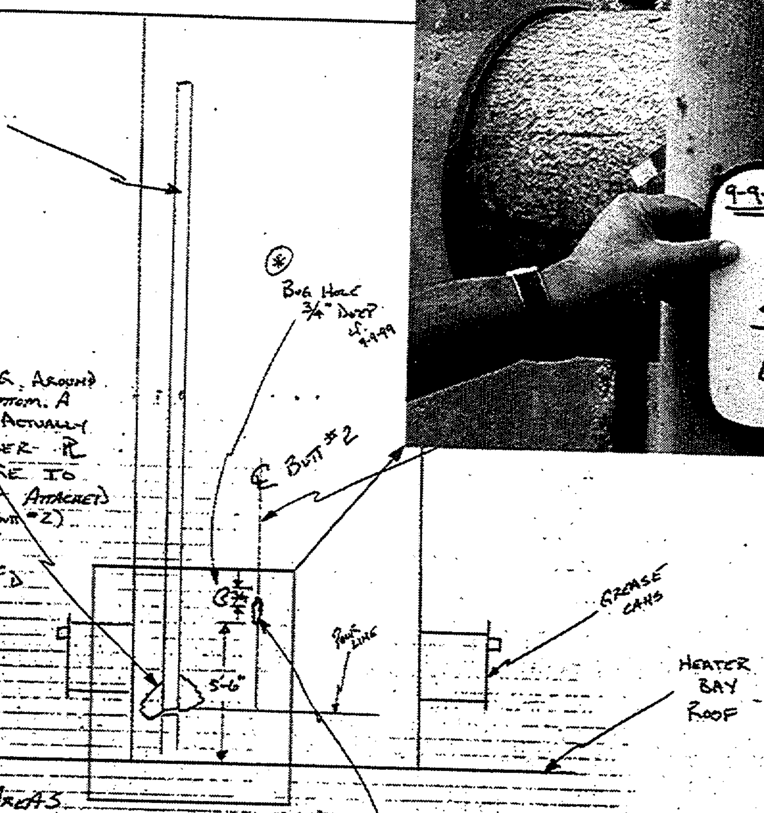
V. GENERAL CONTAINMENT EXTERIOR (continued)

Precision Surveillance Corporation

VT-1C

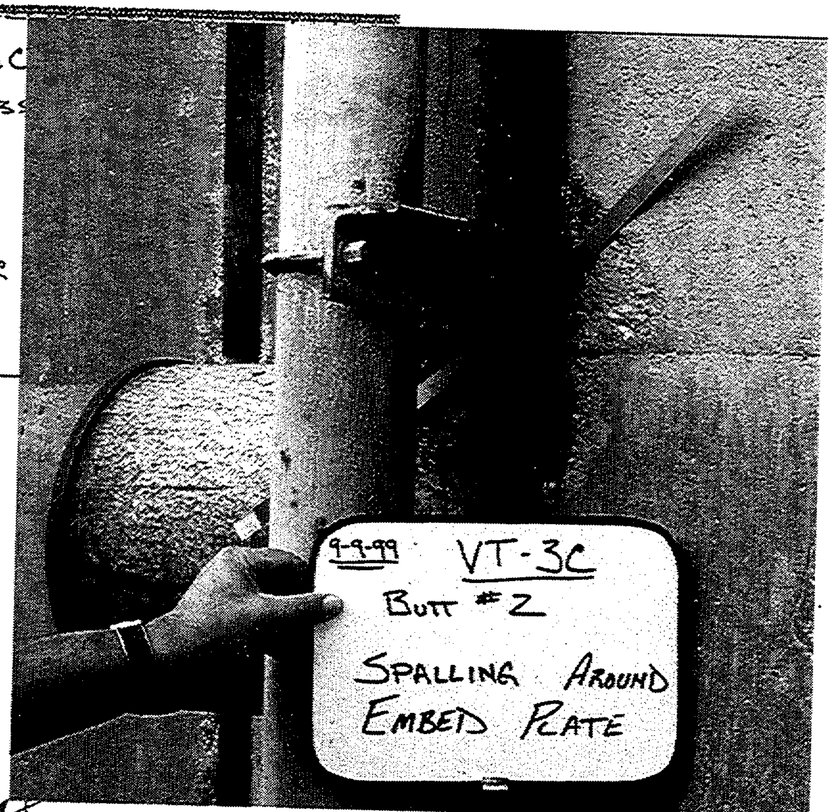
BUTTRESS

* SUSPECT INDICATIONS REQUIRING ENGINEERING EVAL. 9-9-99



* CONCRETE SPALLING AROUND EMBED PL @ BOTTOM. A STEEL RULE CAN ACTUALLY BE SLIPPED UNDER PL FROM ONE EDGE TO THE OTHER. SEE ATTACHED PICTURE. (VT-3C BUTT #2) 9-9-99

DIM'S 6"H x 4"W x 3/8"D 9-9-99

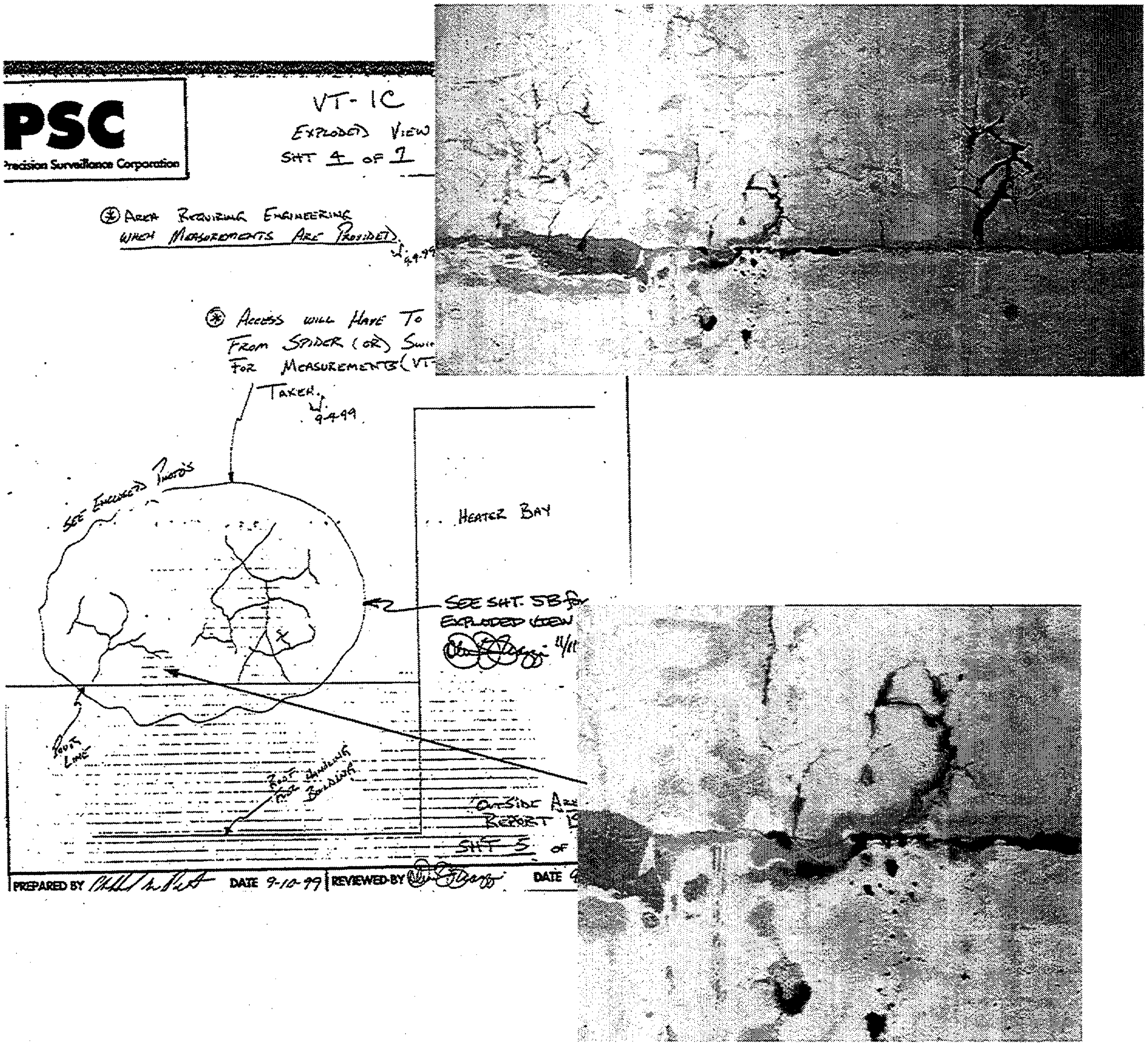


OUTSIDE AREAS
REPORT "B"
SHT 3 OF 7

* SEPERATION IN POUR LINE (JOINT SPALL) 1/4" W x 1 1/2" L x 1/2" D 9-9-99

PREPARED BY [signature]	DATE 9-9-99	REVIEWED BY [signature]	DATE 9/24/99

V. GENERAL CONTAINMENT EXTERIOR (continued)



V. GENERAL CONTAINMENT EXTERIOR (continued)

PSC
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VT-1C

BETWEEN BUTTRESS 5 TO 6

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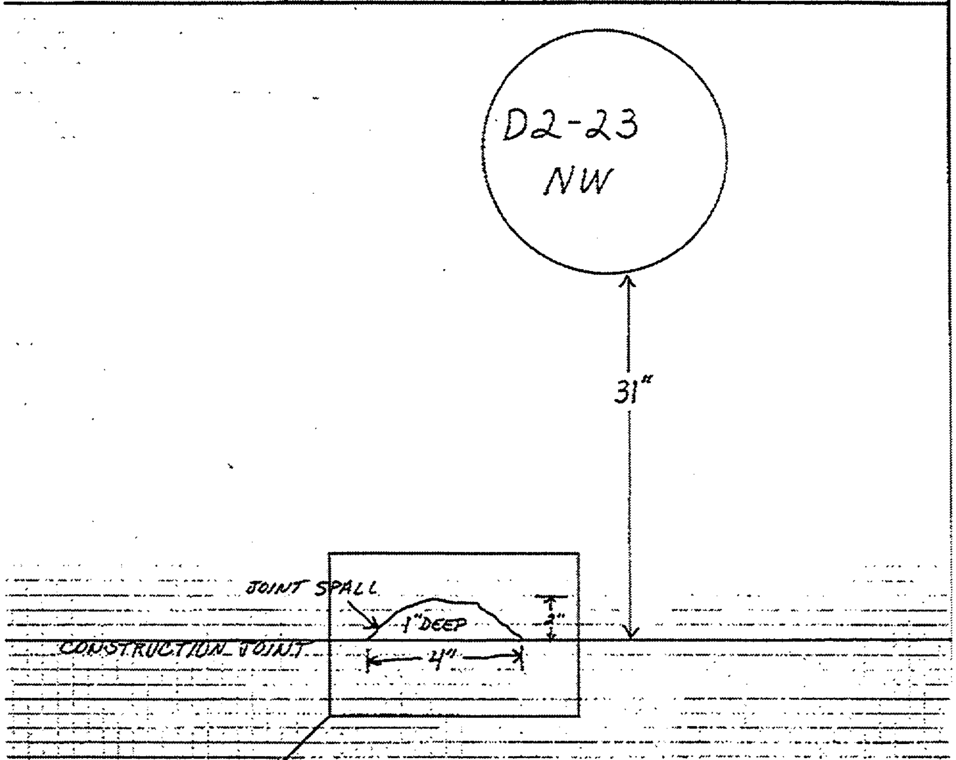
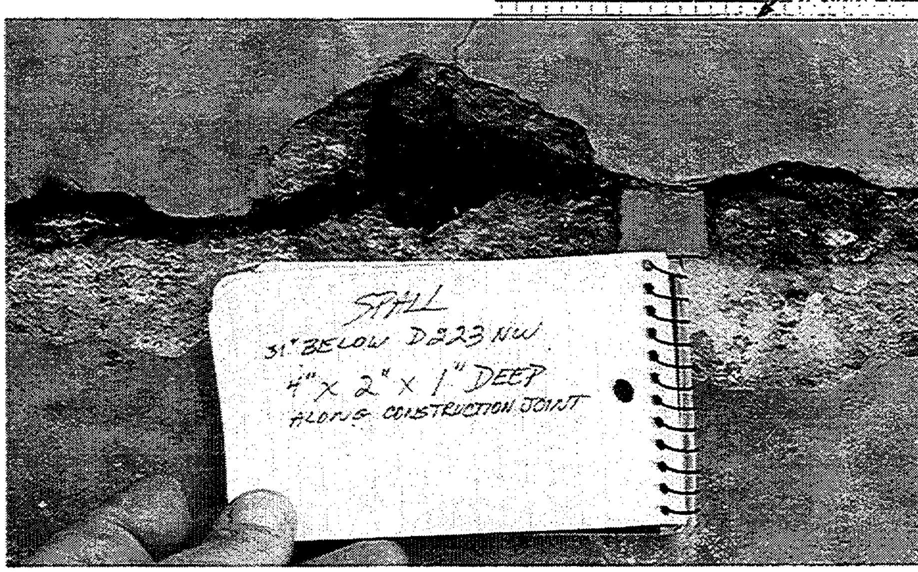
	SAFETY RELATED		NON-SAFETY RELATED	PAGE 5 OF 15





-99 REVIEWED BY H.F. Hedrikson DATE 12-2-99

V. GENERAL CONTAINMENT EXTERIOR (continued)

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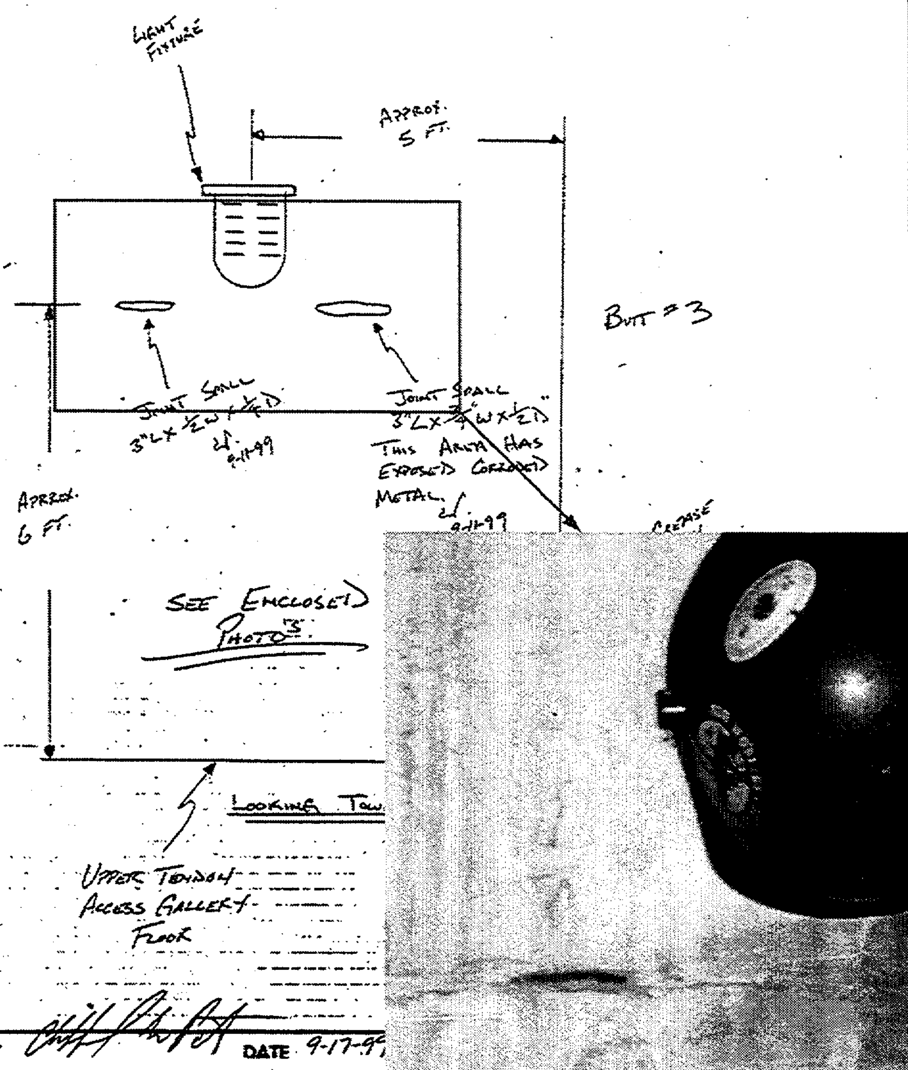
VT-1C A213 of 424

Buttress #3 to #4



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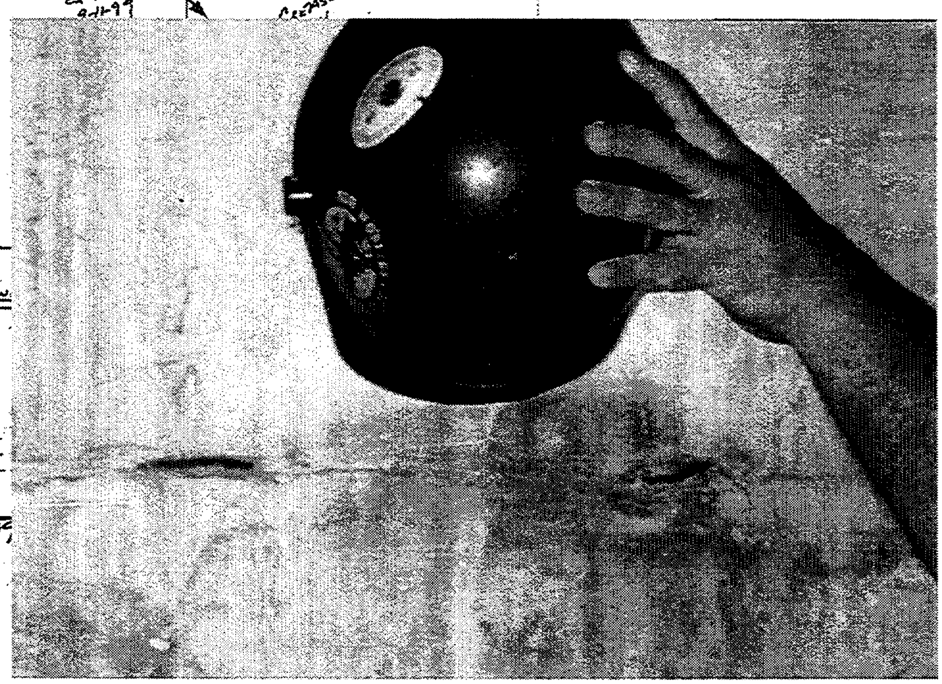
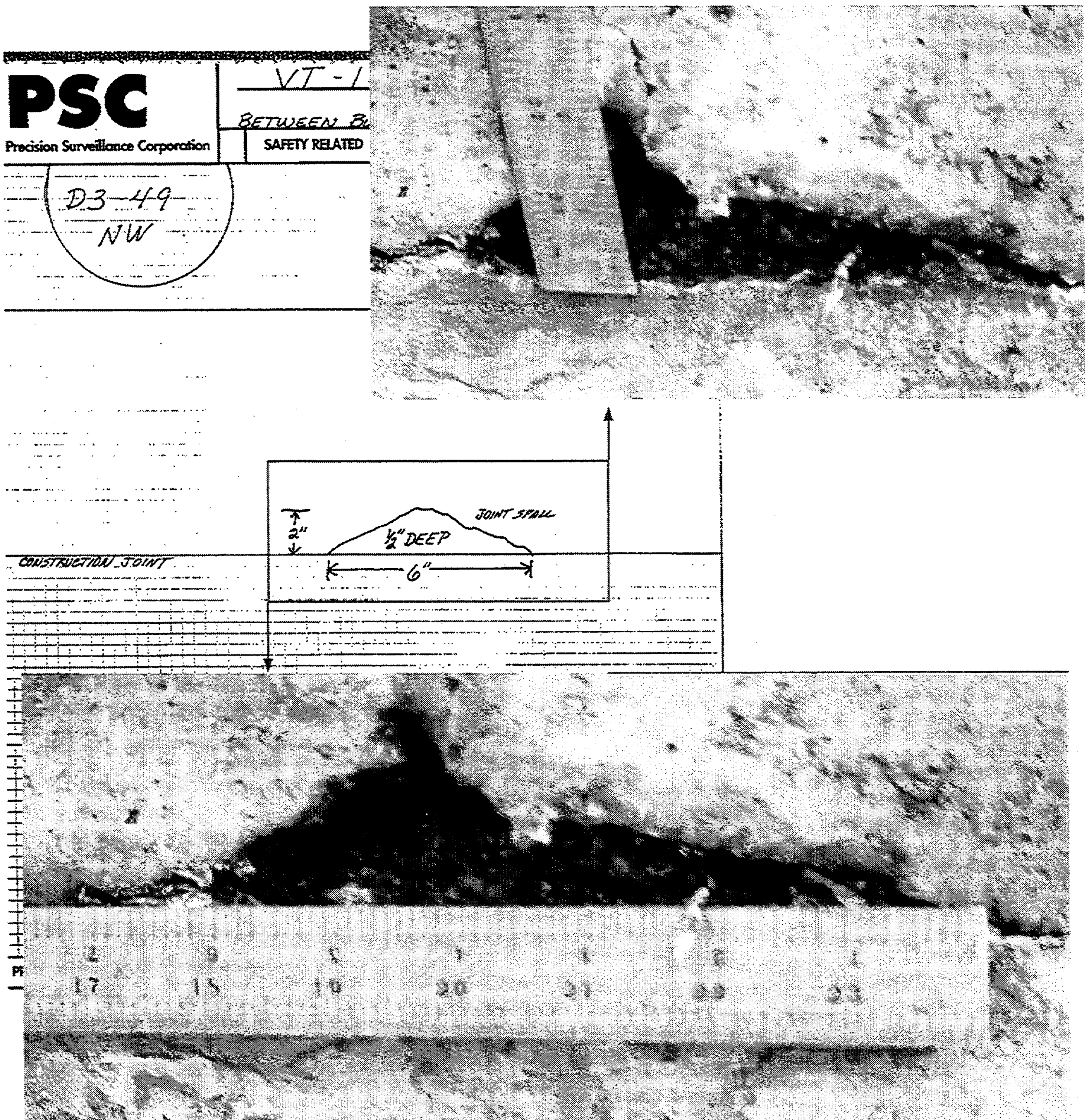


V. GENERAL CONTAINMENT EXTERIOR (continued)



VI. HYDRAULIC JACK CALIBRATIONS

Precision Surveillance has developed a program for calibrating hydraulic jacks utilizing regression analysis (PSC Procedure QA 12.8.G-W). This is a process where a straight line is mathematically best fitted to a set of data points (in this case, force verses gauge pressure). This results in calculating ram area (slope) and constant (y-intercept) for each jack calibration. Completed calibrations for all of the hydraulic jacks used are contained in Appendix C and are summarized in Table VII.

A before and after comparison of the stressing jacks' ram areas revealed that none of the stressing jacks' calibrations varied by more than 0.76% indicating that they were in a properly calibrated status.

The wire testing ram 7702 was also found to be in a properly calibrated status before and after the surveillance.

Note that the force exerted by a jack can be calculated as follows:

Force	=	Area	x	Pressure	+	Constant
(F)		(in^2)		(KSI)		(K)

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TABLE VII: HYDRAULIC JACK CALIBRATIONS

JACK ID	BEFORE SURVEILLANCE			FORCE (Fi)	AFTER SURVEILLANCE			FORCE (Ff)	MAX PRESSURE	VARI %
	DATE	AREA (in^2)	CONSTANT (kips)		DATE	AREA (in^2)	CONSTANT (kips)			
FT-1	8/6/99	165.801	-9.179	1615670.8	12/6/99	165.268	-9.025	1610601.4	9800	0.31
6001	7/27/99	192.113	-15.416	1617544.5	10/23/99	190.777	-11.346	1610258.5	8500	0.45
6002	7/28/99	191.165	-16.036	1608866.5	12/7/99	190.495	-14.869	1604338.5	8500	0.28
9365	7/28/99	213.051	-8.119	1790031.4	12/6/99	211.512	-8.753	1776408.3	8440	0.76
7702	8/12/99	1.555	0.062	13217.562	11/10/99	1.562	0.110	13277.11	8500	0.45

RAM 7702 USED FOR WIRE TESTING

VII. TENDON LIFTOFFS AND DETENSIONING

A liftoff is performed on each surveillance tendon to monitor the force exerted by the tendon onto the structure. The results were documented on Data Sheet 1 and are summarized in Table IX.

It should be noted that performing a liftoff has only a localized effect on a tendon; therefore, it is acceptable to use the same jacks for both ends of a tendon by executing the liftoff on separate occasions.

Prior to coupling on a ram to the tendon, the threads are measured to confirm thread strength and coupler suitability. Thread measurement results are documented on Data Sheet SQ7.1 and are shown in Table VIII.

All dome tendon liftoffs were found to be above the expected limit and above minimum design spec. All hoop tendons except H51-43 were also above the expected limit and acceptable. H51-43 was –0.43%, the group average was above expected and the normalized group average was above the minimum design and the hoops were deemed acceptable. Vertical tendon V-164 was –3.75% below expected, however, all other vertical tendons were above expected and acceptable. This tendon was the detension tendon, the removed wire was in excellent condition and the tendon was restored to expected –0%, +5%.

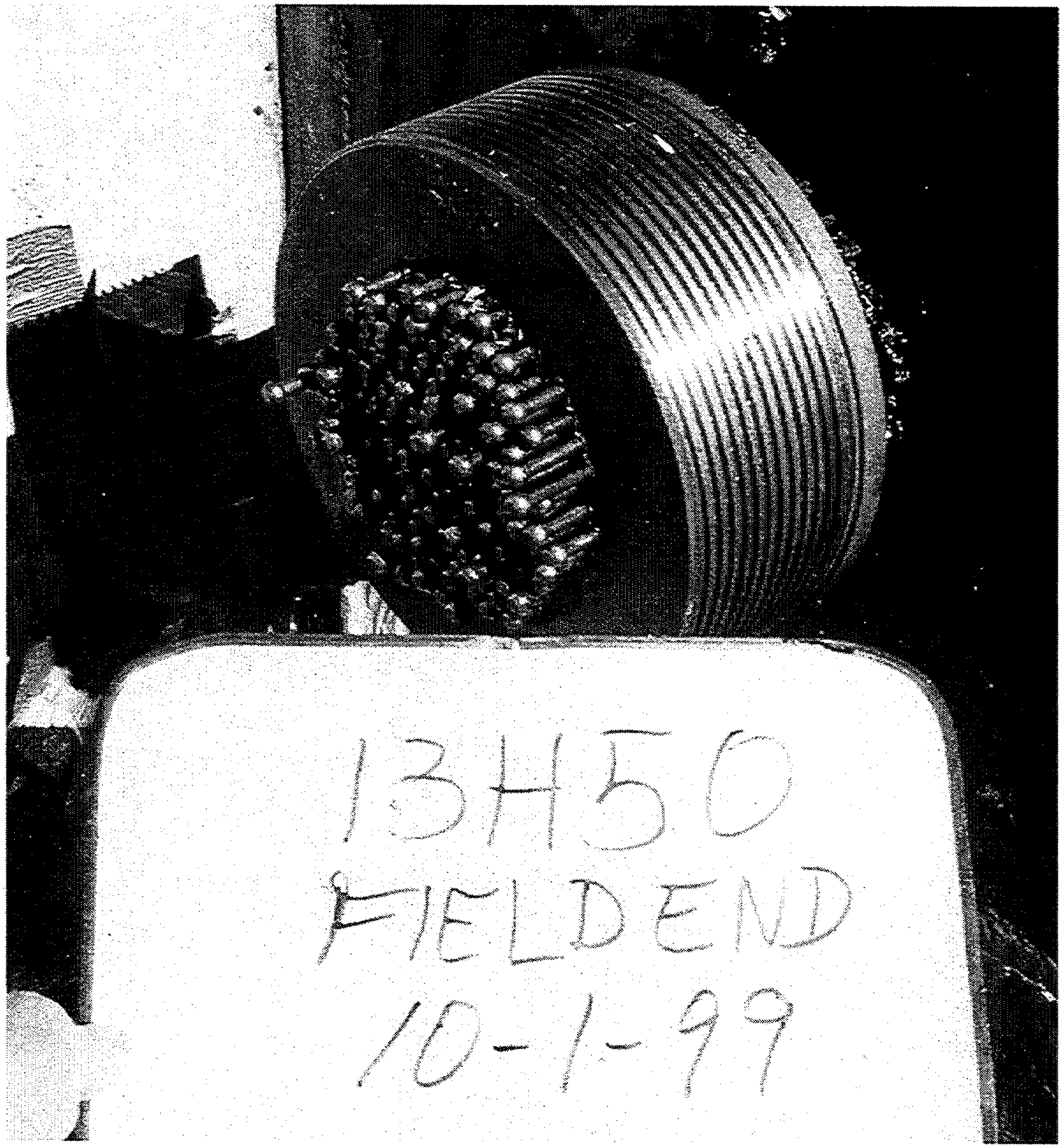
IWL requires that "the average of all measured tendon force for each type of tendon is equal or greater than the minimum required prestress specified at the anchorage for that type of tendon". Minimum design stress values for Three Mile Island tendons by group are:

Domes:	1040 kips for a 170 wire tendon.
Verticals:	1010 kips for a 170 wire tendon
Horizontals:	1121 kips for a 170 wire tendon.

The horizontal group average for the five tendons tested is 1153.6 kips and above the group minimum, therefore acceptable. The averages for domes was 1195 and verticals was 1191 kips, both groups were above the required group minimum.

No additional or broken wires were noted during or after liftoffs.

VII. TENDON LIFTOFFS AND DETENSIONING (continued)



H13-50 during detensioning for wire removal and testing.

**TABLE VIII: SUMMARY OF DATA SHEETS SQ 7.1
ANCHORAGE THREAD MERASUREMENT.**

TENDON	END	ANCHOR I.D.	EXTERNAL THRED DIA. (in)			ACCEPTABLE ADAPTOR
			MAJOR	PITCH	MINOR	
V-32	SHOP (TOP)	1050	9.375	9.264	9.195	D-4
V-40	SHOP (TOP)	610	9.371	9.262	9.193	D-4
V-86	SHOP (TOP)	1063	9.369	9.264	9.185	D-4
V-114	SHOP (TOP)	772	9.374	9.272	9.199	D-4
V-164	SHOP (TOP)	850	9.375	9.262	9.189	D-4
D-102	SHOP (NEAR #5)	706	9.374	9.257	9.184	C6001
	FIELD	599	9.374	9.273	9.197	C6002
D-225	SHOP (NW)	1137	9.375	9.270	9.195	C6001
	FIELD (SE)	684	9.380	9.258	9.187	C6002
D-313	SHOP (NEAR#2)	708	9.375	9.262	9.182	C6001
	FIELD	712	9.374	9.266	9.202	C6002
H13-50	SHOP #1	563	9.377	9.258	9.186	C6001
	FIELD #3	719	9.368	9.248	9.172	C6002
H35-33	SHOP #5	936	9.371	9.251	9.177	C6001
	FIELD #3	905	9.376	9.261	9.189	FSV-1
H46-37	SHOP #6	944	9.377	9.280	9.205	C6001
	FIELD #4	798	9.326	9.244	9.153	C6002
H51-43	SHOP #1	756	9.375	9.271	9.201	C6001
	FIELD #5	583	9.377	9.256	9.175	C6002
H62-26	SHOP #6	924	9.377	9.277	9.188	C6001
	FIELD #2	571	9.378	9.258	9.185	FSV-1

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TABLE IX: SUMMARY OF DATA SHEET 1 TO UNIT 1 DOME TENDON LIFTOFFS

TENDON	END	JACK ID	PREV.	EXPECTED LIFTOFF (KIPS)	GAUGE PRESS.	LIFTOFF	AVE. LIFTOFF	% DIF.	TEMP. (°F) INT.	TEMP. (°F) EXT.	ACCEPT
D-102	NE	6001	1401	1108	6720	1276	1280	+15.5	63.9	38	YES
	NW	6002			6800	1284					
D-225	NW	6001	1427	1081	5900	1118	1104	+2.13	120.9	72	YES
	SE	6002			5787	1090			118.0	70	
D-313	SE	6002	1442	1108	5990	1129	1120	+1.08	68.6	44	YES
	NE	6001			5860	1110					

PREV. Force at time of original installation or if applicable, from previous surveillance in kips.

25TH YEAR SURVEILLANCE OF THE
POST-TENSIONING SYSTEM AT THE
THREE MILE ISLAND
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TABLE IX: SUMMARY OF DATA SHEET 2 TO UNIT 1
HOOP TENDON LIFTOFFS

TENDON	END	JACK ID	PREV.	EXPECTED LIFTOFF (KIPS)	GAUGE PRESS.	LIFTOFF	AVE. LIFTOFF	% DIF.	TEMP. (°F)		ACCEPT
									INT.	EXT.	
H13-50	BUTT 1	6001	1437	1097	6240	1183	1159	+5.65	78	44	YES
	BUTT 3	6002			6020	1135			69.6	48	
H35-33	BUTT 3	FT-1	1406	1137	7040	1158	1170	+2.90	120.2	85	YES
	BUTT 5	6001			6227	1181			123.4	70	
H46-37	BUTT 6	6001	1416	1076	5987	1134	1128	+4.83	93.8	80	YES
	BUTT 4	6002			5960	1123			74.1	46	
H51-43	BUTT 5	6002	1455	1175	6170	1163	1170	-0.43	94.1	82	YES
	BUTT 1	6001			6200	1176			94.1	80	
H62-26	BUTT 6	6001	1416	1120	5980	1133	1136	+1.43	117.9	72	YES
	BUTT 2	FT-1			6920	1138			119.2	88	

PREV. Force at time of original installation or if applicable, from previous surveillance in kips.

25TH YEAR SURVEILLANCE OF THE POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

TABLE IX: SUMMARY OF DATA SHEET 3 TO UNIT 1 VERTICAL TENDON LIFTOFFS

TENDON	END	JACK ID	PREV.	EXPECTED LIFTOFF (KIPS)	GAUGE PRESS.	LIFTOFF	AVE. LIFTOFF	% DIF.	TEMP. (°F)		ACCEPT
									INT.	EXT.	
V-32	TOP	9365	1458	1192	5640	1193	1193	+0.08	121.8	80	YES
V-40	TOP	9365	1421	1187	5680	1202	1202	+1.26	121.8	80	YES
V-114	TOP	9365	1406	1158	5620	1189	1189	+2.68	94.1	68	YES
V-164	TOP	9365	1458	1227	5580	1181	1181	-3.75	104.5	48	YES
V-86	TOP	9365	1427	1176	5680	1202	1202	+2.21	105.6	46	YES

PREV. Force at time of original installation or if applicable, from previous surveillance in kips.

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TABLE X: SUMMARY OF DATA SHEET 1 TO UNIT 1 NORMALIZED TENDON LIFTOFFS

TENDON	AVERAGE LIFTOFF	NORMALIZING FACTOR	NORMALIZED LIFTOFF	AVE. NORM. LIFTOFF	MINIMUM FORCE	% DIFF.	ACCEPTABLE
D-102	1280	18	1298				
D-225	1104	45	1149	1195	1040	+14.9	YES
D-313	1120	19	1139				
H13-50	1159	25	1184				
H35-33	1170	-15	1155				
H46-37	1128	46	1174	1153.6	1121	+2.9	YES
H51-43	1170	-53	1117				
H62-26	1136	2	1138				
V-32	1193	-7	1186				
V-40	1202	-1	1201				
V-86	1202	9	1211	1191	1010	+17.9	YES
V-114	1189	27	1216				
V-164	1181	-42	1139				

VIII. WIRE INSPECTION AND TESTING

One wire was scheduled for removal from each detensioned tendon for visual inspection and tensile testing. PSC Procedure SQ 10.3 outlines the details involved with the wire testing and the data was recorded on Data Sheets SQ 10.2 and SQ 10.3 with the results summarized in Table XI.

All wire diameters were within the acceptance criteria of 0.250 $\pm$ 0.002". The corrosion condition of all samples was either level A - "bright metal; no visible oxidation", or level B—"slight loss of color; no pitting". The Ultimate Strength exceeded the minimum strength criteria of 240,000 psi (240 ksi) for all wire samples tested and all elongations exceeded the minimum requirement of 4%.

TABLE XI: SUMMARY OF DATA SHEETS SQ 10.2 & 10.3 - VISUAL INSPECTION AND TENSILE TESTING OF WIRE

TENDON	SAMPLE No.	CORROSION CONDITION	SAMPLE LOCATION (FT)	DIAMETER (IN)	YIELD STRENGTH (PSI)	ULTIMATE STRENGTH (PSI)	ELONGATION %	ACCEPTABLE
V86	1	B	20 - 29	0.250	214,129	263,544	5.00	YES
	2	B	80 - 89	0.250	209,694	261,010	4.85	YES
	3	B	160 - 169	0.250	211,595	263,544	5.50	YES
V164	1	B	20 - 29	0.251	215,714	266,657	5.30	YES
	2	B	80 - 89	0.251	218,230	261,625	4.90	YES
	3	B	160 - 169	0.251	213,199	262,883	4.95	YES
D-102	1	B	20 - 29	0.250	212,228	250,873	4.80	YES
	2	B	50 - 59	0.250	210,961	250,873	5.20	YES
	3	B	90 - 99	0.250	212,228	250,873	5.00	YES
H13-50	1	A	20 - 29	0.251	199,362	250,305	4.80	YES
	2	A	70 - 79	0.251	201,878	255,336	5.20	YES
	3	A	140 - 149	0.251	206,910	254,707	4.80	YES

IX. TENDON RETENSIONING AND RESEALING

Those tendons that had previously been detensioned for wire removal, (V-86, V-164, D-102 and H13-50) were retensioned with the results recorded on Data Sheet 4 and summarized in Table XII.

All new elongations were compared to original elongations and found to be within ± 10% except D-102 which was +14.8%. A review of force levels in Topical Report No. 136 Table 20 shows the adjusted values to be acceptable. All tendons were locked off at forces greater than those initially found and all final liftoffs were within -0% + 5% of the expected force.

After completion of all surveillance inspections, the anchorage components were hand coated with cold grease to ensure complete coverage, the cans were reinstalled with new gaskets, and the necessary amount of sheathing filler (grease) was added. Results of the grease replacement were recorded on Data Sheet 11 and are summarized in Table XIII.

All surveillance tendons (four vertical, four dome, and five hoop) took less than 10% net tendon duct volume and were acceptable. Of the 166 vertical tendons topped off eight, accepted greater than 10% duct volume (12.0 gallons).

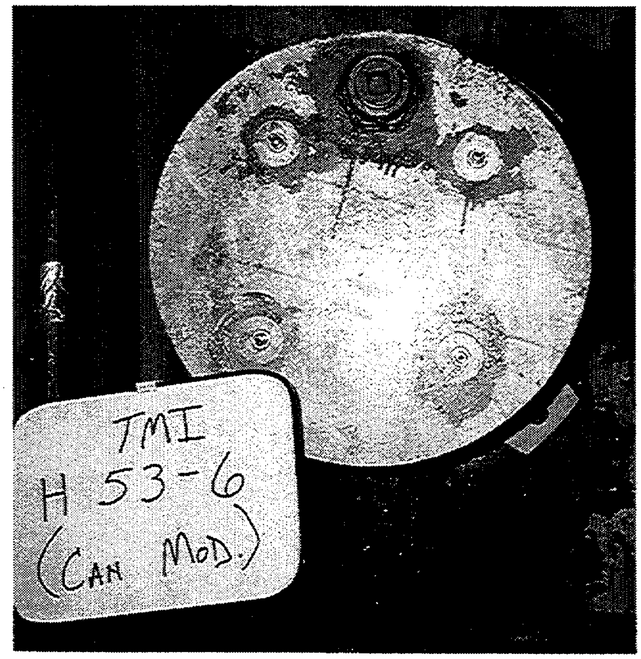
In addition to the surveillance tendons and vertical top offs, Tendon End Cap Modifications were conducted to the following tendons:

H24-51	H31-51	H53-13	H62-13
H26-4	H31-55	H53-25	H62-14
H26-52	H51-4	H53-25	H62-15
H26-53	H51-13	H53-44	D-145SE
H31-18	H51-14	H53-48	D-147SE
H31-46	H53-11	H62-10	D-317SE

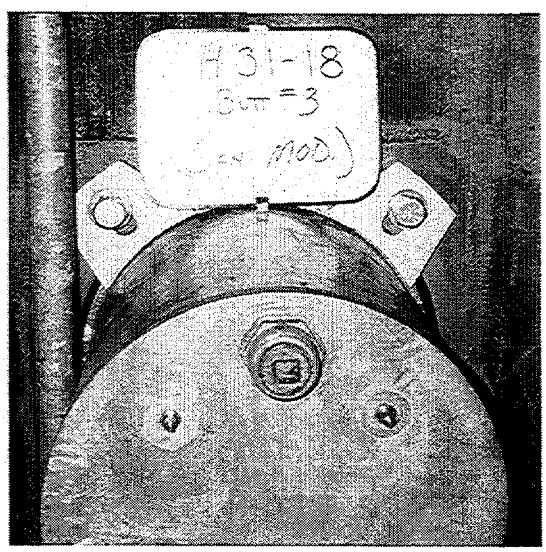
Tendon end cap gaskets were also replaced to:

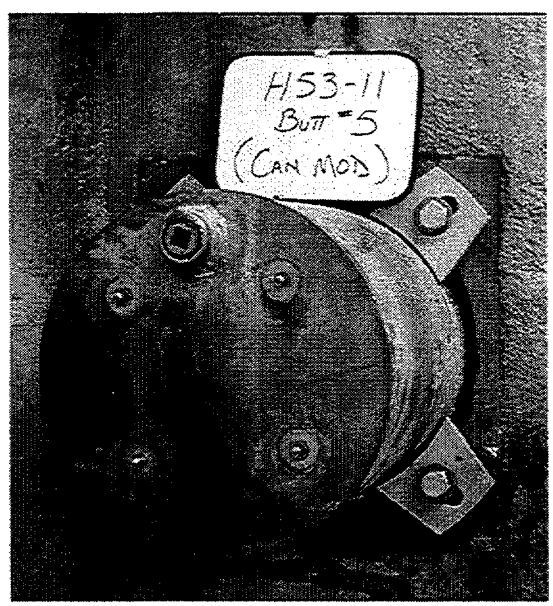
H13-12	H13-13	H13-21	H15-13	D-202NE	D-336NW

IX. TENDON RETENSIONING AND RESEALING

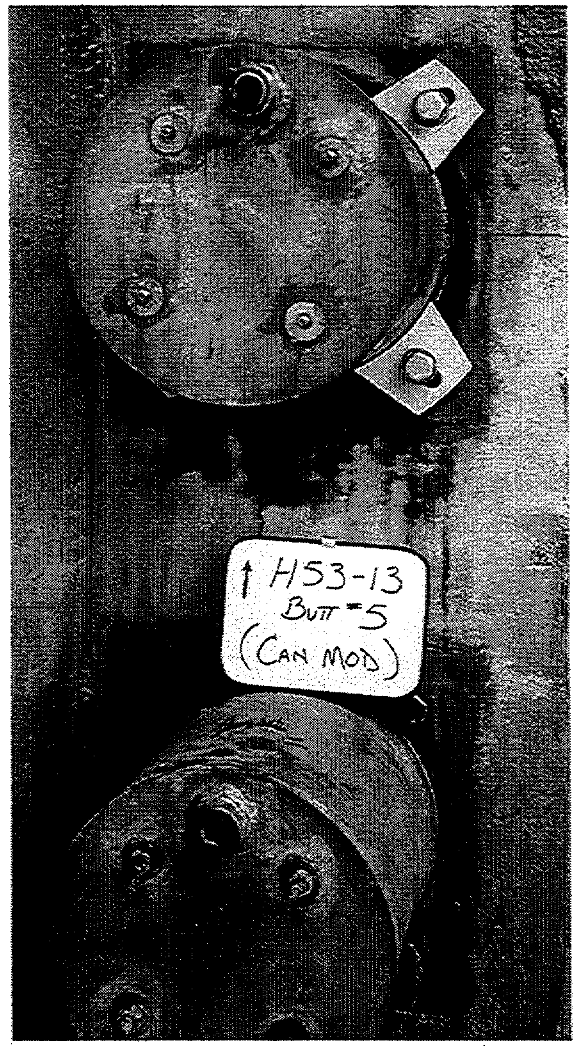


Tendon Cap Modifications

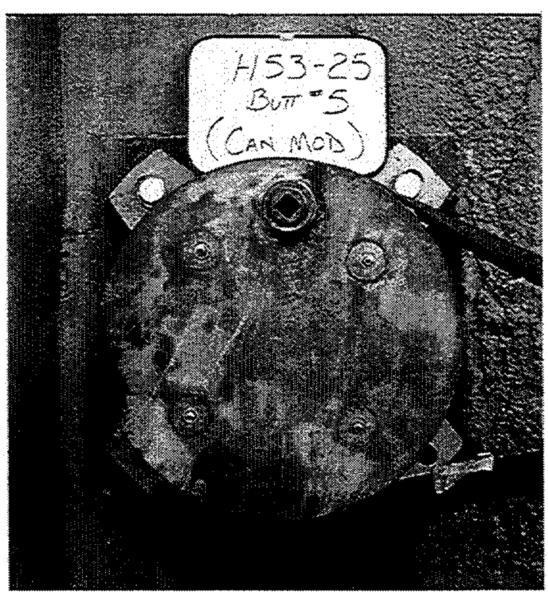




IX. TENDON RETENSIONING AND RESEALING



Tendon Cap Modifications



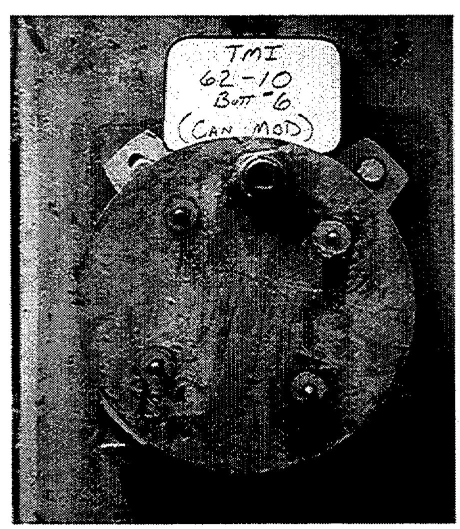


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TABLE XII: SUMMARY OF DATA SHEET 4 RETENSIONING DATA FOR DETENSIONED TENDONS

TENDON	END	ORIGINAL ELONGATION		OBSERVED ELONGATION		% VARI.	ACCEPT	LIFTOFF BEFORE RETEN.	RETENSIONING			% VARI.	ACCEPT .
		EACH	TOTAL	EACH	TOTAL				JACK	PRESS.	L/OFF		
V-86	TOP	12.40	12.40	13.2	13.2	+6.45	YES	1202	9365	5940	1257	+4.58	YES
V-164	TOP	12.45	12.45	13.70	13.70	+10.0	YES	1181	9365	6040	1279	+4.24 *	YES
D-102	NE	3.40	6.75	4.25	7.75	+14.8	YES**	1276	6001	6750	1281	+0.39	YES
	NW	3.35		3.50				1284	6002	6850	1293	+0.70	YES
H13-50	BUTT 1	4.90	10.65	5.2	10.6	-0.47	YES	1183	6001	6433	1220	+3.13	YES
	BUTT 3	5.75		5.4			—	1135	6002	6120	1154	+1.67	YES

* Restored to –0%, +5% of expected force per procedure.

** Acceptable based on Topical Report No. 136 Table 20.

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE LOSS Vs GREASE REPLACEMENT TO SURVEILLANCE TENDONS

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF.	ACCEPT
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)	(GAL.)	
V-32♠	5.0	10.0	15.0	15.0	0.0	15.0	0.0	YES
V-40♠	5.0	59.5	64.5	66.0	0.0	66.0	1.50	YES
V-114♠	3.0	14.0	17.0	18.0	0.0	18.0	1.0	YES
V-164♠	5.0	52.5	57.5	69.5	0.0	69.5	12.0	NO*
D-102♠	9.0	6.0	15.0	9.0	8.0	17.0	2.0	YES
D-104♠	8.0	8.0	16.0	9.75	8.75	18.5	2.5	YES
D-225♠	12.5	0.5	13.0	14.0	0.0	14.0	1.0	YES
D-313♠	4.0	6.0	10.0	4.25	8.75	13.0	3.0	YES
H13-50♠	7.0	6.0	13.0	8.0	8.0	16.0	3.0	YES
H35-33♠	8.0	7.0	15.0	11.0	7.50	18.5	3.5	YES
H46-37♠	6.0	8.0	14.0	8.0	9.0	17.0	3.0	YES
H51-43♠	5.0	5.0	10.0	5.0	8.0	13.0	3.0	YES
H62-26♠	0.5	7.0	7.5	4.0	6.0	10.0	2.5	YES

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI-1 Administrative Limit).

♠ Main Gasket Replaced

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE LOSS Vs GREASE REPLACEMENT TO GREASE LEAK REPAIR TENDONS WITH CAN MODIFICATIONS.

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF.	ACCEPT
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)	(GAL.)	*
D-145 SE♠	N/A	9.0	9.0	N/A	9.75	9.75	0.75	YES
D-147 SE♠	N/A	9.0	9.0	N/A	9.75	9.75	0.75	YES
D-317 SE♠	N/A	6.0	6.0	N/A	9.0	9.0	3.0	YES
H24-51 ♠	N/A	3.0	3.0	N/A	6.0	6.0	3.0	YES
H26-4 ♠	N/A	7.0	7.0	N/A	9.0	9.0	2.0	YES
H26-52 ♠	N/A	6.0	6.0	N/A	8.5	8.5	2.5	YES
H26-53 ♠	N/A	6.0	6.0	N/A	9.0	9.0	3.0	YES
H31-18 ♠	N/A	5.0	5.0	N/A	10.0	10.0	5.0	NO
H31-46 ♠	N/A	5.0	5.0	N/A	9.0	9.0	4.0	YES
H31-51 ♠	N/A	4.0	4.0	N/A	8.0	8.0	4.0	YES
H31-55 ♠	N/A	4.0	4.0	N/A	8.0	8.0	4.0	YES
H51-14 ♠	N/A	6.0	6.0	N/A	12.0	12.0	6.0	NO
H53-11 ♠	4.0	N/A	4.0	7.0	N/A	7.0	3.0	YES
H53-13 ♠	7.0	N/A	7.0	7.5	N/A	7.5	0.5	YES
H53-24 ♠	4.0	N/A	4.0	7.0	N/A	7.0	3.0	YES
H53-25 ♠	4.0	N/A	4.0	8.0	N/A	8.0	4.0	YES
H53-44 ♠	4.5	N/A	4.5	5.0	N/A	5.0	0.5	YES
H53-48 ♠	6.0	N/A	6.0	8.5	N/A	8.5	2.5	YES
H62-10 ♠	9.0	N/A	9.0	8.75	N/A	8.75	-0.25	YES
H62-13 ♠	7.0	N/A	7.0	8.75	N/A	8.75	1.75	YES
H62-14 ♠	8.0	N/A	8.0	8.25	N/A	8.25	0.25	YES
H62-15 ♠	7.0	N/A	7.0	8.75	N/A	8.75	1.75	YES

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI-1 Administrative Limit).

♠ Main Gasket Replaced

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UNIT 1 CONTAINMENT BUILDING

GPU NUCLEAR

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE LOSS Vs GREASE REPLACEMENT TO GREASE LEAK REPAIR TENDONS.

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF.	ACCEPT
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)	(GAL.)	*
D202 NE♠ *	N/A	8.0	8.0	N/A	9.5	9.5	1.5	YES
D-336♠ *	N/A	6.0	6.0	N/A	7.0	7.0	1.0	YES
H13-12♠ *	8.0	N/A	8.0	9.0	N/A	9.0	1.0	YES
H13-13♠ *	7.0	N/A	7.0	8.75	N/A	8.75	1.75	YES
H13-21♠ *	7.0	N/A	7.0	9.0	N/A	9.0	2.0	YES
H51-4♠ **	N/A	4.0	4.0	N/A	6.0	6.0	2.0	YES
H53-6♠	4.0	N/A	4.0	5.0	N/A	5.0	1.0	YES
V-19♠	9.0	N/A	9.0	12.0	N/A	12.0	3.0	YES
V-83♠	5.0	N/A	5.0	10.0	N/A	10.0	5.0	NO
V-126♠	6.0	N/A	6.0	12.0	N/A	12.0	6.0	NO
V-139♠	6.0	N/A	6.0	9.0	N/A	9.0	3.0	YES

COMBINATION

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF.	ACCEPT
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)	(GAL.)	*
H51-13	6.0 *	6.0 **	12.0	9.0	12.0	21.0	9.0	NO

* Leak repair only

♠ Main Gasket Replaced

** Grease can modification and leak repair

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI-1 Administrative Limit).

**TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1
GREASE LOSS Vs GREASE REPLACEMENT TO ADDITIONAL INSPECTION
VERTICAL TENDONS.**

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF. (GAL.)	ACCEPT *
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)		
V-8♠	4.0	0.0	4.0	10.0	0.0	10.0	6.0	NO
V-35♠	4.0	0.0	4.0	10.5	0.0	10.5	6.5	NO
V-57♠	4.0	0.0	4.0	9.0	0.0	9.0	5.0	NO
V-80♠	5.0	0.0	5.0	9.0	0.0	9.0	4.0	YES
V-86♠	4.0	46.0	50.0	47.0	0.0	47.0	-3.0	YES
V-94♠	4.0	0.0	4.0	10.0	0.0	10.0	6.0	NO
V-110♠	4.0	0.0	4.0	12.0	0.0	12.0	8.0	NO
V-143♠	4.0	0.0	4.0	12.25	0.0	12.25	8.25	NO
V-156♠	4.0	0.0	4.0	12.75	0.0	12.75	8.75	NO

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI-1 Administrative Limit).

♠ Main Gasket Replaced

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE LOSS Vs GREASE REPLACEMENT TO GREASE LEAK MITIGATION VERTICAL TENDONS. (7 TOTAL)

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF.	ACCEPT
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD*	TOTAL (GAL.)	(GAL.)	
V-72	0.0	0.5	0.5	4.0	0.0	4.0	3.5	YES
V-73	0.0	0.5	0.5	5.0	0.0	5.0	4.5	NO
V-74	0.0	0.5	0.5	9.0	0.0	9.0	8.5	NO
V-75	0.0	0.5	0.5	9.0	0.0	9.0	8.5	NO
V-76	0.0	0.5	0.5	5.5	0.0	5.5	5.0	NO
V-136	0.0	0.5	0.5	14.0	0.0	14.0	13.5	NO
V-146	0.0	0.5	0.5	12.5	0.0	12.5	12.0	NO

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities.

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE REPLACEMENT/TOP OFF TO VERTICAL TENDONS EXHIBITING GREASE LEAKS. (29 TOTAL)

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF. (GAL.)	ACCEPT *
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)		
V-1	0.0	0.0	0.0	12.5	0.0	12.5	12.5	NO
V-3	0.0	0.0	0.0	10.5	0.0	10.5	10.5	NO
V-5	0.0	0.0	0.0	14.5	0.0	14.5	14.5	NO
V-6	0.0	0.0	0.0	5.0	0.0	5.0	5.0	NO
V-13	0.0	0.0	0.0	9.5	0.0	9.5	9.5	NO
V-17	0.0	0.0	0.0	5.0	0.0	5.0	5.0	NO
V-21	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-23	0.0	0.0	0.0	1.5	0.0	1.5	1.5	YES
V-26	0.0	0.0	0.0	5.0	0.0	5.0	5.0	NO
V-28	0.0	0.0	0.0	10.0	0.0	10.0	10.0	NO
V-31	0.0	0.0	0.0	4.0	0.0	4.0	4.0	YES
V-32	SCHEDULED SURVEILLANCE TENDON							
V-41	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-46	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-51	0.0	0.0	0.0	4.0	0.0	4.0	4.0	YES

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI Administrative Limit).

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE REPLACEMENT/TOP OFF TO VERTICAL TENDONS EXHIBITING GREASE LEAKS. (29 TOTAL)

SHEET 2 OF 2

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF. (GAL.)	ACCEPT *
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)		
V-54	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-59	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-131	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-132	0.0	0.0	0.0	10.0	0.0	10.0	10.0	NO
V-134	0.0	0.0	0.0	10.5	0.0	10.5	10.5	NO
V-135	0.0	0.0	0.0	7.5	0.0	7.5	7.5	NO
V-137	0.0	0.0	0.0	12.5	0.0	12.5	12.5	NO
V-138	0.0	0.0	0.0	4.0	0.0	4.0	4.0	YES
V-139♠	6.0	0.0	6.0	9.0	0.0	9.0	3.0	YES
V-140	0.0	0.0	0.0	9.0	0.0	9.0	9.0	NO
V-153	0.0	0.0	0.0	3.0	0.0	3.0	3.0	YES
V-155	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-159	0.0	0.0	0.0	4.0	0.0	4.0	4.0	YES
V-162	0.0	0.0	0.0	3.0	0.0	3.0	3.0	YES

♠ Main Gasket Replaced

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI-1 Administrative Limit).

25TH YEAR SURVEILLANCE OF THE
POST-TENSIONING SYSTEM AT THE
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE REPLACEMENT/TOP OFF TO ALL VERTICAL TENDONS PER T1999-0962/0963.

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF.	ACCEPT
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)	(GAL.)	*
V-2	0.0	0.0	0.0	4.5	0.0	4.5	4.5	NO
V-4	0.0	0.0	0.0	3.5	0.0	3.5	3.5	YES
V-7	0.0	0.0	0.0	8.5	0.0	8.5	8.5	NO
V-9	0.0	0.0	0.0	4.0	0.0	4.0	4.0	YES
V-10	0.0	0.0	0.0	4.0	0.0	4.0	4.0	YES
V-11	0.0	0.0	0.0	5.0	0.0	5.0	5.0	NO
V-12	0.0	0.0	0.0	4.5	0.0	4.5	4.5	NO
V-14	0.0	0.0	0.0	3.5	0.0	3.5	3.5	YES
V-15	0.0	0.0	0.0	5.0	0.0	5.0	5.0	NO
V-16	0.0	0.0	0.0	3.0	0.0	3.0	3.0	YES
V-17	0.0	0.0	0.0	0.0	0.0	0.0	0.0	YES
V-18	0.0	0.0	0.0	14.5	0.0	14.5	14.5	NO
V-20	0.0	0.0	0.0	8.0	0.0	8.0	8.0	NO
V-22	0.0	0.0	0.0	2.0	0.0	2.0	2.0	YES
V-24	0.0	0.0	0.0	4.0	0.0	4.0	4.0	YES
V-25	0.0	0.0	0.0	5.5	0.0	5.5	5.5	NO
V-27	0.0	0.0	0.0	2.0	0.0	2.0	2.0	YES
V-29	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-30	0.0	0.0	0.0	5.5	0.0	5.5	5.5	NO
V-33	0.0	0.0	0.0	8.0	0.0	8.0	8.0	NO
V-34	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-36	0.0	0.0	0.0	7.5	0.0	7.5	7.5	NO

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI Administrative Limit).

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE REPLACEMENT/TOP OFF TO ALL VERTICAL TENDONS PER T1999-0962/0963.

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF.	ACCEPT
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)	(GAL.)	*
V-37	0.0	0.0	0.0	3.5	0.0	3.5	3.5	YES
V-38	0.0	0.0	0.0	3.5	0.0	3.5	3.5	YES
V-39	0.0	0.0	0.0	5.5	0.0	5.5	5.5	NO
V-42	0.0	0.0	0.0	11.0	0.0	11.0	11.0	NO
V-43	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-44	0.0	0.0	0.0	10.5	0.0	10.5	10.5	NO
V-45	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-47	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-48	0.0	0.0	0.0	0.5	0.0	0.5	0.5	YES
V-49	0.0	0.0	0.0	8.0	0.0	8.0	8.0	NO
V-50	0.0	0.0	0.0	13.0	0.0	13.0	13.0	NO
V-52	0.0	0.0	0.0	12.0	0.0	12.0	12.0	NO
V-53	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-55	0.0	0.0	0.0	1.5	0.0	1.5	1.5	YES
V-56	0.0	0.0	0.0	8.5	0.0	8.5	8.5	NO
V-58	0.0	0.0	0.0	6.5	0.0	6.5	6.5	NO
V-60	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-61	0.0	0.0	0.0	3.5	0.0	3.5	3.5	YES
V-62	0.0	0.0	0.0	6.5	0.0	6.5	6.5	NO
V-63	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-64	0.0	0.0	0.0	2.5	0.0	2.5	2.5	YES
V-65	0.0	0.0	0.0	6.5	0.0	6.5	6.5	NO

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI Administrative Limit).

25TH YEAR SURVEILLANCE OF THE
POST-TENSIONING SYSTEM AT THE
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE REPLACEMENT/TOP OFF TO ALL VERTICAL TENDONS PER T1999-0962/0963.

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF. (GAL.)	ACCEPT *
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)		
V-66	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-67	0.0	0.0	0.0	5.5	0.0	5.5	5.5	NO
V-68	0.0	0.0	0.0	9.0	0.0	9.0	9.0	NO
V-69	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-70	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-71	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-77	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-78	0.0	0.0	0.0	0.5	0.0	0.5	0.5	YES
V-79	0.0	0.0	0.0	29.0	0.0	29.0	29.0	NO
V-81	0.0	0.0	0.0	13.0	0.0	13.0	13.0	NO
V-82	0.0	0.0	0.0	8.0	0.0	8.0	8.0	NO
V-84	0.0	0.0	0.0	1.0	0.0	1.0	1.0	YES
V-85	0.0	0.0	0.0	2.5	0.0	2.5	2.5	YES
V-87	0.0	0.0	0.0	8.5	0.0	8.5	8.5	NO
V-88	0.0	0.0	0.0	9.0	0.0	9.0	9.0	NO
V-89	0.0	0.0	0.0	9.5	0.0	9.5	9.5	NO
V-90	0.0	0.0	0.0	9.5	0.0	9.5	9.5	NO
V-91	0.0	0.0	0.0	9.5	0.0	9.5	9.5	NO
V-92	0.0	0.0	0.0	5.5	0.0	5.5	5.5	NO
V-93	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-95	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-96	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI Administrative Limit).

25TH YEAR SURVEILLANCE OF THE
POST-TENSIONING SYSTEM AT THE
THREE MILE ISLAND
UNIT 1 CONTAINMENT BUILDING

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE REPLACEMENT/TOP OFF TO ALL VERTICAL TENDONS PER T1999-0962/0963.

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF.	ACCEPT
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)	(GAL.)	*
V-97	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-98	0.0	0.0	0.0	8.5	0.0	8.5	8.5	NO
V-99	0.0	0.0	0.0	7.5	0.0	7.5	7.5	NO
V-100	0.0	0.0	0.0	8.0	0.0	8.0	8.0	NO
V-101	0.0	0.0	0.0	9.0	0.0	9.0	9.0	NO
V-102	0.0	0.0	0.0	8.5	0.0	8.5	8.5	NO
V-103	0.0	0.0	0.0	8.5	0.0	8.5	8.5	NO
V-104	0.0	0.0	0.0	8.0	0.0	8.0	8.0	NO
V-105	0.0	0.0	0.0	5.0	0.0	5.0	5.0	NO
V-106	0.0	0.0	0.0	2.0	0.0	2.0	2.0	YES
V-107	0.0	0.0	0.0	10.0	0.0	10.0	10.0	NO
V-108	0.0	0.0	0.0	8.0	0.0	8.0	8.0	NO
V-109	0.0	0.0	0.0	8.0	0.0	8.0	8.0	NO
V-111	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-112	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-113	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-115	0.0	0.0	0.0	8.0	0.0	8.0	8.0	NO
V-116	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-117	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-118	0.0	0.0	0.0	5.5	0.0	5.5	5.5	NO
V-119	0.0	0.0	0.0	3.5	0.0	3.5	3.5	YES
V-120	0.0	0.0	0.0	4.0	0.0	4.0	4.0	YES

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI Administrative Limit).

Precision Surveillance Corporation

25TH YEAR SURVEILLANCE OF THE POST-TENSIONING SYSTEM AT THE THREE MILE ISLAND UNIT 1 CONTAINMENT BUILDING

GPU NUCLEAR

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE REPLACEMENT/TOP OFF TO ALL VERTICAL TENDONS PER T1999-0962/0963.

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF.	ACCEPT
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)	(GAL.)	*
V-121	0.0	0.0	0.0	3.5	0.0	3.5	3.5	YES
V-122	0.0	0.0	0.0	3.0	0.0	3.0	3.0	YES
V-123	0.0	0.0	0.0	4.0	0.0	4.0	4.0	YES
V-124	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-125	0.0	0.0	0.0	6.5	0.0	6.5	6.5	NO
V-127	0.0	0.0	0.0	5.5	0.0	5.5	5.5	NO
V-128	0.0	0.0	0.0	5.5	0.0	5.5	5.5	NO
V-129	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-130	0.0	0.0	0.0	9.0	0.0	9.0	9.0	NO
V-132	0.0	0.0	0.0	4.5	0.0	4.5	4.5	NO
V-133	0.0	0.0	0.0	4.5	0.0	4.5	4.5	NO
V-141	0.0	0.0	0.0	7.5	0.0	7.5	7.5	NO
V-142	0.0	0.0	0.0	12.0	0.0	12.0	12.0	NO
V-144	0.0	0.0	0.0	8.5	0.0	8.5	8.5	NO
V-145	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-147	0.0	0.0	0.0	11.5	0.0	11.5	11.5	NO
V-148	0.0	0.0	0.0	6.5	0.0	6.5	6.5	NO
V-149	0.0	0.0	0.0	7.0	0.0	7.0	7.0	NO
V-150	0.0	0.0	0.0	6.0	0.0	6.0	6.0	NO
V-151	0.0	0.0	0.0	9.0	0.0	9.0	9.0	NO
V-152	0.0	0.0	0.0	4.0	0.0	4.0	4.0	YES

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI Administrative Limit).

TABLE XIII: SUMMARY OF DATA SHEET 11 TO UNIT 1 GREASE REPLACEMENT/TOP OFF TO ALL VERTICAL TENDONS PER T1999-0962/0963.

TENDON	GREASE REMOVED			GREASE REPLACED			DIFF. (GAL.)	ACCEPT *
	SHOP	FIELD	TOTAL (GAL.)	SHOP	FIELD	TOTAL (GAL.)		
V-154	0.0	0.0	0.0	7.5	0.0	7.5	7.5	NO
V-157	0.0	0.0	0.0	7.5	0.0	7.5	7.5	NO
V-158	0.0	0.0	0.0	3.0	0.0	3.0	3.0	YES
V-160	0.0	0.0	0.0	4.5	0.0	4.5	4.5	NO
V-161	0.0	0.0	0.0	5.5	0.0	5.5	5.5	NO
V-163	0.0	0.0	0.0	12.0	0.0	12.0	12.0	NO
V-165	0.0	0.0	0.0	3.5	0.0	3.5	3.5	YES
V-166	0.0	0.0	0.0	5.0	0.0	5.0	5.0	NO

* CAP/MNCR T1999-0962/0963 provides evaluation and corrective actions to address greater than 4 gallons replacement grease quantities (TMI Administrative Limit).

X. COMPARISON WITH ORIGINAL INSTALLATION DATA

A comparison of the liftoff forces from this surveillance to the original installation lock-off forces is made in an effort to detect any evidence of system degradation. The lock-off forces are compared in order to detect any abnormal force loss which would possibly indicate an underestimation of the creep, shrinkage and/or elastic shortening effects in the Containment Building.

The losses for the tendon groups were found to be 17.00% for the vertical tendons, 19.37% for the horizontal tendons and 17.86% for the dome tendons. These losses are as expected for a containment of this age and do not indicate any degradation of the system. Analysis in Topical Report No. 136 also projects acceptable force levels beyond the next surveillance period.

TABLE XIV: COMPARISON OF ORIGINAL LOCKOFF FORCES TO AS FOUND FORCES

TENDON	LIFTOFF FORCE		LOSS	PERCENTAGE	AVERAGE
	ORIGINAL	@ 25 YEARS	(kips)	%	PERCENTAGE
V-32	1458	1193	265	18.18	17.00
V-40	1421	1202	219	15.41	
V-114	1406	1189	217	15.43	
V-164	1458	1181	277	19.00	
D-102	1401	1280	121	8.63	17.86
D-225	1427	1104	323	22.63	
D-313	1442	1120	322	22.33	
H13-50	1455	1159	296	20.34	19.37
H35-33	1406	1170	236	16.79	
H46-37	1416	1128	288	20.34	
H51-43	1455	1170	285	19.59	
H62-26	1416	1136	280	19.77	

CONCLUSION

Based upon an evaluation of the In-Service Inspection results for the Twenty-fifth Year Physical Tendon Surveillance reported herein, PSC concludes that the Three Mile Island Unit 1 Containment Structure has experienced no abnormal degradation of the post tensioning system.

Confirmation testing on one grease sample for high nitrate value on V-164 proved acceptable and no evidence of corrosion or deterioration/cracking was noted on any anchorage components to that tendon.

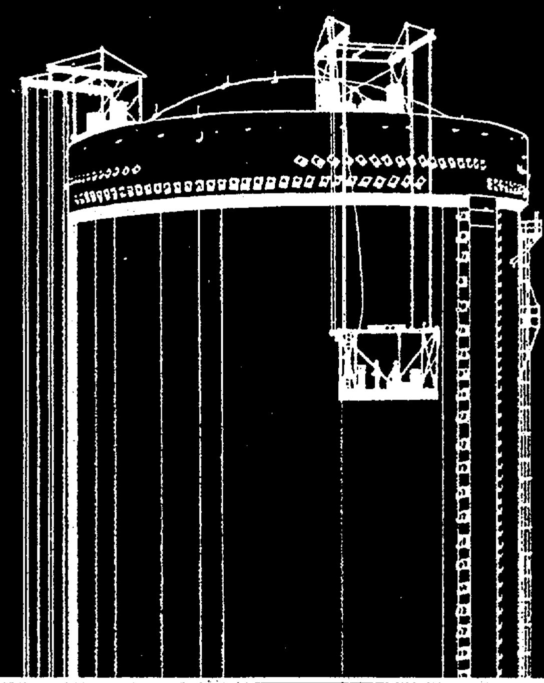
One crack was noted adjacent to the bearing plate of H46-37 buttress 6 end, monitoring before and after liftoff showed no change in the crack size.

Dome tendon crack mapping showed no change from Period 6.

All vertical tendons were topped off to assure complete coverage of upper anchorage assemblies.

No detrimental conditions were noted on any of the tendon ends, and after all evaluation, it is considered that the post tensioning system has experienced no abnormal degradation.

ATTACHMENT 3
TO
TOPICAL REPORT NO. 136
VOLUME II OF III



PSC
Precision Surveillance Corporation

DATA SHEET 1
Prestress Force Confirmation Test
Dome Tendons

INSPECTION PERIOD 7th

TENDON					LIFT-OFF CONDITION					RETENSIONING			REACTOR BLDG. TEMP.		DATE INSP.	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV. INSP.
I.D.	LOCATION	RAM ID/AREA (SQ.IN.)	PREVIOUS FORCE (KIPS)	EXPECTED LIFT-OFF FORCE (KIPS)	GAGE PRESS. (KSI)	FORCE (KIPS)	FORCE AVG. OF 2 ENDS (KIPS)	SHIM THICKNESS (IN.) PREVIOUS	SHIM THICKNESS (IN.) AS-FOUND	GAGE PRESS. (KSI)	FORCE (KIPS)	FINAL SHIM THICKNESS (IN.)	°F INT.	°F EXT.		SIGNATURE	SIGNATURE
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. 225	NW	6001/ ①	1427	1081	5900	1118	1104	7.60"	7.70"	N/A	N/A	N/A	120.9	72	8/25/99	[illegible]	[illegible]
	SE	6002/ ②	1427		5787	1090		4.70"	4.70"	N/A	N/A	N/A	116.0	70	9/1/99	[illegible]	[illegible]
2. 313	SE	6002/ ②	1442	1108	5990	1129	1120	5.30	5.40	N/A	N/A	N/A	68.6	44	10-5-99	[illegible]	[illegible]
	NE	6001/ ①	1442		5860	1110		4.70	5.00	N/A	N/A	N/A	68.6	44	10-5-99	[illegible]	[illegible]
3. 102	NE	6001/ ①	1401	1108	6720	1276	1280	5.150	5.25	6750	1281	5.50"	63.9	38	10-7-99	[illegible]	[illegible]
	NW	6002/ ②	1401		6800	1284		5.175	5.60	6850	129.3	5.70	63.9	38	10-7-99	[illegible]	[illegible]
4.		/															
5.		/															
6.		/															

NOTE A:

FORCE CALCULATION: FORCE @ LIFT-OFF = JACK PRESSURE X RAM AREA
OR
FROM CALIBRATION EQUATION

CALIBRATION EQUATIONS

RAM ID	EQUATION
6001 6002	$PSI = \frac{FORCE - (K)}{AREA} \times 1{,}000$

LEGEND:

LOCATION: NW, NE, SW, SE QUADRANT

SHIM THICKNESS: CLEAR DISTANCE BETWEEN BEARING PLATE AND STRESSING WASHER.

PREVIOUS: AT TIME OF ORIGINAL INSTALLATION OR, IF APPLICABLE, FROM PREVIOUS SURVEILLANCE

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [illegible] DATE: 11/10/99

① RAM 6001
AREA = 192.113
(K) = -15.416

② RAM 6002
AREA = 191.165
(K) = -16.036

DATA SHEET 2
Prestress Force Confirmation Test
Hoop Tendons

INSPECTION PERIOD 7th

TENDON					LIFT-OFF CONDITION					RETENSIONING			REACTOR BLDG. TEMP.		DATE INSP.	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV. INSP.
I.D.	LOCATION	RAM ID/AREA (SQ.IN.)	PREVIOUS FORCE (KIPS)	EXPECTED LIFT-OFF FORCE (KIPS)	GAGE PRESS. (KSI)	FORCE (KIPS)	FORCE AVG. OF 2 ENDS (KIPS)	SHIM THICKNESS (IN.) PREVIOUS	SHIM THICKNESS (IN.) AS-FOUND	GAGE PRESS. (KSI)	FORCE (KIPS)	FINAL SHIM THICKNESS (IN.)	°F INT.	°F EXT.		SIGNATURE	SIGNATURE
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 62-26	BUTT #6	6001/ 1	1416	1120	5980	1133	1136	6.85"	6.90"	N/A	N/A	N/A	117.9	72	9/1/99	[illegible]	[illegible]
	BUTT #2	FT-1/ 2	1416		6920	1138		7.20"	7.30"	N/A	N/A	N/A	119.2	88	9/2/99	[illegible]	[illegible]
2 35-33	BUTT #3	FT-1/ 2	1406	1137	7040	1158	1170	7.25"	7.30"	N/A	N/A	N/A	120.6	85	9/3/99	[illegible]	[illegible]
	BUTT #5	6001/ 1	1406		6227	1181		7.00"	7.10"	N/A	N/A	N/A	123.4	70	9/7/99	[illegible]	[illegible]
3 51-43	BUTT #5	6002/ 3	1455	1175	6170	1163	1170	6.75"	6.80"	N/A	N/A	N/A	94.1	82	9/13/99	[illegible]	[illegible]
	BUTT #1	6001/ 1	1458		6200	1176		7.00"	7.20"	N/A	N/A	N/A	94.1	80	9/14/99	[illegible]	[illegible]
4 46-37	BUTT #6	6001/ 1	1416	1076	5987	1134	1128	6.625"	6.90"	N/A	N/A	N/A	93.8	80	9/14/99	[illegible]	[illegible]
	BUTT #4	6002/ 3	1416		5960	1123		6.40	6.60	N/A	N/A	N/A	74.8	46	9-23-99	[illegible]	DPO
5 19-50	BUTT #1	6001/ 1	1437	1097	6240	1183	1159	6.50	6.65	6433	1220		[illegible]	44	10-2-99	[illegible]	DPO
	BUTT #3	6002/ 3	1437		6020	1135		6.50	6.65	6120	1154		69.6	48	10-2-99	[illegible]	DPO
6.		/															

NOTE A:

FORCE CALCULATION: FORCE @ LIFT-OFF = JACK PRESSURE X RAM AREA
OR
FROM CALIBRATION EQUATION

CALIBRATION EQUATIONS

RAM ID	EQUATION
6001 FT-1 6002	$PSI = \frac{FORCE - (K)}{AREA} \times 1{,}000$

LEGEND:

LOCATION: 1 to 6 - NUMBER OF BUTTRESS NEARER TO END OF TENDON

SHIM THICKNESS: CLEAR DISTANCE BETWEEN BEARING PLATE AND STRESSING WASHER.

PREVIOUS: AT TIME OF ORIGINAL INSTALLATION OR, IF APPLICABLE, FROM PREVIOUS SURVEILLANCE

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [illegible] DATE: 11/10/99

1 RAM 6001
AREA = 192.113
(K) = -15.416

2 RAM FT-1
AREA = 165.801
(K) = -9.179

3 RAM 6002
AREA = 191.165
(K) = -16.036

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DATA SHEET 3
Prestress Force Confirmation Test
Vertical Tendons

INSPECTION PERIOD 7th

TENDON I.D.	LOCATION	RAM ID/AREA (SQ.IN.)	PREVIOUS FORCE (KIPS)	EXPECTED LIFT-OFF FORCE (KIPS)	LIFT-OFF CONDITION GAGE PRESS. (KSI)	FORCE (KIPS)	FORCE AVG. OF 2 ENDS (KIPS)	SHIM THICKNESS (IN.) PREVIOUS	SHIM THICKNESS (IN.) AS-FOUND	RETENSIONING GAGE PRESS. (KSI)	FORCE (KIPS)	FINAL SHIM THICKNESS (IN.)	REACTOR BLDG. TEMP. °F INT.	EXT.	DATE INSP.	INSP. BY CONTR. FOREMAN SIGNATURE	VERIF. BY COGNIZANT QV. INSP. SIGNATURE
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. V32	T	9365/ ①	1458	1192	5640	1193	1193	14.15"	14.2"	N/A	N/A	N/A	121.8°	80°	8/21/99	CB	[illegible]
2. V40	T	9365/ ①	1421	1187	5680	1202	1202		15.1"	N/A	N/A	N/A	121.8°	80°	8/21/99	CB	[illegible]
3. V114	T	9365/ ①	1406	1158	5620	1189	1189	14.50"	14.7"	N/A	N/A	N/A JS 9-13-99	94.1	68°	9/13/99	CB	[illegible]
4. V164	T	9365/ ①	1458	1227	5580	1181	1181	14.75	* 15.10"	4040	1279	* 15.60"	104.5	48	10/21/99	CB	[illegible]
5. V86	T	9365/ ①	1427	1176	5680	1202	1202	~~14.90~~ 16.50	~~15.90~~ * 16.90 DAD 10-22-99	5940	1257	* 15.40	105.6	46	10/22/99	CB	[illegible]
6.		/															

NOTE A:

FORCE CALCULATION: FORCE @ LIFT-OFF = JACK PRESSURE X RAM AREA
OR
FROM CALIBRATION EQUATION

CALIBRATION EQUATIONS	
RAM ID	EQUATION
9365	$PSI = \frac{FORCE - (K)}{AREA} \times 1{,}000$

LEGEND:

LOCATION: T OR B - TOP OR BOTTOM OF VERTICAL TENDON

SHIM THICKNESS: CLEAR DISTANCE BETWEEN BEARING PLATE AND STRESSING WASHER.

PREVIOUS: AT TIME OF ORIGINAL INSTALLATION OR, IF APPLICABLE, FROM PREVIOUS SURVEILLANCE

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [signature] DATE: 11/10/99

RAM 9365
① RAM AREA 213.651
(K) = -8.119

*: V164 ADDED 1" OF SHIMS TO FIELD/BOTTOM END, DAD 10-21-99
V86 ADDED 3" OF SHIMS TO FIELD/BOTTOM END. DAD 10-22-99

A37 424

DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. V86

Inspection Period 7TH.

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	ORIGINAL STRESSING DATA[a]						
1	Tendon Force @ 1000 psi (Kips)	210	DPO	10-22-99			
2	Tendon Force @ 80% ULT (Kips)	1474	DPO	10-22-99			
3	Tendon Elongation @ Installation (Inches)	12.40"	DPO	10-22-99			
4	Tendon Elongation Sum (3), Shop Plus Field Ends	12.40"	DPO	10-22-99	N	A DPO 10-22-99	
	RETENSIONING DATA						
5	Tendon Force (Kips) From Row 1	168	DPO	10-22-99			
6	Initial Gauge Pressure[b] at Tendon Force in Row 5 (PSI)	830	DPO	10-22-99			
7	Ram Extension @ Initial Gauge Press., (Inches)	5.50"	DPO	10-22-99			
8	Overstress Tendon Force (Kips)[c]	1583.5	DPO	10-22-99			
9	Overstress Gauge Pressure[d] for Row 8 Tendon Force (PSI)	7470	DPO	10-22-99			

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. V86

Inspection Period 4TH

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	MEASURED ELONGATION DATA						
10	Gauge Pressure at 1/3 Overstress Force, PSI [(9) x 1/3]	2520	DPO	10-22-99			
11	Ram Extension at Gauge Pressure [from (10)] (Inches)	8.80"	DPO	10-22-99			
12	Gauge Pressure at 2/3 Overstress Force, PSI [(9) x 2/3]	4990	DPO	10-22-99	N A	DPO	10-22-99
13	Ram Extension at Gauge Pressure [from (12)] (Inches)	12.90"	DPO	10-22-99			
14	Ram Extension at Overstress Gauge Pressure, (Inches) [from (9) x 1.0]	18.70	DPO	10-22-99			
15	Tendon Force at Overstress (Kips)	1583.5	DPO	10-22-99			

A57 724

DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. V86

Inspection Period 4TH

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	CALCULATED DATA						
16	Tendon Elongation (14) - (7), inches	13.2"	DPO	10-22-99			
17	Total Elongation Sum (16), Shop plus Field Ends	13.2"	DPO	10-22-99			
18	% Difference Retention vs. Original Elongation $\frac{(17) - (4)}{(4)} \times 100$	+6.5%	DPO	10-22-99		NA DPO 10-22-99	
19	Acceptance Criteria -10% < (18) < +10%	YES	DPO	10-22-99			

a - OBTAIN FROM ORIGINAL STRESSING RECORDS. SEE TABLE 7 OF VM-TM-2485
b - VALUE CORRESPONDING TO TENDON FORCE IN ROW (1). NOTE THE GAUGE PRESSURE DEPENDS ON THE SPECIFIC STRESSING GAUGE AND RAM BEING USED AND THE RESULTING CALIBRATION PRESSURE-FORCE RELATIONSHIP.
c - VALUES FROM ROW (2).
d - VALUE CORRESPONDING TO TENDON FORCE IN ROW (8). SEE NOTE UNDER FOOTNOTE b.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [signature] DATE: 11/1/99

PERFORMED BY [signature] DATE: 10-22-99

A6 7 424

DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. V164

Inspection Period 7TH.

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	ORIGINAL STRESSING DATA[a]						
1	Tendon Force @ 1000 psi (Kips)	210	DPO	10-21-99			
2	Tendon Force @ 80% ULT (Kips)	1479	DPO	10-21-99			
3	Tendon Elongation @ Installation (Inches)	12.45	DPO	10-21-99			
4	Tendon Elongation Sum (3), Shop Plus Field Ends	12.45	DPO	10-21-99			
	RETENSIONING DATA					N/A DPO 10-21-99	
5	Tendon Force (Kips) From Row 1	168	DPO	10-21-99			
6	Initial Gauge Pressure[b] at Tendon Force in Row 5 (PSI)	830	DPO	10-21-99			
7	Ram Extension @ Initial Gauge Press., (Inches)	4.9	DPO	10-21-99			
8	Overstress Tendon Force (Kips)[c]	1583.5	DPO	10-21-99			
9	Overstress Gauge Pressure[d] for Row 8 Tendon Force (PSI)	7470	DPO	10-21-99			

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. ~~V86~~ V164 DPO 10-21-99 | Inspection Period 7TH

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	MEASURED ELONGATION DATA						
10	Gauge Pressure at 1/3 Overstress Force, PSI [(9) x 1/3]	2520	DPO	10-21-99			
11	Ram Extension at Gauge Pressure [from (10)] (Inches)	8.40"	DPO	10-21-99			
12	Gauge Pressure at 2/3 Overstress Force, PSI [(9) x 2/3]	4990	DPO	10-21-99		N/A DPO 10-21-99	
13	Ram Extension at Gauge Pressure [from (12)] (Inches)	13.50"	DPO	10-21-99			
14	Ram Extension at Overstress Gauge Pressure, (Inches) [from (9) x 1.0]	18.60	DPO	10-21-99			
15	Tendon Force at Overstress (Kips)	1583.5	DPO	10-21-99			

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. V164

Inspection Period 7TH

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	CALCULATED DATA						
16	Tendon Elongation (14) - (7), inches	13.70	DPO	10-21-99			
17	Total Elongation Sum (16), Shop plus Field Ends	13.70	DPO	10-21-99			
18	% Difference Retention vs. Original Elongation (17) - (4) x 100 / (4)	+10.0%	DPO	10-21-99		NA DPO 10-21-99	
19	Acceptance Criteria -10% < (18) < +10%	YES	DPO	10-21-99			

a - OBTAIN FROM ORIGINAL STRESSING RECORDS. SEE TABLE 7 OF VM-TM-2485

b - VALUE CORRESPONDING TO TENDON FORCE IN ROW (1). NOTE THE GAUGE PRESSURE DEPENDS ON THE SPECIFIC STRESSING GAUGE AND RAM BEING USED AND THE RESULTING CALIBRATION PRESSURE-FORCE RELATIONSHIP.

c - VALUES FROM ROW (2).

d - VALUE CORRESPONDING TO TENDON FORCE IN ROW (8). SEE NOTE UNDER FOOTNOTE b.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [signature] DATE: 11/1/99

PERFORMED BY: [signature] DATE: 10-21-99

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. D102

Inspection Period 4TH

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	ORIGINAL STRESSING DATA[a]						
1	Tendon Force @ 1000 psi (Kips)	210	DPO	10-11-99	210	DPO	10-11-99
2	Tendon Force @ 80% ULT (Kips)	1472	DPO	10-11-99	1472	DPO	10-11-99
3	Tendon Elongation @ Installation (Inches)	3.40"	DPO	10-11-99	3.35"	DPO	10-11-99
4	Tendon Elongation Sum (3), Shop Plus Field Ends	6.75"	DPO	10-11-99	6.75"	DPO	10-11-99
	RETENSIONING DATA					~~DPO 10-11-99~~ ~~DPO~~	
5	Tendon Force (Kips) From Row 1	168	DPO	10-11-99	168	DPO	10-11-99
6	Initial Gauge Pressure[b] at Tendon Force in Row 5 (PSI)	960	DPO	10-11-99	950	DPO	10-11-99
7	Ram Extension @ Initial Gauge Press., (Inches)	2.95"	DPO	10-11-99	2.40	DPO	10-11-99
8	Overstress Tendon Force (Kips)[c]	1583.5	DPO	10-11-99	1583.5	DPO	10-11-99
9	Overstress Gauge Pressure[d] for Row 8 Tendon Force (PSI)	8360	DPO	10-11-99	8320	DPO	10-11-99

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. D102 Inspection Period 7TH

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	MEASURED ELONGATION DATA						
10	Gauge Pressure at 1/3 Overstress Force, PSI [(9) x 1/3]	2840	DPO	10-11-99	2830	DPO	10-11-99
11	Ram Extension at Gauge Pressure [from (10)] (Inches)	4.00"	DPO	10-11-99	3.10"	DPO	10-11-99
12	Gauge Pressure at 2/3 Overstress Force, PSI [(9) x 2/3]	5600	DPO	10-11-99	5570	DPO	10-11-99
13	Ram Extension at Gauge Pressure [from (12)] (Inches)	5.50"	DPO	10-11-99	4.50"	DPO	10-11-99
14	Ram Extension at Overstress Gauge Pressure, (Inches) [from (9) x 1.0]	7.20"	DPO	10-11-99	5.90"	DPO	10-11-99
15	Tendon Force at Overstress (Kips)	1583.5	DPO	10-11-99	1583.5	DPO	10-11-99

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. D102

Inspection Period 4TH

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	CALCULATED DATA						
16	Tendon Elongation (14) - (7), inches	4.25"	DPO	10-11-99	3.50"	DPO	10-11-99
17	Total Elongation Sum (16), Shop plus Field Ends	7.75"	DPO	10-11-99	7.75"	DPO	10-11-99
18	% Difference Retention vs. Original Elongation $\frac{(17) - (4)}{(4)} \times 100$	+14.8	DPO	10-11-99	+14.8	DPO	10-11-99
19	Acceptance Criteria -10% < (18) < +10%	NO	DPO	10-11-99	NO	DPO	10-11-99

a - OBTAIN FROM ORIGINAL STRESSING RECORDS. SEE TABLE 7 OF VM-TM-2485

b - VALUE CORRESPONDING TO TENDON FORCE IN ROW (1). NOTE THE GAUGE PRESSURE DEPENDS ON THE SPECIFIC STRESSING GAUGE AND RAM BEING USED AND THE RESULTING CALIBRATION PRESSURE-FORCE RELATIONSHIP.

c - VALUES FROM ROW (2).

d - VALUE CORRESPONDING TO TENDON FORCE IN ROW (8). SEE NOTE UNDER FOOTNOTE b.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

PERFORMED BY: David P. O'Hara DATE: 10-11-99

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. 13H50

Inspection Period 7TH

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	ORIGINAL STRESSING DATA[a]						
1	Tendon Force @ 1000 psi (Kips)	210	[illegible]	10-2-99	210	DAO	10-2-99
2	Tendon Force @ 80% ULT (Kips)	1564	[illegible]	10-2-99	1564	DAO	10-2-99
3	Tendon Elongation @ Installation (Inches)	4.90"	[illegible]	10-2-99	5.75"	DAO	10-2-99
4	Tendon Elongation Sum (3), Shop Plus Field Ends	10.65	[illegible]	10-2-99	10.65	DAO	10-2-99
	RETENSIONING DATA						
5	Tendon Force (Kips) From Row 1	168	[illegible]	10-2-99	168	DAO	10-2-99
6	Initial Gauge Pressure[b] at Tendon Force In Row 5 (PSI)	950	[illegible]	10-2-99	960	DAO	10-2-99
7	Ram Extension @ Initial Gauge Press., (Inches)	3.2"	[illegible]	10-2-99	3.3"	DAO	10-2-99
8	Overstress Tendon Force (Kips)[c]	1583.5	[illegible]	10-2-99	1583.5	DAO	10-2-99
9	Overstress Gauge Pressure[d] for Row 8 Tendon Force (PSI)	8320	[illegible]	10-2-99	8360	DAO	10-2-99

12-99 13:24:15

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. 13H50 Inspection Period 7TH.

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	MEASURED ELONGATION DATA						
10	Gauge Pressure at 1/3 Overstress Force, PSI [(9) x 1/3]	2830	[illegible]	10-2-99	2840	DPO	10-2-99
11	Ram Extension at Gauge Pressure [from (10)] (Inches)	4.5"	[illegible]	10-2-99	4.5"	DPO	10-2-99
12	Gauge Pressure at 2/3 Overstress Force, PSI [(9) x 2/3]	5570	[illegible]	10-2-99	5600	DPO	10-2-99
13	Ram Extension at Gauge Pressure [from (12)] (Inches)	6.4"	[illegible]	10-2-99	6.4"	DPO	10-2-99
14	Ram Extension at Overstress Gauge Pressure, (Inches) [from (9) x 1.0]	8.4"	[illegible]	10-2-99	8.7"	DPO	10-2-99
15	Tendon Force at Overstress (Kips)	1583.5	[illegible]	10-2-99	1583.5	DPO	10-2-99

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. 13H50

Inspection Period 4TH

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	CALCULATED DATA						
16	Tendon Elongation (14) - (7), inches	5.2"	[signature]	10-2-99	5.4"	DPO	10-2-99
17	Total Elongation Sum (16), Shop plus Field Ends	10.6"	[signature]	10-2-99	10.6"	DPO	10-2-99
18	% Difference Retention vs. Original Elongation $\frac{(17) - (4)}{(4)} \times 100$	-0.47	[signature]	10-2-99	-0.47	DPO	10-2-99
19	Acceptance Criteria -10% < (18) ≤ +10%	YES	[signature]	10-2-99	YES	DPO	10-2-99

a - OBTAIN FROM ORIGINAL STRESSING RECORDS. SEE TABLE 7 OF VM-TM-2485

b - VALUE CORRESPONDING TO TENDON FORCE IN ROW (1). NOTE THE GAUGE PRESSURE DEPENDS ON THE SPECIFIC STRESSING GAUGE AND RAM BEING USED AND THE RESULTING CALIBRATION PRESSURE-FORCE RELATIONSHIP.

c - VALUES FROM ROW (2).

d - VALUE CORRESPONDING TO TENDON FORCE IN ROW (8). SEE NOTE UNDER FOOTNOTE b.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [signature] DATE: 11/1/99

PERFORMED BY: [signature] DATE: 10-2-99

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A 16 of 424

DATA SHEET 5
AVERAGE OF THE NORMALIZED LIFT OFF FORCE

Dome Tendons (crossed out; N/A 8-30-99)

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes / No
1.				
2.				
3.				(Average Equal to or greater than 1040 kips)
4.				
5.				
6.				
		Total		
		Average		

Vertical Tendons (crossed out; N/A 8-30-99)

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes / No
1.				
2.				(Average Equal to or greater than 1010 kips)
3.				
4.				
5.				
6.				
7.				
		Total		
		Average		

Hoop Tendons

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes / No
1. 62-26	1136	2	1138	
2. 35-33	1170	-15	1155	
3. 51-43	1170	-53	1117	(Average Equal to or greater than 1121 kips)
4. 46-37	1128	46	1174	
5. 13-51D	1159	25	1184	
6.				
7.				
8.				
9.				
10.				
		Total	5768	YES
		Average	1153.6	

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/10/99

Performed By: [signature] Date: 10-1-99

A17 ~~Ø~~ 424

DATA SHEET 5
AVERAGE OF THE NORMALIZED LIFT OFF FORCE

~~Dome Tendons~~ N A W. 8-27-99

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes No
1.				
2.				
3.				(Average Equal to or greater than 1040 kips)
4.				
5.				
6.				
		Total Average		

Vertical Tendons

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes No
1. V32	1193	-7	1186	
2. V40	1202	-1	1201	(Average Equal to or greater than 1010 kips)
3. V114	1189	27	1216	
4. V164	1181	-42	1139	
5. V86	1202	9	1211	
6.				
7.				
		Total	5953	
		Average	1191	YES

~~Hoop Tendons~~ N A W. 8-27-99

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes No
1.				
2.				
3.				(Average Equal to or greater than 1121 kips)
4.				
5.				
6.				
7.				
8.				
9.				
10.				
		Total Average		

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/10/99

Performed By: [signature] Date: 10-23-99

A 159 424

DATA SHEET 5
AVERAGE OF THE NORMALIZED LIFT OFF FORCE

Dome Tendons

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes No
1. D225	1104	45	1149	
2. D313	1120	19	1139	
3. D102	1280	18	1298	(Average Equal to or greater than 1040 kips)
4.				
5.				
6.				
		Total	3586	
		Average	1195	YES

~~Vertical Tendons~~ N A 8-30-99

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes No
1.				
2.				
3.				(Average Equal to or greater than 1010 kips)
4.				
5.				
6.				
7.				
		Total		
		Average		

~~Hoop Tendons~~ N A 8-30-99

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes No
1.				
2.				
3.				
4.				(Average Equal to or greater than 1121 kips)
5.				
6.				
7.				
8.				
9.				
10.				
		Total		
		Average		

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 12/18/99

Performed By: [signature] Date: 10-11-99

DATA SHEET 6
Retensioning Criteria Confirmation

TENDON ID.		GREATER OF BASE FORCE* OR LIFT-OFF** FORCE	LOCK-OFF FORCE	Δ FORCE (2) - (1)	x 100%	COL. 4 WITHIN MINUS 0% PLUS 5% AND YES OR NO
DOME TENDONS						
	SHOP END					
	FIELD END					
	SHOP END					
	FIELD END					
	SHOP END					
	FIELD END					
VERTICAL TENDONS						
V164	SHOP END	1227 ~~1797~~ WPD 10-21-99	1279	52	+4.2	YES
~~V86~~	~~SHOP END~~	~~1176~~	~~1257~~	~~81~~	~~+6.9~~	~~Y~~ DPD 10-22-99
V86	SHOP END	1202	1257	55	+4.6	YES
HOOP TENDONS						
	SHOP END					
	FIELD END					
	SHOP END					
	FIELD END					
	SHOP END					
	FIELD END					

* Applicable Force from Base Curve in VM-TM-2485.
** Lift-Off Force is obtained from column 7 of Data Sheets 1, 2 or 3.

Cognizant Mech/Struc Engineer
Reviewed By: [signature] Date: 11/10/99

Performed By: [signature] Date: 10-23-99

A20 7424

DATA SHEET 6
Retensioning Criteria Confirmation

TENDON ID.		GREATER OF BASE FORCE* OR LIFT-OFF** FORCE	LOCK-OFF FORCE	Δ FORCE (2) - (1)	x 100%	COL. 4 WITHIN MINUS 0% PLUS 5% AND YES OR NO
DOME TENDONS						
D102	SHOP END	1276	1281	5	+.39	YES
	FIELD END	1284	1293	9	+.7	YES
	SHOP END					
	FIELD END					
	SHOP END					
	FIELD END					
VERTICAL TENDONS						
	SHOP END					
	SHOP END					
	SHOP END					
HOOP TENDONS						
	SHOP END					
	FIELD END					
	SHOP END					
	FIELD END					
	SHOP END					
	FIELD END					

* Applicable Force from Base Curve in VM-TM-2485.
** Lift-Off Force is obtained from column 7 of Data Sheets 1, 2 or 3.

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/10/99

Performed By: [signature] Date: 10-11-99

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DATA SHEET 6
Retensioning Criteria Confirmation

TENDON ID.		GREATER OF BASE FORCE* OR LIFT-OFF** FORCE	LOCK-OFF FORCE	Δ FORCE (2) - (1)	x 100%	COL. 4 WITHIN MINUS 0% PLUS 5% AND YES OR NO
DOME TENDONS						
	SHOP END					
	FIELD END					
	SHOP END					
	FIELD END			N/A		
	SHOP END					
	FIELD END					
VERTICAL TENDONS						
	SHOP END					
	SHOP END			N/A		
	SHOP END					
HOOP TENDONS						
13H50	SHOP END	1183**	1220	37	+3.1	YES
	FIELD END	1135**	1154	19	+1.7	YES
	SHOP END					
	FIELD END					
	SHOP END					
	FIELD END					

* Applicable Force from Base Curve in VM-TM-2485.
** Lift-Off Force is obtained from column 7 of Data Sheets 1, 2 or 3.

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/1/99

Performed By: [signature] Date: 10-2-99

-12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7 Tendon I.D. V32

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	5640/1193	-/-	/	/	/
	2	5640/1193	5640/1193	8/27/99	/	/
(SHOP	3	5640/1193	5640/1193	8/27/99	/	/
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY
1ST SET 5400-5640
2ND SET 5400-5640
3RD SET 5350-5640

8-27-99

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY DATE: 11/1/99

PRESSURE GAUGE USED CC-125169
8-27-99

A22-Z424

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7th Tendon I.D. V-4-0

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	5680 / 1202	- / -	8/27/99	/ [illegible]	[illegible] /
(SHOP OR FIELD)	2	5680 / 1202	5680 / 1202	8/27/99	/ [illegible]	[illegible] /
	3	5680 / 1202	5680 / 1202	8/27/99	/ [illegible]	[illegible] /
	4	/	/	/	/	/
	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY

1ST SET 5600 - 5680

2ND SET 5600 - 5680

3rd SET 5600 - 5680

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

PRESSURE GAUGE CC-125169
[initials] 8-27-99

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 4TH Tendon I.D. V86

END LOCATION	MEASUREMENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	5940 / 1257	/	10/22/99	/	/
	2	5940 / 1257	5940/1257	10/22/99	/	/
(SHOP	3	5940 / 1257	5940 / 1257	10/22/99	/	/
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO. ONLY
1ST 5860 - 5940
2ND 5860 - 5940
3RD 5860 - 5940

RUNNING AVERAGE: PRESSURE GAUGE - CC125169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH Tendon I.D. V86

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	5680 / 1202	/	10/22/99	/ [illegible]	[illegible] /
	2	5680 / 1202	5680 / 1202	10/22/99	/ [illegible]	[illegible] /
(SHOP	3	5680 / 1202	5680 / 1202	10/22/99	/ [illegible]	[illegible] /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY
1ST. 5680 - 5680
2ND. 5680 - 5680
3RD. 5680 - 5680

RUNNING AVERAGE: PRESSURE GAUGE - CC125169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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1-12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record

Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7-2 Tendon I.D. V114

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	5660 / 1198	— / —	9/13/99	/	/
	2	5600 / 1185	5630 / 1192	9/13/99	/	/
(SHOP	3	5600 / 1185	5620 / 1189	9/13/99	/	/
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

NA 9-13-99

FOR INFO

1ST SET 5460 - 5660
2ND SET 5420 - 5600
3rd SET 5420 - 5600

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: DATE: 11/1/99

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DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH Tendon I.D. V16+

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	5580 / 1181	/	10/21/99	/ [signature]	[initials] /
	2	5580 / 1181	5580 / 1181	10/21/99	/ [signature]	[initials] /
(SHOP	3	5580 / 1181	5580 / 1181	10/21/99	/ [signature]	[initials] /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
INFO ONLY	6	/	/	/	/	/
1ST. 5440 - 5580	7	/	/	/	/	/
2ND. 5440 - 5580	8	/	/	/	/	/
3RD. 5440 - 5580	9	/	/	/	/	/
	10	/	/	/	/	/

RUNNING AVERAGE: PRESSURE GAUGE - CC125169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUC ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH Tendon I.D. V164

END LOCATION	MEASUREMENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	6020 / 1274	/	10/21/99	/ [illegible]	DPO /
	2	6020 / 1274	6020/1274	10/21/99	/ [illegible]	DPO /
(SHOP	3	6020 / 1274	6020 /1274	10/21/99	/ [illegible]	DPO /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
INFO ONLY	6	/	/	/	/	/
1ST. 5850 - 6020	7	/	/	/	/	/
2ND. 5850 - 6020	8	/	/	/	/	/
3RD. 5850 - 6020	9	/	/	/	/	/
	10	/	/	/	/	/

RUNNING AVERAGE: PRESSURE GAUGE - CC125169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

A287 424

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH Tendon I.D. D1-02

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	6720 / 1276	/	10/7/99	/ [initials]	DPO /
	2	6720 / 1274	6720/1274	10/7/99	/ [initials]	DPO /
(SHOP	3	6720 / 1274	6720/1274	10/7/99	/ [initials]	DPO /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
INFO ONLY	6	/	/	/	/	/
1ST. 5920 - 6720	7	/	/	/	/	/
2ND. 5920 - 6720	8	/	/	/	/	/
3RD. 5920 - 6720	9	/	/	/	/	/
	10	/	/	/	/	/

RUNNING AVERAGE: PRESSURE GAUGE - DRESSER #3

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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-12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH Tendon I.D. D1-02

END LOCATION	MEASUREMENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	6750 / 1281	/	10/11/99	/ CB	DPO /
	2	6750 / 1281	6750 / 1281	10/11/99	/ CB	DPO /
(SHOP	3	6750 / 1281	6750 / 1281	10/11/99	/ CB	DPO /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY

1ST. - 6450 - 6750
2ND. - 6430 - 6750
3RD - 6420 - 6750

RUNNING AVERAGE: PRESSURE GAUGE — CC185169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)
Inspection Period 7TH Tendon I.D. D1-02

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
FIELD	1	6850 / 1293	/	10/11/99	/ [illegible]	[illegible] /
	2	6850 / 1293	6850 / 1293	10/11/99	/ [illegible]	[illegible] /
(SHOP	3	6850 / 1293	6850 / 1293	10/11/99	/ [illegible]	[illegible] /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY
1ST - 6850 - 6850
2ND - 6840 - 6850
3RD - 6830 - 6850

RUNNING AVERAGE: PRESSURE GAUGE - DRESSER #3

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

A31Ø424

-12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)
Inspection Period 7TH Tendon I.D. D1-02

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
FIELD	1	6800 / 1284	/	10/7/99	/ [illegible]	DPO /
	2	6800 / 1284	6800/1284	10/7/99	/ [illegible]	DPO /
(SHOP	3	6800 / 1284	6800 /1284	10/7/99	/ [illegible]	DPO /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY
1ST. 6780 - 6800
2ND. 6780 - 6800
3RD. 6780 - 6800

RUNNING AVERAGE: PRESSURE GAUGE — CC125169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUC ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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-12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7th Tendon I.D. D225

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	5900 / 1118	— / —	8/25/99	/	/
	2	5900 / 1118	5900 / 1118	8/25/99	/	/
(SHOP	3	5900 / 1118	5900 / 1118	8/25/99	/	/
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

N/A 8-25-99

FOR INFO ONLY
1st SET 5500 - 5900
2nd " 5600 - 5900
3rd " 5580 - 5900
8-25-99

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: _____ DATE: 9/14/99

PRESSURE GAUGE CC-125169
8-25-99

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-12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7+2 Tendon I.D. D 225

END LOCATION 1	MEASURE-MENT NUMBER 2	FEELER GAGE WITHDRAWAL 4	RUNNING AVERAGE 8	DATE INSP. 9	INSP. BY CONTR. FOREMAN 10	VERIFIED BY COGNIZANT QV INSP. 11
FIELD	1	5800 / 1093	-/-	9/1/99	/ [initials]	[initials] /
	2	5780 / 1089	5790 / 1091	9/1/99	/ [initials]	[initials] /
(SHOP	3	5780 / 1089	5787 / 1090	9/1/99	/ [initials]	[initials] /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

N/A [initials] 9-1-99

For Info Only

1st Set 5800 - 5800
2nd " 5780 - 5780
3rd " 5780 - 5780
[initials] 9-1-99

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER REVIEWED BY [signature] DATE: 9/14/99

Pressure Gauge CC-125169
[initials]
9-1-99

A 347 424

-12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH Tendon I.D. D3-13

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
~~FIELD~~ SHOP DPD 10-5-99	1	5860 / 1110	/	10/5/99	/ CM	DPO /
	2	5860 / 1110	5860 / 1110	10/5/99	/ CM	DPO /
(SHOP	3	5860 / 1110	5860 / 1110	10/5/99	/ CM	DPO /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY
1ST 5820 5860
2ND 5820 5860
3RD 5820 5860

RUNNING AVERAGE: PRESSURE GAUGE — CC125169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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3-12-99 13:24:15

1301-9.1
Revision 14
Page 1 of 1

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH Tendon I.D. D3-13

END LOCATION 1	MEASURE-MENT NUMBER 2	FEELER GAGE WITHDRAWAL 4	RUNNING AVERAGE 8	DATE INSP. 9	INSP. BY CONTR. FOREMAN 10	VERIFIED BY COGNIZANT QV INSP. 11
~~Shop~~ Field DPO 10-5-99	1	5990 / 1129	/	/	/ CE	DPO /
	2	5990 / 1129	5990/1129	10/5/99	/ CE	DPO /
(SHOP	3	5990 / 1129	5990/1129	10/5/99	/ CE	DPO /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY

1st. 5860 5990

2nd 5840 5990

3rd 5840 5990

RUNNING AVERAGE: Pressure Gauge — CC125169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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DATA SHEET 7
Tendon Force Measurement Record

Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH Tendon I.D. 13H50

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	6240 / 1183	/	9/22/99	/ CB	DPO /
(SHOP OR FIELD)	2	6240 / 1183	6240 / 1183	9/22/99	/ CB	DPO /
	3	6240 / 1183	6240 / 1183	9/22/99	/ CB	DPO /
	4	/	/	/	/	/
	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

NA DPO 9-22-99

INFO ONLY

1ST SET 6060 - 6240

2ND SET 6060 - 6240

3RD SET 6060 - 6240

DPO 9-22-99

RUNNING AVERAGE: PRESSURE GAUGE - CC125169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

A37 / 424

RETENSION

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH Tendon I.D. 13H50

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	6420 / 1218	/	10-21-99	/ [initials]	[initials] / 10-2-99
	2	6440 / ~~1215~~ 1222 [initials] 10-2-99	6430/1220	10-21-99	/ [initials]	[initials] / 10-2-99
(SHOP	3	6440 / ~~1215~~ 1222 [initials] 10-2-99	6433/1220	10-21-99	/ [initials]	[initials] / 10-2-99
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY

1ST 5660 — 6420
2ND 5550 — 6440
3RD 5550 — 6440

RUNNING AVERAGE: PRESSURE GAUGE # DRESSER #3

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

-12-99 13:24:15

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DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH. Tendon I.D. 13H50

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
FIELD	1	6020 / 1135	/	10/1/99	/ CB	ARO /
	2	6020 / 1135	6020 / 1135	10/1/99	/ CB	ARO /
(SHOP	3	6020 / 1135	6020 / 1135	10/1/99	/ CB	ARO /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
INFO ONLY	7	/	/	/	/	/
1ST 5980 6020	8	/	/	/	/	/
2ND 5980 6020	9	/	/	/	/	/
3RD 5980 6020	10	/	/	/	/	/

RUNNING AVERAGE: PRESSURE GAUGE USED - CC125169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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RETENSION

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7TH Tendon I.D. 13H50

END LOCATION 1	MEASURE-MENT NUMBER 2	FEELER GAGE WITHDRAWAL 4	RUNNING AVERAGE 8	DATE INSP. 9	INSP. BY CONTR. FOREMAN 10	VERIFIED BY COGNIZANT QV INSP. 11
FIELD	1	6120 / 1154	/	10/21/99	/ EB	DAD /
	2	6120 / 1154	6120/1154	10/21/99	/ EB	DAD /
(SHOP	3	6120 / 1154	6120/1154	10/21/99	/ EB	DAD /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY

1ST. 6040 — 6120
2ND. 6040 — 6120
3RD. 6040 — 6120

RUNNING AVERAGE: PRESSURE GAUGE # CC125169

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7th Tendon I.D. H 35-33

END LOCATION 1	MEASURE-MENT NUMBER 2	FEELER GAGE WITHDRAWAL 4	RUNNING AVERAGE 8	DATE INSP. 9	INSP. BY CONTR. FOREMAN 10	VERIFIED BY COGNIZANT QV INSP. 11
SHOP	1	6200 / 1176	- / -	9/7/99	/	/
(SHOP	2	6240 / 1183	6220 / 1180	9/7/99	/	/
OR	3	6240 / 1183	6227 / 1181	9/7/99	/	/
FIELD)	4	/	/	/	/	/
	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

N/A 9-7-99

INFO ONLY

1ST SET 6200 - 6200
2ND SET 6200 - 6240
3rd SET 6200 - 6240
9-7-99

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: DATE: 9/14/99

PRESSURE GAUGE CC-125169
9-7-99

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9-12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7+5 Tendon I.D. H 35 33

END LOCATION 1	MEASURE-MENT NUMBER 2	FEELER GAGE WITHDRAWAL 4	RUNNING AVERAGE 8	DATE INSP. 9	INSP. BY CONTR. FOREMAN 10	VERIFIED BY COGNIZANT QV INSP. 11
FIELD	1	7040 / 1158	— / —	9/3 / 99	/ CB	[illegible] /
	2	7040 / 1158	7040 / 1158	9/3 / 99	/ CB	[illegible] /
(SHOP	3	7040 / 1158	7040 / 1158	9/3 / 99	/ CB	[illegible] /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

N/A 9.3.99

INFO ONLY

1ST SET 6820 - 7040
2ND SET 6780 - 7040
3rd SET 6760 - 7040

9-3-99

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 9/14/99

PRESSURE GAUGE CC-125169
9.3.99

-12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7+2 Tendon I.D. 46-37

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	6000 / 1137	- / -	9/14/99	/	/
(SHOP OR FIELD)	2	5980 / 1133	5990 / 1135	9/14/99	/	/
	3	5980 / 1133	5987 / 1134	9/14/99	/	/
	4	/	/	/	/	/
	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

NA 9-14-99

INFO ONLY

1st SET 5600 - 6000
2nd SET 5580 - 5980
3rd SET 5520 - 5980

9-14-99

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: DATE: 11/1/99

PRESSURE GAUGE USED CC 125169
9-14-99

A43 424

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7+4 Tendon I.D. H46-37

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
FIELD	1	5960 / 1123	/	9/23/99	/ CB	DPO /
	2	5960 / 1123	5960 / 1123	9/23/99	/ CB	DPO /
(SHOP	3	5960 / 1123	5960 / 1123	9/23/99	/ CB	DPO /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/ N	A DPO 9-23-99	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY

1st SET 5820 – 5960
2nd SET 5820 – 5960
3rd SET 5820 – 5960
DPO 9-23-99

PRESSURE GAUGE - CC125169

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 11/1/99

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DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period [illegible] Tendon I.D. H51-43

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
SHOP	1	6200 / 1176	– / –	9/14/99	/ [illegible]	[illegible] /
	2	6200 / 1176	6200 / 1176	9/14/99	/ [illegible]	[illegible] /
(SHOP	3	6200 / 1176	6200 / 1176	9/14/99	/ [illegible]	[illegible] /
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/ NA	[illegible] 9.14.99 /	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY

1ST SET 5600 - 6200
2ND SET 5600 - 6200
3rd SET 5600 - 6200

[illegible] 9.14.99

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature] DATE: 9/24/99

PRESSURE GAUGE USED CC-125169
[illegible]
9.14.99

A45 of 424

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7th Tendon I.D. #51-43

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
FIELD	1	6200 / 11169	-/-	9/13/99	/ OB	/
	2	6190 / 11167	6195 / 11168	9/13/99	/ OB	/
(SHOP	3	6120 / 1154	6170 / 1163	9/13/99	/ OB	/
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	N/A 9-13-99	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

INFO ONLY
1st SET 5700 - 6200
2nd SET 5740 - 6190
3rd SET 5700 - 6120
9-13-99

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: _____ DATE: 9/24/99

A46 of 424

PRESSURE GAUGE USED CC-125169
9-13-99

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7+2 Tendon I.D. H62-26

END LOCATION (1)	MEASUREMENT NUMBER (2)	FEELER GAGE WITHDRAWAL (4)	RUNNING AVERAGE (8)	DATE INSP. (9)	INSP. BY CONTR. FOREMAN (10)	VERIFIED BY COGNIZANT QV INSP. (11)
SHOP	1	5980 / ~~1132~~ 1133	– / –	8/30/99	/	/
	2	5980 / 1133	5980 / 1133	8/30/99	/	/
(SHOP	3	5980 / 1133	5980 / 1133	8/30/99	/	/
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

8-30-99

NA 9-2-99

INFO ONLY

1ST SET 5900 - 5980
2ND SET 5900 - 5980
3rd SET 5900 - 5980

8-30-99

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY ______ DATE: 9/14/99

PRESSURE GAUGE CC-125169
8-30-99

A4727 424

-12-99 13:24:15

DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period 7+5 Tendon I.D. H62-26

END LOCATION 1	MEASURE-MENT NUMBER 2	FEELER GAGE WITHDRAWAL 4	RUNNING AVERAGE 8	DATE INSP. 9	INSP. BY CONTR. FOREMAN 10	VERIFIED BY COGNIZANT QV INSP. 11
FIELD	1	6960 / 1145	— / —	9/2/99	/	/
	2	6900 / 1135	6930 / 1140	9/2/99	/	/
(SHOP	3	6900 / 1135	6920 / 1138	9/2/99	/	/
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

N/A 9-2-99

INFO ONLY

1ST SET 6820 - 6960
2ND SET 6820 - 6900
3RD SET 6820 - 6900
9-2-99

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: ________ DATE: 9/14/99

PRESSURE GAUGE CC-125169 9-2-99

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DATA SHEET 8
Minor, Major, and Pitch Diameter Checks - Anchorage and Ram Adapter

	UNIT	IDENTITY OF ANCHORAGE OR ADAPTOR	DIA.	MAJOR O.D. AND MINOR I.D. DIAMETER CHECK: 3RD THREAD	6TH THREAD	9TH THREAD	AVERAGE DIA.	C/A	NC/A	NA	MINOR O.D. AND MAJOR I.D. DIAMETER CHECK: 3RD THREAD	9TH THREAD	AVERAGE DIA.	C/A	NC/A	NA	PITCH DIAMETER CHECK: PITCH DIA.	C/A	NC/A	NA	TOTAL: C/A	NC/A	NA	INSP.BY CONTR. FOREMAN	VERIF.BY COGNIZANT QV INSP.
V32	1	SHOP D-4	O.D.																						
V40	1	SHOP D-4	I.D.																						
V86	1	SHOP D-4	O.D.																						
V114	1	SHOP D-4	I.D.																						
V164	1	SHOP D-4	O.D.																						
D1-02	1	SHOP C6001	I.D.																						
D1-02	1	FIELD C6002	O.D.																						
D2-25	1	SHOP C6001	I.D.																						
D2-25	1	FIELD C6002	O.D.																						
D3-13	1	SHOP C6001	I.D.																						
D3-13	1	FIELD C6002	O.D.																						
13H50	1	SHOP C6001	I.D.																						
13H50	1	FIELD C6002	O.D.																						
H35-53	1	SHOP C6001	I.D.																						
H35-53	1	FIELD FSV-1	O.D.																						
H46-37	1	SHOP C6001	I.D.																						
H46-37	1	FIELD C6002	O.D.																						
H51-43	1	SHOP C6001	I.D.																						
H51-43	1	FIELD C6002	O.D.																						
H62-26	1	SHOP C6001	I.D.																						

REFER TO PSC PROCEDURE SQ 7.1 & DATA SHEETS 7.1 FOR MEASUREMENTS & ACCEPTANCE (VERTICAL TENDONS - SINGLE END STRESSED - MEASUREMENTS PERFORMED ON SHOP END ONLY - TOP ONLY)

H.T. Hendrickson
12/9/99

CALIBRATION CONTROLS

H62-26 1 SHOP FSV-1

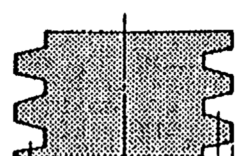
O.D. MICROMETER NO. ______ CAL.DATE ______
I.D. MICROMETER NO. ______ CAL.DATE ______
MICROMETER NO. ______ CAL.DATE ______
SHIM SIZE ______ NO. ______ CAL.DATE ______
WIRE SIZE ______ NO. ______ CAL.DATE ______
WIRE SIZE ______ NO. ______ CAL.DATE ______

GO-GAUGE NO. ______ CAL.DATE ______
NO GO-GAUGE NO. ______ CAL.DATE ______

NOTE: NOT ACCEPTABLE (NA)

RAM ADAPTOR (I.D.)

ANCHORAGE (O.D.)



CONFORMING/ACCEPTABLE (C/A)		NONFORMING/ACCEPTABLE (NC/A)	NONFORMING/ACCEPTABLE (NC/A)		CONFORMING/ACCEPTACLE (C/A)
9.238 MAX, 9.225 MIN	MINOR	9.238 MAX	9.129 MIN	MINOR	9.205 MAX, 9.172 MIN
9.333 MAX, 9.300 MIN	PITCH	9.333 MAX	9.197 MIN	PITCH	9.276 MAX, 9.242 MIN
9.428 MAX, 9.395 MIN	MAJOR	9.428 MAX	9.290 MIN	MAJOR	9.375 MAX, 9.363 MIN

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: [signature]

DATE: 12/18/99

GREASE SAMPLES ONLY

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	V72	BOTTOM	NO	NONE	9-16-99	[illegible]
2.	V73	BOTTOM	NO	NONE	9-16-99	[illegible]
3.	V74	BOTTOM	NO	NONE	9-16-99	[illegible]
4.	V75	BOTTOM	NO	NONE	9-16-99	[illegible]
5.	V76	BOTTOM	NO	NONE	9-16-99	[illegible]
6.	V136	BOTTOM	NO	NONE	9-16-99	[illegible]
7.	V146	BOTTOM	NO	NONE	9-16-99	[illegible]
~~8.~~				NA 9-16-99		
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-16-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

NOTE: .50 GAL. GREASE REMOVED FROM EACH TENDON FOR TESTING

9-16-99

A 4924 424

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7+1

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	V32	T	NO	NONE	8-27-99	
2.	V32	B	NO	NONE	~~9-17-99~~ 9-17-99	
3.	V40	T	NO	NONE	8-27-99	
4.	V40	B	NO	NONE	9-17-99	
5.	V114	T	NO	NONE	9-10-99	
6.	V114	B	NO	NONE	9-16-99	
7.	V164	T	NO	NONE	9-27-99	DRO
8.	V164	B	NO	NONE	9-16-99	
9.	V143	T	NO	NONE	10-13-99	DRO
10.	V156	T	NO	NONE	10-13-99	DRO
11.	V8	T	NO	NONE	10-13-99	DRO
12.	V35	T	NO	NONE	10-13-99	DRO

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 10-23-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	V57	T	NO	NONE	10-13-99	DPO
2.	V80	T	NO	NONE	10-14-99	DPO
3.	V94	T	NO	NONE	10-14-99	DPO
4.	V110	T	NO	NONE	10-14-99	DPO
5.	V86	T	NO	NONE	10-14-99	DPO
☆ 6.	V86	B	YES	2½ GALS WATER COLLECTED DURING LOOSENING OF CAN, DPO 10-4-99. 2 OZ. WATER COLLECTED FROM BOTTOM OF GREASE CAN DPO 10-20-99. WATER OBSERVED MIXED IN GREASE DURING DETENSIONING DPO 10-22-99	10-22-99	DPO
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 10-23-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

☆ CAP/MNCR T1999-0963 provides evaluation & corrective actions associated with V86.
[signature] 11/10/99

A5IZ424

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7+9

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	D225	NW	NO	NONE	8-23-99	[illegible]
2.	D225	SE	NO	NONE	8-31-99	[illegible]
3.	D313	SE	NO	NONE	10-5-99	DPO
4.	D313	NE	NO	NONE	10-5-99	DPO
5.	D102	NE	NO	NONE	10-7-99	DPO
6.	D102	NW	NO	NONE	10-7-99	DPO
7.	D104	NW	NO	NONE	10-11-99	DPO
8.	D104	NE	NO	NONE	10-11-99	DPO
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 10-11-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

A 5 of 424

GREASE LEAK REPAIR
&
CAM MOD.

-12-99 13:24:15

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	D145	SE	NO	NONE	8-26-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.				N/A [illegible] 8.26.99		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 8-26-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

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GREASE CAN ...
&
CAN MOD.

-12-99 13:24:15

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	D147	SE	NO	NONE	8-26-99	
2.						
3.						
4.						
5.						
6.						
7.				NA 8-26-99		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: ________ Date: 8-26-99

Cognizant Mech/Struct Engineer Review By: ________ Date: 9/7/99

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-12-99 13:24:15

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	D202	NE	NO	NONE	8-19-99	[illegible]
2.						
3.						
4.						
5.						
6.				NA [illegible] 8-19-99		
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 8-19-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

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Can & Mod.

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	D317	SE	NO	NONE	9-10-99	L.A
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NA 9-9-99

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-10-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

12-99 13:24:15

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection
GREASE LEAK REPAIR

Inspection Period ______________

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	D336	NW	NO	NONE	10-13-99	DPD
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: Daniel P. D'Shea Date: 10-13-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/11/99

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GREASE LEAK REPAIR

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H13-R	Butt #1	NO	NONE	9-17-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-17-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

A587 424

GREASE LEAK REPAIRS

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H13-13	Butt #1	NO	NONE	9-17-99	CA
~~2.~~						
3.						
4.						
5.						
6.						
7.				N/A		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-17-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

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GREASE LEAK REPAIR

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H13-21	Butt #1	NO	NONE	9-17-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.				NA [illegible] 9-17-99		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-17-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection
GREASE LEAK REPAIR & CAN MOD.

Inspection Period 7TH

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	24H51	BUTT #2	NO	NONE	10-18-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 10-18-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/11/99

A61Z 424

Cam 5th Mod.

12-99 13:24:15

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H26-4	BUTT #2	NO	NONE	9-16-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

N/A [illegible] 9-16-99

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-16-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10/11/99

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12-99 13:24:15

CAN MOD.

1301-9.1
Revision 14
Page 1 of 1

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H 26-52	BUTT #2	NO	NONE	8-23-99	
2.						
3.						
4.						
5.						
6.						
7.				A 8-23-99		
8.				H		
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: Date: 8-23-99

Cognizant Mech/Struct Engineer Review By: Date: 9/7/99

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CAM MOD.

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H26-53	Butt #2	No	NONE	8-20-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.				NA 8-20-99		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 8-20-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

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GREASE LEAK REPAIRS
&
CAN MOD.

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H31-18	BUTT #3	NO	NONE	9-7-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

N/A [illegible] 9-7-99

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-7-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

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GREASE LEAK REPAIR
&
CAN MOD.

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H31-46	BUTT #3	NO	NONE	9-8-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NA [illegible] 9-8-99

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-8-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

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Cam's Mod.

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H31-51	BUTT #3	NO	NONE	9-9-99	[illegible]
2.						
3.						
4.						
5.						
6.				N/A [illegible] 9-8-99		
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-9-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

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GREASE LEAK REPAIR
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CAN MOD.

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H31-55	BUTT #3	NO	NONE	9-8-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.				N/A [illegible] 9-8-99		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-8-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

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Cam Mod.

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1	H51-4	5	NO	N/A	8-24-99	[illegible]
2.						
3.						
4.						
5.						
6.				N/A 8-24-99		
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 8-24-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10/11/99

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• GREASE LEAK REPAIR ; CAN NOT ...
• GREASE LEAK ONLY BUTT #1

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H51-13	BUTT #5	NO	NONE	9-14-99	[illegible]
2.	H15-13	BUTT #1	NO	NONE	9-16-99	[illegible]
3.						
4.						
5.						
6.						
7.				NA [illegible] 9-16-99		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-16-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10/11/99

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CAM & MOD.

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H51-14	BUTT #5	NO	NONE	9-14-99	WJ.
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NA WJ 9-14-99

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-14-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1	H53-6	5	NO	N/A	8-24-99	[illegible]
~~2.~~						
3.						
4.						
5.						
6.				N/A [illegible] 8-24-99		
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 8-24-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H53-11	BUTT #5	NO	NONE	9-2-99	[illegible]
2.						
3.						
4.						
5.						
6.				N/A [illegible] 9-2-99		
7.						
8.						
9.						
10.						
11.						
12.						

NOTE:

Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-2-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/14/99

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GREASE LEAK REPAIR
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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	A53-13	BUTT #5	NO	NONE	9-2-99	EJ
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NA EJ 9-2-99

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-3-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/14/99

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7+1

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H53-~~24~~25	Butt #5	No	None	9-2-99	
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NA 9-2-99

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: ____________ Date: 9-2-99

Cognizant Mech/Struct Engineer Review By: ____________ Date: 9/14/99

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GREASE CAN LEAK REPAIR
&
CAN MOD.

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H 53-44	Butt #5	NO	NONE	9-9-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.				NA [illegible] 9-9-99		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-9-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

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GREASE LEAK REPAIR

& CAN MOD

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H53-48	BUTT #5	NO	NONE	9-9-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.				NA [illegible] 9-9-99		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:
Hoop Tendons: 1 to 6 - Buttress number at end of tendon
Vertical Tendons: T or B - Top or Bottom
Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 9-9-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H62-26	BUTT #6	NO	NONE	8-30-99	[illegible]
2.	H62-26	BUTT #2	NO	NONE	9-2-99	[illegible]
3.	H ~~53~~ 35-33	BUTT #3	No	NONE	9-3-99	[illegible]
4.	H ~~83~~ 35-33	BUTT #5	No	NONE	9-7-99	[illegible]
5.	H51-43	BUTT #5	NO	NONE	9-13-99	[illegible]
6.	H51-43	BUTT #1	No	NONE	9-14-99	[illegible]
7.	H46-37	BUTT #6	NO	NONE	9-13-99	[illegible]
8.	H46-37	BUTT #4	NO	NONE	9-22-99	DAO
9.	H13-50	BUTT #1	NO	NONE	9-22-99	DAO
10.	H13-50	BUTT #3	NO	NONE	9-30-99	DAO
11.						
12.						

9-3-99
9-3-99

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 10-23-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

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GREASE LEAK REPAIR
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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7th

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H62-10	BUTT #6	NO	NONE	8-31-99	[illegible]
2.						
3.						
4.						
5.						
6.				N/A 8-31-99		
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons: 1 to 6 - Buttress number at end of tendon

Vertical Tendons: T or B - Top or Bottom

Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 8-31-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/1/99

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GREASE LEAK REPAIRS
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CAM MOD.

DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7 + 3

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H 62-13	BUTT #6	NO	NONE	8-31-99	
2.						
3.						
4.						
5.						
6.						
7.				N/A 8-31-99		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons: 1 to 6 - Buttress number at end of tendon

Vertical Tendons: T or B - Top or Bottom

Dome Tendons: 1 to 6 - Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: __________ Date: 8-31-99

Cognizant Mech/Struct Engineer Review By: __________ Date: 9/7/99

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7+1

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	H62-14	BUTT #6	NO	NONE	8-31-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.				NA [illegible] 8-31-99		
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 8-31-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/2/99

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DATA SHEET 9

Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period 7+4

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.	#62-15	BUTT #6	NO	NONE	8-30-99	[illegible]
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NA [illegible] 8-30-99

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 8-30-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

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DATA SHEET 10
Tendon Anchor Head Rotation Inspection

Inspection Period 7+1

	Tendon No.	Location	LIFTOFF No. of Turns	LIFTOFF Dir.*	LIFTOFF Insp.By/ Date	DETENSIONING No. of Turns	DETENSIONING Dir.*	DETENSIONING Insp.By/ Date	RETENSIONING No. of Turns	RETENSIONING Dir.*	RETENSIONING Insp.By/ Date
1.	V32	T	0	N/A	[illegible] 8-27-99	N/A	N/A	N/A	N/A	N/A	N/A
		B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2.	V40	T	0	N/A	[illegible] 8-27-99	N/A	N/A	N/A	N/A	N/A	N/A
		B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3.	V114	T	0	N/A	[illegible] ~~9-13-99~~ [illegible] 9-13-99	N/A	N/A	N/A	N/A	N/A	N/A
		B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4.	V164	T	1	CW	[illegible] 10-21-99	NONE	NONE	[illegible] 10-21-99	1	CW	[illegible] 10-21-99
		B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
5.	V86	T	0	N/A	[illegible] 10-22-99	0	N/A	[illegible] 10-22-99	0	N/A	[illegible] 10-22-99
		B	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
6.											

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 10-22-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Turn = a revolution of anchorhead about axis of tendon.
* Direction - Clockwise (CW) or Counter Clockwise (CCW) when looking at anchor head.

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DATA SHEET 10
Tendon Anchor Head Rotation Inspection

Inspection Period 7th

			LIFTOFF			DETENSIONING			RETENSIONING		
	Tendon No.	Location	No. of Turns	Dir.*	Insp.By/ Date	No. of Turns	Dir.*	Insp.By/ Date	No. of Turns	Dir.*	Insp.By/ Date
1.	D225	NW	0	N/A	dl 8-25-99	N/A	N/A	N/A	N/A	N/A	N/A
		SE	0	N/A	Wl 9-1-99	N/A	N/A	N/A	N/A	N/A	N/A
2.	D313	SE	0	N/A	DPO 10-5-99	N/A	N/A	N/A	N/A	N/A	N/A
		NE	0	N/A	DPO 10-5-99	N/A	N/A	N/A	N/A	N/A	N/A
3.	D102	NE	0	N/A	DPO 10-7-99	N/A	N/A	DPO 10-8-99	N/A	N/A	DPO 10-11-99
		NW	0	N/A	DPO 10-7-99	N/A	N/A	TWD 10-08-99	N/A	N/A	DPO 10-11-99
4.											
5.											
6.											

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: Daniel P. O'Shea Date: 10-23-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Turn = a revolution of anchorhead about axis of tendon.
* Direction - Clockwise (CW) or Counter Clockwise (CCW) when looking at anchor head.

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DATA SHEET 10
Tendon Anchor Head Rotation Inspection

Inspection Period 7th

Tendon No.	Location	LIFTOFF No. of Turns	Dir.*	Insp.By/ Date	DETENSIONING No. of Turns	Dir.*	Insp.By/ Date	RETENSIONING No. of Turns	Dir.*	Insp.By/ Date
1. H62-26	Butt #6	0	N/A	JS. 8-30-99	N/A	N/A	N/A	N/A	N/A	N/A
	Butt #2	0	N/A	JS. 9-2-99	N/A	N/A	N/A	N/A	N/A	N/A
2. H35-33	Butt #3	0	N/A	JS. 9-3-99	N/A	N/A	N/A	N/A	N/A	N/A
	Butt #5	0	N/A	JS. 9-7-99	N/A	N/A	N/A	N/A	N/A	N/A
3. H46-37	Butt #6	0	N/A	JS. 9-14-99	N/A	N/A	N/A	N/A	N/A	N/A
	Butt #4	0	N/A	DAO 9-23-99	N/A	N/A	N/A	N/A	N/A	N/A
4. H51-43	Butt #5	0	N/A	JS. 9-13-99	N/A	N/A	N/A	N/A	N/A	N/A
	Butt #1	0	N/A	JS. 9-14-99	N/A	N/A	N/A	N/A	N/A	N/A
5 H ~~H50~~ 13-50 DAO 9-22-99	Butt #1	0	N/A	DAO 9-22-99	0	N/A	MD 10-1-99	0	N/A	MD. 10-2-99
	Butt #3	0	N	DAO 10-1-99	0	N/A	DAO 10-1-99	0	N/A	DAO 10-2-99
6.										

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector Verification By: [signature] Date: 10-23-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Turn = a revolution of anchorhead about axis of tendon.
* Direction - Clockwise (CW) or Counter Clockwise (CCW) when looking at anchor head.

A55g #24

DATA SHEET 11 ☆
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V32	5	* 2+8	15	NONE	15	0	15	0	YES
2.	V40	5	* 47.50+12	~~59.5~~ 64.5 DPO 9-29-99	NONE	66	0	66	1½	YES
3.	V114	3	* ~~2+8~~ 12 DPO 9-29-99	~~13~~ 17 DPO 9-29-99	NONE	18	0	18	1	YES
4.	V164	5	*52.50	57.50	NONE	69½	0	69½	12	NO
5.	V8	4	N/A	4	NONE	10	N/A	10	6	NO
6.	~~VX~~143 DPO 10-13-99	4	N/A	4	NONE	12¼	N/A	12¼	8¼	NO
7.	V156	4	N/A	4	NONE	12¾	N/A	12¾	8¾	NO
8.	V35	4	N/A	4	NONE	10½	N/A	10½	6½	NO
9.	V57	4	N/A	4	NONE	9	N/A	9	5	NO
10.	V80	5	N/A	5	NONE	9	N/A	9	4	YES
11.	V94	4	N/A	4	NONE	10	N/A	10	6	NO

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-23-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

* As of 9-16-99 (V164) 52.50 Gal. Removed 9-16-99 →
As of 9-17-99 (V40) 47.50 Gal. Removed 9-17-99 → 12 GAL DPO 9-29-99 V40
As of 9-17-99 (V32) 2 Gal. Removed 9-17-99 → 8 GAL V32 DPO 9-29-99
As of 9-17-99 (V114) 2 Gal. Removed 38 9-17-99 → ~~18~~ 12 GAL. V114 DPO 9-29-99 DPO 9-29-99

☆ CAP/MNCR T1999-0962/0963 provides evaluation & corrective actions to address greater than 4 gallons replacement grease quantities. 11/10/99

ABC-IP 424

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7TH

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V110	4	N/A	4	NONE	12	N/A	12	8	NO
2.	V86	4	46	50	NONE	47	N/A	47	-3	YES
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: Daniel P. O'Hara Date: 10-26-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

★ CAP/MNCR T1999-0962/0963 provides evaluation & corrective actions to address greater than 4 gallons replacement grease quantities. [signature] 11/10/99

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GREASE SAMPLES ONLY

12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Gallons Removed*					Gallons Replaced*			Diff.**	
	Tendon No.	Shop End	Field End	Shop & Field End	Comments	Shop End	Field End	Shop & Field End	Between Removed & Replaced	Acceptable (Yes or No)
1.	V72	N/A	.50	N/A	NONE					Yes
2.	V73	N/A	.50	N/A	NONE					Yes
3.	V74	N/A	.50	N/A	NONE					Yes
4.	V75	N/A	.50	N/A	NONE			N/A 9.16.99		Yes
5.	V76	N/A	.50	N/A	NONE					Yes
6.	V136	N/A	.50	N/A	NONE					Yes
7.	V146	N/A	.50	N/A	NONE					Yes
8.										
9.					N/A 9.16.99					
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9.16.99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

NOTE: .50 GAL. GREASE REMOVED FROM EACH TENDON FOR TESTING.
9.16.99

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DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V2			Ø		4½	Ø	4½	4½	NO
2.	V4			Ø		3½	Ø	3	3½	YES
3.	V7			Ø		8½	Ø	8½	8½	NO
4.	V24			Ø		4	Ø	4	4	YES
5.	V25			Ø		5½	Ø	5½	5½	NO
6.	V27			Ø		2	Ø	2	2	YES
7.	V29			Ø		6	Ø	6	6	NO
8.	V30			Ø		5½	Ø	5½	5½	NO
9.	V33			Ø		8	Ø	8	8	NO
10.	V34			Ø		6	Ø	6	6	NO
11.	V36			Ø		7½	Ø	7½	7½	NO

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-26-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

* The additions shown above were the result of resolutions to CAP/MNCR T1999-0962/0963. Of the grease addition shown above, none exceed 10% specified by IWL/10CFR50.55a, i.e. 12 gallons of a 120 gallon tendon duct void, and are therefore acceptable.

[signature] 11/10/99

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DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Gallons Removed* Field End	Gallons Removed* Shop & Field End	Comments	Gallons Replaced* Shop End	Gallons Replaced* Field End	Gallons Replaced* Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V9			Ø		4	Ø	4	4	YES
2.	V10			Ø		4	Ø	4	4	YES
3.	V11			Ø		5	Ø	5	5	NO
4.	V12			Ø		4½	Ø	4½	4½	NO
5.	V14			Ø		3½	Ø	3½	3½	YES
6.	V15			Ø		5	Ø	5	5	NO
7.	V16			Ø		3	Ø	3	3	YES
8.	V17			Ø	TENDON IS FULL	Ø	Ø	Ø	Ø	YES
☆ 9.	V18			Ø		14½ ~~Ø~~	Ø	14½	14½	NO
10.	V20			Ø		8	Ø	8	8	NO
11.	V22			Ø		2	Ø	2	2	YES

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-26-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

☆ The additions shown above were the result of resolutions to CAP/MNCR T1999-0962/0963. Of the grease additions shown above, only V18 exceeds the 10% specified by IWL/10CFR50.55a. i.e. 12 gallon limit based on 120 gallon tendon duct void. Additional IWL exams of sampled anchor heads provides assurance that loss of corrosion inhibitor [signature] has not caused tendon degradation.

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☆ **DATA SHEET 11**
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Gallons Removed*				Gallons Replaced*				
Tendon No.	Shop End	Field End	Shop & Field End	Comments	Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1. V37			Ø		3½	Ø	3½	3½	YES
2. V38			Ø		3½	Ø	3½	3½	YES
3. V39			Ø		5½	Ø	5½	5½	NO
4. V42			Ø		11	Ø	11	11	NO
5. V43			Ø		6	Ø	6	6	NO
6. V44			Ø		10½	Ø	10½	10½	NO
7. V45			Ø		7	Ø	7	7	NO
8. V47			Ø		6	Ø	6	6	NO
9. V48			Ø		½	Ø	½	½	YES
10. V49			Ø		8	Ø	8	8	NO
☆ 11. V50			Ø		13 ~~8~~	Ø	13 ~~8~~	13 ~~8~~	NO

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-26-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

☆ The grease additions shown above were the result of resolutions to CAP/MNCR T1999-0962/0963. Of the grease additions shown above, only V50 exceeds the 10% limit specified by IWL/10CFR50.55a, i.e. 12 gallon limit based on a 120 gallon tendon duct void. Additional IWL exams of sampled anchor heads provides assurance that loss of corrosion inhibitor has not caused tendon degradation.

[signature] 11/10/99

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* DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V52			Ø		12	Ø	12	12	NO
2.	V53			Ø		7	Ø	7	7	NO
3.	V55			Ø		1½	Ø	1½	1½	~~NO~~ YES
4.	V56			Ø		8½	Ø	8½	8½	NO
5.	V58			Ø		6½	Ø	6½	6½	NO
6.	V60			Ø		6	Ø	6	6	NO
7.	V61			Ø		3½	Ø	3½	3½	YES
8.	V62			Ø		6½	Ø	6½	6½	NO
9.	V63			Ø		6	Ø	6	6	NO
10.	V64			Ø		2½	Ø	2½	2½	YES
11.	V65			Ø		6½	Ø	6½	6½	NO

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-26-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

* The grease add'ns shown above were the result of resolutions to CAP/MNCR T1999-0962/0963. Of the grease additions shown above, none exceed the 10% limit specified in IWL/10CFR50.55a, i.e. 12 gallon limit for a 120 gallon tendon duct void, and are acceptable on this basis.

[signature] 11/10/99

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DATA SHEET 11 *
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V66			Ø		7	Ø	7	7	NO
2.	V67			Ø		5½	Ø	5½	5½	NO
3.	V68			Ø		9	Ø	9	9	NO
4.	V69			Ø		7	Ø	7	7	NO
5.	V70			Ø		6	Ø	6	6	NO
6.	V71			Ø		7	Ø	7	7	NO
7.	V77			Ø		7	Ø	7	7	NO
8.	V78			Ø		½	Ø	½	½	YES
* 9.	V79			Ø		29	Ø	29	29	NO
* 10.	V81			Ø		13	Ø	13	13	NO
11.	V82			Ø		8	Ø	8	8	NO

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-26-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

* The grease add'ns shown above were the result of resolutions to CAP/MNCR T1999-0962/0963. Of those, V79 & V81 exceed the 10% limit specified by IWL/10CFR50.55a, ie 12 gallon limit based on a 120 gallon tendon duct void. Additional IWL exams of sampled anchor heads provides assurance that loss of corrosion inhibitor has not caused tendon degradation.

[signature] 11/10/99

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☆ DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V84			Ø		1	Ø	1	1	YES
2.	V85			Ø		2½	Ø	2½	2½	YES
3.	V87			Ø		8½	Ø	8½	8½	NO
4.	V88			Ø		9	Ø	9	9	NO
5.	V89			Ø		9½	Ø	9½	9½	NO
6.	V90			Ø		9½	Ø	9½	9½	NO
7.	V91			Ø		9½	Ø	9½	9½	NO
8.	V92			Ø		5½	Ø	5½	5½	NO
9.	V93			Ø		7	Ø	7	7	NO
10.	V95			Ø		7	Ø	7	7	NO
11.	V96			Ø		6	Ø	6	6	NO

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-26-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

☆ The grease add'ns shown above were the result of resolutions to CAP/MNCR T1999-0962/0963. None of the above exceeds the 10% limit specified in I.WL/10CFR50.55a, ie 12 gallon limit based on a 120 gallon tendon duct void, and are acceptable on this basis.

[signature] 11/10/99

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☆ DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V97			Ø		7	Ø	7	7	NO
2.	V98			Ø		8½	Ø	8½	8½	NO
3.	V99			Ø		7½	Ø	7½	7½	NO
4.	V100			Ø		8	Ø	8	8	NO
5.	V101			Ø		9	Ø	9	9	NO
6.	V102			Ø		8½	Ø	8½	8½	NO
7.	V103			Ø		8½	Ø	8½	8½	NO
8.	V104			Ø		8	Ø	8	8	NO
9.	V105			Ø		5	Ø	5	5	NO
10.	V106			Ø		2	Ø	2	2	YES
11.	V107			Ø		10	Ø	10	10	NO

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: Daniel O'Hara Date: 10-26-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

☆ The grease add'ns shown above were the result of resolutions to CAP/MNCR T1999-0962/0963. None of the above exceeds the 10% limit specified in IWL/10CFR50.55a, i.e. 12 gallon limit based on a 120 gallon tendon duct void, and are acceptable on this basis.

[signature] 11/10/99

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☆ **DATA SHEET 11**
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V108			∅		8	∅	8	8	NO
2.	V109			∅		8	0	8	8	NO
3.	V111			∅		7	∅	7	7	NO
4.	V112			∅		7	∅	7	7	NO
5.	V113			∅		6	0	6	6	NO
6.	V115			∅		8	0	8	8	NO
7.	V116			∅		6	0	6	6	NO
8.	V117			∅		7	0	7	7	NO
9.	V118			∅		5½	0	5½	5½	NO
10.	V119			∅		3½	0	3½	3½	YES
11.	V120			∅		4	0	4	4	YES

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-26-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

☆ The grease addins shown above were the result of resolutions to CAP/mmr T1999-0962/0963. None of the above exceeds the 10% limit specified in INL/10CFR50.55a, i.e. 12 gallon limit based on a 120 gallon tendon duct void, and are acceptable on this basis.

[signature] 11/10/99

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☆ **DATA SHEET 11**
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V121			Ø		3½	Ø	3½	3½	YES
2.	V122			Ø		3	Ø	3	3	YES
3.	V123			Ø		4	Ø	4	4	YES
4.	V124			Ø		7	Ø	7	7	NO
5.	V125			Ø		6½	Ø	6½	6½	NO
6.	V127			Ø		5½	Ø	5½	5½	NO
7.	V128			Ø		5½	Ø	5½	5½	NO
8.	V129			Ø		6	Ø	6	6	NO
9.	V130			Ø		9	Ø	9	9	NO
10.	V133			Ø		4½	Ø	4½	4½	NO
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector
Verification By: [signature] Date: 10-26-99
Cognizant Mech/Struct Engineer
Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

☆ Grease addns. shown above resulted from resolutions to CAP/MNCR T1999-0962/0963. None of the above tendons exceeds the 10% limit specified in IWL/10CFR50.55a, i.e. 12 gallon limit based on a 120 gallon tendon duct void, & are acceptable on this basis.

[signature] 11/10/99

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* DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V132			Ø		4½	Ø	4½	4½	NO
2.	V141			Ø		7½	Ø	7½	7½	NO
3.	V142			Ø		12	Ø	12	12	NO
4.	V144			Ø		8½	Ø	8½	8½	NO
5.	V145			Ø		7	Ø	7	7	NO
6.	V147			Ø		11½	Ø	11½	11½	NO
7.	V148			Ø		6½	Ø	6½	6½	NO
8.	V149			Ø		7	Ø	7	7	NO
9.	V150			Ø		6	Ø	6	6	NO
10.	V151			Ø		9	Ø	9	9	NO
11.	V152			Ø		4	Ø	4	4	YES

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 11-26-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

* Grease adding shown above resulted from resolutions to CAP/MNCR T1999-0962/0963. None of the tendons above exceeds the 10% limit specified in IWL/10CFR50.55a, ie 12 gallon limit based on a 120 gallon tendon duct void, ∴ are acceptable on this basis.

[signature] 11/10/99

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DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	V154			Ø		7½	Ø	7½	7½	NO
2.	V157			Ø		7½	Ø	7½	7½	NO
3.	V158			Ø		3	Ø	3	3	YES
4.	V160			Ø		4½	Ø	4½	4½	NO
5.	V161			Ø		5½	Ø	5½	5½	NO
6.	V163			Ø		12	Ø	12	12	NO
7.	V165			Ø		3½	Ø	3½	3½	YES
8.	V166			Ø		5	Ø	5	5	NO
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-26-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

* Grease adding shown above resulted from resolutions to CAP/MNCR T1999-0962/0963. None of the above tendons exceeds the 10% limit specified in IWL/10CFR50.55a, ie 12 gallon limit based on a 120 gallon tendon duct void, & are acceptable on this basis.

[signature] 11/10/99

2-99 13:24:15

SCHEDULED 7 VERTICAL TENDONS - GREASE LEAKAGE MITIGATION IN LOWER TENDON ACCESS GALLEY

12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Gallons Removed* Field End	Gallons Removed* Shop & Field End	Comments	Gallons Replaced* Shop End	Gallons Replaced* Field End	Gallons Replaced* Shop & Field End	Diff.** Between Removed & Replaced	Acceptable ☆ (Yes or No)
1.	V72	Ø	1/2	1/2	NO REPAIRS NECESSARY	4	Ø	4	3 1/2	YES
2.	V73	Ø	1/2	1/2	NO REPAIRS NECESSARY	5	Ø	5	4 1/2	NO
3.	V74	Ø	1/2	1/2	NO REPAIRS NECESSARY	9	Ø	9	8 1/2	NO
4.	V75	Ø	1/2	1/2	NO REPAIRS NECESSARY	9	Ø	9	8 1/2	NO
5.	V76	Ø	1/2	1/2	NO REPAIRS NECESSARY	5 1/2	Ø	5 1/2	5	NO
6.	V136	Ø	1/2	1/2	NO REPAIRS NECESSARY	14	Ø	14	13 1/2	NO
7.	V146	Ø	1/2	1/2	NO REPAIRS NECESSARY	12 1/2	Ø	12 1/2	12	NO
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector
Verification By: DANIEL P. O'SHEA D.P.O. 12-2-99 Date:

Cognizant Mech/Struct Engineer
Review By: [signature] Date: 10-9-99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

☆ GPUN CAP 0962 issued to capture the vertical tendons which exceeded the 4 gallon max grease difference added req't.. All verticals will be topped off w/grease & quantity added recorded.
[signature] 10/9/99

GREASE LEAK REPAIRS
SHOP END MAIN GASKET

2-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No) ☆
1.	V19	9	Ø	9		12	Ø	12	3	YES
2.	V83	5	Ø	5		10	Ø	10	5	NO
3.	V86	3	Ø	3			Ø			
4.	V126	6	Ø	6		12	Ø	12	6	NO
5.	V139	6	Ø	6		9	Ø	9	3	YES
6.										
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector
Verification By: DANIEL P. O'SHEA [illegible] 12-2-99 Date:
Cognizant Mech/Struct Engineer
Review By: [signature] Date: 10-9-99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

☆ GPUN CAP 0962 issued to capture the vertical tendons which exceeded the 4 gallon max grease difference added req't.. All verticals will be topped off w/ grease & quantity added recorded.
[signature] 10/9/99

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REFILL / TOP OFF OF 29 VERTICAL TENDONS EXHIBITING GREASE LEAKAGE IN UPPER TENDON ACCESS GALLERY PG 1 of 3

DATA SHEET 11

Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	9/29/99 Comments *	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable ☆ (Yes or No)
1.	V1			∅	~~3'~~ 19' COUNTER OF 1	12½	∅	12½	12½	NO
2.	V3			∅	14' COUNTER OF 1	10½	∅	10½	10½	NO
3.	V5			∅	8' COUNTER OF 1	14½	∅	14½	14½	NO
4.	V6			∅	3' COUNTER OF 1	5	∅	5	5	NO
5.	V13			∅	3' CLOCKWISE OF 1	9½	∅	9½	9½	NO
6.	V17			∅	14' CLOCKWISE OF 1	5	∅	5	5	NO
7.	V21			∅	23' CLOCKWISE OF 1	6	∅	6	6	NO
8.	V23			∅	28' CLOCKWISE OF 1	1½	∅	1½	1½	YES
9.	V26			∅	28' COUNTER OF 2	5	∅	5	5	NO
10.	V28			∅	22' COUNTER OF 2	10	∅	10	10	NO
11.	V31			∅	14' COUNTER OF 2	4	∅	4	4	YES

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector
Verification By: DANIEL P. O'SHEA [illegible] 12-2-99 Date:

Cognizant Mech/Struct Engineer
Review By: [signature] Date: 10/9/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

* LOCATIONS ARE REFERENCES TO AREAS EXHIBITING GREASE LEAKAGE THROUGH THE RB EXTERIOR CONCRETE (SHRINKAGE CRACKS) IN THE UPPER TENDON ACCESS GALLERY. APPROX. DISTANCE FROM THE EDGE OF A GIVEN BUTTRESS (CLOCKWISE OR COUNTER-CLOCKWISE FROM EDGE OF BUTTRESS)

☆ GPUN CAP 0962 issued to capture the vertical tendons which exceeded the 4 gallon max grease difference added reqt.. All verticals will be topped off [illegible] recorded. [signature] 10/9/99

12-99 13:24:15

REFILL / TOP OFF OF 29 VERTICAL TENDONS PG 2 of 3

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments **	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No) ☆
1.	V32 *	11' COUNTER OF 2			SCHEDULED SURVEILLANCE TENDON					
2.	V41			∅	2' CLOCKWISE OF 2	6	∅	6	6	NO
3.	V46			∅	47' COUNTER OF 3	7	∅	7	7	NO
4.	V51			∅	34' COUNTER OF 3	4	∅	4	4	YES
5.	V54			∅	28' COUNTER OF 3	6	∅	6	6	NO
6.	V59			∅	14' COUNTER OF 3	7	∅	7	7	NO
7.	V131			∅	44' COUNTER OF 6	7	∅	7	7	NO
8.	V132			∅	39' COUNTER OF 6	10	∅	10	10	NO
9.	V134			∅	35' COUNTER OF 6	10½	∅	10½	10½	NO
10.	V135			∅	32' COUNTER OF 6	7½	∅	7½	7½	NO
11.	V137			∅	28' COUNTER OF 6	12½	∅	12½	12½	NO

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: DANIEL P. O'SHEA [illegible] 12-2-99 Date:

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10/9/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

* SCHEDULED SURVEILLANCE TENDON REFER SURVEILLANCE TENDON DATA SHEETS

** SEE NOTE ON PAGE 1 of 3

38

☆ GPUN CAP 0962 issued to capture vertical tendons which exceeded the 4 gallon max grease difference added req't.. All verticals will be topped off w/ grease & quantity added recorded. [signature] 10/9/99

A10 3 # 424

REFILL/TOP OFF OF 29 VERTICAL TENDONS PG 5 OF 5

2-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments **	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No) ☆
1.	V138			Ø	25' COUNTER OF 6	4	Ø	4	4	YES
2.	V139*	6		6	23' COUNTER OF 6	9	Ø	9	3	YES
3.	V140			Ø	20' COUNTER OF 6	9	Ø	9	9	NO
4.	V153			Ø	58' COUNTER OF 1	3	Ø	3	3	YES
5.	V155			Ø	51' COUNTER OF 1	6	Ø	6	6	NO
6.	V159			Ø	39' COUNTER OF 1	4	Ø	4	4	YES
7.	V162			Ø	31' COUNTER OF 1	3	Ø	3	3	YES
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector
Verification By: DANIEL P. O'SHEA Date: 12-2-99

Cognizant Mech/Struct Engineer
Review By: [signature] Date: 10-9-99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

* MAIN GASKET REPLACED
** SEE NOTE ON PAGE 1 of 3

☆ GPUN CAP 0962 issued to capture the vertical tendons which exceeded the 4 gallon max grease difference req't.. All verticals will be topped off w/ grease & quantity added recorded.
[signature] 10/9/99

GREASE LEAK REPAIR
&
CAN MOD.

18-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Gallons Removed*				Gallons Replaced*			Diff.**	
Tendon No.	Shop End	Field End	Shop & Field End	Comments	Shop End	Field End	Shop & Field End	Between Removed & Replaced	Acceptable (Yes or No)
1. D145	N/A	9	N/A	NONE	N/A	9.75	N/A	.75	YES
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									

NA [initials] 8-27-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 8-27-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

NOTE: CAN REMOVED ON 8-26-99 TO REPLACE GASKET & PERFORM CAN MODIFICATION.
[initials] 8-26-99

D145 / 427

GREASE LEAK REPAIR
&
CAN MOD

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7+9

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	D147	N/A	9	N/A	NONE	N/A	9.75	N/A	.75	YES
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

A 8-26-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 8-27-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

NOTE: CAN REMOVED ON 8-26-99 TO REPLACE GASKET & PERFORM CAN MODIFICATION. 8-26-99

A106 of 424

LEAK REPAIR

3-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	D202 NE	N/A	8	N/A	NONE	N/A	9.5	N/A	1.5	YES
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

NA 8-30-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 8-30-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

NOTE: CAN REMOVED ON 8-19-99 TO INSTALL NEW GASKET. 8-19-99

D202 NE

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7+4

		Gallons Removed*				Gallons Replaced*			Diff.**	
	Tendon No.	Shop End	Field End	Shop & Field End	Comments	Shop End	Field End	Shop & Field End	Between Removed & Replaced	Acceptable (Yes or No)
1.	D225	12.5	.50	13.00		14.00	0	14.00	1	YES
2.	D313	4	6	10.00		4.25	8.75	13.00	3	YES
3.	D102	9	6	15.00		9	8	17	2	YES
4.	~~D102~~ DP010-7-99									
5.	D104	8	8	16		9.75	8.75	18.5	2.5	YES
6.										
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-28-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

3-12-99 13:24:15

A10 of 424

GREASE LEAK TIEMINE
&
CAN MOD.

-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	D 317 SE	N/A	6	N/A	None	N/A	9	N/A	3	YES
2.										
3.										
4.										
5.										
6.						A	9.9.99			
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-10-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

H100.17 424

12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement
GREASE LEAK REPAIR

Inspection Period 7TH

	Tendon No.	Gallons Removed* Shop End	Gallons Removed* Field End	Gallons Removed* ~~Shop &~~ Field End (DPO 10-13-99)	Comments	Gallons Replaced* Shop End	Gallons Replaced* Field End	Gallons Replaced* ~~Shop &~~ Field End (DPO 10-13-99)	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	D336	N/A	6	6	NONE	N/A	7	7	1	YES
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-13-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/11/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

A1100 424

Grease Leak Repair

1301-9.1
Revision 14
Page 1 of 1

3-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H13-12	8	N/A	N/A	NONE	9	N/A	N/A	1	YES
2.										
3.										
4.										
5.										
6.					N/A					
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-28-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

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Fill 4 27

GREASE LEAK REPAIR

-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H13-13	7	N/A	N/A	NONE	8 3/4	N/A	N/A	1 3/4 9-20-99	YES
~~2.~~										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: Daniel P. Odhn Date: 9-20-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

Att. 724

GREASE LEAK REPAIR

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H13-21	7	N/A	N/A	NONE	9	N/A	N/A	2	YES
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

NA 9-17-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: Daniel P. [illegible] Date: 9-28-99
Cognizant Mech/Struct Engineer Review By: [illegible] Date: 10-11-99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

12-99 13:24:15

7113 [illegible] 424

DATA SHEET 11
Bulk Filler Grease Removal and Replacement
GREASE LEAK REPAIR & CAN MOD.

Inspection Period 7TH.

		Gallons Removed*				Gallons Replaced*			Diff.** Between Removed & Replaced	Acceptable (Yes or No)
	Tendon No.	Shop End	Field End	Shop & Field End	Comments	Shop End	Field End	Shop & Field End		
1.	24H51	N/A	3	3	NONE	N/A	6	6	3	YES
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-19-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/11/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

A114 of 424

GREASE LEAK REPAIR
&
CAN MOD

8-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H26-4	N/A	7	N/A	NONE	N/A	9	N/A	2	YES
2.										
3.										
4.										
5.										
6.					N/A	9-16-99				
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector
Verification By: [signature] 9-16-99 Date: 10-26-99
Cognizant Mech/Struct Engineer
Review By: [signature] Date: 10/11/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

A11.5.7 424

MAREASL LEAK MCTAIN

CAN MOD.

3-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H26-52	N/A	6	N/A	None	N/A	8.5	N/A	2.5	Yes
2.										
3.										
4.										
5.										
6.					N/A [initials] 8-26-99					
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 8-26-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

NOTE: CAN REMOVED ON 8-23-99 TO REPLACE GASKET & PERFORM CAN MODIFICATION. 8-23-99

Fill 6 of 24

GREASE LEAK REPAIR
&
CAH MOD.

08-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Gallons Removed*				Gallons Replaced*			Diff.**	
Tendon No.	Shop End	Field End	Shop & Field End	Comments	Shop End	Field End	Shop & Field End	Between Removed & Replaced	Acceptable (Yes or No)
1. H26-53	N/A	6	N/A	NONE	N/A	9	N/A	3	YES
2.									
3.									
4.									
5.									
6.				N/A 8-20-99					
7.									
8.									
9.									
10.									
11.									

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 8-26-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

NOTE: CAH REMOVED ON 8-20-99 TO REPLACE GASKET & PERFORM CAH MODIFICATION. 8-20-99

A11704424

GREASE LEAK REPAIR
&
CAM MOD.

-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period ________________

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H 31-18	N/A	5	N/A	NONE	N/A	10	N/A	5	NO
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

9-7-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-28-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

GREASE LEAK REPAIR
&
CAN MOD.

3-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7+3

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H31-46	N/A	5	N/A	NONE	N/A	9	N/A	4	Yes
2.										
3.										
4.										
5.										
6.					NA	9-8-99				
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9.9.99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

Otherwise leak repair
&
Can' Mod.

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Revision 14
Page 1 of 1

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H31-51	N/A	4	N/A	None	N/A	8	N/A	4	Yes
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

N/A 9-8-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: ________ Date: 9-9-99
Cognizant Mech/Struct Engineer Review By: ________ Date: 9/24/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

-12-99 13:24:15

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Grease Leak Repair
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Can Med.

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	1131-55	N/A	4	N/A	None	N/A	8	N/A	4	Yes
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

NA ul. 9-8-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-9-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

3-12-99 13:24:15

A1210424

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Gallons Removed* Field End	Gallons Removed* Shop & Field End	Comments	Gallons Replaced* Shop End	Gallons Replaced* Field End	Gallons Replaced* Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H51-4	N/A	4	N/A	NONE	N/A	6	N/A	2	YES
~~2.~~										
3.										
4.										
5.					N/A 8-29-99					
6.										
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-28-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

A12137 424

• GREASE LEAK REPAIR & CAN/MOD BUTT #5
• GREASE LEAK REPAIR ONLY BUTT #1

-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H51-13	6	6	12	NONE	9	12	21	9	NO
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

N/A 9-16-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-28-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

A123 427

GREASE LEAK REPAIR
&
CAN MOD.

8-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Gallons Removed*				Gallons Replaced*				
Tendon No.	Shop End	Field End	Shop & Field End	Comments	Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1. H51-14	N/A	6	N/A	NONE	N/A	12	N/A	6	NO
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									

N/A 9-14-99

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-25-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1. H53-6	4	N/A	N/A	NONE	5	N/A	N/A	1	YES
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									

NA 8-24-99

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-25-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 10-11-99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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GREASE LEAK REPAIR
&
CAM MOD

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DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7+1

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H53-13	7	N/A	N/A	NONE	7.50	N/A	N/A	.50	YES
2.										
3.										
4.										
5.										
6.					N/A 9-2-99					
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-2-99

Cognizant Mech/Struc Engineer Review By: [signature] Date: 9/14/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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GREASE LEAK REPAIR
&
CAN MOD.

8-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H53-24	4	N/A	N/A	NONE	7	N/A	N/A	3	YES
2.										
3.										
4.										
5.										
6.					N/A ✓ 9-2-99					
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-7-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/14/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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GREASE LEAK REPAIR
&
CAM MOD.

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H53-25	4	N/A	N/A	NONE	8	N/A	N/A	4	9-7-99 YES
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

NA 9-2-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-7-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/14/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

-12-99 13:24:15

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GREASE LEAK REPAIR
&
CAN MOD.

8-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H53-44	4.50	N/A	N/A	NONE	5	N/A	N/A	.50	YES
2.										
3.										
4.										
5.										
6.					A W 9-9-99					
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-9-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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GREASE LEAK REPAIR
&
CAN MOD.

-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H53-4E	6	N/A	N/A	NONE	8.50	N/A	N/A	2.50	YES
2.										
3.										
4.										
5.										
6.					A	9-9-99				
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-9-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/24/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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GREASE LEAK REPAIR
&
CAM MOD

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Revision 14
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DATA SHEET 11
Bulk Filler Grease Removal and Replacement

3-12-99 13:24:15

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H62-10	9	N/A	N/A	NONE	~~8.2~~ 8.75	N/A	N/A	.25	YES
2.										
3.										
4.										
5.										
6.					N/A					
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-1-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/1/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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GREASE LEAK REPAIR
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CAH MOD.

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H62-13	7	N/A	N/A	NONE	8.75	N/A	N/A	1.75	YES
2.										
3.										
4.										
5.					N/A W 9-1-99					
6.										
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-1-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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GREASE LEAK REPAIR

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CAM MOD

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period ______________

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H62.14	8	N/A	N/A	NONE	8.25	N/A	N/A	.25	YES
2.										
3.										
4.										
5.										
6.					N/A 9-1-99					
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.

** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-1-99

Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/1/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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Grease Leak Repair & Can Mod.

8-12-99 13:24:15

DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Gallons Removed*				Gallons Replaced*			Diff.**	
Tendon No.	Shop End	Field End	Shop & Field End	Comments	Shop End	Field End	Shop & Field End	Between Removed & Replaced	Acceptable (Yes or No)
1. H62-15	7	N/A	N/A	None	8.75	N/A	N/A	1.75	Yes
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									

N/A 9-1-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 9-1-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 9/7/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period 7th

	Tendon No.	Gallons Removed* Shop End	Field End	Shop & Field End	Comments	Gallons Replaced* Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.	H62-26	.50	7.00	7.50		4.00	6	10.00	2.50	YES
2.	H~~53~~ 35-33	8.00	7.00	15.00		11.00	7.50	18.50	3.50	YES
3.	H51-43	5.00	5.00	10.00		5.00	8.00	13.00	3.00	YES
4.	H46-37	6.00	8.00	14.00		8.00	9.00	17.00	3.00	YES
5.	H13-50	7.00	6.00	13.00		8.00	8.00	16.00	3.00	YES
6.										
7.										
8.										
9.										
10.										
11.										

9-3-99

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector Verification By: [signature] Date: 10-23-99
Cognizant Mech/Struct Engineer Review By: [signature] Date: 11/10/99

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

A135 Z 424

18-12-99 13:24:15

ENCLOSURE 3

Data Sheet 1

Laboratory Analysis of Bulk Filler Grease

Dome Tendons

INSPECTION PERIOD 7th

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES(1) (PPM)	NITRATES(1) (PPM)	SULFIDES(1) (PPM)	WATER/DRY WEIGHT (2) %	RESERVE(1) ALKALINITY (BASE NUMBER)
1. D1-02	FIELD	<0.50	3.02	1.54	<0.10	<0.50
2. D1-02	SHOP	<0.50	1.27	0.890	<0.10	0.544
3. D1-04	SHOP	<0.50	4.44	1.21	<0.10	3.33
4. D1-04	FIELD	<0.50	3.97	1.00	0.20	1.63
D2-25	SE/FIELD	<0.50	1.27	1.02	0.20	55.4
D2-25	SHOP/NW	<0.50	2.70	1.28	0.10	33.6

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT. TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: SUBURBAN LAB. H.F.H. DATE: 12-9-99

LABORATORY SUPERVISOR
VERIFIED BY: SUBURBAN LAB. H.F.H. DATE: 12-9-99

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: [signature] DATE: 12/18/99

A135 of 424

08-12-99 13:24:15

ENCLOSURE 3

Data Sheet 1

Laboratory Analysis of Bulk Filler Grease

Dome Tendons

INSPECTION PERIOD 7th

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES[1] (PPM)	NITRATES[1] (PPM)	SULFIDES[1] (PPM)	WATER/DRY WEIGHT (2) %	RESERVE[1] ALKALINITY (BASE NUMBER)
1. D3-13	FIELD	<0.50	1.27	0.920	0.10	2.22
2. D3-13	SHOP	<0.50	1.75	1.10	0.20	49.3
3.						
4.						

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: SUBURBAN LAB. H.T.H. DATE: 12-9-99

LABORATORY SUPERVISOR
VERIFIED BY: SUBURBAN LAB. H.T.H. DATE: 12-9-99

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: [signature] DATE: 12/18/99

4135 6 of 424

98-12-99 13:24:15

ENCLOSURE 3

Data Sheet 2

Laboratory Analysis of Bulk Filler Grease

Vertical Tendons

INSPECTION PERIOD 7th

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES[1] (PPM)	NITRATES[1] (PPM)	SULFIDES[1] (PPM)	WATER/DRY WEIGHT (2) %	RESERVE[1] ALKALINITY (BASE NUMBER)
1. V-8	SHOP-TOP	<0.50	1.27	1.08	<0.1	0.554
2. V-19	FIELD-BOTTOM	<0.50	2.22	1.20	<0.1	<0.50
3. V-32	SHOP-TOP	<0.50	1.75	1.10	0.2	51.8
4. V-32	FIELD-BOTTOM	<0.50	4.29	1.57	<0.1	8.32
V-35	SHOP-TOP	<0.50	2.06	1.36	<0.1	2.69
V-40	SHOP-TOP	<0.50	4.76	1.91	<0.1	1.06

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: SUBURBAN LAB. N.F.H. DATE: 12-9-99

LABORATORY SUPERVISOR
VERIFIED BY: SUBURBAN LAB. N.F.H. DATE: 12-9-99

COGNIZANT MECH/STRUC ENGINEER
APPROVED BY: [signature] DATE: 12/18/99

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ENCLOSURE 3

Data Sheet 2

Laboratory Analysis of Bulk Filler Grease

Vertical Tendons

INSPECTION PERIOD 7th

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES[1] (PPM)	NITRATES[1] (PPM)	SULFIDES[1] (PPM)	WATER/DRY WEIGHT (2) %	RESERVE[1] ALKALINITY (BASE NUMBER)
1. V-40	FIELD-BOTTOM	<0.50	6.03	2.25	<0.10	0.538
2. V-57	SHOP-TOP	<0.50	2.86	1.66	0.15	1.09
3. V-72	BOTTOM	<0.50	2.75	1.16	0.22	4.39
4. V-73	BOTTOM	<0.50	2.06	1.34	<0.10	0.544
V-74	BOTTOM	<0.50	2.22	1.41	<0.10	0.523
V-75	BOTTOM	<0.50	2.39	1.45	<0.10	1.67

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: SUBURBAN LAB. H.K.N. 12-9-99 DATE:

LABORATORY SUPERVISOR
VERIFIED BY: SUBURBAN LAB. H.K.N. 12-9-99 DATE:

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: [signature] DATE: 12/18/99

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ENCLOSURE 3

Data Sheet 2

Laboratory Analysis of Bulk Filler Grease

Vertical Tendons

INSPECTION PERIOD 7th

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES(1) (PPM)	NITRATES(1) (PPM)	SULFIDES(1) (PPM)	WATER/DRY WEIGHT (2) %	RESERVE(1) ALKALINITY (BASE NUMBER)
1. V-76	BOTTOM	<0.50	1.59	1.39	<0.10	1.09
2. V-79	FIELD-BOTTOM	<0.50	3.02	1.32	<0.10	3.89
3. V-80	SHOP-TOP	<0.50	4.60	1.60	<0.10	1.09
4. V-83	FIELD-BOTTOM	<0.50	4.44	1.18	4.10	36.4
V-86	FIELD-BOTTOM	<0.50	2.70	1.57	<0.10	<0.50
V-94	SHOP-TOP	<0.50	1.43	1.21	<0.10	<0.50

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: SUBURBAN LAB. H.F.H. DATE: 12-4-99

LABORATORY SUPERVISOR
VERIFIED BY: SUBURBAN LAB. H.F.H. DATE: 12-9-99

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: [signature] DATE: 12/18/99

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ENCLOSURE 3

Data Sheet 2

Laboratory Analysis of Bulk Filler Grease

Vertical Tendons

INSPECTION PERIOD 7th

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES[1] (PPM)	NITRATES[1] (PPM)	SULFIDES[1] (PPM)	WATER/DRY WEIGHT (2) %	RESERVE[1] ALKALINITY (BASE NUMBER)
1. V-110	SHOP-TOP	<0.50	5.71	1.84	<0.10	0.544
2. V-114	SHOP-TOP	<0.50	3.05	1.39	<0.10	1.68
3. V-114	FIELD-BOTTOM	<0.50	2.06	1.47	<0.10	1.12
4. V-126	FIELD-BOTTOM	<0.50	1.27	1.45	<0.10	<0.50
V-136	BOTTOM	<0.50	3.49	1.97	<0.10	0.549
V-139	FIELD-BOTTOM	<0.50	5.23	2.57	<0.10	1.08

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: SUBURBAN LAB. N.T.H. DATE: 12-9-99

LABORATORY SUPERVISOR
VERIFIED BY: SUBURBAN LAB. N.T.N. DATE: 12-9-99

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: [signature] DATE: 12/18/99

08-12-99 13:24:15

ENCLOSURE 3

Data Sheet 2

Laboratory Analysis of Bulk Filler Grease

Vertical Tendons

INSPECTION PERIOD 7th

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES[1] (PPM)	NITRATES[1] (PPM)	SULFIDES[1] (PPM)	WATER/DRY WEIGHT (2) %	RESERVE[1] ALKALINITY (BASE NUMBER)
1. V-143	SHOP-TOP	<0.50	4.76	1.62	<0.10	2.19
2. V-146	BOTTOM	<0.50	4.13	2.10	0.10	4.35
3. V-156	SHOP-TOP	<0.50	4.29	1.70	0.25	<0.50
4. V-164	SHOP-TOP	<0.50	8.57	2.99	0.30	2.22
☆ V-164	FIELD-BOTTOM	<0.50	10.3	3.20	0.10	1.08

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT. TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN PREPARED BY: SUBURBAN LAB. H.F.H. DATE: 12-9-99

LABORATORY SUPERVISOR VERIFIED BY: SUBURBAN LAB. H.F.H. DATE: 12-9-99

COGNIZANT MECH/STRUCT ENGINEER APPROVED BY: [signature] DATE: 12/18/99

☆ V164 bottom Nitrates of 10.3 ppm exceeds acceptance limit of 10.0 ppm. Refer to Topical Report No. 136 for evaluation which accepts "as-found" condition. [signature] 12/18/99

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18-12-99 13:24:15

ENCLOSURE 3

Data Sheet 3

Laboratory Analysis of Bulk Filler Grease

Hoop Tendons

INSPECTION PERIOD 7th

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES[1] (PPM)	NITRATES[1] (PPM)	SULFIDES[1] (PPM)	WATER/DRY WEIGHT (2) %	RESERVE[1] ALKALINITY (BASE NUMBER)
1. H46-37	SHOP	<0.50	7.78	2.41	<0.10	2.22
2. H46-37	FIELD	<0.50	9.84	2.87	<0.10	<0.50
3. 13H-50	SHOP	<0.50	2.22	1.00	<0.10	2.24
4. 13H-50	FIELD	<0.50	3.97	1.29	0.10	<0.50
H35-33	FIELD	<0.50	2.22	1.31	<0.10	<0.50
H35-33	SHOP	<0.50	6.98	1.43	<0.10	2.80

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: SUBURBAN LAB. H.F.H. DATE: 12-9-99

LABORATORY SUPERVISOR
VERIFIED BY: SUBURBAN LAB. H.F.H. DATE: 12-9-99

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: [signature] DATE: 12/18/99

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08-12-99 13:24:15

ENCLOSURE 3

Data Sheet 3

Laboratory Analysis of Bulk Filler Grease

Hoop Tendons

INSPECTION PERIOD 7th

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES(1) (PPM)	NITRATES(1) (PPM)	SULFIDES(1) (PPM)	WATER/DRY WEIGHT (2) %	RESERVE(1) ALKALINITY (BASE NUMBER)
1. H62-26	FIELD	<0.50	1.11	1.18	<0.10	54.3
2. H62-26	SHOP	<0.50	1.11	1.10	0.30	53.2
3. H51-43	SHOP	<0.50	5.40	0.950	<0.10	<0.50
4. H51-43	FIELD	<0.50	2.22	1.28	<0.10	5.60

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: SUBURBAN LAB. H.F.H. DATE: 12-9-99

LABORATORY SUPERVISOR
VERIFIED BY: SUBURBAN LAB. H.F.H. DATE: 12-9-99

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: [signature] DATE: 12/18/99

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ENCLOSURE 4
Data Sheet 1
Tendon Wire Inspection Data

INSPECTION PERIOD 7TH

Tendon Identification: V 86

0	B	25'
25'	B	50'
50'	B	75'
75'	B	100'
100'	B	125'
125'	B	150'
150'	B	175'
175'	B	180'

180' B | 184' 7" TOTAL LENGTH OF WIRE

Sample for Tensile Test(2)	Wire Sample Diameters At 1/4-Points			At Breaking Points
Sample 1: 20 ft to 29 ft	.250	.250	.250	.246
Sample 2: 80 ft to 89 ft	.250	.250	.250	.244
Sample 3: 160 ft to 169 ft	.250	.250	.250	.244

NOTE

1. Corrosion Categories (See Table 1 of this enclosure), or any signs of deterioration shall be indicated full length as shown on the above chart.
2. Sample shall include areas representative of significant corrosion or pitting if they exist on removed tendon wire.
3. Diameter at Breaking Point is to be interpolated from 1/4-point diameters on either side of breaking points.

Laboratory Technician prepared by: [signature] Date 10-26-99

Laboratory Supervisor Verified by: ______ Date ______

Cognizant Mech/Struct Engineer Approved by: [signature] Date 11/11/99

WIRE TEST DOCUMENTATION

PROJECT Three Mile Island SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. V86 TENDON END/BUTTRESS NO. SHOP/TOP UNIT 1

Q.C. SIGNOFF [signature] TITLE QC INSPECTER DATE 10-26-99

(8.1.4) Wire ID and Location of removal SAMPLE 1 20'-29' Length 107 3/4 (.04909)

(8.2.1) Wire Diameters: Tag End .250 Middle .250 Ram End .250 Avg. .250
Measuring Device ID QC19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID R21 Recal Date 5-10-00
(8.6.1) Preload force 2.45 kips
Preload Pressure 1540 psi Pressure Gauge ID CC125169 Recal Date DAILY ON USE
Ram Identification 7702 Ram Area 1.555 K = 0.062 Recal Date JOB END
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips(0.1% elongation)
Initial load of pressure 870 psi Elongation 9.40 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID EC23 Recal Date 5-10-00

(8.10.1) Force at 1% elongation 10.51 kips; Pressure 6720 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.30 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.30 in.

(8.12.2) Maximum force at failure 12.93 kips; Pressure 8280 psi

(8.13.1) Type of break DUCTILE Location of break 1" RAM END

(8.14) CALCULATIONS:

(1) Ultimate Stress 263,544 Max.Force ÷ (π Diam.^{2} ÷ 4)

(2) Yield Stress at 1% elongation 214,129 Force @ 1% ÷ (π Diam.^{2} ÷ 4)

(3) Percent elongation at failure 5 % [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ____ Engr. Notified ____

Q.C. Review [signature: H. F. Hendrickson] Level III Date 12-2-99

Title MGR., Q.A.

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PSC PROCEDURE SQ 10.3
TESTING TENDON WIRES
DATA SHEET 10.3
September 6, 1994
Page 1 of 1
Revision 0

WIRE TEST DOCUMENTATION

PROJECT Three Mile Island SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. V84 TENDON END/BUTTRESS NO. SHOP/TOP UNIT 1

Q.C. SIGNOFF Daniel P. O'Hare TITLE QC INSPECTOR DATE 10-26-99

(8.1.4) Wire ID and Location of removal SAMPLE 2 80'-89' Length 108" (.04999)

(8.2.1) Wire Diameters: Tag End .250 Middle .250 Ram End .250 Avg. .250
Measuring Device ID QC 19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID X21 Recal Date 5-10-00
(8.6.1) Preload force 2.45 kips
Preload Pressure 1540 psi Pressure Gauge ID CC125169 Recal Date DAILY ON USE
Ram Identification 7702 Ram Area 1.535 K = .0062 Recal Date JOB END
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips(0.1% elongation)
Initial load of pressure 870 psi Elongation 9.45 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID EC623 Recal Date 5-10-00

(8.10.1) Force at 1% elongation 10.29 kips; Pressure 6580 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.35 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.20 in.

(8.12.2) Maximum force at failure 12.81 kips; Pressure 8200 psi

(8.13.1) Type of break DUCTILE Location of break 52" RAM END

(8.14) CALCULATIONS:

(1) Ultimate Stress 261,010 Max.Force ÷ (π Diam.^{2} ÷ 4)

(2) Yield Stress at 1% elongation 209,694 Force @ 1% ÷ (π Diam.^{2} ÷ 4)

(3) Percent elongation at failure 4.85 % [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ______ Engr. Notified ______

Q.C. Review H. T. Hendrickson Level III Date 12-2-99

Title Mgr. Q.A.

A139 of 424

PSC PROCEDURE SQ 10.3
TESTING TENDON WIRES
DATA SHEET 10.3
September 6, 1994
Page 1 of 1
Revision 0

WIRE TEST DOCUMENTATION

PROJECT THREE MILE ISLAND SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. V86 TENDON END/BUTTRESS NO. SHOP/TOP UNIT 1

Q.C. SIGNOFF [signature] TITLE QC INSPECTOR DATE 10 7 3/8"

(8.1.4) Wire ID and Location of removal SAMPLE 3 160'-169' Length (C04909)

(8.2.1) Wire Diameters: Tag End .250 Middle .250 Ram End .250 Avg. .250
Measuring Device ID QC19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID R21 Recal Date 5-10-00
(8.6.1) Preload force 2.45 kips
Preload Pressure 1540 psi Pressure Gauge ID CC125169 Recal Date DAILY ON USE
Ram Identification 7702 Ram Area 1.555 K = 6.062 Recal Date JOB END
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips(0.1% elongation)
Initial load of pressure 870 psi Elongation 9.40 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID ECC23 Recal Date 5-10-00

(8.10.1) Force at 1% elongation 10.38 kips; Pressure 6640 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.30 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.80 in.

(8.12.2) Maximum force at failure 12.93 kips; Pressure 8280 psi

(8.13.1) Type of break DUCTILE Location of break 11" RAM END

(8.14) CALCULATIONS:

(1) Ultimate Stress 263,544 Max.Force ÷ (π Diam.^{2} ÷ 4)

(2) Yield Stress at 1% elongation 211,595 Force @ 1% ÷ (π Diam.^{2} ÷ 4)

(3) Percent elongation at failure 5.5 % [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ______ Engr. Notified ______

Q.C. Review H.F. Hendrickson Level III Date 12-2-99

Title MGR., Q.A.

ENCLOSURE 4
Data Sheet 1
Tendon Wire Inspection Data

INSPECTION PERIOD 7TH

Tendon Identification: V164

0	B	25'
25'	B	50'
50'	B	75'
75'	B	100'
100'	B	125'
125'	B	150'
150'	B	175'
175'	B	180'

180' B | 184' 6 3/4" TOTAL LENGTH OF WIRE

Sample for Tensile Test(2)	Wire Sample Diameters At 1/4-Points			At Breaking Points
Sample 1: 20 ft to 29 ft	.251	.251	.251	.246
Sample 2: 80 ft to 89 ft	.251	.251	.251	.245
Sample 3: 160 ft to 169 ft	.251	.251	.251	.246

NOTE

1. Corrosion Categories (See Table 1 of this enclosure), or any signs of deterioration shall be indicated full length as shown on the above chart.
2. Sample shall include areas representative of significant corrosion or pitting if they exist on removed tendon wire.
3. Diameter at Breaking Point is to be interpolated from 1/4-point diameters on either side of breaking points.

Laboratory Technician prepared by: [signature] Date 10-26-99

Laboratory Supervisor Verified by: ____ Date ____

Cognizant Mech/Struct Engineer Approved by: [signature] Date 11/11/99

WIRE TEST DOCUMENTATION

PROJECT THREE MILE ISLAND SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. V164 TENDON END/BUTTRESS NO. SHOP/TOP UNIT 1

Q.C. SIGNOFF [signature] TITLE ~~QC~~ QC INSPECTER DPO 10-25-99 DATE 10-26-99

(8.1.4) Wire ID and Location of removal SAMPLE 1 20'-29' Length 108 3/4 (.04945)

(8.2.1) Wire Diameters: Tag End .251 Middle .251 Ram End .251 Avg. .251
Measuring Device ID QC19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4" Measuring Device ID R21 Recal Date 5-10-0
(8.6.1) Preload force 2.45 kips
Preload Pressure 1540 psi Pressure Gauge ID CC125169 Recal Date DAILY ON USE
Ram Identification 7702 Ram Area 1.555 K = 6.062 Recal Date JOB END

(8.7.1) Force reduced to 0 OK

(8.8.1) Initial load of wire force 1.42 kips(0.1% elongation)
Initial load of pressure 870 psi Elongation 9.40 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID ECC23 Recal Date 5-10-00

(8.10.1) Force at 1% elongation 10.66 kips; Pressure 6820 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.30 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.60 in.

(8.12.2) Maximum force at failure 13.18 kips; Pressure 8440 psi

(8.13.1) Type of break DUCTILE Location of break 1/4" OPPOSITE RAM END

(8.14) CALCULATIONS:

(1) Ultimate Stress 266,657 Max.Force ÷ (π Diam.^{2} ÷ 4)

(2) Yield Stress at 1% elongation 215,714 Force @ 1% ÷ (π Diam.^{2} ÷ 4)

(3) Percent elongation at failure 5.3 % [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ____ Engr. Notified ____

Q.C. Review H.F. Hendrikson Level III Date 12-2-99

Title MGR., Q.A.

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PSC PROCEDURE SQ 10.3
TESTING TENDON WIRES
DATA SHEET 10.3
September 6, 1994
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Revision 0

WIRE TEST DOCUMENTATION

PROJECT Three Mile Island SURVEILLANCE NO. 4TH YEAR 1999

TENDON NO. V164 TENDON END/BUTTRESS NO. Shop/Top UNIT 1

Q.C. SIGNOFF [signature] TITLE QC Inspector DATE 10-26-99

(8.1.4) Wire ID and Location of removal Sample 2 80'-89' Length 108 (04945)

(8.2.1) Wire Diameters: Tag End .251 Middle .251 Ram End .251 Avg. .251
Measuring Device ID QC19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID R21 Recal Date 5-10-00
(8.6.1) Preload force 2.45 kips
Preload Pressure 1540 psi Pressure Gauge ID CC125169 Recal Date Daily on Use
Ram Identification 7702 Ram Area 1.555 K = 0.062 Recal Date Job End
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips (0.1% elongation)
Initial load of pressure 870 psi Elongation 9.40" in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID EC23 Recal Date 5-10-00

(8.10.1) Force at 1% elongation 10.79 kips; Pressure 6900 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.30 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.20 in.

(8.12.2) Maximum force at failure 12.93 kips; Pressure 8280 psi

(8.13.1) Type of break Ductile Location of break 5½" Ram End

(8.14) CALCULATIONS:

(1) Ultimate Stress 261,625 Max.Force $\div$ (π Diam.$^2 \div 4$)

(2) Yield Stress at 1% elongation 218,230 Force @ 1% $\div$ (π Diam.$^2 \div 4$)

(3) Percent elongation at failure 4.9 % [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ______ Engr. Notified ______

Q.C. Review H. F. Hendrikson Level III Date 12-2-99

Title Mgr., Q.A.

A143 7 424

WIRE TEST DOCUMENTATION

PROJECT Three Mile Island SURVEILLANCE NO. 4TH YEAR 1999

TENDON NO. V164 TENDON END/BUTTRESS NO. Shop/Top UNIT 1

Q.C. SIGNOFF Daniel P. O'Shea TITLE QC Inspector DATE 10-26-99

(8.1.4) Wire ID and Location of removal Sample 3 160'-169' Length 108 (.04945)

(8.2.1) Wire Diameters: Tag End .251 Middle .251 Ram End .251 Avg. .251
Measuring Device ID QC19 Recal Date ~~5-16-00~~ 10-25-99 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID R21 Recal Date 5-10-0
(8.6.1) Preload force 2.45 kips
Preload Pressure 1540 psi Pressure Gauge ID CC125169 Recal Date Daily/on use
Ram Identification 7702 Ram Area 1.555 K = 1.062 Recal Date Job end
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips(0.1% elongation)
Initial load of pressure 870 psi Elongation 9.45 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID CC23 Recal Date 5-10-

(8.10.1) Force at 1% elongation 10.54 kips; Pressure 6740 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.35 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.30 in.

(8.12.2) Maximum force at failure 12.99 kips; Pressure 8320 psi

(8.13.1) Type of break Ductile Location of break 1 1/4" Ram End

(8.14) CALCULATIONS:

(1) Ultimate Stress 262,883 Max.Force $\div$ (π Diam.$^2 \div 4$)

(2) Yield Stress at 1% elongation 213,199 Force @ 1% $\div$ (π Diam.$^2 \div 4$)

(3) Percent elongation at failure 4.95% [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ____ Engr. Notified ____

Q.C. Review H. F. Hendrikson Level III Date 12-2-99

Title MGR, Q.A.

ENCLOSURE 4
Data Sheet 1
Tendon Wire Inspection Data

INSPECTION PERIOD 7TH

Tendon Identification: D102

0	B	25'
25'	B	50'
50'	B	75'
75'	B	100'
100'	B | 106'5" TOTAL LENGTH OF WIRE	125'
125'		150'
150'		175'
175'		180'

Sample for Tensile Test(2)	Wire Sample Diameters At 1/4-Points			At Breaking Points
Sample 1: 20 ft to 29 ft	.250	.250	.250	.247
Sample 2: 50 ft to 59 ft	.250	.250	.250	.244
Sample 3: 90 ft to 99 ft	.250	.250	.250	.244

NOTE

1. Corrosion Categories (See Table 1 of this enclosure), or any signs of deterioration shall be indicated full length as shown on the above chart.
2. Sample shall include areas representative of significant corrosion or pitting if they exist on removed tendon wire.
3. Diameter at Breaking Point is to be interpolated from 1/4-point diameters on either side of breaking points.

Laboratory Technician prepared by: [signature] Date 10-26-99

Laboratory Supervisor Verified by: ______ Date ______

Cognizant Mech/Struct Engineer Approved by: [signature] Date 11/11/99

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WIRE TEST DOCUMENTATION

PROJECT Three Mile Island SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. D102 TENDON END/BUTTRESS NO. Field / Near Butt 1 UNIT 1

Q.C. SIGNOFF [signature] TITLE QC Inspecter DATE 10-26-99

(8.1.4) Wire ID and Location of removal Sample 1 20'-29' Length 107 1/2" (.04909)

(8.2.1) Wire Diameters: Tag End .250 Middle .250 Ram End .250 Avg. .250
Measuring Device ID QC 19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID R21 Recal Date 5-10-00
(8.6.1) Preload force 245 kips
Preload Pressure 1540 psi Pressure Gauge ID CC125169 Recal Date Daily on Use
Ram Identification 7702 Ram Area 1.555 K = 0.062 Recal Date Job End
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips (0.1% elongation)
Initial load of pressure 870 psi Elongation 9.30 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID ECC23 Recal Date 5-10-00

(8.10.1) Force at 1% elongation 10.41 kips; Pressure 6660 psi

(8.11.1) "Rule" reading measurement at 1% elongation ~~10.20~~ 10.20 in. DPO 10-26-99

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.00 in.

(8.12.2) Maximum force at failure 12.31 kips; Pressure 7880 psi

(8.13.1) Type of break Ductile Location of break 31" Ram End

(8.14) CALCULATIONS:

(1) Ultimate Stress 250,873 Max.Force ÷ (π Diam.^{2} ÷ 4)

(2) Yield Stress at 1% elongation 212,228 Force @ 1% ÷ (π Diam.^{2} ÷ 4)

(3) Percent elongation at failure 4.8% [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ______ Engr. Notified ______

Q.C. Review H. L. Hendrikson Level III Date 12-2-99

Title MGR, Q.A.

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PSC PROCEDURE SQ 10.3
TESTING TENDON WIRES
DATA SHEET 10.3
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WIRE TEST DOCUMENTATION

PROJECT Three Mile Island SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. 2102 TENDON END/BUTTRESS NO. Field / Near Butt 1 UNIT 1

Q.C. SIGNOFF [signature] TITLE QC Inspector DATE 10-26-99

(8.1.4) Wire ID and Location of removal Sample 2 50'-59' Length 107½" (.04989)

(8.2.1) Wire Diameters: Tag End .250 Middle .250 Ram End .250 Avg. .250
Measuring Device ID QC19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID R21 Recal Date 5-10-00
(8.6.1) Preload force 2.45 kips
Preload Pressure 1540 psi Pressure Gauge ID QC125169 Recal Date Daily on use
Ram Identification 7702 Ram Area 1.555 K = 0.062 Recal Date Job End
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips(@.1% elongation)
Initial load of pressure 870 psi Elongation 9.40 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID QC033 Recal Date 5-10-00

(8.10.1) Force at 1% elongation 10.35 kips; Pressure 6620 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.30 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.50 in.

(8.12.2) Maximum force at failure 12.31 kips; Pressure 7880 psi

(8.13.1) Type of break Ductile Location of break 31" opposite Ram

(8.14) CALCULATIONS:

(1) Ultimate Stress 250,873 Max.Force ÷ (π Diam.^{2} ÷ 4)

(2) Yield Stress at 1% elongation 210,961 Force @ 1% ÷ (π Diam.^{2} ÷ 4)

(3) Percent elongation at failure 5.2% [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ____ Engr. Notified ____

Q.C. Review [signature: H. L. Hedrickson] Level III Date 12-2-99

Title MGR., Q.A.

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TESTING TENDON WIRES
DATA SHEET 10.3
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WIRE TEST DOCUMENTATION

PROJECT Three Mile Island SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. D102 TENDON END/BUTTRESS NO. Field/Near Butt. #1 UNIT 1

Q.C. SIGNOFF [signature] TITLE QC Inspecter DATE 10-26-99

(8.1.4) Wire ID and Location of removal Sample 3 90'-99' Length 107 7/8" (.04989)

(8.2.1) Wire Diameters: Tag End .250 Middle .250 Ram End .250 Avg. .250
Measuring Device ID QC19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID R21 Recal Date 5-10-00
(8.6.1) Preload force 2.45 kips
Preload Pressure 1540 psi Pressure Gauge ID CC125169 Recal Date Daily on use
Ram Identification 7702 Ram Area 1.555 K = 0.062 Recal Date Job end
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips (0.1% elongation)
Initial load of pressure 870 psi Elongation 9.40 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID CC23 Recal Date 5-10-00

(8.10.1) Force at 1% elongation ~~X~~ 10.41 kips; Pressure 6660 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.30 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.30 in.

(8.12.2) Maximum force at failure 12.31 kips; Pressure 7880 psi

(8.13.1) Type of break Ductile Location of break 10 1/4" Ram End

(8.14) CALCULATIONS:

(1) Ultimate Stress 250,873 Max.Force ÷ (π Diam.^{2} ÷ 4)

(2) Yield Stress at 1% elongation 212,228 Force @ 1% ÷ (π Diam.^{2} ÷ 4)

(3) Percent elongation at failure 5 % [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ______ Engr. Notified ______

Q.C. Review [signature: H. F. Hendrickson] Level III Date 12-2-99

Title MGR., Q.A.

ENCLOSURE 4
Data Sheet 1
Tendon Wire Inspection Data

INSPECTION PERIOD 7TH

Tendon Identification: 13H50

0	A	25'
25'	A	50'
50'	A	75'
75'	A	100'
100'	A	125'
125'	A	150'
150'	A | 155'6" TOTAL LENGTH OF WIRE	175'
175'		180'

Sample for Tensile Test(2)	Wire Sample Diameters At 1/4-Points			At Breaking Points
Sample 1: 20 ft to 29 ft	.251	.251	.251	.247
Sample 2: 70 ft to 79 ft	.251	.251	.251	.244
Sample 3: 140 ft to 149 ft	.251	.251	.251	.245

NOTE

1. Corrosion Categories (See Table 1 of this enclosure), or any signs of deterioration shall be indicated full length as shown on the above chart.
2. Sample shall include areas representative of significant corrosion or pitting if they exist on removed tendon wire.
3. Diameter at Breaking Point is to be interpolated from 1/4-point diameters on either side of breaking points.

Laboratory Technician prepared by: [signature] Date 10-26-99

Laboratory Supervisor Verified by: ____________ Date ______

Cognizant Mech/Struct Engineer Approved by: [signature] Date 11/11/99

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TESTING TENDON WIRES
DATA SHEET 10.3
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WIRE TEST DOCUMENTATION

PROJECT THREE MILE ISLAND SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. 13H50 TENDON END/BUTTRESS NO. FIELD/BUTT#1 UNIT 1

Q.C. SIGNOFF [signature] TITLE QC INSPECTOR DATE 10-26-99

(8.1.4) Wire ID and Location of removal SAMPLE 1 20'-29' Length 108"

(8.2.1) Wire Diameters: Tag End .251 Middle .251 Ram End .251 Avg. .251 (.04945)
Measuring Device ID QC19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID 821 Recal Date 5-10-00
(8.6.1) Preload force 2.45 kips
Preload Pressure 1540 psi Pressure Gauge ID CC125169 Recal Date DAILY/IN USE
Ram Identification 7702 Ram Area 1.555 K = 0.062 Recal Date JOB END
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips(0.1% elongation)
Initial load of pressure 870 psi Elongation 9.30 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID EC23 Recal Date 5-10-00

(8.10.1) Force at 1% elongation 9.85 kips; Pressure 6300 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.20 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.00 in.

(8.12.2) Maximum force at failure 12.37 kips; Pressure 7920 psi

(8.13.1) Type of break DUCTILE Location of break 1/4" RAM END

(8.14) CALCULATIONS:

(1) Ultimate Stress 250,305 Max.Force $\div$ (π Diam.$^2 \div 4$)

(2) Yield Stress at 1% elongation 199,362 Force @ 1% $\div$ (π Diam.$^2 \div 4$)

(3) Percent elongation at failure 4.8 % [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ____ Engr. Notified ____

Q.C. Review H. F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A.

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TESTING TENDON WIRES
DATA SHEET 10.3
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WIRE TEST DOCUMENTATION

PROJECT Three Mile Island SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. 13H50 TENDON END/BUTTRESS NO. Field/Butt #1 UNIT 1

Q.C. SIGNOFF [signature] TITLE QC Inspecter DATE 10-26-99

(8.1.4) Wire ID and Location of removal Sample 2 70'-79' Length 108' (.04945)

(8.2.1) Wire Diameters: Tag End .251 Middle .251 Ram End .251 Avg. .251
Measuring Device ID QC19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID R21 Recal Date 5-10-00
(8.6.1) Preload force 2.45 kips
Preload Pressure 1540 psi Pressure Gauge ID CC125169 Recal Date Daily on Use
Ram Identification 7702 Ram Area 1.535 K = 0.062 Recal Date Job End
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips(0.1% elongation)
Initial load of pressure 870 psi Elongation 9.30 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID ECC23 Recal Date 5-10-00

(8.10.1) Force at 1% elongation 9.98 kips; Pressure 6380 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.20 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading 14.40 in.

(8.12.2) Maximum force at failure 12.62 kips; Pressure 8080 psi

(8.13.1) Type of break Ductile Location of break 42" opposite Ram

(8.14) CALCULATIONS:

(1) Ultimate Stress 255,336 Max.Force ÷ (π Diam.^{2} ÷ 4)

(2) Yield Stress at 1% elongation 201,878 Force @ 1% ÷ (π Diam.^{2} ÷ 4)

(3) Percent elongation at failure 5.2% [1 +("Rule"Dim @ Failure −"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ______ Engr. Notified ______

Q.C. Review H. F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A.

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WIRE TEST DOCUMENTATION

PROJECT THREE MILE ISLAND SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. 13H50 TENDON END/BUTTRESS NO. FIELD/BUTT #1 UNIT 1

Q.C. SIGNOFF Daniel P. O'Hara TITLE QC INSPECTOR DATE 10-26-99

(8.1.4) Wire ID and Location of removal SAMPLE 3 140'-149' Length ~~110~~ 108 (.04945)

(8.2.1) Wire Diameters: Tag End .251 Middle .251 Ram End .251 Avg. .251
Measuring Device ID QC19 Recal Date 1-29-00

(8.3.2.1) Buttonhead Inspection: Tag End OK Ram End OK

(8.4.1) Gauge Length of Wire 99 3/4 Measuring Device ID R21 Recal Date 5-10-00
(8.6.1) Preload force 2.45 kips
Preload Pressure 1530 psi Pressure Gauge ID CC12516f Recal Date DAILY ON USE
Ram Identification 7702 Ram Area 1.555 K = 0.062 Recal Date JOB END
(8.7.1) Force reduced to 0 OK
(8.8.1) Initial load of wire force 1.42 kips(@.1% elongation)
Initial load of pressure 870 psi Elongation 9.40 in.

(8.9.1) Preset Dial Indicator OK (0.9% elongation) Indicator ID ECC23 Recal Date 5-10-00

(8.10.1) Force at 1% elongation 10.23 kips; Pressure 6540 psi

(8.11.1) "Rule" reading measurement at 1% elongation 10.30 in.

(8.12.1) Maximum elongation at failure, from "Rule" reading ~~14.10~~ 14.10 DPO 10-26-99 in.

(8.12.2) Maximum force at failure 12.59 kips; Pressure 8060 psi

(8.13.1) Type of break DUCTILE Location of break 1/4" OPPOSITE RAM

(8.14) CALCULATIONS:

(1) Ultimate Stress 254,707 Max.Force ÷ (πDiam.^{2}÷4)

(2) Yield Stress at 1% elongation 206,910 Force @ 1% ÷ (πDiam.^{2}÷4)

(3) Percent elongation at failure 4.8 % [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ✓ Unacceptable ______ Engr. Notified ______

Q.C. Review H.F. Hendrikson Level III Date 12-2-99

Title MGR., Q.A.

8-12-99 13:24:15

ENCLOSURE 4
Data Sheet 2
Tendon Wire Test Results

INSPECTION PERIOD 4TH

11/11/99 11/11/99

TENDON WIRE (1) SAMPLE NO.	LOCATION (2) FROM END OF WIRE	YIELD (3) STRESS ~~(ksi)~~ psi	ULTIMATE STRESS ~~(ksi)~~ psi	PERCENT (4) ELONGATION	COMMENTS
DOME					
1.					
2.					
3.					
VERTICAL					
1. V86 SAMPLE 1	20'-29'	214,129	263,544	5	NONE
2. V86 SAMPLE 2	80'-89'	209,694	261,010	4.85	NONE
3. V86 SAMPLE 3	160'-169'	211,595	263,514	5.5	NONE
HOOP					
1.					
2.					
3.					

NOTES:

(1) See Section 7 of this enclosure.
(2) End starts from end of zero length as indicated on Data Sheet 1 of this enclosure.
(3) Yield stress is defined as stress at 1 percent elongation, i.e., 192,000 psi minimum.
(4) At Ultimate Tensile Strength.

Laboratory Technician
Prepared By: [signature] Date 10-26-99

Laboratory Supervisor
Verified By: ______ Date ______

Cognizant Mech/Struct Engineer
Approved By: [signature] Date 11/11/99

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ENCLOSURE 4
Data Sheet 2
Tendon Wire Test Results

INSPECTION PERIOD 7TH

11/11/99 11/11/99

TENDON WIRE [1] SAMPLE NO.	LOCATION [2] FROM END OF WIRE	YIELD [3] STRESS ~~(ksi)~~ psi	ULTIMATE STRESS ~~(ksi)~~ psi	PERCENT [4] ELONGATION	COMMENTS
DOME					
1. D102 SAMPLE 1	20'-29'	212,228	250,873	4.8	NONE
2. D102 SAMPLE 2	50'-59'	210,961	250,873	5.2	NONE
3. D102 SAMPLE 3	90'-99'	212,228	250,873	5	NONE
VERTICAL					
1. V164 SAMPLE 1	20'-29'	215,714	266,657	5.3	NONE
2. V164 SAMPLE 2	80'-89'	218,230	261,625	4.9	NONE
3. V164 SAMPLE 3	160'-169'	213,199	262,883	4.95	NONE
HOOP					
1. 13H50 SAMPLE 1	20'-29'	199,362	250,305	4.8	NONE
2. 13H50 SAMPLE 2	70'-79'	201,878	255,336	5.2	NONE
3. 13H50 SAMPLE 3	140'-149'	206,910	254,707	4.8	NONE

NOTES:

(1) See Section 7 of this enclosure.
(2) End starts from end of zero length as indicated on Data Sheet 1 of this enclosure.
(3) Yield stress is defined as stress at 1 percent elongation, i.e., 192,000 psi minimum.
(4) At Ultimate Tensile Strength.

Laboratory Technician
Prepared By: Daniel P. [signature] Date 10-26-99

Laboratory Supervisor
Verified By: ______ Date ______

Cognizant Mech/Struct Engineer
Approved By: [signature] Date 11/11/99

11-12-99 13:24:15

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ENCLOSURE 6

Data Sheet 1
Anchorage Assembly Surveillance Inspection
Dome Tendons

INSPECTION PERIOD 7th

TENDON I.D. 1	END Location 2	Corr. Cat. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	BUTTONHEADS: CATEGORY OF CRACKS 5	BUTTONHEADS: PROPERLY FORMED 6	BUTTONHEADS: SKETCHED 7	STRESSING WASHER & NUT: CORR. CAT. 8	STRESSING WASHER & NUT: CRACKS 9	STRESSING WASHER & NUT: SKETCHED 10	SHIMS: CORR. CAT. 11	SHIMS: CRACKS 12	SHIMS: SKETCHED 13	BEARING PLATE: CORR. CAT. 14	BEARING PLATE: CRACKS 15	BEARING PLATE: SKETCHED 16	DATE INSP. 17	COMMENTS 18	INSP. BY CONTR. FOREMAN 19	VERIF. BY COGNIZANT QV INSP. 20
1. D225	NW	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	8/23/99	N	[illegible]	[illegible]
	SE	1	0	N/A	Y	N	1	N	N	1	N	N	7	N	N	8/31/99	N	[illegible]	[illegible]
2. D313	SE	1	0	N/A	Y	N	1	N	N	1	N	N	7	~~N~~ N DPO 10-6-99	N	10/5/99	N	[illegible]	DPO
	NE	1	1	N/A	Y	Y	1	N	N	1	N	N	7	N	N	10-5-99	1 PROTRUDING BUTTONHEAD	[illegible]	DPO
3. D102	NE	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-7-99	N	[illegible]	DPO
	NW	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-7-99	N	[illegible]	DPO
4. D104	NW	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-11-99	N	[illegible]	DPO
	NW	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-11-99	N	[illegible]	DPO
5.																			
6.																			

LEGEND

GENERAL — **TENDON END-LOCATION**

Y = YES — IDENTIFY TENDON END (SHOP OR FIELD) AND NW, NE, SW, SE
N = NO

NOTE:
SEE TABLE 2 FOR CORROSION CATEGORIES.
SEE TABLE 1 FOR ACCEPTANCE CRITERIA FOR BUTTONHEADS.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [signature] DATE: 11/10/99

NOTE: PRE LIFT-OFF & POST LIFT-OFF INSPECTION WAS PERFORMED

08-12-99 13:24:15

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ENCLOSURE 6

Data Sheet 2
Anchorage Assembly Surveillance Inspection
Vertical Tendons

INSPECTION PERIOD 7th

TENDON	END		BUTTONHEADS				STRESSING WASHER & NUT			SHIMS			BEARING PLATE			DATE INSP.	COMMENTS	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV INSP.
I.D. 1	Location 2	Corr. Cat. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	CATEGORY OF CRACKS 5	PROPERLY FORMED 6	SKETCHED 7	CORR. CAT. 8	CRACKS 9	SKETCHED 10	CORR. CAT. 11	CRACKS 12	SKETCHED 13	CORR. CAT. 14	CRACKS 15	SKETCHED 16	17	18	19	20
1. 32	T	1	0	N/A	Y	N	2	N	N	2	N	N	8	N	N	8/27/99	None	CB	DJ.
	B	1	0	N/A	Y	N	1	N	N	1	N	N	7	NO	N	9-29-99	NONE	CB	DPO
2. 40	T	1	1	N/A	Y	Y	1	N	N	2	N	N	8	N	N	8/27/99	(1) PROTUDING BUTTON HEAD	CB	DJ.
	B	1	1	N/A	Y	Y	1	NO	N	1	N	N	7	N	N	9-29-99	1 MISSING BH 1 DOUBLE BH	CB	DPO
3. 114	T	1	0	N/A	Y	N	2	N	N	2	N	N	8	N	N	9/10/99	None	CB	DJ.
	B	1	0	N/A	Y	Y	1	N	N	1	N	N	7	N	N	9-29-99	1 DOUBLE BH	CB	DPO 9-29-99
4. 164	T	1	0	N/A	Y	N	2	N	N	2	N	N	8	N	N	9-27-99	NONE	CB	DPO
	B	1	0	N/A	Y	N	1	N	N	1	N	N	7	N	N	9-29-99	NONE	CB	DPO
5. 8	T	2	0	N/A	Y	N	2	N	N	2	N	N	8	~~N/A~~ N DPO 10-13-99	N	10-13-99	NONE	CB	DPO
	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	CB	DPO
6. 35	T	2	~~N/A~~ 0 DPO 10-13-99	~~N/A~~	~~N/A~~ Y DPO 10-13-99	N	2	N	N	2	N	N	7	N	N	10-13-99	NONE	CB	DPO
	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	—	~~N/A~~	CB	DPO

LEGEND

GENERAL — **TENDON END-LOCATION**

Y = YES
N = NO

IDENTIFY TENDON END (SHOP OR FIELD) AND TOP (T) OR BOTTOM (B) OF TENDON

NOTE:

SEE TABLE 2 FOR CORROSION CATEGORIES.
SEE TABLE 1 FOR ACCEPTANCE CRITERIA FOR BUTTONHEADS.

COGNIZANT MECH/STRUCT ENGINEER REVIEWED BY [signature] DATE: 11/10/99

NOTE: PRE LIFT-OFF & POST LIFT-OFF INSPECTION PERFORMED.

1-12-99 13:24:15

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ENCLOSURE 6

Data Sheet 1
Anchorage Assembly Surveillance Inspection
Dome Tendons

INSPECTION PERIOD 7th

TENDON I.D. 1	END Location 2	Corr. Cat. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	BUTTONHEADS: CATEGORY OF CRACKS 5	BUTTONHEADS: PROPERLY FORMED 6	BUTTONHEADS: SKETCHED 7	STRESSING WASHER & NUT: CORR. CAT. 8	STRESSING WASHER & NUT: CRACKS 9	STRESSING WASHER & NUT: SKETCHED 10	SHIMS: CORR. CAT. 11	SHIMS: CRACKS 12	SHIMS: SKETCHED 13	BEARING PLATE: CORR. CAT. 14	BEARING PLATE: CRACKS 15	BEARING PLATE: SKETCHED 16	DATE INSP. 17	COMMENTS 18	INSP. BY CONTR. FOREMAN 19	VERIF. BY COGNIZANT QV INSP. 20
1. D225	NW	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	5/23/99	N	CB	SW
	SE	1	0	N/A	Y	N	1	N	N	1	N	N	7	N	N	5/31/99	N	CB	SW
2. D313	SE	1	0	N/A	Y	N	1	N	N	1	N	N	7	~~[illegible]~~ N DPO 10-6-99	N	10/5/99	N	CB	DPO
	NE	1	1	N/A	Y	Y	1	N	N	1	N	N	7	N	N	10-5-99	1 PROTRUDING BUTTONHEAD	CB	DPO
3. D102	NE	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-7-99	N	CB	DPO
	NW	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-7-99	N	CB	DPO
4. D104	NE	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-11-99	N	CB	DPO
	NW	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-11-99	N	CB	DPO
5.																			
6.																			

LEGEND

GENERAL
Y = YES
N = NO

TENDON END-LOCATION
IDENTIFY TENDON END (SHOP OR FIELD) AND NW, NE, SW, SE

NOTE:
SEE TABLE 2 FOR CORROSION CATEGORIES.
SEE TABLE 1 FOR ACCEPTANCE CRITERIA FOR BUTTONHEADS.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [signature] DATE: 11/10/99

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NOTE: PRE LIFT-OFF & POST LIFT-OFF INSPECTION WAS PERFORMED

ENCLOSURE 6

Data Sheet 2
Anchorage Assembly Surveillance Inspection
Vertical Tendons

INSPECTION PERIOD 7th

TENDON I.D. 1	END Location 2	BUTTONHEADS Corr. Cat. 3	BUTTONHEADS No. of Missing, Broken, and/or Damaged Wires 4	BUTTONHEADS Category of Cracks 5	BUTTONHEADS Properly Formed 6	BUTTONHEADS Sketched 7	STRESSING WASHER & NUT Corr. Cat. 8	STRESSING WASHER & NUT Cracks 9	STRESSING WASHER & NUT Sketched 10	SHIMS Corr. Cat. 11	SHIMS Cracks 12	SHIMS Sketched 13	BEARING PLATE Corr. Cat. 14	BEARING PLATE Cracks 15	BEARING PLATE Sketched 16	DATE INSP. 17	COMMENTS 18	INSP. BY CONTR. FOREMAN 19	VERIF. BY COGNIZANT QV INSP. 20
1. 32	T	1	0	N/A	Y	N	2	N	N	2	N	N	8	N	N	8/27/99	None	CB	DJ.
	B	1	0	N/A	Y	N	1	N	N	1	N	N	7	NO	N	9-29-99	None	CB	DPO
2. 40	T	1	1	N/A	Y	Y	1	N	N	2	N	N	8	N	N	8/27/99	(1) Protruding Button Head	CB	DJ.
	B	1	1	N/A	Y	Y	1	NO	N	1	N	N	7	N	N	9-29-99	1 Missing BH 1 Double BH	CB	DPO
3. 114	T	1	0	N/A	Y	N	2	N	N	2	N	N	8	N	N	9/10/99	None	CB	DJ.
	B	1	0	N/A	Y	Y	1	N	N	1	N	N	7	N	N	9-29-99	1 Double BH	CB	DPO 9-29-99
4. 164	T	1	0	N/A	Y	N	2	N	N	2	N	N	8	N	N	9-27-99	None	CB	DPO
	B	1	0	N/A	Y	N	1	N	N	1	N	N	7	N	N	9-29-99	None	CB	DPO
5. 8	T	2	0	N/A	Y	N	2	N	N	2	N	N	8	~~N/A~~ N DPO 10-13-99	N	10-13-99	None	CB	DPO
	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	CB	DPO
6. 35	T	2	~~N/A~~ 0 DPO 10-13-99	N/A	~~N/A~~ Y DPO 10-13-99	N	2	N	N	2	N	N	7	N	N	10-13-99	None	CB	DPO
	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	~~N/A~~	—	~~N/A~~	CB	DPO

LEGEND

GENERAL

Y = YES
N = NO

TENDON END-LOCATION

IDENTIFY TENDON END (SHOP OR FIELD) AND TOP (T) OR BOTTOM (B) OF TENDON

NOTE:

SEE TABLE 2 FOR CORROSION CATEGORIES.
SEE TABLE 1 FOR ACCEPTANCE CRITERIA FOR BUTTONHEADS.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [illegible] DATE 11/10/99

NOTE: PRE LIFT-OFF & POST LIFT-OFF INSPECTION PERFORMED.

3-12-99 13:24:15

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18-12-99 13:24:15

ENCLOSURE 6

Data Sheet 2
Anchorage Assembly Surveillance Inspection
Vertical Tendons

INSPECTION PERIOD 7

TENDON I.D. 1	END Location 2	Corr. Cat. 3	BUTTONHEADS NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	BUTTONHEADS CATEGORY OF CRACKS 5	BUTTONHEADS PROPERLY FORMED 6	BUTTONHEADS SKETCHED 7	STRESSING WASHER & NUT CORR. CAT. 8	STRESSING WASHER & NUT CRACKS 9	STRESSING WASHER & NUT SKETCHED 10	SHIMS CORR. CAT. 11	SHIMS CRACKS 12	SHIMS SKETCHED 13	BEARING PLATE CORR. CAT. 14	BEARING PLATE CRACKS 15	BEARING PLATE SKETCHED 16	DATE INSP. 17	COMMENTS 18	INSP. BY CONTR. FOREMAN 19	VERIF. BY COGNIZANT QV INSP. 20
1. 57	T	2	0	N/A	Y	N	2	N	N	2	N	N	7	N	N	10-18-99	NONE	CB	DPO
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
2. 143	T	2	1	N/A	Y	Y	2	N	N	2	N	N	7	N	N	10-13-99	ONE PROTRUDING BUTTONHEAD PREVIOUSLY RECORDED	CB	DPO
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
3. 156	T	2	1	N/A	Y	Y	2	N	N	2	N	N	8	N	N	10-13-99	ONE PROTRUDING BUTTONHEAD PREVIOUSLY RECORDED	CB	DPO
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
4. V80	T	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-14-99	NONE	CB	DPO
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
5. V94	T	2	0	N/A	Y	N	2	N	N	2	N	N	7	N	N	10-14-99	NONE	CB	DPO
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				
6. V110	T	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-14-99	NONE	CB	DPO
	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A				

LEGEND

GENERAL

Y = YES
N = NO

TENDON END-LOCATION

IDENTIFY TENDON END (SHOP OR FIELD) AND TOP (T) OR BOTTOM (B) OF TENDON

NOTE:

SEE TABLE 2 FOR CORROSION CATEGORIES.
SEE TABLE 1 FOR ACCEPTANCE CRITERIA FOR BUTTONHEADS.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [signature] DATE: 11/10/99

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ENCLOSURE 6

Data Sheet 2
Anchorage Assembly Surveillance Inspection
Vertical Tendons

INSPECTION PERIOD 7 TH

TENDON	END		BUTTONHEADS				STRESSING WASHER & NUT			SHIMS			BEARING PLATE			DATE INSP.	COMMENTS	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV INSP.
I.D. 1	Location 2	Corr. Cat. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	CATEGO-RY OF CRACKS 5	PROPERLY FORMED 6	SKETCHED 7	CORR. CAT. 8	CRACKS 9	SKETCHED 10	CORR. CAT. 11	CRACKS 12	SKETCHED 13	CORR. CAT. 14	CRACKS 15	SKETCHED 16	17	18	19	20
1. 86	T	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-14-99	NONE	CB	DPO
	B	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	10-4-99	NONE	CB	DPO
2.																			
3.																			
4.																			
5.																			
6.																			

LEGEND

GENERAL

Y = YES
N = NO

TENDON END-LOCATION

IDENTIFY TENDON END (SHOP OR FIELD) AND TOP (T) OR BOTTOM (B) OF TENDON

NOTE:

SEE TABLE 2 FOR CORROSION CATEGORIES.
SEE TABLE 1 FOR ACCEPTANCE CRITERIA FOR BUTTONHEADS.

COGNIZANT MECH/STRUC ENGINEER
REVIEWED BY [signature] DATE: 11/10/99

ENCLOSURE 6

Data Sheet 3
Anchorage Assembly Surveillance Inspection
Hoop Tendons

INSPECTION PERIOD 7th

TENDON I.D. 1	END Location 2	Corr. Cat. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	BUTTONHEADS CATEGORY OF CRACKS 5	BUTTONHEADS PROPERLY FORMED 6	BUTTONHEADS SKETCHED 7	STRESSING WASHER & NUT CORR. CAT. 8	STRESSING WASHER & NUT CRACKS 9	STRESSING WASHER & NUT SKETCHED 10	SHIMS CORR. CAT. 11	SHIMS CRACKS 12	SHIMS SKETCHED 13	BEARING PLATE CORR. CAT. 14	BEARING PLATE CRACKS 15	BEARING PLATE SKETCHED 16	DATE INSP. 17	COMMENTS 18	INSP. BY CONTR. FOREMAN 19	VERIF. BY COGNIZANT QV INSP. 20
1. 62-26	Butt #6	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	8/30/99	None	CB	[illegible]
	Butt #2	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	9/2/99	None	CB	[illegible]
2. 35-33	Butt #3	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	9/3/99	None	CB	[illegible]
	Butt #5	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	9/7/99	None	CB	[illegible]
3. 51-43	Butt #5	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	9/13/99	None	CB	[illegible]
	Butt #1	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	9/14/99	None	CB	[illegible]
4. 46-37	Butt #6	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	9/13/99	None	CB	[illegible]
	Butt #4	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	9-23-99	None	CB	DPO
5. 13H50	Butt #1	1	0	N/A	Y	N	1	N	N	2	N	N	7	N	N	9-22-99	None	CB	DPO
	Butt #3	2	0	N/A	Y	Y	2	N	N	2	N	N	2	N	N	9-30-99	~~[illegible]~~ 4 Buttonheads	CB	DPO
6.																			

LEGEND

GENERAL

Y = YES
N = NO

TENDON END-LOCATION

IDENTIFY TENDON END (SHOP OR FIELD) AND NUMBER OF BUTTRESS (1 TO 6) NEAREST TO TENDON END

NOTE:

SEE TABLE 2 FOR CORROSION CATEGORIES.
SEE TABLE 1 FOR ACCEPTANCE CRITERIA FOR BUTTONHEADS.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY [signature] DATE: 11/10/99

Note: Pre Lift-Off & Post Lift-Off Inspection Was Performed.

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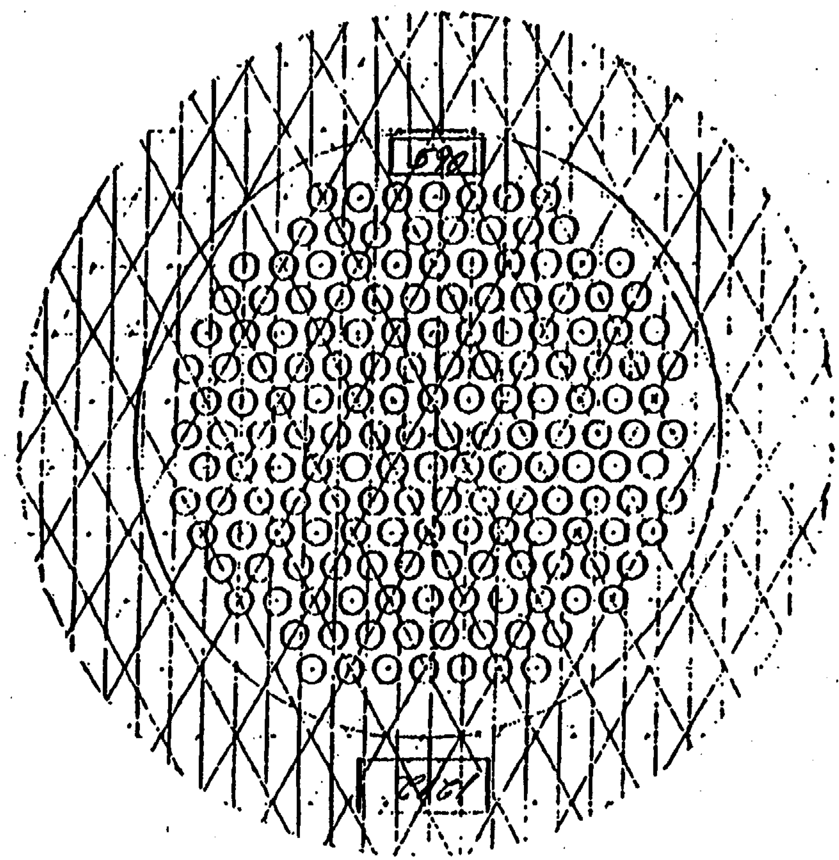
ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: No MISSING, CRACKED, MALFORMED OR PROTRUDING BUTTONHEADS FOUND. DPO 10-13-99

INSPECTED BY
CONTRACTOR FOREMAN C. BROOKS' H.F.H. 12-2-99 Date
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-18-99
COGNIZANT MECH/STRUCT ENGINEER Date
REVIEWED BY [signature] 11/11/99

INSPECTION PERIOD 7TH

Tendon # V8
END: FIELD ____ (1 piece washer)
SHOP X (2 piece washer)

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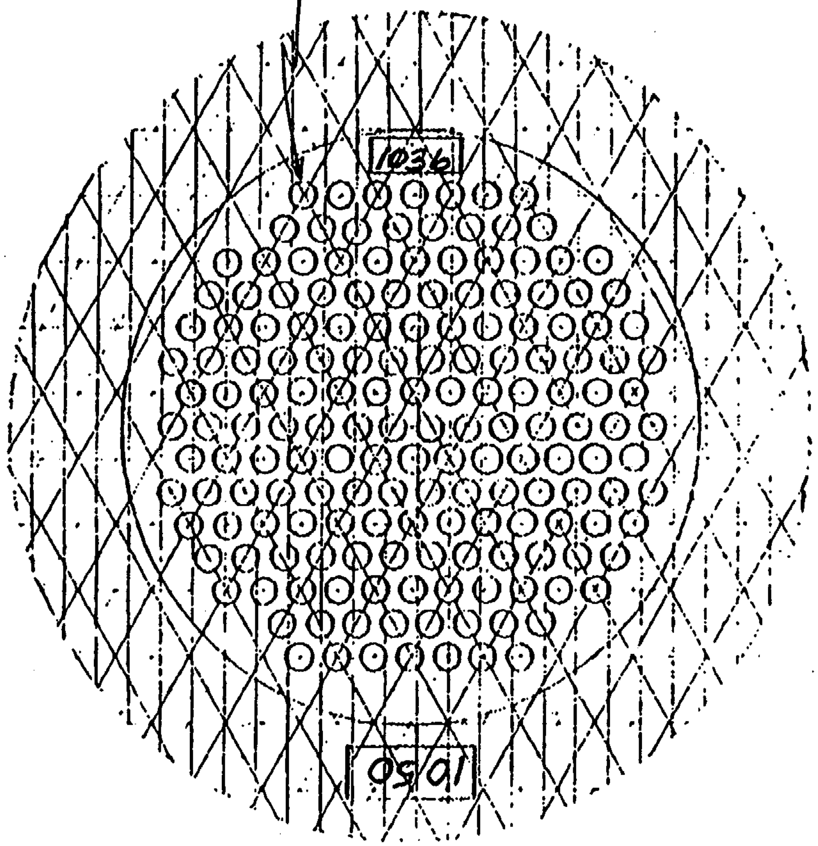
8-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection

7' SURVEILLANCE WIRE ef 8-27-99



RB Tendon Surveillance

COMMENT: PERFORMED PRE LIFT-OFF & POST LIFT-OFF INSPECTION & FOUND NO CHANGE. ef 8-27-99

INSPECTED BY
CONTRACTOR FOREMAN ________ Date 10/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ________ Date 8-27-99
COGNIZANT MECH/STRUCT ENGINEER ________ Date ______
REVIEWED BY ________ 11/1/99

INSPECTION PERIOD 7th

Tendon # V32
END: FIELD ______ (1 piece washer)
SHOP X (2 piece washer)

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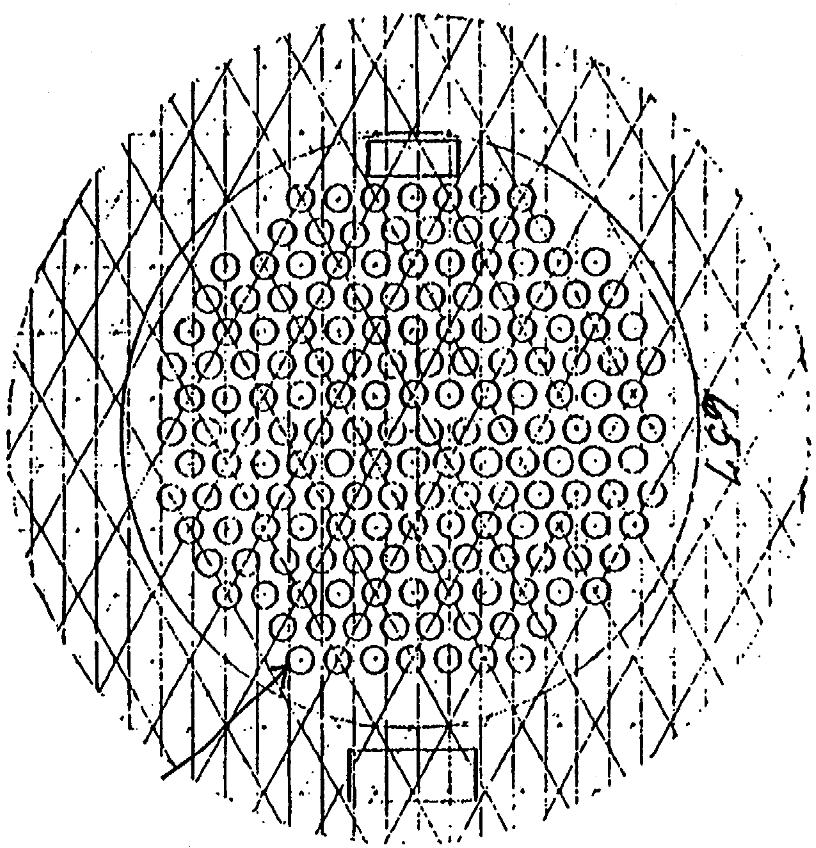
ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: NO MISSING OR MALFORMED, CRACKED OR PROTRUDING BUTTONHEADS.
INSPECTION PERFORMED AFTER LIFTOFF DPO 9-29-99

INSPECTED BY
CONTRACTOR FOREMAN ______ Date 10/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR Daniel P. Olthen Date 9-29-99
COGNIZANT MECH/STRUCT ENGINEER ______ Date ______
REVIEWED BY ______ 11/1/99

INSPECTION PERIOD 7th

Tendon # V32
END: FIELD X (1 piece washer)
SHOP ______ (2 piece washer)

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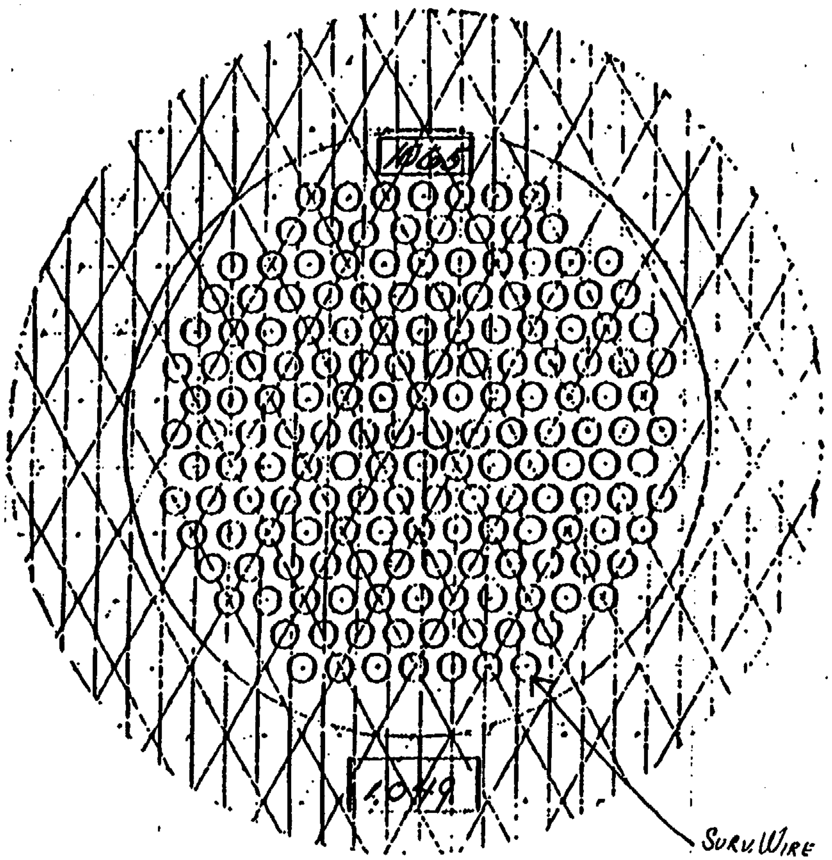
ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: NO MISSING, CRACKED, MALFORMED OR PROTRUDING BUTTONHEADS FOUND. APO 10-13-99

INSPECTED BY
CONTRACTOR FOREMAN C. BROOKS' H.F.N. 12-2-99 Date
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-13-99
COGNIZANT MECH/STRUCT ENGINEER Date
REVIEWED BY [signature] 11/11/99

INSPECTION PERIOD 7TH

Tendon # V35
END: FIELD ____ (1 piece washer)
SHOP X (2 piece washer)

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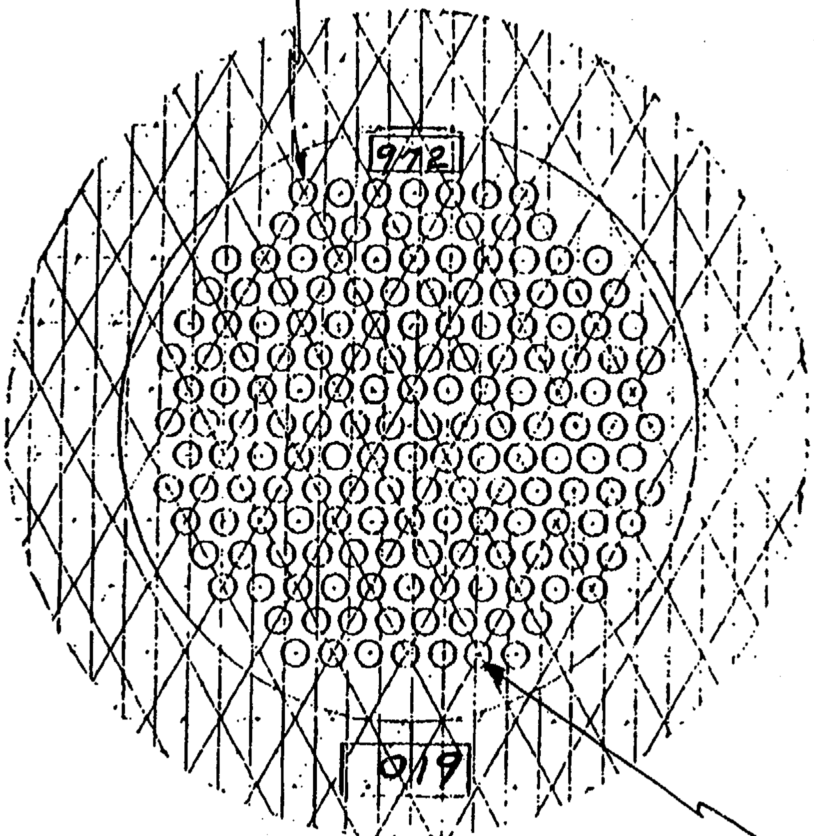
ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection

7' SURVEILLANCE WIRE 8-27-99



PROTRUDING WIRE
.70" PROTRUSION 8-27-99

INSPECTION PERIOD 7th

Tendon # V40
END: FIELD____(1 piece washer)
SHOP X (2 piece washer)

RB Tendon Surveillance

COMMENT: PERFORMED PRE LIFT OFF & POST LIFT OFF INSPECTION & FOUND NO CHANGE. 8-27-99

INSPECTED BY
CONTRACTOR FOREMAN [signature] Date 10/26/99
VERIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 8-27-99
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 11/1/99
REVIEWED BY

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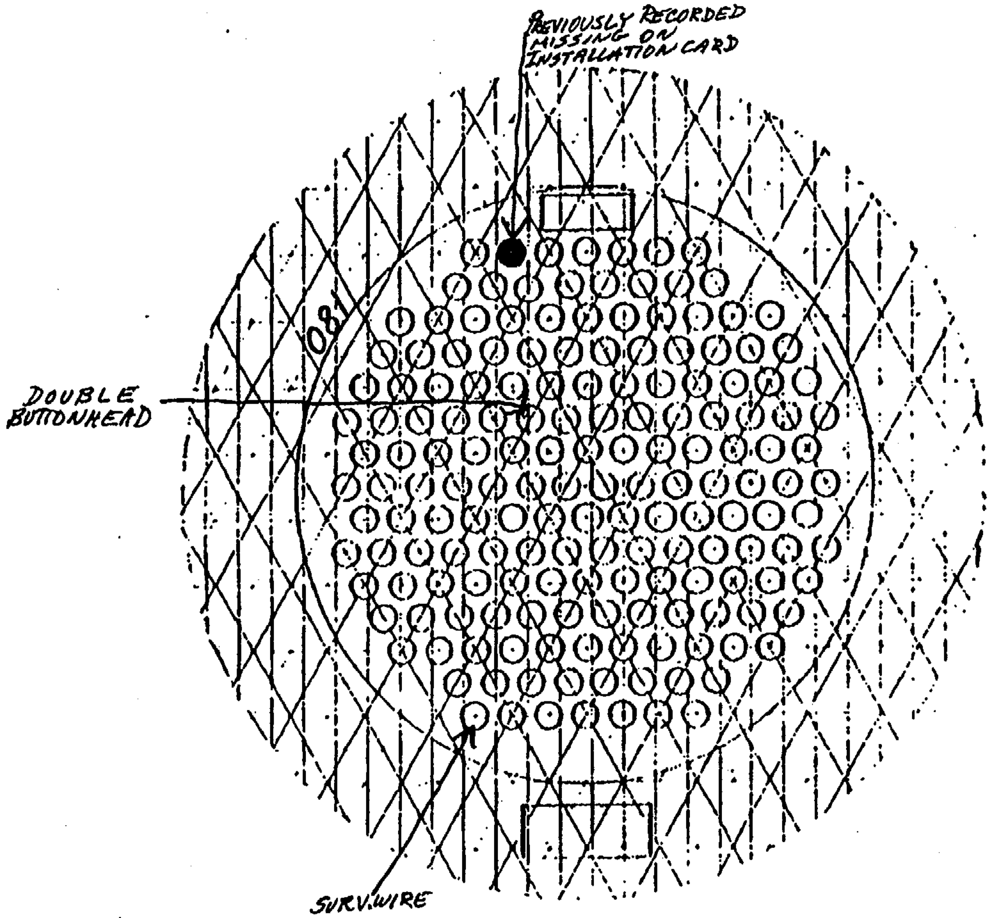
-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance	
COMMENT: / MISSING BUTTONHEAD PREVIOUSLY RECORDED ON INSTALLATION CARD. / DOUBLE BUTTONHEAD. POST LIFTOFF INSPECTION PERFORMED 9-29-99 NO CHANGE.	
INSPECTED BY CONTRACTOR FOREMAN [signature]	Date 9/26/99
VERIIFIED BY COGNIZANT QV INSPECTOR [signature]	Date 9-29-99
COGNIZANT MECH/STRUCT ENGINEER REVIEWED BY [signature]	Date 11/11/99

INSPECTION PERIOD 7th (W.S.H. 12-1-99)
Tendon # V40
END: FIELD X (1 piece washer)
SHOP ____ (2 piece washer)

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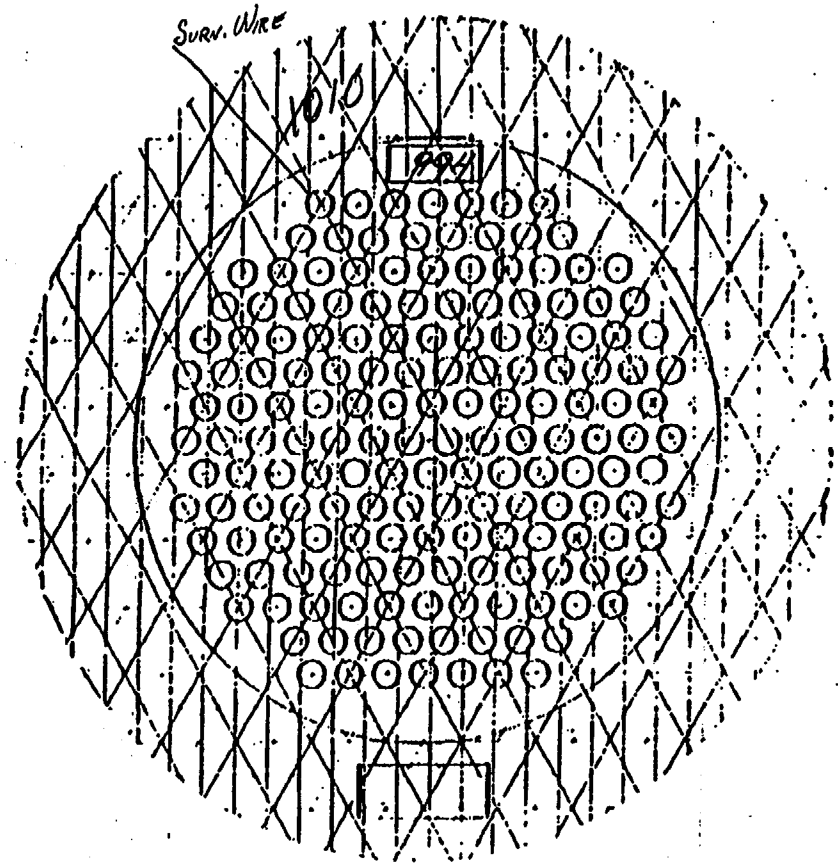
12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: No MISSING, CRACKED, MALFORMED OR PROTRUDING BUTTONHEADS FOUND. RPD 10-13-99

INSPECTED BY
CONTRACTOR FOREMAN C. BROOKS H.F.H. 12-2-99 Date
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-13-99
COGNIZANT MECH/STRUCT ENGINEER Date
REVIEWED BY [signature] 11/11/99

INSPECTION PERIOD 7TH

Tendon # V57
END: FIELD ____ (1 piece washer)
SHOP X (2 piece washer)

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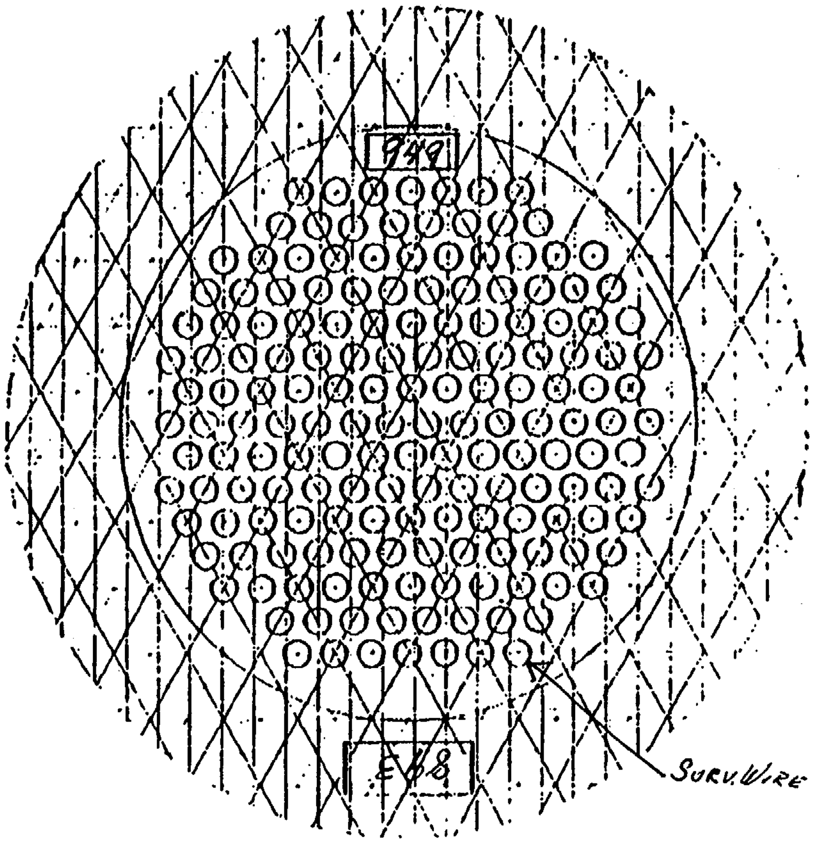
3-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: NO MISSING, CRACKED, MALFORMED OR PROTRUDING BUTTON HEADS FOUND, JPO 10-14-99

INSPECTED BY
CONTRACTOR FOREMAN C. BROOKS' H.T.N. 12-2-97 Date
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-14-99
COGNIZANT MECH/STRUCT ENGINEER [signature] Date
REVIEWED BY 11/11/99

INSPECTION PERIOD 7TH

Tendon # V80
END: FIELD ____ (1 piece washer)
SHOP X (2 piece washer)

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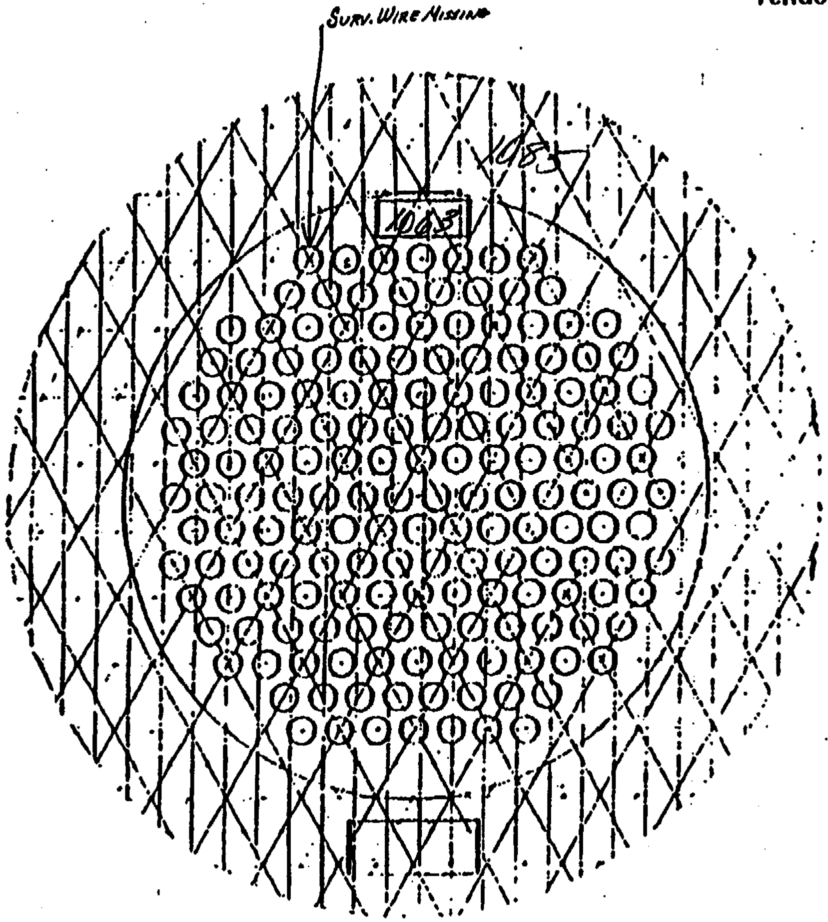
ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: PREFORMED PRE LIFT-OF INSPECT ION 10-14-99 APO & POST LIFT-OFF INSPECTION - NO CHANGE APO 10-22-99 PREFORMED POST DETENSION & RETENSION INSPECTION NO CHANGE. APO 10-22-99

INSPECTED BY
CONTRACTOR FOREMAN ________ Date 10/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ________ Date 10-22-99
COGNIZANT MECH/STRUCT ENGINEER ________ Date
REVIEWED BY ________ 11/1/99

INSPECTION PERIOD 7TH

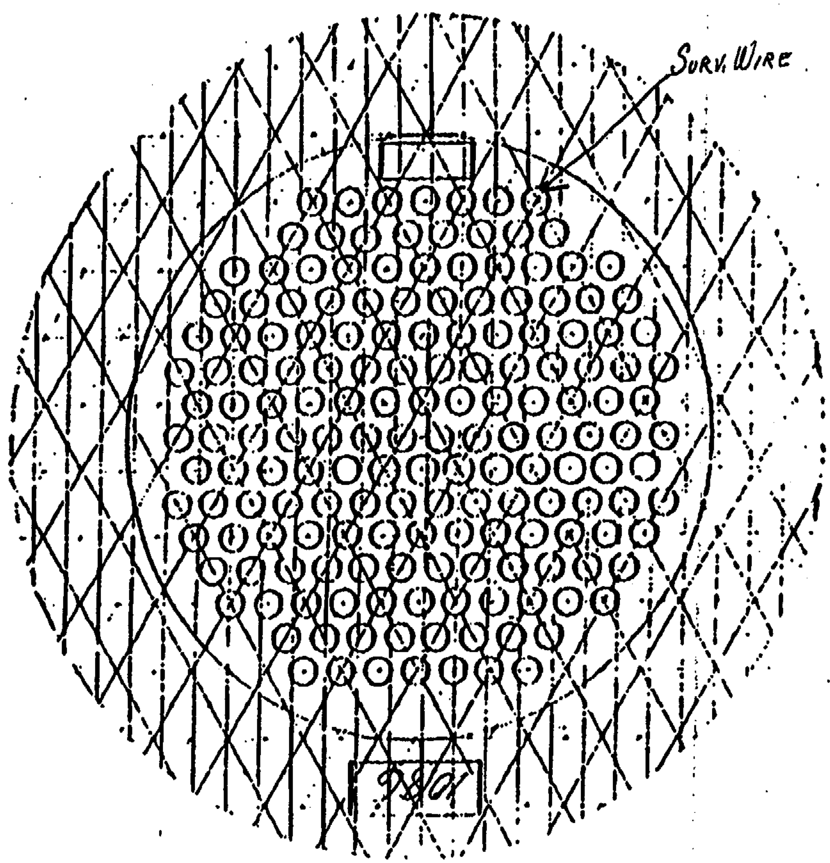
Tendon # V86
END: FIELD____(1 piece washer)
SHOP X (2 piece washer)

A1C7CJ424

12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: PREFORMED PRE LIFT-OFF INSPECTION DPO 10-20-99
POST LIFT-OFF INSPECTION - NO CHANGE DPO 10-22-99
PREFORMED POST DETENSION & RETENSION INSPECTION - NO CHANGE DPO 10-22-99

INSPECTED BY
CONTRACTOR FOREMAN [signature] Date 10/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-22-99
COGNIZANT MECH/STRUCT ENGINEER [signature] Date
REVIEWED BY 11/1/99

INSPECTION PERIOD 7TH

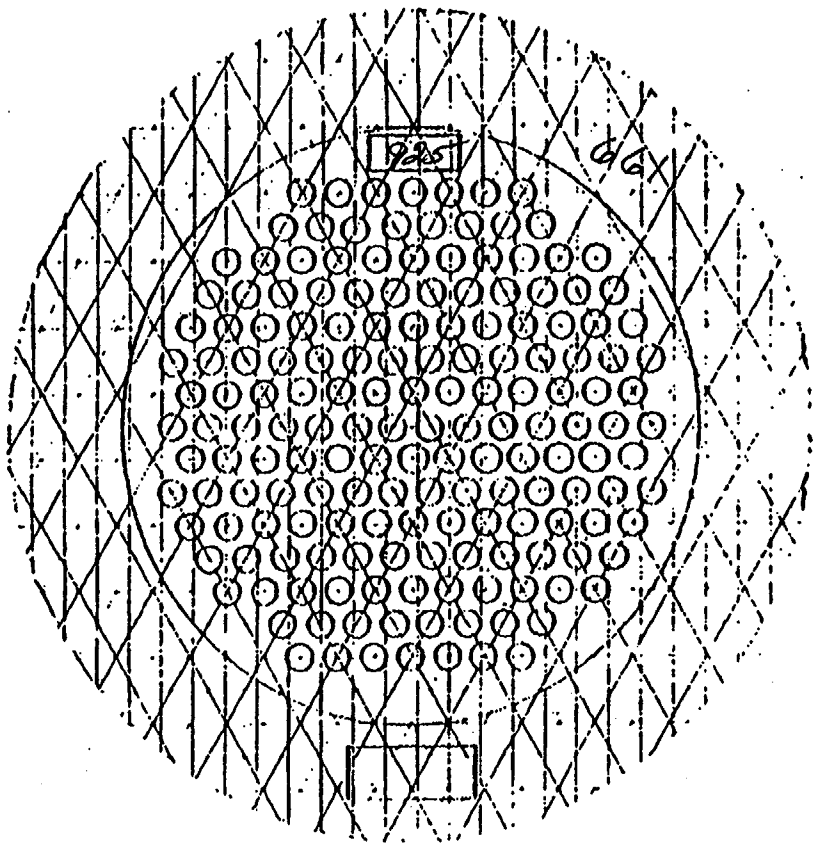
Tendon # V86
END: FIELD X (1 piece washer)
SHOP ____ (2 piece washer)

A168 of 424

3-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: NO MISSING, CRACKED, MALFORMED OR PROTRUDING BUTTONHEADS FOUND. ABU 10-14-99

INSPECTED BY
CONTRACTOR FOREMAN C. BROOKS N.F.N. 12-2-99 Date
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-14-99
COGNIZANT MECH/STRUCT ENGINEER [signature] Date 11/11/94
REVIEWED BY

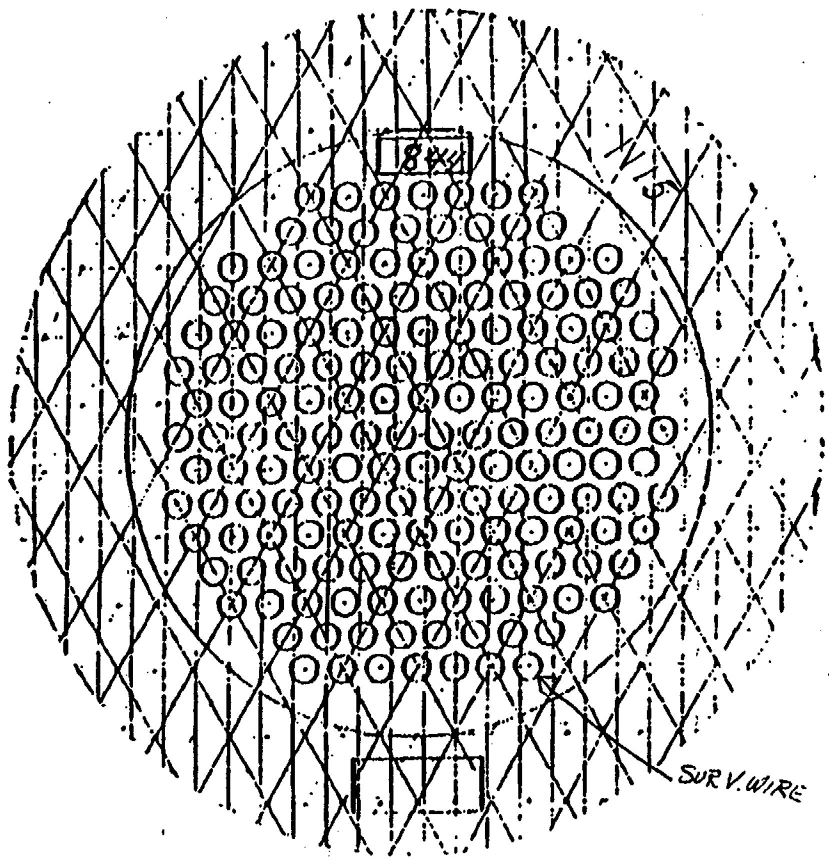
INSPECTION PERIOD 7TH

Tendon # V94
END: FIELD_____(1 piece washer)
SHOP X (2 piece washer)

A169 of 424

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: NO MISSING, CRACKED, MALFORMED OR PROTRUDING BUTTONHEADS FOUND. DRO 10-14-99

INSPECTED BY
CONTRACTOR FOREMAN C. BROOKS 12-1-99 Date
VERIIFIED BY
COGNIZANT QV INSPECTOR Date 10-14-99
COGNIZANT MECH/STRUCT ENGINEER Date
REVIEWED BY 11/11/99

INSPECTION PERIOD 7TH

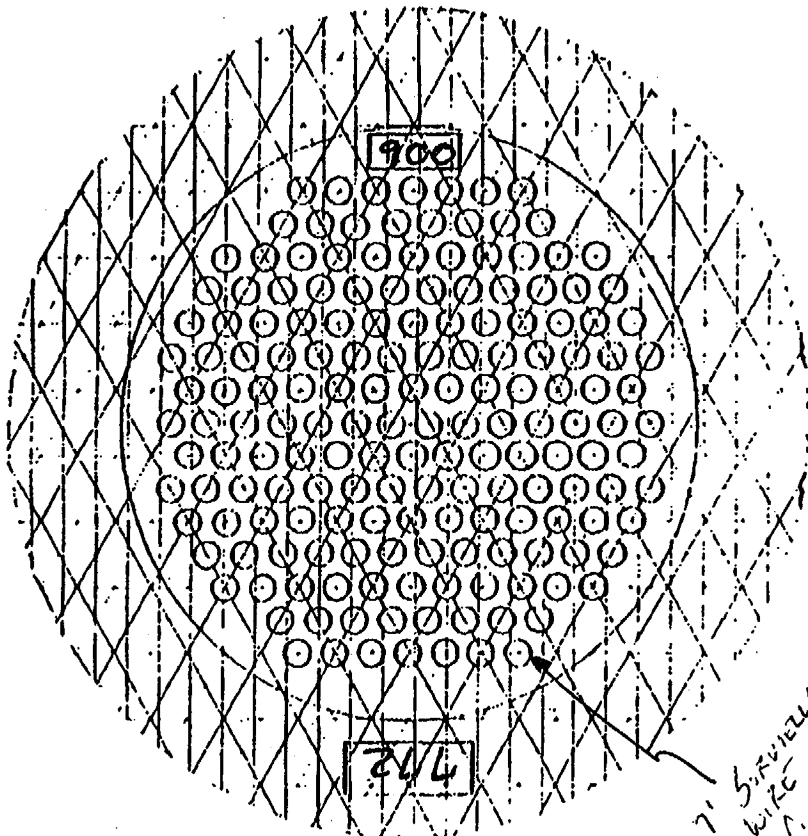
Tendon # V110
END: FIELD____(1 piece washer)
SHOP X (2 piece washer)

A1706 of 424

12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



7' SURVEILLANCE WIRE
d. 9.10.99

RB Tendon Surveillance

COMMENT: PERFORMED PRE LIFT-OFF & POST LIFT-OFF INSPECTIONS & FOUND NO CHANGE
d. 9-13-99

INSPECTED BY
CONTRACTOR FOREMAN ______ Date 10/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ______ Date 9-13-99
COGNIZANT MECH/STRUCT ENGINEER ______ Date 11/1/99
REVIEWED BY

INSPECTION PERIOD 7th

Tendon # V114
END: FIELD____(1 piece washer)
SHOP X (2 piece washer)

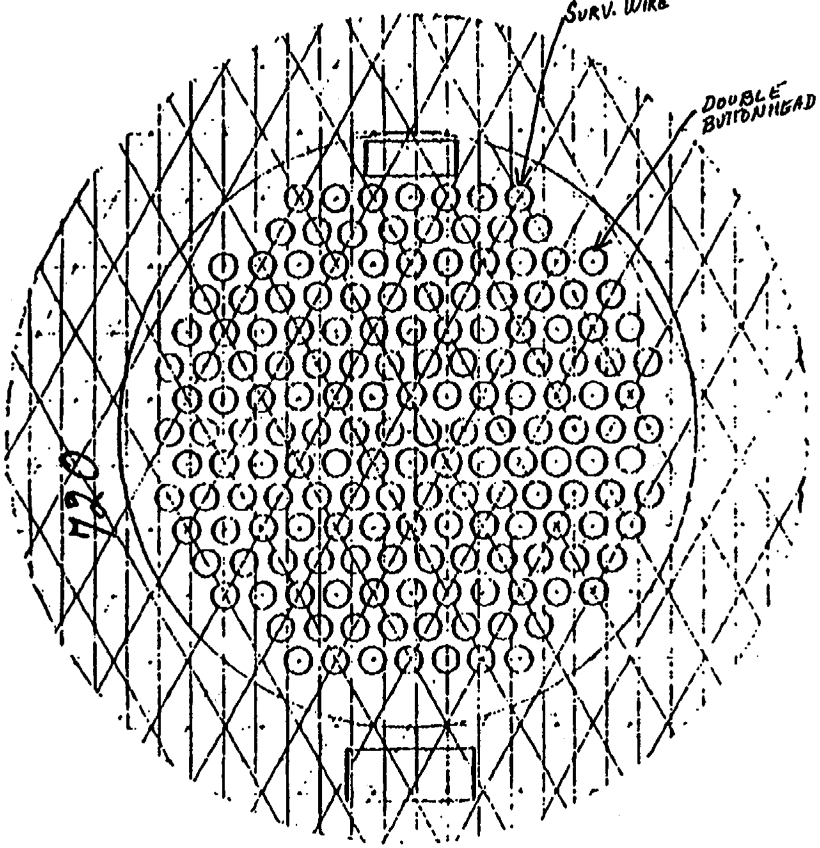
3-12-99 13:24:15

A171 424

08-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: NO MISSING OR PROTRUDING BUTTONHEADS / DOUBLE BUTTONHEAD. INSPECTION PERFORMED AFTER LIFTOFF. 9-29-99

INSPECTED BY
CONTRACTOR FOREMAN______ Date 10/26/99
VERIFIED BY
COGNIZANT QV INSPECTOR______ Date 9-29-99
COGNIZANT MECH/STRUCT ENGINEER______ Date 11/1/99
REVIEWED BY

INSPECTION PERIOD 7th

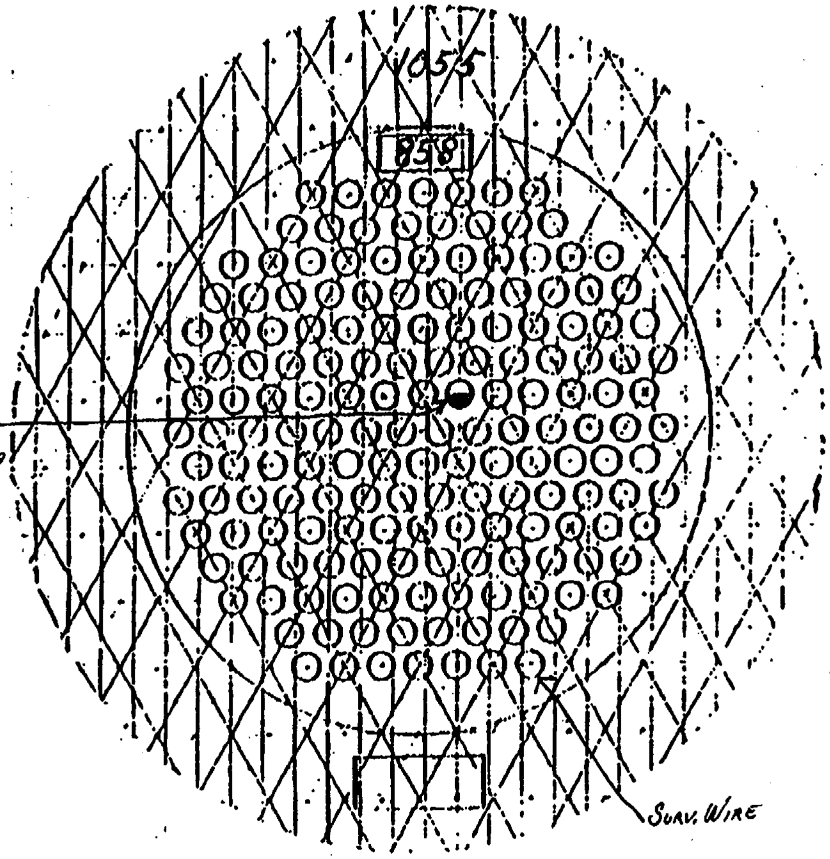
Tendon # V114
END: FIELD X (1 piece washer)
SHOP____(2 piece washer)

A1724 427

-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: 1 PROTRUDING BUTTONHEAD ~~.01'~~ .10" DRO 10-13-99
PREVIOUSLY RECORDED ON ORIGINAL STRESSING CARD. DRO 10-13-99
NO OTHER MISSING, CRACKED, MALFORMED OR PROTRUDING BUTTONHEADS.

INSPECTED BY
CONTRACTOR FOREMAN C. BROOKS H.T.H. 12-2-99 Date
VERIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-13-99
COGNIZANT MECH/STRUCT ENGINEER Date
REVIEWED BY [signature] 11/11/99

INSPECTION PERIOD 7TH

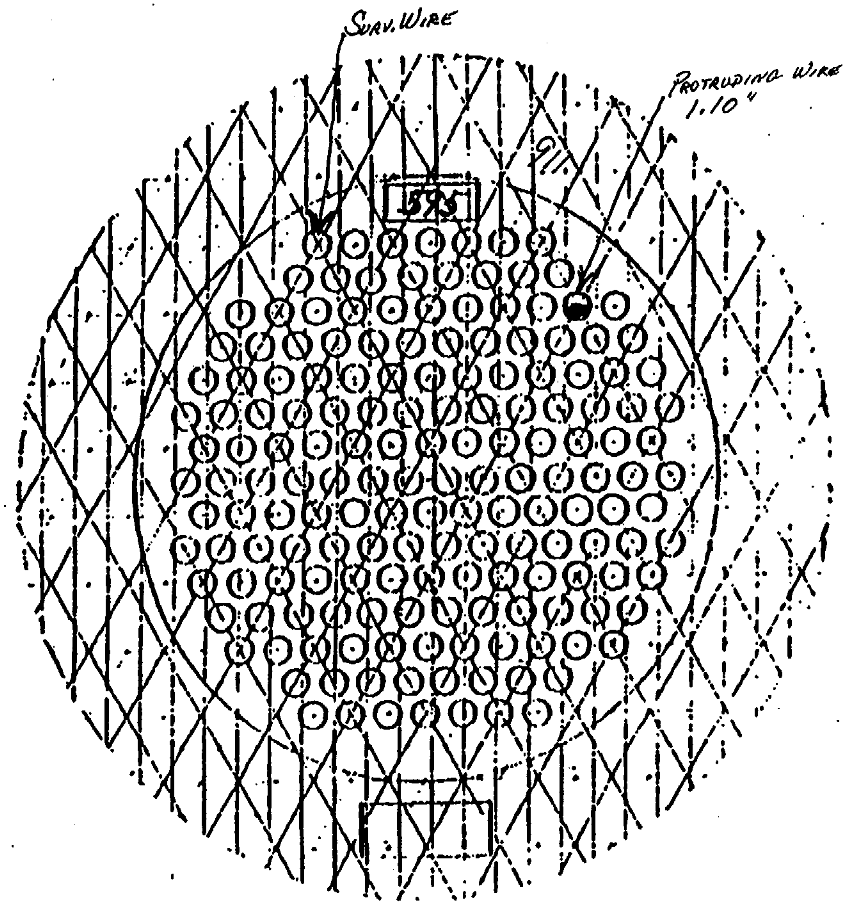
Tendon # V143
END: FIELD ____ (1 piece washer)
SHOP X (2 piece washer)

A173 of 424

12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: 1 PROTRUDING BUTTONHEAD 1.10" 10-13-99
PREVIOUSLY RECORDED ON ORIGINAL STRESSING CARD 10-13-99
NO OTHER MISSING, CRACKED, MALFORMED OR PROTRUDING BUTTONHEADS

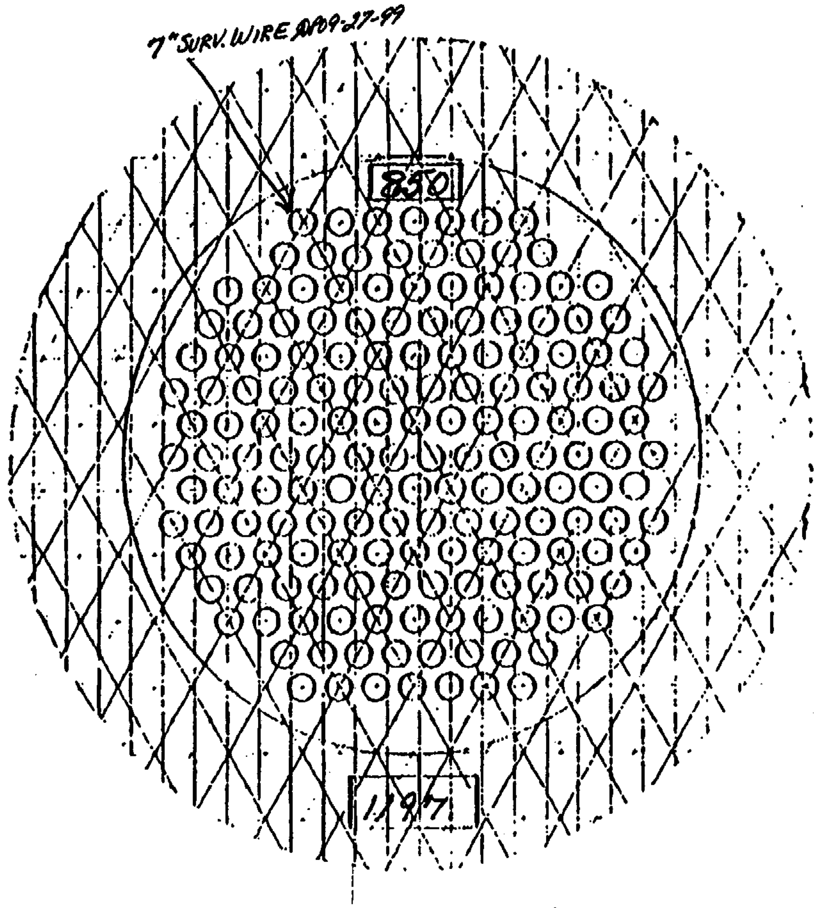
INSPECTED BY
CONTRACTOR FOREMAN C. BROCKS 12-2-99 Date
VERIIFIED BY
COGNIZANT QV INSPECTOR Date 10-13-99
COGNIZANT MECH/STRUCT ENGINEER Date
REVIEWED BY 11/11/99

INSPECTION PERIOD 7TH

Tendon # V156
END: FIELD____(1 piece washer)
SHOP X (2 piece washer)

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



INSPECTION PERIOD 7TH

Tendon # V164
END: FIELD____(1 piece washer)
SHOP X (2 piece washer)

RB Tendon Surveillance

COMMENT: PREFORMED PRE LIFTOFF INSPECTION DPO 9-27-99 AND POST LIFTOFF INSPECTION NO CHANGE DPO 10-21-99
PREFORMED POST DETENSION AND RETENSION INSPECTION NO CHANGE DPO 10-21-99

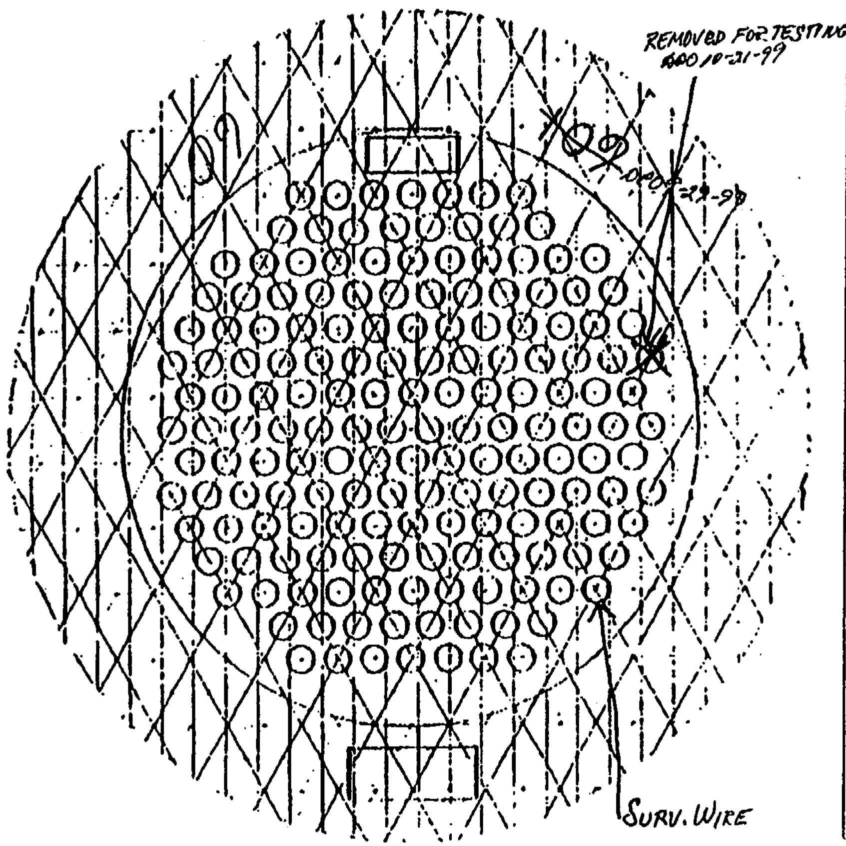
INSPECTED BY
CONTRACTOR FOREMAN [signature] Date 10/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-21-99
COGNIZANT MECH/STRUCT ENGINEER [signature] Date
REVIEWED BY 11/1/99

3-12-99 13:24:15

RI 75 of 424

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance
COMMENT: PREFORMED PRELIFTOFF DPO 9-29-99 AND POST-LIFTOFF NO CHANGE DPO 10-21-99 POST DETENSION + RETENSION NO CHANGE DPO 10-21-99
INSPECTED BY CONTRACTOR FOREMAN [signature] Date 10/26/99 VERIIFIED BY COGNIZANT QV INSPECTOR [signature] Date 10-22-99 COGNIZANT MECH/STRUCT ENGINEER [signature] Date REVIEWED BY [signature] 11/1/99

INSPECTION PERIOD 4TH

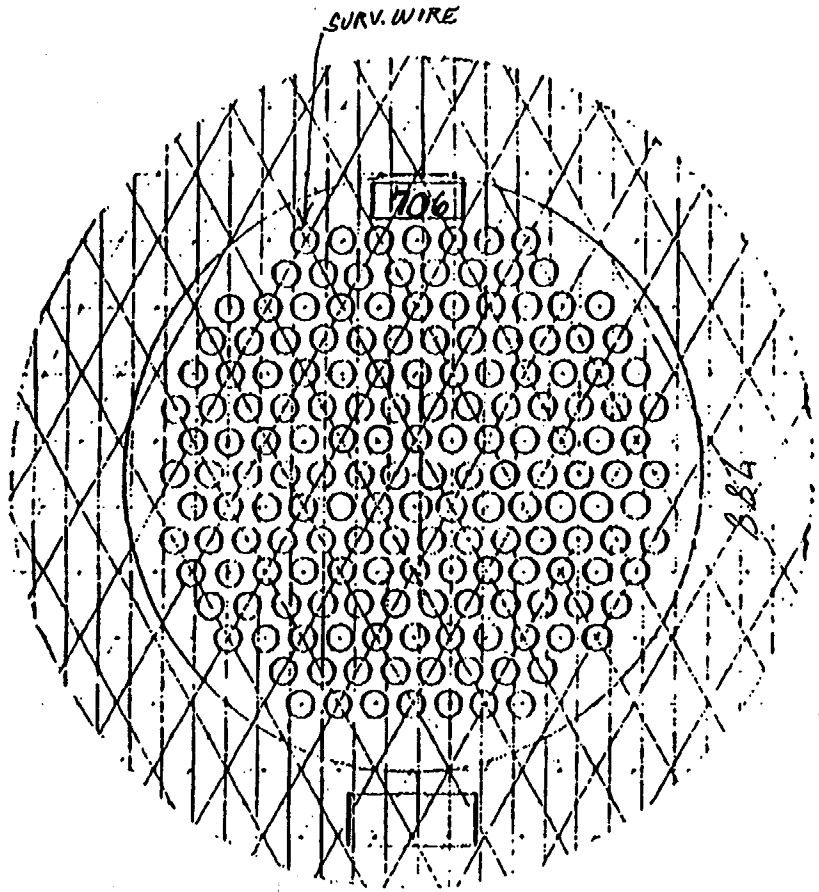
Tendon # V164
END: FIELD X (1 piece washer)
SHOP ____ (2 piece washer)

-12-99 13:24:15

A176 Ø 424

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: PERFORMED PRE LIFT-OFF AND POST LIFT-OFF INSPECTIONS. FOUND NO CHANGE. [illegible] 10-7-99
DETENSIONED INSPECTION FOUND NO CHANGE. [illegible] 10-8-99
RETENSION INSPECTION FOUND NO CHANGE. [illegible] 10-11-99

INSPECTED BY
CONTRACTOR FOREMAN [signature] Date 10/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-11-99
COGNIZANT MECH/STRUCT ENGINEER Date
REVIEWED BY [signature] 11/1/99

INSPECTION PERIOD 7TH.

Tendon # D1-02
END: FIELD____ (1 piece washer)
SHOP X (2 piece washer)

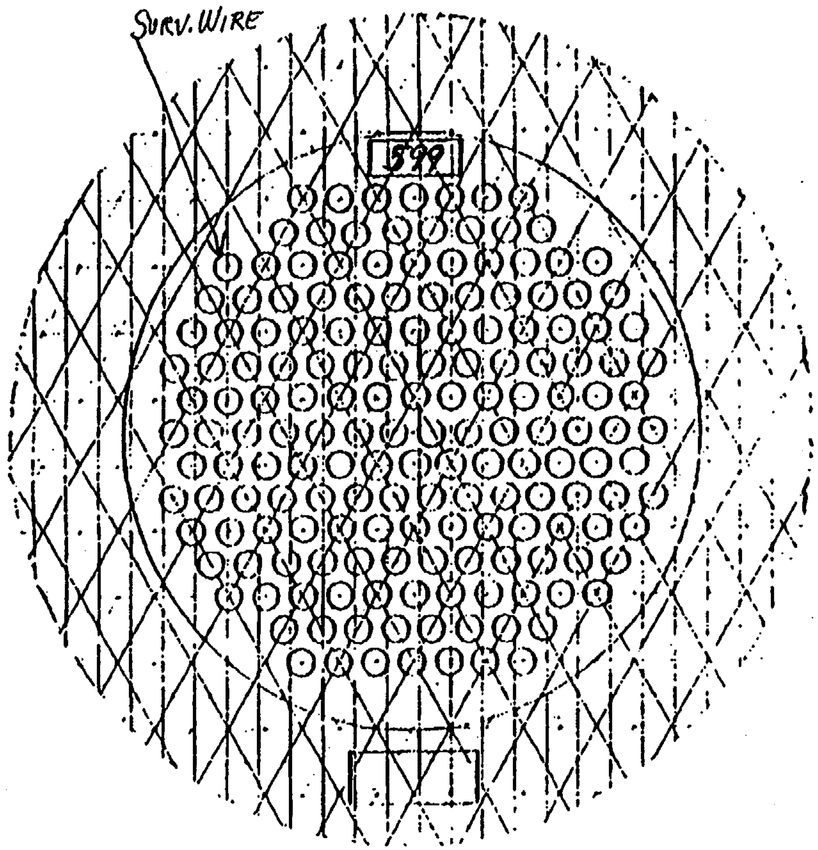
3-12-99 13:24:15

A1177 4/4 24

3-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



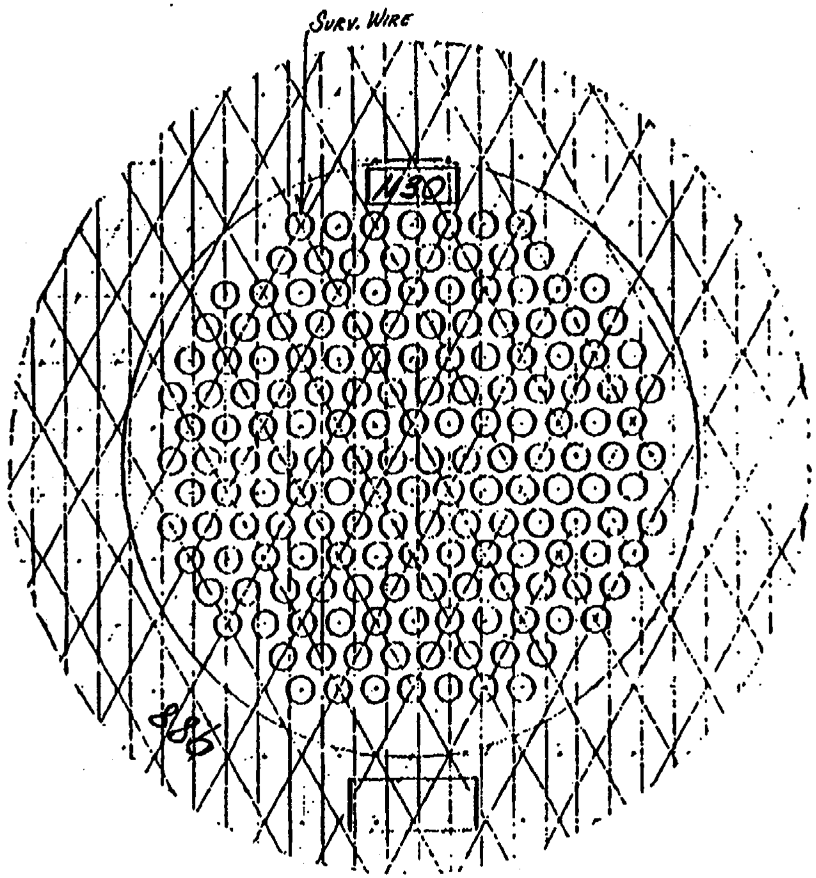
RB Tendon Surveillance
COMMENT: PERFORMED PRE LIFT-OFF AND POST LIFT-OFF INSPECTIONS. FOUND NO CHANGE. 10-7-99 POST DETENSIONING FOUND NO CHANGE. 10-8-99 POST RETENSIONING INSPECTION FOUND NO CHANGES. 10-11-99
INSPECTED BY CONTRACTOR FOREMAN ______ Date 10/26/99 VERIIFIED BY COGNIZANT QV INSPECTOR ______ Date 10-11-99 COGNIZANT MECH/STRUCT ENGINEER ______ Date ______ REVIEWED BY ______ 11/1/99

INSPECTION PERIOD 7TH

Tendon # D1-02
END: FIELD X (1 piece washer)
SHOP ______ (2 piece washer)

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: NO MISSING BUTTONHEADS, CRACKS, MALFORMED BUTTONHEADS OR PROTRUDING WIRES. DPO 10-11-99

INSPECTED BY
CONTRACTOR FOREMAN C. BROOKS H.F.V. 12-2-99 Date

VERIIFIED BY
COGNIZANT QV INSPECTOR Daniel P. O... Date 10-11-99

COGNIZANT MECH/STRUCT ENGINEER Date

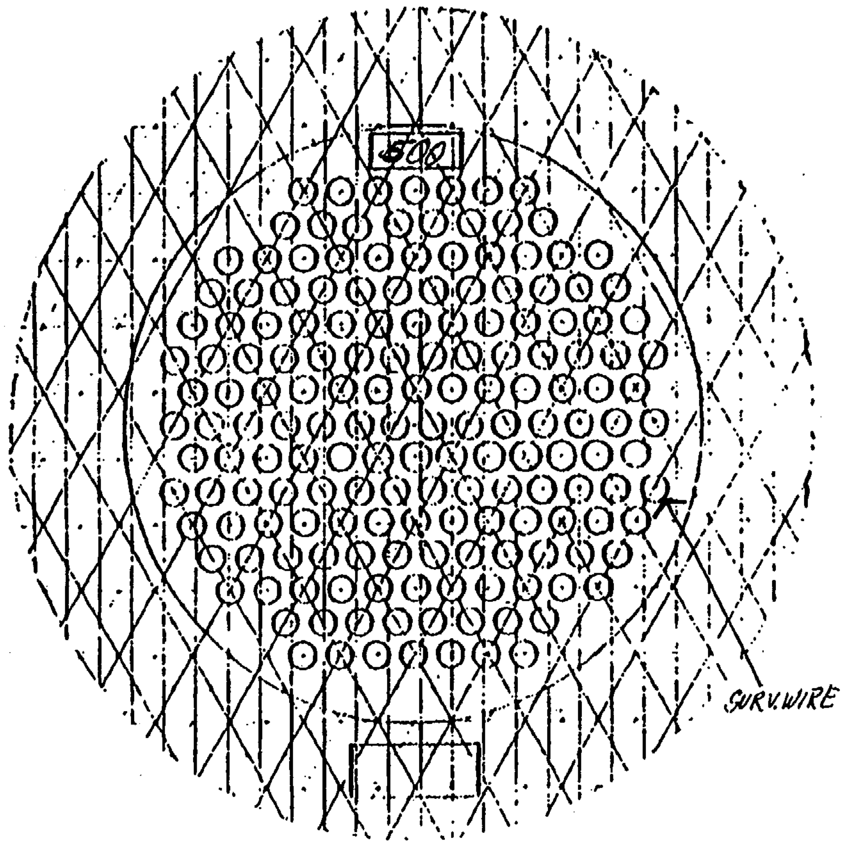
REVIEWED BY 11/11/99

INSPECTION PERIOD 4TH

Tendon # D1-04
END: FIELD ____ (1 piece washer)
SHOP X (2 piece washer)

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: No MISSING BUTTONHEADS, CRACKS, MALFORMED HEADS OR PROTRUDING WIRES. APU 10-11-99

INSPECTED BY
CONTRACTOR FOREMAN C. BROOKS' H.G.H. 12-2-99 Date
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-11-99
COGNIZANT MECH/STRUCT ENGINEER [signature] Date
REVIEWED BY 11/11/99

INSPECTION PERIOD 7TH

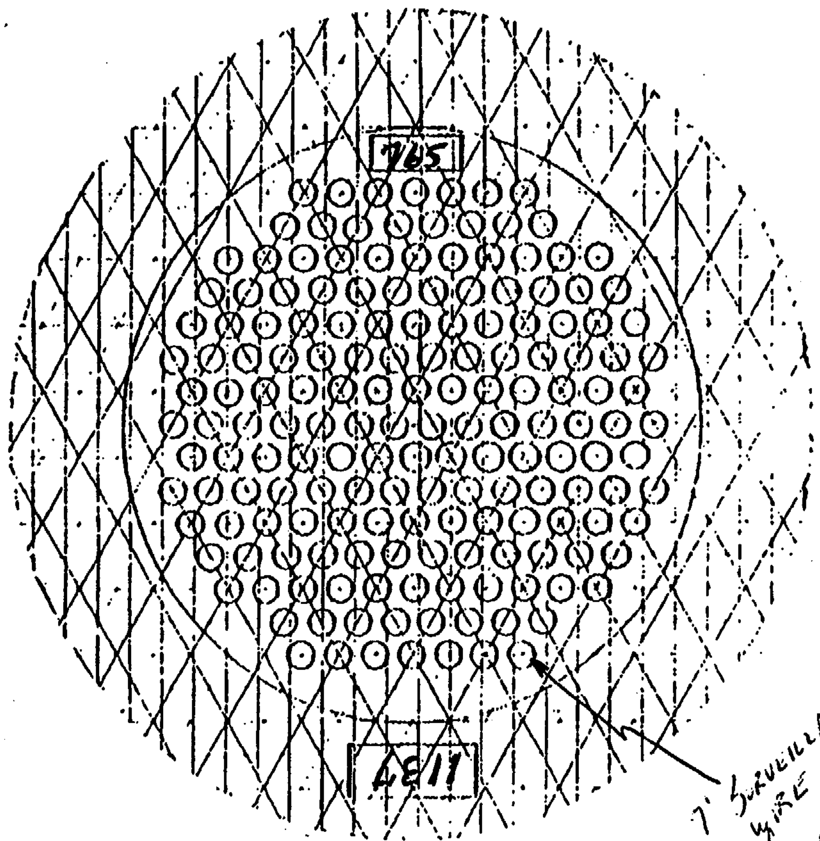
Tendon # D104
END: FIELD X (1 piece washer)
SHOP ______ (2 piece washer)

A18 of 424

18-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: PERFORMED PRE LIFT-OFF & POST LIFT-OFF INSPECTION & FOUND NO CHANGE. 8-26-99

INSPECTED BY
CONTRACTOR FOREMAN ______ Date 8/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ______ Date 8-26-99
COGNIZANT MECH/STRUCT ENGINEER ______ Date 9/14/99
REVIEWED BY

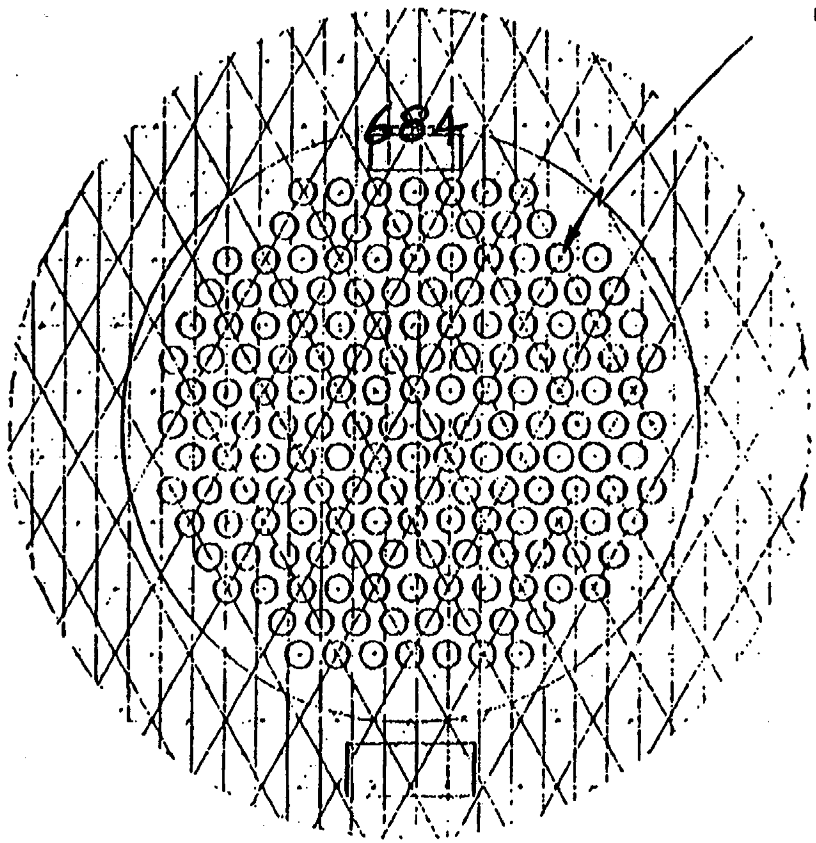
INSPECTION PERIOD 7th

Tendon # D225
END: FIELD_____(1 piece washer)
SHOP X (2 piece washer)

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection

7' Surveillance wire 9-1-99



RB Tendon Surveillance

COMMENT:

Performed Pre Lift-Off & Post Lift-Off Visual Inspection & Found No Change. W. 9-1-99

INSPECTED BY
CONTRACTOR FOREMAN ______ Date 9/1/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ______ Date 9-1-99
COGNIZANT MECH/STRUCT ENGINEER ______ Date 9/14/99
REVIEWED BY

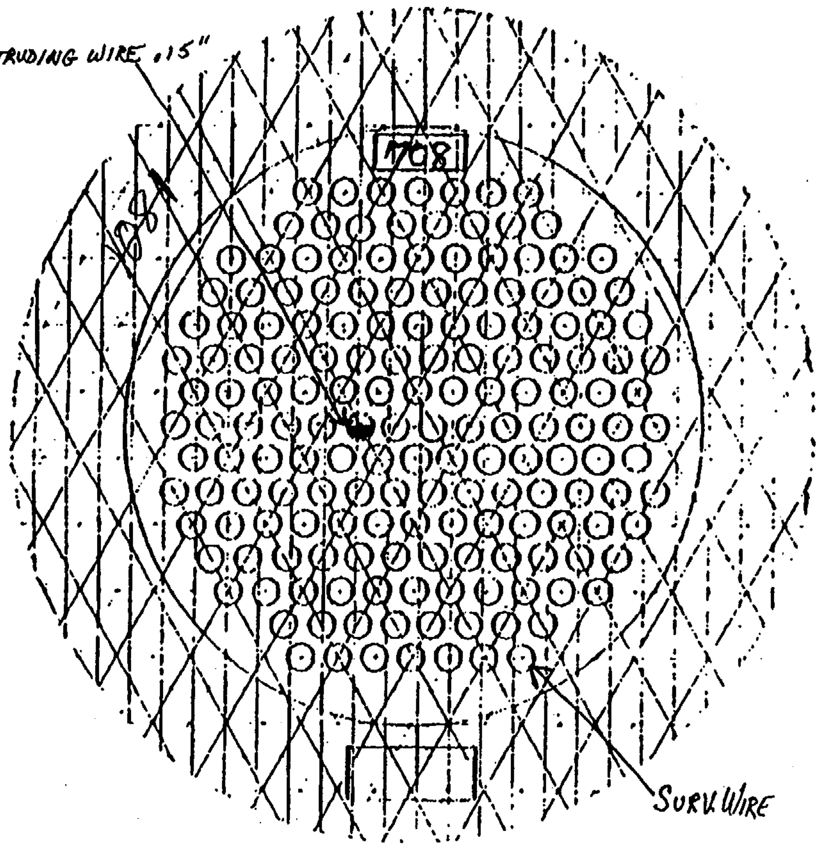
INSPECTION PERIOD 7th

Tendon # D 225
END: FIELD X (1 piece washer)
SHOP ____ (2 piece washer)

A18227 424

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: / PROTRUDING WIRE ØPO 10-5-99
POST LIFT-OFF INSPECTION PERFORMED
FOUND NO CHANGE ØPO 10-5-99

INSPECTED BY
CONTRACTOR FOREMAN ________ Date 10/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ________ Date 10-5-99
COGNIZANT MECH/STRUCT ENGINEER ________ Date ________
REVIEWED BY ________ 11/1/99

INSPECTION PERIOD 7TH

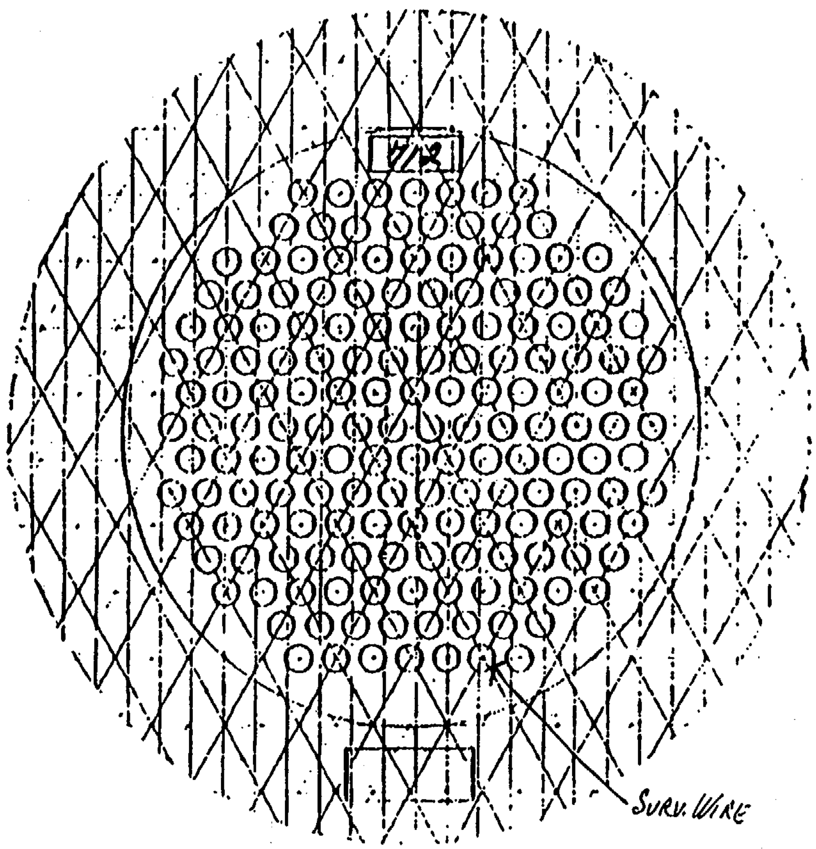
Tendon # D3-13
END: FIELD ____ (1 piece washer)
SHOP X (2 piece washer)

A1933 7 424

08-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: Performed pre lift-off + post lift-off inspection + found no change DPD 10-5-99

INSPECTED BY
CONTRACTOR FOREMAN ________ Date 10/26/99
VERIFIED BY
COGNIZANT QV INSPECTOR ________ Date 11-5-99
COGNIZANT MECH/STRUCT ENGINEER ________ Date
REVIEWED BY ________ 11/1/99

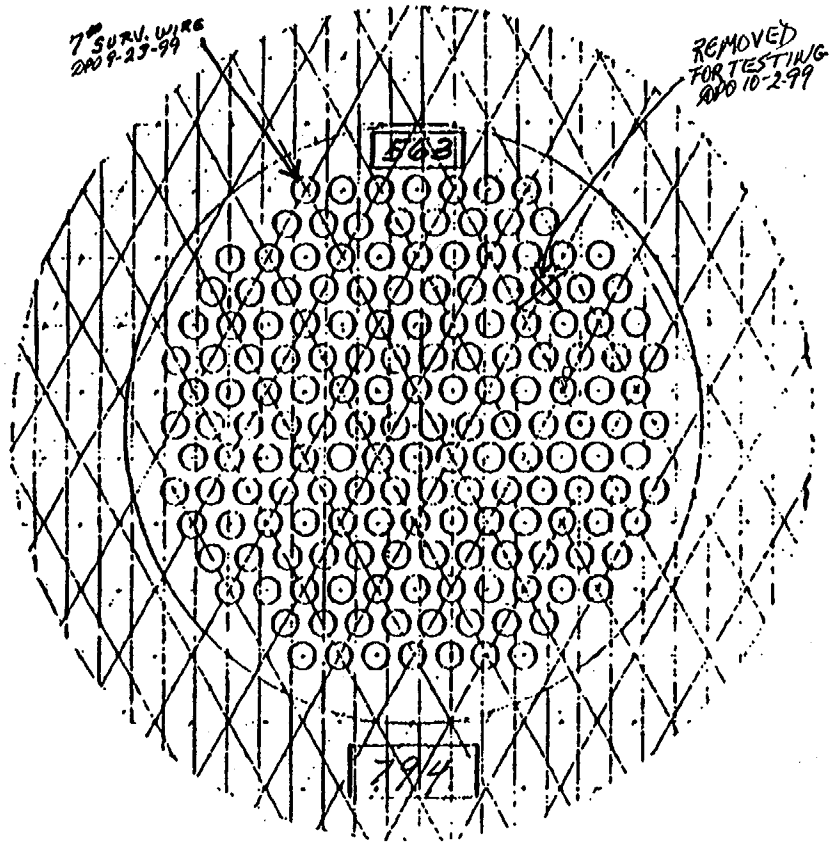
INSPECTION PERIOD 7th

Tendon # D3-13
END: FIELD X (1 piece washer)
SHOP ____ (2 piece washer)

A184 of 424

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: PERFORMED PRE LIFTOFF INSPECTION & POST LIFTOFF. FOUND NO CHANGE DRO 9-22-99
POST DETENSION INSPECTION FOUND NO CHANGE DRO 10-1-99
NO CHANGE AFTER RETENSIONING DRO 10-2-99

INSPECTED BY
CONTRACTOR FOREMAN __________ Date 10/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR __________ Date 9-22-99
COGNIZANT MECH/STRUCT ENGINEER __________ Date ______
REVIEWED BY __________ 11/1/99

INSPECTION PERIOD 7TH

Tendon # 13H50
END: FIELD _____ (1 piece washer)
SHOP ✓ (2 piece washer)

-12-99 13:24:15

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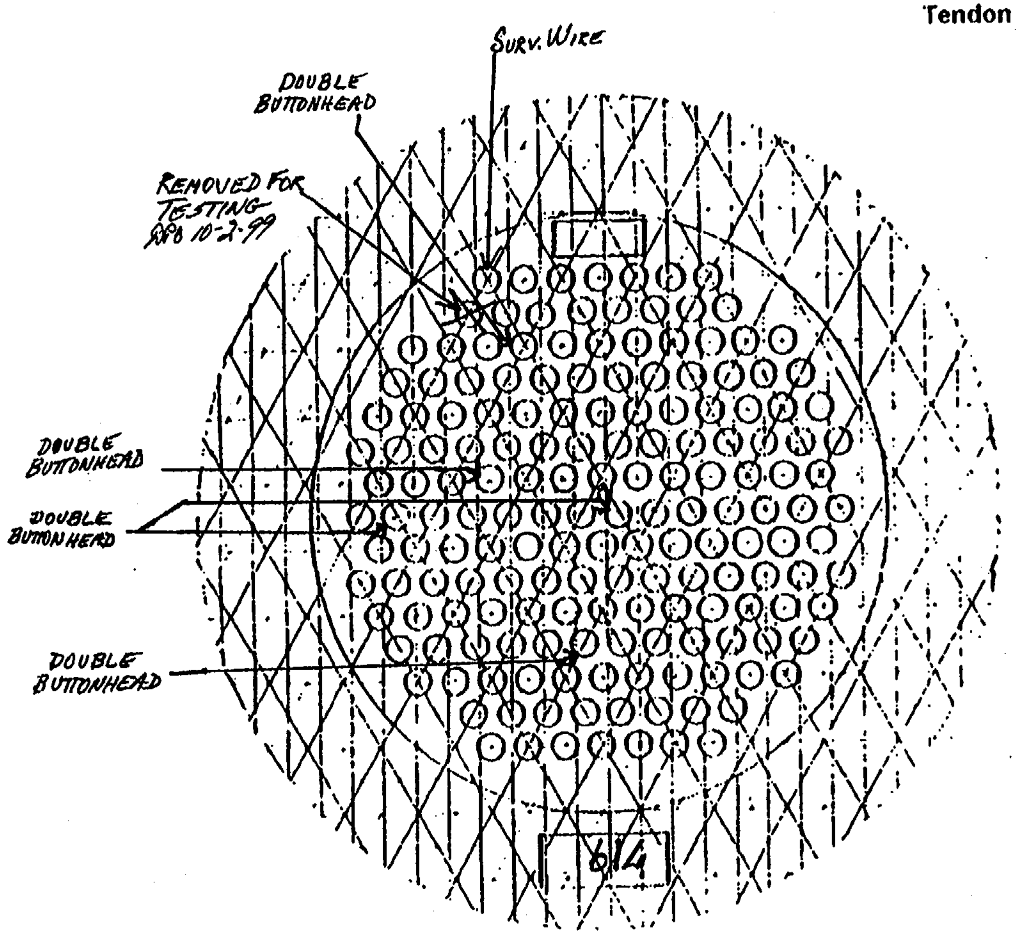
ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: 5 DOUBLE BUTTONHEADS. RPO 9-30-99
PERFORMED PRE LIFTOFF + POST LIFTOFF INSPECTION, FOUND NO CHANGE. RPO 10-1-99
PERFORMED POST DETENSIONING INSPECTION, FOUND NO CHANGE RPO 10-1-99
NO CHANGE AFTER RETENSIONING RPO 10-2-99

INSPECTED BY
CONTRACTOR FOREMAN [signature] Date 10/26/99
VERIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 10-2-99
COGNIZANT MECH/STRUCT ENGINEER ____ Date ____
REVIEWED BY [signature] 11/1/99

INSPECTION PERIOD 7TH.

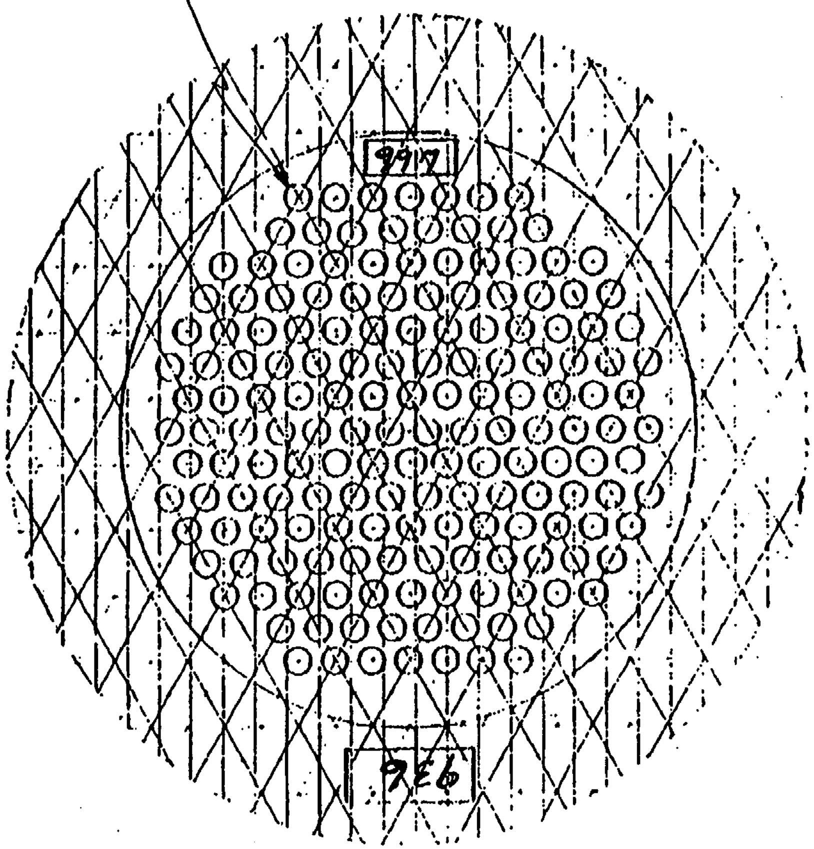
Tendon # 13H50
END: FIELD X (1 piece washer)
SHOP ____ (2 piece washer)

1-12-99 13:24:15

7' Surveillance Wire 9-7-99

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: Performed Pre Lift-Off & Post Lift-Off Inspections & Found No Change. 9-7-99

INSPECTED BY
CONTRACTOR FOREMAN Date 9/7/99
VERIIFIED BY
COGNIZANT QV INSPECTOR Date 9-7-99
COGNIZANT MECH/STRUCT ENGINEER Date 9/14/99
REVIEWED BY

INSPECTION PERIOD 7th

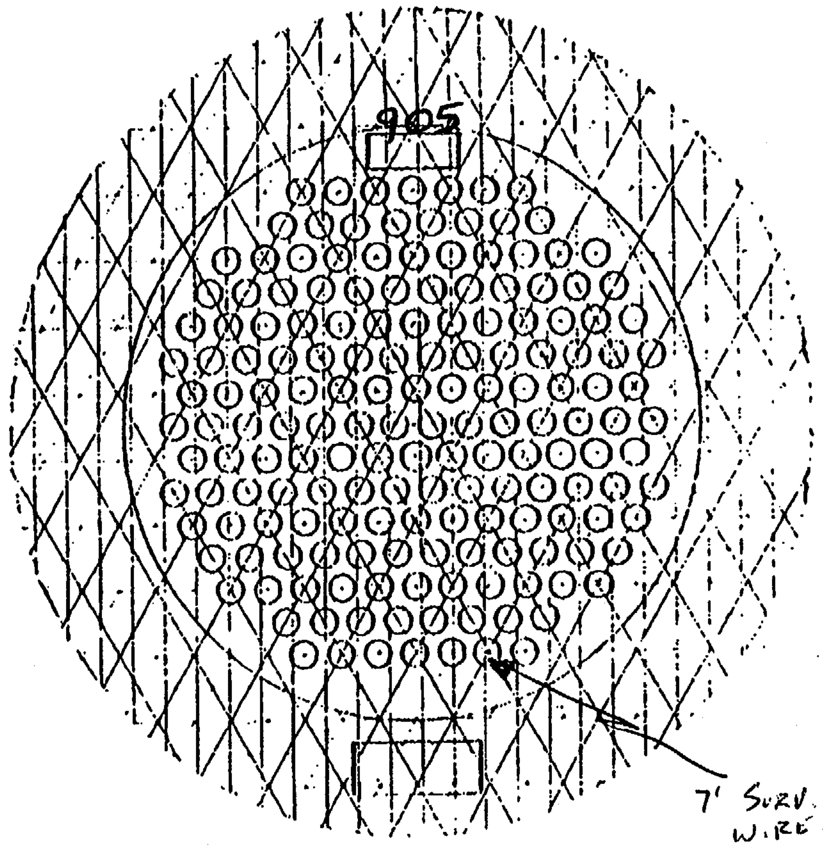
Tendon # H 35-33
END: FIELD_____(1 piece washer)
SHOP X (2 piece washer)

A1874 424

18-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



7' SURV. WIRE.
9-3-99

RB Tendon Surveillance

COMMENT: PERFORMED PRE LIFT-OFF & POST LIFT-OFF INSPECTION & FOUND NO CHANGE. 9-3-99

INSPECTED BY
CONTRACTOR FOREMAN ______ Date 9/3/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ______ Date 9-3-99
COGNIZANT MECH/STRUCT ENGINEER ______ Date 9/14/99
REVIEWED BY

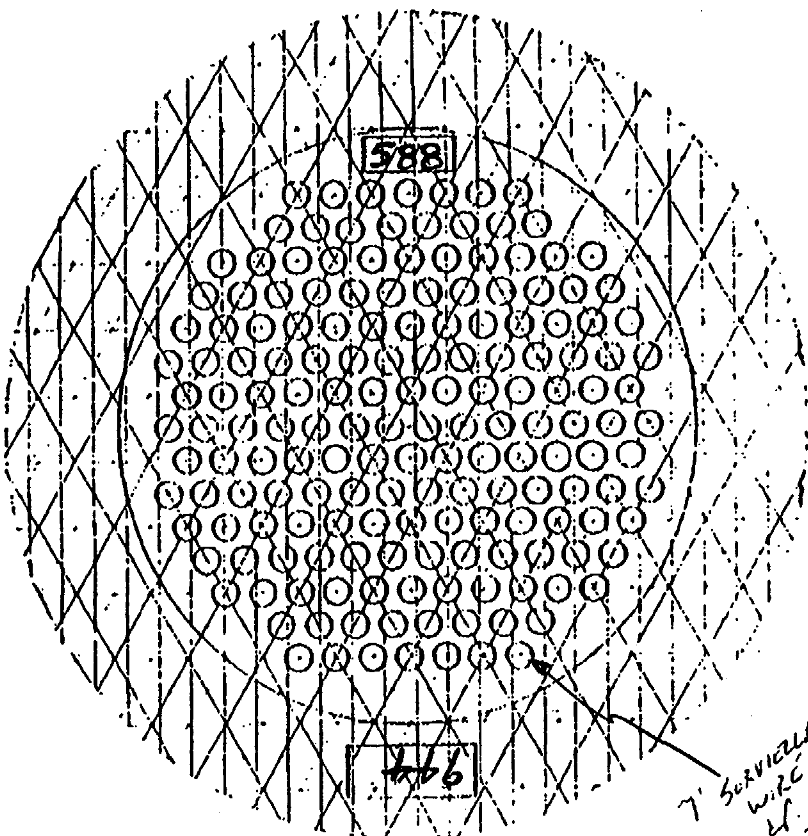
INSPECTION PERIOD 7th

Tendon # H 35-33
END: FIELD X (1 piece washer)
SHOP ____ (2 piece washer)

A188 ∅ 4.24

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



7' SURVEILLANCE WIRE W. 9-13-99

RB Tendon Surveillance

COMMENT:

PERFORMED PRE LIFT-OFF INSPECTION & POST LIFT-OFF & FOUND NO CHANGE. W. 9-14-99

INSPECTED BY
CONTRACTOR FOREMAN ____ Date 10/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ____ Date 9-14-99
COGNIZANT MECH/STRUCT ENGINEER ____ Date ____
REVIEWED BY ____ 11/1/99

INSPECTION PERIOD 7th

Tendon # H 46-37
END: FIELD ____ (1 piece washer)
SHOP X (2 piece washer)

8-12-99 13:24:15

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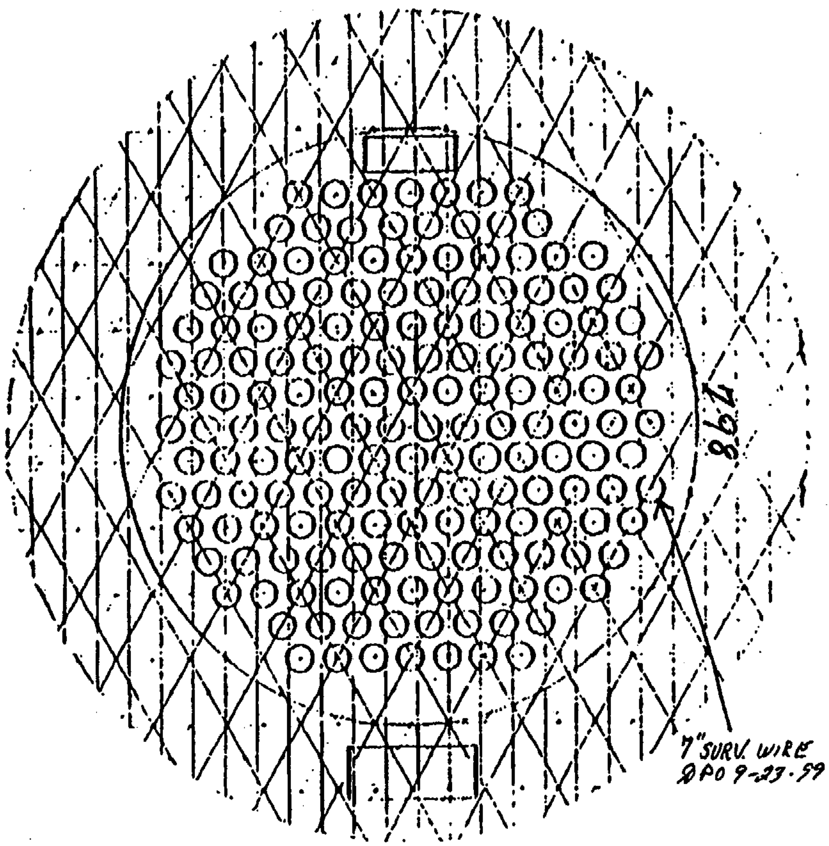
ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: PREFORMED PRE LIFT-OFF INSPECTION + POST LIFT-OFF, FOUND NO CHANGE. DPO 9-23-99

INSPECTED BY
CONTRACTOR FOREMAN ____ Date 9/26/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ____ Date 9-23-99
COGNIZANT MECH/STRUCT ENGINEER ____ Date 11/1/99
REVIEWED BY

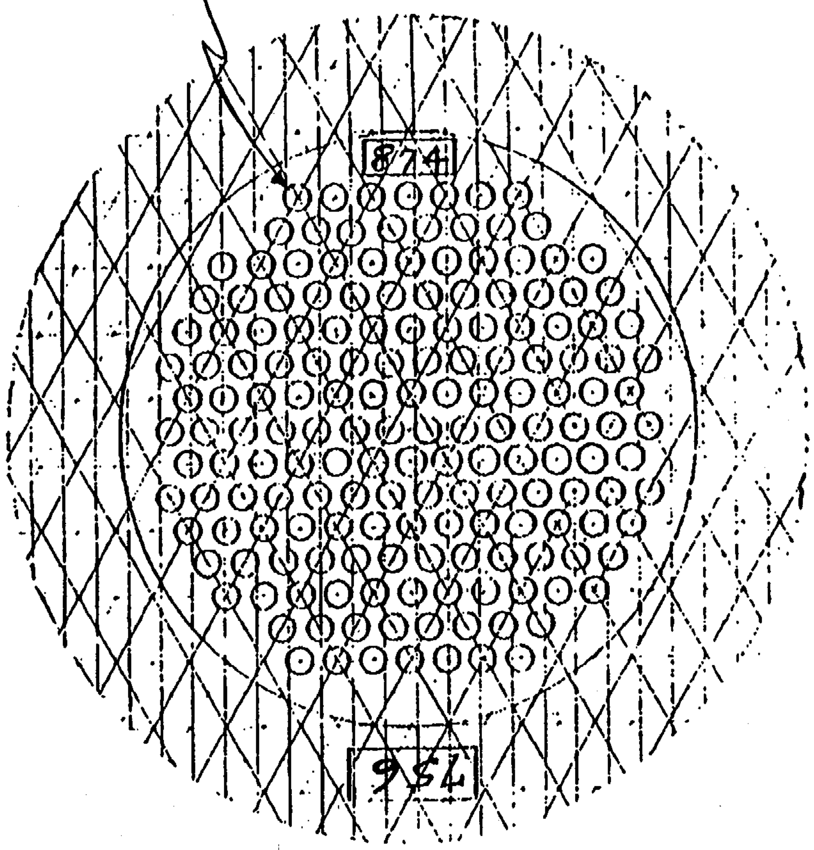
INSPECTION PERIOD 7TH

Tendon # H46-37
END: FIELD X (1 piece washer)
SHOP ____ (2 piece washer)

7' SURV. WIRE
9-14-99

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance
COMMENT: PERFORMED PRE-LIFT & POST LIFT-OFF INSPECTION & FOUND NO CHANGE. 9-14-99
INSPECTED BY CONTRACTOR FOREMAN ________ Date 10/27/99
VERIIFIED BY COGNIZANT QV INSPECTOR ________ Date 9-14-99
COGNIZANT MECH/STRUCT ENGINEER REVIEWED BY ________ Date 9/24/99

INSPECTION PERIOD 7th

Tendon # H51-43
END: FIELD____(1 piece washer)
SHOP X (2 piece washer)

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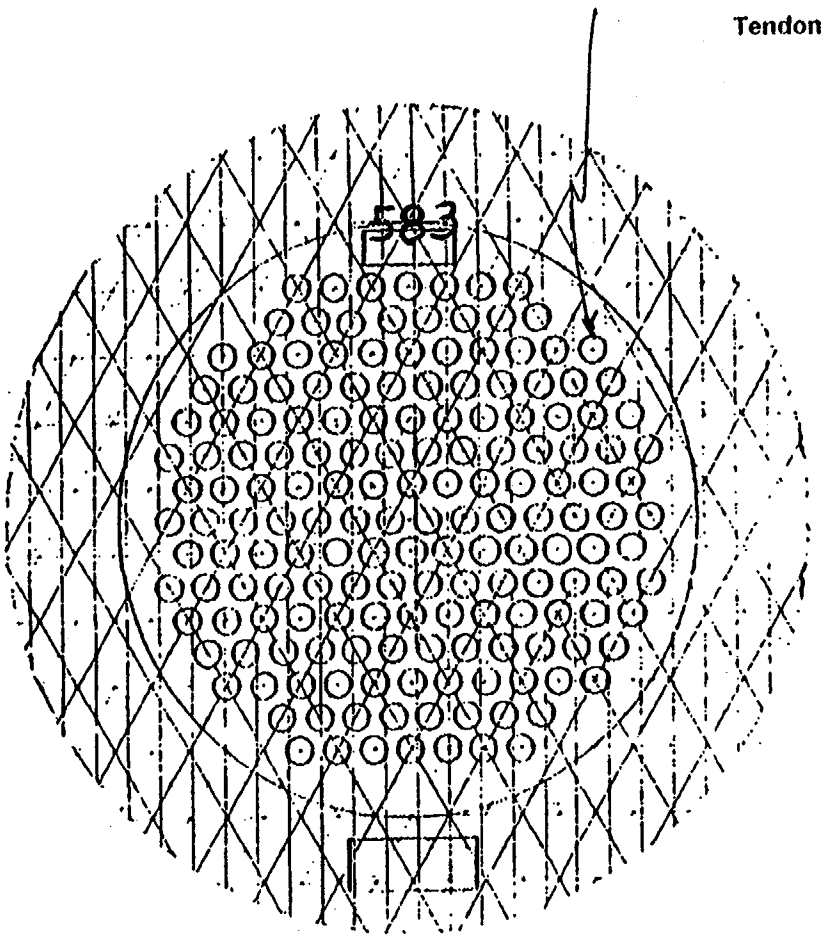
ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection

1' SURVIELLANCE WIRE. 9-13-99



RB Tendon Surveillance

COMMENT: PERFORMED PRE LIFT-OFF & POST LIFT-OFF INSPECTION & FOUND NO CHANGE. 9-13-99

INSPECTED BY
CONTRACTOR FOREMAN ______ Date 10/27/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ______ Date 9-13-99
COGNIZANT MECH/STRUCT ENGINEER ______ Date 9/24/99
REVIEWED BY

INSPECTION PERIOD 7th

Tendon # H51-43
END: FIELD X (1 piece washer)
SHOP ______ (2 piece washer)

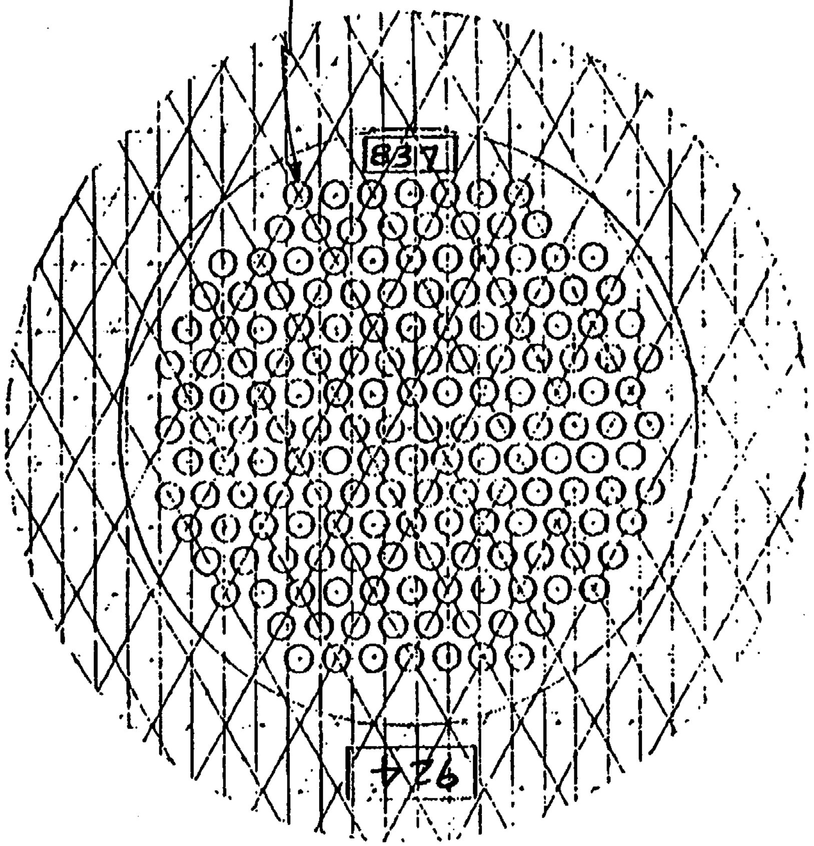
18-12-99 13:24:15

A192 of 424

7' SURVEILLANCE WIRE 8-30-99

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT: PERFORMED PRE LIFT-OFF & POST LIFT-OFF INSPECTION & FOUND NO CHANGE. 8-30-99

INSPECTED BY
CONTRACTOR FOREMAN [signature] Date 8/30/99
VERIIFIED BY
COGNIZANT QV INSPECTOR [signature] Date 8-30-99
COGNIZANT MECH/STRUCT ENGINEER [signature] Date
REVIEWED BY 9/14/99

INSPECTION PERIOD 7th

Tendon # H62-26
END: FIELD____(1 piece washer)
SHOP__x__(2 piece washer)

8-12-99 13:24:15

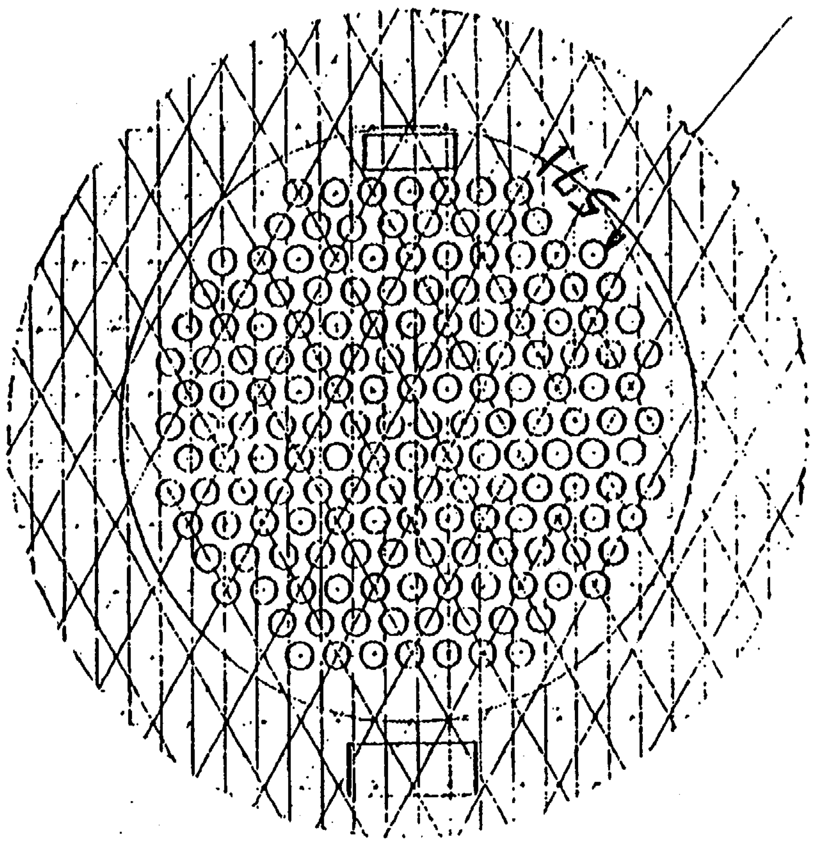
A1937 424

8-12-99 13:24:15

ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection

7' SURVEILLANCE WIRE
9-2-99



RB Tendon Surveillance

COMMENT: PERFORMED PRE LIFT-OFF & POST LIFT-OFF INSPECTION & FOUND NO CHANGE.
9-2-99

INSPECTED BY
CONTRACTOR FOREMAN ________ Date 9/2/99
VERIIFIED BY
COGNIZANT QV INSPECTOR ________ Date 9-2-99
COGNIZANT MECH/STRUCT ENGINEER ________ Date
REVIEWED BY ________ 9/14/99

INSPECTION PERIOD 7th

Tendon # H 62-26
END: FIELD X (1 piece washer)
SHOP ______ (2 piece washer)

A19447 424

8-12-99 13:24:15

ENCLOSURE 6

Date Sheet 5
Tendon Anchorage Area Crack Inspection
Dome Tendons

Inspection Period 7th

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location	Width (IN.)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. 225	NW	* No Change	*	*	8-23-99	[illegible]	[illegible]
	SE	No cracks > .005"	N/A	N/A	8-31-99	[illegible]	[illegible]
2. 313	SE	* No change	*	*	10-5-99	[illegible]	[illegible]
	NE	None	N/A	N/A	10-5-99	[illegible]	[illegible]
3. D102	NE	* No change	*	*	10-7-99	[illegible]	[illegible]
	NW	None	N/A	N/A	10-7-99	[illegible]	[illegible]
4. D104	NE	None	N/A	N/A	10-11-99	[illegible]	[illegible]
	NW	None	N/A	N/A	10-11-99	[illegible]	[illegible]
5.							
6.							

NOTE: Location

Identify Tendon End (Shop or Field) and NW, NE, SW, SE

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/10/99

[illegible] 8-23-99

* Cracks are as identified & documented on ~~Encl~~ Enclosure 6 Data Sht 8 & 9 for Crack Growth Inspection Dome Tendons. There is no change in crack pattern or size since Period 6.

A195 / 424

3-12-99 13:24:15

ENCLOSURE 6
Data Sheet 6
Tendon Anchorage Area Crack Inspection
Vertical Tendons

Inspection Period 7th

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location	Width (IN.)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. V32	T	No Cracks	None	None	8-27-99	[illegible]	[illegible]
	B	NO CRACKS	NONE	NONE	9-29-99	[illegible]	DRO
2. V40	T	No Cracks	None	None	8-27-99	[illegible]	[illegible]
	B	NO CRACKS	NONE	NONE	9-29-99	[illegible]	DRO
3. V114	T	No Cracks	None	None	9-10-99	[illegible]	[illegible]
	B	NO CRACKS	NONE	NONE	9-29-99	[illegible]	DRO
4. V164	T	NO CRACKS	NONE	NONE	9-27-99	[illegible]	DRO
	B	NO CRACKS	NONE	NONE	9-29-99	[illegible]	DRO
5. V143	T	NO CRACKS	NONE	NONE	10-13-99	[illegible]	DRO
	N/A	N/A	N/A	N/A	N/A	[illegible]	DRO
6. V156	T	NO CRACKS	NONE	NONE	10-13-99	[illegible]	DRO
	N/A	N/A	N/A	N/A	N/A	[illegible]	DRO
7. V8	T	NOCRACKS	NONE	NONE	N/A	[illegible]	DRO
	N/A	N/A	N/A	N/A	N/A	[illegible]	DRO

NOTE: Location
Identify Tendon End (Shop or Field) and
T or B - Top or Bottom of Vertical Tendon

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/10/99

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8-12-99 13:24:15

ENCLOSURE 6
Data Sheet 6
Tendon Anchorage Area Crack Inspection
Vertical Tendons

Inspection Period 4TH

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location	Width (IN.)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. V35	T	NO CRACKS	NONE	NONE	10-13-99	CH	DPO
	N/A	N/A	N/A	N/A			
2. V57	T	NO CRACKS	NONE	NONE	10-13-99	CH	DPO
	N/A	N/A	N/A	N/A			
3. V80	T	NO CRACKS	NONE	NONE	10-14-99	CH	DPO
	N/A	N/A	N/A	N/A			
4. V94	T	NO CRACKS	NONE	NONE	10-14-99	CH	DPO
	N/A	N/A	N/A	N/A			
5. V110	T	NO CRACKS	NONE	NONE	10-14-99	CH	DPO
	N/A	N/A	N/A	N/A			
6. V86	T	NO CRACKS	NONE	NONE	10-14-99	CH	DPO
	B	NO CRACKS	NONE	NONE	10-20-99	CH	DPO
7.							

NOTE: Location
Identify Tendon End (Shop or Field) and
T or B - Top or Bottom of Vertical Tendon

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/10/99

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ENCLOSURE 6
Date Sheet 7
Tendon Anchorage Area Crack Inspection
Hoop Tendons

Inspection Period 7th

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location	Width (IN.)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. H62-26	BUTT #6	NONE	NONE	NONE	8-30-99	[signature]	[signature]
	BUTT #2	NONE	NONE	NONE	9-2-99	[signature]	[signature]
2. H ~~53~~ 35-33 (9-3-99)	BUTT #3	NONE	NONE	NONE	9-3-99	[signature]	[signature]
	BUTT #5	NONE	NONE	NONE	9-7-99	[signature]	[signature]
3. H51-43	BUTT #5	NONE	NONE	NONE	9-13-99	[signature]	[signature]
	BUTT #1	NONE	NONE	NONE	9-14-99	[signature]	[signature]
4. H46-37	BUTT #6	* UPPER R/H CORNER OF BEARING PL CRACK 2½"	LONG	.013"	9-13-99	[signature]	[signature]
	BUTT #4	NONE	NONE	NONE	9-23-99	[signature]	[signature]
5. H13-50	BUTT #1	NONE	NONE	NONE	9-22-99	[signature]	[signature]
	BUTT #3	NONE	NONE	NONE	9-30-99	[signature]	[signature]
6.							
7.							
8.							
9.							
10.							

NOTE: Location
Identify Tendon End (Shop or Field) and
1 to 6 - Number of Butress Nearest to End of Tendon

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/10/99

* PER JOHN PIAZZA THIS CRACK WAS MONITORED DURING LIFT-OFF & AFTER LIFT-OFF, THE CRACK DID NOT GROW IN LENGTH OR WIDTH.

78 Reexamine H46-37 (Butt #6) during Period 8 to ensure crack is stable. Shown in Encl. 7 of 1301-9.1. [signature] 11/10/99

11/18/99 424

8-12-99 13:24:15

ENCLOSURE 6

Date Sheet 8
Crack Growth Inspection
Dome Tendons

Inspection Period 7th

	Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location	Cracks with width >0.01" Width (IN.)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1.	203	NE	NO CHANGE	(*)	(*)	8-19-99	[illegible]	[illegible]
2.	225	NW	NO CHANGE	(*)	(*)	8-19-99	[illegible]	[illegible]
3.	218	SE	NO CHANGE	N/A	N/A	8-26-99	[illegible]	[illegible]
4.	249	SE	NO CHANGE	N/A	N/A	9-10-99	[illegible]	[illegible]
5.	329	SW	NO CHANGE	N/A	N/A	9-10-99	[illegible]	[illegible]
6.	118	SW	NO CHANGE	(*)	(*)	9-13-99	[illegible]	[illegible]
7.	334	NW	NO CHANGE	N/A	N/A	10-6-99	[illegible]	[illegible]
8.	103	NE	NO CHANGE	N/A	N/A	10-7-99	[illegible]	[illegible]
9.	313	SE	NO CHANGE	N/A	N/A	11-5-99	[illegible]	[illegible]
10.								
11.								
12.								

NOTE: Location

Identify Tendon End (Shop or Field) and NW, NE, SW, Se

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/10/99

(*) SEE ATTACHED ENCLOSURE 6 DATA SHEET 9 FOR LOCATION & WIDTHS.

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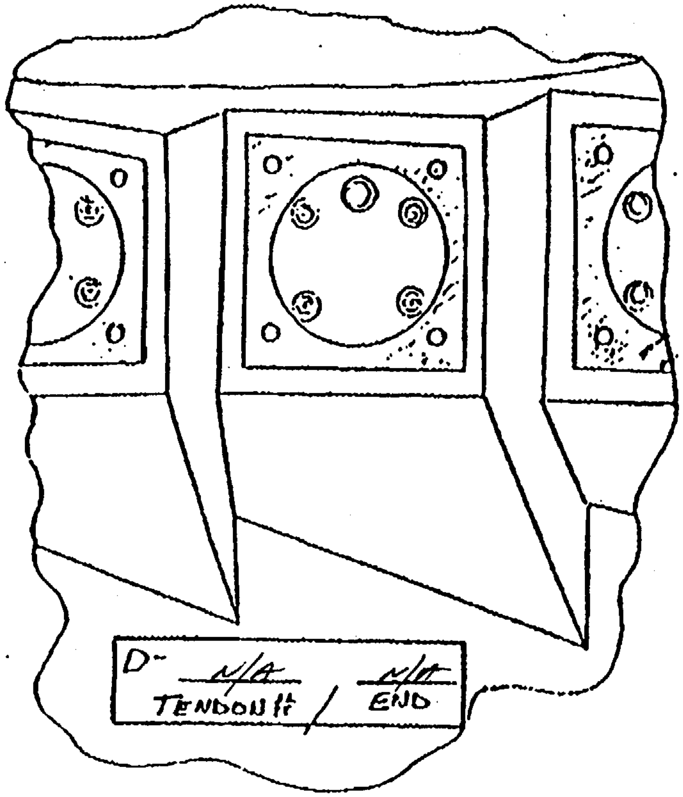
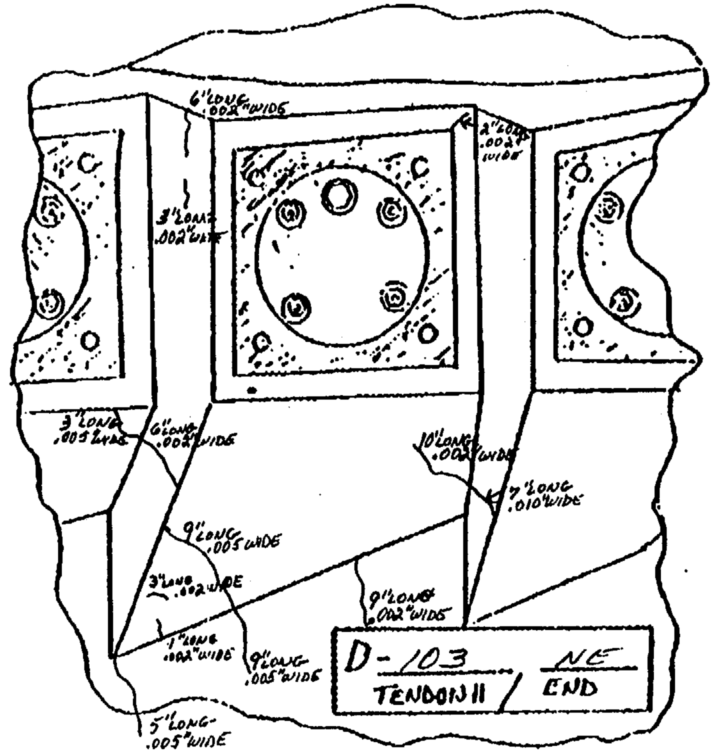
ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections





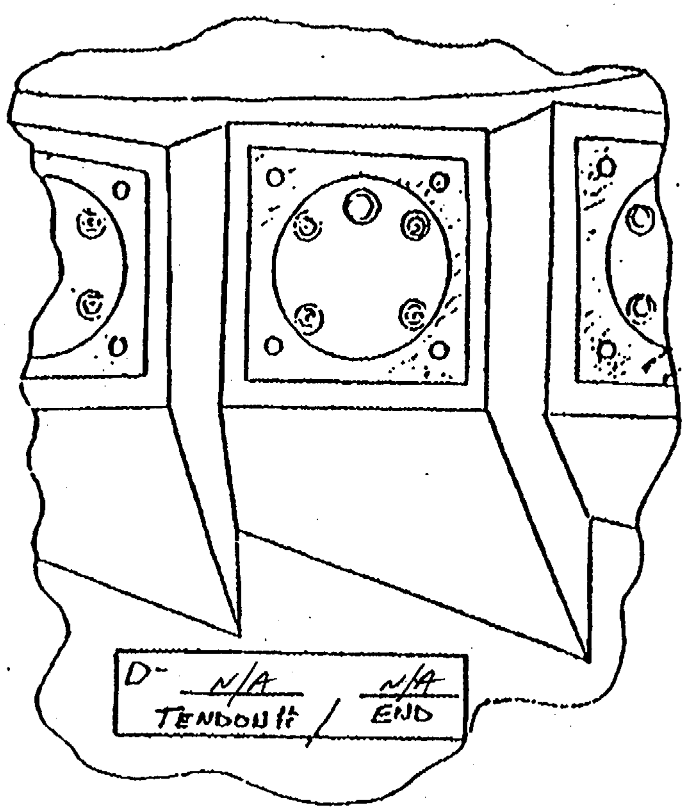
Choose the sketch which is most appropriate and plot the observed cracks.

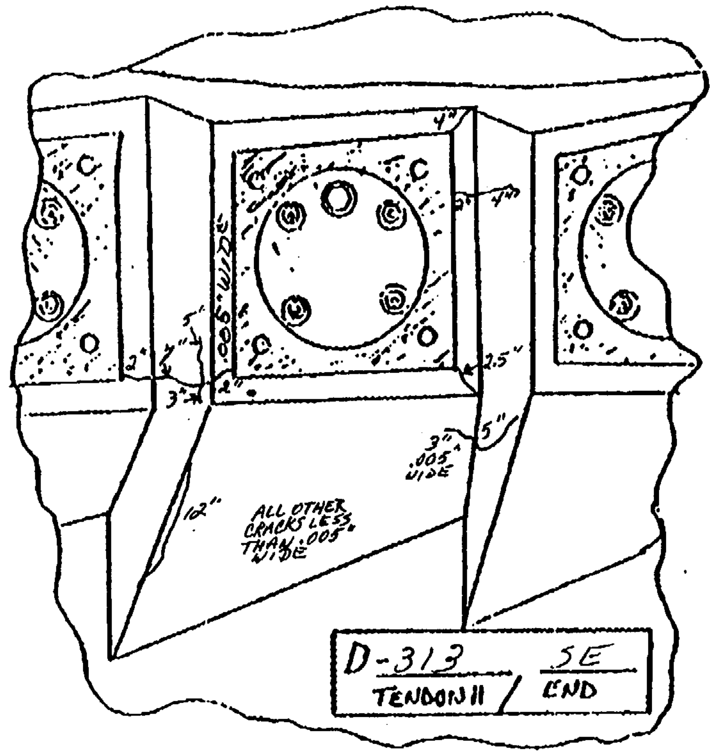
INSPECTED BY CONTRACTOR ______________ DATE 10/26/99

VERIFIED BY COGNIZANT QV INSPECTOR ______________ DATE 10-7-99

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER ______________ DATE 11/10/99

ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections





420 of 424

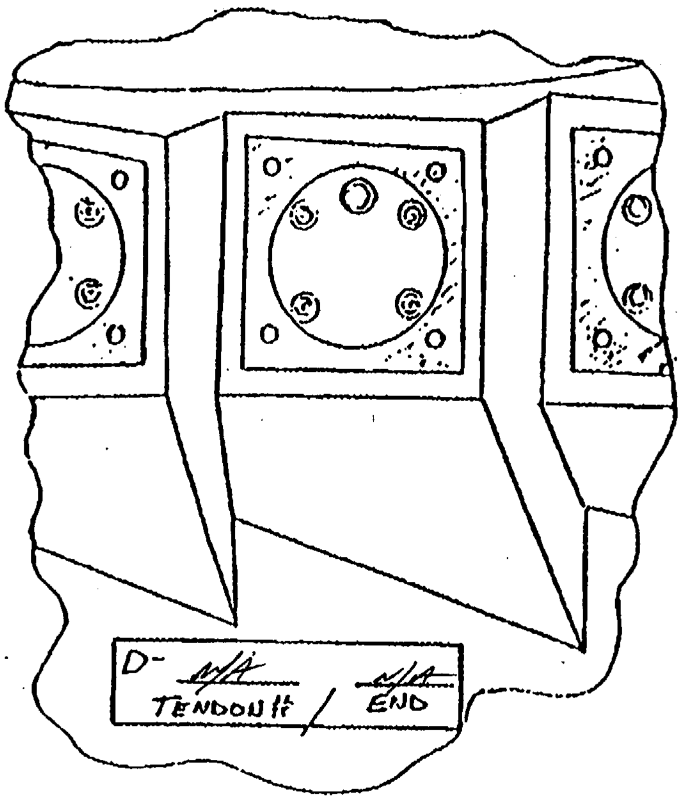
Choose the sketch which is most appropriate and plot the observed cracks.

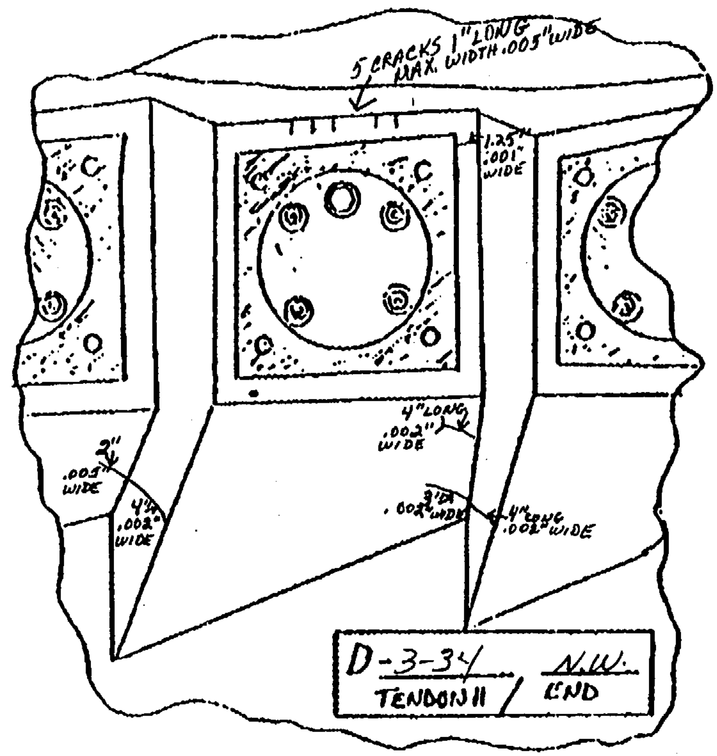
INSPECTED BY CONTRACTOR ______ DATE 10/26/99

VERIFIED BY COGNIZANT QV INSPECTOR ______ DATE 10-5-99

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER ______ DATE 11/10/99

ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections





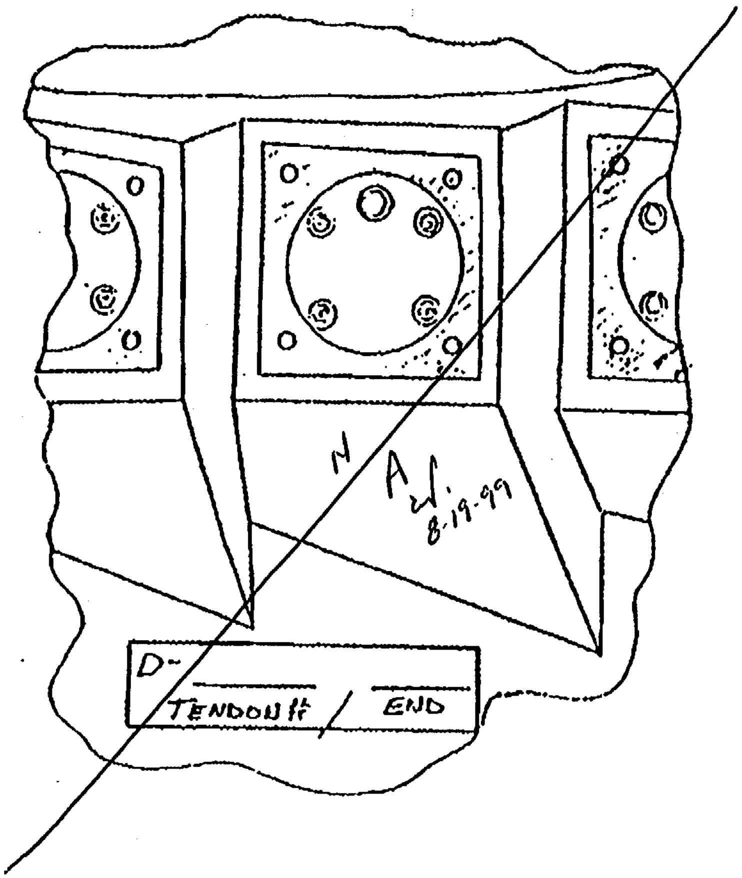
Choose the sketch which is most appropriate and plot the observed cracks.

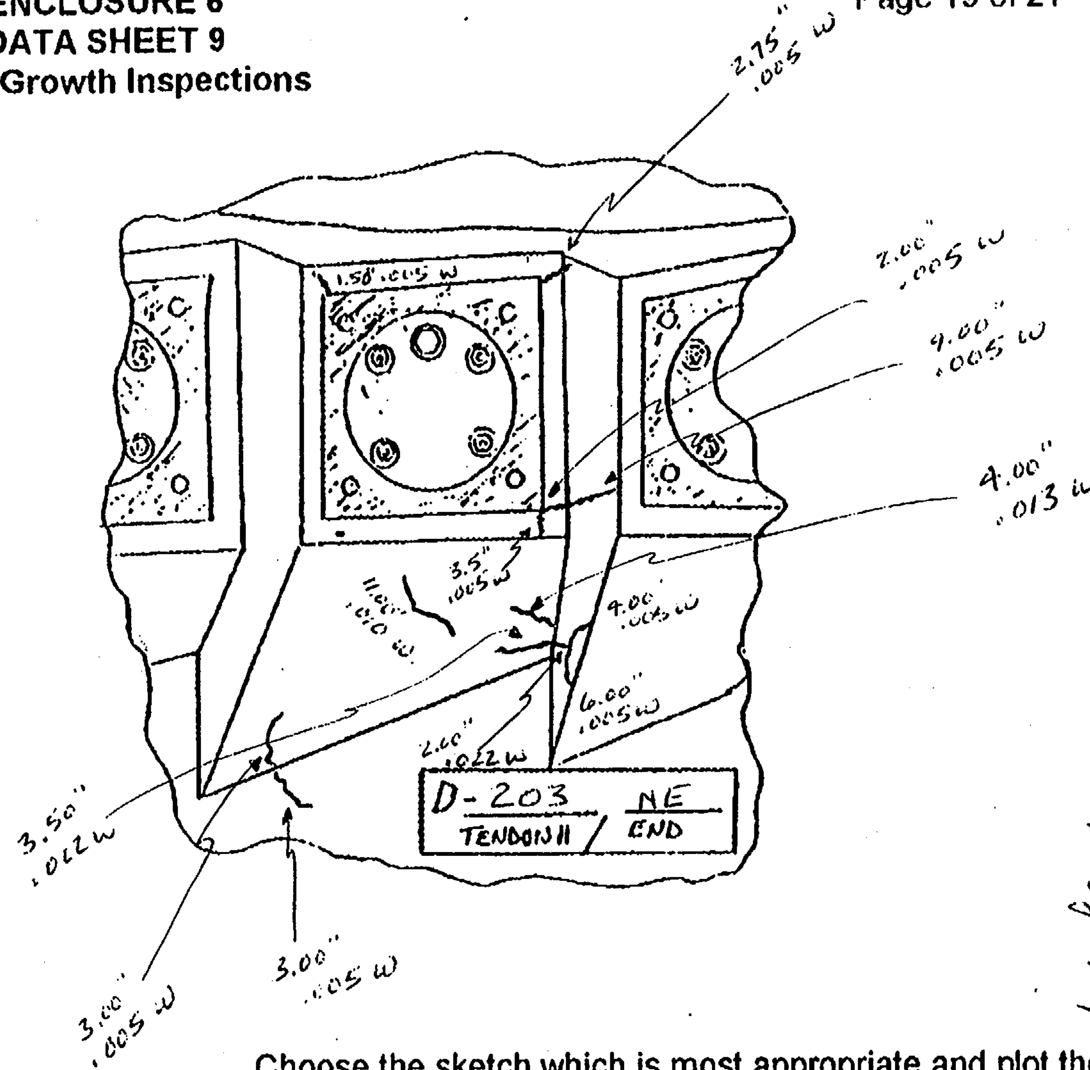
INSPECTED BY CONTRACTOR ____________ DATE 10/26/99

VERIFIED BY COGNIZANT QV INSPECTOR ____________ DATE 10-7-99

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER ____________ DATE 11/10/99

ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections





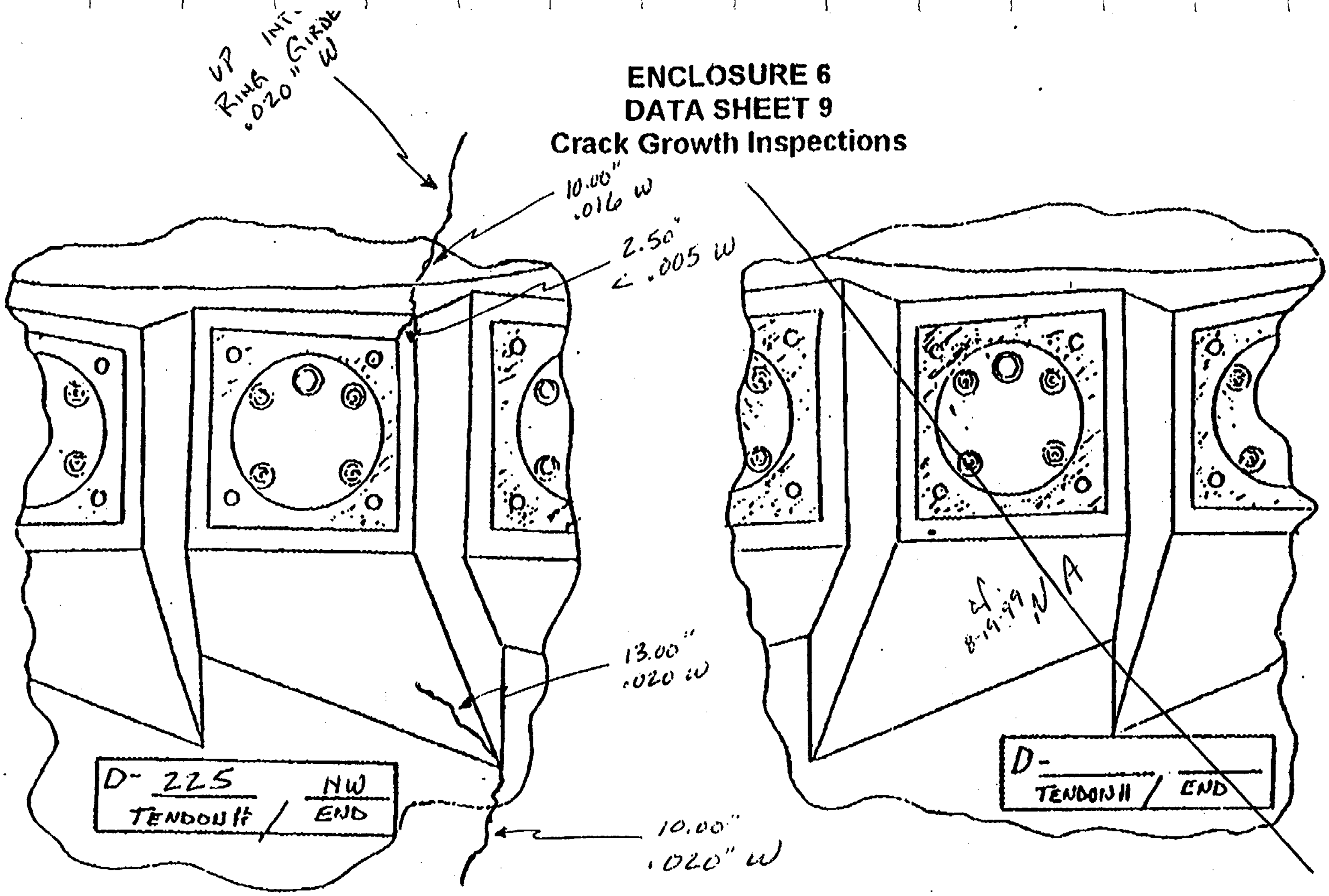
Choose the sketch which is most appropriate and plot the observed cracks.

INSPECTED BY CONTRACTOR ____________ DATE 10/26/99

VERIFIED BY COGNIZANT QV INSPECTOR ____________ DATE 8-19-99

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER ____________ DATE 11/10/99

ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections



A204 of 424

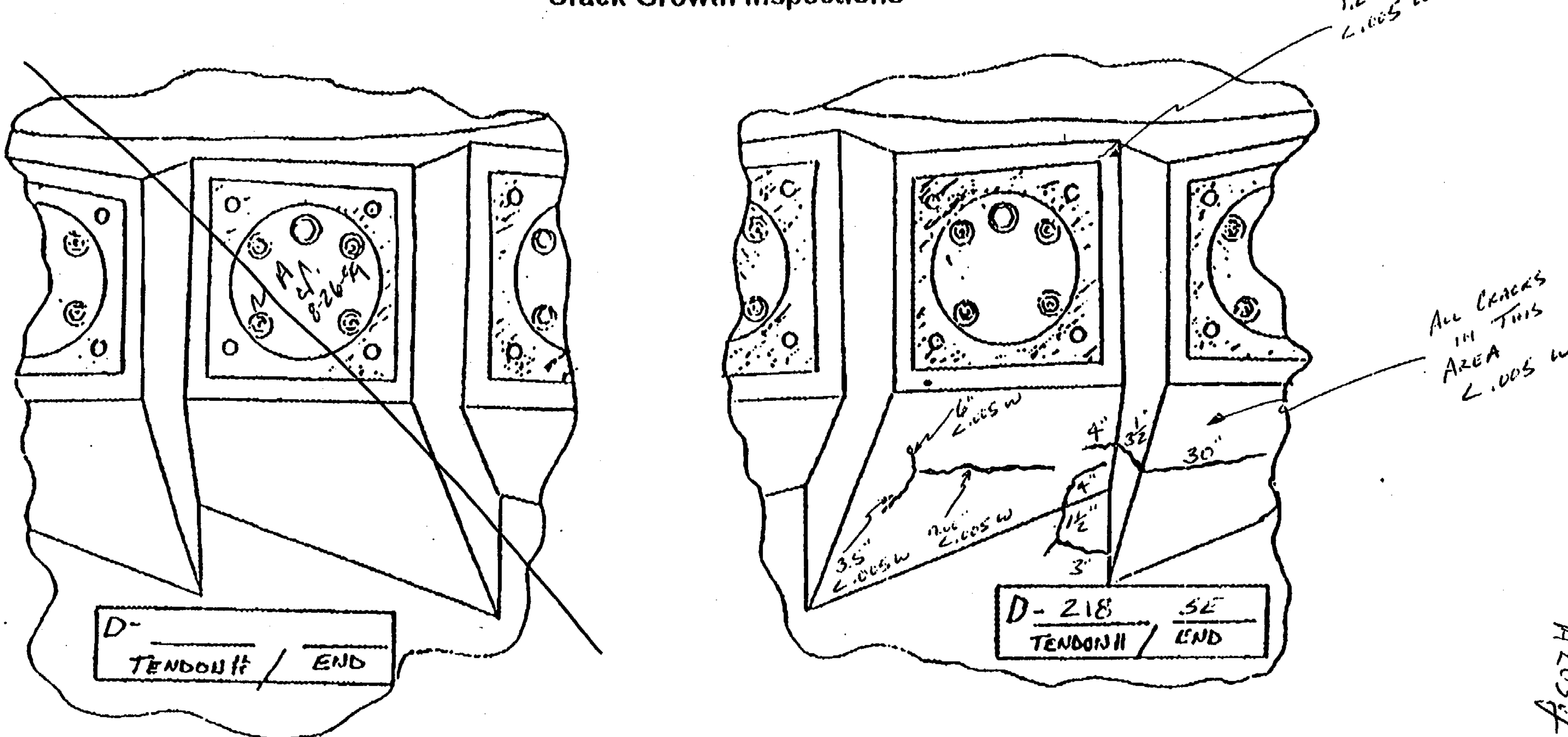
Choose the sketch which is most appropriate and plot the observed cracks.

INSPECTED BY CONTRACTOR ____________ DATE 10/26/99

VERIFIED BY COGNIZANT QV INSPECTOR ____________ DATE 8-19-99

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER ____________ DATE 11/10/99

ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections



A205 / 424

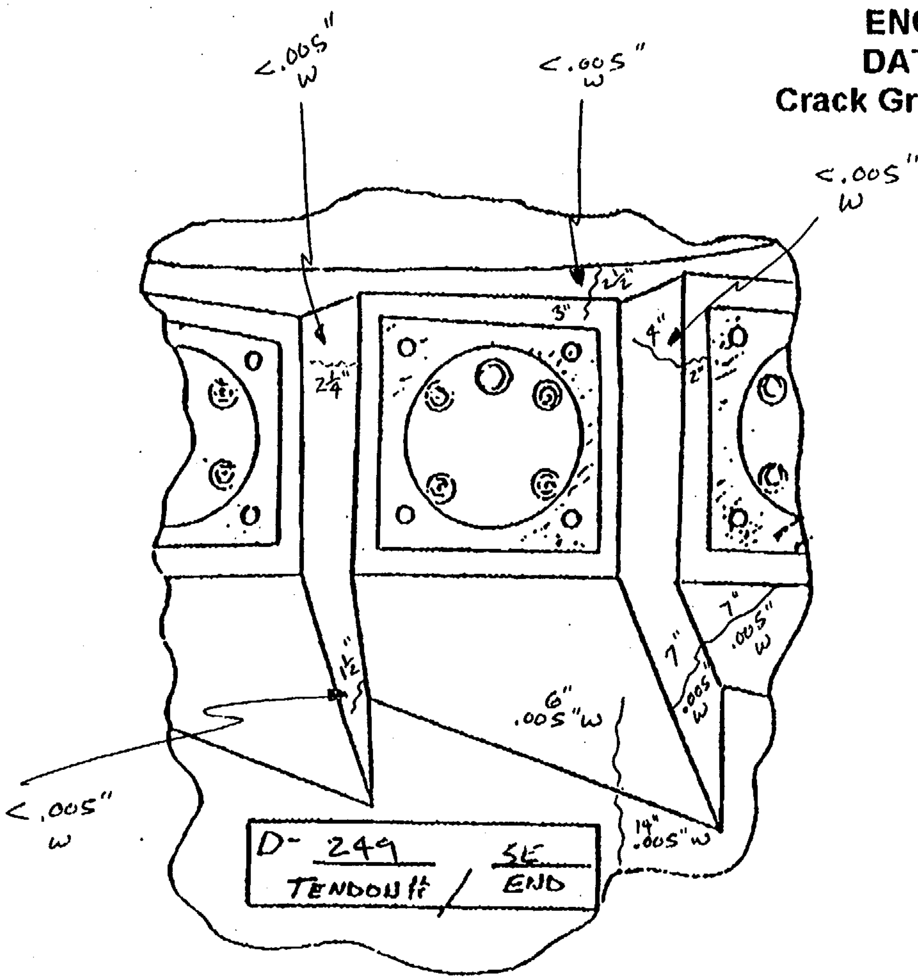
Choose the sketch which is most appropriate and plot the observed cracks.

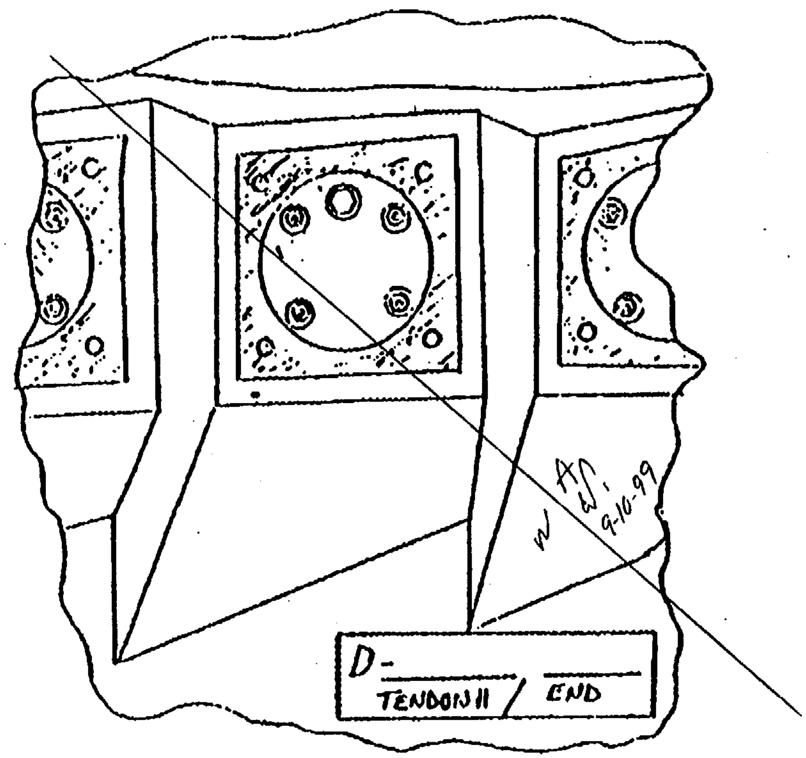
INSPECTED BY CONTRACTOR ____________ DATE 10/26/99

VERIFIED BY COGNIZANT QV INSPECTOR ____________ DATE 8-26-99

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER ____________ DATE 11/10/99

ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections





A2066 4224

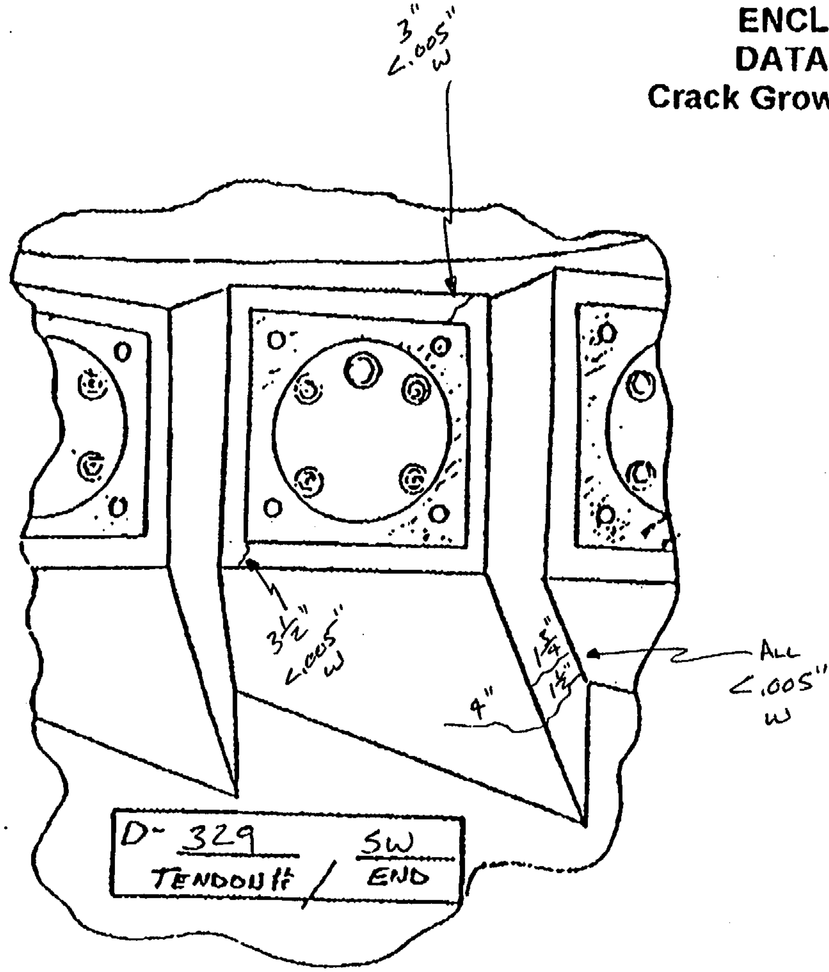
Choose the sketch which is most appropriate and plot the observed cracks.

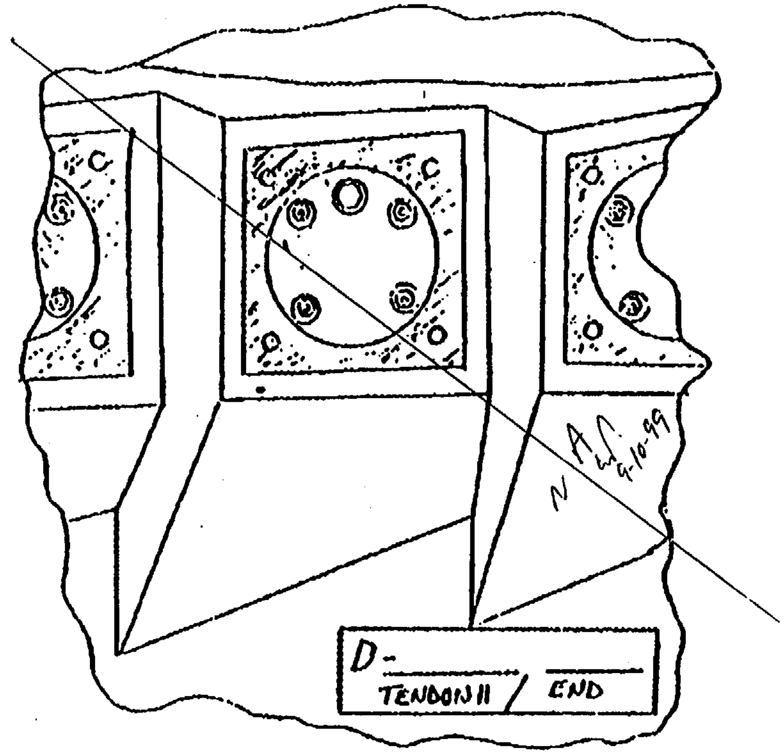
INSPECTED BY CONTRACTOR ______ DATE 10/26/99

VERIFIED BY COGNIZANT QV INSPECTOR ______ DATE 9-10-99

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER ______ DATE 11/10/99

ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections





A207 of 424

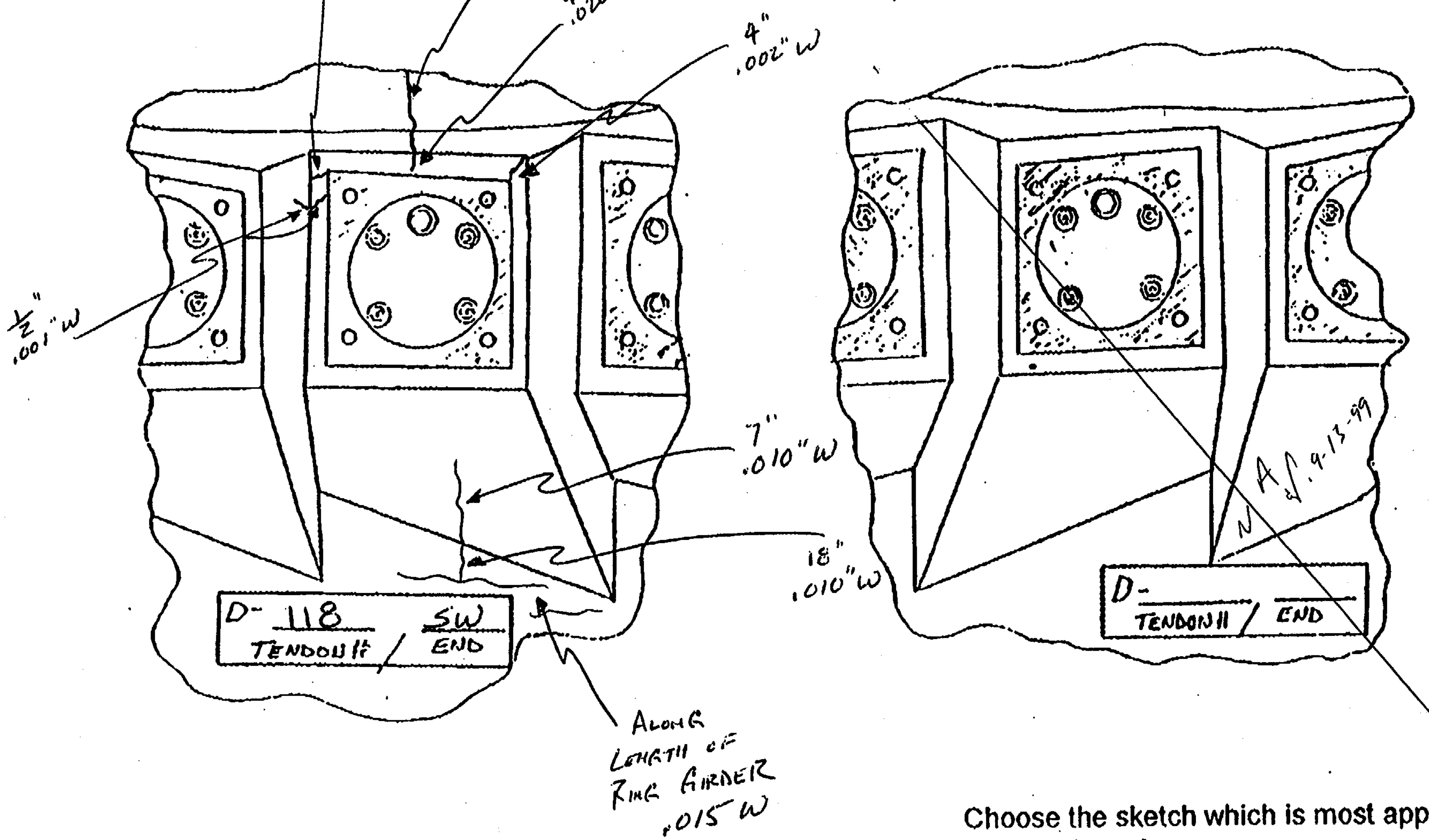
Choose the sketch which is most appropriate and plot the observed cracks.

INSPECTED BY CONTRACTOR [signature] DATE 10/26/99

VERIFIED BY COGNIZANT QV INSPECTOR [signature] DATE 9-10-99

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER [signature] DATE 11/10/99

ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections



A2087 424

Choose the sketch which is most appropriate and plot the observed cracks.

INSPECTED BY CONTRACTOR ____________ DATE 9/24/99

VERIFIED BY COGNIZANT QV INSPECTOR ____________ DATE 9-13-99

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER ____________ DATE 11/10/99

REPORT "A"

INSIDE AREAS

ENCLOSURE 6
Data Sheet 10
General Containment Inspection Results

~~Mat Foundation in Tendon Gallery~~ 9-11-99

REPORT "A" INCLUDES INSPECTIONS PERFORMED FROM INSIDE THE INT. BLDG, HTR BAY BLDG, FUEL BLDG., AUX BLDG, UPPER TENDON ACCESS GALLERY AND TENDON GALLERY. 9-11-99

Tendon Grease Caps

AT THE TIME THIS REPORT WAS CLOSED GREASE LEAK REPAIRS WERE ONGOING. 9-17-99

Buttress 1 to 2

ELEVATION 305 OF HEATER BAY UPTO CEILING VT-3C PERFORMED AND NO SIGNS OF CONCRETE DEGRADATION FOUND. 9-11-99

ELEVATION 295 OF INTERMEDIATE BLDG UPTO ELEV. 327 NO CONCRETE DEGRADATION. 9-11-99

AS OF 9-17-99 ELEV. 327 TO CEILING OF INTERMEDIATE BLDG. IS NOT DONE. ~~9-16-99~~ 9-17-99

USED 6 VOLT HAND HELD FLASHLIGHT & BINOCULARS TO PERFORM INSPECTION. 9-17-99 2-10-00

Buttress 2 to 3

ELEVATION 305 FUEL HANDLING BUILDING - PERFORMED VT-3C INSPECTION FROM PERSONNEL HATCH TO BUTT # 3 AND FOUND NO SIGNS OF CONCRETE DEGRADATION. 9-7-99

ELEVATION 305 OF HEATER BAY UPTO CEILING VT-3C PERFORMED AND FOUND NO SIGNS OF CONCRETE DEGRADATION 9-11-99

USED 6 VOLT HAND HELD FLASHLIGHT & BINOCULARS TO PERFORM INSPECTIONS. 2-10-00

Buttress 3 to 4

ELEVATION 281 & 305 FUEL HANDLING BUILDING - PERFORMED VT-3C INSPECTION FROM BUTT # 3 TO BUTT # 4 & FOUND NO SIGNS OF CONCRETE DEGREDATION. THERE IS MINOR GREASE STREAKING ON BUTT # 3 @ GREASE CANS AND SIGNS OF GREASE LEAKS ON BUTT # 4, DRIP PANS ARE IN PLACE ON BUTT # 4. 9-7-99 ⊛ USED 6 VOLT HAND HELD FLASHLIGHT & BINOCULARS. 2-10-00

Cognizant Mech/Struct Engineer
Reviewed By: [signature] * Date: 9/24/99

Perfomed By: [signature] Date: 9-17-99

* Conditions of concrete identified herein indicate some degradation of concrete. However, this has been reviewed & no impairment found which would cause loss of containment safety function or structural integrity. [signature] 9/24/99
ETTS24923 generated to monitor/repair, as req'd, as part of maint. Rule.

INSIDE AREAS
REPORT "A"

ENCLOSURE 6
Data Sheet 10
General Containment Inspection Results

Buttress 4 to 5 ELEVATION 281 & 305 AUX. BLDG. - PERFORMED VT-3C INSPECTION FROM BUTT #4 TOWARD BUTT #5 AND FOUND NO SIGNS OF CONCRETE DEGRADATION. 9-7-99

Buttress 5 to 6

N/A 9-11-99

Buttress 6 to 1 ELEVATION 295 OF INTERMEDIATE BLDG UPTO ELEV. 327 NO SIGNS OF CONCRETE DEGRADATION. 9-11-99
AS OF 9-17-99 ELEV. 327 TO CEILING OF INTERMEDIATE BLDG. IS NOT DONE. 9-17-99
* USED 6 VOLT FLASHLIGHT & BINOCULARS TO PERFORM INSPECTION. 2-10-00

Dome Area

N/A 9-11-99

Cognizant Mech/Struct Engineer Reviewed By: [signature] Date: 9/24/99

Performed By: [signature] Date: 9-17-99

* CLARIFICATION TO WHAT TOOLS WERE USED TO PERFORM INSPECTION ADDED ON 2-10-00. 2-10-00

INSIDE AREAS REPORT "A" SHT 2 OF 9

08-12-99 13:24:15

UPPER ACCESS GALLERY & MAT FOUNDATION ONLY ON SHTS 3 OF 9 & 4 OF 9 ω 9-11-99

A211Ø424

Mat Foundation in Tendon Gallery

NO CRACKS >.015", LEACHING IS PRESENT WERE WALLS MEET MAT (INNER & OUTER) OF TENDON GALLERY (CONT ON SHT 9 OF 9) ALSO SEE ATTACHED SHTS 6 OF 9, 7 OF 9 & 8 OF 9 FOR VT-1C INSPECTIONS REQUIRING ENGINEERING EVAL. ω 9-11

Tendon Grease Caps

AT THE TIME THIS REPORT WAS CLOSED GREASE LEAK REPAIRS WERE ONGOING. ω 9-17-99

Buttress 1 to 2

UPPER ACCESS - NO CRACK >.015" & NO SIGNS OF CONCRETE DEGRADATION. ω 9-11-99

Buttress 2 to 3

UPPER ACCESS - NO CRACK >.015" & NO SIGNS OF CONCRETE DEGRADATION. ω 9-11-99

Buttress 3 to 4

UPPER ACCESS - NO CRACK >.015", SEE SHT 5 OF 9 REPORT "A" FOR VT-1C SKETCH REQUIRING ENGINEERING EVALUATION. ω 9-11-99

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 9/21/99

Perfomed By: [signature] Date: 9-17-99

INSIDE AREA
REPORT "A"
SHT 3 OF 9

A212 # 424

ENCLOSURE 6
Data Sheet 10
General Containment Inspection Results

Buttress 4 to 5 UPPER ACCESS - NO CRACK >.015 & NO SIGNS OF CONCRETE DEGRADATION. CJ 9-11-99

Buttress 5 to 6 UPPER ACCESS - NO CRACK >.015 & NO SIGNS OF CONCRETE DEGRADATION. CJ 9-11-99

Buttress 6 to 1 UPPER ACCESS - NO CRACK >.015 & NO SIGNS OF CONCRETE DEGRADATION. CJ 9-11-99

Dome Area

~~NA CJ 9-11-99~~

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 9/24/99

Performed By: [signature] Date: 9-17-99

INSIDE AREAS
REPORT "A"
SHT 4 OF 9

PSC

Precision Surveillance Corporation

VT-1C

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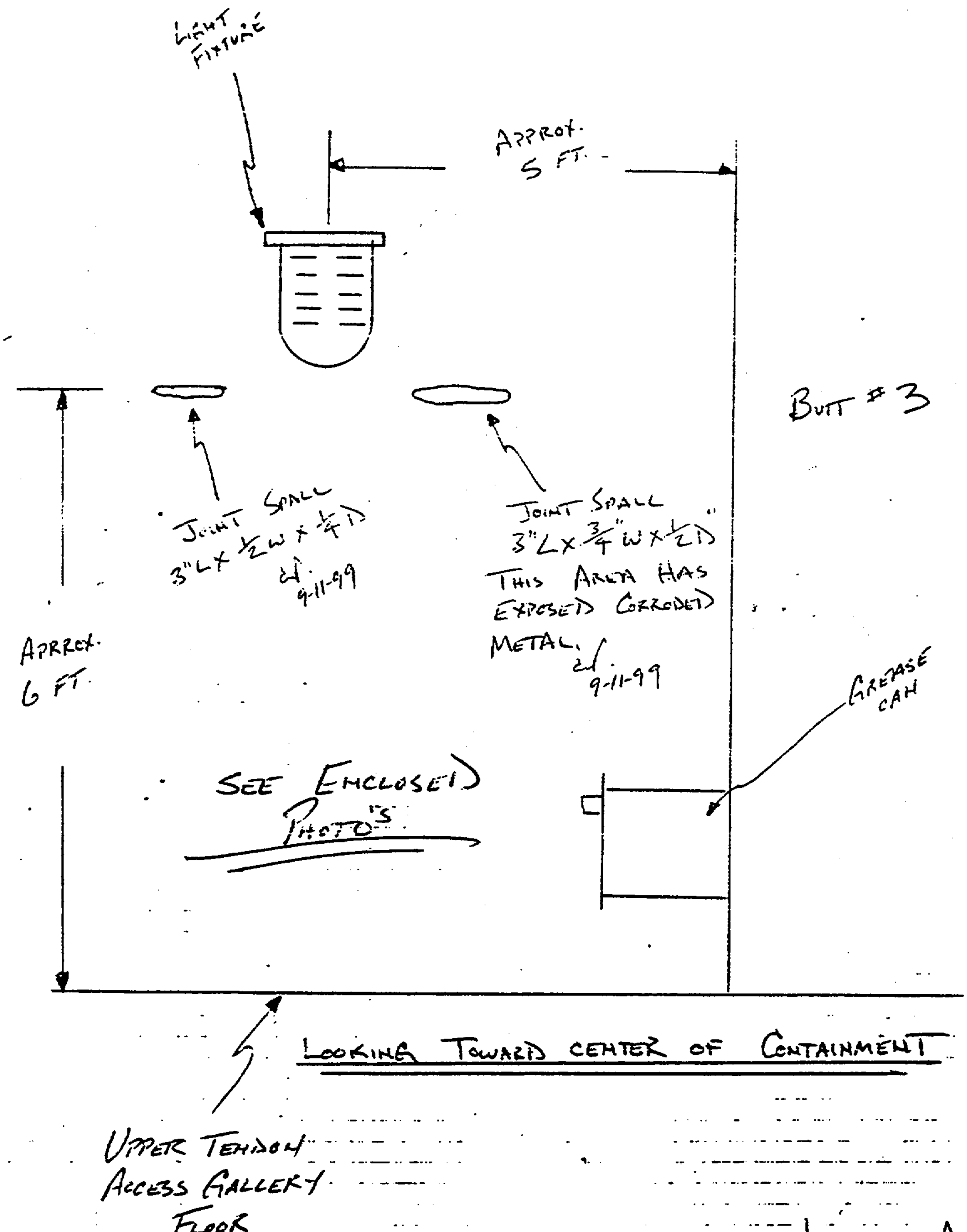
Buttress #3 to #4



Inside Area
Report "A"
SHT 5 of 9

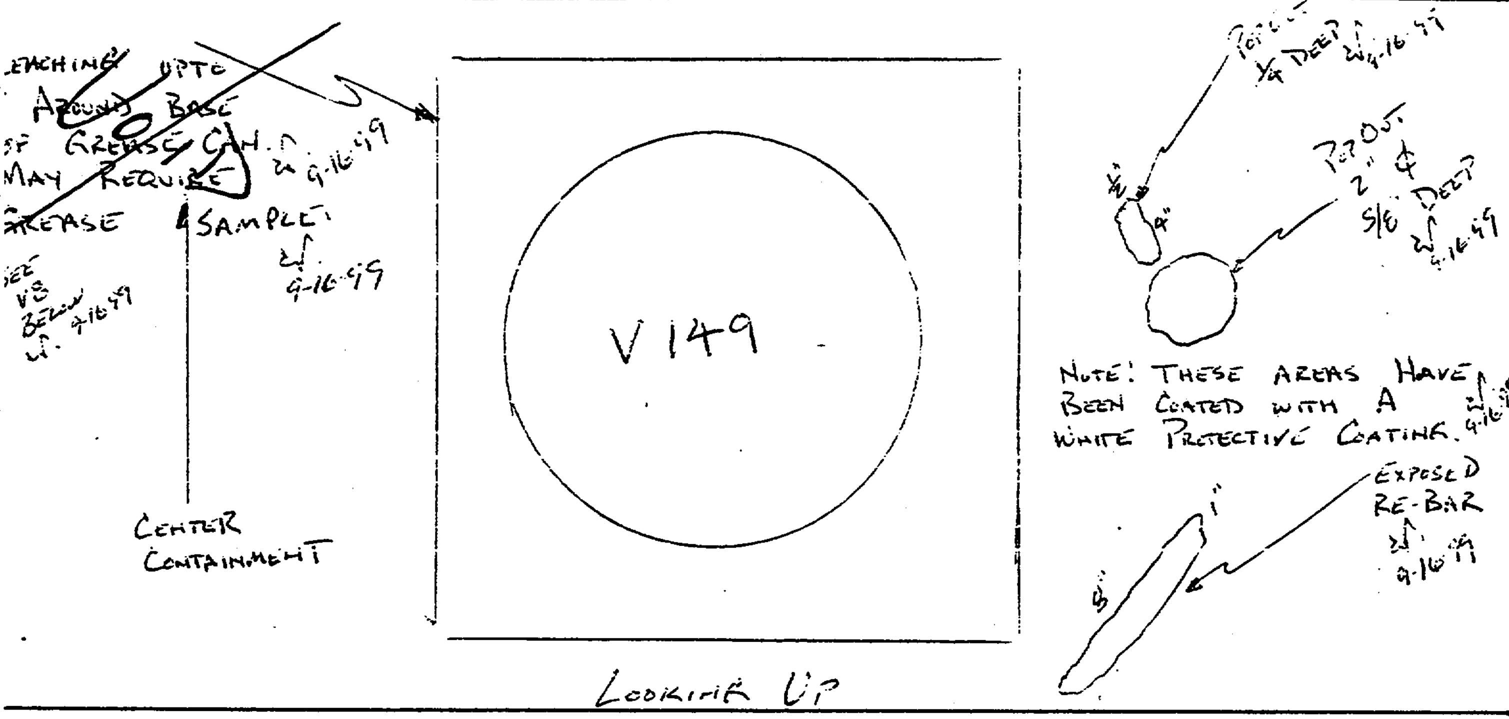
DATE 9-17-99

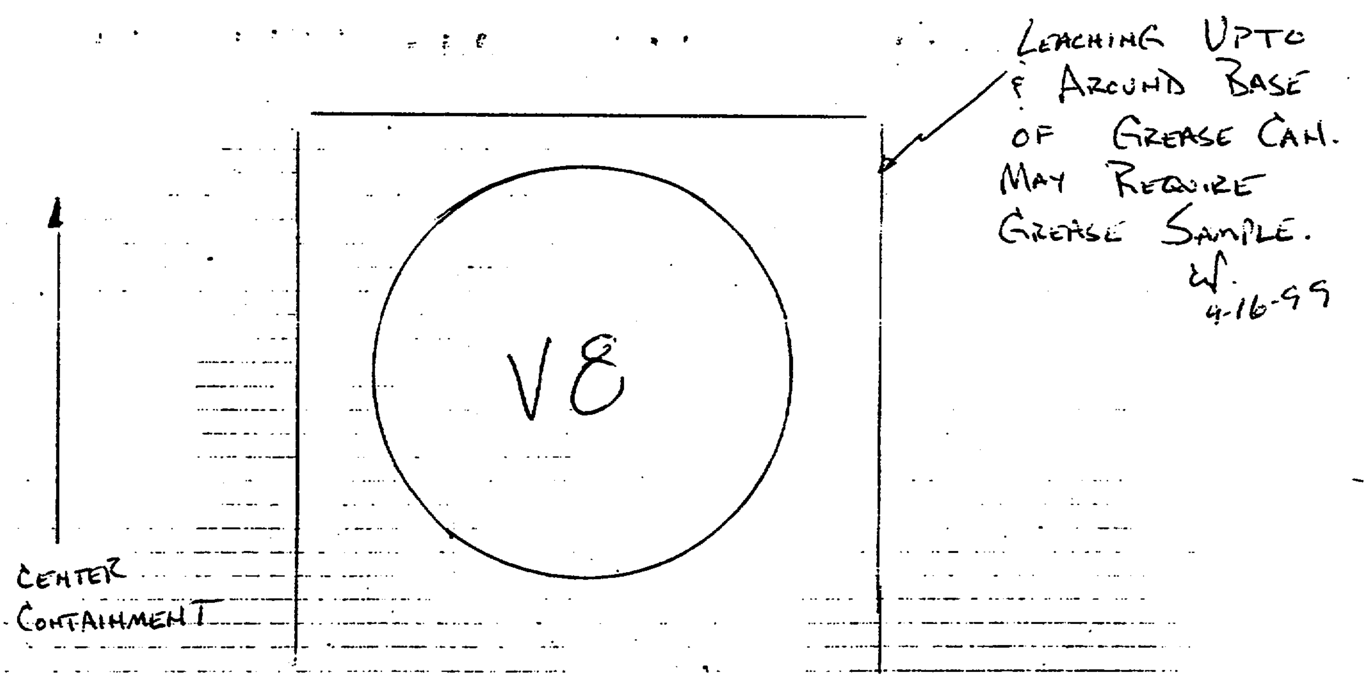
DATE 9-24-99

PSC
Precision Surveillance Corporation

VT-1C A214 of 424

Mat Foundation in Tendon Gallery





Inside Area Report "A"
SHT 6 OF 9

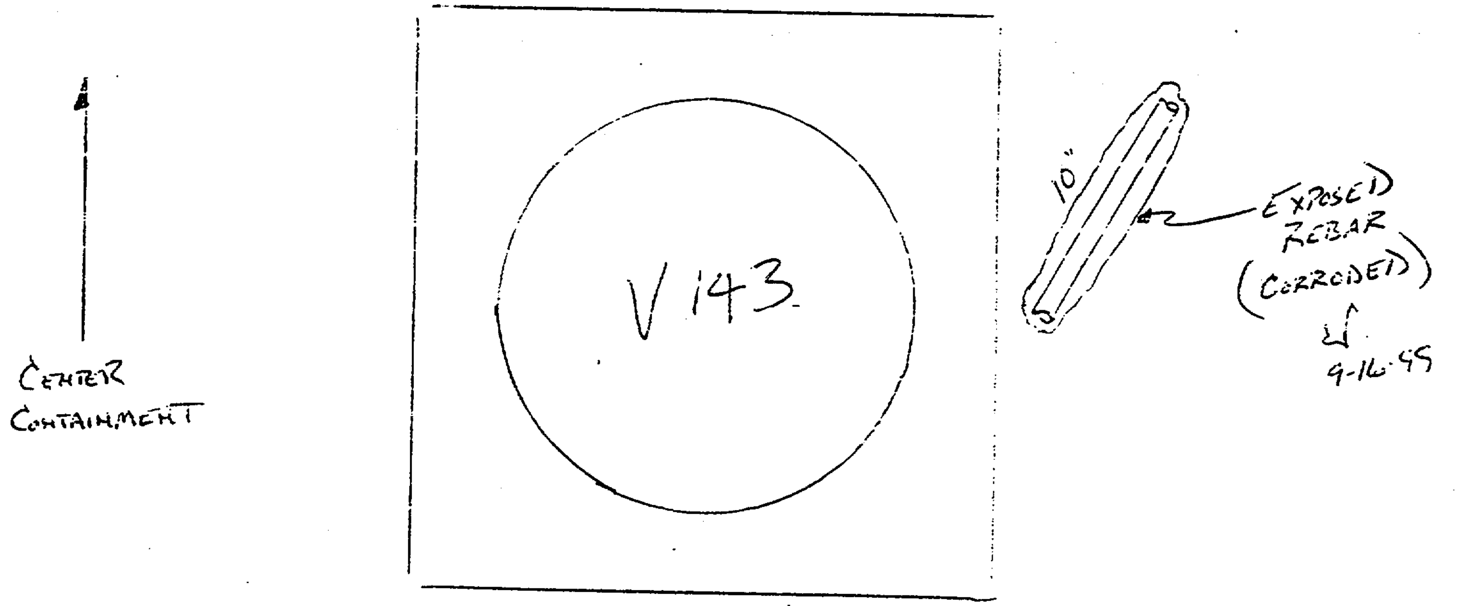
PREPARED BY [signature] DATE 9-17-99 | REVIEWED BY [signature] DATE 9-24-99

PSC
ecision Surveillance Corporation

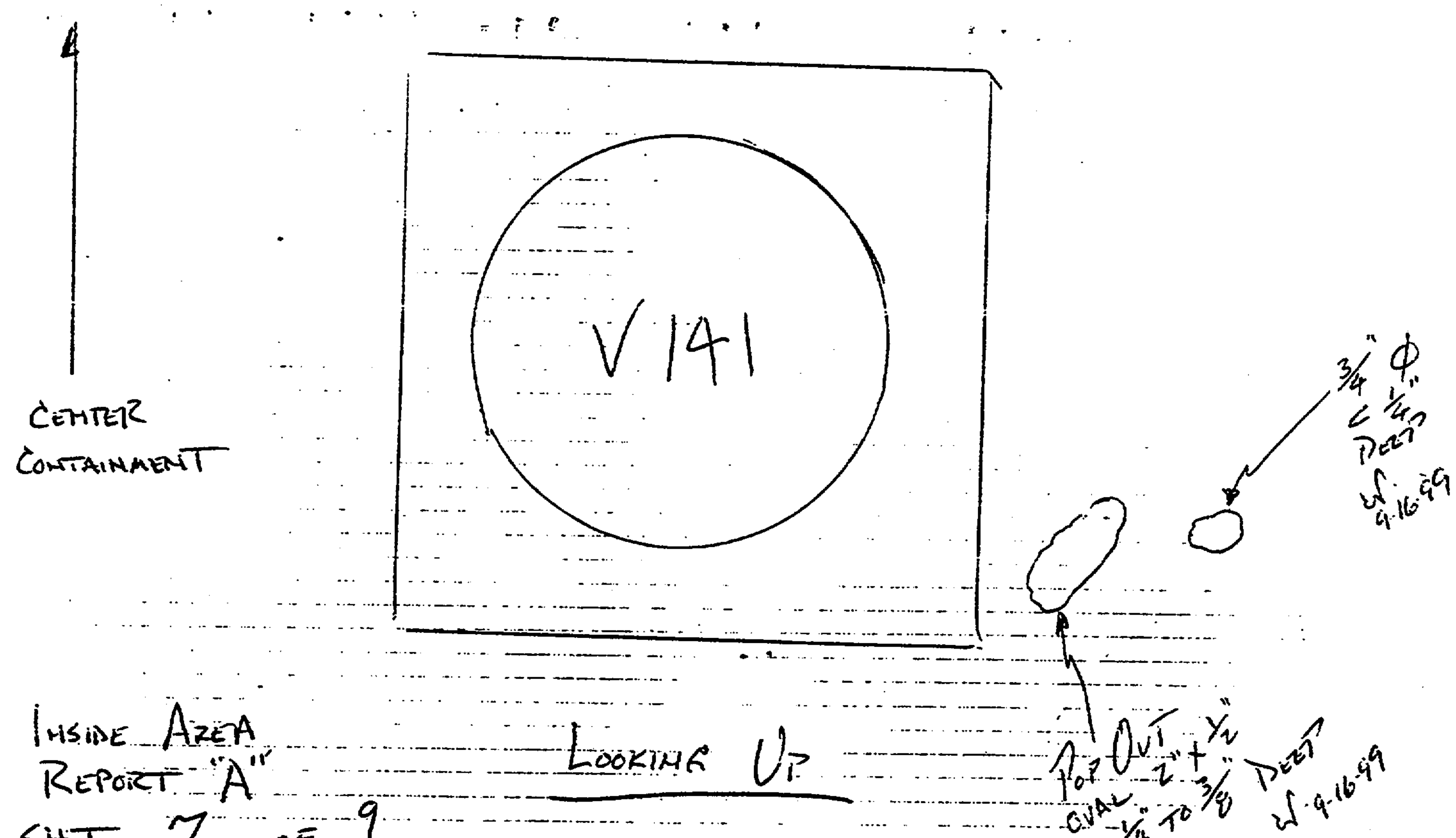
VT-1C A215-f424

MAT FOUNDATION

TENDON GALLERY



LOOKING UP



INSIDE AREA
REPORT "A"
SHT 7 OF 9

LOOKING UP

EPARED BY [signature] DATE 9-17-99 | REVIEWED BY [signature] DATE 9-24-99

PSC

recision Surveillance Corporation

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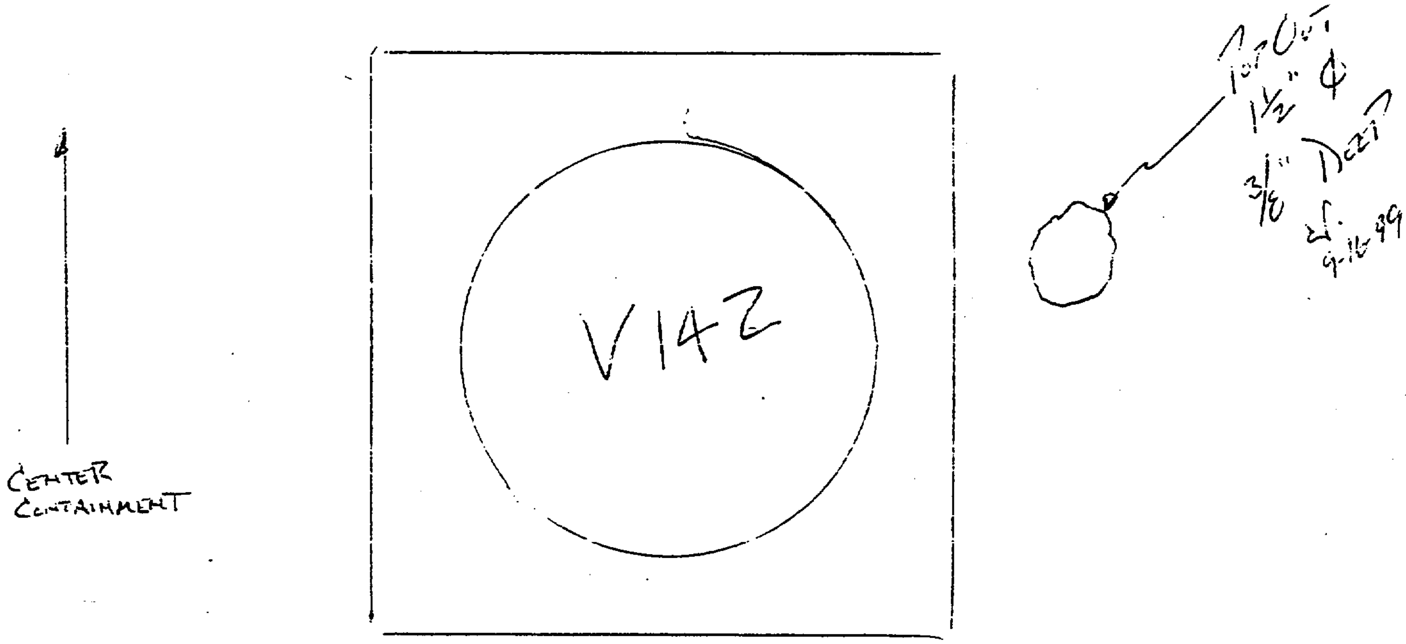
VT-1C

MAT FOUNDATION
TENDON GALLERY



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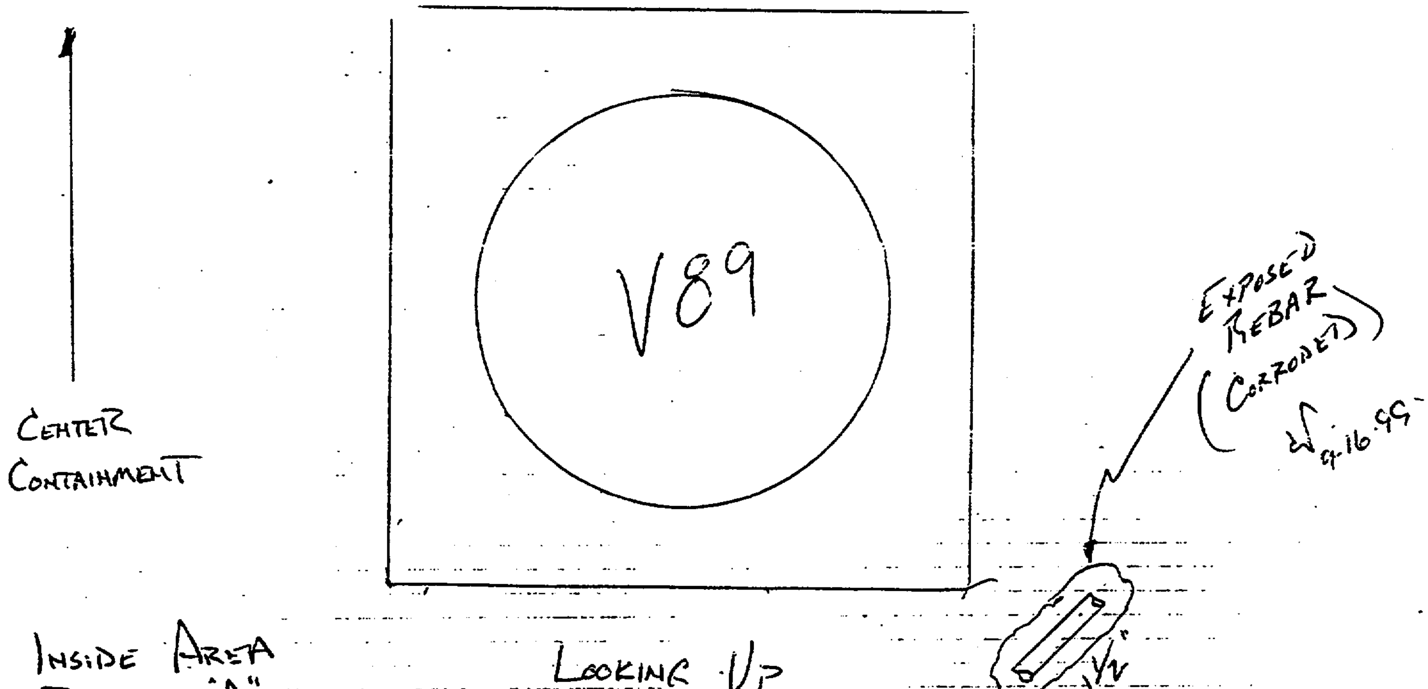


INSIDE AREA
REPORT "A"

LOOKING UP

SHT 8 OF 9

REPARED BY [signature] DATE 9-17-99 | REVIEWED BY [signature] DATE 9-24-99

PSC
recision Surveillance Corporation

VT-3C A217 of 424
MAT FOUNDATION
TENDON GALLERY

CONT. FROM SHT 3 OF 9 REPORT "A"
MAT FOUNDATION IN TENDON GALLERY.

REF. SECT. 4-4, SECT. 5-5, & SECT. 6-6 OF DRAWING E-421-006 - 6" SCH 40 PIPE THAT SETS INBOARD FROM TENDON SLEEVE & BEARING PL HAS BEEN GROUTED. OVER THESE AREAS HAVE SIGNS OF GROUT DEGRADATION, LEACHING & EXPOSED METAL.
[initials] 9-16-99

INSIDE AREA
REPORT "A"
SHT 9 OF 9

REPARED BY [signature] DATE 9-17-99 | REVIEWED BY [signature] DATE 9-24-99

REPORT "B"

OUTSIDE AREAS

ENCLOSURE 6
Data Sheet 10
General Containment Inspection Results

ef 9-9-99

~~Mat Foundation in Tendon Gallery~~

REPORT "B" INCLUDES INSPECTIONS PERFORMED FROM THE GROUND, ROOF TOPS, LADDERS, SWING STAGES AND THE TOP OF CONTAINMENT BLDG. DOME. ef 9-9-99

Tendon Grease Caps

AT THE TIME THIS REPORT WAS CLOSED GREASE LEAK REPAIRS WERE ONGOING. ef 9-17-99

Buttress 1 to 2

NO CRACKS >.015", NOTE: THERE ARE SEVERAL AREAS OF GROUT OVERLAY IN THIS AREA MOSTLY @ POUR LINES. GROUT IN THIS AREA IS STILL INTACT SHOWING SIGNS OF MINOR DEGREDATION. ef 9-9-99

Buttress 2 to 3

NO CRACKS >.015", NOTE: SEE SHT 3 OF 7 OF REPORT "B" FOR VT-1C SKETCH OF SUSPECT INDICATIONS REQUIRING ENGINEERING EVALUATION. ALSO POUR LINES HAVE BEEN GROUTED & GROUT SHOWS SIGNS OF DEGRADATION. ef 9-9-99

Buttress 3 to 4

SEE VT-1C SKETCH SHT 4 OF 7 & SHT 5 OF 7 FOR AREAS REQUIRING ENGINEERING EVALUATION. ALSO POUR LINES HAVE BEEN GROUTED & AREAS SHOW SIGNS OF DEGRADATION. ef 9-9-99

The areas of cracking shown on Sht 5B will be reexamined during Period 8 (30th Year) to assure no active degradation mechanism exists. Procedure 1301-9.1 will be revised to address. Repairs will be considered at that time if cracks do not remain stable. [signature] 11/11/99

Cognizant Mech/Struct Engineer
Reviewed By: [signature] ☆ Date: 9/24/99

Performed By: [signature] Date: 9-17-99

☆ Conditions identified herein indicate some degradation of concrete on exterior containment. However, the findings have been reviewed & no impairment found which would cause loss of containment safety function or structural integrity. ETTS No. 24923 generated to monitor/repair, as part of Mtce Rule. [signature] 9/24/99

OUTSIDE AREAS
REPORT "B"
SHT 1 OF 7

A219 of 424

Buttress 4 to 5 SEE SHT 6 OF 7 OF REPORT "B" FOR VT-1C SKETCH FOR AREA REQUIRING ENGINEERING EVALUATION. VERY LITTLE GROUT OVERLAY BETWEEN BUTT # 4 & # 5 AND IT IS IN FAIRLY GOOD CONDITION. ~~9-9-99~~ 9-14-99 9-14-99

Buttress 5 to 6 AT LOCATION APPROX. 12' UP FROM EQUIP. HATCH ROOF & BUTT 5 & 6 A SECTION OF GROUT OVERLAY APPROX. 2' x 5' IS MISSING. SEE ENCLOSED PHOTO. ALSO POUR LINES & VARIOUS AREAS HAVE GROUT OVERLAY THAT SHOWS SIGNS OF MINOR DEGRADATION. 9-9-99 (SEE ENCLOSED PHOTO'S)

Buttress 6 to 1 SEE SHT 7 OF 7 OF REPORT "B" FOR VT-1C SKETCH FOR AREAS REQUIRING ENGINEERING EVALUATION. VERY LITTLE GROUT OVERLAY BETWEEN BUTT 6 & 1 AND IT IS IN FAIRLY GOOD CONDITION 9-15-99

Dome Area BOTTOM OF RING GIRDER UP AND OVER DOME HAS SEVERAL AREAS WERE GROUT OVERLAY IS CHIPPED, CRACKED, AND FALLING OFF. A MORE EXTENSIVE EXAMINATION OF DOME GREASE CAN POCKETS AND FACE OF RING GIRDER WILL NEED TO BE MADE FROM SWING STAGES AND WITH TRANSIT IF REQUIRED. ALSO COVERS ON TOP / VERT. (OVER)

Cognizant Mech/Struct Engineer Reviewed By: [signature] Date: 9-24-99

Performed By: [signature] Date: 9-17-99

GREASE CANS WILL REQUIRE REMOVAL FOR AREAS AROUND GREASE CANS. 9-15-99
(SEE ENCLOSED DOME PHOTO'S)

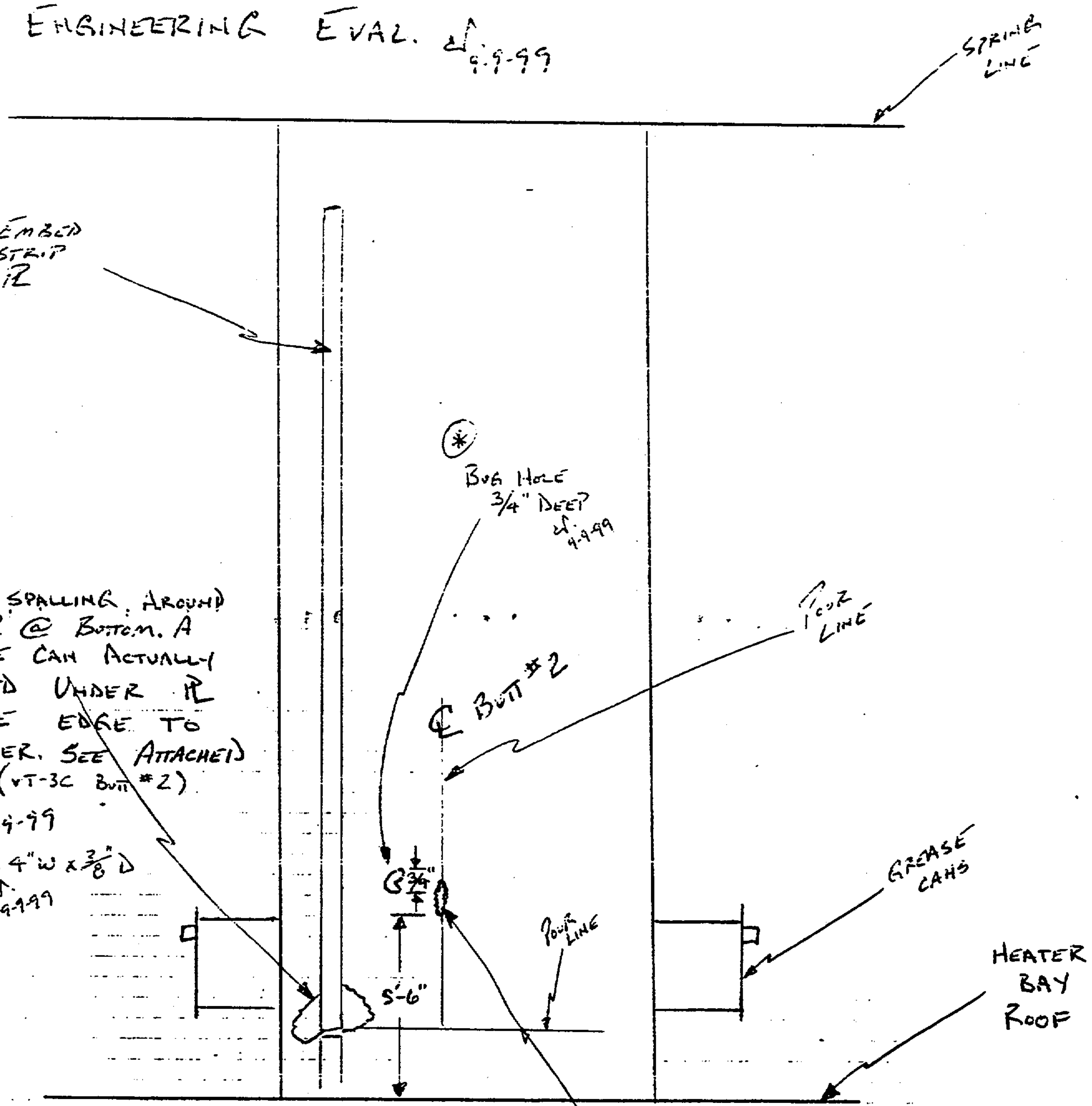
OUTSIDE AREAS
REPORT "B"
SHT 7 OF 7

PSC
Precision Surveillance Corporation

A220 of 424

VT-1C
Buttress 2 to 3

(*) Suspect Indications Requiring Engineering Eval. [initials] 9-9-99



(*) Concrete spalling around embed PL @ bottom. A steel rule can actually be slipped under PL from one edge to the other. See attached picture. (VT-3C Butt #2) [initials] 9-9-99

Dim's 6"H x 4"W x 3/8" D [initials] 9-9-99

(*) (Joint Spall) Seperation in Pour Line
1/4" W x 1 1/2" L x 1/2" D [initials] 9-9-99

Outside Areas
Report "B"
SHT 3 of 7

PREPARED BY [signature] DATE 9-9-99 | REVIEWED BY [signature] DATE 9/24/99

PSC

Precision Surveillance Corporation

VT - 1C

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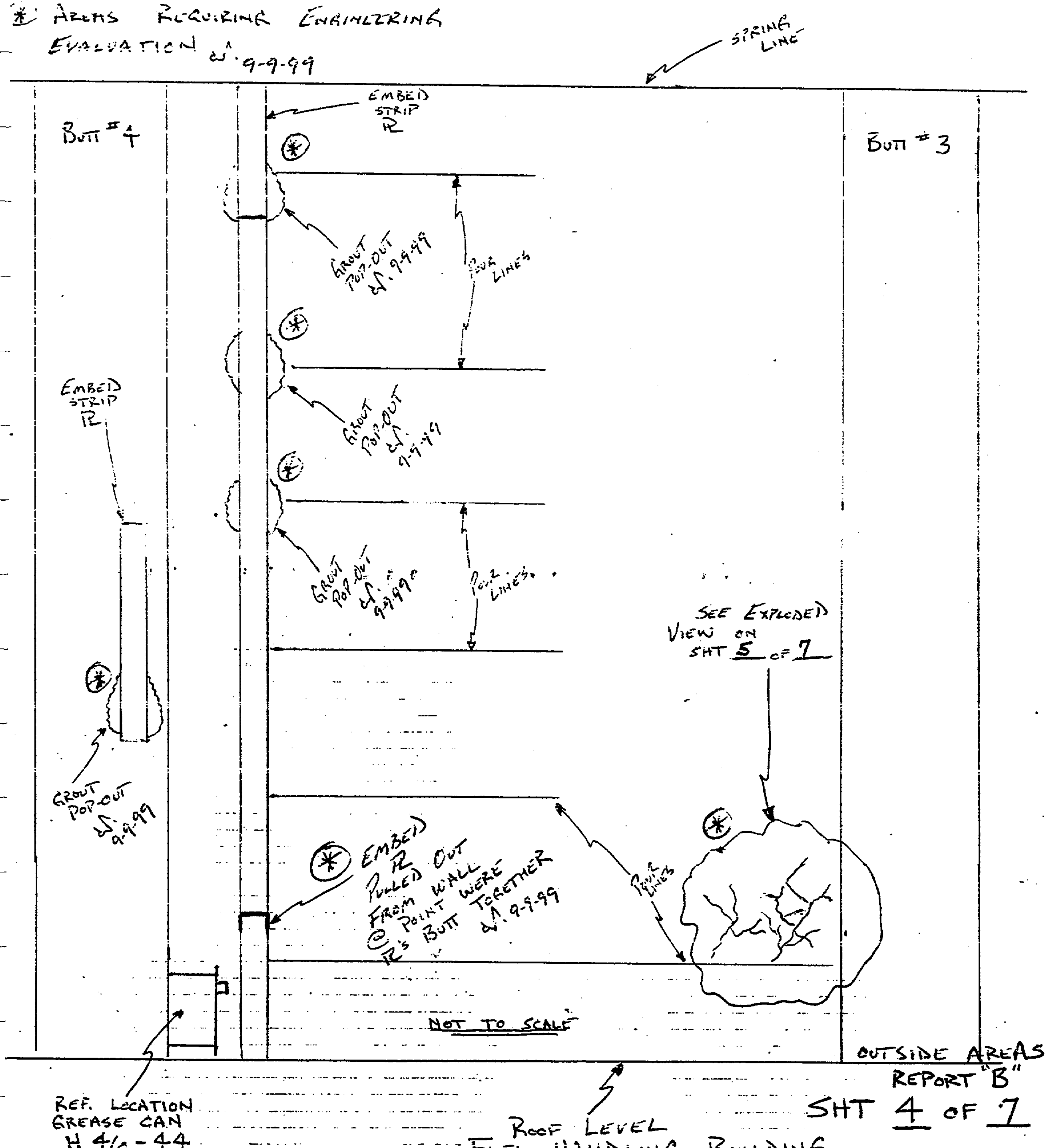
Buttress 3 to 4

(*) Areas Requiring Engineering Evaluation [initials] 9-9-99



Outside Areas Report "B"

Sht 4 of 7

PREPARED BY [signature] DATE 9-9-99 | REVIEWED BY [signature] DATE 9/24/99

Precision Surveillance Corporation

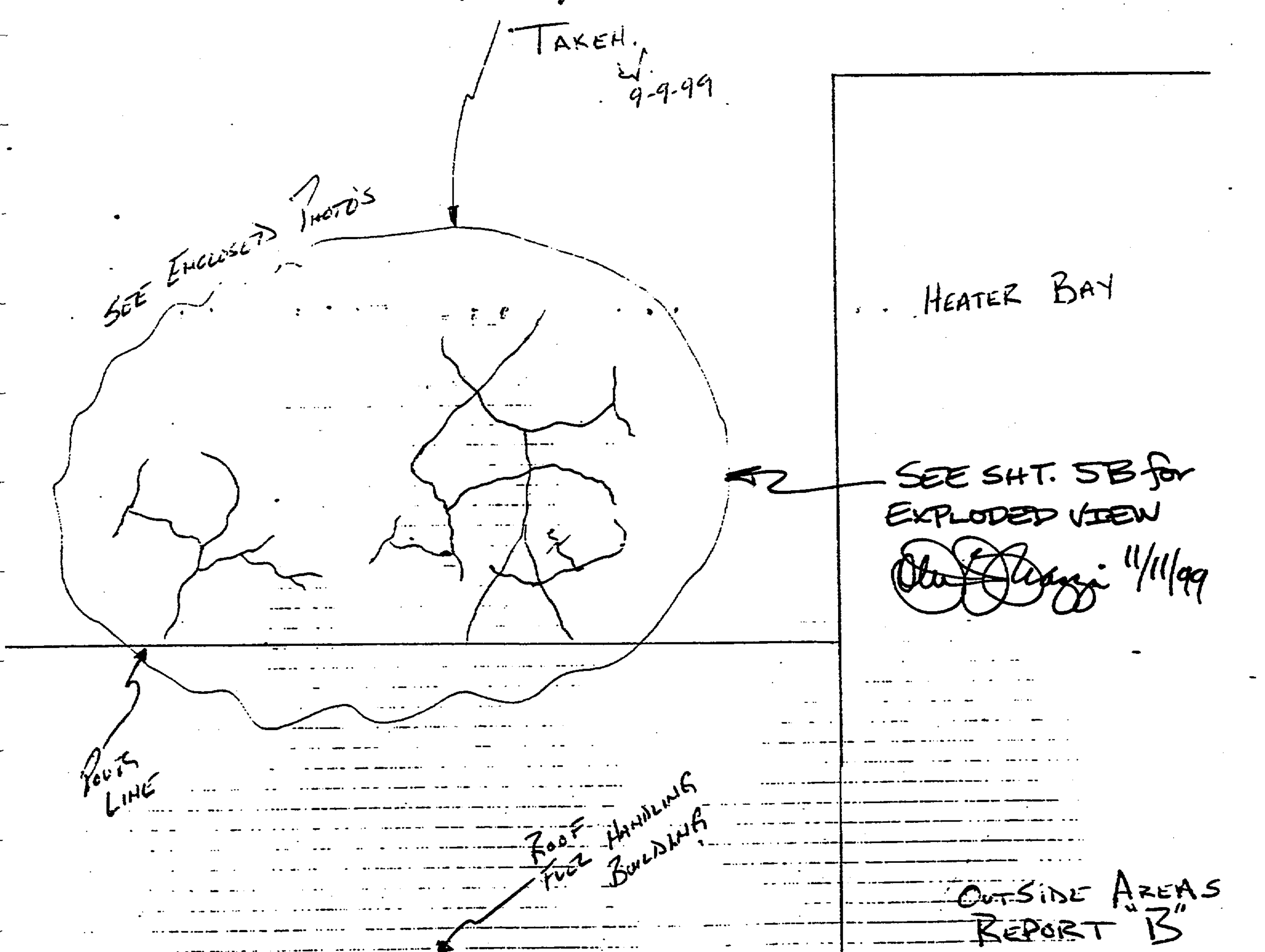
A222 of 424

VT-1C

EXPLODED VIEW FROM
SHT 4 OF 7 REPORT B

(*) AREA REQUIRING ENGINEERING
WHEN MEASUREMENTS ARE PROVIDED
9-9-99

(*) ACCESS WILL HAVE TO BE GAINED
FROM SPIDER (OR) SWING STAGE
FOR MEASUREMENTS (VT-1C) TO BE
TAKEN.
9-9-99



OUTSIDE AREAS
REPORT "B"
SHT 5 OF 7

REVIEWED BY DATE 9/24/99

PSC

recision Surveillance Corporation

VT-1C

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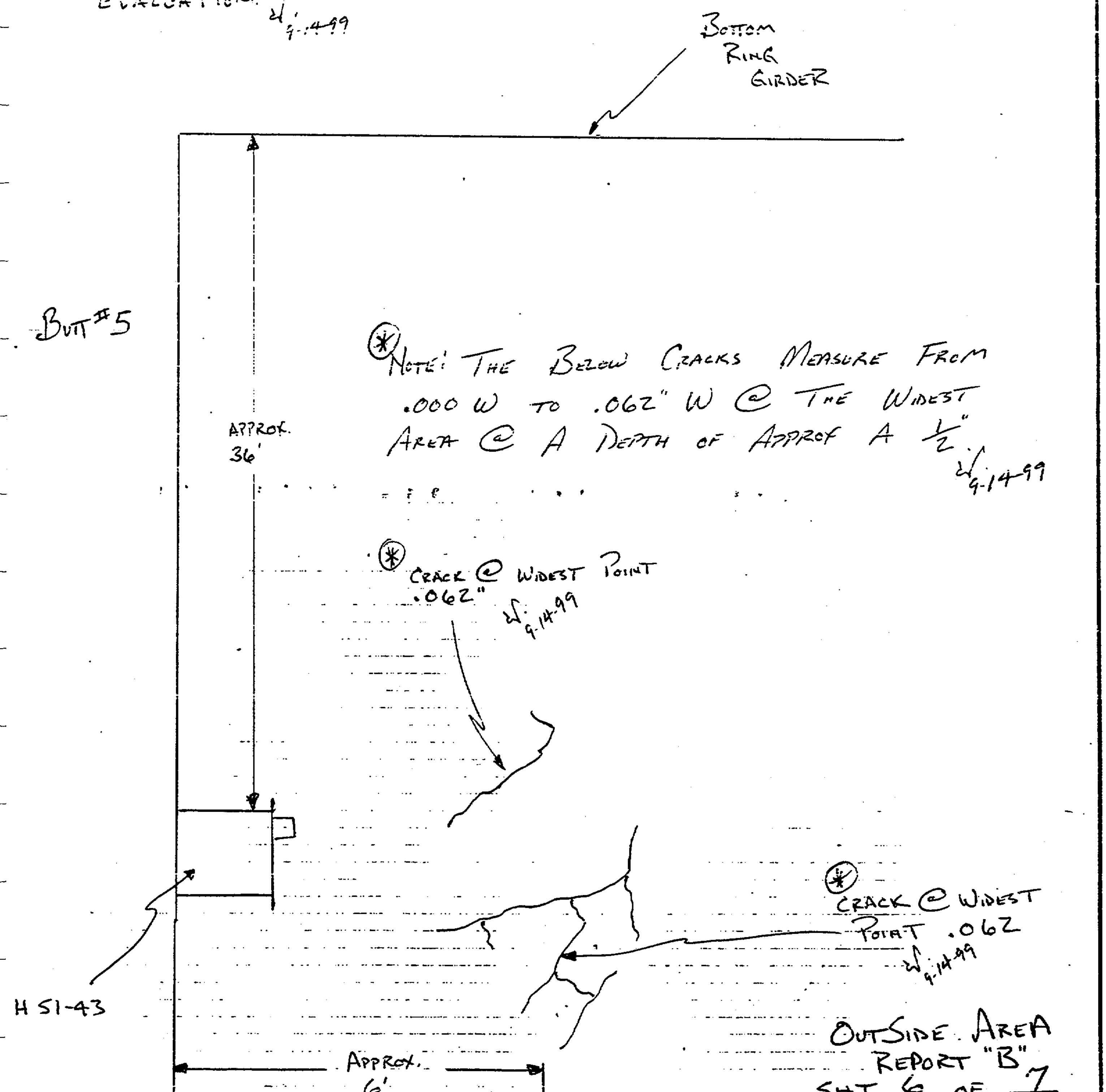
Butt # 4 to # 5

(*) Areas Requiring Engineering Evaluation. [initials] 9-14-99

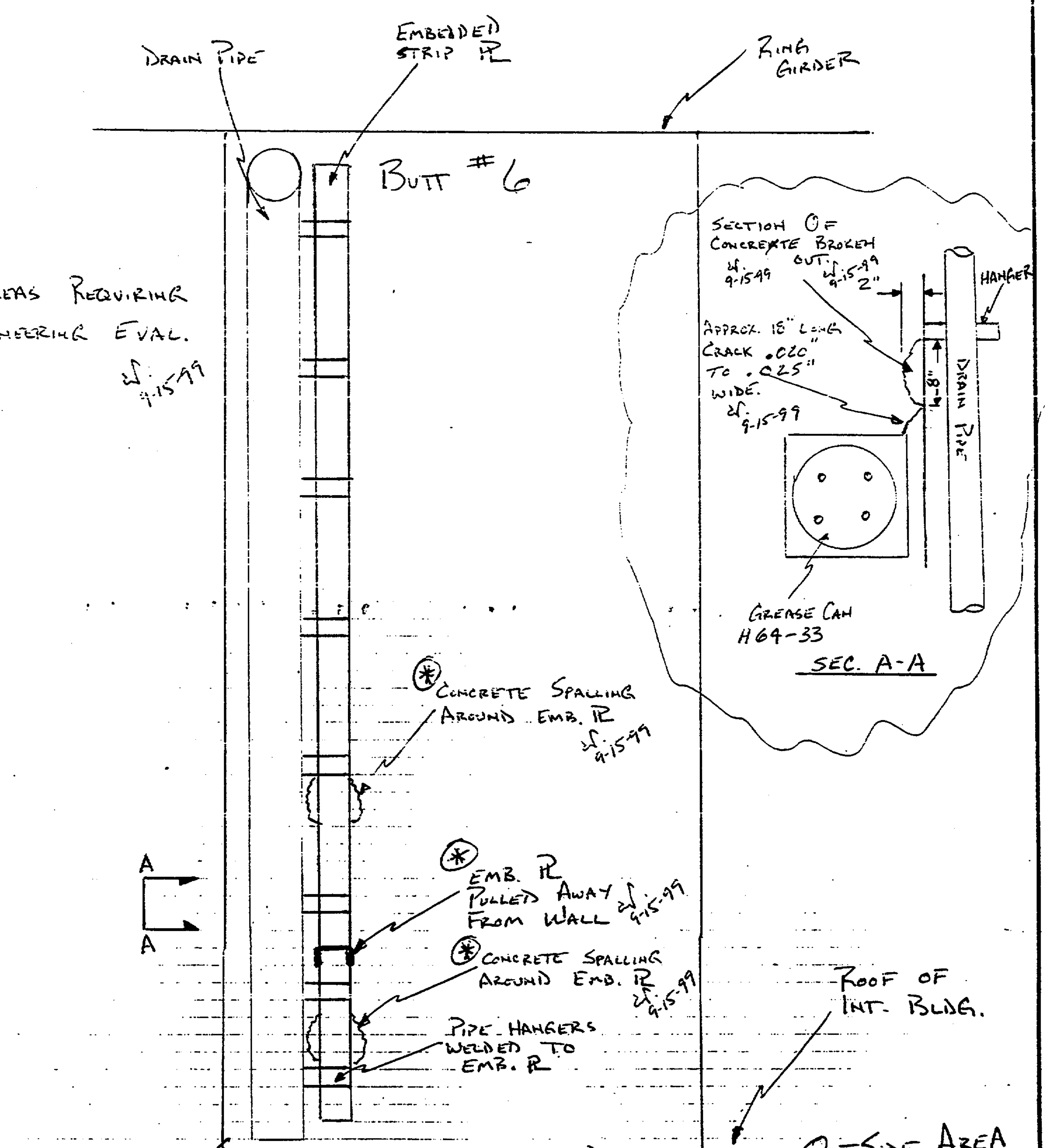


OutSide Area Report "B"
SHT 6 of 7

REPARED BY [signature] DATE 9-14-99 | REVIEWED BY [signature] DATE 9/24/99

PSC
Precision Surveillance Corporation

VT-1C
Butt # 6 to #1



(SEE ENCLOSED PHOTO'S)

OUTSIDE AREA
REPORT "B"
SHT 7 OF 7

PREPARED BY [signature] DATE 9-15-99 | REVIEWED BY [signature] DATE 9/24/99

PSC
Precision Surveillance Corporation

VT-1C ~~SKETCH~~ 10-1-99

BUTTRESS 3 TO 4

SAFETY RELATED

NON-SAFETY RELATED

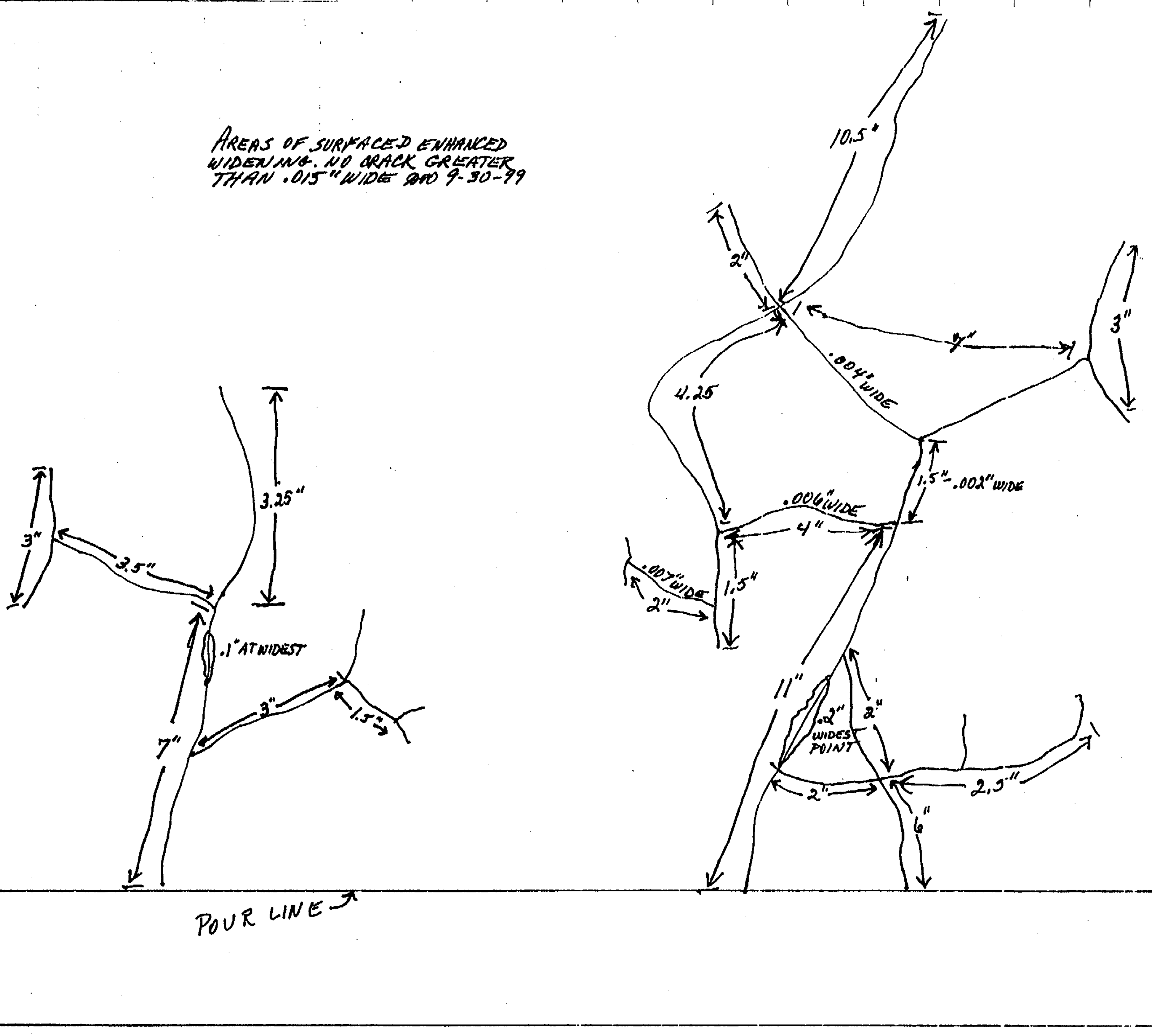
CALCULATION NO: A225/424

PAGE 5B OF 7

PREPARED BY [signature] DATE 10-1-99

REVIEWED BY [signature] DATE 12-2-99

AREAS OF SURFACED ENHANCED WIDENING. NO CRACK GREATER THAN .015" WIDE 9-30-99



~~Mat Foundation in Tendon Gallery~~ DPO 9-28-99

REPORT "A" INCLUDES INSPECTIONS PERFORMED FROM ELV. 327 TO CEILING OF INTERMEDIATE BLDG. DPO 9-28-99

Tendon Grease Caps

IN INTERMEDIATE BLDG. BUTTRESS 1 TO 2 AND BUTTRESS 6 TO 1 FROM ELEV. 327 TO CEILING NO INDICATIONS OF GREASE LEAKAGE OR DEFORMED END CAPS WERE FOUND. DPO 9-28-99

Buttress 1 to 2

ELEVATION 327' TO CEILING OF INTERMEDIATE BLDG. VT-3C PERFORMED AND NO SIGNS OF CONCRETE DEGRADATION FOUND. DPO 9-28-99

Buttress 2 to 3

N/A DPO 9-28-99

Buttress 3 to 4

N/A DPO 9-28-99

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/11/99

Performed By: [signature] Date: 9-28-99

A227 of 424

Buttress 4 to 5

~~N A~~ QPO 9-28-99

Buttress 5 to 6

~~N A~~ QPO 9-28-99

Buttress 6 to 1

ELEVATION 327 TO CEILING OF INTERMEDIATE BLDG VT-3C PERFORMED AND NO SIGNS OF CONCRETE DEGRADATION FOUND. QPO 9-28-99

Dome Area

~~N A~~ QPO 9-28-99

Cognizant Mech/Struct Engineer Reviewed By: [signature] Date: 11/11/99

Performed By: [signature] Date: 9-28-99

ENCLOSURE 6
Data Sheet 10
General Containment Inspection Results

~~Mat Foundation in Tendon Gallery~~ DPO 10-18-99

THIS REPORT INCLUDES INSPECTIONS PERFORMED FROM SPRINGLINE OF RING GIRDER AND

DOME AREA OF CONTAINMENT BUILDING. DPO 10-18-99

Tendon Grease Caps

THE FOLLOWING LIST OF GREASE CAPS SHOW SIGNS OF ACTIVE GREASE LEAKS – 24H51, D336 NW, V19, V83, V86,

V121, + V139. THE FOLLOWING LIST OF GREASE CAPS HAD OLD GREASE STAINS AROUND CONCRETE + WERE CLEANED, GREASE LEAKS DO

DPO 10-18-99

NOT ~~APPEAR~~ APPEAR ACTIVE AT PRESENT – NW QUADRANT D323, D324, D325, D330, D333, D340, D342, D344, D345, D226, D224, D228, D230, D231, D233, NE QUADRANT D312, D310, D309, 305, D306, D303, D106, D103, D111, D317, D320, D322, SE QUADRANT D303, D239, D240, D241, D242, D317, SW QUADRANT D333, D147, D146, D145, D136, D135, D134, D249, D248, D247

Buttress 1 to 2 OF RING GIRDER

GROUT OVERLAY CRACKED AND FALLING OFF. CLOSE UP EXAMINATION FOUND NO SIGNS OF DEGRADATION OR CRACKS GREATER THAN .015".

NOTE: SEE SHEET 1 OF 15 OF REPORT FOR VT-1C SKETCH OF AREA REQUIRING ENGINEERING EVALUATION.

Buttress 2 to 3 OF RING GIRDER

GROUT OVERLAY CRACKED AND FALLING OFF. CLOSE UP EXAMINATION FOUND NO SIGNS OF DEGRADATION OR CRACKS GREATER THAN .015".

NOTE: SEE SHEETS 2 AND 3 OF 15 OF REPORT FOR VT-1C SKETCH OF AREA REQUIRING ENGINEERING EVALUATION.

Buttress 3 to 4 OF RING GIRDER

GROUT OVERLAY CRACKED AND FALLING OFF. CLOSE UP EXAMINATION FOUND NO SIGNS OF DEGRADATION OR CRACKS GREATER THAN .015".

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/11/99

Performed By: [signature] Date: 10-18-99

Buttress 4 to 5 OF RING GIRDER

GROUT OVERLAY CRACKED AND FALLING OFF. CLOSE UP EXAMINATION FOUND NO SIGNS OF DEGRADATION OR CRACKS GREATER THAN .015".

NOTE: SEE SHEET 4 OF 15 OF REPORT FOR VT-1C SKETCH OF AREA REQUIRING ENGINEERING EVALUATION.

Buttress 5 to 6 OF RING GIRDER

GROUT OVERLAY CRACKED AND FALLING OFF. CLOSE UP EXAMINATION FOUND NO SIGNS OF DEGRADATION OR CRACKS GREATER THAN .015".

NOTE: SEE SHEETS 5,6,7,8 & 9 OF 15 OF REPORT FOR VT-1C SKETCHES OF AREAS REQUIRING ENGINEERING EVALUATION.

Buttress 6 to 1 OF RING GIRDER

GROUT OVERLAY CRACKED AND FALLING OFF. CLOSE UP EXAMINATION FOUND NO SIGNS OF DEGRADATION OR CRACKS GREATER THAN .015".

NOTE: SEE SHEETS 10 AND 11 OF 15 OF REPORT FOR VT-1C SKETCHES OF AREAS REQUIRING ENGINEERING EVALUATION.

Dome Area

TOP OF DOME HAS GROUT OVERLAY, SMALL PATCHES WHERE GROUT HAS BROKEN AWAY SHOW NO SIGNS OF DEGRADATION OR CRACKS GREATER THAN .015". RAIL PADS HAVE GROUT PATCHES CRACKED AND FALLING OFF - NO SIGNS OF DEGRADATION OR CRACKS GREATER THAN .015".

NOTE: SEE SHEETS 12, 13, 14 AND 15 OF 15 OF REPORT FOR VT-1C SKETCHES OF AREAS REQUIRING ENGINEERING EVALUATION.

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 11/11/99

Performed By: [signature] Date: 10-18-99

The attached data sheets reflect that the cosmetic grout overlay is falling off. This condition is of no consequence since the underlying concrete was examined and found not to be significantly weathered or deteriorating. No concrete cracks were found where the grout cover had come loose. Consideration for repair of the grout cover will be exercised during Period 8.

Of greater significance is the area located in the SE quadrant of the RB exterior above the spring line, where the cosmetic grout cover has fallen off and underlying rebar is exposed. This is an original construction disparity. Ted Noble, PE, independently examined this area. His report of findings, conclusions and recommendations are attached. No loss of structural integrity or safety function of containment is realized by this finding. However, Procedure 1301-9.1 will be revised to reexamine the area during Period 8 Tendon Surveillance. Consideration for repairs will be exercised at that time.

The concrete spalls identified herein are inconsequential. The concrete structure remains unaffected with regards to structural integrity, and will still perform its safety function. No active degradation mechanisms were found. These areas will be monitored/reexamined during the Period 8 Tendon Surveillance. Procedure 1301-9.1 will be revised accordingly. Consideration for repairs will be exercised at that time.

A construction joint above the spring line between D320NE and D321 NE was identified on page 10 as having a crack width of .018" (exceeds ACI 349.3R-96 crack width of .015"). No active degradation mechanism such as freeze-thaw cycling was evident in the area in question. The crack is of limited length and the containment structure will still perform its safety function without compromise to structural integrity. However, this area will be monitored/reexamined during Period 8 Tendon Surveillance to ensure the crack is stable. Procedure 1301-9.1 will be revised accordingly. Consideration for repairs will be exercised at that time.

John J Piazza, PE
11/11/99

10/15/99 RING GIRDER INSPECTION

I inspected a portion of the ring girder from the basket on Friday afternoon on request of Connie Brooks, PCS Contractor Supervisor. One area of exposed rebar was identified on the East side, just below the dome tendon pockets.

Description:

A length of hoop rebar, approximately 8 feet long, is partially exposed (about 1 " in width, less than the bar diameter). The cover concrete along this length varies from 3/4" to 1", significantly less than specified (ACI 318 specifies 2"). As a result, incomplete concrete consolidation was attained between the bar and the formwork. This is an original construction condition.

The concrete surrounding the area is in excellent condition with no indications of cracking. spalling or popouts as a result of the exposed rebar. The bar has minor corrosion with no significant loss of bar diameter. There is no rust staining of the concrete surfaces beneath the area.

When interviewed, Dan O'Shea, the Contractors QV, stated that no other instance of this type has been found to date and that no cases of rust staining have been documented.

Conclusions:

1. Lack of rebar cover is a condition resulting from original construction. There was no active concrete degradation indications. Rebar loss of material in not significant.
2. The location of the hoop bar is not loaded by the post-tension system.
3. This is an isolated condition, based on a nearly complete tendon surveillance.

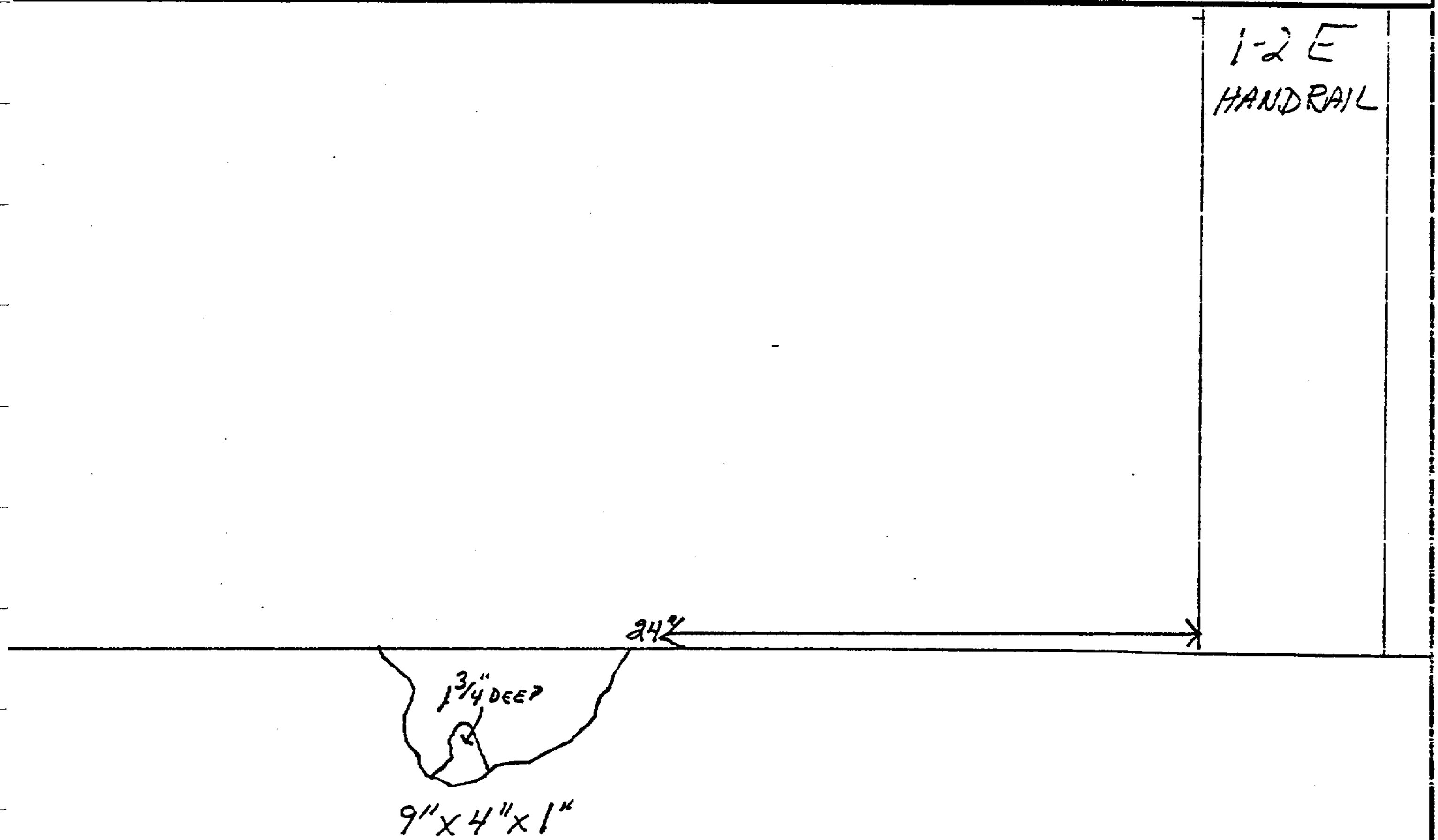
Recommendations:

1. ✱ Note the as-found condition in detail in the surveillance report. Preliminary Engineering review indicates no repair is required.
2. Since the condition does not indicate currently active degradation mechanisms, no concrete repair or rebar coating is indicated.
3. Note for re-inspection at next tendon surveillance (5 years).

Ted Noble 10/16/99

✱ The undersigned has reviewed the "As-Found" details (page 2 of 15). Based on the measurements found, the details are bounded by the evaluation performed above. The undersigned agrees with the conclusions & recommendations stated above. Procedure 1301-9.1 to be revised to reinspect @ 30th Year Surveillance. [signature] 11/11/99

PSC Precision Surveillance Corporation	VT-1C BETWEEN BUTT. 1 & 2	CALCULATION NO: A232 of 424
	SAFETY RELATED / NON-SAFETY RELATED	PAGE 1 OF 15



DOME TENDON POCKETS

D125
NE

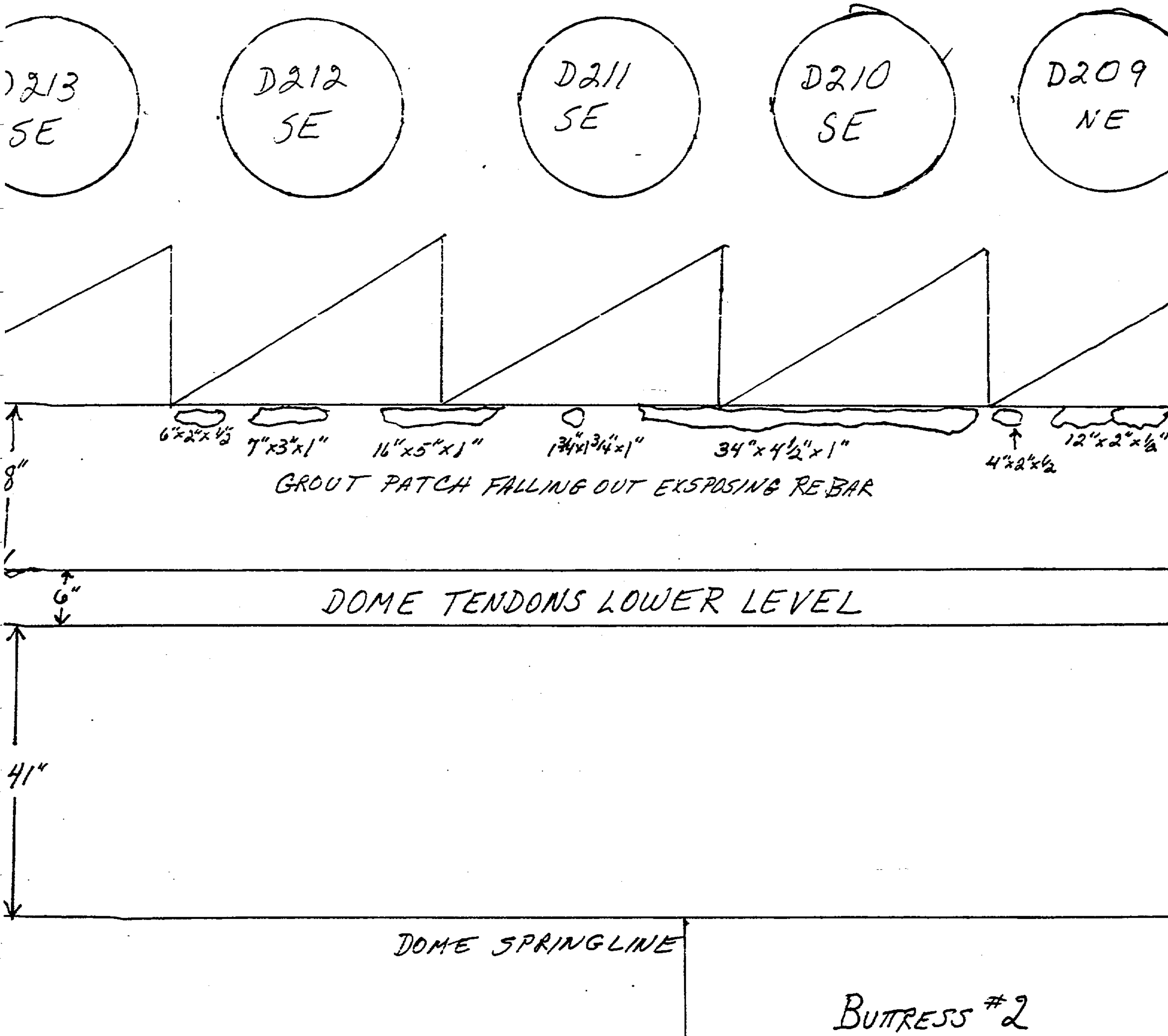
PREPARED BY	DATE 10-18-99	REVIEWED BY	DATE 12-2-99

PSC
Precision Surveillance Corporation

VT-1C BETWEEN BUTT. # 2 TO 3

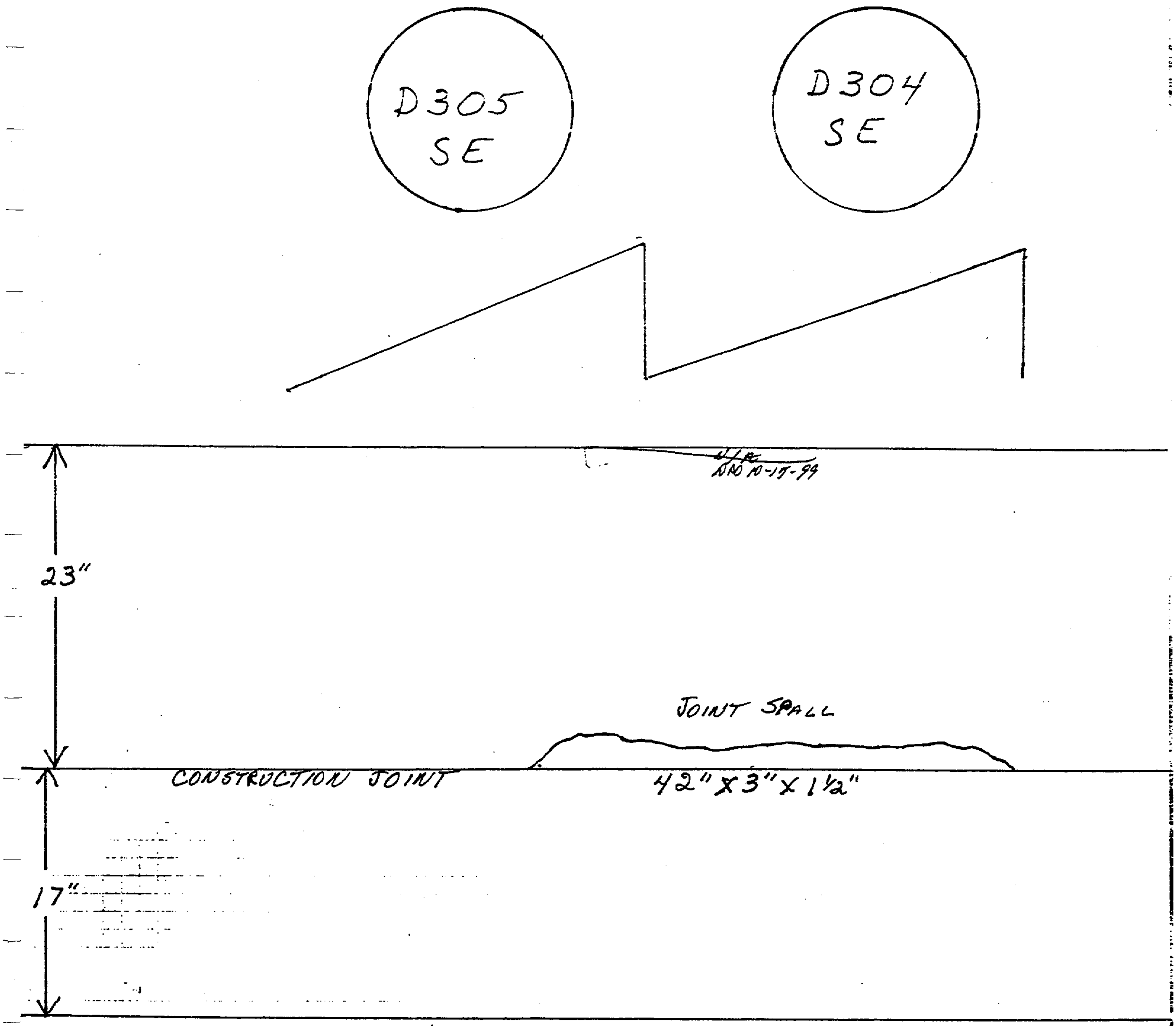
CALCULATION NO: A233 of 424

SAFETY RELATED | NON-SAFETY RELATED | PAGE 2 OF 15



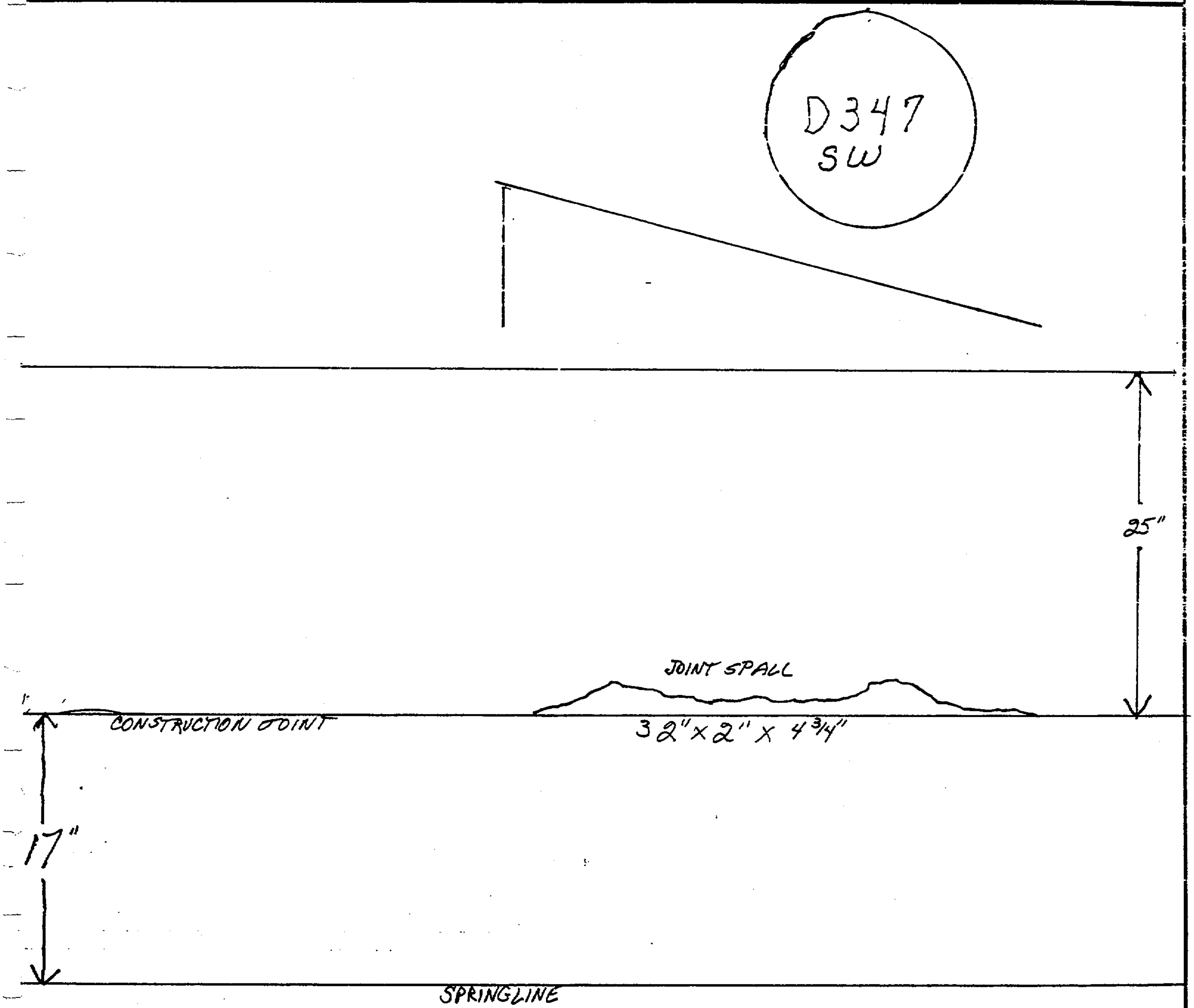
PREPARED BY Daniel P. [signature] DATE 10-18-99 | REVIEWED BY H. T. Hendrikson DATE 12-2-99

PSC Precision Surveillance Corporation	VT-1C BETWEEN BUTT.# 2 TO 3		CALCULATION NO: A234.1 424
	SAFETY RELATED	NON-SAFETY RELATED	PAGE 3 OF 15



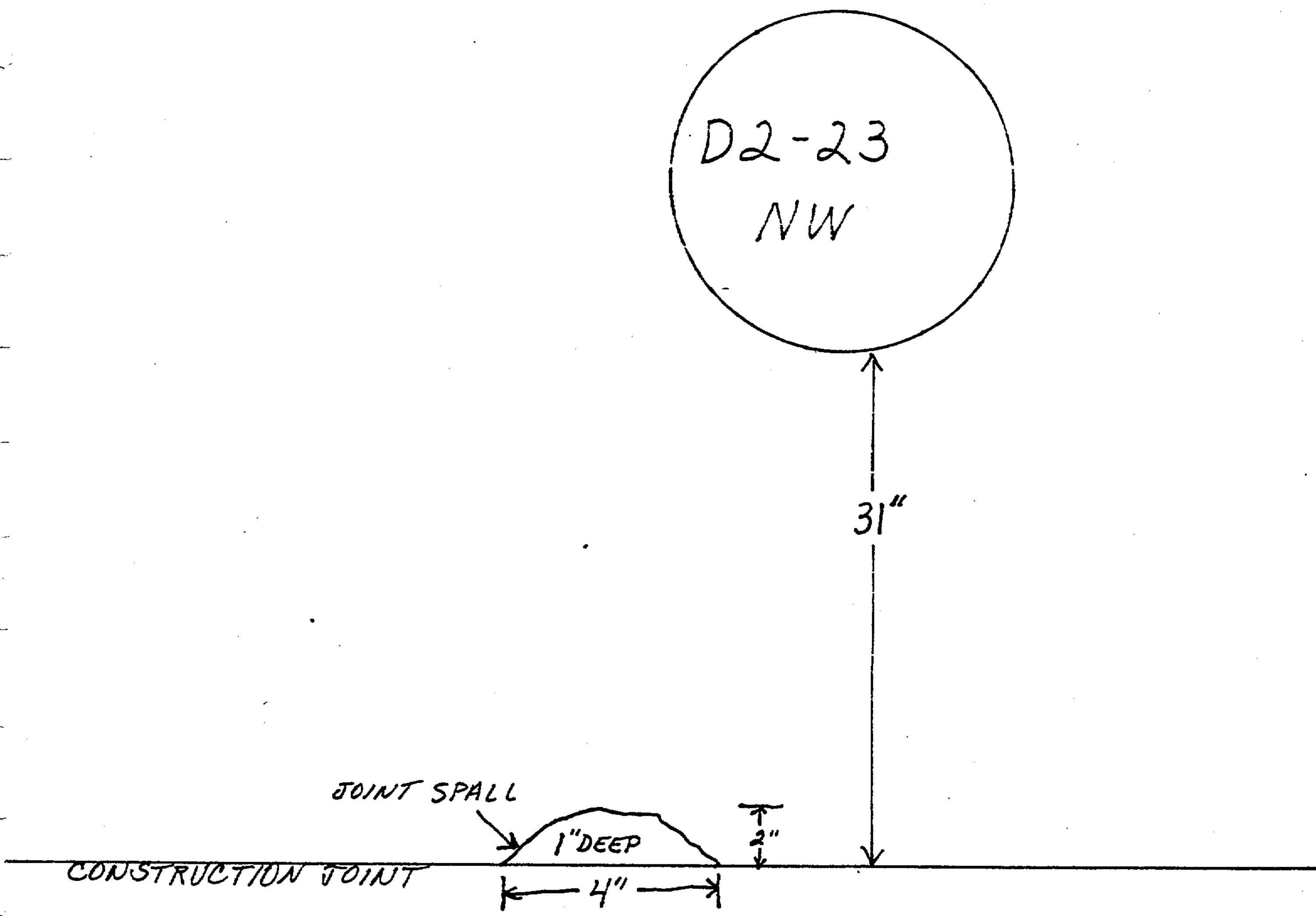
PREPARED BY [signature]	DATE 10-19-99	REVIEWED BY H.F. Hendrickson	DATE 12-2-99

PSC Precision Surveillance Corporation	VT-1C BETWEEN BUTT. # 4 TO 5				CALCULATION NO: A235 of 424
		SAFETY RELATED		NON-SAFETY RELATED	PAGE 4 OF 15



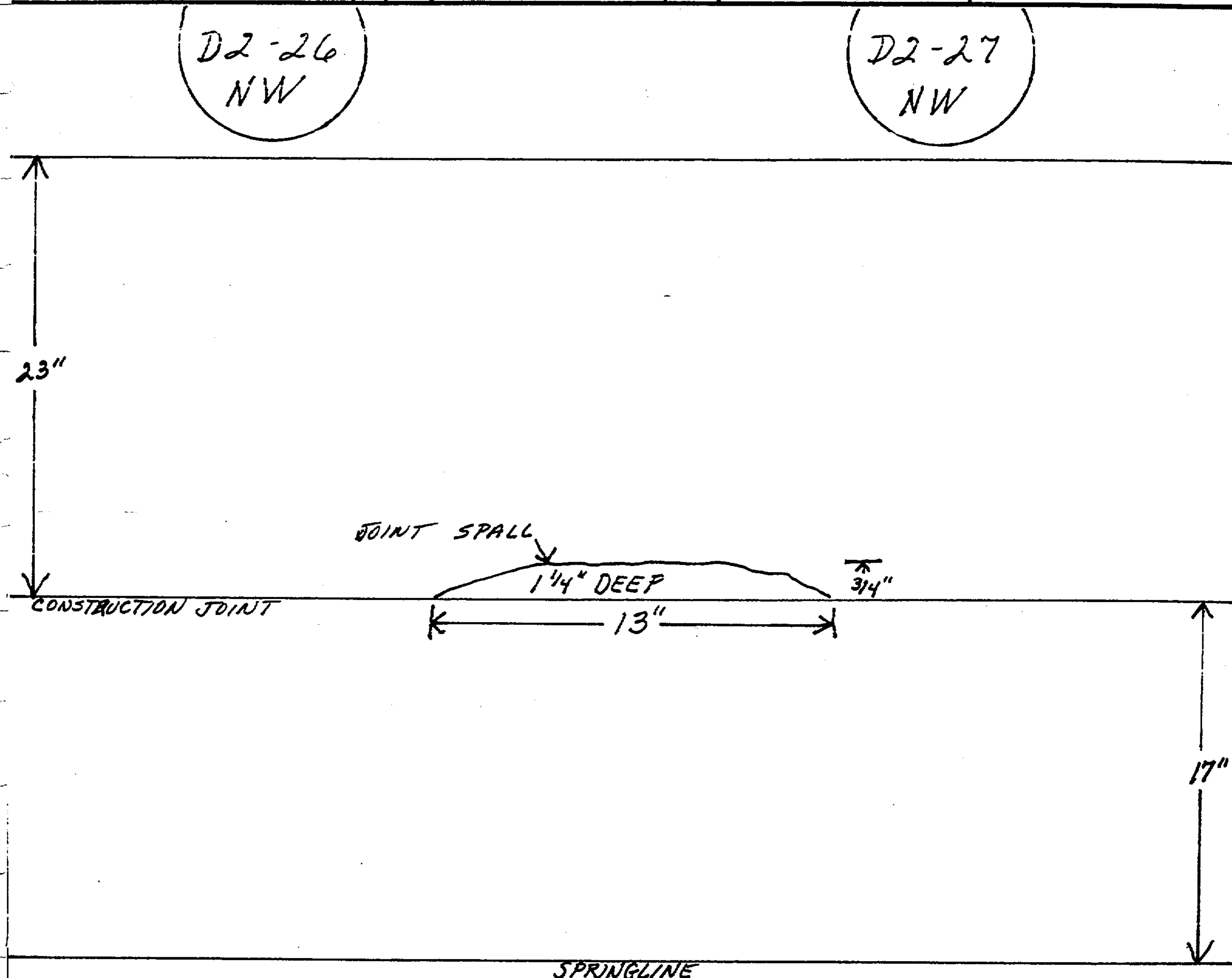
PREPARED BY [signature]	DATE 10-18-99	REVIEWED BY H. F. Hendrickson	DATE 12-2-99

PSC Precision Surveillance Corporation	VT-1C Between Buttress 5 to 6	CALCULATION NO: A236 of 424
	SAFETY RELATED | NON-SAFETY RELATED	PAGE 5 OF 15



PREPARED BY [signature] DATE 10-18-99 REVIEWED BY H. F. Hendrikson DATE 12-2-99

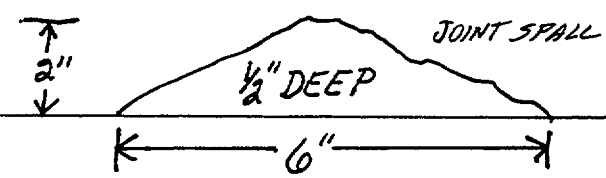
PSC Precision Surveillance Corporation	VT-1C BETWEEN BUTTRESS 5 TO 6	CALCULATION NO: A237J424
	SAFETY RELATED / NON-SAFETY RELATED	PAGE 6 OF 15



PREPARED BY [signature] DATE 10-18-99 REVIEWED BY H. L. Hendricksen DATE 12-2-99

PSC Precision Surveillance Corporation	VT-1C BETWEEN BUTTRESS 5 TO 6				CALCULATION NO: A238 of 424
		SAFETY RELATED		NON-SAFETY RELATED	PAGE 7 OF 15

D3-49
NW



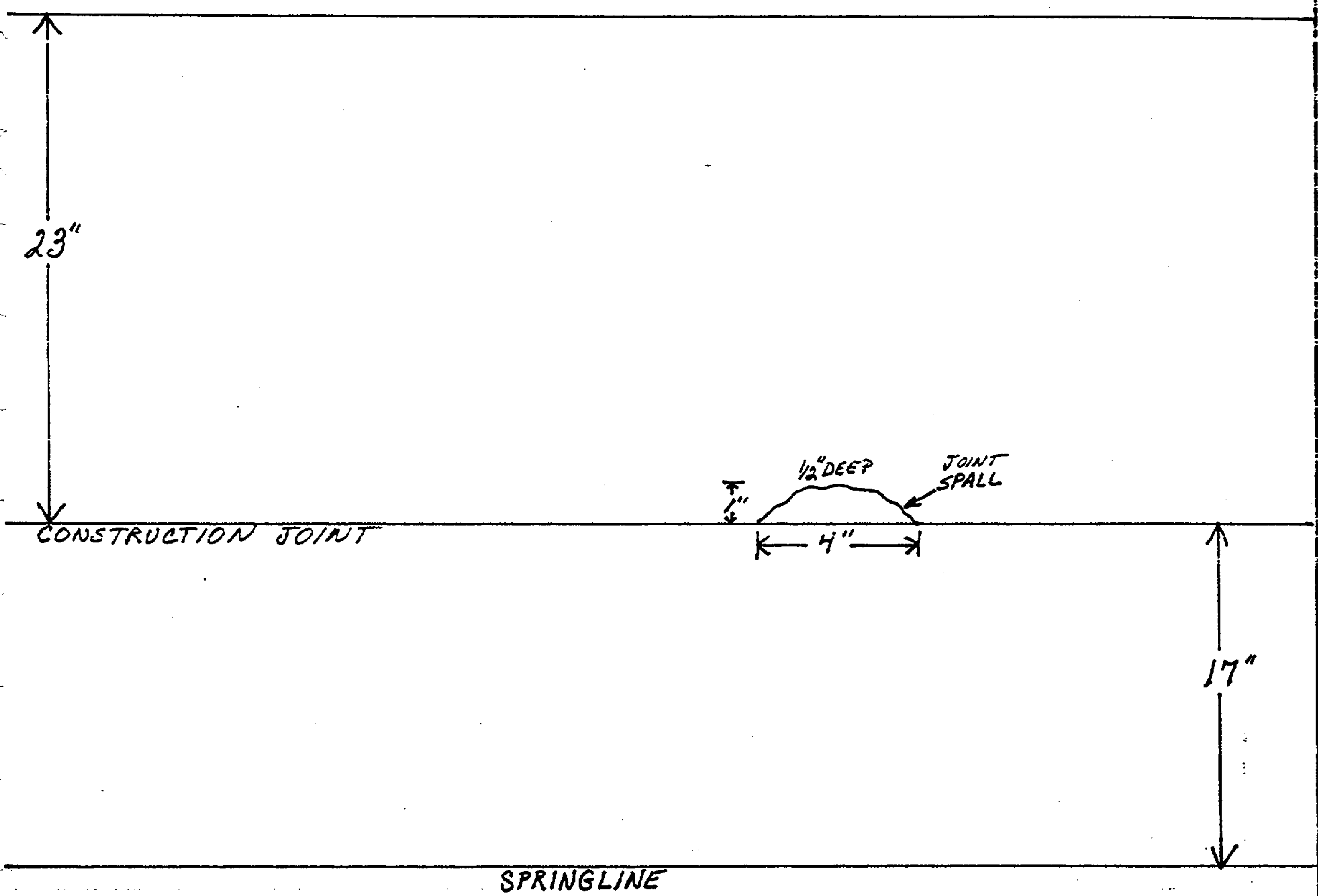
CONSTRUCTION JOINT

SPRINGLINE

PREPARED BY [signature]	DATE 10-18-99	REVIEWED BY H. F. Hendrickson	DATE 12-2-99

PSC Precision Surveillance Corporation	VT-1C BETWEEN BUTTRESS 5 TO 6	CALCULATION NO: A239 of 424
	SAFETY RELATED / NON-SAFETY RELATED	PAGE 8 OF 15

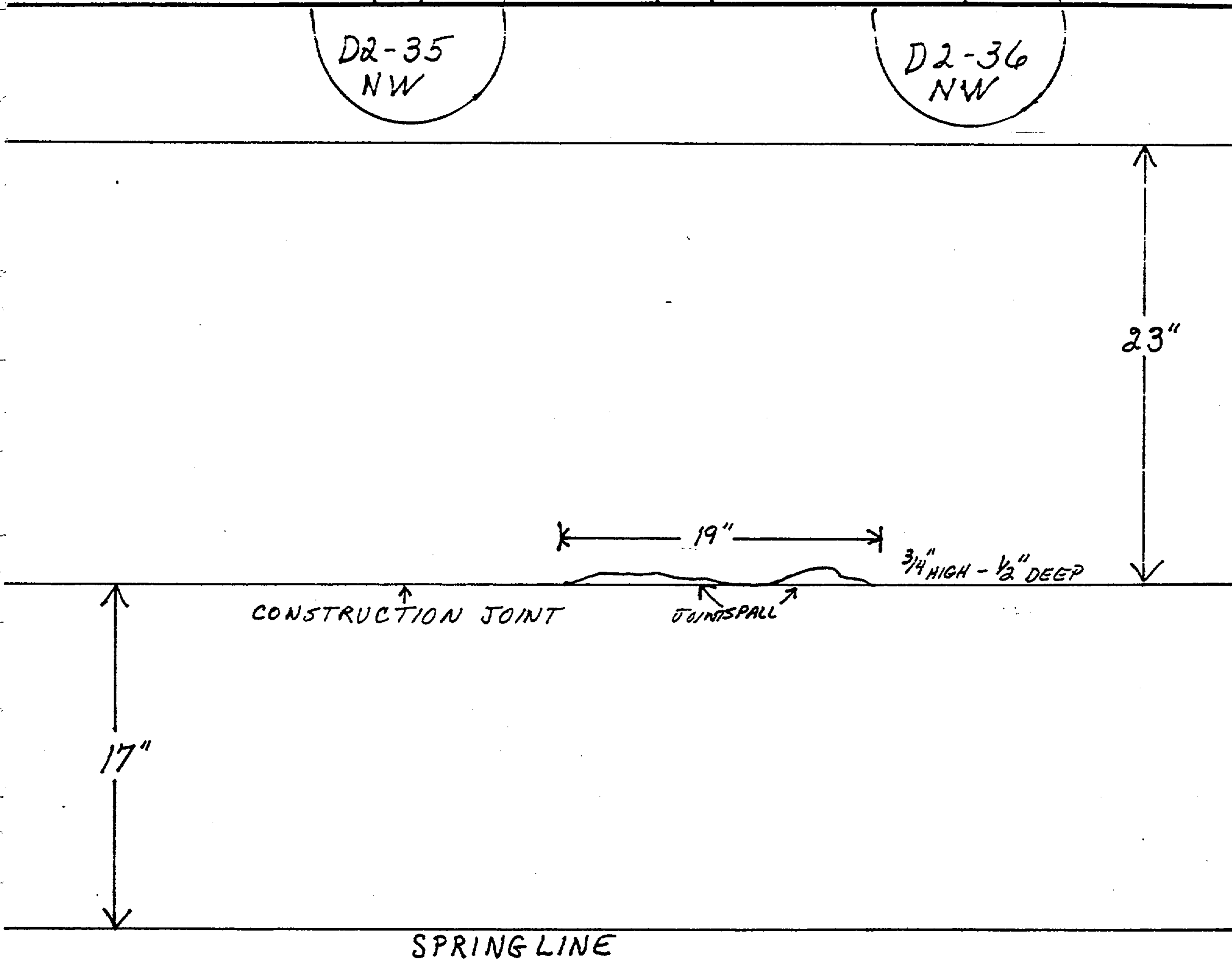
D2-30
NW



PREPARED BY [signature]	DATE 10-19-99	REVIEWED BY H. T. Hendrickson	DATE 12-2-99

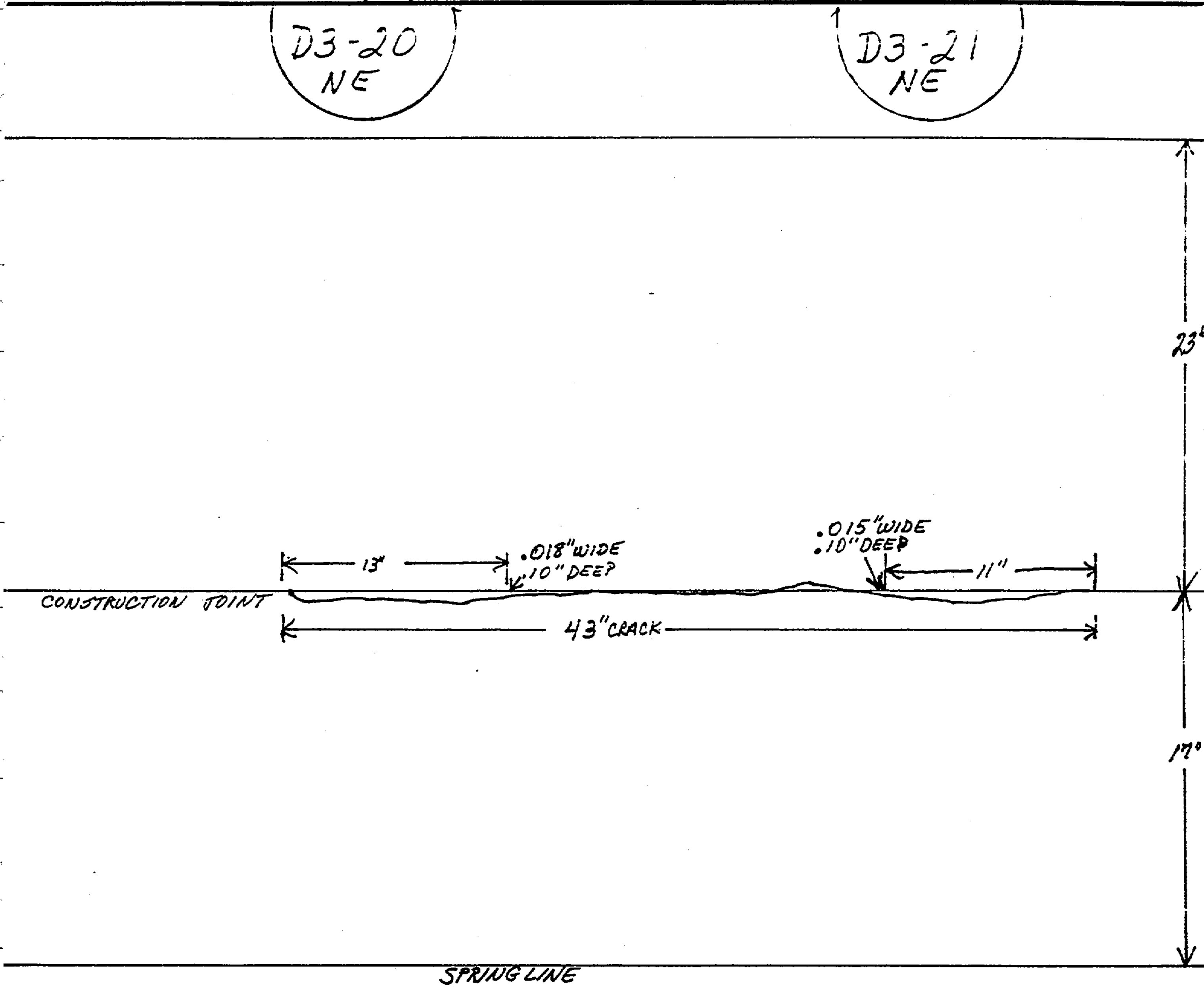
PSC
Precision Surveillance Corporation

VT - 1C BETWEEN BUTTRESS 5 TO 6	CALCULATION NO: A240 of 424
SAFETY RELATED | NON-SAFETY RELATED	PAGE 9 OF 15



PREPARED BY [signature] DATE 10-18-99 REVIEWED BY H. F. Hendrickson DATE 12-2-99

PSC Precision Surveillance Corporation	VT - IC Between Buttress 1 to 6	CALCULATION NO: A241 of 424
	SAFETY RELATED / NON-SAFETY RELATED	PAGE 10 OF 15



PREPARED BY Daniel P. [signature] DATE 10-18-99 REVIEWED BY H. F. Hendrickson DATE 12-2-99

PSC
Precision Surveillance Corporation

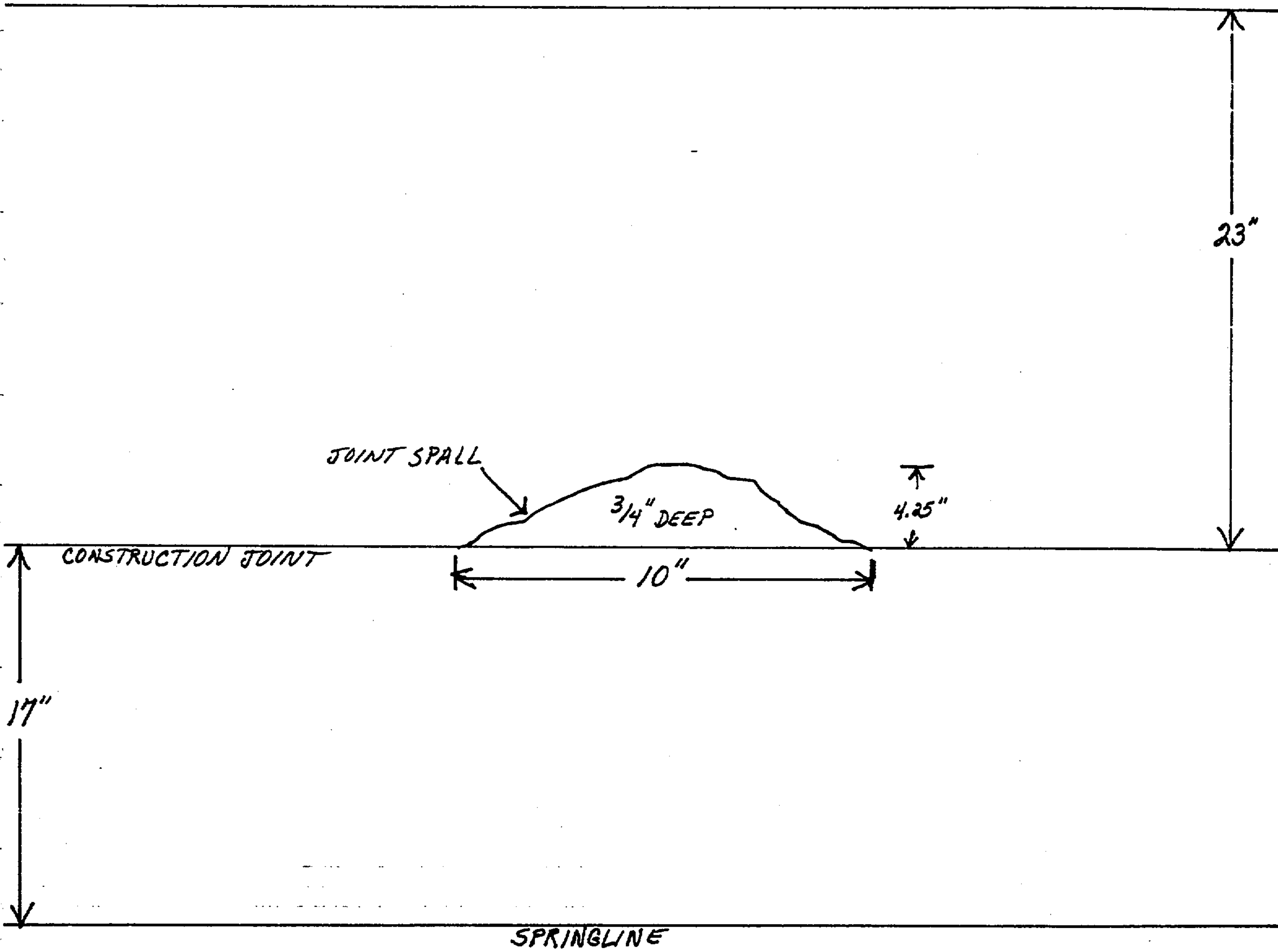
VT-1C

BETWEEN BUTTRESS 1 TO 6

SAFETY RELATED	NON-SAFETY RELATED

CALCULATION NO: A242 of 424

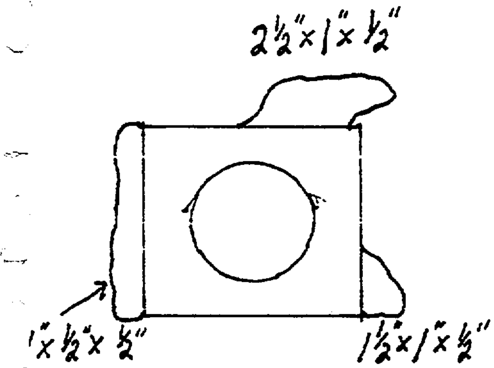
D3-30
NW



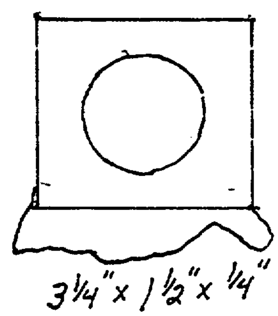
PREPARED BY [signature] DATE 10-18-99 | REVIEWED BY H. T. Hendrickson DATE 12-2-99

PSC Precision Surveillance Corporation	VT-1C HANDRAIL IMBEDS STARTING AT ℄ BUTTRESS / GOING CLOCKWISE	CALCULATION NO: A243 / 424
	☐ SAFETY RELATED ☐ NON-SAFETY RELATED	PAGE 12 OF 15

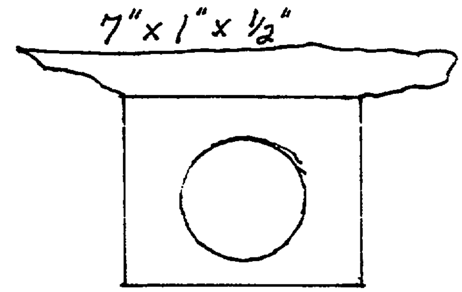
1-2A



1-2D



1-2E



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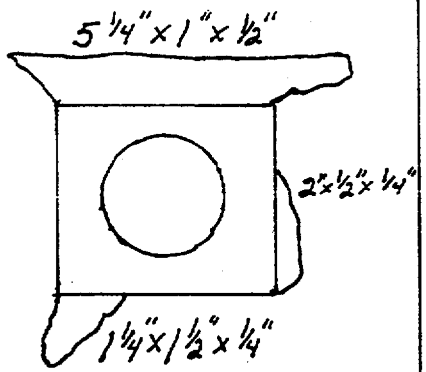
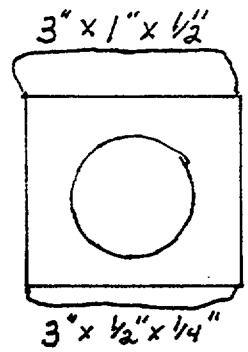
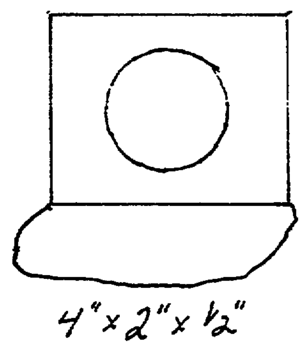


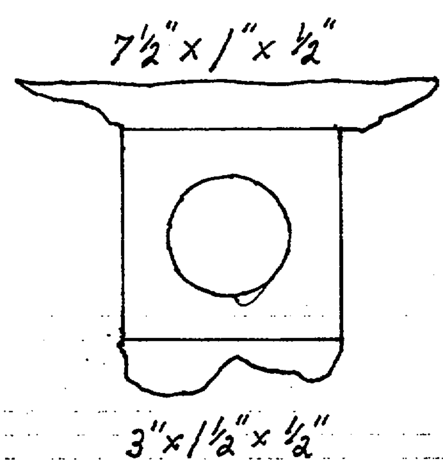
1-2G



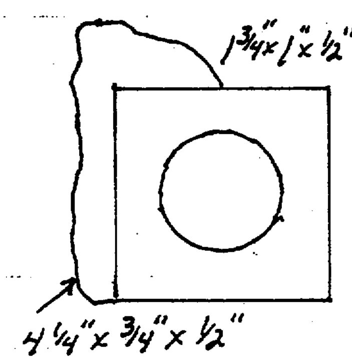
1-2H



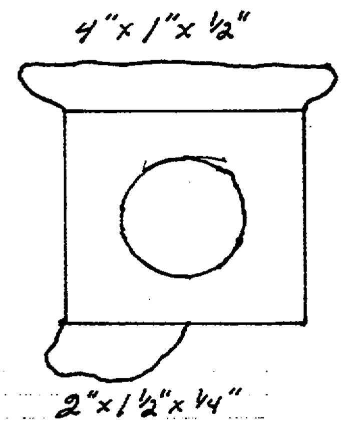
1-2I



2-3A



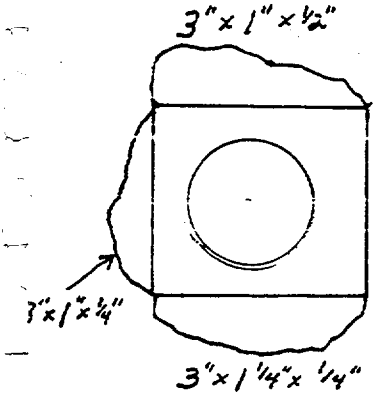
2-3B



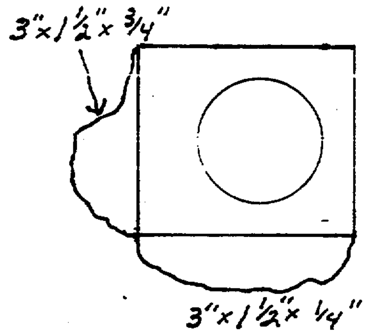
PREPARED BY [signature]	DATE 10-18-99	REVIEWED BY H. G. Hendrickson	DATE 12-2-99

PSC Precision Surveillance Corporation	VT-1C HANDRAIL IMBEDS STARTING AT ℄ BUTTRESS / GOING CLOCKWISE	CALCULATION NO: A244 of 424
	SAFETY RELATED / NON-SAFETY RELATED	PAGE 13 OF 15

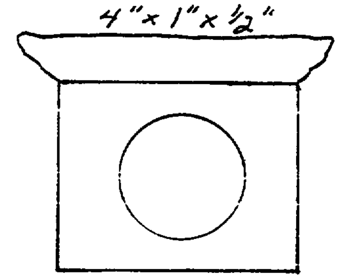
2-3 C



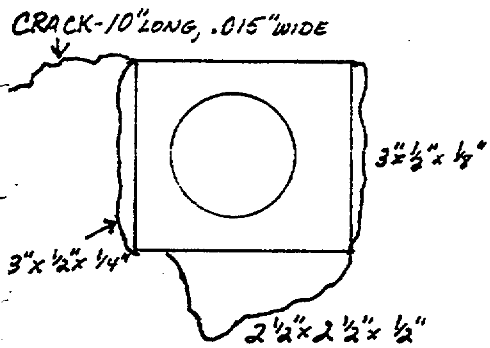
2-3 D



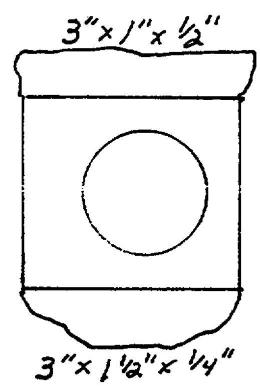
2-3 J



3-4 H



4-5 C



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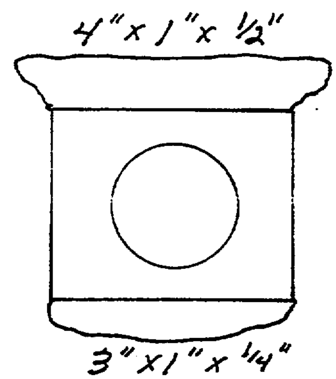

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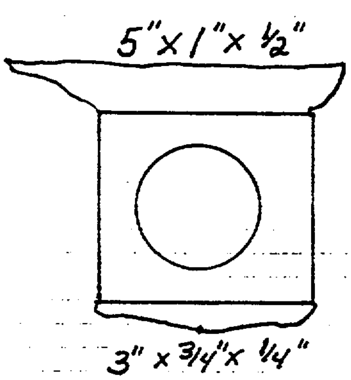

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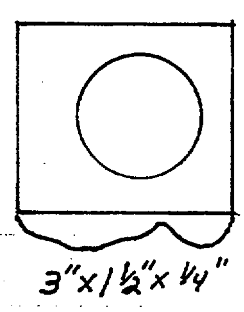
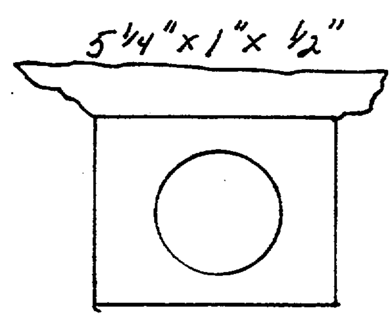


5-6 G



PREPARED BY Daniel P. O'Shea DATE 10-18-99 REVIEWED BY H. F. Hendrickson DATE 12-2-99

PSC

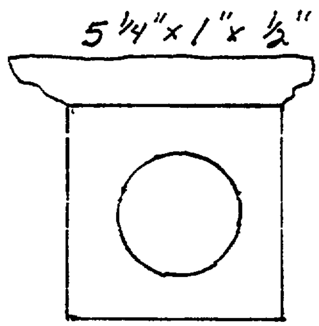
Precision Surveillance Corporation

VT-1C HANDRAIL IMBEDS STARTING AT ℄ BUTTRESS 1 GOING CLOCKWISE

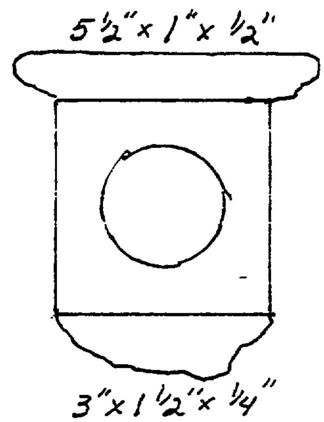
	SAFETY RELATED		NON-SAFETY RELATED

CALCULATION NO: A245 of 424

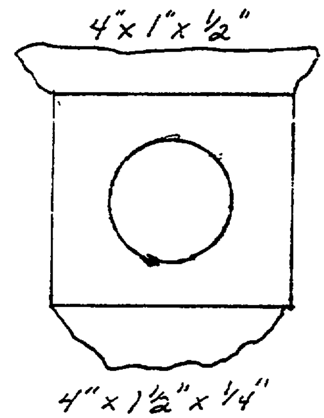
6-1 B



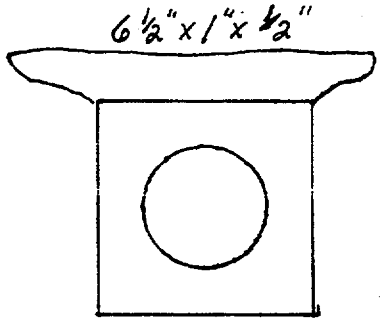
6-1 C



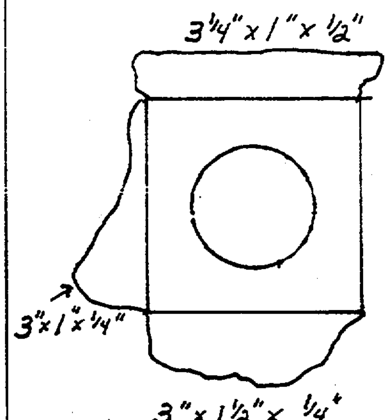
6-1 E



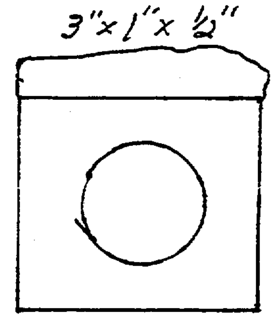
6-1 F



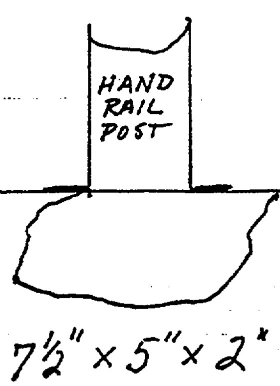
6-1 I



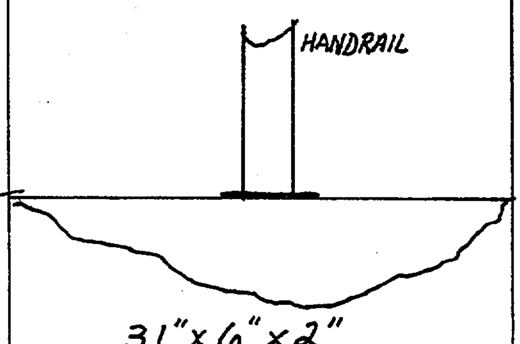
6-1 J



2-3 F



6-1 D



PREPARED BY [signature] **DATE** 10-18-99 **REVIEWED BY** H. F. Hendrickson **DATE** 12-2-99

PSC

Precision Surveillance Corporation

VT-1C TOP OF CONTAINMENT

BETWEEN BUTT. # 4 TO 5

	SAFETY RELATED		NON-SAFETY RELATED

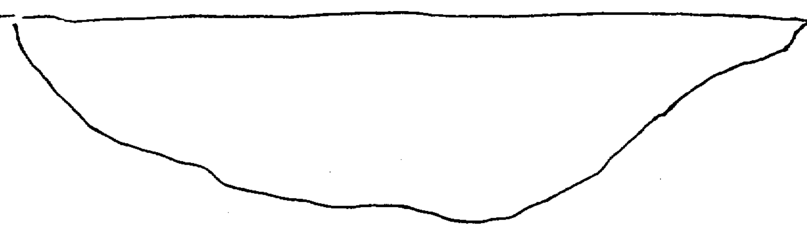
CALCULATION NO: A24 of 424

PAGE 15 OF 15

11' FROM ℄ OF BUTT. # 5 TO BUTT # 4

↑ INSIDE TOWARD DOME

RAIN TRENCH
9" WIDE BY 2" DEEP



32" x 9" x 3"

PREPARED BY [signature] DATE 10-18-99 REVIEWED BY H. F. Hendrickson DATE 12-2-99

ENCLOSURE 6
Data Sheet 10
General Containment Inspection Results

~~Mat Foundation in Tendon Gallery~~ DPO 10-20-99

THIS REPORT INCLUDES INSPECTIONS PERFORMED ON THE UPPER ACCESS LEVEL TO THE TENDON GALLERY. DPO 10-20-99

Tendon Grease Caps

NO INDICATIONS OF GREASE LEAKAGE OR DEFORMED GREASE CAPS DPO 10-20-99

★ Buttress 1 to 2

NO CRACKS GREATER THAN .015". CRACKS SHOWED SIGNS OF GREASE LEAKAGE AND WERE CLEANED, AFTER CLEANING CRACKS SHOWED VISIBLE SIGNS OF ~~GREA~~ ACTIVE GREASE LEAKAGE. DPO 10-20-99

NOTE: SEE SKETCH 1 OF 4 OF REPORT FOR VT-1C SKETCH OF AREA.

★ Buttress 2 to 3

NO CRACKS GREATER THAN .015" CRACKS SHOWED SIGNS OF GREASE LEAKAGE AND WERE CLEANED AFTER CLEANING CRACKS SHOWED VISIBLE SIGNS OF ACTIVE GREASE LEAKAGE.

NOTE: SEE SKETCH 2 OF 4 OF REPORT FOR VT-1C SKETCH OF AREA.

Buttress 3 to 4

SMALL AREA ACCESSABLE. NO CRACKS GREATER THAN .015"

Cognizant Mech/Struct Engineer Reviewed By: [signature] Date: 11/11/99

Performed By: [signature] Date: 10-20-99

★ As part of repetitive task # 9641, Mech/Structural Engrg shall annually examine the active grease leakage which is noted above. A report will be filed annually as part of this task. This is a condition which has existed since time of original construction. Leakage is minor but will be monitored.

[signature] 11/11/99

A248 of 424

ENCLOSURE 6
Data Sheet 10
General Containment Inspection Results

Buttress 4 to 5

SMALL AREA ACCESSABLE. NO CRACKS GREATER THAN .015"

Buttress 5 to 6

NO CRACKS GREATER THAN .015". CRACKS SHOWED SIGNS OF GREASE LEAKAGE AND WERE CLEANED, AFTER CLEANING CRACKS SHOWED VISIBLE SIGNS OF ACTIVE GREASE LEAKAGE.

NOTE: SEE SKETCH 3 OF 4 OF REPORT FOR VT-1C SKETCH OF AREA.

Buttress 6 to 1

NO CRACKS GREATER THAN .015". CRACKS SHOWED SIGNS OF GREASE LEAKAGE AND WERE CLEANED, AFTER CLEANING CRACKS SHOWED VISIBLE SIGNS OF ACTIVE GREASE LEAKAGE.

NOTE: SEE SKETCH 4 OF 4 OF REPORT FOR VT-1C SKETCH OF AREA.

Dome Area

N/A

Cognizant Mech/Struct Engineer Reviewed By: [signature] Date: 11/11/99

Performed By: [signature] Date: 10-20-99

As part of repetitive Task No. 9641, Mech/Structural Engrg shall annually examine the active grease leakage which is noted above. A report will be filed annually as part of this task. This is a condition which has existed since time of original construction. Leakage is minor but will be monitored. [signature] 11/11/99

PSC

Precision Surveillance Corporation

VT-1C UPPER ACCESS

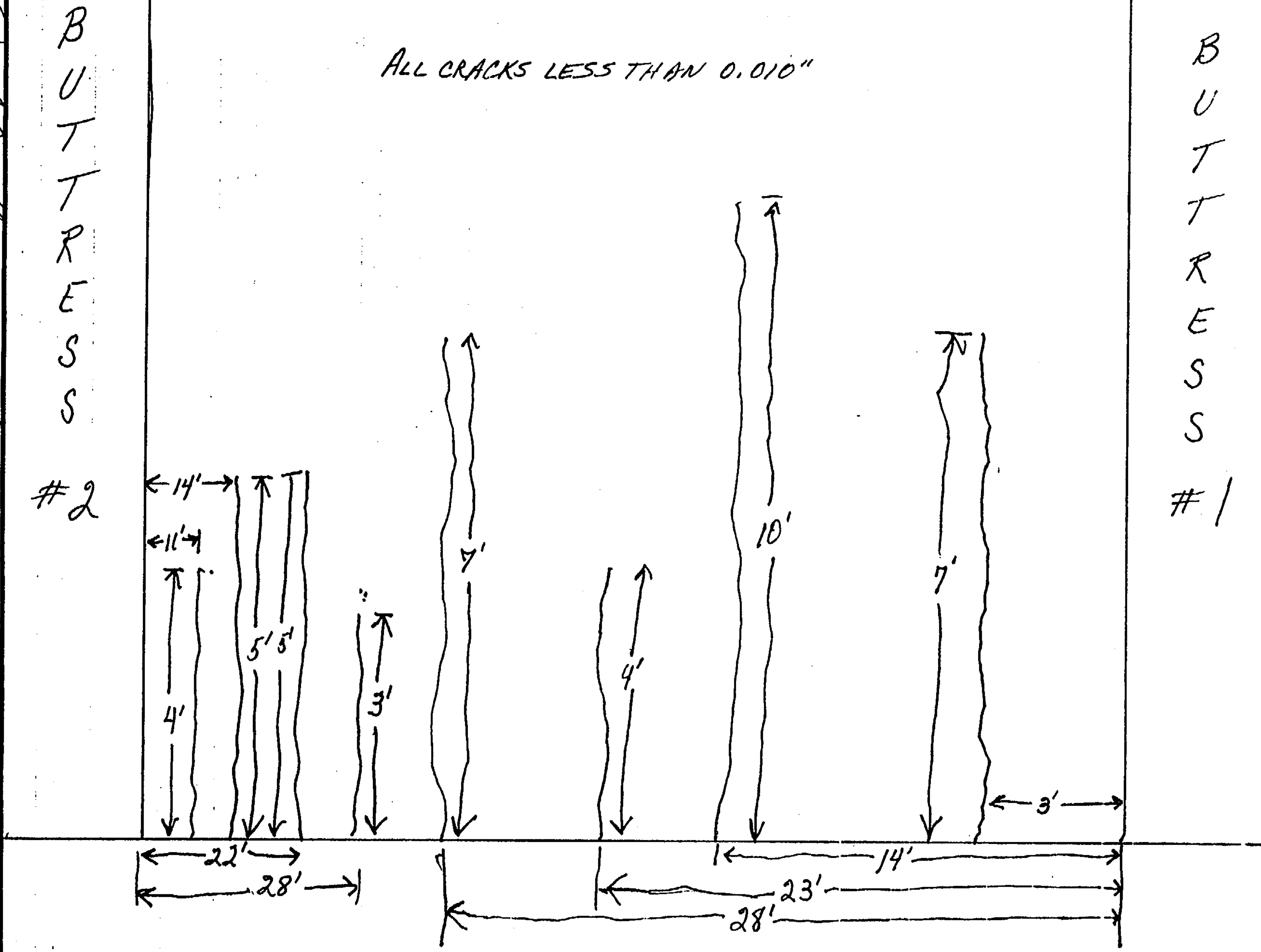
LEVEL TO TENDON GALLERY BUTT #1 TO 2

SAFETY RELATED

NON-SAFETY RELATED

CALCULATION NO: A249 of 424

PAGE 1 OF 4



PREPARED BY [signature] DATE 10-20-99

REVIEWED BY H.T. Hutchinson DATE 12-2-99

PSC
Precision Surveillance Corporation

VT-1C UPPER ACCESS LEVEL
TO TENDON GALLERY BUTT.#2 TO 3

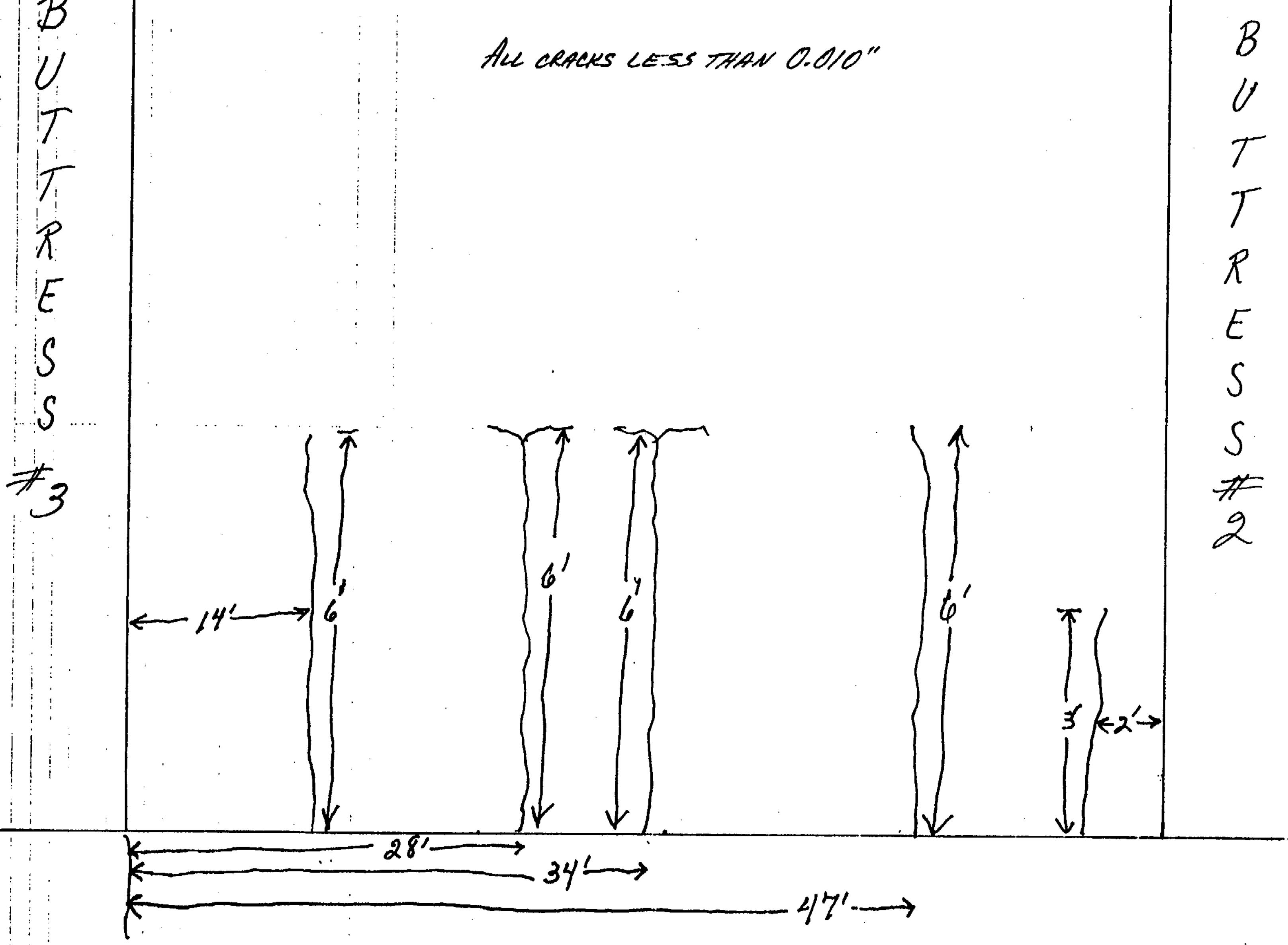
SAFETY RELATED

NON-SAFETY RELATED

CALCULATION NO: A250 of 424

PAGE 2 OF 4

ALL CRACKS LESS THAN 0.010"



PREPARED BY [signature] DATE 10-20-95

REVIEWED BY [signature] DATE 12-2-95

PSC

Precision Surveillance Corporation

VT-1C UPPER ACCESS LEVEL

70 TENDON GALLERY BUTT #5 TO 6

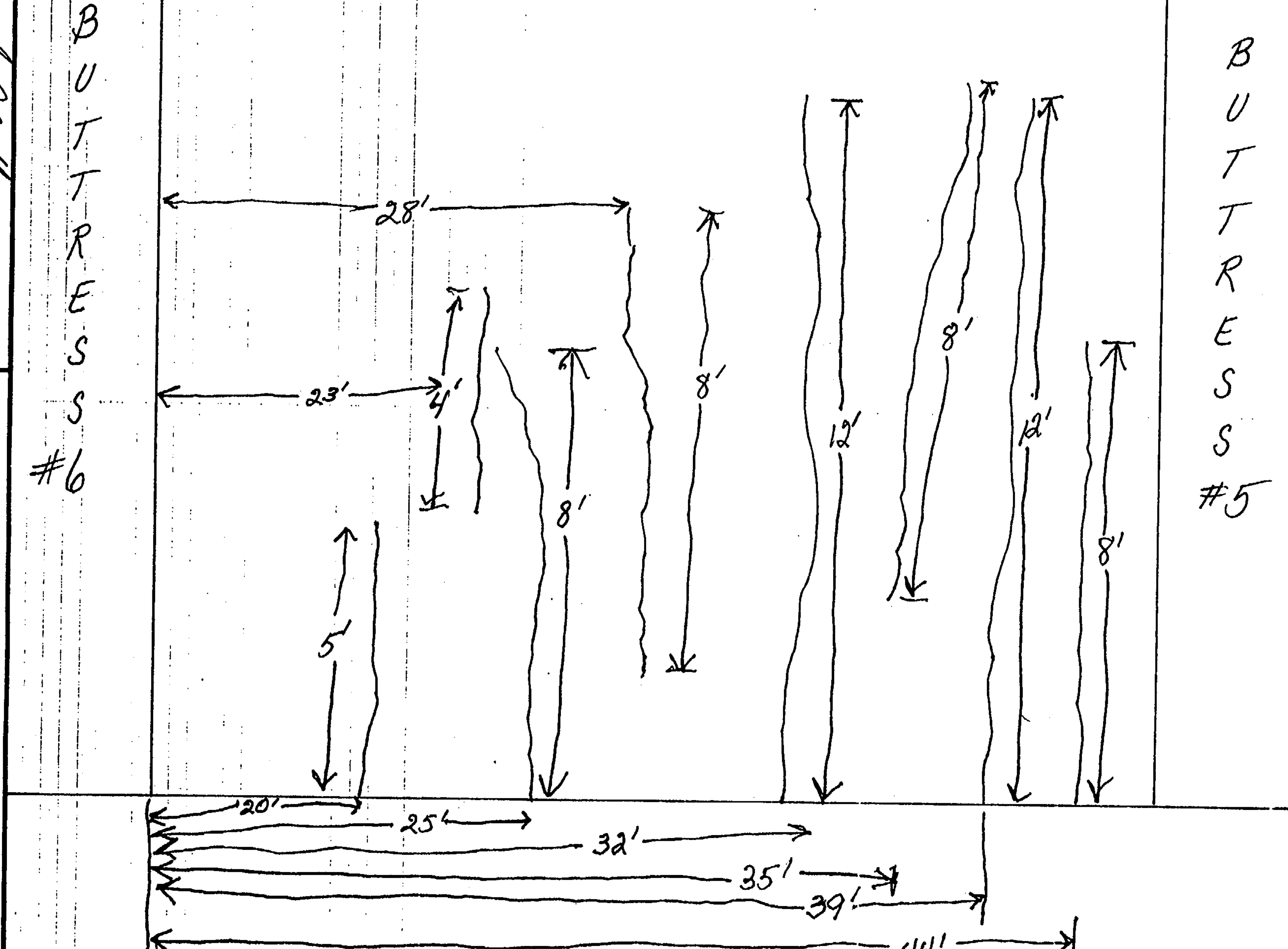
SAFETY RELATED

NON-SAFETY RELATED

CALCULATION NO: A251 / 424

PAGE 3 OF 4

ALL CRACKS LESS THAN 0.010"



PREPARED BY

DATE 10-20-99

REVIEWED BY

DATE 12-2-99

PSC
Precision Surveillance Corporation

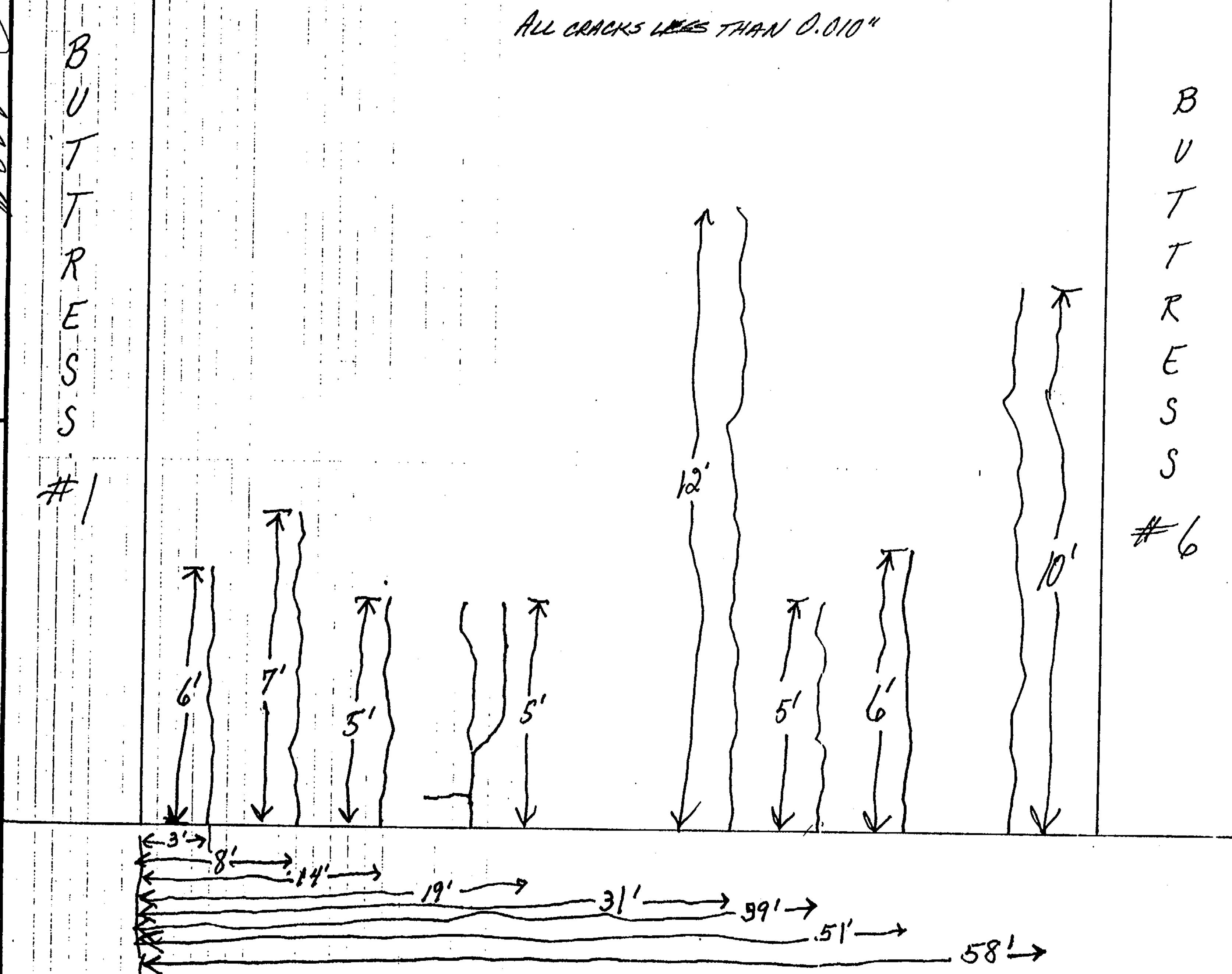
VT-1C UPPER ACCESS LEVEL
TO TENDON GALLERY BUTT. #6 TO 1

SAFETY RELATED

NON-SAFETY RELATED

CALCULATION NO: A252 Ø 4-24

PAGE 4 OF 4



PREPARED BY [signature] DATE 10-20-99

REVIEWED BY [signature] DATE 12-2-99

A2.534 424

ENCLOSURE 6
Data Sheet 10
General Containment Inspection Results

Mat Foundation in Tendon Gallery

N/A DPO 10-26-99

Tendon Grease Caps

BUTT 4 IN FUEL HANDLING/AUX BLD. - NO INDICATIONS OF GREASE LEAKAGE OR DEFORMED CANS

Buttress 1 to 2

N/A DPO 10-26-99

Buttress 2 to 3

N/A DPO 10-26-99

Buttress 3 to 4

FUEL HANDLING/AUX BLD - NO SIGNS ~~OF~~ OF CONCRETE DEGRADATION. DPO 10-26-99

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 12/18/99

Performed By: [signature] Date: 10-26-99

A254 of 424

Buttress 4 to 5

FUEL HANDLING/AUX BLD – NO SIGNS OF CONCRETE DEGRADATION

Buttress 5 to 6

N/A DPO 10-26-99

Buttress 6 to 1

N/A DPO 10-26-99

Dome Area

N/A DPO 10-26-99

Cognizant Mech/Struct Engineer
Reviewed By: ______ Date: 11/11/99

Performed By: ______ Date: 10-26-99

VERTICAL TENDON TRENCH

ENCLOSURE 6
Data Sheet 10
General Containment Inspection Results

~~Mat Foundation in Tendon Gallery~~ DPO 9-27-99

INSPECTIONS PERFORMED ON VERTICAL TENDON TRENCH ON TOP OF CONTAINMENT. DPO 9-27-99

Tendon Grease Caps

V19 BETWEEN BUTT. 1+2, V83 + V86 BETWEEN BUTT. 3+4, V126 + V139 BETWEEN BUTT 5+6 ARE LEAKING FROM MAIN GASKET.

Buttress 1 to 2

NO CRACKS GREATER THAN .015". NO SIGNS OF CONCRETE DEGRADATION.

Buttress 2 to 3

NO CRACKS GREATER THAN .015". NO SIGNS OF CONCRETE DEGRADATION.

Buttress 3 to 4

NO CRACKS GREATER THAN .015". NO SIGNS OF CONCRETE DEGRADATION.

Cognizant Mech/Struct Engineer
Reviewed By: [signature] Date: 10-11-99

Performed By: [signature] Date: 9-27-99

VERTICAL TENDON TRENCH

A256 of 424

Buttress 4 to 5

NO CRACKS GREATER THAN .015". NO SIGNS OF CONCRETE DEGRADATION.

Buttress 5 to 6

LARGE SPALL NEAR BOTTOM OF INSIDE WALL OF TENDON TRENCH BETWEEN TENDONS V144 & V145. SEE ATTACHED VT-10 SKETCH FOR ENGINEERING EVALUATION. DPO 9-27-99

Response/evaluation: Consulted w/ Ted Noble who visually examined this spall. The exposed section of metal is not rebar. The spall is inconsequential to the safety function of containment & as such, no further action or repair is req'd..

10/11/99

Buttress 6 to 1

NO CRACKS GREATER THAN .015". NO SIGNS OF CONCRETE DEGRADATION

Dome Area

N/A DPO 9-27-99

Cognizant Mech/Struct Engineer
Reviewed By: Date: 10-11-99

Performed By: Date: 9-27-99

PSC
Precision Surveillance Corporation

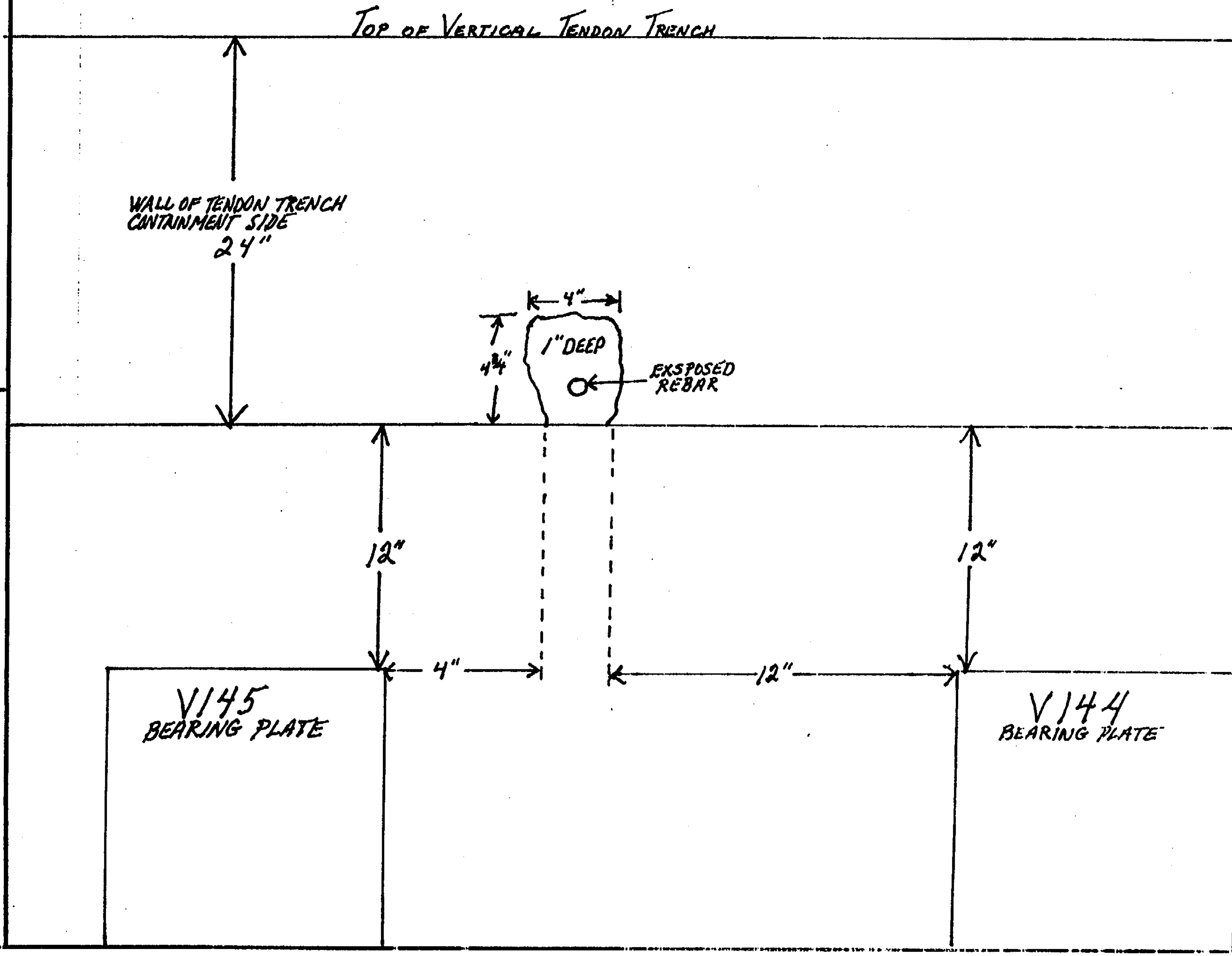
VT-1C SCETCH OF SPALL
IN VERTICAL TENDON TRENCH

SAFETY RELATED

NON-SAFETY RELATED

CALCULATION NO:

PAGE A257 OF 424



PREPARED BY

DATE

REVIEWED BY

DATE

GREASE LEAK REPAIR

CAN MODS

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D145 Tendon End: FIELD

Date End Cap Removed: 8-26-99

8.3.2 Amount of grease removed: 9 gallons

8.4.8 Replacement grease type: VISCCHORUST 2090 P-4

8.4.8 Replacement grease temperature: 180 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) ____

8.4.9 Amount of grease replaced: 9.75 gallons

10.0 P.M.T.: Sat ✓ Unsat ____

Comments: ____

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: ____ Date: 8/30/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

Grease Leak Repair & Can Mod.

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number A2594424 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D 147 Tendon End: Field

Date End Cap Removed: 8-26-99

8.3.2 Amount of grease removed: 9 gallons

8.4.8 Replacement grease type: Visconorust 2090 P4

8.4.8 Replacement grease temperature: 180 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) ____

8.4.9 Amount of grease replaced: 9.75 gallons

10.0 P.M.T.: Sat ✓ Unsat ____

Comments: ____

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: ____ Date: 8/30/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

LEAK REPAIR

A260 # 424

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title

RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D202 NE Tendon End: FIELD

Date End Cap Removed: 8-19-99

8.3.2 Amount of grease removed: 8 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P4

8.4.8 Replacement grease temperature: 190 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) [illegible]

8.4.9 Amount of grease replaced: 9.5 gallons

10.0 P.M.T.: Sat ✓ Unsat _____

Comments:

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 8/30/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

NOTE: NO CAN MODIFICATION REQUIRED.

2551c

Grease Leak Repair & Can Mods

A261 of 424

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D 317 SE Tendon End: Field

Date End Cap Removed: 9-10-99

8.3.2 Amount of grease removed: 6 gallons

8.4.8 Replacement grease type: Visconorust 2090 P4

8.4.8 Replacement grease temperature: 180 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) [initials]

8.4.9 Amount of grease replaced: 9 gallons

10.0 P.M.T.: Sat ✓ Unsat ______

Comments: ______

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/10/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

A2C2 424

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title **RB Tendon End Cap Installation**		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: D3-36 N.W. Tendon End: FIELD

Date End Cap Removed: 10/13/99

8.3.2 Amount of grease removed: 6 gallons

8.4.8 Replacement grease type: VISCONORUST 2090P-4

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [initials]

8.4.9 Amount of grease replaced: 7 gallons

10.0 P.M.T.: Sat ✓ Unsat ______

Comments: ______

Calibrated Test Equip.: PK20 Cal. Due Date: 5/10/00

Supervisor Signoff: [signature] Date: 10/13/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

GREASE LEAK REPAIR

A263 # 424

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title **RB Tendon End Cap Installation**		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H13-12 Tendon End: SHOP

Date End Cap Removed: 9-17-99

8.3.2 Amount of grease removed: 8 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 180 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) EB

8.4.9 Amount of grease replaced: 9 ~~12~~ EB 9/28/99 gallons

10.0 P.M.T.: Sat X Unsat ____

Comments: ____________________

Calibrated Test Equip.: PK 20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/28/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

GREASE LEAK REPAIR

A264 # 424

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 13-13 Tendon End: SHOP

Date End Cap Removed: 9-17-99

8.3.2 Amount of grease removed: 7 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 180 °F

~~8.4.9 1 1/2" to 2" air space at top of can after filling (initial)~~ ~~EB~~

8.4.9 Amount of grease replaced: 8 3/4 ~~TC~~ EB 9/28/99 gallons

10.0 P.M.T.: Sat X Unsat ____

Comments: ____

Calibrated Test Equip.: PK20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/28/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

A2459 424

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title: RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon identity: H13-21 Tendon End: SHOP

Date End Cap Removed: 9-17-99

8.3.2 Amount of grease removed: 7 gallons

8.4.8 Replacement grease type: Viscoconrust 2090 P-4

8.4.8 Replacement grease temperature: 190 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) ____

8.4.9 Amount of grease replaced: 9 gallons

10.0 P.M.T.: Sat ✓ Unsat ____

Comments: ____

Calibrated Test Equip.: 9K20 Cal. Due Date: 5-10-00

Supervisor Signoff: ____ Date: 9/22/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK ONLY

A266 of 424

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title

RB Tendon End Cap Installation

Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 15-13 Tendon End: SHOP

Date End Cap Removed: 9-16-99

8.3.2 Amount of grease removed: 6 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P4

8.4.8 Replacement grease temperature: 190 °F

~~8.4.9 1 1/2" to 2" air space at top of can after filling (Initial)~~

8.4.9 Amount of grease replaced: 9 gallons

10.0 P.M.T.: Sat ✓ Unsat

Comments: Both H15-13 & H51-13 showed evidence of leakage. The sum of grease added vs. removed for both ends exceeded the 1301-9.1, 4 gallon max difference req't.. This tendon was previously surveilled during period 2. RG 1.35 Rev. 3 allows for 5% max difference of grease added vs. grease removed. For this tendon, this relates to 5.65 gallons. H15-13 is indoors & potential for water intrusion is non-existent, therefore the ~~six~~ three gallons added to this side is without consequence. H51-13 req'd an additional 6 gals be added. This is .35 gals greater than allowed. Of the 112.9 gallon net duct volume this represents .3% & is considered insignificant. The total grease inventory lost is < 10% (11.29 gals > 9 gals) as req'd by IWL/10CFR50.55a. Therefore the reported condition is acceptable. 10-18-99

Calibrated Test Equip.: PK 20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/22/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2S1c

A2674 424

GPU Nuclear

TMI-1
Corrective Maintenance Procedure

Number 1410-Y-83

Title

RB Tendon End Cap Installation

Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: 24H51 Tendon End: FIELD/BUTT #2

Date End Cap Removed: 10-18-99

8.3.2 Amount of grease removed: 3 gallons

8.4.8 Replacement grease type: 2090-P4

8.4.8 Replacement grease temperature: 190° °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [illegible]

8.4.9 Amount of grease replaced: 6 gallons

10.0 P.M.T.: Sat X Unsat ____

Comments:

Calibrated Test Equip.: PK20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 10/18/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR
&
CAN MOD.

A2637 424

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title

RB Tendon End Cap Installation

Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H26-4 Tendon End: FIELD

Date End Cap Removed: 9-15-99

8.3.2 Amount of grease removed: 7 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 190 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) ORO

8.4.9 Amount of grease replaced: 9 gallons

10.0 P.M.T.: Sat ✓ Unsat ______

Comments: ______

Calibrated Test Equip.: PK20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/22/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR & CAN MOD.

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number: A269424 1410-Y-83
Title **RB Tendon End Cap Installation**		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H26-52 Tendon End: FIELD

Date End Cap Removed: 8-23-99

8.3.2 Amount of grease removed: 6 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [initials]

8.4.9 Amount of grease replaced: 8.5 gallons

10.0 P.M.T.: Sat ✓ Unsat ______

Comments:

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 8/30/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

Grease Leak Repair & Can Mod.

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number: A270 of 424 1410-Y-83
Title **RB Tendon End Cap Installation**		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 26-53 Tendon End: FIELD

Date End Cap Removed: 8-20-99

8.3.2 Amount of grease removed: 6 gallons

8.4.8 Replacement grease type: Visconorust 2090 P-4

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [illegible]

8.4.9 Amount of grease replaced: 9 gallons

10.0 P.M.T.: Sat ✓ Unsat ____

Comments:

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 8/30/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR & CAN MOD

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number A271 Ø 424 1410-Y-83

Title

RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 31-18 Tendon End: FIELD

Date End Cap Removed: 9-7-99

8.3.2 Amount of grease removed: 5 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P4

8.4.8 Replacement grease temperature: 190 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) OB

8.4.9 Amount of grease replaced: 10 gallons

10.0 P.M.T.: Sat ✓ Unsat

Comments: Difference between grease removed vs. added is 5 gallons & exceeds 1301-9.1, 4 gallon max difference req't. RG 1.35 Rev3 allows for 5% difference. For H31-18, 5% is 5.51 gallon based on horizontal tendon grease void calculations. Therefore this difference is acceptable. This tendon end was repaired to mitigate any future leakage. This tendon was not part of the original surveillance scope & therefore an SDR is not required. [signature] 10/18/99

Calibrated Test Equip.: PK20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/28/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

Grease Leak Repair
&
Can Mod.

A272 of 424

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number: 1410-Y-83

Title: **RB Tendon End Cap Installation** | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 31-46 Tendon End: Field

Date End Cap Removed: 9-8-99

8.3.2 Amount of grease removed: 5 gallons

8.4.8 Replacement grease type: Visconorust 2090 P4

8.4.8 Replacement grease temperature: 190 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [illegible]

8.4.9 Amount of grease replaced: 9 gallons

10.0 P.M.T.: Sat ✓ Unsat ______

Comments: ______

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/9/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

Grease Leak Repair
Can Mod.

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number A2734424 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 31-51 Tendon End: Field

Date End Cap Removed: 9-9-99

8.3.2 Amount of grease removed: 4 gallons

8.4.8 Replacement grease type: Visconorust 2090 P-4

8.4.8 Replacement grease temperature: 190 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) ____

8.4.9 Amount of grease replaced: 8 gallons

10.0 P.M.T.: Sat ✓ Unsat____

Comments:

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: ____ Date: 9/9/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR
&
CAN MOD

A274 of 424

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title

RB Tendon End Cap Installation

Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 31-55 Tendon End: FIELD

Date End Cap Removed: 9-8-99

8.3.2 Amount of grease removed: 4 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P4

8.4.8 Replacement grease temperature: 190 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) [illegible]

8.4.9 Amount of grease replaced: 8 gallons

10.0 P.M.T.: Sat ✓ Unsat ____

Comments: ____

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/9/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

A275 / 424

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number: 1410-Y-83

Title: **RB Tendon End Cap Installation** | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H51-4 Tendon End: FIELD

Date End Cap Removed: 8-24-99

8.3.2 Amount of grease removed: 4 gallons

8.4.8 Replacement grease type: 2090 P-4

8.4.8 Replacement grease temperature: 186 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [illegible]

8.4.9 Amount of grease replaced: 6 gallons

10.0 P.M.T.: Sat ✓ Unsat ____

Comments: ____

Calibrated Test Equip.: PK20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/22/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR
& CAN MOD.

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number A276 #424 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H51-13 Tendon End: FIELD

Date End Cap Removed: 9-14-99

8.3.2 Amount of grease removed: 6 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 180 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) EB

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat X Unsat

Comments: Both H15-13 & H51-13 showed evidence of leakage. Sum of grease added vs. removed for both ends exceeded the 1301-9.1, 4 gallon max difference req't. This tendon was last surveilled during period 2. RG 1.35 Rev 3 allows for 5% max difference of grease added vs. grease removed. For this tendon, this relates to 5.65 gallons. H15-13 is indoors & potential for water intrusion is non-existent, therefore the 3 added gallons to this side is without consequence. H51-13 req'd an additional 6 gals be added. This is .35 gals greater than allowed or .3% of the 112.9 gallon available net tendon duct volume & is insignificant. Total grease inventory lost is <10% (11.29 gals > 9 gals) as req'd by IWL/10CFR50.5a. Therefore the reported condition is acceptable.

Calibrated Test Equip.: PK20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/20/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR & CAN MOD.

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number A277 of 424 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 51-14 Tendon End: FIELD

Date End Cap Removed: 9-14-99

8.3.2 Amount of grease removed: 6 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 180 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [illegible]

8.4.9 Amount of grease replaced: 12 gallons

10.0 P.M.T.: Sat X Unsat ____

Comments: H51-14 showed evidence of grease leakage & was repaired to mitigate future leakage. No visual abnormalities of tendon end anchorage were reported when end cap was removed to facilitate leak repair/end cap. The 4 gallon limit of 1301-9.1 was exceeded since grease add'n was 6 gallons. The RG 1.35 Rev. 3 5% limit is 5.64 gallons for this tendon. This is ~~#~~ .36 gallon greater than allowed or .3% of the 112.8 gallon available net tendon duct volume & is insignificant. Total grease inventory lost is < 10% (11.28 gals > 6 gals) as req'd by 10CFR50.55a. Therefore the reported condition is acceptable. [signature] 10/18/99

Calibrated Test Equip.: PK 20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/20/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

A278 of 424

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H53-6 Tendon End: SHOP

Date End Cap Removed: 8-24-99

8.3.2 Amount of grease removed: 4 gallons

8.4.8 Replacement grease type: 2090 P-4

8.4.8 Replacement grease temperature: 190 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) QM

8.4.9 Amount of grease replaced: 5 gallons

10.0 P.M.T.: Sat ✓ Unsat ____

Comments: ____

Calibrated Test Equip.: PK20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/22/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR
&
CAN MOD.

A279 & 424

GPU Nuclear

TMI-1
Corrective Maintenance Procedure

Number
1410-Y-83

Title
RB Tendon End Cap Installation

Revision No.
0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 53-11 Tendon End: SHOP

Date End Cap Removed: 9-2-99

8.3.2 Amount of grease removed: 4 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 200° °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) [illegible]

8.4.9 Amount of grease replaced: 7 gallons

10.0 P.M.T.: Sat ✓ Unsat ____

Comments:

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/8/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR
(CS MOD)

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number A230 # 424 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H53-13 Tendon End: SHOP

Date End Cap Removed: 9-2-99

8.3.2 Amount of grease removed: 7 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 190° °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) ___

8.4.9 Amount of grease replaced: 7.50 gallons

10.0 P.M.T.: Sat ✓ Unsat ___

Comments: ___

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/8/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR
&
CAN MOD

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number A291 of 424 **1410-Y-83**
Title **RB Tendon End Cap Installation**		Revision No. **0**

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H53-25 Tendon End: SHOP

Date End Cap Removed: 9-2-99

8.3.2 Amount of grease removed: 4 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P4

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) [illegible]

8.4.9 Amount of grease replaced: 8 gallons

10.0 P.M.T.: Sat ✓ Unsat ______

Comments: ______

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/8/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR
CAN MOD

A282 of 424

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 53-44 Tendon End: SHOP

Date End Cap Removed: 9-9-99

8.3.2 Amount of grease removed: 4.50 gallons

8.4.8 Replacement grease type: VISCONOREST 2090 P4

8.4.8 Replacement grease temperature: 190 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) ______

8.4.9 Amount of grease replaced: 5.00 gallons

10.0 P.M.T.: Sat ✓ Unsat ______

Comments: ______

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: ______ Date: 9/9/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR
&
CAN MOD.

A283 of 424

GPU Nuclear | TMI-1 Corrective Maintenance Procedure | Number 1410-Y-83

Title: RB Tendon End Cap Installation | Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 53-4E Tendon End: SHOP

Date End Cap Removed: 9-9-99

8.3.2 Amount of grease removed: 6 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 190 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [initials]

8.4.9 Amount of grease replaced: 8.50 gallons

10.0 P.M.T.: Sat ✓ Unsat ______

Comments:

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/9/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR

CAN MOD

GPU Nuclear

TMI-1
Corrective Maintenance Procedure

Number A2847 424

1410-Y-83

Title

RB Tendon End Cap Installation

Revision No.

0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 62-10 Tendon End: SHOP

Date End Cap Removed: 8-31-99

8.3.2 Amount of grease removed: 9 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 200 °F

8.4.9 ~~1 1/2" to 2" air space at top of can after filling~~ (initial) ______

8.4.9 Amount of grease replaced: 8.75 gallons

10.0 P.M.T.: Sat ✓ Unsat ______

Comments: ______

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/1/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR

& Cit - Mod

GPU Nuclear

TMI-1
Corrective Maintenance Procedure

Number A285 of 424

1410-Y-83

Title

RB Tendon End Cap Installation

Revision No.

0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H 62-13 Tendon End: SHOP

Date End Cap Removed: 8-31-99

8.3.2 Amount of grease removed: 7 gallons

8.4.8 Replacement grease type: VISCONOROST 2090 P-4

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) _____

8.4.9 Amount of grease replaced: 8.75 gallons

10.0 P.M.T.: Sat ✓ Unsat ______

Comments: ______

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: ______ Date: 9/1/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR

& CAN MOD.

GPU Nuclear

TMI-1
Corrective Maintenance Procedure

Number
1410-Y-83

Title
RB Tendon End Cap Installation

Revision No.
0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H62-14 Tendon End: SHOP

Date End Cap Removed: 8-31-99

8.3.2 Amount of grease removed: 8 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P4

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) [initials]

8.4.9 Amount of grease replaced: 8.25 gallons

10.0 P.M.T.: Sat ✓ Unsat ____

Comments: ____

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/1/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

GREASE LEAK REPAIR & CAN MOD.

GPU Nuclear	TMI-1 Corrective Maintenance Procedure	Number A287 / 424 1410-Y-83
Title RB Tendon End Cap Installation		Revision No. 0

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity: H62-15 Tendon End: SHOP

Date End Cap Removed: 8-30-99

8.3.2 Amount of grease removed: 7 gallons

8.4.8 Replacement grease type: VISCONORUST 2090 P-4

8.4.8 Replacement grease temperature: 200 °F

8.4.9 1 1/2" to 2" air space at top of can after filling (initial) [initials]

8.4.9 Amount of grease replaced: 8.75 gallons

10.0 P.M.T.: Sat ✓ Unsat ____

Comments: ____

Calibrated Test Equip.: PK-20 Cal. Due Date: 5-10-00

Supervisor Signoff: [signature] Date: 9/1/99

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

cc: Lead Mechanical Engineer

2551c

PSC PROCEDURE SQ 6.1
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PROJECT: THREE MILE ISLAND DATE: 10-13-99

TENDON NO.: V8 TENDON END/BUTTRESS NO.: Shop/Top SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date ______

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-13-99

QC Review H. F. Hendrickson Level III Date 12-2-99

Title MGR. Q.A.

GREASE SAMPLE ONLY

PROJECT: THREE MILE ISLAND DATE: 10-4-99

TENDON NO.: V19 TENDON END/BUTTRESS NO.: FIELD/BOTTOM SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No DPO 10-4-99 Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN N/A

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE N/A

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date ______

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-4-99

QC Review H. F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A

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PROJECT: THREE MILE ISLAND DATE: 8-27-99

TENDON NO.: V32 TENDON END/BUTTRESS NO.: SHOP / TOP SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO V32 FIELD / BOTTOM

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A 8-27-99

(11.) OWNER/AGENT NOTIFIED ~~Yes~~ No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-27-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A

PROJECT: THREE MILE ISLAND DATE: 9-17-99

TENDON NO.: V32 TENDON END/BUTTRESS NO.: FIELD / BOTTOM SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO V32 SHOP / TOP

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

X 4.17-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-17-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A

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PROJECT: THREE MILE ISLAND DATE: 10-13-99

TENDON NO.: V35 TENDON END/BUTTRESS NO.: SHOP/TOP SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

9.4) DURING LOOSENING OF GREASE CAN

9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO.

(12.2) SAMPLES STORED AT N/A

QC Signoff Daniel P. O'Hara Level II Date 10-13-99

QC Review H. T. Hendrickson Level III Date 12-2-99

Title MGR., Q.A.

PROJECT: THREE MILE ISLAND DATE: 8-27-99

TENDON NO.: V-40 TENDON END/BUTTRESS NO.: SHOP / TOP SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO V40 FIELD / BOTTOM

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

A [illegible] 8-27-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-27-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A

PROJECT: THREE MILE ISLAND DATE: 9-17-99

TENDON NO.: V40 TENDON END/BUTTRESS NO.: FIELD / BOTTOM SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO V40 SHOP / TOP

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

NA W 9-17-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-17-99

QC Review H. T. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

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PROJECT: THREE MILE ISLAND DATE: 9-29-99

TENDON NO.: V40 TENDON END/BUTTRESS NO.: FIELD/BOTTOM SURVEILLANCE 4TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff Daniel P. O'Hara Level II Date 9-29-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

PROJECT: THREE MILE ISLAND DATE: 10-13-99

TENDON NO.: V57 TENDON END/BUTTRESS NO.: SHOP/TOP SURVEILLANCE 27

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT

QC Signoff [signature] Level II Date 10-13-99

QC Review H. F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A.

GREASE SAMPLE ONLY

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PROJECT: THREE MILE ISLAND DATE: 9-16-99

TENDON NO.: V72 TENDON END/BUTTRESS NO.: FIELD / BOTTOM SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

PLUG ONLY REMOVED / Y DEVICE USED

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(11.) OWNER/AGENT NOTIFIED N/A W 9-16-99 Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-16-99

QC Review H.T. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

GREASE SAMPLE ONLY

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PROJECT: THREE MILE ISLAND DATE: 9-11-99

TENDON NO.: V73 TENDON END/BUTTRESS NO.: FIELD/BOTTOM SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

PLUG ONLY REMOVED / Y DEVICE USED

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A 9-16-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-16-99

QC Review H.T. Hendrikson Level III Date 12-1-99

Title MGR., Q.A.

GREASE SAMPLE ONLY

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PROJECT: THREE MILE ISLAND DATE: 6-11-99

TENDON NO.: V 74 TENDON END/BUTTRESS NO.: FIELD / BOTTOM SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

PLUG ONLY REMOVED / Y DEVICE USED

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

X W 9-16-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-16-99

QC Review H. T. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

Grease Sample Only

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PROJECT: THREE MILE ISLAND DATE: 9-16-99

TENDON NO.: V75 TENDON END/BUTTRESS NO.: Field / Bottom SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

Plug Only Removed / Y Device Used

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

~~(9.10) DURING DETENSIONING~~

~~(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO~~

~~Comments ______~~

9-16-99

~~(11.) OWNER/AGENT NOTIFIED Yes No Date ______~~

~~CONDITION: OBSERVABLE ______ SIGNIFICANT ______~~

~~(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO~~

~~(12.2) SAMPLES STORED AT ______~~

QC Signoff [signature] Level II Date 9-16-99

QC Review H.F. Hendrickson Level III Date 12-7-99

Title MGR, Q.A.

GREASE SAMPLE ONLY

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PROJECT: THREE MILE ISLAND DATE: 9-16-99

TENDON NO.: V76 TENDON END/BUTTRESS NO.: FIELD / BOTTOM SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN — PLUG ONLY REMOVED / Y DEVICE USED

(9.4.1) Water Detected Yes **No** Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes **No** Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes **No** Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

A 9-16-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-16-99

QC Review H. L. Hendrikson Level III Date 12-1-99

Title MGR, Q.A.

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PROJECT: THREE MILE ISLAND DATE: 10-14-99

TENDON NO.: V80 TENDON END/BUTTRESS NO.: SHOP/TOP SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-14-99

QC Review H.K. Hendrickson Level III Date 12-2-99

Title MGR, Q.A.

GREASE SAMPLE ONLY

PROJECT: THREE MILE ISLAND DATE: 10-4-99

TENDON NO.: V83 TENDON END/BUTTRESS NO.: FIELD/BOTTOM SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No DPO 10-4-99 Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN N/A

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(9.8) AROUND TENDON ANCHORAGE N/A

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff Daniel P. Ohlsen Level II Date 10-4-99

QC Review H.F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A.

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PROJECT: THREE MILE ISLAND DATE: 10-14-99

TENDON NO.: V86 TENDON END/BUTTRESS NO.: Shop/Top SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO ____________

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No DPO 10-14-99 Quantity ______ Sample Taken Yes NO

Comments ____________

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No DPO 10-14-99 Quantity ______ Sample Taken Yes NO

Comments ____________

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No DPO 10-14-99 Quantity ______ Sample Taken Yes N

Comments ____________

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No DPO 10-22-99 Quantity ______ Sample Taken Yes N

Comments ____________

(11.) OWNER/AGENT NOTIFIED Yes No Date 10-14-99

CONDITION: OBSERVABLE ______ SIGNIFICANT ✓

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT PSC TRAILER

QC Signoff Daniel P. Olthu Level II Date 10-22-99

QC Review H. F. Hendrikson Level III Date 12-1-99

Title Mgr, Q.A

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PROJECT: THREE MILE ISLAND DATE: 10-4-99

TENDON NO.: V86 TENDON END/BUTTRESS NO.: FIELD/BOTTOM SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes DPO 10-4-99 No Quantity 2 1/2 GAL. Sample Taken Yes NO

☆ Comments WHEN REMOVING GREASE INLET PLUG DROPS OF WATER WHERE OBSERVED. AFTER CONNECTING Y-DEVICE TO DRAIN GREASE APPROX. 2 1/2 GAL. OF WATER WAS COLLECTED. DPO 10-4-99

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes DPO 10-20-99 No Quantity 2 OZ. Sample Taken Yes NO

Comments APPROX. 2 OZ. OF WATER COLLECTED FROM BOTTOM OF GREASE CAN.

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes DPO 10-20-99 No Quantity DROPS Sample Taken Yes NO

Comments DROPS OF WATER MIXED IN GREASE COMING OUT OF SHIM GAPS.

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes DPO 10-22-99 No Quantity DROPS Sample Taken Yes NO

Comments DROPS OF WATER MIXED IN GREASE

(11.) OWNER/AGENT NOTIFIED Yes D No Date 10-4-99

CONDITION: OBSERVABLE ______ SIGNIFICANT X

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT PSC TRAILER

☆ CAP/MNCR # T1999-0963 generated to evaluate & provide corrective action. 11/10/99

QC Signoff [signature] Level II Date 10-22-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

PROJECT: THREE MILE ISLAND DATE: 10-14-99

TENDON NO.: V94 TENDON END/BUTTRESS NO.: Shop/Top SURVEILLANCE 4TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff Daniel P. Ethan Level II Date 10-14-99

QC Review H.F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A.

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PROJECT: THREE MILE ISLAND DATE: 10-14-99

TENDON NO.: V110 TENDON END/BUTTRESS NO.: 5409/TOP SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO ____

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ____ Sample Taken Yes N

Comments ____

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ____ Sample Taken Yes N

Comments ____

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ____ Sample Taken Yes N

Comments ____

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ____ Sample Taken Yes N

Comments ____

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date ____

CONDITION: N/A OBSERVABLE ____ SIGNIFICANT ____

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff Daniel P. Ottho Level II Date 10-14-99

QC Review H. F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A.

PROJECT: THREE MILE ISLAND DATE: 9-10-99

TENDON NO.: V114 TENDON END/BUTTRESS NO.: SHOP / TOP SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO FIELD / BOTTOM

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

NA 9-10-99

(11.) OWNER/AGENT NOTIFIED ~~Yes~~ No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level ~~9-10-9~~ II 9-10-99 Date 9-10-99

QC Review H. F. Hendriksen Level III Date 12-1-99

Title Mgr., Q.A.

PROJECT: THREE MILE ISLAND DATE: 9-12-99

TENDON NO.: V114 TENDON END/BUTTRESS NO.: FIELD / BOTTOM SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO V114 SHOP / TOP

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

~~(9.10) DURING DETENSIONING~~

~~(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO~~

~~Comments ______~~

N/A W 9-16-99

~~(11.) OWNER/AGENT NOTIFIED Yes No Date ______~~

~~CONDITION: OBSERVABLE ______ SIGNIFICANT ______~~

~~(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO~~

~~(12.2) SAMPLES STORED AT ______~~

QC Signoff [signature] Level II Date 9-16-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A

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PROJECT: THREE MILE ISLAND DATE: 9-29-99

TENDON NO.: V114 TENDON END/BUTTRESS NO.: FIELD/BOTTOM SURVEILLANCE 4TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 9-29-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title Mgr., Q.A.

GREASE SAMPLE ONLY

PROJECT: THREE MILE ISLAND DATE: 10-4-99

TENDON NO.: V126 TENDON END/BUTTRESS NO.: FIELD/BOTTOM SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No DPO 10-4-99 Quantity ____ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN n/a

(9.7.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE n/a

(9.8.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING n/a

(9.10.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED n/a Yes No Date

CONDITION: OBSERVABLE ____ SIGNIFICANT ____

(12.1) SAMPLES ADEQUATELY IDENTIFIED n/a Yes NO

(12.2) SAMPLES STORED AT n/a

QC Signoff [signature] Level II Date 10-4-99

QC Review H.F. Hendrickson Level III Date 12-2-99

Title MGR., Q.A.

GREASE SAMPLE ONLY

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PROJECT: THREE MILE ISLAND DATE: 9-16-99

TENDON NO.: V136 TENDON END/BUTTRESS NO.: FIELD / BOTTOM SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

PLUG ONLY REMOVED / Y DEVICE USED

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(11.) OWNER/AGENT NOTIFIED N ~~Yes~~ No Date ______ 9-16-99

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-16-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

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GREASE SAMPLE ONLY

PROJECT: THREE MILE ISLAND DATE: 10-4-99

TENDON NO.: V139 TENDON END/BUTTRESS NO.: FIELD/BOTTOM SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

DPO 10-4-99

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments

(9.7) IN GREASE CAN n/A

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments

(9.8) AROUND TENDON ANCHORAGE n/A

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments

(9.10) DURING DETENSIONING n/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments

(11.) OWNER/AGENT NOTIFIED n/A Yes No Date ______

CONDITION: n/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED n/A Yes NO

(12.2) SAMPLES STORED AT n/A

QC Signoff Daniel P. O'Brien Level II Date 10-4-99

QC Review H.F. Hendrickson Level III Date 12-2-99

Title MGR., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 10-13-99

TENDON NO.: V143 TENDON END/BUTTRESS NO.: SHOP/TOP SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-13-99

QC Review H.K. Hendrickson Level III Date 12-2-99

Title Mgr. Q.A

GREASE SAMPLE ONLY

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PROJECT: THREE MILE ISLAND DATE: 9-16-99

TENDON NO.: V146 TENDON END/BUTTRESS NO.: FIELD / BOTTOM SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

PLUG ONLY REMOVED / Y DEVICE USED

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

NA 9-16-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-16-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 10-13-99

TENDON NO.: V156 TENDON END/BUTTRESS NO.: Shop/Top SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff Daniel P. Dillon Level II Date 10-13-99

QC Review H.F. Hendrikson Level III Date 12-2-99

Title MGR, Q.A.

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PROJECT: THREE MILE ISLAND DATE: 9-27-99

TENDON NO.: V164 TENDON END/BUTTRESS NO.: SHOP / TOP SURVEILLANCE 7+2

OTHER TENDON END LOCATION INFO V164 FIELD / BOTTOM

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No DPO 9-27-99 Quantity ______ Sample Taken Yes No

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No DPO 9-27-99 Quantity ______ Sample Taken Yes No

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No DPO 9-27-99 Quantity ______ Sample Taken Yes No

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No DPO 10-21-99 Quantity ______ Sample Taken Yes No

Comments ______

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date ______

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff Daniel P. O'Shea Level II Date 10-21-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 9-16-99

TENDON NO.: V164 TENDON END/BUTTRESS NO.: FIELD / BOTTOM SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO V164 SHOP / TOP

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

~~(9.10) DURING DETENSIONING~~

~~(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes No~~

~~Comments~~

N/A 9-16-99

~~(11.) OWNER/AGENT NOTIFIED Yes No Date ______~~

~~CONDITION: OBSERVABLE ______ SIGNIFICANT ______~~

~~(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO~~

~~(12.2) SAMPLES STORED AT ______~~

QC Signoff [signature] Level II Date 9-16-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title Mgr, Q.A.

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PROJECT: THREE MILE ISLAND DATE: 9-29-99

TENDON NO.: V164 TENDON END/BUTTRESS NO.: FIELD/BOTTOM SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No DPO 9-29-99 Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No DPO 9-29-99 Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No DPO 9-29-99 Quantity ______ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No DPO 10-21-99 Quantity ______ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-21-99

QC Review H.F. Hendricksen Level III Date 12-1-99

Title MGR, Q.A.

PROJECT: THREE MILE ISLAND DATE: 10-7-99

TENDON NO.: D1-02 TENDON END/BUTTRESS NO.: SHOP/NEAR BUTT. # 5 SURVEILLANCE 4TH

OTHER TENDON END LOCATION INFO ______

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes NO OPO 10-7-99 Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No OPO 10-7-99 Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No OPO 10-7-99 Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-8-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

PROJECT: THREE MILE ISLAND DATE: 10-7-99

TENDON NO.: D1-02 TENDON END/BUTTRESS NO.: FIELD / NEAR BUTT. # 1 SURVEILLANCE 4TH.

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No (SPD 10-7-99) Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No (SPD 10-7-99) Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No (SPD 10-7-99) Quantity ______ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No (10-27-99) Quantity ______ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED n/a Yes No Date

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED n/a Yes NO

(12.2) SAMPLES STORED AT n/a

QC Signoff [signature] Level II Date 10-8-99

QC Review H.T. Hendrickson Level III Date 12-1-99

Title Mgr., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 10-11-99

TENDON NO.: D1-04 TENDON END/BUTTRESS NO.: SHOP/NEAR BUTT #5 SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: N/A OBSERVABLE ____ SIGNIFICANT ____

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-11-99

QC Review H.F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A

PROJECT: THREE MILE ISLAND DATE: 10-11-99

TENDON NO.: D104 TENDON END/BUTTRESS NO.: FIELD/BUTT #1 NEAR SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-11-99

QC Review H. F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A.

GREASE LEAK REPAIR
&
CAN MOD.

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PROJECT: THREE MILE ISLAND DATE: 8-26-99

TENDON NO.: D145 TENDON END/BUTTRESS NO.: FIELD / SE SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes **No** Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes **No** Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes **No** Quantity ______ Sample Taken Yes NO

Comments ______

~~(9.10) DURING DETENSIONING~~

~~(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO~~

~~Comments ______~~

N/A W 8-26-99

~~(11.) OWNER/AGENT NOTIFIED Yes No Date ______~~

~~CONDITION: OBSERVABLE ______ SIGNIFICANT ______~~

~~(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO~~

~~(12.2) SAMPLES STORED AT ______~~

QC Signoff [signature] Level II Date 8-26-99

QC Review H.T. Hendricksen Level III Date 12-1-99

Title MGR., Q.A.

GREASE LEAK REPAIR
&
CAN MOD.

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PROJECT: THREE MILE ISLAND DATE: 8-26-99

TENDON NO.: D 147 TENDON END/BUTTRESS NO.: FIELD / 5E SURVEILLANCE 7+1

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A W 8-26-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-26-99

QC Review H. T. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

GREASE LEAK REPAIR

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PROJECT: THREE MILE ISLAND DATE: 8-19-99

TENDON NO.: D 202 NE TENDON END/BUTTRESS NO.: FIELD / NE SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes N/A No Quantity N/A Sample Taken Yes N/A NO

Comments N/A

(11.) OWNER/AGENT NOTIFIED Yes N/A No Date N/A

CONDITION: OBSERVABLE N/A SIGNIFICANT N/A

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes N/A NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 8-19-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 8-23-99

TENDON NO.: D225 TENDON END/BUTTRESS NO.: SHOP / NW SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO D225 FIELD / SE

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A cf 8-23-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-23-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

PROJECT: THREE MILE ISLAND DATE: 8-31-99

TENDON NO.: D225 TENDON END/BUTTRESS NO.: FIELD / SE SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO D225 SHOP / HW

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

NA 8-31-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-31-99

QC Review H. T. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 10-5-99

TENDON NO.: D3-13 TENDON END/BUTTRESS NO.: SHOP/NEAR BUTT #2 SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity _____ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity _____ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity _____ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity _____ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: OBSERVABLE _____ SIGNIFICANT _____

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO.

(12.2) SAMPLES STORED AT N/A

QC Signoff Daniel P. O'Shea Level II Date 10-5-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

PROJECT: THREE MILE ISLAND DATE: 10-5-99

TENDON NO.: D3-13 TENDON END/BUTTRESS NO.: Field/Near Butt 3 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: OBSERVABLE ____ SIGNIFICANT ____

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-5-99

QC Review H. L. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

Grease Leak Repair
&
Can Mod

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PROJECT: THREE MILE ISLAND DATE: 9-10-99

TENDON NO.: D317 TENDON END/BUTTRESS NO.: Field / 5E SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

A 9-9-99

(11.) OWNER/AGENT NOTIFIED N ~~Yes~~ No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-10-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

GREASE LEAK REPAIR

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PROJECT: THREE MILE ISLAND DATE: 10-13-99

TENDON NO.: D336 TENDON END/BUTTRESS NO.: FIELD/NW SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date ______

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-13-99

QC Review H.F. Hendrickson Level III Date 12-2-99

Title MGR., Q.A.

Grease Leak Repair

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PROJECT: THREE MILE ISLAND DATE: 9-17-99

TENDON NO.: H 13-12 TENDON END/BUTTRESS NO.: Shop / Butt #1 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(11.) OWNER/AGENT NOTIFIED NA Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-17-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A

Grease Leak Repair

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PROJECT: THREE MILE ISLAND DATE: 9-17-99

TENDON NO.: H 13-13 TENDON END/BUTTRESS NO.: SHOP / BUTT #1 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(11.) OWNER/AGENT NOTIFIED N/A ~~Yes~~ No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-17-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

Grease Leak Repair

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PROJECT: THREE MILE ISLAND DATE: 9-17-99

TENDON NO.: H13-21 TENDON END/BUTTRESS NO.: SHOP/Butt #1 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

~~(9.10) DURING DETENSIONING~~

~~(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO~~

~~Comments ______~~

N/A 9-17-99

~~(11.) OWNER/AGENT NOTIFIED Yes No Date ______~~

~~CONDITION: OBSERVABLE ______ SIGNIFICANT ______~~

~~(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO~~

~~(12.2) SAMPLES STORED AT ______~~

QC Signoff [signature] Level II Date 9-17-99

QC Review H.F. Hendricksen Level III Date 12-1-99

Title MGR., Q.A.

PROJECT: THREE MILE ISLAND DATE: 9-22-99

TENDON NO.: 13 H 50 TENDON END/BUTTRESS NO.: Shop / Butt #1 SURVEILLANCE 27th

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No DPO 9-22-99 Quantity ______ Sample Taken Yes N

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No DPO 9-22-99 Quantity ______ Sample Taken Yes N

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No DPO 9-22-99 Quantity ______ Sample Taken Yes N

Comments

(9.10) DURING DETENSIONING TL 10-1-99

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff Daniel P. Oehme Level II Date 10-1-99

QC Review H.F. Hendrikson Level III Date 12-1-99

Title MGR, Q.A

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PROJECT: THREE MILE ISLAND

DATE: 9-30-99

TENDON NO.: 13H50 TENDON END/BUTTRESS NO.: FIELD / BUTT #3 SURVEILLANCE 7TH

OTHER TENDON END LOCATION INFO

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No DPO 9-30-99 Quantity ______ Sample Taken Yes NO

Comments

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No DPO 9-30-99 Quantity ______ Sample Taken Yes NO

Comments

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No DPO 9-30-99 Quantity ______ Sample Taken Yes NO

Comments

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff Daniel R. O'Shea Level II Date 10-1-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

Grease Leak Repair
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PROJECT: THREE MILE ISLAND DATE: 10-18-99

TENDON NO.: 24H51 TENDON END/BUTTRESS NO.: FIELD/BUTT. #2 SURVEILLANCE 4TH

OTHER TENDON END LOCATION INFO ______

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date ______

CONDITION: N/A OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 10-18-99

QC Review H.F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A

GREASE LEAK REPAIR
&
CAN MOD.

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PROJECT: THREE MILE ISLAND DATE: 9-15-99

TENDON NO.: H 26-A TENDON END/BUTTRESS NO.: FIELD / BUTT #2 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

A 9-16-99

(11.) OWNER/AGENT NOTIFIED ~~Yes~~ No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-16-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A

Grease Leak Repair
&
Can Mod.

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PROJECT: THREE MILE ISLAND DATE: 8-23-99

TENDON NO.: H26-52 TENDON END/BUTTRESS NO.: Field / Butt #2 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A 8-23-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-23-99

QC Review H. T. Hendrikson Level III Date 12-1-99

Title MGR, Q.A.

GREASE LEAK REPAIR
&
CAN MOD.

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PROJECT: THREE MILE ISLAND DATE: 8-20-99

TENDON NO.: H 26-53 TENDON END/BUTTRESS NO.: FIELD / BUTT #2 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

A W 8-20-99

(11.) OWNER/AGENT NOTIFIED N Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-20-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

GREASE LEAK REPAIR
&
CAN MOD

PROJECT: THREE MILE ISLAND DATE: 9-7-99

TENDON NO.: H 31-18 TENDON END/BUTTRESS NO.: FIELD / BUTT #3 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A 9-7-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-7-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

Grease Leak Repair
&
Can Mod

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PROJECT: THREE MILE ISLAND DATE: 9.8.99

TENDON NO.: H 31-46 TENDON END/BUTTRESS NO.: / Butt #3 SURVEILLANCE 7

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments ____

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments ____

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments ____

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments ____

A of 9-8-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ____

CONDITION: OBSERVABLE ____ SIGNIFICANT ____

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ____

QC Signoff [signature] Level II Date 9-8-99

QC Review H. F. Hendricksen Level III Date 12-1-99

Title MGR., Q.A.

Grease Leak Repair
&
Can Mod

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PROJECT: THREE MILE ISLAND DATE: 9-9-99

TENDON NO.: H 31-51 TENDON END/BUTTRESS NO.: / Butt #3 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

A ✓ 9.8.99

(11.) OWNER/AGENT NOTIFIED ~~Yes~~ No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-9-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

Grease Leak Repair
&
Can Mod

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PROJECT: THREE MILE ISLAND DATE: 9-8-99

TENDON NO.: H31-55 TENDON END/BUTTRESS NO.: / Butt #3 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

A 9-8-99

(11.) OWNER/AGENT NOTIFIED N ~~Yes~~ No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-8-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 9-7-99

TENDON NO.: H35-33 TENDON END/BUTTRESS NO.: SHOP / BUTT #5 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO H35-33 FIELD / BUTT #3

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A 9-3-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-7-99

QC Review H.T. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 9-3-99

TENDON NO.: H35-33 TENDON END/BUTTRESS NO.: FIELD / BUTT #3 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO H 35-33 SHOP / BUTT #5

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments ____

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments ____

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments ____

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ____ Sample Taken Yes NO

Comments ____

9-2-99

(11.) OWNER/AGENT NOTIFIED ~~Yes~~ No Date ____

CONDITION: OBSERVABLE ____ SIGNIFICANT ____

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ____

QC Signoff [signature] Level II Date 9-3-99

QC Review H. L. Hendricksen Level III Date 12-1-99

Title MGR., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 9-13-99

TENDON NO.: H 46-37 TENDON END/BUTTRESS NO.: SHOP / BUTT #6 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO H46-37 FIELD / BUTT #4

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

~~(9.10) DURING DETENSIONING~~

~~(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO~~

~~Comments ______~~

N/A 9-13-99

~~(11.) OWNER/AGENT NOTIFIED Yes No Date ______~~

~~CONDITION: OBSERVABLE ______ SIGNIFICANT ______~~

~~(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO~~

~~(12.2) SAMPLES STORED AT ______~~

QC Signoff [signature] Level II Date 9-13-99

QC Review H. T. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

PROJECT: THREE MILE ISLAND DATE: 9-22-99

TENDON NO.: H46-37 TENDON END/BUTTRESS NO.: FIELD / BUTT #4 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO H46-37 SHOP / BUTT #6

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING N/A

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(11.) OWNER/AGENT NOTIFIED N/A Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED N/A Yes NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 9-22-99

QC Review H. T. Hendriksen Level III Date 12-1-99

Title MGR., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 8-24-99

TENDON NO.: H 51-4 TENDON END/BUTTRESS NO.: FIELD/BUTT #5 SURVEILLANCE 7TH W.8-24-

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes N/A No Quantity N/A Sample Taken Yes N/A N

Comments N/A

(11.) OWNER/AGENT NOTIFIED Yes N/A No Date N/A

CONDITION: OBSERVABLE N/A SIGNIFICANT N/A

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes N/A NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 8-24-99

QC Review H.F. Hendrickson Level III Date 12-2-99

Title MGR, Q.A

GREASE LEAK REPAIR
&
CAN MOD.

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PROJECT: THREE MILE ISLAND DATE: 9-14-99

TENDON NO.: H51-14 TENDON END/BUTTRESS NO.: FIELD / BUTT 5 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

NA 9-14-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-14-99

QC Review H. F. Hendrikson Level III Date 12-1-99

Title MGR. Q.A.

Grease Leak Repair Chk-1

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PROJECT: THREE MILE ISLAND DATE: 9.16.99

TENDON NO.: H 15-13 TENDON END/BUTTRESS NO.: Shop / Butt #1 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO H 51-13 Field / Butt #5

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

A.J. 9.16-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-16-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

GREASE LEAK REPAIR
&
CAN MOD.

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PROJECT: THREE MILE ISLAND DATE: 9-14-99

TENDON NO.: H51-13 TENDON END/BUTTRESS NO.: FIELD / BUTT #5 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO H 15-13 SHOP / BUTT #1

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

9-14-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-14-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

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PROJECT: THREE MILE ISLAND DATE: 9-14-99

TENDON NO.: H51-43 TENDON END/BUTTRESS NO.: SHOP / BUTT #1 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO H51-43 FIELD / BUTT #5

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

NA 9-14-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-14-99

QC Review H.J. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

PROJECT: THREE MILE ISLAND DATE: 9-13-99

TENDON NO.: H51-43 TENDON END/BUTTRESS NO.: FIELD / BUTT #5 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO H51-43 SHOP / BUTT #1

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

CA 9-13-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-13-99

QC Review H.T. Hendrickson Level III Date 12-1-99

Title Mbr, R.A.

PROJECT: THREE MILE ISLAND DATE: 8-24-99

TENDON NO.: H53-6 TENDON END/BUTTRESS NO.: SHOP/BUTT #5 SURVEILLANCE ~~6~~ 7TH 8-24-

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes N/A No Quantity N/A Sample Taken Yes N/A N

Comments N/A

(11.) OWNER/AGENT NOTIFIED Yes N/A No Date N/A

CONDITION: OBSERVABLE N/A SIGNIFICANT N/A

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes N/A NO

(12.2) SAMPLES STORED AT N/A

QC Signoff [signature] Level II Date 8-24-99

QC Review H. L. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

GREASE LEAK REPAIR
&
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PROJECT: THREE MILE ISLAND DATE: 9-2-99

TENDON NO.: H53-11 TENDON END/BUTTRESS NO.: SHOP / BUTT 5 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A 9-2-99

(11.) OWNER/AGENT NOTIFIED N ~~Yes~~ No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-2-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

Grease Leak Repair
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Can Mod.

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PROJECT: THREE MILE ISLAND DATE: 9-2-99

TENDON NO.: H 53-13 TENDON END/BUTTRESS NO.: SHOP / Butt #5 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes N

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes N.

Comments ______

N/A 9-2-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-2-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

Grease Leak Repair
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Can Mod.

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PROJECT: THREE MILE ISLAND DATE: 9-2-99

TENDON NO.: H 53-25 TENDON END/BUTTRESS NO.: SHOP / Butt # 5 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

~~(9.10) DURING DETENSIONING~~

~~(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO~~

~~Comments ______~~

N/A w/ 9-2-99

~~(11.) OWNER/AGENT NOTIFIED Yes No Date ______~~

~~CONDITION: OBSERVABLE ______ SIGNIFICANT ______~~

~~(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO~~

~~(12.2) SAMPLES STORED AT ______~~

QC Signoff [signature] Level II Date 9-2-99

QC Review H. T. Hendrickson Level III Date 12-1-99

Title MGR, Q.A

Grease Leak Repair
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Can Mod.

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PROJECT: THREE MILE ISLAND DATE: 9-9-99

TENDON NO.: H 53-44 TENDON END/BUTTRESS NO.: Shop / Butt #5 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes No

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

X 9.9.99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-9-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

4 9-9-99
Grease Cap Leak Repair
&
Can Mod

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PROJECT: THREE MILE ISLAND DATE: 9-9-99

TENDON NO.: H 53-48 TENDON END/BUTTRESS NO.: Shop / Butt #5 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes **No** Quantity ______ Sample Taken Yes No

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes **No** Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes **No** Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A 9-9-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 9-9-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

Grease Leak Repair
&
Can Mod

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PROJECT: THREE MILE ISLAND DATE: 8-31-99

TENDON NO.: H62-10 TENDON END/BUTTRESS NO.: SHOP / Butt #6 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A 8-31-99

(11.) OWNER/AGENT NOTIFIED ~~Yes~~ No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-31-99

QC Review H.T. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

Grease Leak Repair
&
Can Mod

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PROJECT: THREE MILE ISLAND DATE: 8-31-99

TENDON NO.: H 62-13 TENDON END/BUTTRESS NO.: SHOP / Butt #6 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

N/A 8-31-99

(11.) OWNER/AGENT NOTIFIED N Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-31-99

QC Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

GREASE LEAK REPAIR
&
CAN MOD.

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PROJECT: THREE MILE ISLAND DATE: 8-31-99

TENDON NO.: H 62 14 TENDON END/BUTTRESS NO.: SHOP / BUTT #6 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

NA CL 8-31-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-31-99

QC Review H.T. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

GREASE LEAK REPAIR
&
CAM MOD.

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PROJECT: THREE MILE ISLAND DATE: 8-30-99

TENDON NO.: H62-15 TENDON END/BUTTRESS NO.: SHOP / BUTT #6 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO N/A

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(11.) OWNER/AGENT NOTIFIED N A ~~Yes~~ 8-30-99 No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-30-99

QC Review H.K. Hendrickson Level III Date 12-1-99

Title MGR, R.A.

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PROJECT: THREE MILE ISLAND DATE: 8-30-99

TENDON NO.: H62-26 TENDON END/BUTTRESS NO.: SHOP / BUTT #6 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO H62-26 FIELD / BUTT #2

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

NA 8-30-99

(11.) OWNER/AGENT NOTIFIED Yes No Date ______

CONDITION: OBSERVABLE ______ SIGNIFICANT ______

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ______

QC Signoff [signature] Level II Date 8-30-99

QC Review H.F. Hendricksen Level III Date 12-1-99

Title MGR, Q.A.

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PROJECT: THREE MILE ISLAND DATE: 9-2-99

TENDON NO.: H62-26 TENDON END/BUTTRESS NO.: Field / Butt #2 SURVEILLANCE 7th

OTHER TENDON END LOCATION INFO H62-26 Shop / Butt #6

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO

Comments ______

~~(9.10) DURING DETENSIONING~~

~~(9.10.1) Water Detected Yes No Quantity ______ Sample Taken Yes NO~~

~~Comments ______~~

A 9-2-99

~~(11.) OWNER/AGENT NOTIFIED N ~~Yes~~ No Date ______~~

~~CONDITION: OBSERVABLE ______ SIGNIFICANT ______~~

~~(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO~~

~~(12.2) SAMPLES STORED AT ______~~

QC Signoff [signature] Level II Date 9-2-99

QC Review H.F. Hendrickson Level III Date 12-1-99

Title MGR. Q.A.

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BUTTONHEAD GUIDE
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1991
TENDON NO.: V8 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1
ANCHORHEAD I.D. 590 BUSHING I.D. 1212

(3) BUTTONHEAD DATA
- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Malformed

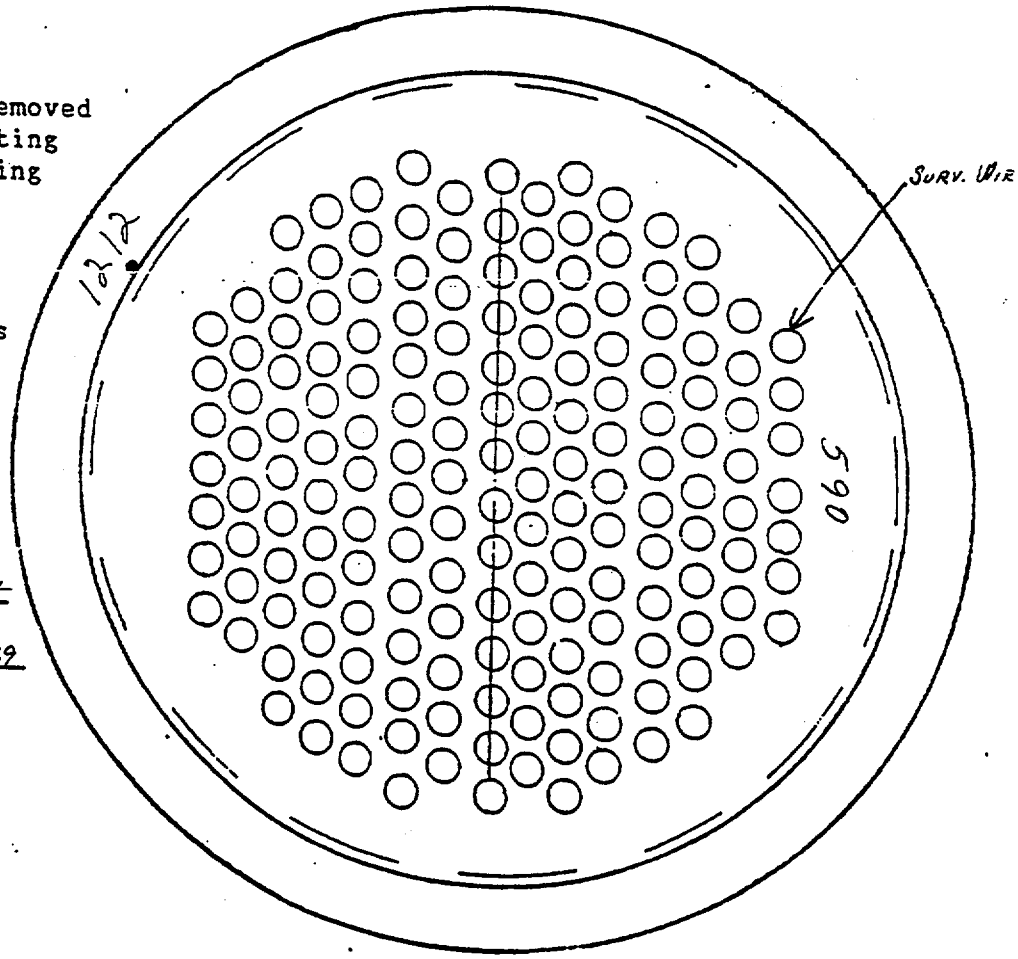
M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

SHIM STACK
16.10" BOTH SIDES
(4", 4", 4", 2", 1", 1")



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 10-13-99

QC Review A.F. Hendrickson
Title MGR, Q.A. Level III
Date 12-2-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: V32 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1

ANCHORHEAD I.D. 1036 BUSHING I.D. 1050

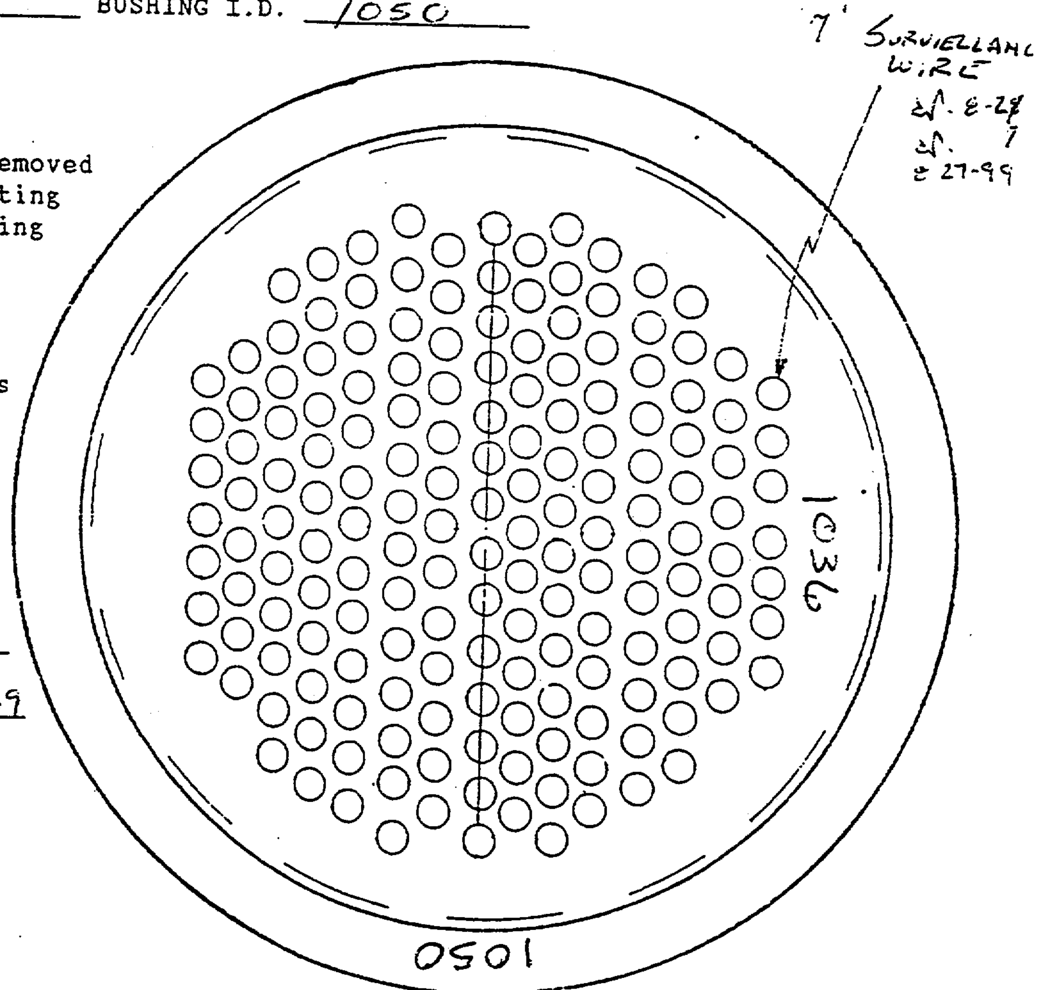
(3) BUTTONHEAD DATA
- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



QC Signoff [signature]
Title Inspector Level II
Date 8-27-99

QC Review H.G. Hendrickson
Title MGR., Q.A. Level III
Date 12-1-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999
TENDON NO.: V32 TENDON END/BUTTRESS NO.: FIELD / BOTTOM UNIT 1
ANCHORHEAD I.D. 657 BUSHING I.D. N/A

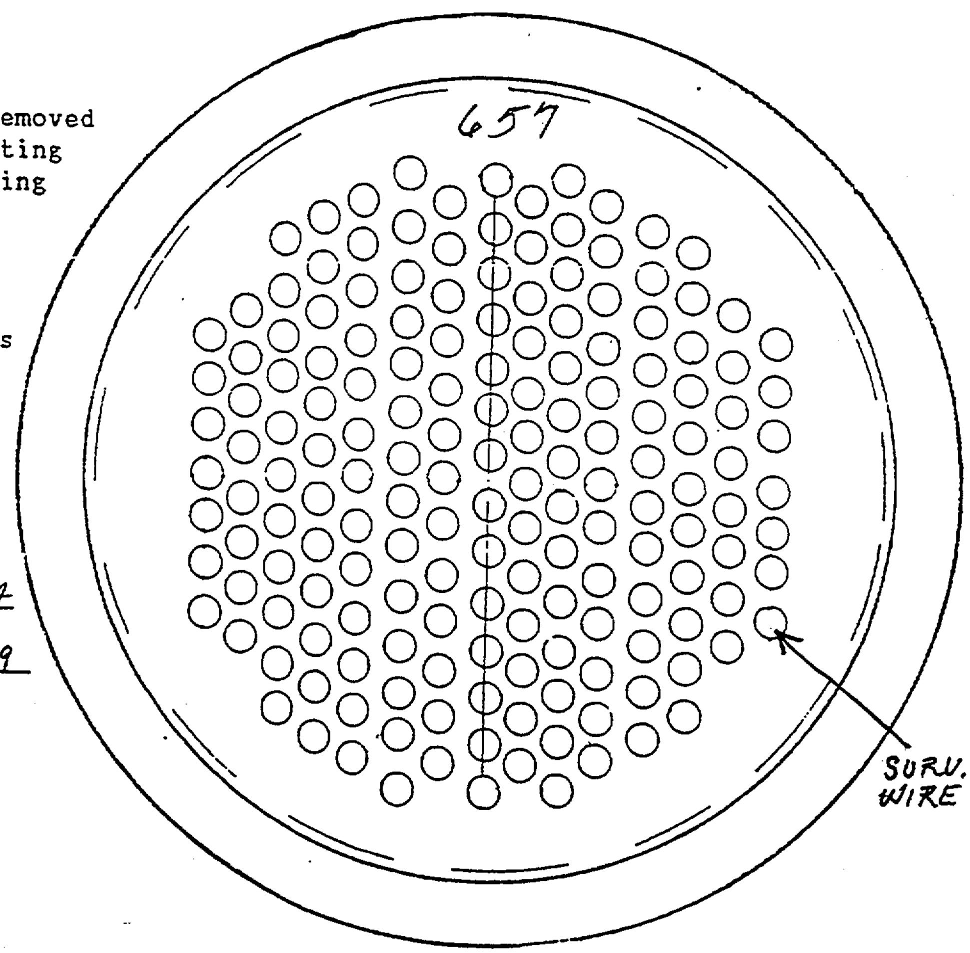
(3) BUTTONHEAD DATA
- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 9-29-99

QC Review H. F. Hendrickson
Title MGR, Q.A. Level III
Date 12-1-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999
TENDON NO.: V35 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1
ANCHORHEAD I.D. 1065 BUSHING I.D. 1049

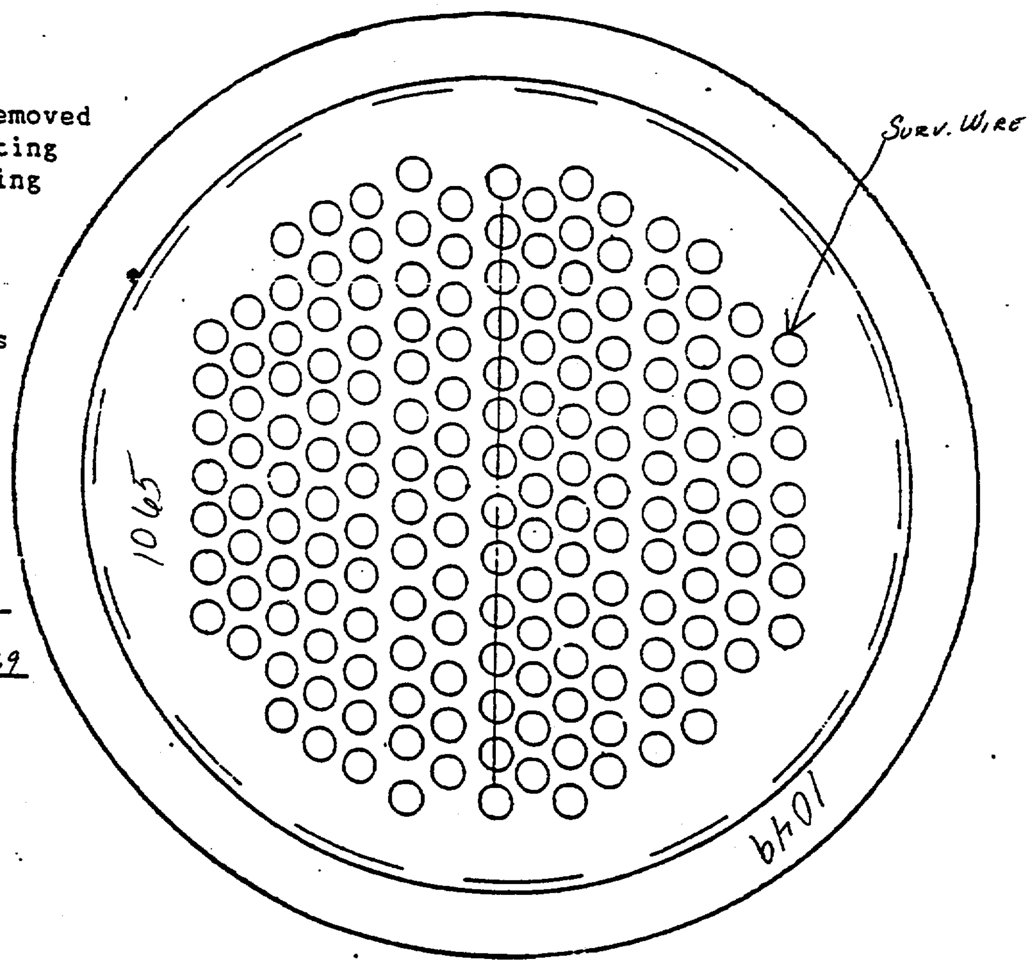
(3) BUTTONHEAD DATA
- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169
Shim Stack
15.40 Both Sides
(4", 4", 4", 2", 1")



QC Signoff [signature]
Title QC Inspector Level II
Date 10-13-99

QC Review H. R. Hendrickson
Title MGR., Q.A. Level III
Date 12-2-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: V-40 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1

ANCHORHEAD I.D. 972 BUSHING I.D. 610

(3) BUTTONHEAD DATA

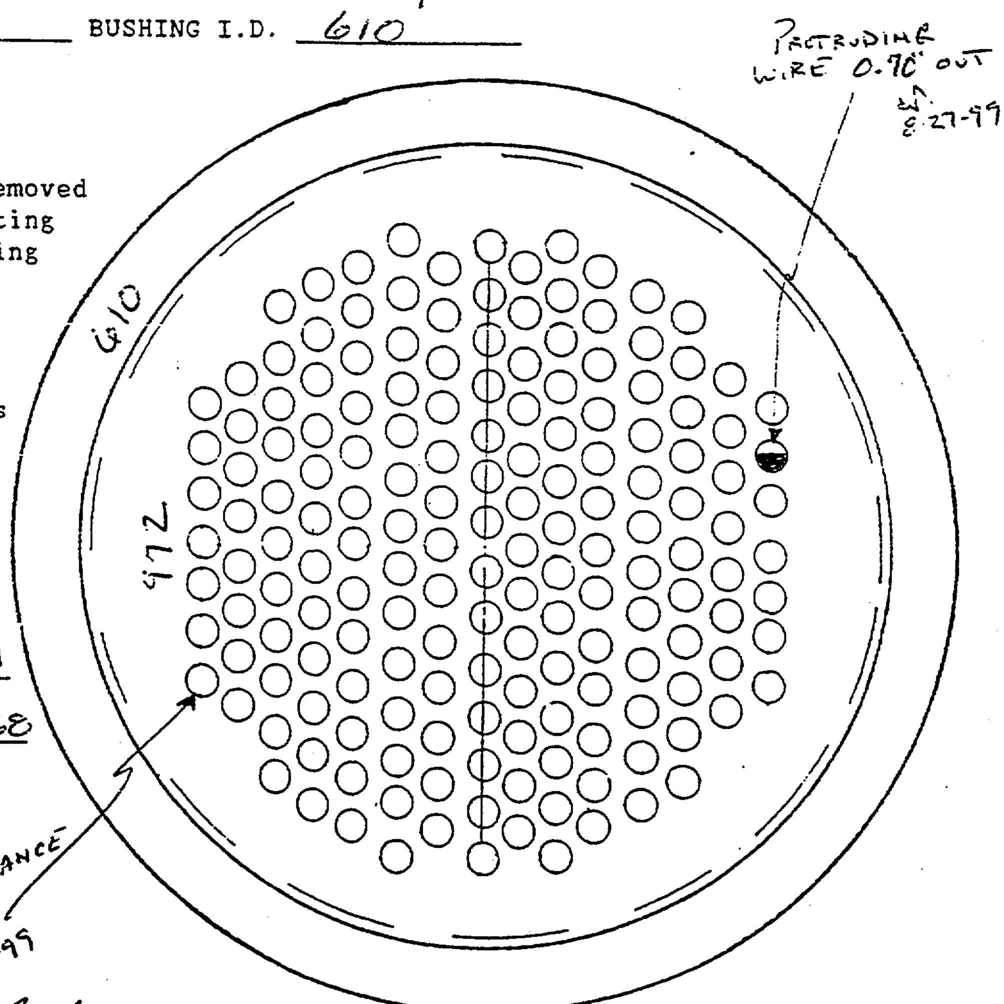
- ⊘ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 168



QC Signoff [signature]
Title INSPECTOR Level II
Date 8-27-99

QC Review H.T. Hendrickson
Title MGR, Q.A. Level III
Date 12-1-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999
TENDON NO.: V40 TENDON END/BUTTRESS NO.: FIELD/BOTTOM UNIT 1
ANCHORHEAD I.D. 081 BUSHING I.D. N/A

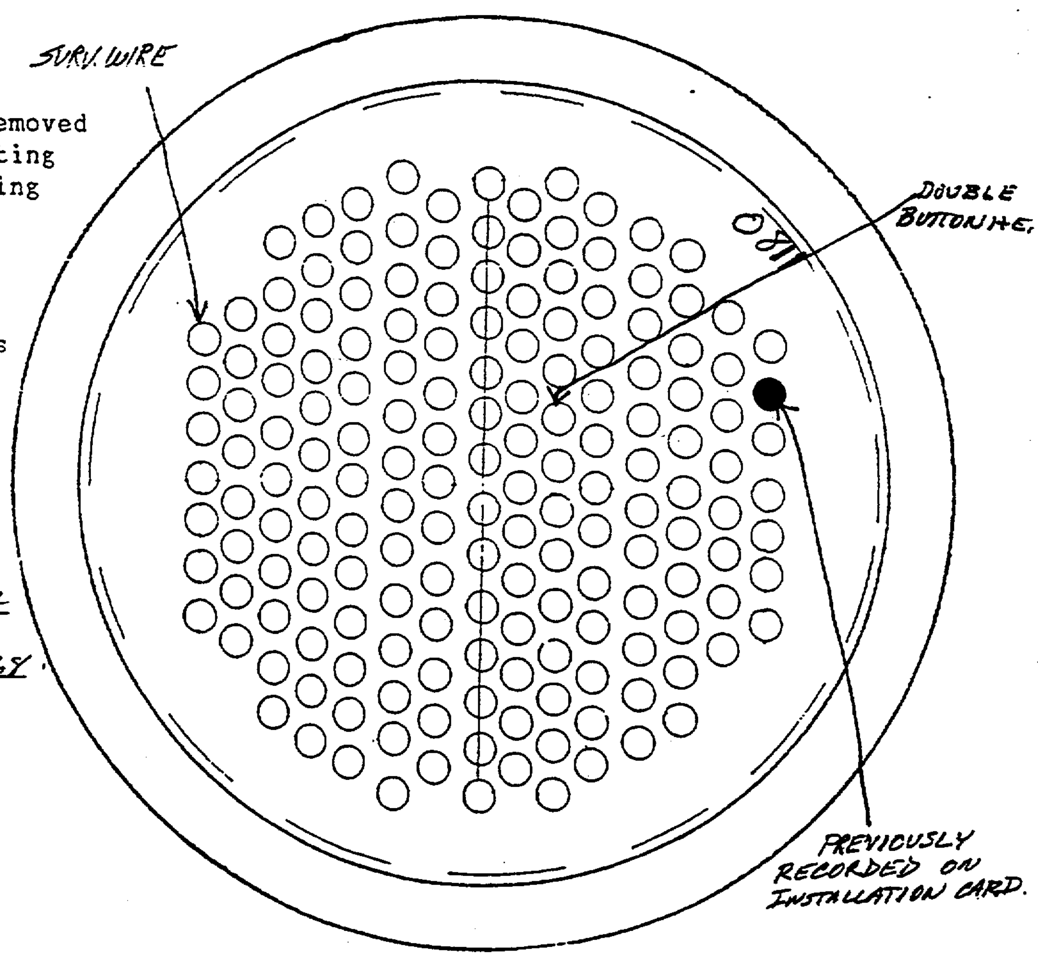
(3) BUTTONHEAD DATA
- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◻ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 168



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 9-29-99

QC Review H.T. Hendrickson
Title MGR., Q.A. Level III
Date 12-1-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: V57 TENDON END/BUTTRESS NO.: Shop/Top UNIT 1

ANCHORHEAD I.D. 994 BUSHING I.D. 1010

(3) BUTTONHEAD DATA

- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Malformed

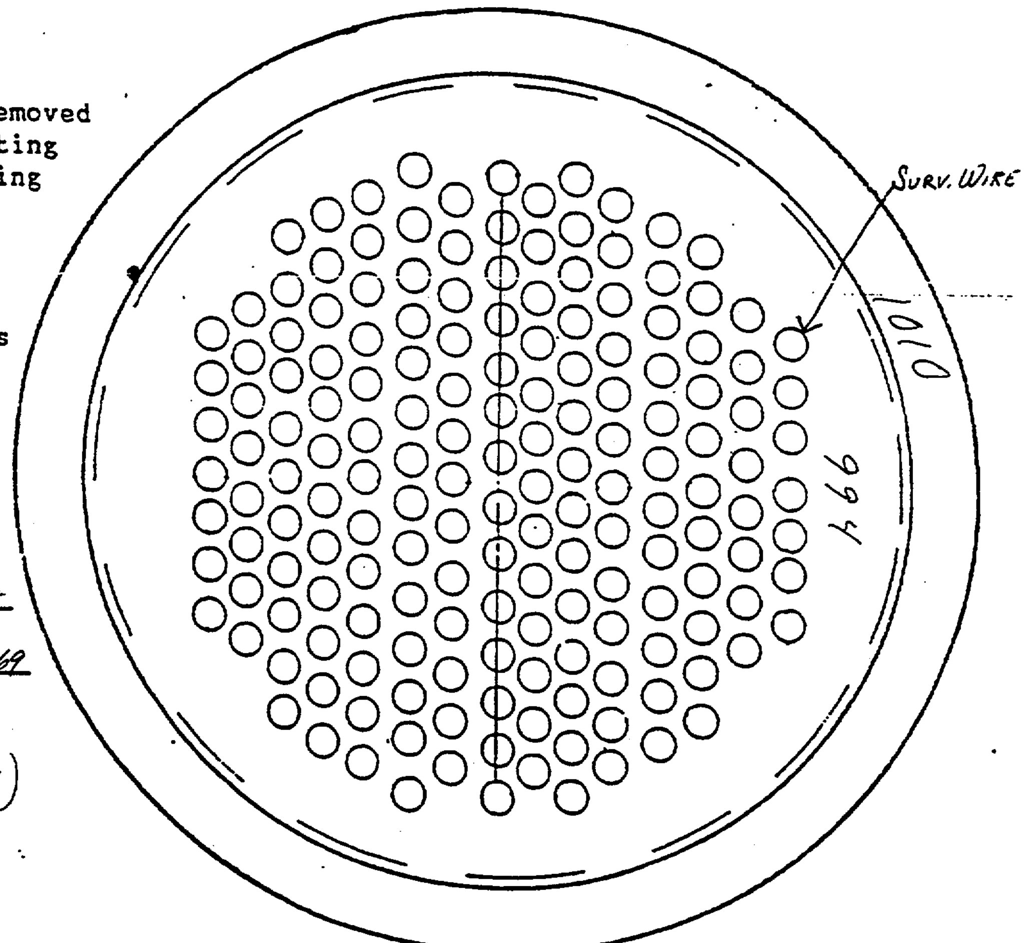
M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

Shim Stack
15.65" Both Sides
(4", 4", 4", 2", 1", 1/4")



QC Signoff [signature]
Title QC Inspector Level II
Date 10-13-99

QC Review H. F. Hendrickson
Title MGR, Q.A. Level III
Date 12-2-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999
TENDON NO.: V80 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1
ANCHORHEAD I.D. 949 BUSHING I.D. 993

(3) BUTTONHEAD DATA
- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

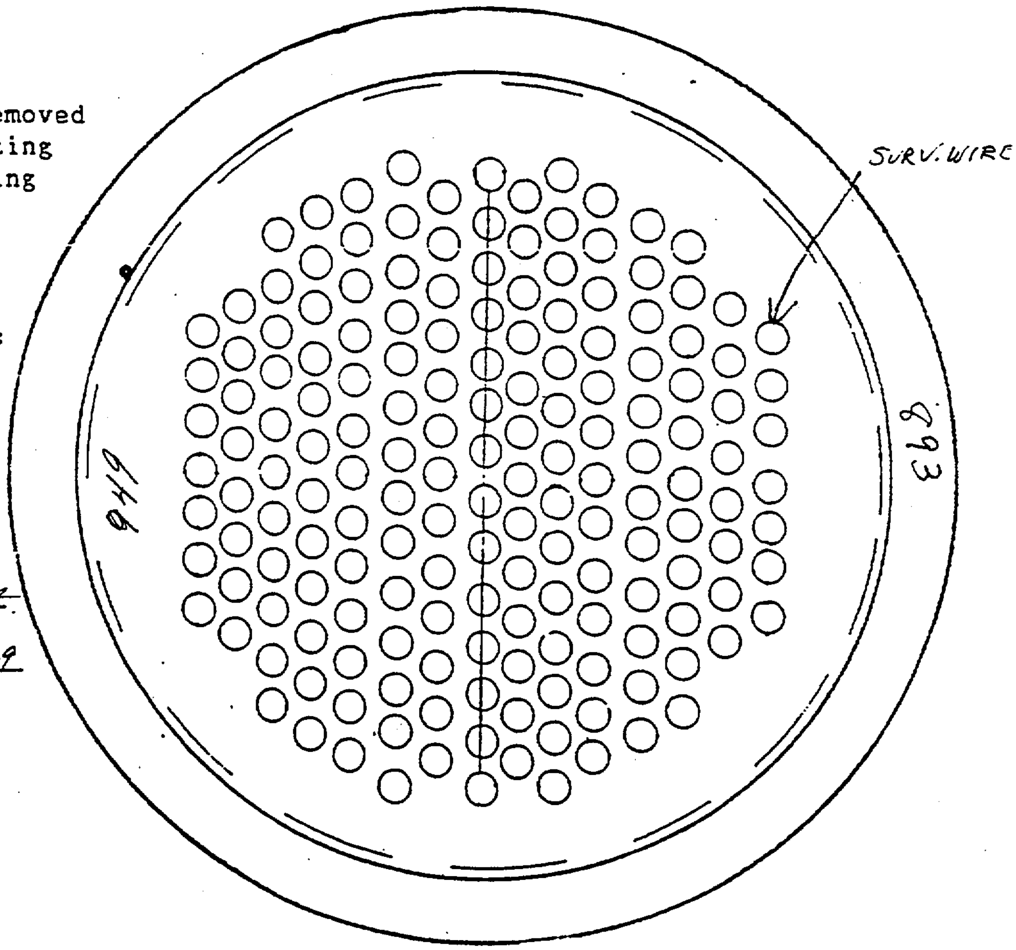
M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

SHIM STACK
15.15" BOTH SIDES
(4, 4, 4, 2, 1/2", 1/4")



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 10-14-99

QC Review H.F. Hendrickson
Title MGR., Q.A. Level III
Date 12-2-99

A376 # 424

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PROJECT: THREE MILE ISLAND SURVEILLANCE 4TH YEAR: 1999

TENDON NO.: V86 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1

ANCHORHEAD I.D. 1063 BUSHING I.D. 1085

(3) BUTTONHEAD DATA

- ⌀ = Discontinuous-Removed
- ⊠ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

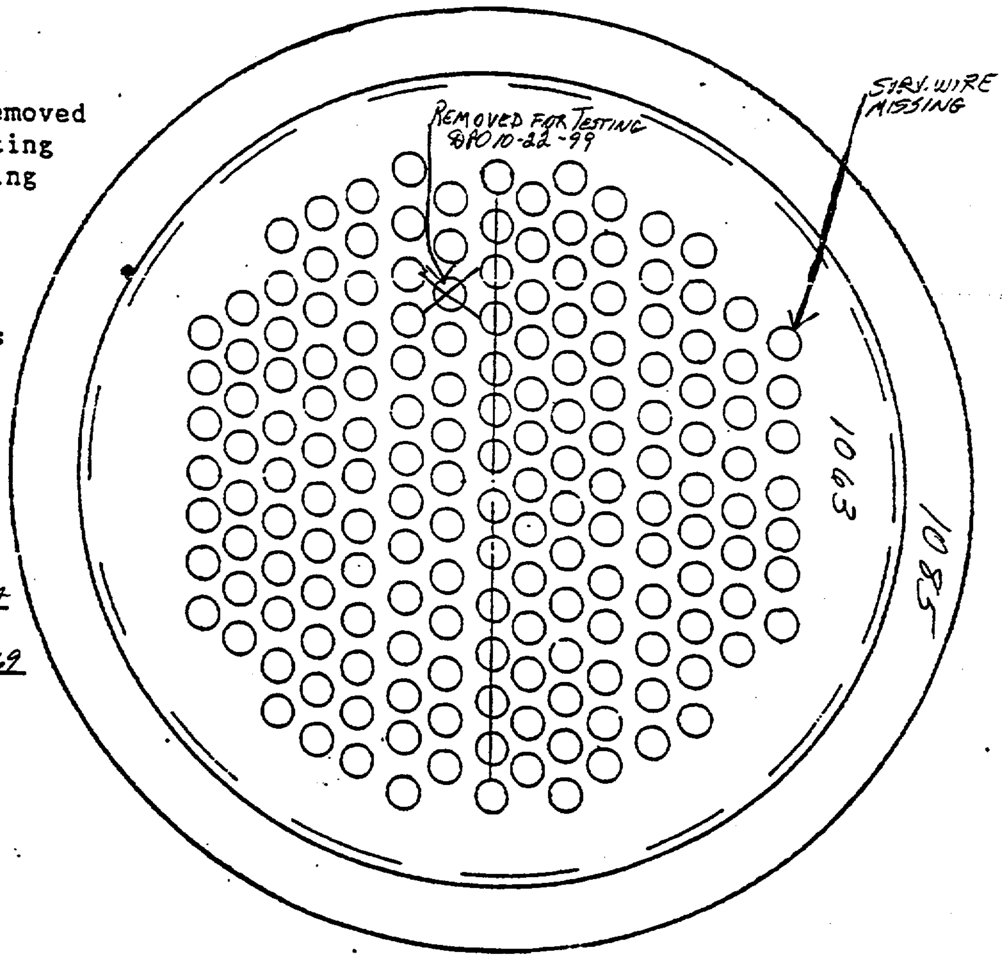
(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

SHIM STACK
16.90
(4", 4", 4", 2", 2", ½")

RETENSIONED
15.40"
4, 4, 4, 2, ½", ½"



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 10-14-99

QC Review H. F. Hedinkan
Title MGR, Q.A. Level III
Date 12-1-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: V86 TENDON END/BUTTRESS NO.: FIELD/BOTTOM UNIT 1

ANCHORHEAD I.D. 1086 BUSHING I.D. N/A

(3) BUTTONHEAD DATA
- ⊘ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◎ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

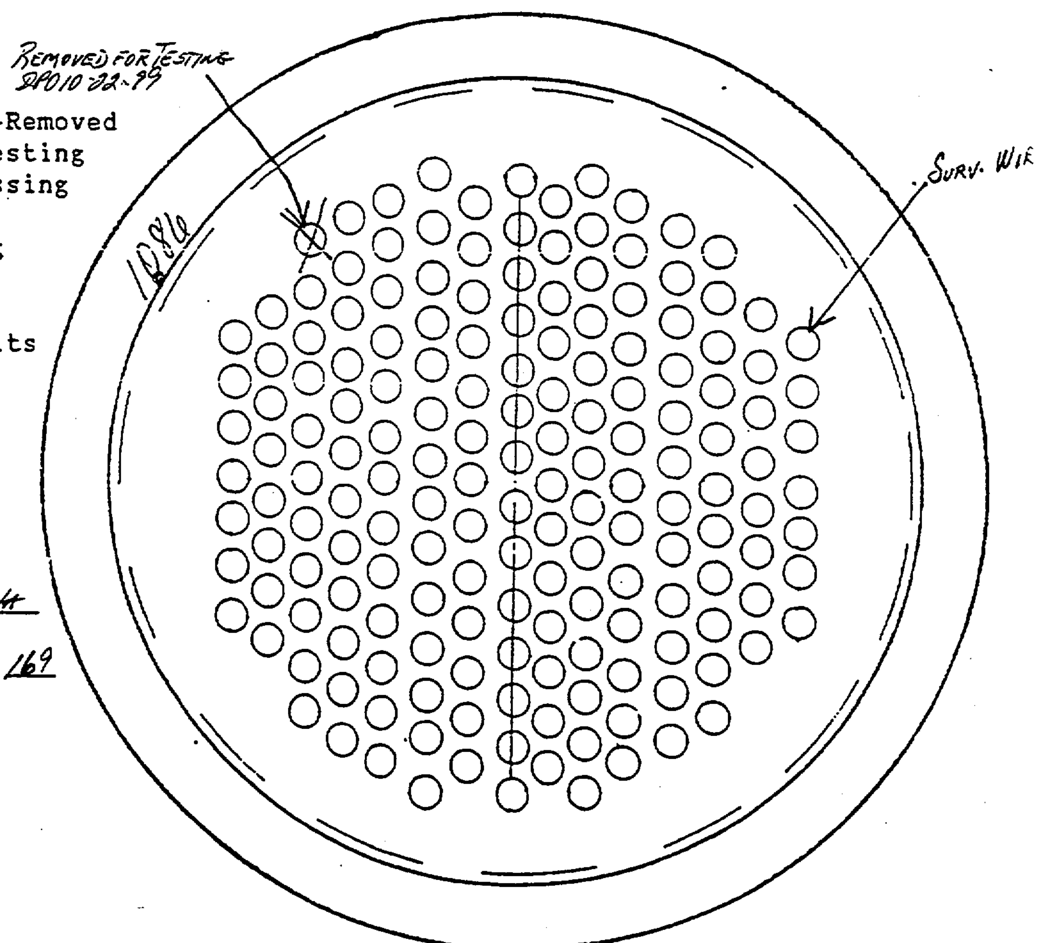
(4) Locate Anchorage
Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

ASFOUND SHIMSTACK
2"

RETENSIONED.
5.1"
(2, ½, ½, 2)



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 10-20-99

QC Review H.F. Hendrikson
Title MGR., Q.A. Level III
Date 12-1-99

A378F 424

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: V94 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1

ANCHORHEAD I.D. 925 BUSHING I.D. 661

(3) BUTTONHEAD DATA

- Ø = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

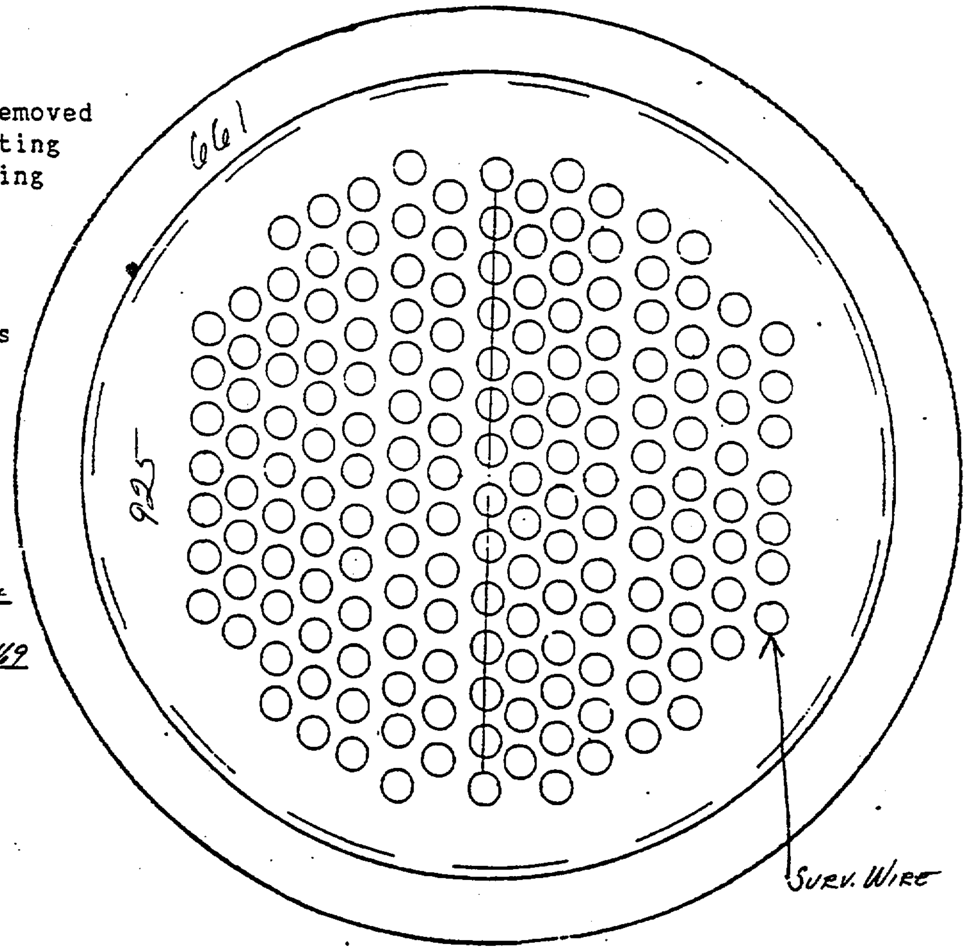
M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

SHIM STACK
14.85".
(4", 4", 4", 2", 1/2")



QC Signoff [signature]
Title QC Inspector Level II
Date 10-14-99

QC Review H. F. Hendrickson
Title MGR., Q.A. Level III
Date 12-2-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: V110 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1

ANCHORHEAD I.D. 844 BUSHING I.D. 1115

(3) BUTTONHEAD DATA

- ⊘ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

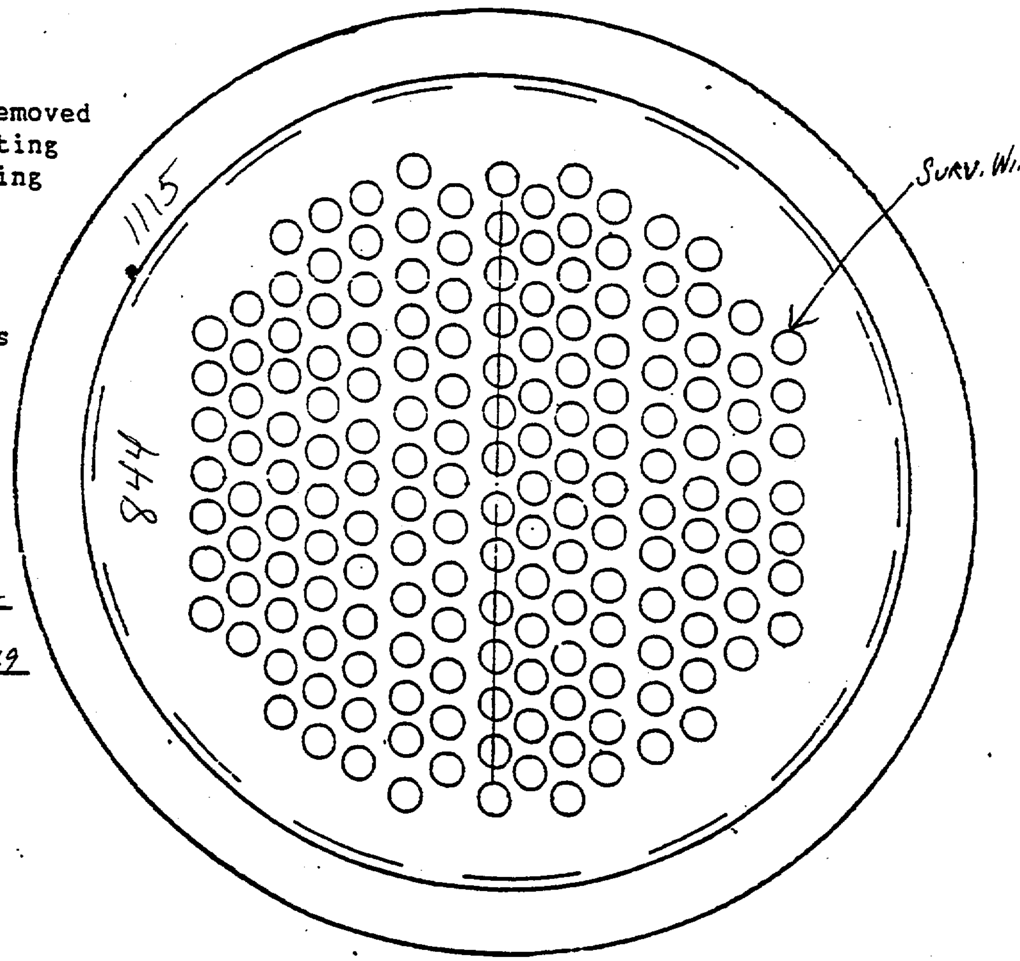
M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

SHIM STACK
15.65"
(4", 4", 4", 2", 1", 1/4")



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 10-14-99

QC Review H. F. Hendrickson
Title MGR, Q.A. Level III
Date 12-2-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: V114 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1

ANCHORHEAD I.D. 900 BUSHING I.D. 772

(3) BUTTONHEAD DATA

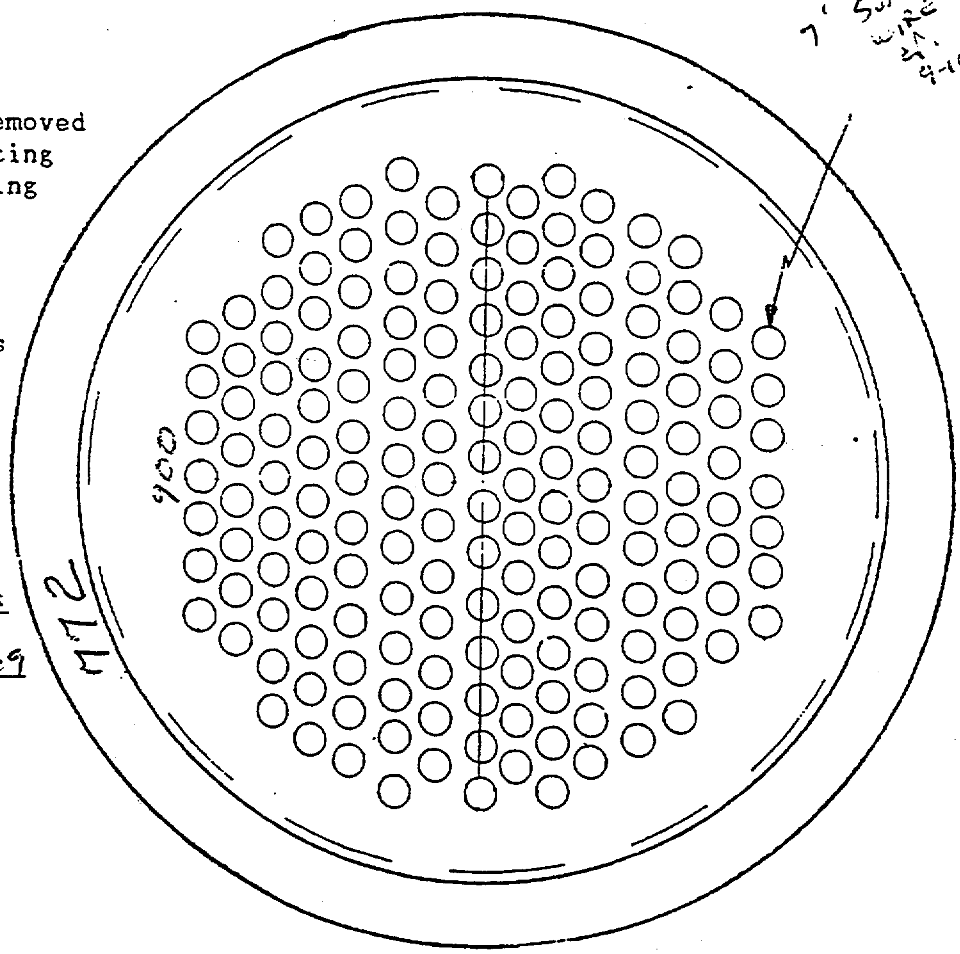
- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



7' Surveillance wire 9-10-99

QC Signoff [signature]
Title Inspector Level II
Date 9-10-99

QC Review H. F. Hendrickson
Title Mod. Q.A. Level III
Date 12-1-99

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PSC PROCEDURE SQ 8.0
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: V114 TENDON END/BUTTRESS NO.: Field/Bottom UNIT 1

ANCHORHEAD I.D. 720 BUSHING I.D. n/a

(3) BUTTONHEAD DATA

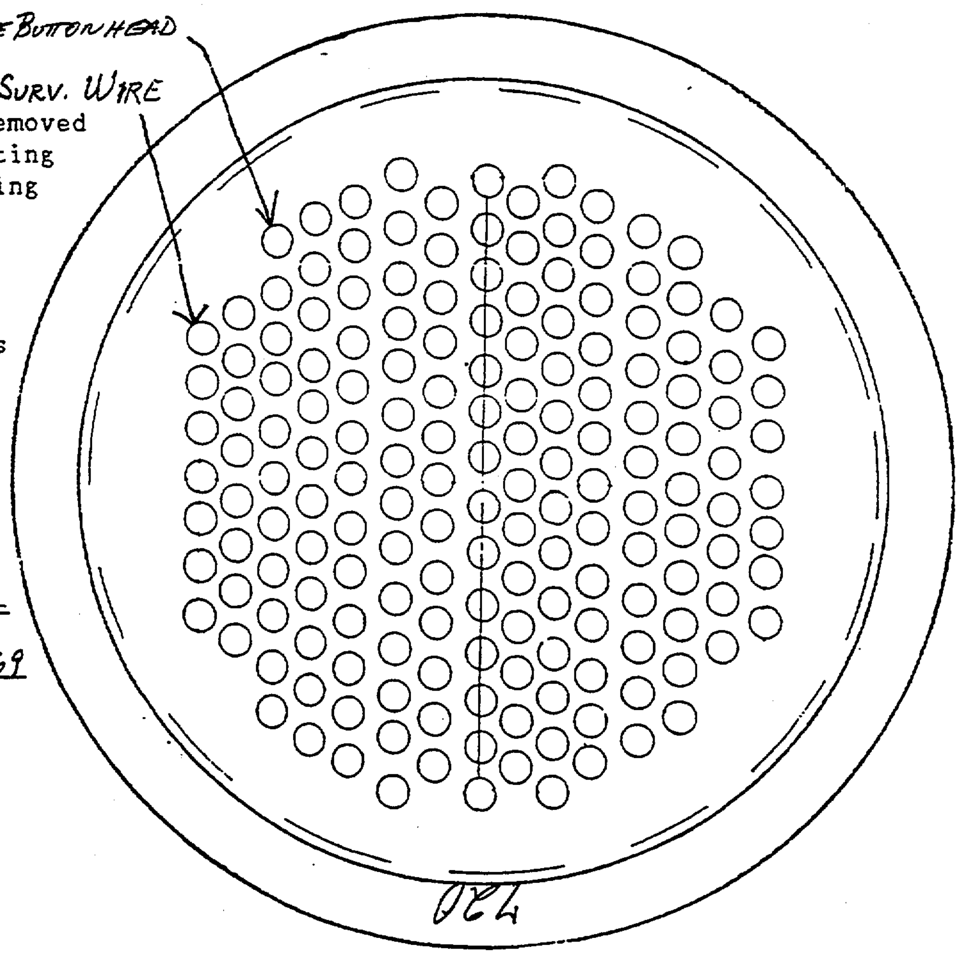
- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found n/a

(5.3) Total Effective BH 169



QC Signoff [signature]

Title QC Inspector Level II

Date 9-29-99

QC Review H.F. Hendricksen

Title Mgr, Q.A. Level III

Date 12-1-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: V143 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1

ANCHORHEAD I.D. 858 BUSHING I.D. 10.55

(3) BUTTONHEAD DATA

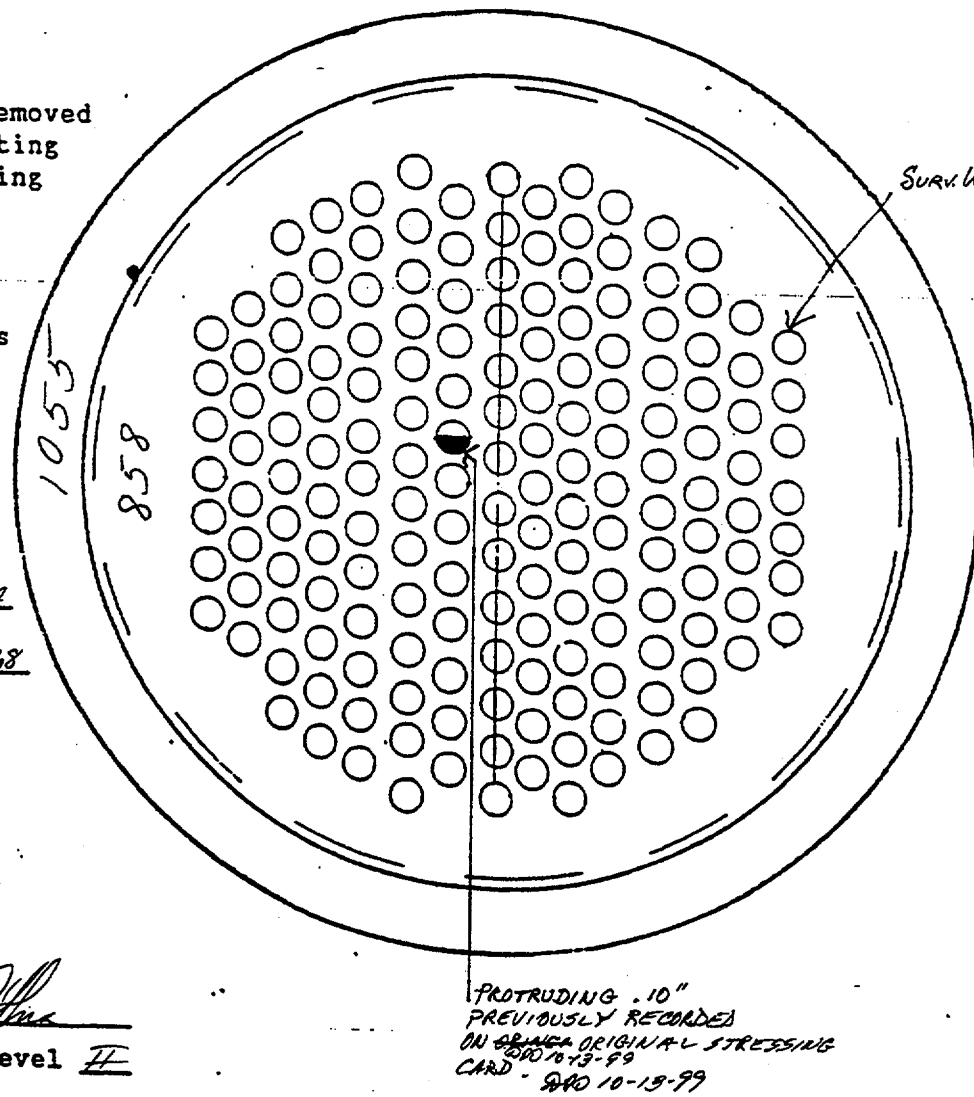
- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 168



SHIM STACK
(14.95", 14.90")
4", 4", 4", 1/4", 2", 1/2"

QC Signoff [signature]
Title QC INSPECTER Level II
Date 10-13-99

QC Review H.F. Hendrickson
Title MGR, Q.A Level III
Date 12-2-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: V156 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1

ANCHORHEAD I.D. 595 BUSHING I.D. 911

(3) BUTTONHEAD DATA

- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◎ = Broken/Missing
- ◑ = Malformed

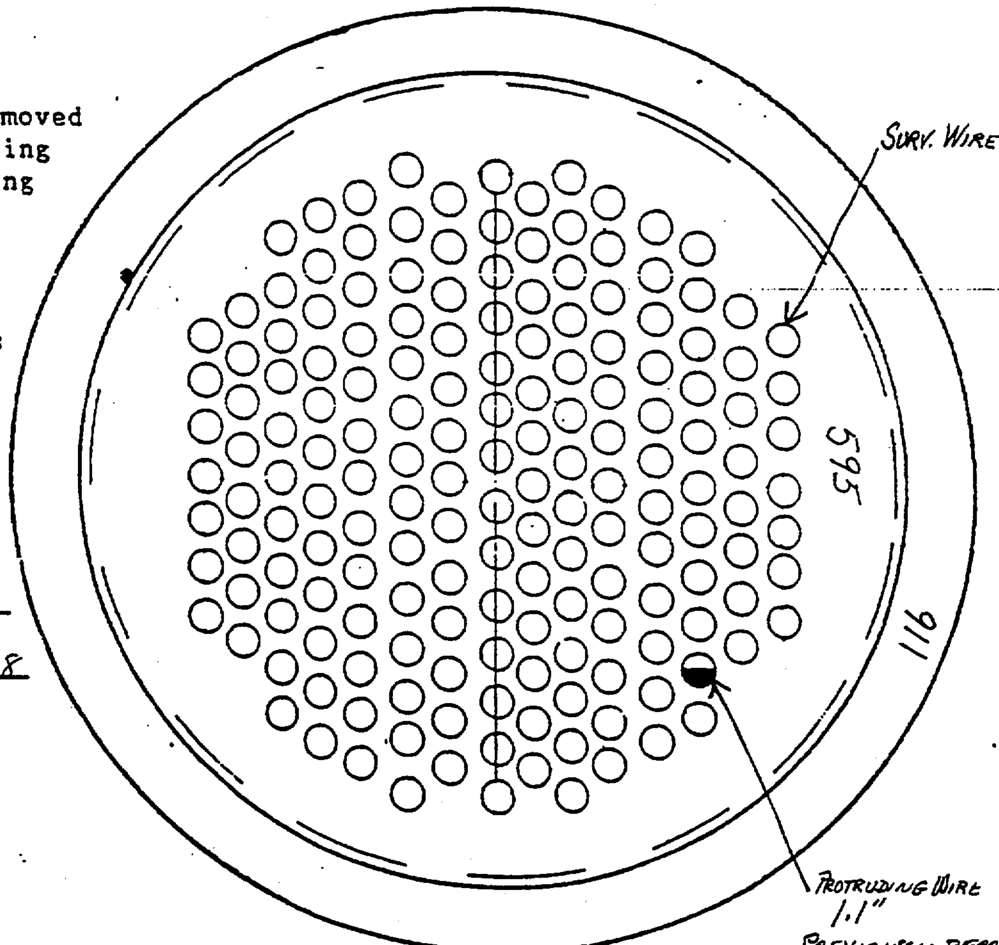
M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 168

SHIM STACK
15.40" BOTH SIDES
(4", 4", 4", 2", 1")



QC Signoff [signature]
Title QC INSPECTER Level II
Date 10-13-99

QC Review H. F. Hendrikson
Title MGR., Q.A. Level III
Date 12-2-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: V164 TENDON END/BUTTRESS NO.: SHOP/TOP UNIT 1

ANCHORHEAD I.D. 850 BUSHING I.D. 1197

(3) BUTTONHEAD DATA

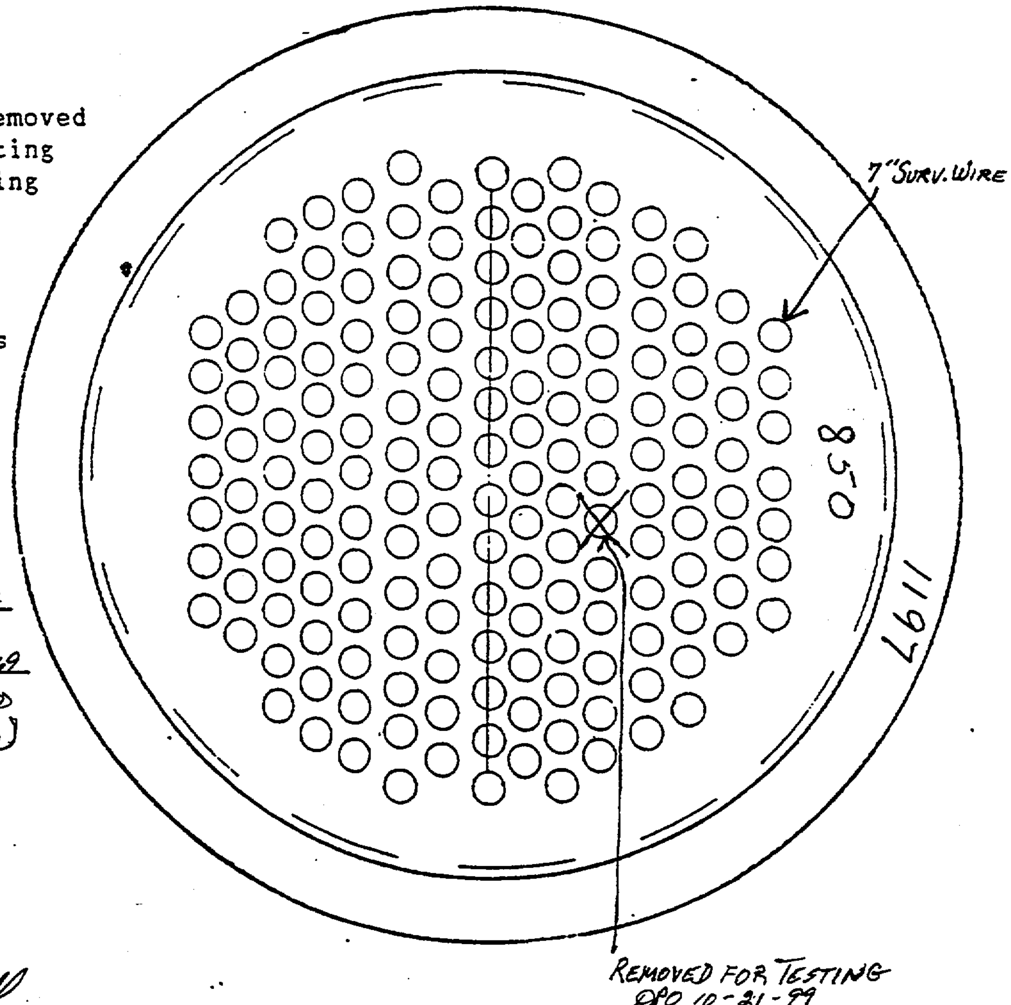
⊘ = Discontinuous-Removed
⊗ = Removed for Testing
● = Previously Missing
⊖ = Protruding
◎ = Broken/Missing
◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage
Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169
SHIM STACK RETENSIONED
15.50"-15.60 (4,4,4,2,½,¼,½)



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 9-27-99

QC Review H.F. Hendrickson
Title MGR., QA Level III
Date 12-1-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: V164 TENDON END/BUTTRESS NO.: FIELD/BOTTOM UNIT 1

ANCHORHEAD I.D. 601 BUSHING I.D. N/A

(3) BUTTONHEAD DATA

- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

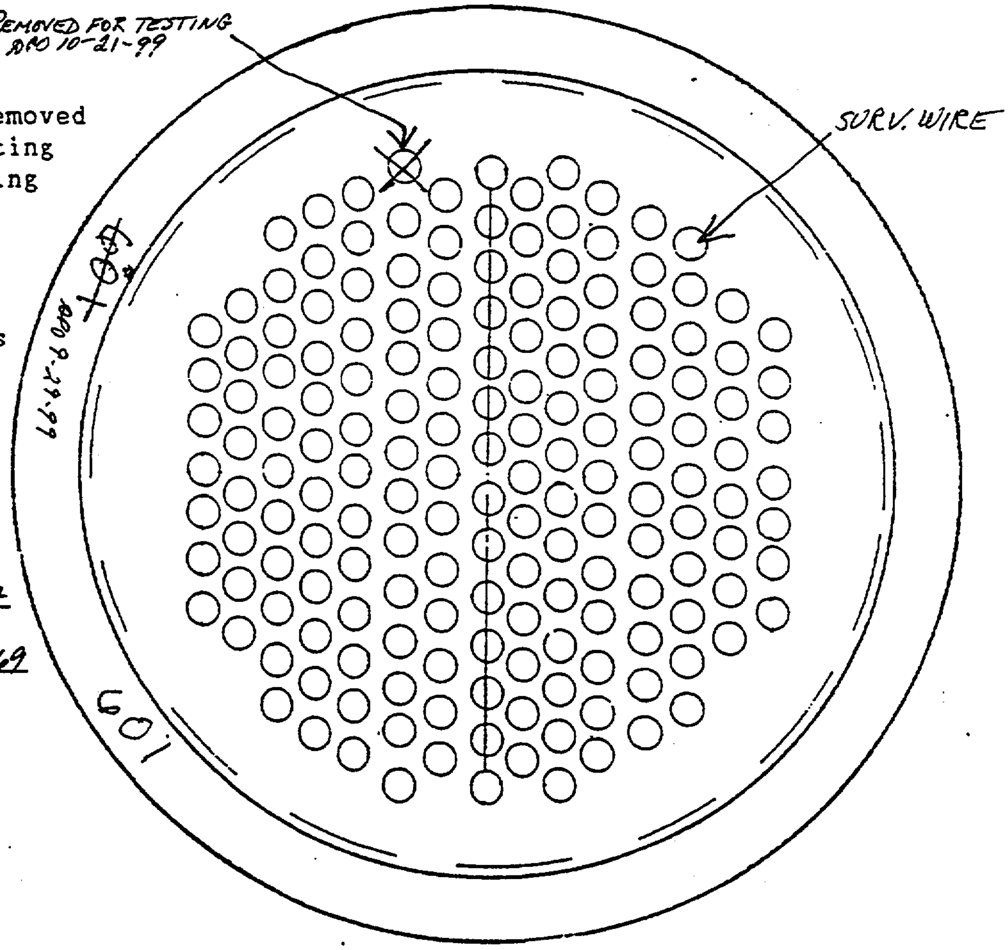
(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

SHIM STACK
2".

RETENSIONED
3.05
(½", ½", 2")



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 9-29-99

QC Review H.F. Hendrickson
Title Mgr, Q.A. Level III
Date 12-1-99

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PROJECT: THREE MILE ISLAND   SURVEILLANCE 7TH   YEAR: 1999

TENDON NO.: D1-02   TENDON END/BUTTRESS NO.: SHOP/NEAR BUTT.*   UNIT 1

ANCHORHEAD I.D. 706   BUSHING I.D. N/A

BUSHING ID 788

(3) BUTTONHEAD DATA

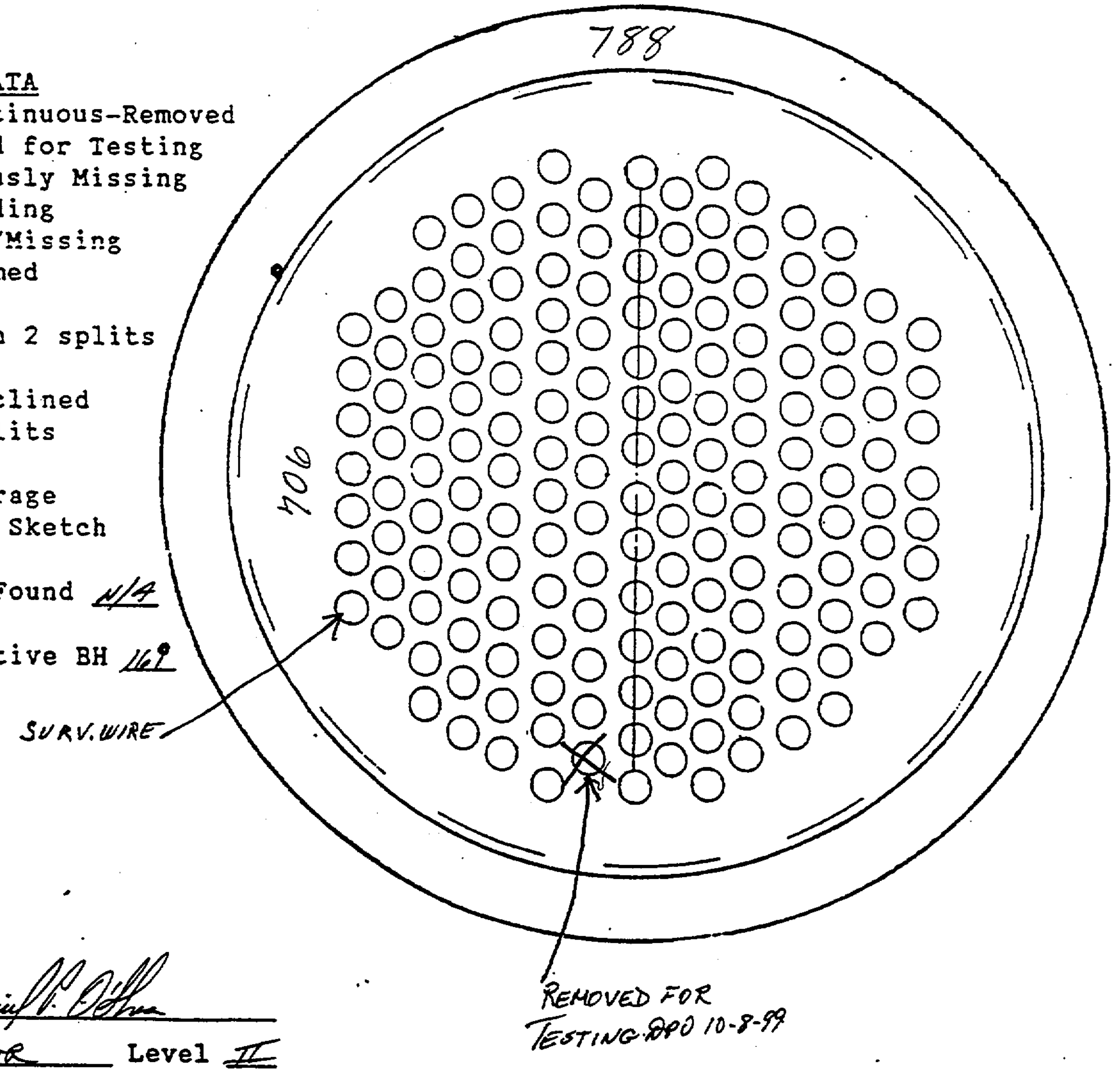
- ⊘ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ▣ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



QC Signoff [signature]
Title QC INSPECTOR   Level II
Date 11-7-99

QC Review H.F. Hendrickson
Title MGR, Q.A.   Level III
Date 12-1-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999
TENDON NO.: D1-02 TENDON END/BUTTRESS NO.: FIELD/NEAR BUTT. #1 UNIT 1
ANCHORHEAD I.D. 599 BUSHING I.D. N/A

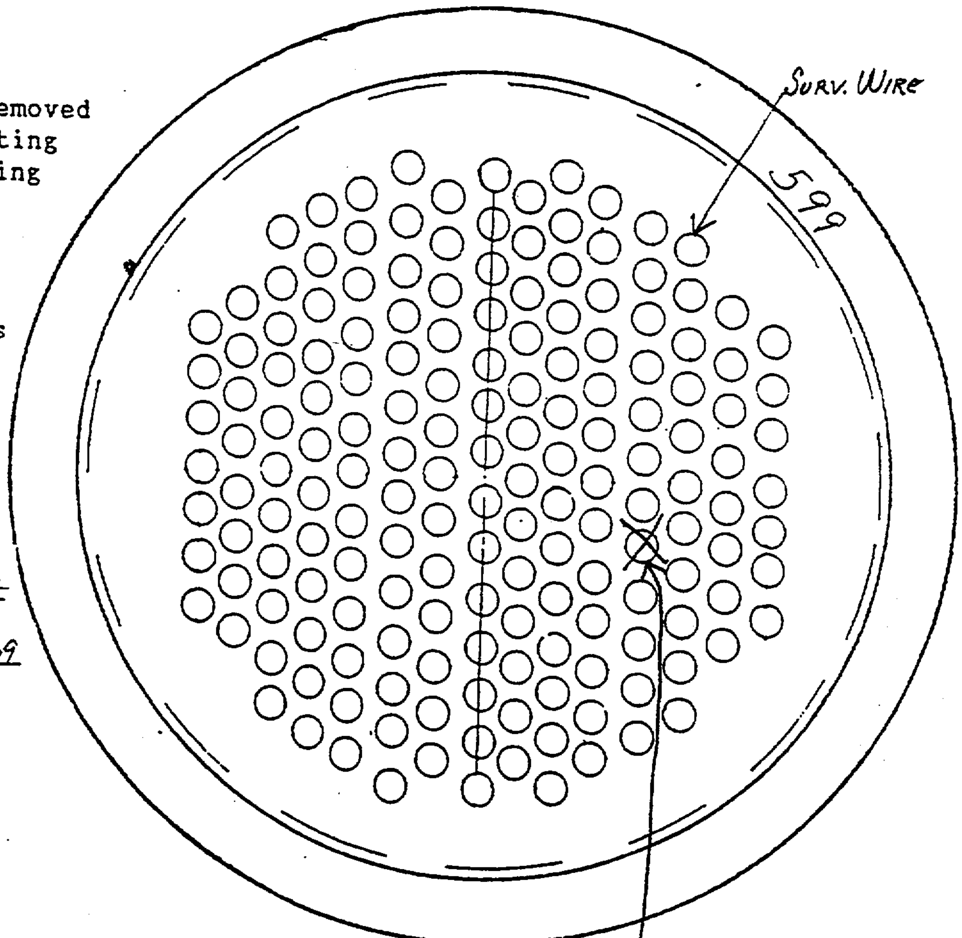
(3) BUTTONHEAD DATA
- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◘ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 10-7-99

QC Review H. F. Hendrickson
Title MGR, Q.A. Level III
Date 12-1-99

PSC PROCEDURE SQ 8.0
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: D1-04 TENDON END/BUTTRESS NO.: SHOP/NEAR BUTT #5 UNIT 1

ANCHORHEAD I.D. 1130 BUSHING I.D. 988

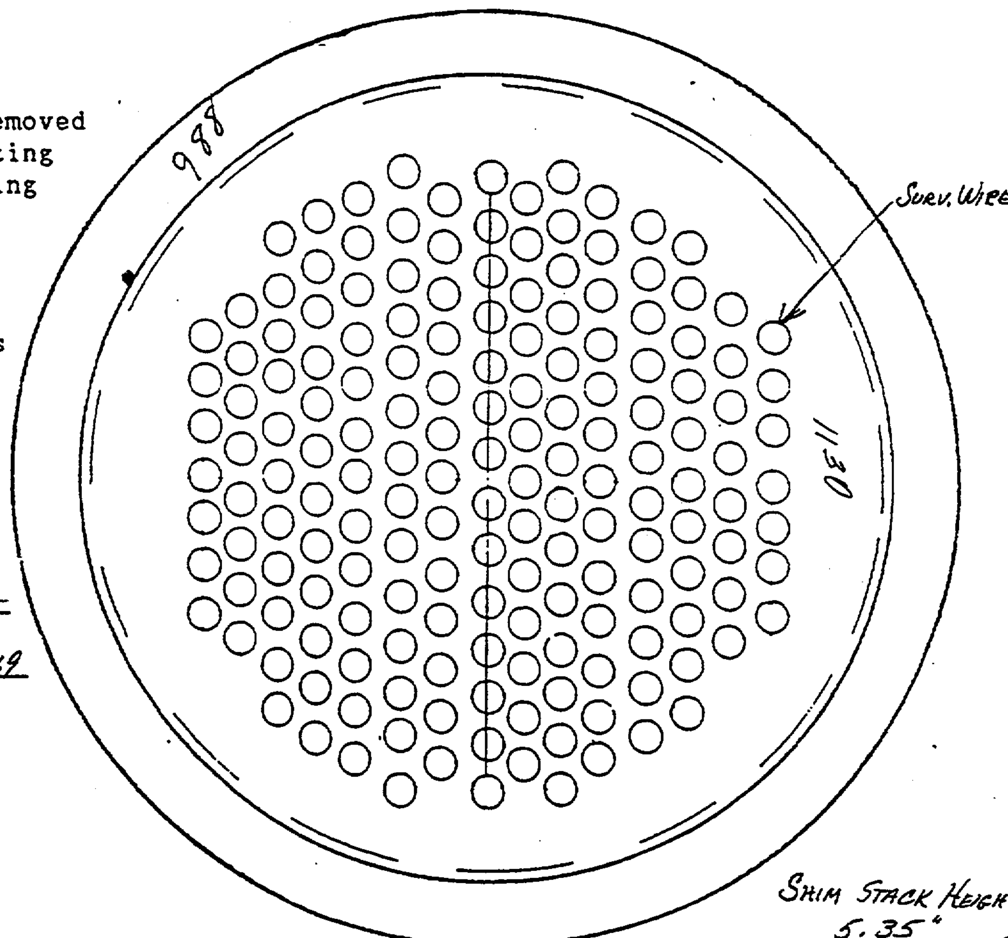
(3) BUTTONHEAD DATA
- ⌀ = Discontinuous-Removed
- ⊠ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ⊡ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



SHIM STACK HEIGHT
5.35"
(2", 2", 1", 1/4")

QC Signoff [signature]
Title QC INSPECTOR Level II
Date 10-11-99

QC Review H.T. Hendrickson
Title MGR., R.A. Level III
Date 12-2-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: D1-04 TENDON END/BUTTRESS NO.: FIELD/BUTT (NEAR) UNIT 1

ANCHORHEAD I.D. 500 BUSHING I.D. N/A

(3) BUTTONHEAD DATA

- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

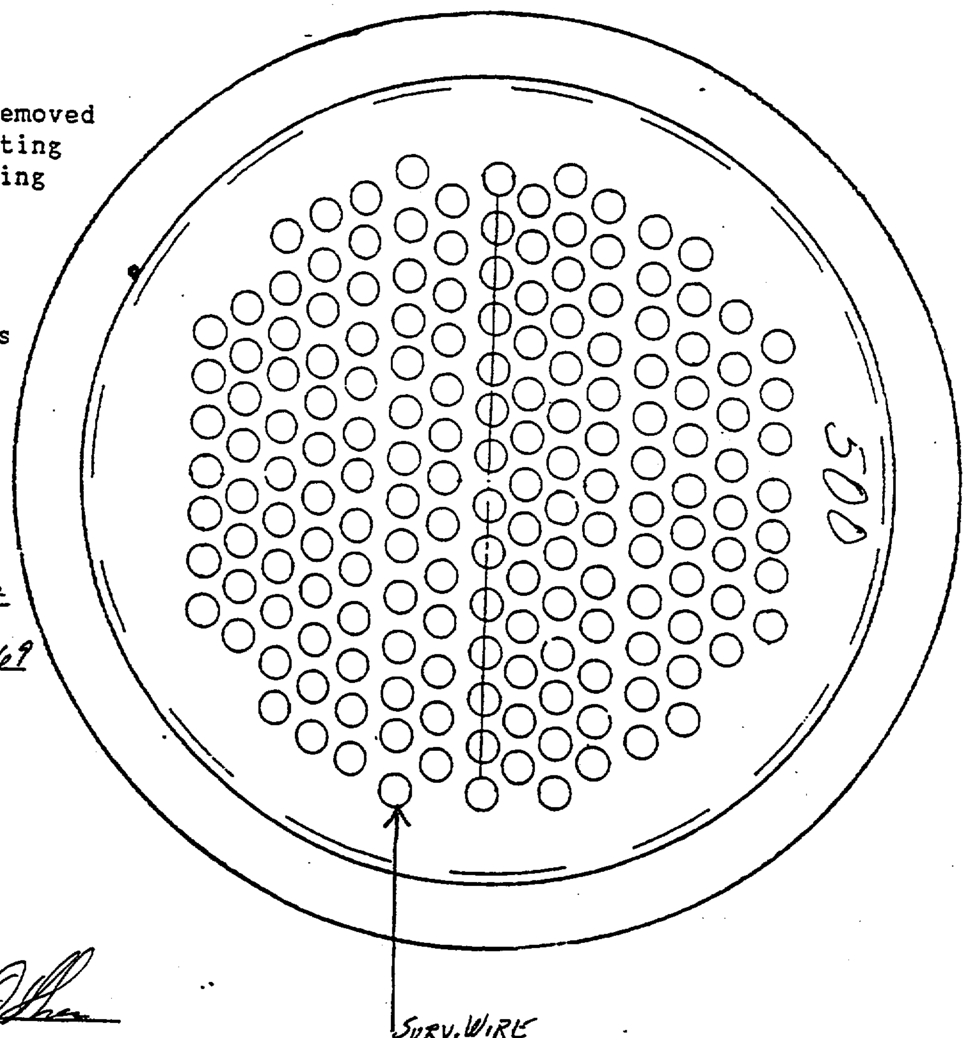
M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

SHIM STACK
4.75"
(2", 2", ½", ⅛")



QC Signoff [signature]
Title QC INSPECTOR Level II
Date 10-11-99

QC Review H.F. Hendrickson
Title MGR, Q.A. Level III
Date 12-2-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: D225 TENDON END/BUTTRESS NO.: SHC?/HW UNIT 1

ANCHORHEAD I.D. 765 BUSHING I.D. 1137

(3) BUTTONHEAD DATA

- ⊘ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

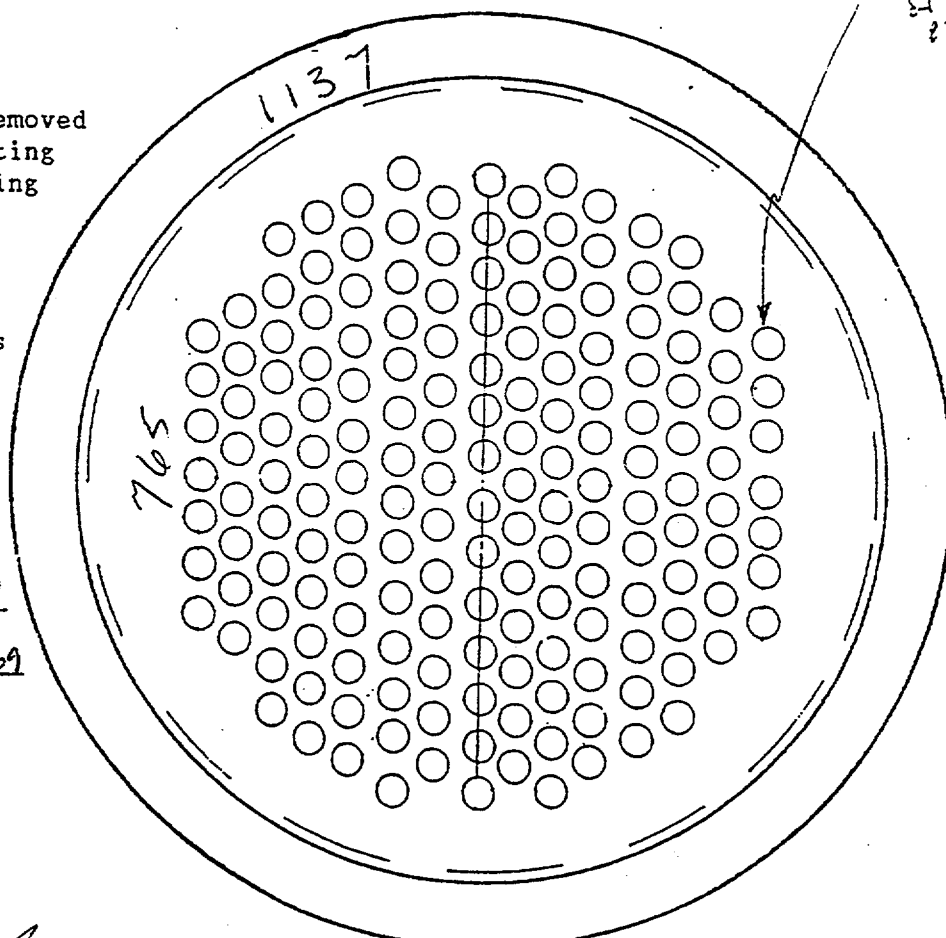
M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

7' SURVEILLANCE WIRE 8.23.99



QC Signoff [signature]
Title INSPECTOR Level II
Date 8-23-99

QC Review H.F. Hendrickson
Title MGR., Q.A. Level III
Date 12-1-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999
TENDON NO.: D225 TENDON END/BUTTRESS NO.: FIELD/SE UNIT 1
ANCHORHEAD I.D. 684 BUSHING I.D. N/A

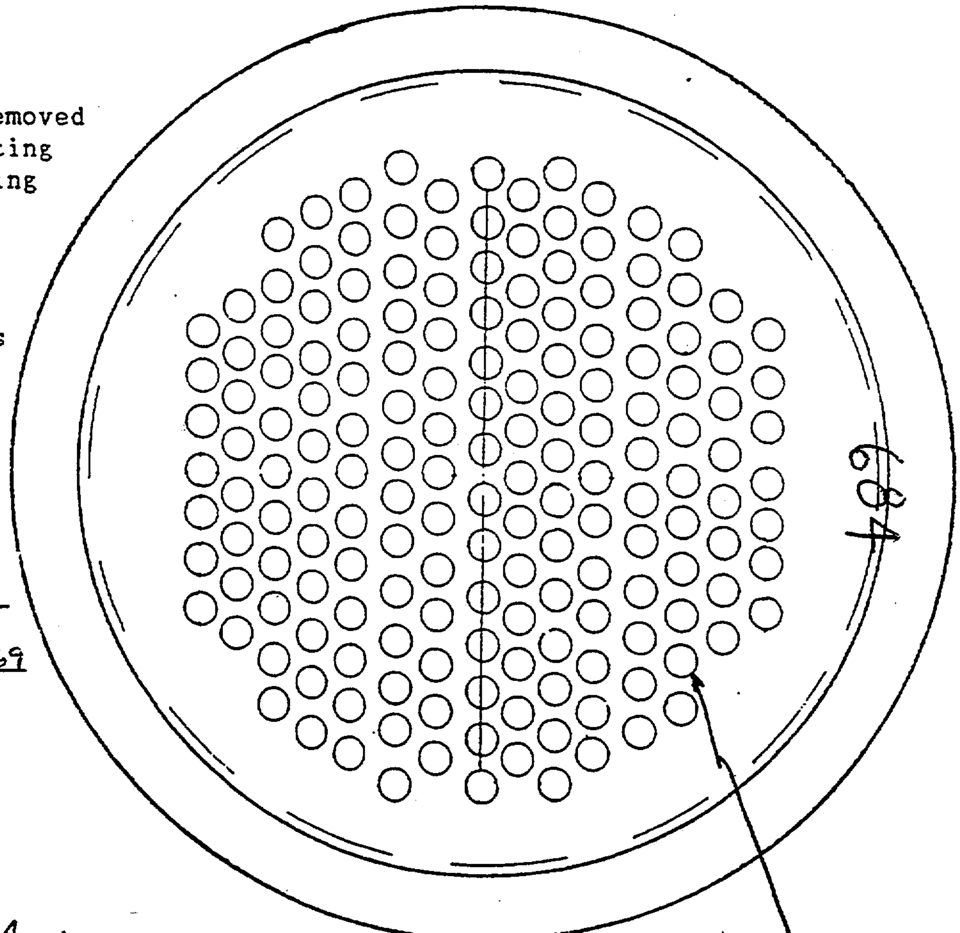
(3) BUTTONHEAD DATA
- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage
Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



7' SURVIELLANCE
WIRE
ch 8-31-99

QC Signoff [signature]
Title INSPECTOR Level II
Date 8-31-99

QC Review [signature: H. L. Hendrickson]
Title MGR., Q.A. Level III
Date 12-1-99

PSC PROCEDURE SQ 8.0
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: D3-13 TENDON END/BUTTRESS NO.: SHOP/BUTT NEAR UNIT 1

ANCHORHEAD I.D. 708 BUSHING I.D. 1081

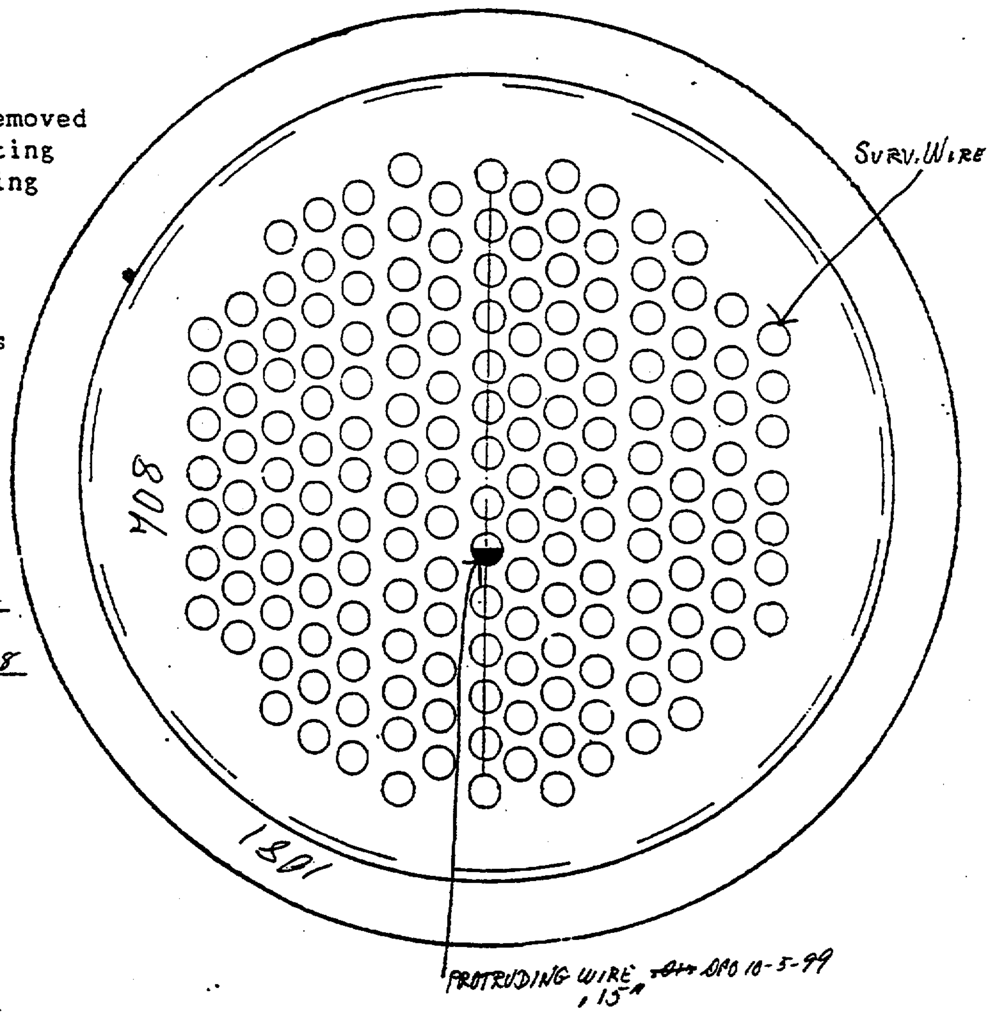
(3) BUTTONHEAD DATA
- ⦰ = Discontinuous-Removed
- ⊠ = Removed for Testing
- ● = Previously Missing
- ◓ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found n/A

(5.3) Total Effective BH 168



QC Signoff Daniel P. O'Hara
Title QC Inspector Level II
Date 10-5-99

QC Review H.F. Hendrickson
Title MGR. QA. Level III
Date 12-1-99

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PSC PROCEDURE SQ 8.0
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PROJECT: THREE MILE ISLAND   SURVEILLANCE 7TH   YEAR: 1999

TENDON NO.: D3-13   TENDON END/BUTTRESS NO.: FIELD/BUTT NEAR #3   UNIT 1

ANCHORHEAD I.D. 712   BUSHING I.D. N/A

(3) BUTTONHEAD DATA

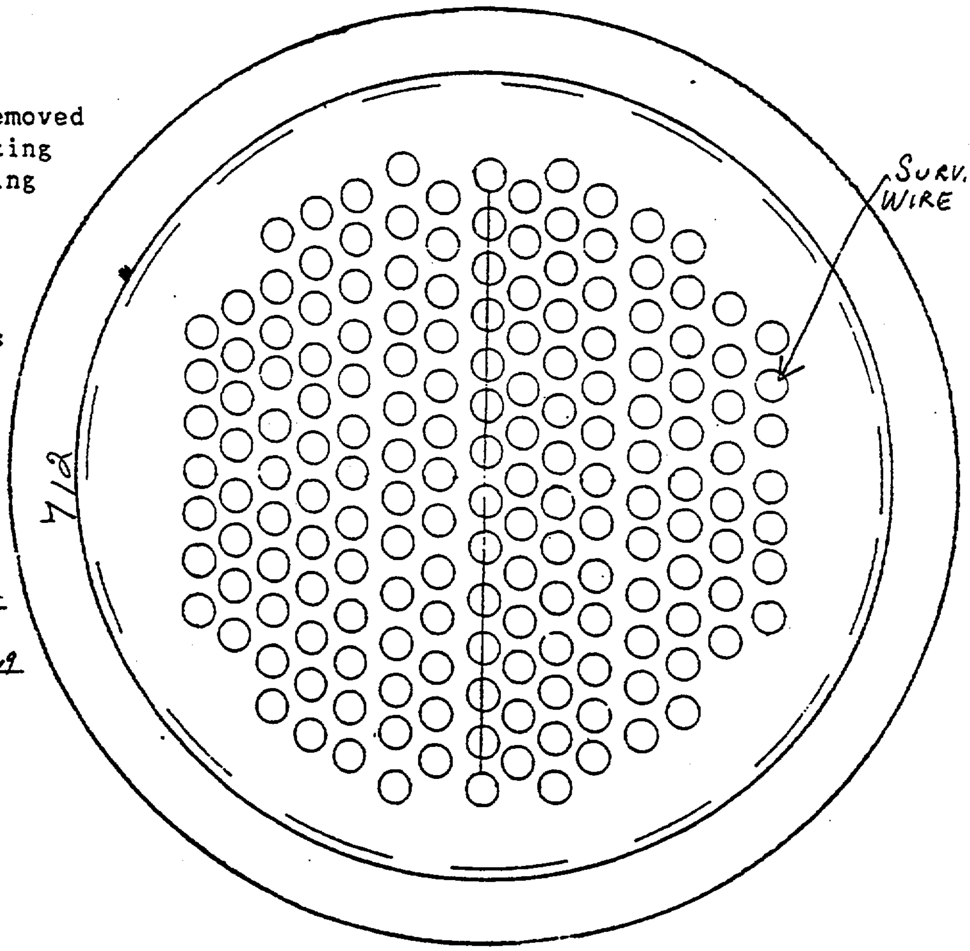
- ⊘ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◻ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 149



QC Signoff [signature]
Title QC Inspector   Level II
Date 10-5-99

QC Review H. F. Hendrickson
Title Mgr., Q.A.   Level III
Date 12-1-99

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PSC PROCEDURE SQ 8.0
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: 13H50 TENDON END/BUTTRESS NO.: SHOP/BOTT #1 UNIT 1

ANCHORHEAD I.D. 563 BUSHING I.D. 794

(3) BUTTONHEAD DATA

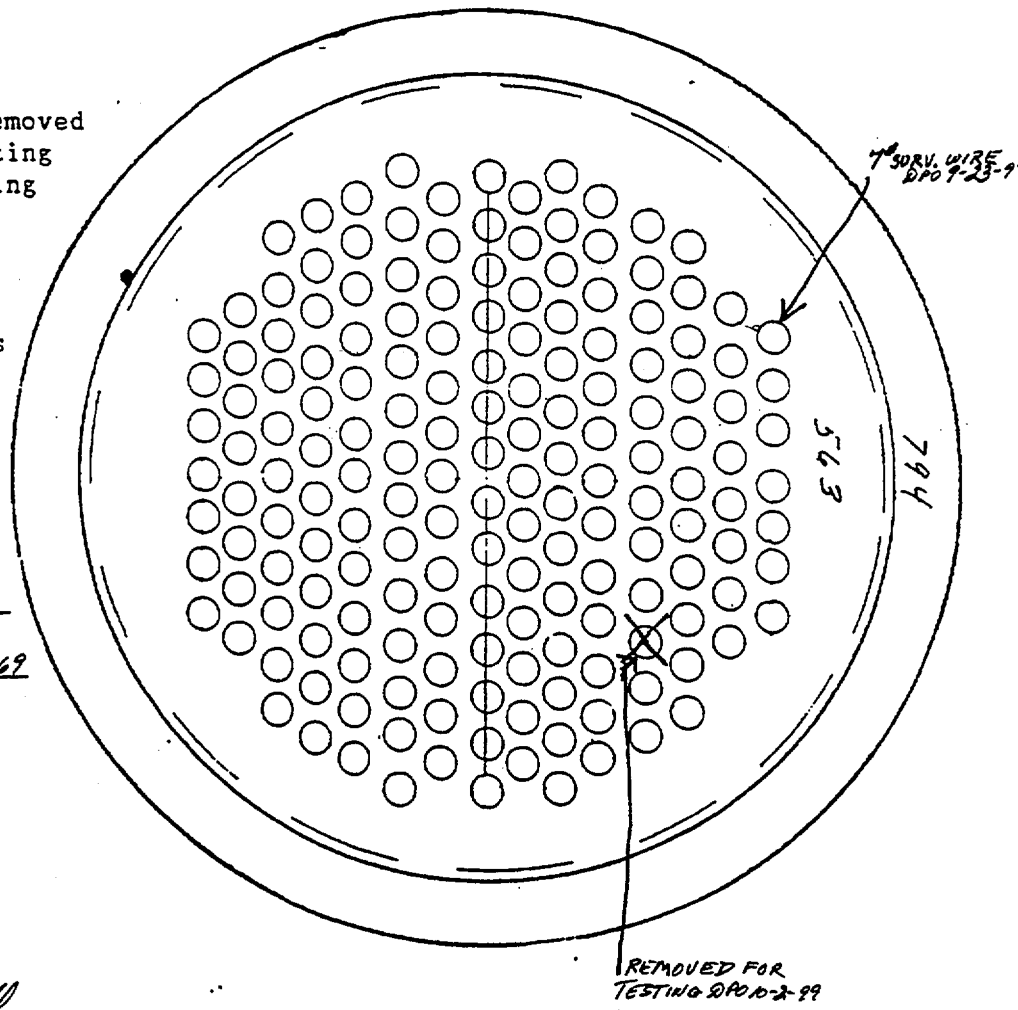
= Discontinuous-Removed
= Removed for Testing
= Previously Missing
= Protruding
= Broken/Missing
= Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage
Heat Code on Sketch

(5.2) Buttonhead Found n/a

(5.3) Total Effective BH 169



QC Signoff [signature]
Title QC Inspector Level II
Date 9-22-99

QC Review H.F. Hendrickson
Title Mgr. Q.A. Level III
Date 12-1-99

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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: 13H50 TENDON END/BUTTRESS NO.: FIELD/BUTT #3 UNIT 1

ANCHORHEAD I.D. 719 BUSHING I.D. N/A

(3) BUTTONHEAD DATA

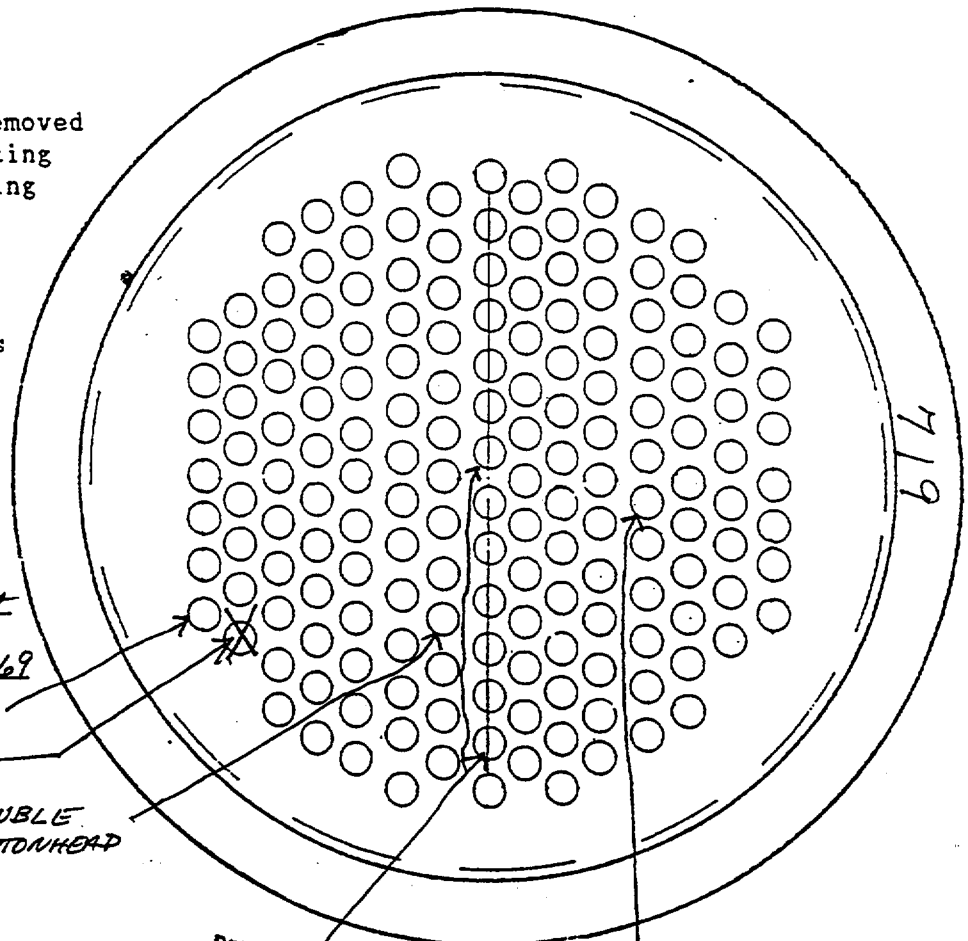
- ⌀ = Discontinuous-Removed
- ⊠ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



QC Signoff [signature]
Title QC Inspector Level II
Date 9-30-99

QC Review H.F. Hendrickson
Title Mgr., Q.A. Level III
Date 12-1-99

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PSC PROCEDURE SQ 8.0
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: H35-33 TENDON END/BUTTRESS NO.: SHOP/Butt #5 UNIT 1

ANCHORHEAD I.D. ~~936~~ 997 BUSHING I.D. 936

ef 9-7-99

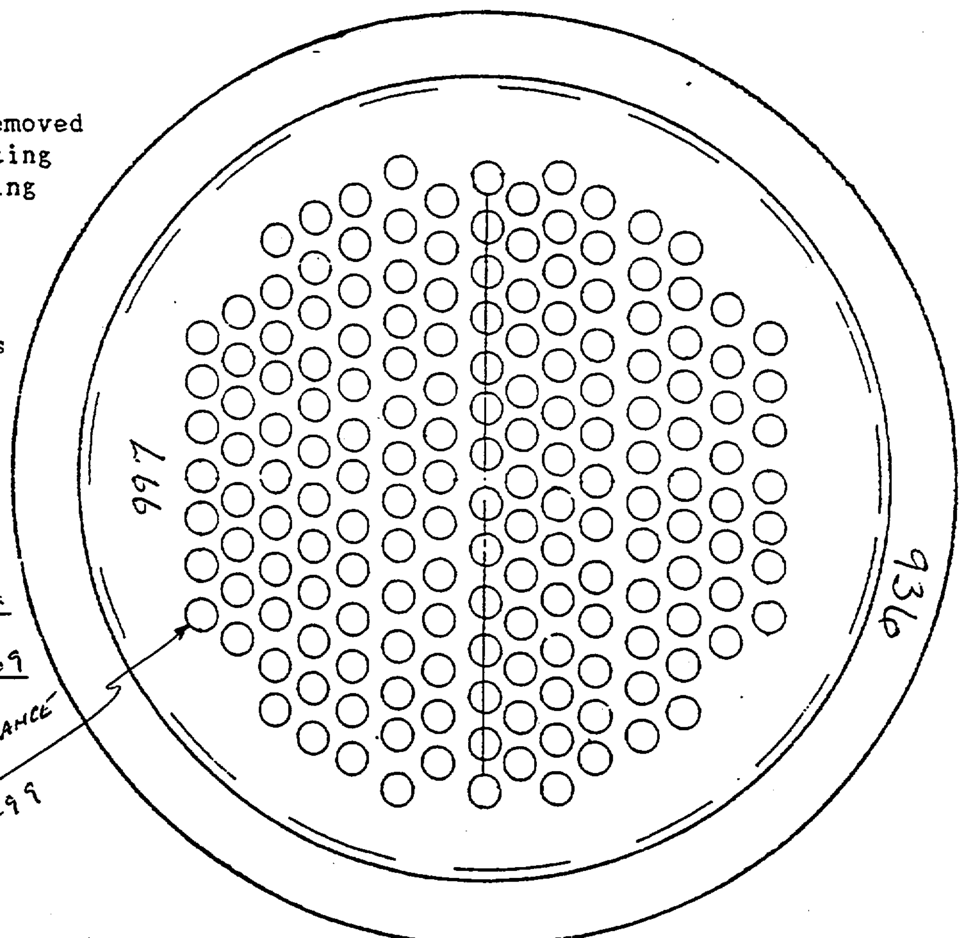
(3) BUTTONHEAD DATA
- ∅ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage
Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



QC Signoff [signature]
Title INSPECTOR Level II
Date [signature]

QC Review H.T. Hendrickson
Title MGR., Q.A. Level III
Date 12-1-99

A397 ~~Ø~~ 424

PSC PROCEDURE SQ 8.0
BUTTONHEAD GUIDE
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: H35 33 TENDON END/BUTTRESS NO.: Field/Butt #3 UNIT 1

ANCHORHEAD I.D. 905 BUSHING I.D. N/A

(3) BUTTONHEAD DATA

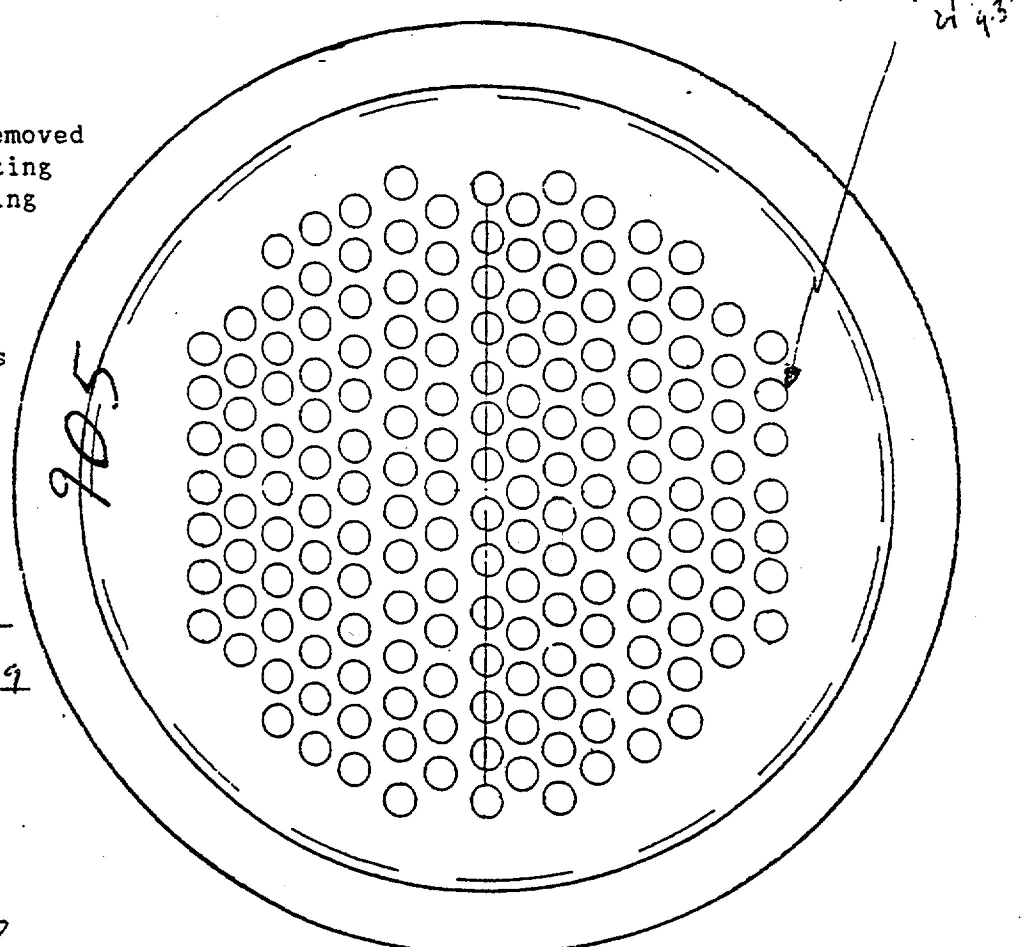
= Discontinuous-Removed
= Removed for Testing
= Previously Missing
= Protruding
= Broken/Missing
= Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



QC Signoff [signature]
Title Inspector Level II
Date 9-3-99

QC Review H.F. Hendricksen
Title Mgr., Q.A. Level III
Date 12-1-99

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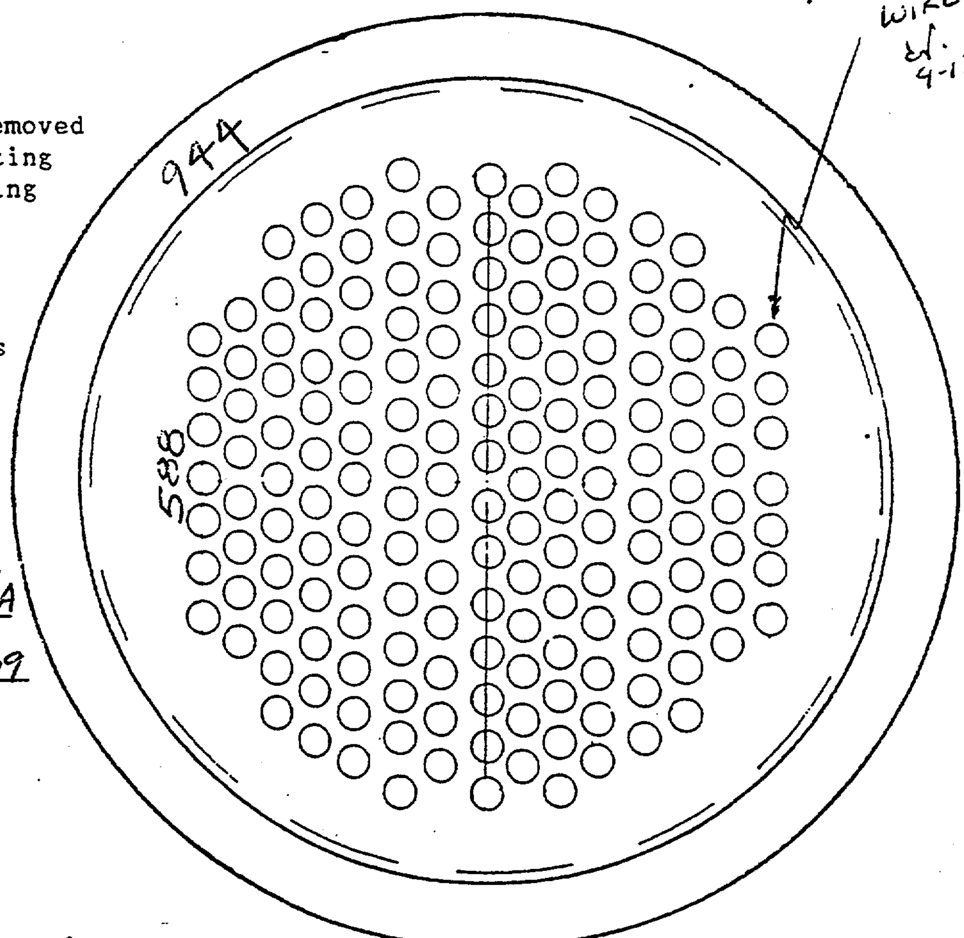
PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: H46-37 TENDON END/BUTTRESS NO. Shop/Butt #6 UNIT 1

ANCHORHEAD I.D. 588 BUSHING I.D. 944

7' SURVIELLANCE WIRE. [initials] 9-13-99



(3) BUTTONHEAD DATA

- ☒ = Discontinuous-Removed
- ☒ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◙ = Broken/Missing
- ◐ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage
Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

QC Signoff [signature]
Title INSPECTOR Level II
Date 9-13-99

QC Review H. F. Hendrickson
Title MGR, Q.A. Level III
Date 12-1-99

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PSC PROCEDURE SQ 8.0
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7TH YEAR: 1999

TENDON NO.: H46-37 TENDON END/BUTTRESS NO.: FIELD/BUTT #4 UNIT 1

ANCHORHEAD I.D. 798 BUSHING I.D. N/A

(3) BUTTONHEAD DATA

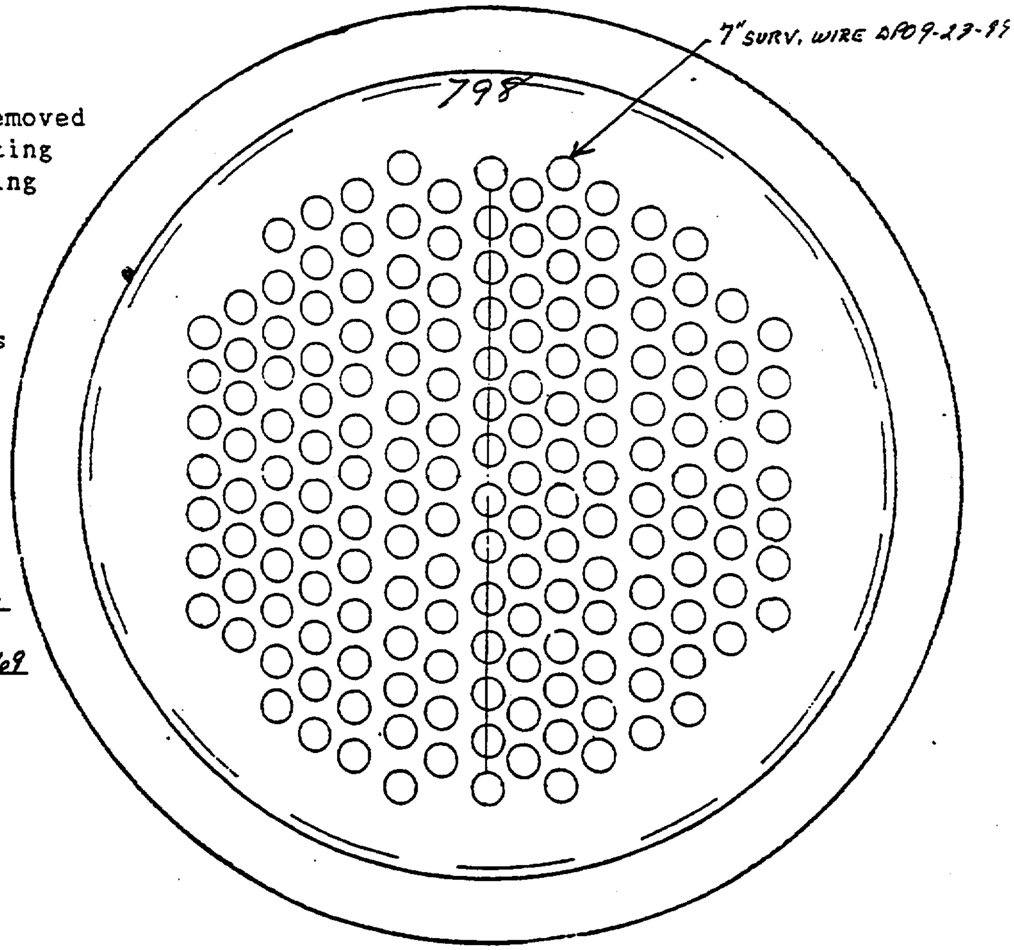
- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



QC Signoff [signature]
Title QC Inspector Level II
Date 9-23-99

QC Review [signature]
Title MGR, Q.A. Level III
Date 12-1-99

A 4cc ~~φ~~ 424

PSC PROCEDURE SQ 8.0
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: H51-43 TENDON END/BUTTRESS NO.: SHOP/BUTT #1 UNIT 1

ANCHORHEAD I.D. 874 BUSHING I.D. 756

(3) BUTTONHEAD DATA

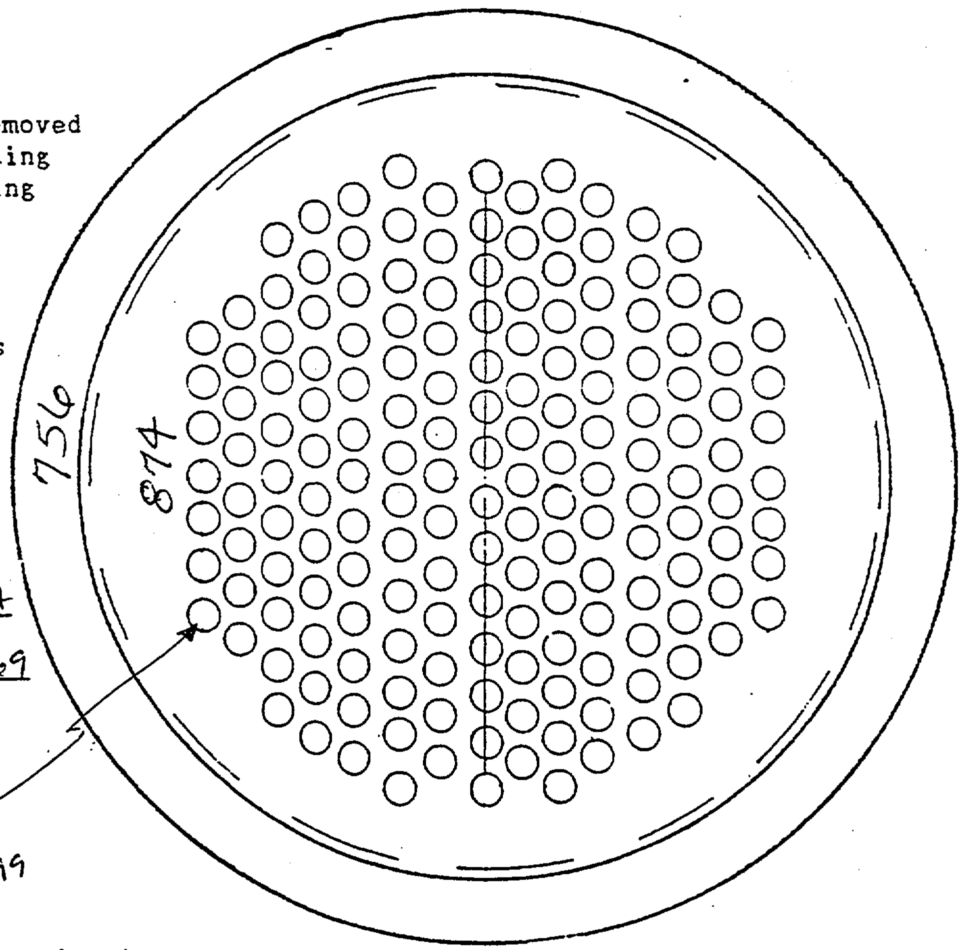
- ⊘ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ◻ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage
Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



QC Signoff [signature]
Title INSPECTOR Level II
Date 9-14-99

QC Review H. F. Hendricksen
Title MGR., Q.A. Level III
Date 12-1-99

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PSC PROCEDURE SQ 8.0
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999
TENDON NO.: H51-43 TENDON END/BUTTRESS NO.: Field / Butt #5 UNIT 1
ANCHORHEAD I.D. 583 BUSHING I.D. N/A

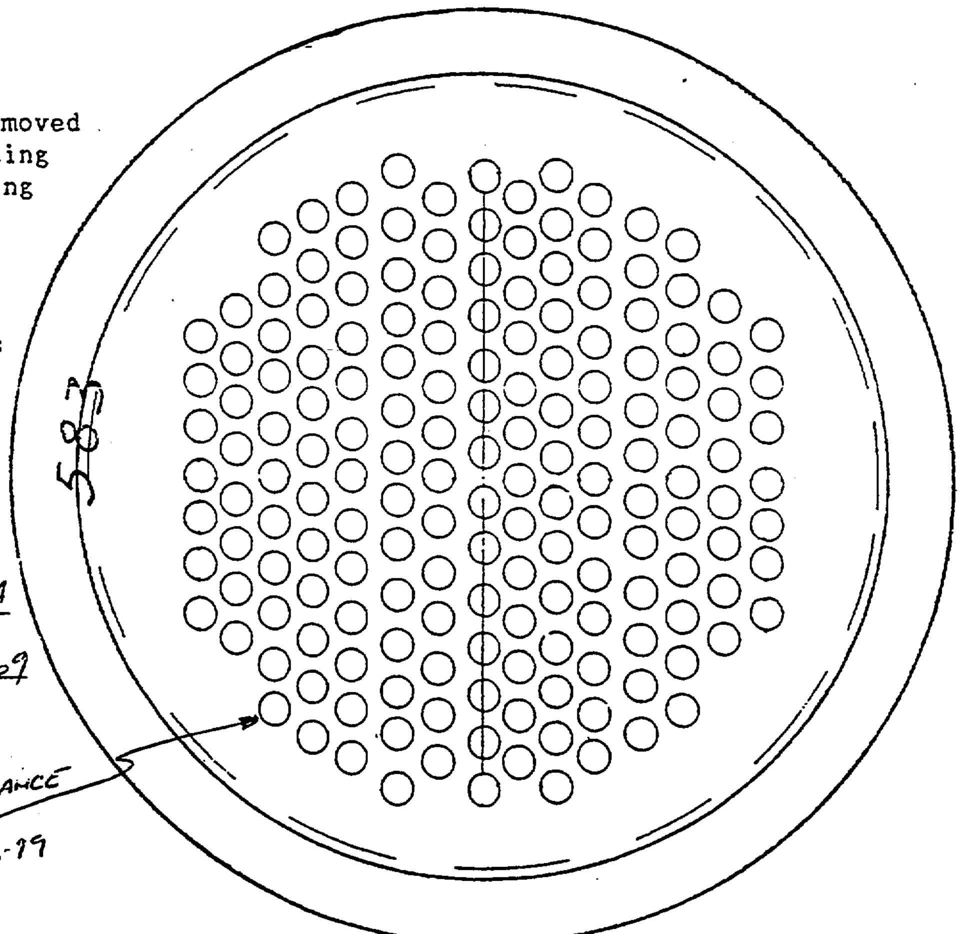
(3) BUTTONHEAD DATA
- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ⊡ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



7' SURVIELLANCE WIRE
cd. 9-13-99

QC Signoff [signature]
Title INSPECTOR Level II
Date 9-13-99

QC Review H.T. Hendrickson
Title MGR., Q.A. Level III
Date 12-1-99

A402 ~~f~~ 424

PSC PROCEDURE SQ 8.0
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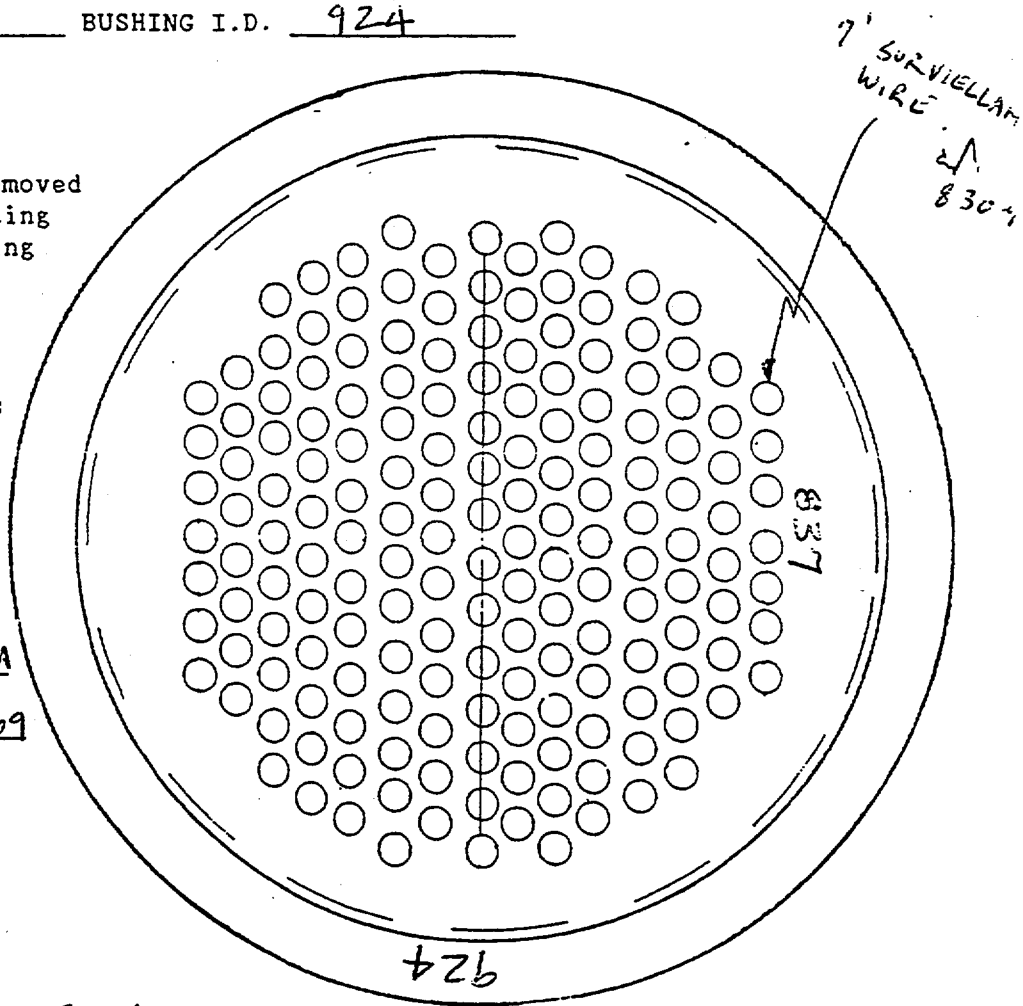
PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999

TENDON NO.: H62-26 TENDON END/BUTTRESS NO.: SHOP/BUTT #6 UNIT 1

ANCHORHEAD I.D. 837 BUSHING I.D. 924



(3) BUTTONHEAD DATA

- ⌀ = Discontinuous-Removed
- ⊗ = Removed for Testing
- ● = Previously Missing
- ◒ = Protruding
- ▣ = Broken/Missing
- ◑ = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage
Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169

QC Signoff [signature]
Title INSPECTOR Level II
Date 8-30-99

QC Review H.F. Hendrickson
Title MGR, Q.A. Level III
Date 12-1-99

PSC PROCEDURE SQ 8.0
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PROJECT: THREE MILE ISLAND SURVEILLANCE 7th YEAR: 1999
TENDON NO.: H62-26 TENDON END/BUTTRESS NO.: FIELD/BUTT #2 UNIT 1
ANCHORHEAD I.D. 571 BUSHING I.D. N/A

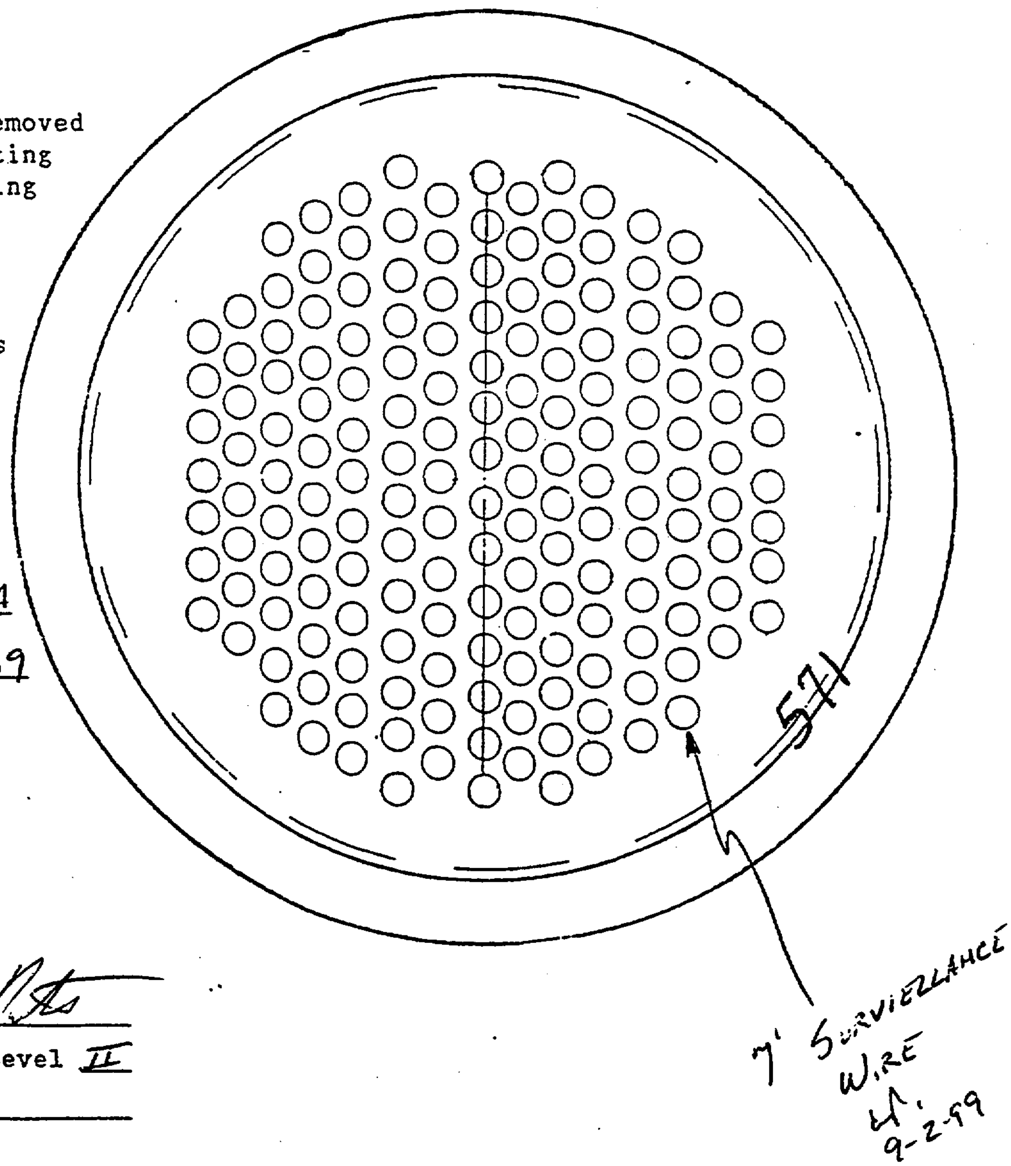
(3) BUTTONHEAD DATA
- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found N/A

(5.3) Total Effective BH 169



QC Signoff [signature]
Title INSPECTOR Level II
Date 9-2-99

QC Review H.F. Hendrickson
Title MGR., Q.A. Level III
Date 12-1-99

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. V32 TENDON END/BUTTRESS NO. SHOP / TOP UNIT 1

ANCHORAGE I.D. 1050 ADAPTOR I.D. D-4

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	1-29-00	SOR 5	1-29-00
EXT. MINOR	QC66	1-8-00	B&F/462	1-29-00	SOR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.370	9.373	9.381					9.375
	2	9.369	9.375	9.380					
EXT.[1] PITCH	1	9.551		9.556	9.548	.253		.0315	9.264
	2	9.535		9.550					
EXT.[2] MINOR	1	9.471		9.467	9.467		.120	.0315	9.195
	2	9.460		9.470					
INT. MAJOR	1	N/A		N/A					
	2	N/A		N/A					
INT. MINOR	1	N/A		N/A					
	2	N/A		N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	D-4			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.580			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date ~~8-26-99~~ 8-27-99 cf. 8-27-99

Q.C. Review H. F. Hendricksen Level III Date 12-1-99

Title MGR, R.A.

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. V40 TENDON END/BUTTRESS NO. SHOP / TOP UNIT 1

ANCHORAGE I.D. 610 ADAPTOR I.D. D-4

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	4-29-00
EXT. MINOR	QC66	1-8-00	BLK/462	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.364	9.369	9.372					9.371
	2	9.367	9.374	9.379					
EXT.[1] PITCH	1	9.551		9.554	9.546	.253		.0315	9.262
	2	9.537		9.543					
EXT.[2] MINOR	1	9.466		9.468	9.464		.120	.0315	9.193
	2	9.456		9.465					
INT. MAJOR	1	N/A		N/A					
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					
	2	N/A	N/A	N/A					

INT. PITCH				
GO GAUGE # N/A	RECAL DATE	N/A	RESULT	N/A
NO-GO GAUGE # N/A	RECAL DATE	N/A	RESULT	N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	D-4			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.628			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 8-27-99

Q.C. Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A

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ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT THREE MILE ISLAND SURVEILLANCE NO. 4TH YEAR 1999

TENDON NO. V86 TENDON END/BUTTRESS NO. SHOP/TOP UNIT 1

ANCHORAGE I.D. 1063 ADAPTOR I.D. ~~1085~~ D-4
BUSHING ID 1085 DRD 10-14-99

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL.	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.364	9.367	9.372					9.369
	2	9.366	9.371	9.374					
EXT.[1] PITCH	1	9.544		9.550	9.548	.253		.0315	9.264
	2	9.547		9.551					
EXT.[2] MINOR	1	9.454		9.459	9.456		.120	.0315	9.185
	2	9.450		9.461					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	D-4			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.628			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 10-14-99

Q.C. Review H. F. Hendricksen Level III Date 12-1-99

Title MGR. Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: △0 9-6-94	Page 1 of 1

Formerly "Inryco Surveillance"

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. V114 TENDON END/BUTTRESS NO. SHOP / TOP UNIT 1

ANCHORAGE I.D. 772 ADAPTOR I.D. D-4

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	THREAD 3RD	THREAD 6TH	THREAD 9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.371	9.375	9.380					9.374
	2	9.365	9.372	9.378					
EXT. PITCH [1]	1	9.554		9.557	9.556	.253		.0315	9.272
	2	9.549		9.565					
EXT. MINOR [2]	1	9.466		9.469	9.470		.120	.0315	9.199
	2	9.469		9.477					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	D-4			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.628			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 9-10-99

Q.C. Review H. L. Hendrickson Level III Date 12-1-99

Title Mgr, Q.A.

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT Three Mile Island SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. V164 TENDON END/BUTTRESS NO. Shop/Top UNIT 1

ANCHORAGE I.D. 850 ADAPTOR I.D. D-4
Bushing I D 1197

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	Set 5	4-29-00	Sur 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL.	1-29-00	Sur 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	THREAD 3RD	THREAD 6TH	THREAD 9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.373	9.376	9.380					9.375
	2	9.369	9.374	9.379					
EXT.[1] PITCH	1	9.546		9.547	9.5465	.253		.0315	9.262
	2	9.546		9.547					
EXT.[2] MINOR	1	9.459		9.460	9.461		.120	.0315	9.189
	2	9.461		9.463					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

MIN. MINOR DIAM.	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	D-4			
FROM ADAPTOR TABLE	8.580			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 9-27-99

Q.C. Review H. R. Hendrickson Level III Date 12-1-99

Title MGR. Q.A

Effective Date: 9-6-94	Previous Revision: △	Revision: △0 9-6-94	Page 1 of 1

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

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PSC Precision Surveillance Corporation

PROJECT Three Mile Island SURVEILLANCE NO. 4TH YEAR 1999

TENDON NO. D1-02 TENDON END/BUTTRESS NO. Shop/Near Butt. # 5 UNIT 1

ANCHORAGE I.D. 706 ADAPTOR I.D. C6001
BUSHING I.D. 788

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	Set 5	4-29-00	Sur5	1-29-00
EXT. MINOR	QC66	1-8-00	Blk/Yel.	1-29-00	Sur3	1-29-00
INT. MAJOR	n/a	n/a				
INT. MINOR	n/a	n/a				

2. MEASUREMENTS

THREAD	READ	THREAD 3RD	THREAD 6TH	THREAD 9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.370	9.374	9.377					9.374
	2	9.372	9.374	9.378					
EXT.[1] PITCH	1	9.537		9.542	9.541	.253		.0315	9.257
	2	9.540		9.543					
EXT.[2] MINOR	1	9.451		9.457	9.455		.120	.0315	9.184
	2	9.454		9.458					
INT. MAJOR	1	n/a		n/a					n/a
	2	n/a		n/a					
INT. MINOR	1	n/a	n/a	n/a					n/a
	2	n/a	n/a	n/a					

INT. PITCH GO GAUGE # n/a RECAL DATE n/a RESULT n/a
NO-GO GAUGE # n/a RECAL DATE n/a RESULT n/a

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6001			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.570			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff David P. O'Hara Date 10-7-99

Q.C. Review H.T. Hendrickson Level III Date 12-1-99

Title Mgr., Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: 0 9-6-94	Page 1 of 1

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PROJECT Three Mile Island SURVEILLANCE NO. 7TH. YEAR 1999

TENDON NO. D1-02 TENDON END/BUTTRESS NO. Field / Near Butt.# UNIT 1

ANCHORAGE I.D. 599 ADAPTOR I.D. C6002

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL.	1-29-00	SUR 2&3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.370	9.375	9.378					9.374
	2	9.369	9.373	9.376					
EXT.[1] PITCH	1	9.557		9.560	9.557	.253		.0315	9.273
	2	9.554		9.557					
EXT.[2] MINOR	1	9.468		9.470	9.468		.120	.0315	9.197
	2	9.466		9.469					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6002			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.593			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff Daniel P. O'Hare Date 10-7-99

Q.C. Review H. F. Hendrickson Level III Date 12-1-99

Title Mgr, Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: △0 9-6-94	Page 1 of 1

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

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PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. D225 TENDON END/BUTTRESS NO. SHOP / NW UNIT 1

ANCHORAGE I.D. 1137 ADAPTOR I.D. C6001

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	Sur 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL	1-29-00	Sur 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	THREAD 3RD	THREAD 6TH	THREAD 9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.369	9.373	9.378					9.375
	2	9.375	9.377	9.379					
EXT. PITCH [1]	1	9.539		9.550	9.550	.253		.0315	9.270
	2	9.549		9.561					
EXT. MINOR [2]	1	9.457		9.468	9.466		.120	.0315	9.195
	2	9.468		9.472					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH					
GO GAUGE #	N/A	RECAL DATE	N/A	RESULT	N/A
NO-GO GAUGE #	N/A	RECAL DATE	N/A	RESULT	N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6001			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.500			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 8-23-99

Q.C. Review H.T. Hendricksen Level III Date 12-1-99

Title MGR., Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: 0 9-6-94	Page 1 of 1

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

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PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. D225 TENDON END/BUTTRESS NO. FIELD / SE UNIT 1

ANCHORAGE I.D. 684 ADAPTOR I.D. C6002

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	1-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/402	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	THREAD 3RD	THREAD 6TH	THREAD 9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.375	9.379	9.383					9.380
	2	9.375	9.380	9.385					
EXT.[1] PITCH	1	9.537		9.548	9.542	.253		.0315	9.258
	2	9.537		9.547					
EXT.[2] MINOR	1	9.453		9.462	9.458		.120	.0315	9.187
	2	9.454		9.461					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH					
GO GAUGE #	N/A	RECAL DATE	N/A	RESULT	N/A
NO-GO GAUGE #	N/A	RECAL DATE	N/A	RESULT	N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6002			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.565			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 8-31-99

Q.C. Review H.F. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT Three Mile Island SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. D3-13 TENDON END/BUTTRESS NO. Shop/near Butt #2 UNIT 1

ANCHORAGE I.D. 708 ADAPTOR I.D. C6001

Bushing I.D. 1081

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	Set 5	4-29-00	Sur 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL.	1-29-00	Sur 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.371	9.375	9.377					9.375
	2	9.372	9.374	9.379					
EXT.[1] PITCH	1	9.543		9.547	9.546	.253		.0315	9.262
	2	9.546		9.547					
EXT.[2] MINOR	1	9.449		9.455	9.453		.120	.0315	9.182
	2	9.450		9.458					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH			
GO GAUGE # N/A	RECAL DATE N/A	RESULT N/A	
NO-GO GAUGE # N/A	RECAL DATE N/A	RESULT N/A	

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6001			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.500			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 10-5-99

Q.C. Review H.F. Hendrickson Level III Date 12-1-99

Title MGR. Q.A.

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT THREE MILE ISLAND SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. D3-13 TENDON END/BUTTRESS NO. FIELD/NEAR BUTT #3 UNIT 1

ANCHORAGE I.D. 712 ADAPTOR I.D. C6002

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL.	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.371	9.373	9.376					9.374
	2	9.372	9.375	9.377					
EXT.[1] PITCH	1	9.546		9.551	9.550	.253		.0315	9.266
	2	9.548		9.553					
EXT.[2] MINOR	1	9.469		9.474	9.473		.120	.0315	9.202
	2	9.472		9.474					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6002			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.593			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 10-4-99

Q.C. Review H.F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: 0 9-6-94	Page 1 of 1

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1	PSC Precision Surveillance Corporation
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PROJECT Three Mile Island SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. 13 H 50 TENDON END/BUTTRESS NO. SHOP/BUTT # 1 UNIT 1

ANCHORAGE I.D. 563 BUSHING # 794 ADAPTOR I.D. C6001

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL.	1-29-00	SUR 3	1-29-00
INT. MAJOR	n/a	n/a				
INT. MINOR	n/a	n/a				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.373	9.376	9.380					9.377
	2	9.374	9.377	9.381					
EXT.[1] PITCH	1	9.542		9.546	9.543	.253		.0315	9.258
	2	9.540		9.545					
EXT.[2] MINOR	1	9.458		9.458	9.458		.120	.0315	9.186
	2	9.456		9.459					
INT. MAJOR	1	n/a		n/a					n/a
	2	n/a		n/a					
INT. MINOR	1	n/a	n/a	n/a					n/a
	2	n/a	n/a	n/a					

INT. PITCH GO GAUGE # n/a RECAL DATE n/a RESULT n/a
NO-GO GAUGE # n/a RECAL DATE n/a RESULT n/a

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6001			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.522			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff Daniel P. O'Shea Date 9-22-99

Q.C. Review H.F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: △0 9-6-94	Page 1 of 1

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT THREE MILE ISLAND SURVEILLANCE NO. 7TH YEAR 1999

TENDON NO. 13H50 TENDON END/BUTTRESS NO. FIELD/BUTT #3 UNIT 1

ANCHORAGE I.D. 719 ADAPTOR I.D. C6002

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	THREAD 3RD	THREAD 6TH	THREAD 9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.366	9.367	9.370					9.368
	2	9.367	9.369	9.371					
EXT.[1] PITCH	1	9.528		9.538	9.5325	.253		.0315	9.248
	2	9.531		9.533					
EXT.[2] MINOR	1	9.443		9.444	9.444		.120	.0315	9.172
	2	9.441		9.447					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH					
GO GAUGE #	N/A	RECAL DATE	N/A	RESULT	N/A
NO-GO GAUGE #	N/A	RECAL DATE	N/A	RESULT	N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6002			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.612			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 9-30-99

Q.C. Review H.F. Hendricksen Level III Date 12-1-99

Title MGR, Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: △0 9-6-94	Page 1 of 1

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ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1	PSC Precision Surveillance Corporation
DATA SHEET 7.1 - INSPECTION DOCUMENTATION	

PROJECT TMI SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. H35-53 TENDON END/BUTTRESS NO. SHOP / BUTT #5 UNIT 1

ANCHORAGE I.D. 936 ADAPTOR I.D. C6001

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.365	9.368	9.375					9.371
	2	9.371	9.373	9.376					
EXT.[1] PITCH	1	9.524		9.534	9.535	.253		.0315	9.251 ~~8.967~~
	2	9.535		9.546					
EXT.[2] MINOR	1	9.441		9.452	9.448		.120	.0315	9.177
	2	9.442		9.457					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

WJ 9-7-99

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6001			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.570			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 9-7-99

Q.C. Review H.F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

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ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7+5 YEAR 1999

TENDON NO. H35-53 TENDON END/BUTTRESS NO. Field/Butt #3 UNIT 1

ANCHORAGE I.D. 905 ADAPTOR I.D. FSV-1

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.369	9.375	9.378					9.376
	2	9.375	9.380	9.381					
EXT.[1] PITCH	1	9.543		9.546	9.545	.253		.0315	9.261
	2	9.544		9.547					
EXT.[2] MINOR	1	9.459		9.460	9.460		.120	.0315	9.189
	2	9.458		9.464					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	FSV-1			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.594			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 9-3-99

Q.C. Review H.F. Hendrickson Level III Date 12-1-99

Title Mgr., Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: △0 9-6-94	Page 1 of 1

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. H46-37 TENDON END/BUTTRESS NO. SHOP / BUTT #6 UNIT 1

ANCHORAGE I.D. 944 ADAPTOR I.D. C6001

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BK/462	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	THREAD 3RD	THREAD 6TH	THREAD 9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.370	9.375	9.380					9.377
	2	9.376	9.377	9.381					
EXT.[1] PITCH	1	9.563		9.571	9.564	.253		.0315	9.280
	2	9.558		9.565					
EXT.[2] MINOR	1	9.472		9.480	9.476		.120	.0315	9.205
	2	9.471		9.481					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6001			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.478			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 9-13-99

Q.C. Review H.R. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. H46-37 TENDON END/BUTTRESS NO. FIELD / BUTT #4 UNIT 1

ANCHORAGE I.D. 798 ADAPTOR I.D. C6002

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL.	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.361	9.361	9.361					9.362
	2	9.363	9.363	9.363					
EXT.[1] PITCH	1	9.526		9.531	9.529	.253		.0315	9.244
	2	9.528		9.533					
EXT.[2] MINOR	1	9.424		9.426	9.425		.120	.0315	9.153
	2	9.424		9.428					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6002			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.677			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 9-28-99

Q.C. Review H.F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: 0 9-6-94	Page 1 of 1

Formerly "Hayes Surveillance"

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. H51-43 TENDON END/BUTTRESS NO. SHOP / BUTT #1 UNIT 1

ANCHORAGE I.D. 756 ADAPTOR I.D. C6001

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	THREAD 3RD	THREAD 6TH	THREAD 9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.368	9.373	9.379					9.375
	2	9.373	9.376	9.379					
EXT.[1] PITCH	1	9.548		9.559	9.555	.253		.0315	9.271
	2	9.552		9.559					
EXT.[2] MINOR	1	9.467		9.475	9.472		.120	.0315	9.201
	2	9.473		9.474					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6001			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.500			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 9-14-99

Q.C. Review H. F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: △0 9-6-94	Page 1 of 1

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7th YEAR 1999

TENDON NO. H 51-43 TENDON END/BUTTRESS NO. FIELD/BUTT #5 UNIT 1

ANCHORAGE I.D. 583 ADAPTOR I.D. C6002

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SOR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL	1-29-00	SOR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.377	9.375	9.377					9.377
	2	9.376	9.376	9.378					
EXT.[1] PITCH	1	9.537		9.545	9.540	.253		.0315	9.256
	2	9.532		9.544					
EXT.[2] MINOR	1	9.439		9.448	9.446		.120	.0315	9.175
	2	9.445		9.450					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6002			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.565			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 9-13-99

Q.C. Review H.F. Hendrickson Level III Date 12-1-99

Title MGR, Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: △0 9-6-94	Page 1 of 1

ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1	PSC Precision Surveillance Corporation
DATA SHEET 7.1 - INSPECTION DOCUMENTATION	

PROJECT TMI SURVEILLANCE NO. #7+? YEAR 1999

TENDON NO. H62-26 TENDON END/BUTTRESS NO. SHOP / BUTT #6 UNIT 1

ANCHORAGE I.D. 924 ADAPTOR I.D. C6001

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	THREAD 3RD	THREAD 6TH	THREAD 9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.373	9.375	9.380					9.377
	2	9.375	9.378	9.380					
EXT.[1] PITCH	1	9.555		9.570	9.562	.253		.0315	9.277
	2 9.557	~~9.554~~		9.564					
EXT.[2] MINOR	1	9.451		9.461	9.460		.120	.0315	9.188
	2	9.454		9.472					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	C6001			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.478			
ACCEPTABLE? (YES, NO)	YES			

Q.C. Signoff [signature] Date 8-30-99

Q.C. Review H. F. Hendrikson Level III Date 12-1-99

Title MGR, Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: △0 9-6-94	Page 1 of 1

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ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT TMI SURVEILLANCE NO. 7+4 YEAR 1999

TENDON NO. H62-26 TENDON END/BUTTRESS NO. FIELD / BUTT #2 UNIT 1

ANCHORAGE I.D. ~~957~~ 571 (9-2-99) ADAPTOR I.D. FSV-1

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR	QC66	1-8-00				
EXT. PITCH	QC66	1-8-00	SET 5	4-29-00	SUR 5	1-29-00
EXT. MINOR	QC66	1-8-00	BLK/YEL	1-29-00	SUR 3	1-29-00
INT. MAJOR	N/A	N/A				
INT. MINOR	N/A	N/A				

2. MEASUREMENTS

THREAD	READ	3RD	6TH	9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1	9.369	9.374	9.381					9.378
	2	9.377	9.382	9.385					
EXT.[1] PITCH	1	9.536		9.547	9.542	.253		.0315	9.258
	2	9.539		9.544					
EXT.[2] MINOR	1	9.450		9.456	9.456		.120	.0315	9.185
	2	9.457		9.459					
INT. MAJOR	1	N/A		N/A					N/A
	2	N/A		N/A					
INT. MINOR	1	N/A	N/A	N/A					N/A
	2	N/A	N/A	N/A					

INT. PITCH GO GAUGE # N/A RECAL DATE N/A RESULT N/A
NO-GO GAUGE # N/A RECAL DATE N/A RESULT N/A

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK	FSV-1			
MIN. MINOR DIAM. FROM ADAPTOR TABLE	8.594			
ACCEPTABLE? (YES, NO)	YES			

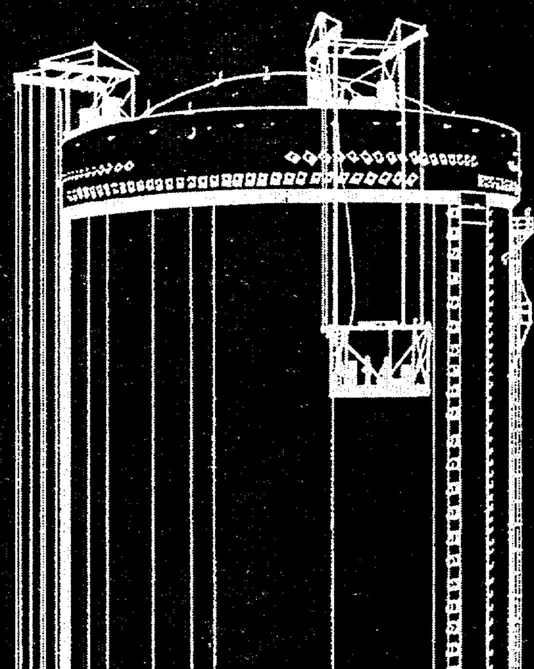
Q.C. Signoff [signature] Date 9-2-99

Q.C. Review H.T. Hendrickson Level III Date 12-1-99

Title MGR., Q.A.

Effective Date: 9-6-94	Previous Revision: △	Revision: ⓪ 9-6-94	Page 1 of 1

ATTACHMENT 3
TO
TOPICAL REPORT NO. 136
VOLUME III OF III



PSC
Precision
Surveillance
Corporation

B1 | B11 TM1

SUBURBAN LABORATORIES, Inc.

4140 Litt Drive • Hillside, Illinois 60162-1183
Tel. (708) 544-3260 • Toll Free (800) 783-LABS • Fax (708) 544-8587

REVIEWED BY
PSC Q. A. PERSONNEL
DATE 12-20-99
BY H.F. Hendrickson

FINAL REPORT OF LABORATORY ANALYSIS
LEVEL I REPORT

Precision Surveillance Corp.
3468 Watling Street
East Chicago, IN 46312

Attention: Harry Hendrickson

Reported: December 17, 1999
SLI Order #: S911199
Project ID.: Grease Samples
P.O. #: 724
Samples Received: 11/08/99
Collected By: Client

Sample ID: V8 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 01

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.1	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	**0.554**	**mg KOH/g**	**0.50**	**11/30/99**	**SH**	**ASTM D-97**
Nitrate	**1.27**	**ppm**	**0.50**	**11/19/99**	**CM**	**ASTM D-99**
Sulfide	**1.08**	**ppm**	**0.50**	**11/19/99**	**CM**	**APHA 42**

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V19 field bottom | Type: GREASE | Collected: 11/08/99 | SLI #: 02

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.1	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	<0.50	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	**2.22**	**ppm**	**0.50**	**11/19/99**	**CM**	**ASTM D-99**
Sulfide	**1.20**	**ppm**	**0.50**	**11/19/99**	**CM**	**APHA 42**
Total Acid Number	<0.18	mg KOH/g	0.18	12/17/99	SH	ASTM D-97

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V32 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 03

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	**0.2**	**%**	**0.10**	**11/30/99**	**JP**	**ASTM D-9**
Neutralization Number	**51.8**	**mg KOH/g**	**0.50**	**11/30/99**	**SH**	**ASTM D-97**
Nitrate	**1.75**	**ppm**	**0.50**	**11/19/99**	**CM**	**ASTM D-99**
Sulfide	**1.10**	**ppm**	**0.50**	**11/19/99**	**CM**	**APHA 42**

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V32 field bottom | Type: GREASE | Collected: 11/08/99 | SLI #: 04

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.1	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	**8.32**	**mg KOH/g**	**0.50**	**11/30/99**	**SH**	**ASTM D-97**
Nitrate	**4.29**	**ppm**	**0.50**	**11/19/99**	**CM**	**ASTM D-99**
Sulfide	**1.57**	**ppm**	**0.50**	**11/19/99**	**CM**	**APHA 42**

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V35 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 05

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.1	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	**2.69**	**mg KOH/g**	**0.50**	**11/30/99**	**SH**	**ASTM D-97**

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REVIEWED BY
PSC Q. A. PERSONNEL
DATE 12-20-99
BY H.F. Hendrickson

LEVEL I REPORT
Client: Precision Surveillance Corp.
Project ID: Grease Samples

Reported: December 17, 1999
SLI Order No.: S911199
Samples Received: 11/08/99

Sample ID: V35 shop top   Type: GREASE   Collected: 11/08/99   SLI #: 05A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Nitrate	2.06	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.36	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V40 shop top   Type: GREASE   Collected: 11/08/99   SLI #: 06A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	<0.1	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	1.06	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	4.76	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.91	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V40 field bottom   Type: GREASE   Collected: 11/08/99   SLI #: 07A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	0.538	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	6.03	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	2.25	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V57 shop top   Type: GREASE   Collected: 11/08/99   SLI #: 08A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	0.15	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	1.09	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	2.86	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.66	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V72 bottom   Type: GREASE   Collected: 11/08/99   SLI #: 09A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	0.22	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	4.39	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	2.75	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.16	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V73 bottom   Type: GREASE   Collected: 11/08/99   SLI #: 10A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	0.544	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	2.06	ppm	0.50	11/19/99	CM	ASTM D-992

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REVIEWED BY
PSC Q. A. PERSONNEL
DATE 12-20-99
BY H.F. Hendrickson

LEVEL I REPORT
Client: Precision Surveillance Corp.
Project ID: Grease Samples

Reported: December 17, 1999
SLI Order No.: S911199
Samples Received: 11/08/99

Sample ID: V73 bottom — Type: GREASE — Collected: 11/08/99 — SLI #: 10A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Sulfide	1.34	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V74 bottom — Type: GREASE — Collected: 11/08/99 — SLI #: 11A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	0.523	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	2.22	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.41	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V75 bottom — Type: GREASE — Collected: 11/08/99 — SLI #: 12A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	1.67	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	2.39	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.45	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V76 bottom — Type: GREASE — Collected: 11/08/99 — SLI #: 13A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	1.09	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	1.59	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.39	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V79 field bottom — Type: GREASE — Collected: 11/08/99 — SLI #: 14A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	3.89	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	3.02	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.32	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V80 shop top — Type: GREASE — Collected: 11/08/99 — SLI #: 15A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	1.09	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	4.60	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.60	ppm	0.50	11/19/99	CM	APHA 427

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REVIEWED BY
PSL Q. A. PERSONNEL
DATE 12-20-99
BY H. E. Hendrickson

LEVEL I REPORT
Client: Precision Surveillance Corp.
Project ID: Grease Samples

Reported: December 17, 1999
SLI Order No.: S911199
Samples Received: 11/08/99

Sample ID: V80 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 15

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Sulfide	1.60	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V83 field bottom | Type: GREASE | Collected: 11/08/99 | SLI #: 16

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	4.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	36.4	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	4.44	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.18	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V86 field bottom | Type: GREASE | Collected: 11/08/99 | SLI #: 17

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	<0.50	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	2.70	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.57	ppm	0.50	11/19/99	CM	APHA 42
Total Acid Number	<0.18	mg KOH/g	0.18	12/17/99	SH	ASTM D-97

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V94 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 18

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	<0.50	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	1.43	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.21	ppm	0.50	11/19/99	CM	APHA 42
Total Acid Number	<0.18	mg KOH/g	0.18	12/17/99	SH	ASTM D-97

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V110 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 19

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	0.544	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	5.71	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.84	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V114 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 20

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	1.68	mg KOH/g	0.50	11/30/99	SH	ASTM D-97

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REVIEWED BY
PSC Q. A. PERSONN
DATE 12-20-99
BY [signature]

LEVEL I REPORT
Client: Precision Surveillance Corp.
Project ID: Grease Samples

Reported: December 17, 1999
SLI Order No.: S911199
Samples Received: 11/08/99

Sample ID: V114 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 20

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Nitrate	3.05	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.39	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V114 field bottom | Type: GREASE | Collected: 11/08/99 | SLI #: 21

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	1.12	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	2.06	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.47	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V126 field bottom | Type: GREASE | Collected: 11/08/99 | SLI #: 22

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	<0.50	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	1.27	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.45	ppm	0.50	11/19/99	CM	APHA 42
Total Acid Number	<0.18	mg KOH/g	0.18	12/17/99	SH	ASTM D-97

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V136 bottom | Type: GREASE | Collected: 11/08/99 | SLI #: 23

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	0.549	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	3.49	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.97	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V139 field bottom | Type: GREASE | Collected: 11/08/99 | SLI #: 24

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	1.08	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	5.23	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	2.57	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V143 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 25

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	2.19	mg KOH/g	0.50	11/30/99	SH	ASTM D-97

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REVIEWED BY
PSC Q. A. PERSONNEL
DATE 12-20-99
BY H.T. Hendrickson

LEVEL I REPORT
Client: Precision Surveillance Corp.
Project ID: Grease Samples

Reported: December 17, 1999
SLI Order No.: S911199
Samples Received: 11/08/99

Sample ID: V143 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 25A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Nitrate	4.76	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.62	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V146 bottom | Type: GREASE | Collected: 11/08/99 | SLI #: 26

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	4.35	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	4.13	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	2.10	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V156 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 27

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.25	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	<0.50	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	4.29	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.70	ppm	0.50	11/19/99	CM	APHA 42
Total Acid Number	<0.18	mg KOH/g	0.18	12/17/99	SH	ASTM D-97

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V164 shop top | Type: GREASE | Collected: 11/08/99 | SLI #: 28A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.30	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	2.22	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	8.57	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	2.99	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: V164 field bottom | Type: GREASE | Collected: 11/08/99 | SLI #: 29A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	1.08	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	10.3	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	3.20	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: D1-02 field | Type: GREASE | Collected: 11/08/99 | SLI #: 30

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	<0.50	mg KOH/g	0.50	11/30/99	SH	ASTM D-97

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REVIEWED BY
PSd Q. A. PERSONNEL
DATE 1-3-00
BY H.T. Hendrickson

FINAL REPORT OF LABORATORY ANALYSIS
LEVEL I REPORT

Precision Surveillance Corp.
3468 Watling Street
East Chicago, IN 46312

Attention: Harry Hendrickson

Reported: December 30, 1999
SLI Order #: S912351
Project ID.: Grease Sample
P.O. #: 724
Samples Received: 12/16/99
Collected By: Client

Sample ID: V164 Field/Bottom #2 Type: GREASE Collected: SLI #: 01

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Special Instructions						
Nitrate	<0.50	ppm	0.50	12/28/99	CM	ASTM D-99

COMMENTS

SLI LIMIT: The lowest concentration that can be reliably achieved within specified requirements of precision and accuracy during routine laboratory operating conditions. Limit may also represent a project specific reporting level.
NOTE: All results reported in wet weight unless otherwise indicated. (DW = Dry Weight) Please refer to glossary for abbreviations and definitio
This report consists of this final report of laboratory analysis, and any accompanying documentation including, but not limited to, chain of custody records, raw data, and letters of explanation or reliance. This report may not be reproduced, except in full, without the prior written approval of Suburban Laboratories, Inc.

Report Reviewed By: 12/30/99

Reported By: ANAMARIE (Last Page) REV 03/20/97 RL1
Verified By: AMF

B3 | B11

SUBURBAN LABORATORIES, Inc.

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REVIEWED BY
PSC Q. A. PERSONNEL
DATE 12-20-99
BY H.K. Hudickson

LEVEL I REPORT
Client: Precision Surveillance Corp.
Project ID: Grease Samples

Reported: December 17, 1999
SLI Order No.: S911199
Samples Received: 11/08/99

Sample ID: D1-02 field | Type: GREASE | Collected: 11/08/99 | SLI #: 30

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Nitrate	3.02	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.54	ppm	0.50	11/19/99	CM	APHA 42
Total Acid Number	<0.18	mg KOH/g	0.18	12/17/99	SH	ASTM D-97

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: D1-02 shop | Type: GREASE | Collected: 11/08/99 | SLI #: 31

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHC
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	0.544	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	1.27	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	0.890	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: D1-04 shop | Type: GREASE | Collected: 11/08/99 | SLI #: 32

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHC
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	3.33	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	4.44	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.21	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: D1-04 field | Type: GREASE | Collected: 11/08/99 | SLI #: 33

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.20	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	1.63	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	3.97	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.00	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: D225 se/field | Type: GREASE | Collected: 11/08/99 | SLI #: 34

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.20	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	55.4	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	1.27	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.02	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: D225 shop/nw | Type: GREASE | Collected: 11/08/99 | SLI #: 35

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	33.6	mg KOH/g	0.50	11/30/99	SH	ASTM D-97

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E9/B11

REVIEWED BY
PSC Q. A. PERSONNEL
DATE 12-20-99
BY K.K. Hendrickson

LEVEL I REPORT
Client: Precision Surveillance Corp.
Project ID: Grease Samples

Reported: December 17, 1999
SLI Order No.: S911199
Samples Received: 11/08/99

Sample ID: D225 shop/nw | Type: GREASE | Collected: 11/08/99 | SLI #: 35

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Nitrate	2.70	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.28	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: D313 field | Type: GREASE | Collected: 11/08/99 | SLI #: 36

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	2.22	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	1.27	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	0.920	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: D313 shop | Type: GREASE | Collected: 11/08/99 | SLI #: 37

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.20	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	49.3	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	1.75	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.10	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: H46-37 shop | Type: GREASE | Collected: 11/08/99 | SLI #: 38

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	2.22	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	7.78	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	2.41	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: H46-37 field | Type: GREASE | Collected: 11/08/99 | SLI #: 39

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	<0.50	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	9.84	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	2.87	ppm	0.50	11/19/99	CM	APHA 42
Total Acid Number	<0.18	mg KOH/g	0.18	12/17/99	SH	ASTM D-97

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: 13H50 shop | Type: GREASE | Collected: 11/08/99 | SLI #: 40

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	2.24	mg KOH/g	0.50	11/30/99	SH	ASTM D-97

B10/B11

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REVIEWED BY
PSC Q. A. PERSONNEL
DATE 12-20-99
BY H.G. Hendrickson

LEVEL I REPORT
Client: Precision Surveillance Corp.
Project ID: Grease Samples

Reported: December 17, 1999
SLI Order No.: S911199
Samples Received: 11/08/99

Sample ID: 13H50 shop | Type: GREASE | Collected: 11/08/99 | SLI #: 40

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Nitrate	2.22	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.00	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: 13H50 field | Type: GREASE | Collected: 11/08/99 | SLI #: 41

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	<0.50	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	3.97	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.29	ppm	0.50	11/19/99	CM	APHA 42
Total Acid Number	<0.18	mg KOH/g	0.18	12/17/99	SH	ASTM D-97

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: H35-33 field | Type: GREASE | Collected: 11/08/99 | SLI #: 42

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	<0.50	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	2.22	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.31	ppm	0.50	11/19/99	CM	APHA 42
Total Acid Number	<0.18	mg KOH/g	0.18	12/17/99	SH	ASTM D-97

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: H35-33 shop | Type: GREASE | Collected: 11/08/99 | SLI #: 43

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	2.80	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	6.98	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.43	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: H62-26 field | Type: GREASE | Collected: 11/08/99 | SLI #: 44

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-9
Neutralization Number	54.3	mg KOH/g	0.50	11/30/99	SH	ASTM D-97
Nitrate	1.11	ppm	0.50	11/19/99	CM	ASTM D-99
Sulfide	1.18	ppm	0.50	11/19/99	CM	APHA 42

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: H62-26 shop | Type: GREASE | Collected: 11/08/99 | SLI #: 45

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-51
Moisture Content	0.30	%	0.10	11/30/99	JP	ASTM D-9

B11/B11

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REVIEWED BY
PSC Q. A. PERSONNEL
DATE 12-20-99
BY [signature]

LEVEL I REPORT
Client: Precision Surveillance Corp.
Project ID: Grease Samples

Reported: December 17, 1999
SLI Order No.: S911199
Samples Received: 11/08/99

Sample ID: H62-26 shop | Type: GREASE | Collected: 11/08/99 | SLI #: 45A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Neutralization Number	53.2	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	1.11	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.10	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: H51-43 shop | Type: GREASE | Collected: 11/08/99 | SLI #: 46A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	<0.50	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	5.40	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	0.950	ppm	0.50	11/19/99	CM	APHA 427
Total Acid Number	<0.18	mg KOH/g	0.18	12/17/99	SH	ASTM D-974

procedure 1301-9.1 rev.14 Enclosure 3

Sample ID: H51-43 field | Type: GREASE | Collected: 11/08/99 | SLI #: 47A

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHOD
Chloride	<0.50	ppm	0.50	12/01/99	SR	ASTM D-512
Moisture Content	<0.10	%	0.10	11/30/99	JP	ASTM D-95
Neutralization Number	5.60	mg KOH/g	0.50	11/30/99	SH	ASTM D-974
Nitrate	2.22	ppm	0.50	11/19/99	CM	ASTM D-992
Sulfide	1.28	ppm	0.50	11/19/99	CM	APHA 427

procedure 1301-9.1 rev.14 Enclosure 3

COMMENTS

SLI LIMIT: The lowest concentration that can be reliably achieved within specified requirements of precision and accuracy during routine laboratory operating conditions. Limit may also represent a project specific reporting level.
NOTE: All results reported in wet weight unless otherwise indicated. (DW = Dry Weight) Please refer to glossary for abbreviations and definitions
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Report Reviewed By: [signature] 12/17/99

Reported By: ANAMARIE — (Last Page) — REV 03/20/97 RL1 — Verified By: AMF

3 A

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REVIEWED BY
PSC Q. A. PERSONNEL
DATE 11-12-99
BY H.G. Hendrickson

FINAL REPORT OF LABORATORY ANALYSIS
LEVEL I REPORT

Precision Surveillance Corp.
3468 Watling Street
East Chicago, IN 46312

Attention: Harry Hendrickson

Reported: November 11, 1999
SLI Order #: S911200
Project ID.: Water Sample V86 Field Bottom
P.O. #: 724
Samples Received: 11/08/99
Collected By: Client

Sample ID: V86 Field/Bottom   Type: WATER   Collected: 10/04/99   SLI #: 01.

PARAMETER	RESULT	UNITS	SLI LIMIT	ANALYZED	BY	METHO
pH (Laboratory)	11.67 J	S.U.		11/08/99	JD	EPA 150.

COMMENTS
pH: J = Sample received and run past hold time.

SLI LIMIT: The lowest concentration that can be reliably achieved within specified requirements of precision and accuracy during routine laboratory operating conditions. Limit may also represent a project specific reporting level.
NOTE: All results reported in wet weight unless otherwise indicated. (DW = Dry Weight) Please refer to glossary for abbreviations and definitior
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Report Reviewed By: 11/11/99   REV 03/20/97 RL1
Reported By: ANAMARIE   (Last Page)   Verified By: AMF

B11B

Viscosity Oil / Pennzoil-Quaker State Co.
600-H Joliet Rd.
Willowbrook, Illinois 60521 U.S.A.
Tel. # (630)-850-4000
Fax. # (630)-850-4020

Date: December 21, 1999

To Name: Mr. Harry Hendrickson

Firm: Precision Surveillance Corp.

Fax No.: 1-219-397-5867

From: C.W. Novak

Subject: Base/Acid Numbers Visconorust 2090P Series Casing Filler

Total number of pages including this cover letter: 1

The modified ASTM D-974 Base Number test is designed for a strong base type product like our Visconorust 2090P-4 Casing Filler, to show (1) that it meets the specifications when it is new and (2) if the base starts to decrease due to some problem occurring in the system. The test will never show a negative number, though it can get quite low such as less than 0.5, because the test method is just designed to show how much base is in the product.

When you take the same product and run the ASTM D-974 standard procedure for a weak acid, you again can only approach the neutral mark, which in the above case was less than 0.18.

In both cases of the above, the results of the product being tested from both an acid value and a base value is approaching "0" or neutral. The Visconorust 2090P type product was neutral, hence the test results are showing that the product being tested is mainly the Visconorust 2090P type product. There is nothing wrong with neutral, in this case, as we have several containments with over 25 years of service with the 2090P type product as their original fill. The later units, with the higher base number, provide the more desirable properties, along with other additional features from the upgrading of the product.

Test results of other mixtures of Visconorust 2090P-2 to 2090P-4 have shown a Base No. of 3 to 35 plus as the mixtures have been more of the higher base number products.

In summation then, if testing on samples known to contain the neutral type Visconorust 2090P type product come in at close to zero base neutralization number, and it is desired to be sure the product has not deteriorated to a major acid condition, it is suggested that the ASTM D-974 Acid Number be run to show that the product has an acid number of less than 1.0 and is therefore practically neutral. The acid number stems from the fact that an additive in the product has an organic acid number which is necessary for it to function in the corrosion preventive system, but it in no way is detrimental to the casing filler.

Best regards, C.W. Novak

NOT USED

D1/D4

FIELD CHANGE REQUEST

INDEX LOG

PSC Precision Surveillance Corporation

FCR No.	Item	Date Written	Date Approved	Date Rev.
F669-001	SQ 10.3 CHANGES 8.1, 8.1.4, 8.3.2.1, 9.2, 10.2	8-16-99	8-17-99	

D2/D4

SPECIAL FIELD REVISION CONTROL

PSC Precision Surveillance Corporation

FIELD CHANGE REQUEST NO. FCR F669-001

Requested By: JOHN PIAZZA Title: ENGINEER Date: 8-16-99

Originator: CLIFFORD W. PETERS

PROCEDURE NUMBER: SQ 10.~~$3~~ (8-16-99) REV. NO.: 0 PROCEDURE TITLE: PHYSICAL TESTING OF TENDON WIRES

AFFECTED SECTION: 8.1, 8.1.4, 8.3.2.1, 9.2, 10.2 Revision to Manual Required Yes [X] No [ ]

NCR REQUIRED: Yes [ ] No [X] NCR. No. N/A Hold Tag No. N/A

DETAILED DESCRIPTION OF EXISTING CONDITION: (use extra pages or write on back)
SEC. 8.1 REFERENCES ENCLOSURE 5 SHOULD BE ENCLOSURE 4; SEC. 8.1.4 & 10.2 REFERENCE DATA SHT 4 OF GPU PROCEDURE 1301-9. SHOULD BE DATA SHT 2; SECTION 8.3.2.1 REFERNCES ENCLOSURE 7 TABLE 4 SHOULD BE ENCLOSURE 6 TABLE 1; SEC. 9.2 REFERENCES TABLE 3 SHOULD BE ENCLOSURE 4 TABLE 1

RECOMMENDED CHANGE: CHANGE SECTION 8.1 FROM ENCLOSURE 5 TO 4; CHANGE SECTIONS 8.1.4 & 10.2 FROM DATA SHT 4 TO 2, CHANGE SECTION 8.3.2.1 FROM ENCLOSURE 7 TABLE 4 TO ENCLOSURE 6 TABLE 1; CHANGE SECTION 9.2 FROM TABLE 3 TO ENCLOSURE (8-16-99) 4 TABLE 1.

PSC Approval: Sign & Date	Quality Assurance	Quality Control	Engineering
	HARRY HENDRICKSON PER TELECON 8-16-99	8-16-99	PAUL SMITH PER TELECON 8-16-99

ON SITE OWNER/AGENT, APPROVAL OR COMMENTS: Change Acceptable.
8/17/99
JOHN J. PIAZZA

APPROVED SITE QA AUTHORITY: Jeffrey B. Miller TITLE: (for QU Mgr.) for CLI DATE: 8-17-99

DISPOSITION PSC REVISE @ QC: LATER DATE HOLD TAG APPLIED N/A HOLD TAG REMOVED N/A

Q.C. INSPECTOR: DATE: 8-17-99

Distribution:
____ Quality Assurance Owner
____ Quality Assurance PSC
____ Engineering Owner
____ Engineering PSC
____ Project Manager PSC
____ Quality Control Owner
____ Quality Control PSC

PSC

PRECISION SURVEILLANCE CORPORATION

3468 WATLING ST. EAST CHICAGO, IN 46312
(219) 397-5826 FAX (219) 397-5867

D3/D4

Three Mile Island Tendon Surveillance 1999

1. Twenty-nine vertical tendons which were exhibiting grease leakage through the reactor building exterior concrete (shrinkage cracks) in the upper tendon access gallery were identified to specific vertical tendons by location and topped off. The 29 (listed below) were then cleaned and re-inspected at a later date and found to be still exhibiting active grease leakage, not grease, but oil in nature. These areas should be regularly checked and monitored

V1	V17	V31	V54	V135	V153
V3	V21	V32	V59	V137	V155
V5	V23	V41	V131	V138	V159
V6	V26	V46	V132	V139	V162
V13	V28	V51	V134	V140	-----

2. Buttress 2 (the H24 side) from elevation 305' to 380' was cleaned of excess grease to ascertain which, if any, cans were leaking to allow repairs. No cans appeared to be leaking. This grease may have been from a previous spill which has spread over time. No repairs were performed in this area but it should be monitored for future leaks that were not immediately apparent.

3. There were numerous areas on the exterior concrete containment building walls which were cleaned of grease leakage and spills. These areas are as follows:
   - between buttress 1 and 2 below dome ring; one area approximately 30ft long and one approximately 50ft long.
   - between buttress 6 and equipment access hatch, approximately 40ft long.
   between buttress 5 and 6 under dome ring - 2 areas.
   - between buttress 4 and 5 – below dome ring.
   - between buttress 4 and 3 – below dome ring
     - below D3-17 SE
     - 2 areas below turbine building roof each 100ft long.
   - buttress 3 along side of ladder north side of dome ring to turbine building roof.
   - between buttress 1 and 2 below dome ring – dome ring to turbine building roof.
   - neighboring areas where horizontal or dome can repairs were performed.

In all cases the grease was from spills or leakage. Some of the areas were easily cleaned while others had stained with age (weathering) and were more difficult. Some areas of staining still remain and may be addressed at another time if warranted.

4. Many grease cans have shown non-active grease leakage. In most cases, those areas were cleaned and cans that showed active leaks were repaired per procedure. Those cans that should be monitored are listed in the general exterior inspection report.

5. Seven vertical tendon lower end cans (caps) were scheduled for repair. These caps were not showing active grease leaks yet showed oil dripping from around the can flange. These can bolts were tightened and cleaned. Other lower ends of vertical tendons beside the seven scheduled were also found to be leaking oil. All of the tendons exhibiting this condition were cleaned and should be monitored for changing conditions.

6. Four top vertical caps showed active grease leaks from the main gasket. During the gasket repair a cursory exam showed the grease coating to be intact and no evidence of corrosion or unusual condition was noted.

7. Tendon V-86 also showed active grease leakage at the top vertical can. This can was found to be shorter that the overall length of the shim stack therefore not compressing the gasket. The tendon was detensioned and a wire removed for inspection. The wire was found to be in excellent condition, as were al of the anchorage components. When the tendon was retensioned, additional shims were placed at the bottom to reduce the top shim stack and allow proper fitting of the grease can.
Prior to work on this tendon as much as possible of the grease was removed and air was added before refilling to remove all possible old grease. This tendon was refilled but due to the amount of water obtained, further monitoring of the grease for water content and discoloration should be considered.

E1/E20

RAM/JACK CALIBRATION RECORD FORM 12.8.G

PSC Formerly Inryco Surveillance

PROJECT PRE-TMT CONTRACT/PART NO. N669

Jack Description PINE Size 1000 Tons Register No. 9365

Theoretical Ram Area 212.65 Max. Pressure 8440 PSI

Calibrating Device TELEDYNE Register No. 4734 Constant 32987.5

Calibrating Gauge HEISE Register No. 59-27100 Recal Date 12-4-00

Raw Data By Daniel P. O'Hea 7-28-99

Mean Ram Area 213.051 sq.in. K= 8.119 Kips

Computed By Ronald D. Hough

Title G.M. Date 7-28-99

WITNESS Paul D. Fish Anita Seponski

Agency HsBI+Jco Date 7/28/99

QC Check H.F. Hendrickson

Title MGR, Q.A. Date 7-28-99

Target PSI	Gauge Reading PSI	Load Cell Readout	COMMENTS
1000	1015	-6.30	RUN 1 POSITION 2"
2000	2003	-12.66	
3000	3012	-19.16	
4000	4008	-25.58	
5000	5002	-32.00	
6000	6010	-38.54	
7000	7002	-44.94	
8000	8002	-51.40	
1000	1001	-6.26	RUN 2 POSITION 4"
2000	2018	-12.80	
3000	3021	-19.26	
4000	4003	-25.60	
5000	5001	-32.06	
6000	6003	-38.54	
7000	7001	-45.00	
8000	8001	-51.46	
1000	1007	-6.30	RUN 3 POSITION 6"
2000	2010	-12.74	
3000	3006	-19.18	
4000	4006	-25.64	
5000	5003	-32.10	
6000	6002	-38.54	
7000	7002	-45.00	
8000	8001	-51.46	

E2/E2s

ACK CALIBRATION - LINEAR REGRESSION ANALYSIS

JECT PRE-TMI
CONTRACT NO. N669

K DESCRIPTION: PINE " TONS: 1000
REGISTER NO.: 9365

EORETICAL RAM AREA (sq.in): 212.65

MAX PRESSURE (psi): 8440

ALIBRATING DEVICE USED: TELEDYNE REGISTER NO.: 4734 CONSTANT= 32987.5

ALIBRATING GAUGE DESCRIPTION: HEISE
REGISTER NO.: S9-271c

............INPUT............		
ACTUAL GAUGE READING (psi)	LOAD CELL READOUT	COMPUTED FORCE (k)
1015	6.30	207.821
2003	12.66	417.622
3012	19.16	632.041
4008	25.58	843.820
5002	32.00	1055.600
6010	38.54	1271.338
7002	44.94	1482.458
8002	51.40	1695.558
1001	6.26	206.502
2018	12.80	422.240
3021	19.26	635.339
4003	25.60	844.480
5001	32.06	1057.579
6003	38.54	1271.338
7001	45.00	1484.438
8001	51.46	1697.537
1007	6.30	207.821
2010	12.74	420.261
3006	19.18	632.700
4006	25.64	845.800
5003	32.10	1058.899
6002	38.54	1271.338
7002	45.00	1484.438
8001	51.46	1697.537

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION
- ERROR IN STANDARD .... 0.0100 ksi
- INTERPOLATION IN GAUGE .... 0.0000 ksi
- ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION
- INTERPOLATION IN MASTER .... 0.0000 ksi
- INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi
- ACCURACY OF MASTER .... 0.0100 ksi
- ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE
- INTERPOLATION ERROR .... 0.0050 ksi
- ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 8.0020 ksi

** FORCE (k) = 213.051 (sq.in.) X GAUGE READING (ksi) -8.119 (k) **

CORRELATION = 0.99999779 N/NO= 1.0000 (NOT < .66667)
MAXIMUM ERROR RATIO IN JACK .... .0068
MAXIMUM ERROR RATIO IN GAUGE .... .0052
MAXIMUM TOTAL ERROR RATIO .... .0086

COMPUTED BY: R. D. Houge DATE: 7-28-99 CHECKED BY: Paul C Smith DATE: 7/28/9

E3/E20

RAM/JACK CALIBRATION RECORD FORM 12.8.G

PSC Formerly Inryco Surveillance

PROJECT POST-TMI CONTRACT/PART NO. N669

Jack Description PINE Size 1000 Tons Register No. 9365

Theoretical Ram Area 212.65 Max. Pressure 8440 PSI

Calibrating Device TELEDYNE Register No. 4734 Constant 32987.5

Calibrating Gauge HEISE Register No. 59-27100 DUE CAL. Date 12-4-00

Raw Data By [signature] 12-6-99

Mean Ram Area 211.512 sq.in. K= (-) 8753 Kips

Computed By [signature]

Title Project Manager Date 12/6/99

WITNESS N/A

Agency N/A Date N/A

WITNESSED & QC Check H. F. Hendrickson

Title MGR, Q.A. Date 12-6-99

Target PSI	Gauge Reading PSI	Load Cell Readout	COMMENTS
1000	1004	- 6.18	RUN 1 POSITION 2"
2000	2011	- 12.64	
3000	3014	- 19.06	
4000	4025	- 25.56	
5000	5018	- 31.92	
6000	6022	- 38.32	
7000	7035	- 44.70	
8000	8016	- 50.80	
1000	1002	- 6.08	RUN 2 POSITION 4"
2000	2019	- 12.66	DZP 12-6-99
3000	3018	- ~~19.02~~ 19.10	
4000	4016	- 25.52	
5000	5046	- 32.08	
6000	6025	- 38.46	
7000	7010	- 44.70	
8000	8005	- 51.10	
1000	1021	- 6.22	RUN 3 POSITION 6"
2000	2024	- 12.68	
3000	3017	- 19.08	
4000	4017	- 25.56	
5000	5016	- 32.02	
6000	6018	- 38.44	
7000	7004	- 44.76	
8000	8028	- 51.30	

E4/E2

JACK CALIBRATION - LINEAR REGRESSION ANALYSIS

PROJECT POST TMI
CONTRACT NO. N669
JACK DESCRIPTION: PINE
TONS: 1000
REGISTER NO.: 9365
THEORETICAL RAM AREA (sq.in): 212.65
MAX PRESSURE (psi): 8440
CALIBRATING DEVICE USED: TELEDYNE
REGISTER NO.: 4734
CONSTANT= 32987.5
CALIBRATING GAUGE DESCRIPTION: HEISE
REGISTER NO.: S9-271c

ACTUAL GAUGE READING (psi)	...............INPUT............... LOAD CELL READOUT	COMPUTED FORCE (k)
1004	6.18	203.863
2011	12.64	416.962
3014	19.06	628.742
4025	25.56	843.161
5018	31.92	1052.961
6022	38.32	1264.081
7035	44.70	1474.541
8016	50.80	1675.765
1002	6.08	200.564
2019	12.66	417.622
3018	19.10	630.061
4016	25.52	841.841
5046	32.08	1058.239
6025	38.40	1266.720
7010	44.70	1474.541
8005	51.10	1685.661
1021	6.22	205.182
2024	12.68	418.282
3017	19.08	629.401
4017	25.56	843.161
5016	32.02	1056.260
6018	38.44	1268.040
7004	44.76	1476.521
8028	51.30	1692.259

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION
- ERROR IN STANDARD .... 0.0100 ksi
- INTERPOLATION IN GAUGE .... 0.0000 ksi
- ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION
- INTERPOLATION IN MASTER .... 0.0000 ksi
- INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi
- ACCURACY OF MASTER .... 0.0100 ksi
- ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE
- INTERPOLATION ERROR .... 0.0050 ksi
- ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 8.0280 ksi

** FORCE (k) = 211.512 (sq.in.) X GAUGE READING (ksi) -8.753 (k) **

CORRELATION = 0.99998036 N/NO= 1.0000 (NOT < .66667)
MAXIMUM ERROR RATIO IN JACK .... .0129
MAXIMUM ERROR RATIO IN GAUGE .... .0052
MAXIMUM TOTAL ERROR RATIO .... .0139

COMPUTED BY: [signature] DATE: 12/6/99 CHECKED BY: H.T. Hendrickson 12/6/99 DATE:

ES/E20

RAM/JACK CALIBRATION RECORD FORM 12.8.G

PSC Formerly Inryco Surveillance

PROJECT Post Callaway/Pre TMI CONTRACT/PART NO. N667

Jack Description Pine Size 850 Tons Register No. 6002

Theoretical Ram Area 190.45 Max. Pressure 8500 PSI

Calibrating Device TELEDYNE Register No. 4734 Constant 32,987.5

Calibrating Gauge HEISE Register No. 58-27100 Date DUE 12-4-00

Raw Data By [signature] 7-28-99

Mean Ram Area 191.165 sq.in. K= (-)16.036 Kips

Computed By [signature]

Title Project Manager Date 7/28/99

WITNESS [signature] ANII Supervisor

Agency HSB I&I Co Date 7/28/99

QC Check H. E. Hendrickson

Title MGR., Q.A. Date 7-28-99

Target PSI	Gauge Reading PSI	Load Cell Readout	COMMENTS
1000	1009	-5.32	RUN 1 POSITION 1½"
2000	2003	-11.04	Initial Post Callaway Calibration halted due to center tube seal leak. This seal does not effect the pressure area of the ram. This calibration run after replacing the new pressure seal. Paul C Smith 7/28/99
3000	3002	-16.82	
4000	4003	-22.56	
5000	5006	-28.34	
6000	6003	-34.08	
7000	7001	-39.88	
8000	8002	-45.70	
8500	8503	-48.60	
1000	1002	-5.44	RUN 2 POSITION 3"
2000	2004	-11.20	
3000	3008	-17.00	
4000	4001	-22.74	
5000	5005	-28.54	
6000	6006	-34.34	
7000	7002	-40.14	
8000	8008	-46.00	
8500	8506	-48.90	
1000	1001	-5.38	RUN 3 POSITION 4½"
2000	2002	-11.18	
3000	3007	-17.00	
4000	4005	-22.80	
5000	5001	-28.58	
6000	6002	-34.38	
7000	7001	-40.20	
8000	8003	-46.06	
8500	8505	-48.98	

JACK CALIBRATION - LINEAR REGRESSION ANALYSIS E6/E2 7/2?/

JECT POST CALLAWAY / PRE TMI CONTRACT NO. N667/N66
ACK DESCRIPTION: PINE TONS: 850 REGISTER NO.: 6002
HEORETICAL RAM AREA (sq.in): 190.45
MAX PRESSURE (psi): 8500
CALIBRATING DEVICE USED: TELEDYNE REGISTER NO.: 4734 CONSTANT= 32987.5
CALIBRATING GAUGE DESCRIPTION: HEISE REGISTER NO.: S9-271

ACTUAL GAUGE READING (psi)	INPUT LOAD CELL READOUT	COMPUTED FORCE (k)
1009	5.32	175.494
2003	11.04	364.182
3002	16.82	554.850
4003	22.56	744.198
5006	28.34	934.866
6003	34.08	1124.214
7001	39.88	1315.542
8002	45.70	1507.529
8503	48.60	1603.193
1002	5.44	179.452*
2004	11.20	369.460
3008	17.00	560.788
4001	22.74	750.136
5005	28.56	942.123
6006	34.34	1132.791
7002	40.14	1324.118
8008	46.00	1517.425
8506	48.90	1613.089
1001	5.38	177.473
2002	11.18	368.800
3007	17.00	560.788
4005	22.80	752.115
5001	28.58	942.783
6002	34.38	1134.110
7001	40.20	1326.098
8003	46.06	1519.404
8505	48.98	1615.728

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION
- ERROR IN STANDARD .... 0.0100 ksi
- INTERPOLATION IN GAUGE .... 0.0000 ksi
- ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION
- INTERPOLATION IN MASTER .... 0.0000 ksi
- INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi
- ACCURACY OF MASTER .... 0.0100 ksi
- ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE
- INTERPOLATION ERROR .... 0.0050 ksi
- ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 8.5060 ksi

** FORCE (k) = 191.165 (sq.in.) X GAUGE READING (ksi) -16.036 (k) **

CORRELATION = 0.99996385 N/NO= 0.9630 (NOT < .66667)
MAXIMUM ERROR RATIO IN JACK .... .0123
MAXIMUM ERROR RATIO IN GAUGE .... .0049

MAXIMUM TOTAL ERROR RATIO .... .0132

COMPUTED BY: Paul C Smith DATE: 7/28/99 CHECKED BY: H.F. Hendricksen 7/28/99 DATE:

E7/E20

RAM/JACK CALIBRATION RECORD FORM 12.8.G

PSC Formerly Inryco Surveillance

PROJECT POST-TMI CONTRACT/PART NO. N669

Jack Description PINE Size 850 Tons Register No. 6002

Theoretical Ram Area 190.45 Max. Pressure 8500 PSI

Calibrating Device TELEDYNE Register No. 4734 Constant 32987.5

Calibrating Gauge HEISE Register No. 59-27100 DUE CAL Date 12-4-00

Raw Data By [signature] 12-7-99 WITNESS N/A

Mean Ram Area 190.495 sq.in. K= (-) 14869 Kips Agency N/A Date N/A

Computed By [signature] WITNESSED QC Check [signature]

Title Project Manager Date 12/7/99 Title MGR, Q.A. Date 12-7-99

Target PSI	Gauge Reading PSI	Load Cell Readout	COMMENTS
1000	1007	-5.48	RUN 1 POSITION 1½"
2000	2011	-11.22	
3000	3005	-16.94	
4000	4022	-22.82	
5000	5011	-28.52	
6000	6011	-34.26	
7000	7016	-40.08	
8000	8010	-45.82	
8500	8510	-48.70	
1000	1013	-5.46	RUN 2 POSITION 3"
2000	2014	-11.14	
3000	3007	-16.84	
4000	4014	-22.64	
5000	5007	-28.38	
6000	6010	-34.16	
7000	7004	-39.94	
8000	8006	-45.72	
8500	8514	-48.62	
1000	1006	-5.38	RUN 3 POSITION 4½"
2000	2045	-11.36	
3000	3012	-16.92	
4000	4016	-22.72	
5000	5012	-28.52	
6000	6010	-34.30	
7000	7009	-40.10	
8000	8004	-45.88	
8500	8517	-48.82	

E8/E20

.CK CALIBRATION - LINEAR REGRESSION ANALYSIS

.ECT POST TMI — CONTRACT NO. N669

DESCRIPTION: PINE — TONS: 850 — REGISTER NO.: 6002

EORETICAL RAM AREA (sq.in): 190.45

MAX PRESSURE (psi): 8500

CALIBRATING DEVICE USED: TELEDYNE — REGISTER NO.: 4734 — CONSTANT= 32987.5

CALIBRATING GAUGE DESCRIPTION: HEISE — REGISTER NO.: S9-271

ACTUAL GAUGE READING (psi)	INPUT LOAD CELL READOUT	COMPUTED FORCE (k)
1007	5.48	180.772*
2011	11.22	370.120
3005	16.94	558.808
4022	22.82	752.775
5011	28.52	940.804
6011	34.26	1130.152
7016	40.08	1322.139
8010	45.82	1511.487
8510	48.70	1606.491
1013	5.46	180.112
2014	11.14	367.481
3007	16.84	555.510
4014	22.64	746.837
5007	28.38	936.185
6010	34.16	1126.853
7004	39.94	1317.521
8006	45.72	1508.189
8514	48.62	1603.852
1006	5.38	177.473
2045	11.36	374.738
3012	16.92	558.149
4016	22.72	749.476
5012	28.52	940.804
6010	34.30	1131.471
7009	40.10	1322.799
8004	45.88	1513.467
8517	48.82	1610.450

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION
- ERROR IN STANDARD .... 0.0100 ksi
- INTERPOLATION IN GAUGE .... 0.0000 ksi
- ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION
- INTERPOLATION IN MASTER .... 0.0000 ksi
- INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi
- ACCURACY OF MASTER .... 0.0100 ksi
- ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE
- INTERPOLATION ERROR .... 0.0050 ksi
- ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 8.5170 ksi

** FORCE (k) = 190.495 (sq.in.) X GAUGE READING (ksi) -14.869 (k) **

CORRELATION = 0.99999127 — N/NO= 0.9630 (NOT < .66667)

MAXIMUM ERROR RATIO IN JACK .... .0113

MAXIMUM ERROR RATIO IN GAUGE .... .0049

MAXIMUM TOTAL ERROR RATIO .... .0123

COMPUTED BY: Paul Chutt — DATE: 12/7/99 — CHECKED BY: H.T. Henderson 12/7/99 DATE:

E9/E20

RAM/JACK CALIBRATION RECORD	FORM 12.8.G	PSC Formerly Inryco Surveillance
PROJECT PRE-TMI POST CALLAWAY	CONTRACT/PART NO. N669 N667	

Jack Description PINE Size 850 Tons Register No. 6001

Theoretical Ram Area 190.45 Max. Pressure 8500 PSI

Calibrating Device TELEDYNE Register No. 4734 Constant 32987.5

Calibrating Gauge HEISE Register No. 59-27100 DUE CAL. Date 12-4-00

Raw Data By [illegible] 7-27-99	WITNESS [illegible] ANII Supervisor
Mean Ram Area 192.113 sq.in. K(-) = 15.4.6 Kips	Agency HSBI&I Co Date 7/27/99
Computed By [illegible]	QC Check H. F. Hendrickson
Title Project Manager Date 7/27/99	Title MGR., Q.A. Date 7-27-99

Target PSI	Gauge Reading PSI	Load Cell Readout	COMMENTS
1000	1001	-5.48	RUN 1 POSITION 1 1/2"
2000	2000	-11.20	
3000	3007	-17.02	
4000	4009	-22.86	
5000	5003	-28.64	
6000	6003	-34.48	
7000	7004	-40.32	
8000	8001	-46.16	
8500	8502	-49.08	
1000	1004	-5.42	RUN 2 POSITION 3"
2000	2002	-11.18	
3000	3002	-16.96	
4000	4003	-22.78	
5000	5004	-28.60	
6000	6005	-34.44	
7000	7001	-40.24	
8000	8004	-46.10	
8500	8508	-49.06	
1000	1002	-5.46	RUN 3 POSITION 4 1/2"
2000	2003	-11.26	
3000	3003	-17.08	
4000	4001	-22.86	
5000	5002	-28.70	
6000	6006	-34.54	
7000	7002	-40.36	
8000	8001	-46.18	
8500	8501	-49.10	

...CK CALIBRATION - LINEAR REGRESSION ANALYSIS

...ECT POST CALLAWAY / PRE TMI — CONTRACT NO. N667/N6

...K DESCRIPTION: PINE — TONS: 850 — REGISTER NO.: 6001

...ORETICAL RAM AREA (sq.in): 190.45

MAX PRESSURE (psi): 8500

...ALIBRATING DEVICE USED: TELEDYNE — REGISTER NO.: 4734 — CONSTANT= 32987.5

CALIBRATING GAUGE DESCRIPTION: HEISE — REGISTER NO.: S9-271c

E10/E20

ACTUAL GAUGE READING (psi)	LOAD CELL READOUT	COMPUTED FORCE (k)
1001	5.48	180.772*
2000	11.20	369.460
3007	17.02	561.447
4009	22.86	754.094
5003	28.64	944.762
6003	34.48	1137.409
7004	40.32	1330.056
8001	46.16	1522.703
8502	49.08	1619.027
1004	5.42	178.792
2002	11.18	368.800
3002	16.96	559.468
4003	22.78	751.455
5004	28.60	943.443
6005	34.44	1136.090
7001	40.24	1327.417
8004	46.10	1520.724
8508	49.06	1618.367
1002	5.46	180.112*
2003	11.26	371.439
3003	17.08	563.426
4001	22.86	754.094
5002	28.70	946.741
6006	34.54	1139.388
7002	40.36	1331.376
8001	46.18	1523.363
8501	49.10	1619.686

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION
- ERROR IN STANDARD .... 0.0100 ksi
- INTERPOLATION IN GAUGE .... 0.0000 ksi
- ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION
- INTERPOLATION IN MASTER .... 0.0000 ksi
- INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi
- ACCURACY OF MASTER .... 0.0100 ksi
- ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE
- INTERPOLATION ERROR .... 0.0050 ksi
- ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 8.5080 ksi

** FORCE (k) = 192.113 (sq.in.) X GAUGE READING (ksi) -15.416 (k) **

CORRELATION = 0.99999465 — N/NO= 0.9259 (NOT < .66667)

MAXIMUM ERROR RATIO IN JACK .... .0075

MAXIMUM ERROR RATIO IN GAUGE .... .0049

MAXIMUM TOTAL ERROR RATIO .... .0090

COMPUTED BY: Paul C Smith — DATE: 7/27/99 — CHECKED BY: R. D. Hough — DATE: 7-28-99

E11/E20

RAM/JACK CALIBRATION RECORD FORM 12.8.G

PSC Formerly Inryco Surveillance

PROJECT PRE-OCONEE POST-TMI CONTRACT/PART NO. N682/N669

Jack Description PINE Size 850 Tons Register No. 6001

Theoretical Ram Area 190.45 Max. Pressure 8500 PSI

Calibrating Device TELEDYNE Register No. 4734 Constant 329875

Calibrating Gauge HEISE Register No. 59-27100 Cal. Date 12-4-00

Raw Data By [signature] ~~10-29-99~~ 10-23-99 WITNESS N/A

Mean Ram Area 190.777 sq.in. K (-)11.346 Kips Agency N/A Date N/A

Computed By [signature] QC Check [signature]

Title G. M. Date 10-23-99 Title MGR., Q.A. Date 10-23-99

Target PSI	Gauge Reading PSI	Load Cell Readout	COMMENTS
1000	1019	- 5.68	RUN 1 POSITION 1½"
2000	2014	- 11.32	
3000	3016	- 17.04	
4000	4002	- 22.76	
5000	5002	- 28.52	
6000	~~5997~~ PRD 10-23-99 5997	- 34.30	
7000	7002	- 40.14	
8000	8014	- 46.00	
8500	8503	- 48.88	
1000	1000	- 5.56	RUN 2 POSITION 3"
2000	2030	- 11.44	
3000	3008	- 17.04	
4000	4002	- 22.78	
5000	PRD 10-23-99 ~~500~~ 5030	- 28.74	
6000	6004	- 34.36	
7000	6995	- 40.10	
8000	8004	- 45.96	
8500	8525	- 49.00	
1000	1032	- 5.76	RUN 3 POSITION 4½"
2000	2008	- 11.32	
3000	3001	- 17.04	
4000	4023	- 22.94	
5000	5010	- 28.66	
6000	6014	- 34.44	
7000	6995	- 40.12	
8000	8000	- 45.92	
8500	8504	- 48.82	

E12/E20

JACK CALIBRATION - LINEAR REGRESSION ANALYSIS

*QJECT PRE-OCONEE/POST TMI | CONTRACT NO. N682/N6

ACK DESCRIPTION: PINE | TONS: 850 | REGISTER NO.: 6001

THEORETICAL RAM AREA (sq.in): 190.45

MAX PRESSURE (psi): 8500

CALIBRATING DEVICE USED: TELEDYNE | REGISTER NO.: 4734 | CONSTANT= 32987.5

CALIBRATING GAUGE DESCRIPTION: HEISE | REGISTER NO.: S9-271

ACTUAL GAUGE READING (psi)	...INPUT... LOAD CELL READOUT	COMPUTED FORCE (k)
1019	5.68	187.369*
2014	11.32	373.419
3016	17.04	562.107
4002	22.76	750.796
5002	28.52	940.804
5997	34.30	1131.471
7002	40.14	1324.118
8014	46.00	1517.425
8503	48.88	1612.429
1000	5.56	183.411*
2030	11.44	377.377
3008	17.04	562.107
4002	22.78	751.455
5030	28.74	948.061
6004	34.36	1133.451
6995	40.10	1322.799
8004	45.96	1516.106
8525	49.00	1616.388
1032	5.76	190.008*
2008	11.32	373.419
3001	17.04	562.107
4023	22.94	756.733
5010	28.66	945.422
6014	34.44	1136.090
6995	40.12	1323.459
8000	45.92	1514.786
8504	48.82	1610.450

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION
- ERROR IN STANDARD .... 0.0100 ksi
- INTERPOLATION IN GAUGE .... 0.0000 ksi
- ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION
- INTERPOLATION IN MASTER .... 0.0000 ksi
- INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi
- ACCURACY OF MASTER .... 0.0100 ksi
- ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE
- INTERPOLATION ERROR .... 0.0050 ksi
- ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 8.5250 ksi

** FORCE (k) = 190.777 (sq.in.) X GAUGE READING (ksi) -11.346 (k) **

CORRELATION = 0.99999699 N/NO= 0.8889 (NOT < .66667)

MAXIMUM ERROR RATIO IN JACK .... .0045

MAXIMUM ERROR RATIO IN GAUGE .... .0049

MAXIMUM TOTAL ERROR RATIO .... .0067

COMPUTED BY: Ronald D. Hough DATE: 10/23/99 CHECKED BY: F.E. Hendrickson 10/23/99 DATE:

E 3/E2

RAM/JACK CALIBRATION RECORD FORM 12.8.G

PSC Formerly Inryco Surveillance

PROJECT PRE-TMI CONTRACT/PART NO. NGC9

Jack Description PANCAKE Size 1000 Tons Register No. FT-1

Theoretical Ram Area 164.323 Max. Pressure 9800 PSI

Calibrating Device TELEDYNE Register No. 4734 Constant 32987.5

Calibrating Gauge HEISE Register No. 59-27100 Due Cal. Date 12-4-00

Raw Data By Peter R. Dombrowski 8/6/99

Mean Ram Area 165.801 sq.in. K= (-) 9.79 Kips

Computed By Paul C [illegible]

Title Project Manager Date 8/6/99

WITNESS H.F. Hendrickson

Agency PSC-MGR, Q.A. Date 8-6-99

QC Check H.F. Hendrickson

Title MGR, Q.A. Date 8-6-99

Target PSI	Gauge Reading PSI	Load Cell Readout
1000	1000	− ~~4.78~~ 4.78 PRD 08/06/99
2000	2002	− 9.74
3000	3001	− 14.74
4000	4002	− 19.74
5000	5006	− 24.76
6000	6004	− 29.76
7000	7002	− 34.78
8000	8005	− 39.80
9000	9002	− 44.82
1000	1001	− 4.84
2000	2001	− 9.82
3000	3000	− 14.82
4000	4000	− 19.86
5000	5001	− 24.88
6000	6006	− 29.92
7000	7002	− 34.94
8000	8003	− 39.98
9000	9001	− 45.02
1000	1001	− 4.86
2000	2010	− 9.88
3000	3003	− 14.86
4000	4001	− 19.88
5000	5004	− 24.92
6000	6008	− 29.98
7000	7003	− 35.00
8000	8000	− 40.04
9000	9004	− 45.10

COMMENTS

RUN 1 POSITION 1/4

TARGET	GAUGE	READOUT
9800	9801	−48.84

RUN 2 POSITION 2/4

TARGET	GAUGE	READOUT
9800	9816	−49.12

RUN 3 POSITION 3/4

TARGET	GAUGE	READOUT
9800	9803	−49.14

E14/E20

JACK CALIBRATION - LINEAR REGRESSION ANALYSIS

PROJECT PRE TMI — CONTRACT NO. N669

JACK DESCRIPTION: PANCAKE — TONS: 1000 — REGISTER NO.: FT-1

THEORETICAL RAM AREA (sq.in): 164.323

MAX PRESSURE (psi): 9800

CALIBRATING DEVICE USED: TELEDYNE — REGISTER NO.: 4734 — CONSTANT= 32987.5

CALIBRATING GAUGE DESCRIPTION: HEISE — REGISTER NO.: S9-271

..............INPUT.............

ACTUAL GAUGE READING (psi)	LOAD CELL READOUT	COMPUTED FORCE (k)
1000	4.78	157.680
2002	9.74	321.298
3001	14.74	486.236
4002	19.74	651.173
5006	24.76	816.771
6004	29.76	981.708
7002	34.78	1147.305
8005	39.80	1312.903
9002	44.82	1478.500
9801	48.84	1611.110
1001	4.84	159.660*
2001	9.82	323.937
3000	14.82	488.875
4000	19.86	655.132
5001	24.88	820.729
6006	29.92	986.986
7002	34.94	1152.583
8003	39.98	1318.840
9001	45.02	1485.097
9816	49.12	1620.346
1001	4.86	160.319*
2010	9.88	325.917
3003	14.86	490.194
4001	19.88	655.791
5004	24.92	822.049
6008	29.98	988.965
7003	35.00	1154.563
8000	40.04	1320.820
9004	45.10	1487.736
9803	49.14	1621.006

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION
- ERROR IN STANDARD .... 0.0100 ksi
- INTERPOLATION IN GAUGE .... 0.0000 ksi
- ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION
- INTERPOLATION IN MASTER .... 0.0000 ksi
- INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi
- ACCURACY OF MASTER .... 0.0100 ksi
- ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE
- INTERPOLATION ERROR .... 0.0050 ksi
- ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 9.8160 ksi

** FORCE (k) = 165.801 (sq.in.) X GAUGE READING (ksi) -9.179 (k) **

CORRELATION = 0.99997849 N/NO= 0.9333 (NOT < .66667)

MAXIMUM ERROR RATIO IN JACK .... .0068

MAXIMUM ERROR RATIO IN GAUGE .... .0043

MAXIMUM TOTAL ERROR RATIO .... .0080

COMPUTED BY: Paul C Smith DATE: 8/6/99 CHECKED BY: Ronald Hough DATE: 8-6-99

E15/E20

RAM/JACK CALIBRATION RECORD	FORM 12.8.G	PSC Formerly Inryco Surveillance

PROJECT Post-TMI CONTRACT/PART NO. N 669

Jack Description Pancake Size 1000 Tons Register No. FT-1
Theoretical Ram Area 164.323 Max. Pressure 9800 PSI
Calibrating Device Teledyne Register No. 4734 Constant 32987.5
Calibrating Gauge Heise Register No. 59-27100 Date DUE Cal. 12-4-00

Raw Data By [signature] 12-6-99 WITNESS N/A
Mean Ram Area 165.268 ~~165.252~~ sq.in. K= (-)9.025 ~~9.892~~ Kips Agency N/A Date N/A
Computed By [signature] WITNESSED & QC Check H.E. Hendricksen
Title Project Manager Date 12/6/99 Title MGR., Q.A. Date 12-6-99

Target PSI	Gauge Reading PSI	Load Cell Readout	COMMENTS		
1000	1005	-4.86	RUN 1	POSITION	1"
2000	2010	-9.82	TARGET	GUAGE	READOUT
3000	3014	-14.80	9800	9803	-48.78
4000	4010	-19.78			
5000	5032	-24.90			
6000	6011	-29.80			
7000	7013	-34.82			
8000	8006	-39.78			
9000	9007	-44.82			
1000	1006	-4.88	RUN 2 Target	POSITION Guage	2" Readout
2000	2007	-9.82	9800	9804	-48.88
3000	3010	-14.82			
4000	4013	-19.80			
5000	5010	-24.82			
6000	6012	-29.84			
7000	7016	-34.86			
8000	8005	-39.82			
9000	9007	-44.88			
1000	1003	-4.86	RUN 3 Target	POSITION Guage	3" Read out
2000	2004	-9.80	9800	9806	-48.92
3000	3019	-14.86			
4000	4007	-19.82			
5000	5015	-24.86			
6000	6009	-29.84			
7000	7013	-34.88			
8000	8016	-39.94			
9000	9006	-44.90			

E16/E20

JACK CALIBRATION - LINEAR REGRESSION ANALYSIS

OJECT POST TMI

CONTRACT NO. N669

ACK DESCRIPTION: PANCAKE TONS: 1000

REGISTER NO.: FT-1

HEORETICAL RAM AREA (sq.in): 164.323

MAX PRESSURE (psi): 9800

CALIBRATING DEVICE USED: TELEDYNE REGISTER NO.: 4734 CONSTANT= 32987.5

CALIBRATING GAUGE DESCRIPTION: HEISE REGISTER NO.: S9-271c

ACTUAL GAUGE READING (psi)	..............INPUT.............. LOAD CELL READOUT	COMPUTED FORCE (k)
1005	4.86	160.319*
2010	9.82	323.937
3014	14.80	488.215
4010	19.78	652.493
5032	24.90	821.389
6011	29.80	983.028
7013	34.82	1148.625
8006	39.78	1312.243
9007	44.82	1478.500
9803	48.78	1609.130
1006	4.88	160.979*
2007	9.82	323.937
3010	14.82	488.875
4013	19.80	653.153
5010	24.82	818.750
6012	29.84	984.347
7016	34.86	1149.944
8005	39.82	1313.562
9007	44.88	1480.479
9804	48.88	1612.429
1003	4.86	160.319*
2004	9.80	323.278
3019	14.86	490.194
4007	19.82	653.812
5015	24.86	820.069
6009	29.84	984.347
7013	34.88	1150.604
8016	39.94	1317.521
9006	44.90	1481.139
9806	48.92	1613.749

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION
- ERROR IN STANDARD .... 0.0100 ksi
- INTERPOLATION IN GAUGE .... 0.0000 ksi
- ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION
- INTERPOLATION IN MASTER .... 0.0000 ksi
- INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi
- ACCURACY OF MASTER .... 0.0100 ksi
- ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE
- INTERPOLATION ERROR .... 0.0050 ksi
- ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 9.8060 ksi

** FORCE (k) = 165.268 (sq.in.) X GAUGE READING (ksi) -9.025 (k) **

CORRELATION = 0.99999632 N/NO= 0.9000 (NOT < .66667)

MAXIMUM ERROR RATIO IN JACK .... .0039

MAXIMUM ERROR RATIO IN GAUGE .... .0043

MAXIMUM TOTAL ERROR RATIO .... .0058

COMPUTED BY: Paul C Smith DATE: 12/6/99 CHECKED BY: H. F. Hendrickson 12/6/99 DATE:

E17/E20

RAM/JACK CALIBRATION RECORD P.R.D. 08/12/99 P.R.D. 08/12/99 FORM 12.8.G

PSC Formerly Inryco Surveillance

PROJECT POST ~~BYRON~~ POINT BEACH /PRE ~~CALLOWAY~~ TMI P.R.D. 08/12/99 CONTRACT/PART NO. ~~N665~~ / ~~N667~~ N671 / N669 P.R.D. 08/12/99

Jack Description PINE Size 16 TON Tons Register No. 7702

Theoretical Ram Area N/A Max. Pressure 8500 PSI

Calibrating Device 25 TON CELL Register No. 9321 Constant 500

Calibrating Gauge HEISE Register No. 59-27100 Date DELE 12-4-00

Raw Data By Peter R. Dombrowski 8-12-99

Mean Ram Area 1.555 sq.in. K= .062 Kips

Computed By Ronald D. Hough

Title G. M. Date 8-12-99

WITNESS [signature]

Agency PSC Date 8-12-99

QC Check [signature]

Title LEAD QC Date 8-12-99

Target PSI	Gauge Reading PSI	Load Cell Readout	COMMENTS
1000	1001	3.1	RUN 1 POSITION 3"
2000	2001	6.3	
3000	3002	9.4	
4000	4002	12.65	
5000	5004	15.7	
6000	6003	18.7	
7000	7001	21.7	
8000	8001	24.75	
8500	8505	26.3	
1000	1001	3.0	RUN 2 POSITION 6"
2000	2002	6.3	
3000	3004	9.4	
4000	4006	12.7	
5000	5002	15.8	
6000	6003	18.85	
7000	7008	21.9	
8000	8004	25.0	
8500	8506	26.6	
1000	1001	3.0	RUN 3 POSITION 9"
2000	2002	6.35	
3000	3002	9.5	
4000	4001	12.8	
5000	5010	16.0	
6000	6003	19.1	
7000	7007	22.2	
8000	8005	25.25	
8500	8506	26.8	

JECT POST PT. BEACH/PRE TMI
CK DESCRIPTION: PINE TONS: 16
THEORETICAL RAM AREA (sq.in): N/A MAX PRESSURE (psi): 8500
CALIBRATING DEVICE USED: 25TON CELLREGISTER NO.: 9321
CALIBRATING GAUGE DESCRIPTION: HEISE

CONTRACT NO. N671/N6
REGISTER NO.: 7702
CONSTANT= 500
REGISTER NO.: S9-271

E78/E20

ACTUAL GAUGE READING (psi)	INPUT LOAD CELL READOUT	COMPUTED FORCE (k)
1001	3.10	1.550*
2001	6.30	3.150
3002	9.40	4.700
4002	12.65	6.325
5004	15.70	7.850
6003	18.70	9.350
7001	21.70	10.850
8001	24.75	12.375
8505	26.30	13.150
1001	3.00	1.500*
2002	6.30	3.150
3004	9.40	4.700
4006	12.70	6.350
5002	15.80	7.900
6003	18.85	9.425
7008	21.90	10.950
8004	25.00	12.500
8506	26.60	13.300
1001	3.00	1.500*
2002	6.35	3.175
3002	9.50	4.750
4001	12.80	6.400*
5010	16.00	8.000*
6003	19.10	9.550*
7007	22.20	11.100
8005	25.25	12.625
8506	26.80	13.400

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION
- ERROR IN STANDARD .... 0.0100 ksi
- INTERPOLATION IN GAUGE .... 0.0000 ksi
- ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION
- INTERPOLATION IN MASTER .... 0.0000 ksi
- INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi
- ACCURACY OF MASTER .... 0.0100 ksi
- ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE
- INTERPOLATION ERROR .... 0.0050 ksi
- ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 8.5060 ksi

** FORCE (k) = 1.555 (sq.in.) X GAUGE READING (ksi) 0.062 (k) **

CORRELATION = 0.99980668 N/NO= 0.7778 (NOT < .66667)
MAXIMUM ERROR RATIO IN JACK .... .0127
MAXIMUM ERROR RATIO IN GAUGE .... .0049
MAXIMUM TOTAL ERROR RATIO .... .0136

COMPUTED BY: Ronald D. Hough DATE: 8-12-99 CHECKED BY: H. F. Hendricksen DATE: 8-12-99

E19/E20

RAM/JACK CALIBRATION RECORD FORM 12.8.G

PSC Formerly Inryco Surveillance

PROJECT PRE-ANO POST-TMI CONTRACT/PART NO. N689 N669

Jack Description PINE Size 16 Tons Register No. 7702

Theoretical Ram Area N/A Max. Pressure 8500 PSI

Calibrating Device 25 TON CELL Register No. 9321 Constant 499.724

Calibrating Gauge HEISE Register No. 59-27100 DUE CAL. Date 12-4-00

Raw Data By H.F. Hendrickson 11/10/99 WITNESS N/A

Mean Ram Area 1.562 sq.in. K= 0.110 Kips Agency N/A Date N/A

Computed By Paul C. Smith QC Check H.F. Hendrickson

Title Project Manager Date 11/10/99 Title MGR., Q.A. Date 11-10-99

Target PSI	Gauge Reading PSI	Load Cell Readout	COMMENTS
1000	1003	3.20	RUN 1 POSITION 3"
2000	2004	6.40	
3000	3002	9.50	
4000	4002	12.80	
5000	5004	15.95	
6000	6012	~~18.85~~ 18.95	H.H. 11/10/99
7000	7000	22.05	
8000	8007	25.15	
8500	8513	26.70	
1000	1001	3.10	RUN 2 POSITION 6"
2000	2000	6.30	
3000	3007	9.40	
4000	4009	12.70	
5000	5006	15.90	
6000	6022	19.05	
7000	7002	22.15	
8000	8022	25.20	
8500	8543	26.75	
1000	1002	3.15	RUN 3 POSITION 9"
2000	2006	6.35	
3000	3004	9.50	
4000	4001	12.85	
5000	5003	16.00	
6000	6016	19.10	
7000	7026	22.30	
8000	8003	25.40	
8500	8548	27.05	

E20/E20

JACK CALIBRATION - LINEAR REGRESSION ANALYSIS
PROJECT POST-TMI/PRE-ANO
JACK DESCRIPTION: PINE
TONS: 16
THEORETICAL RAM AREA (sq.in): N/A MAX PRESSURE (psi): 8500
CALIBRATING DEVICE USED: 25TON CELLREGISTER NO.: 9321
CALIBRATING GAUGE DESCRIPTION: HEISE

CONTRACT NO. N669/N68
REGISTER NO.: 7702
CONSTANT= 499.724
REGISTER NO.: S9-271

..........INPUT.......... ACTUAL GAUGE READING (psi)	LOAD CELL READOUT	COMPUTED FORCE (k)
1003	3.20	1.599*
2004	6.40	3.198
3002	9.50	4.747
4002	12.80	6.396
5004	15.95	7.971
6012	18.95	9.470
7000	22.05	11.019
8003	25.15	12.568
8513	26.70	13.343
1001	3.10	1.549*
2000	6.30	3.148*
3007	9.40	4.697*
4009	12.70	6.346
5006	15.90	7.946
6022	19.05	9.520
7002	22.15	11.069
8022	25.20	12.593
8543	26.75	13.368
1002	3.15	1.574*
2006	6.35	3.173*
3004	9.50	4.747
4001	12.85	6.421
5003	16.00	7.996
6016	19.10	9.545
7026	22.30	11.144
8003	25.40	12.693
8548	27.05	13.518

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION
- ERROR IN STANDARD .... 0.0100 ksi
- INTERPOLATION IN GAUGE .... 0.0000 ksi
- ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION
- INTERPOLATION IN MASTER .... 0.0000 ksi
- INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi
- ACCURACY OF MASTER .... 0.0100 ksi
- ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE
- INTERPOLATION ERROR .... 0.0050 ksi
- ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 8.5480 ksi

** FORCE (k) = 1.562 (sq.in.) X GAUGE READING (ksi) 0.110 (k) **

CORRELATION = 0.99986923 N/NO= 0.7778 (NOT < .66667)
MAXIMUM ERROR RATIO IN JACK .... .0130
MAXIMUM ERROR RATIO IN GAUGE .... .0049
MAXIMUM TOTAL ERROR RATIO .... .0139

ED By: [illegible]

GPU NUCLEAR

TMI
Surveillance Procedure

Number
F1 of 273
1301-9.1

Title
RB Structural Integrity Tendon Surveillance

Revision No.
14

Applicability/Scope
TMI Division

Responsible Office
Mgr., Mech. Structural Engrng.

Effective Date
08/06/99

This document is within QA plan scope	X	Yes		No
Safety Reviews Required	X	Yes		No

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verified latest rev 8/18/99 EB 8/25/99 EB 9/1/99 EB 9/7/99 EB EB 9/14/99
EB 9/21/99 EB 9/28/99 EB 10/5/99 EB 10/12/99

	Signature	Date
Originator		8-6-99
Procedure Owner		8-6-99
PRG	for J. Schork	8-6-99
Approver		8/6/99

GPU NUCLEAR	TMI Surveillance Procedure	Number F2 of 273 1301-9.1
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1.0 PURPOSE

1.1 To provide instructions and acceptance criteria for RB tendon inspections as required by TMI-1 Technical Specification, Section 4.4.2.

1.2 Tendon surveillance is performed at intervals after initial containment Structural Integrity Test (SIT), as follows:

a. One (1) year after SIT. Completed 1975.

b. Three (3) years after SIT. Completed 1977.

c. Five (5) years after SIT. Completed 1980.

d. At successive 5-year intervals for remaining station life.

> **NOTE**
>
> 23 tendons were inspected at each of first three surveillance periods; see Table 1 of Enclosure 2. Unless surveillance results indicate abnormal degradation of the prestressing system, 11 tendons shall be inspected for each subsequent surveillance period. Prior to Cycle 7, and for subsequent periods, an additional vertical tendon was selected in order to comply with Table IWL-2521-1. Total is twelve (12). Enclosure 2, Tables 1 and 2, provides identification of tendons for each inspection period per GAI DC-5930-225.02-SE. Tendon selection is random and meet the requirement of NRC R.G. 1.35 Rev. 3 and IWL 2520. In the event that a randomly selected tendon becomes inaccessible, it shall become exempt. Exempt tendons shall be inspected per IWL 2524 and 2525. Substitute tendons shall be selected per IWL-2521.1(b).

2.0 REFERENCES

2.1 TMI Unit 1 Technical Specifications Section 4.4.2, "Structural Integrity"

2.2 GPUN Industrial Safety and Health Manual

2.3 1000-PLN-7200.01, GPUNC OQA Plan for TMI-1 and Oyster Creek

2.4 6610-ADM-4110.04, Radiation Work Permit.

2.5 1001J, Technical Specification Surveillance Testing Program

2.6 1035, Control of Transient Combustible Materials

2.7 1070, TMI-1 Maintenance Plan

2.8 1440-Y-3, Scaffold Construction/Inspection and Use of Extension Ladders

2.9 Inryco, Reactor Building Tendons, VM-TM-2485

2.10 IEN 85-10 and Supplement 1 to same, entitled Post Tensioned Containment Tendon Anchorhead Failure; date February 6, 1985

2.11 1101-23-007, Latest Revision, RB Tendon Surveillance Specification

2.12 Operating manuals and calibration charts for hydraulic stressing jack, pumps, and controls (supplied by vendor).

2.13 Building Pre-Stressing System Tendon History, including Tendon Pulling, Buttonheading, and Stressing Records (cards).

2.14 Reports from previous surveillance

- ❶ 1974 Structural Integrity Test - GAI Report 1838
- ❷ 1975 Tendon Surveillance - 1301-9.1
- ❸ 1977 Tendon Surveillance - 1301-9.1
- ❹ 1980 Tendon Surveillance - 1301-9.1
- ❺ 1985 Tendon Surveillance - 1301-9.1
- ❻ 1990 Tendon Surveillance - 1301-9.1
- ❼ 1995 Tendon Surveillance - 1301-9.1 & Topical Report 093
- ❽ 1977 RB Ring Girder Surveillance Three Years After S.I.T. - 1303-8.2

2.15 1410-Y-83, RB Tendon End Cap Installation

2.16 1440-Y-23, RB Concrete Crack Repair

2.17 GAI DC-5930-225.02-SE, TMI-1 Reactor Building Post-Tensioning System Tendon Selection and Force vs. Time Curves Surveillances 6 through 10.

2.18 Regulatory Guide 1.35, Rev. 3, Inservice Inspection of Ungrouted Tendons in Prestressed Concrete Containments.

2.19 G/C Calculation Books 1, Index 1:01:01.01, "Structural Design Review Book 1" (Source Document)

2.20 1407-15, "Control and Use of Lifting/Rigging Equipment"

2.21 AP 1089, "Control of Contractors"

2.22 10CFR 50.55a, Codes and Standards

2.23 AP 1088, "Chemical Control at TMINS"

2.24 ASME XI 1992 Edition through 1992 Addenda, Subsection IWL

2.25 ACI 201.1R-92 and ACI 201.1R-68, "Guide for Making a Condition Survey of Concrete In Service"

2.26 ACI 349.3R-96, "Evaluation of Existing Nuclear Safety Related Concrete Structures"

3.0 PLANT STATUS

3.1 Operating or Shutdown.

NOTE
RB entry not necessary for tendon inspection.

3.2 For safety reasons, during plant operation no tendons with end caps located above steam safety valves are to be scheduled for surveillance.

4.0 PREREQUISITES

4.1 TENDON SURVEILLANCE CONTRACTOR (CONTRACTOR) shall perform tendon surveillance in accordance with this procedure, GPUNC OQA Plan and 1101-23-007, latest revision.

4.1.1 CONTRACTOR shall have a quality assurance program in place which meets requirements of 10 CFR 50, Appendix B.

4.1.2 CONTRACTOR shall be on GPUN Supplier Quality Classification List (SQCL).

4.2 CONTRACTOR shall ensure TESTING LABORATORY equipped to perform following services shall be available for this surveillance:

❶ Inspection of removed wires for corrosion and other defects, and to perform required tensile tests. (See Enclosure 4.)

❷ Inspection of bulk filler grease samples and test for chlorides, sulfides, nitrates, and moisture content. (See Enclosure 3.)

❸ Calibration (traceable to NIST) of all hydraulic rams and gauges to be used.

NOTE

1. Stressing ram shall be calibrated per Enclosure 1 prior to mobilization to TMI-1 and within 15 days after demobilization from TMI-1 (IWL-2522), or CONTRACTOR may propose an alternative method.
2. IF alternative used, CONTRACTOR shall submit method for TMI-1 approval at least 30 days prior to start of tendon surveillance and procedure must then be included in CONTRACTOR report.
3. CONTRACTOR's QA program shall be imposed on Testing Laboratory.

4.3 CONTRACTOR shall ensure all necessary inspection, detensioning/retensioning/greasing equipment is obtained and calibrated as specified herein.

4.3.1 CONTRACTOR shall ensure detailed operating instructions and calibration documentation are supplied with rams.

4.3.2 At a minimum, CONTRACTOR shall submit calibration records to OWNER at least 15 days prior to start of tendon surveillance work and again within 15 days after demobilization from TMI-1.

4.4 CONTRACTOR shall field verify proposed stressing rams are of proper configuration for TMI-1 dome tendons.

4.5 CONTRACTOR must perform and document training of supervisory personnel with respect to this procedure prior to starting work.

4.6 CONTRACTOR shall verify communication equipment (i.e., headsets, walkie talkies) for use in communication between work crews is operable.

4.7 CONTRACTOR QC/QV personnel should report to Site QV and NDE Manager.

4.8 **IF** lifting and handling equipment is to be used, CONTRACTOR shall ensure rigging and lifting devices have been inspected/approved for use per Procedure 1407-15.

4.9 OWNER shall verify calibration documentation is acceptable for calibrated inspection and stressing equipment.

4.10 COGNIZANT WORK COORDINATOR (per AP 1089) or designated alternate shall notify on-shift TMI-1 Shift Supervisor/Foreman of work scope to be performed by CONTRACTOR at beginning of each work day of Tendon Surveillance or related activities.

4.11 **IF** working on or in radiologically controlled area, initiate RWP.

4.12 Install required scaffolding per 1440-Y-3, Scaffold Construction/Inspection and Use of Extension Ladders.

4.13 Work Coordinator shall ensure ANII is notified prior to start of work.

4.14 Work Coordinator shall ensure required indoctrination and training of CONTRACTOR per AP 1089 is conducted prior to start of work.

5.0 LIMITS AND PRECAUTIONS

5.1 Conduct this procedure in accordance with 1070, TMI-1 Maintenance Plan and 1001J, Technical Specification Surveillance Testing Program.

5.1.1 IF AS FOUND conditions do not meet acceptance criteria, notify COGNIZANT MECHANICAL/STRUCTURAL ENGINEER as soon as practical and initiate Surveillance Deficiency Report (SDR) per 1001J.

5.2 Ensure all work is done in accordance with TMI-1 Safety and Health Manual.

5.2.1 CONTRACTOR shall report IMMEDIATELY to COGNIZANT WORK COORDINATOR, any working condition which appears to be unsafe.

5.3 Some work may be near plant equipment required for safe shutdown or which may CAUSE shutdown if damaged. Use special care when suspending or moving stressing rams (jacks) or other heavy surveillance equipment.

5.3.1 TMI WORK COORDINATOR should work with CONTRACTOR FOREMAN to predict such hazards, and shall keep Operations Shift Supervisor informed when working in such vital areas.

5.3.2 Discuss all lifting arrangements inside plant buildings with COGNIZANT MECHANICAL/STRUCTURAL ENGINEER and obtain verbal approval to ensure no damage to plant equipment.

5.3.3 Discuss routes for transporting heavy equipment through plant buildings with COGNIZANT MECHANICAL/STRUCTURAL ENGINEER and obtain verbal approval.

5.4 Protect all roof surfaces from grease, oil, and debris as spillage will result in roof degradation. Use drop cloths or similar covering to prevent roof damage.

5.5 Protect all built-up roof surfaces when erecting scaffolding, moving or storing heavy equipment, tool boxes, etc., by installing planking on roof surface.

5.6 Minimize transient combustibles per 1035. Clearly label all receptacles containing combustibles such as grease, solvent, used rags, etc.

5.7 All chemicals utilized shall be controlled and evaluated via AP 1088.

6.0 DESCRIPTION AND LOCATION OF SYSTEM/ASSEMBLY

6.1 RB tendons located within concrete shell of Reactor Building. Access to tendons is from outside of RB.

6.2 Layout of tendon system, location and identification can be found in VM-TM-2485.

NOTE

Testing of tendons around Main Steam Safety Valve exhaust area shall not be scheduled during plant operation due to personnel safety concerns.

7.0 SPECIAL TOOLS, MATERIALS AND PERSONNEL QUALIFICATIONS

7.1 General

NOTE

CONTRACTOR must document any substitution of materials along with TMI-1 COGNIZANT MECHANICAL/STRUCTURAL ENGINEER approval.

7.1.1 (2) - powered staging platforms consisting of roof trolley and working platform with hoisting equipment for jack handling. Platforms will provide access to tendon ends being inspected and will support jacks during lift off measurement at each end.

7.1.2 Permanent 460 volt electrical outlets on top surface of ring girder for miscellaneous uses.

7.1.3 115 volt outlets on working platform to power hydraulic stressing jack, pumps, and other electrically-powered equipment.

7.1.4 Electrical cables or heavy duty extension cords as necessary for lights, hydraulic stressing jack pumps, and other miscellaneous power tools.

7.1.5 Lift for two (2) men and hand tools.

7.1.6 Portable work platforms for use inside buildings.

7.1.7 Communications equipment for work crew communications.

7.1.8 Miscellaneous hand tools.

7.1.9 Solvent - for removing grease from around tendon anchorage and cleaning any stained concrete (CRC Natural Degreaser Aerosol or EPA 2000).

7.1.10 Cleaning rags - approximately 3 bales.

7.1.11 Ambient temperature monitoring equipment.

7.2 Detensioning/Retensioning Equipment

7.2.1 (2) - tendon stressing rams (jacks) with 1600 KIPS or greater capacity.

❶ Rams body configuration must not conflict with ring girder cut-outs and must have a 6 to 8 inch stroke.

❷ Ram heads (stressing ram adapters) must mate with Inland Ryerson 170 wire threaded anchor head.

❸ Ram must have a longer than standard chair piece to fit TMI dome tendons.

- Ram chair shall have access openings at 180° to permit installation and removal of feeler gauges at about 180° apart under the stressing washer to obtain lift-off readings.

> **NOTE**
>
> Considerable critical path time was spent by CONTRACTOR during inspection number 2 and 3 to modify Ft. St. Vrain rams.
>
> Jury rigging of improper equipment can cause personnel or equipment hazards.

7.2.2 Pumps, hoses, pressure gauges, controls, hydraulic fluid, etc. as required for use of stressing ram.

7.2.3 Files for dressing threads on damaged anchorage heads.

7.2.4 Shims - 170 wire split type of various thicknesses, such as 1/8", 1/4", 1/2", 3/4", and 1", (5) sets or more of each thickness, as required (Inland-Ryerson part No. 101006-8, 101006-5, 6, 7, and 1 respectively).

- Specifications for replacement shims shall require certificate of compliance to ASTM A36 with S2 requirements (material to be silicon-killed fine grain practice) and certified mill test reports showing chemical and physical test results.

7.2.5 Wooden or plastic paddles or spatulas to scoop out bulk filler grease from around anchorage assembly.

7.3 Inspection Equipment

> **NOTE**
>
> Calibration Documentation required for all measuring equipment in this section.

7.3.1 Feeler gages for crack measurements. Required range of blade sizes is 0.005" to 0.010" by 0.001" increments.

7.3.2 Feeler gages for lift-off tests. Gage thickness is 0.030" and width 1/2".

7.3.3 Optical comparators with 0.001" accuracy for measuring crack widths in concrete or buttonheads.

7.3.4 Grid paper for showing concrete crack patterns at vertical and hoop tendons.

7.3.5 Magnifying glass, 5x (minimum)

7.3.6 Wire cutters to cut 1/4 inch diameter, high strength (240,000 PSI) tendon wires.

7.3.7 Extraction tool suitable for removing wires subject to tensile tests.

7.3.8 Come-along hoist, or similar device, for extracting test wires.

7.3.9 Six-foot diameter wire coiler to coil removed wire.

7.3.10 GO/NO-GO thread plug gages for anchorage thread measurement.

7.3.11 Inside and outside micrometers for anchorage thread measurements.

7.3.12 Visual inspection equipment to perform VT-3C and VT-1C exams.

7.4 Equipment for Greasing and End Cap Replacement

7.4.1 Grease pump, transmission lines, various fittings mounted on storage tank equipped with heating system to heat grease to between 140°F and 200°F.

❶ Grease pump must be fitted with discharge relief valve set for maximum of 300 PSIG.

7.4.2 (5) - 55-gallon drums of bulk filler grease, Visconorust 2090P4, by Viscosity Oil Co., or EQUAL as approved by the COGNIZANT MECHANICAL/STRUCTURAL ENGINEER.

NOTE
Grease quantity is estimate only. More or less may be required.

❶ Certified test report for grease is required indicating water soluble chloride, sulfide, nitrate, reserve alkalinity and moisture content.

❷ Tests shall be per Enclosure 3.

❸ Water-soluble chloride and sulfide content shall not exceed 2 PPM and water-soluble nitrate content shall not exceed 4 PPM.

❹ Reserve alkalinity base number for new grease shall be a minimum of 35.

❺ Moisture Content (by weight) shall not exceed 0.5%.

7.4.3 (Approx. 6) - 55-gallon capacity drums for holding reusable grease. Should be steam cleaned and air dried until no moisture or dirt is observed.

❶ To be clearly labeled on top and side: "REUSABLE TENDON GREASE ONLY".

7.4.4 (Approximately 10) - 5-gallon capacity cans with bails.

7.4.5 End Cap Consumables and Hardware per 1410-Y-83.

8.0 PROCEDURE

8.1 Equipment Setup

8.1.1 Verify all applicable equipment listed in Section 7.0 available.

8.1.2 Verify Operating manuals and calibration charts for hydraulic stressing jack, pumps, and controls available for use.

- ❶ Verify all personnel familiar with operating manuals of equipment to be used during inspection.

8.1.3 Verify stressing jacks, pressure gages, optical comparators, and all other measuring devices have been calibrated and are in good working condition.

- ❶ Ensure calibration documentation signed, dated, and traceable to NIST.
- ❷ Verify stressing jack-pressure gauge system is capable of measuring tendon force within an accuracy of ± 1.5% of the calibration range specified in Enclosure 1 (IWL-2522[b]).
- ❸ During inspection, check pressure gauge calibration daily against a master pressure gauge used only for this purpose. CONTRACTOR shall document this check.

8.1.4 Verify TESTING LABORATORY prepared to receive wire and grease samples.

8.1.5 Complete Data Sheets 1, 2, and 3 with:

- ❶ tendon number,
- ❷ location,
- ❸ previous force,
- ❹ expected lift-off force, and
- ❺ previous shim thickness.

> **NOTE**
>
> Value in Column 5 is Base Value force obtained from applicable Force versus Time curve contained in VM-TM-2485.

8.1.6 Complete Rows 1 through 6, 8, 9, 10 and 12 of Data Sheet 4 for tendons to be detensioned.

> **NOTE**
>
> Values to be entered in Rows 1 through 4 of Data Sheet 4 are given in Table 7 of VM-TM-2485.

8.1.7 Enter Normalization Factor (NF) obtained from Table 5 of VM-TM-2485 in Column 2 of Data Sheet 5 for selected tendons.

8.1.8 IF working in areas exposed to steam vents, verify plant is shut down.

8.2 Hoop and Dome Tendon Inspection

> **NOTE**
>
> Once inspection of a given tendon has started, it should be completed as soon as possible to avoid unnecessary exposure of anchorage head.

8.2.1 Protect roof surface as required prior to starting inspection.

8.2.2 Place platforms in position at ends of tendon to be inspected.

8.2.3 IF tendon inspection is not completed during a work shift, protect anchorage area and grease cans from exposure to moisture, dirt and any other potentially damaging materials.

8.2.4 Tendons shall be regreased (filled) within 30 days maximum after removal of an end cap.

8.2.5 Corrosion Protection System

a. Depressurize and remove end caps per 1410-Y-83.

b. Inspect for presence of free water in end cap and at anchorage area.

c. Enter inspection results on Data Sheet 9.

> **CAUTION**
>
> When removing grease to make visual inspection, ensure no damage to steel (by scratching) and no increase of corrosion effects occurs.

> **NOTE**
>
> Free water shall not be included in the grease sample (IWL-2525.1[a]).

d. Take a representative grease sample from each end anchorage of selected tendons.

e. When present, free water sample shall be taken where water is present in quantities sufficient for lab analysis. Record quantity of free water and request lab analysis for PH (IWL-2525.2[b]).

f. Have grease sample tested per Enclosure 3.

g. Verify sample meets acceptance criteria specified in Enclosure 3.

h. Remove and collect remaining bulk filler from tendon anchorage area using wooden or plastic scoops and cleanup using solvent and rags.

i. Record the total amount of bulk filler grease removed up until reinstallation of the end cap per the guidelines of 1410-Y-83.

8.2.6 Inspect Anchorage prior to Lift-Off test.

a. Perform VT-1 inspection of tendon anchorage assemblies and associated hardware (bearing plates, stressing washers, stressing shims, buttonheads, etc.) for signs of corrosion, cracks, missing wires, broken wires, and cracked buttonheads. If broken or damaged wires are detected, the tendon shall be detensioned and the wire removed for testing as specified in Section 8.2.9.

b. Perform VT-1C inspection of the concrete around tendon anchorage area, and for a distance of 2 feet extending outward from the bearing plate for crack width and general cracking pattern and for indications of abnormal material behavior.

c. Complete data sheets in Enclosure 6.

d. IF crack widths in concrete > 0.010" are identified, record and report to COGNIZANT MECHANICAL/STRUCTURAL ENGINEER for evaluation and resolution.

NOTE

Crack widths in concrete > 0.010" are potentially reportable per 10 CFR 50.72.

e. IF crack widths > 0.05" are identified, record and report to COGNIZANT MECHANICAL/STRUCTURAL ENGINEER for IMMEDIATE evaluation and investigation to determine amount of structural impairment upon containment structure and its continued integrity.

f. IF any condition not meeting acceptance criteria in Enclosure 6 is noted, document using sketches, photographs, etc. as applicable.

g. CONTRACTOR shall ensure TMI-1 has evaluated any out-of-specification condition prior to making condition inaccessible. A written evaluation will be provided to CONTRACTOR for his report.

h. Cracks ≥ 0.050" must be repaired after TMI-1 Engineering does an evaluation. Repair will be per 1440-Y-23, "RB Concrete Surface Crack Repairs".

8.2.7 Lift-Off Test

a. Perform dimensional check of threads on stressing ram adaptor and anchorhead per VM-TM-2485. Complete Data Sheet 8, indicating if major, minor and pitch diameters for anchorage and stressing ram adaptor are:

❶ CONFORMING AND ACCEPTABLE (C/A),
❷ NONCONFORMING BUT ACCEPTABLE (NC/A), or

③ NOT ACCEPTABLE (N/A).

b. IF NOT ACCEPTABLE condition exists, notify COGNIZANT MECHANICAL/STRUCTURAL ENGINEER.

c. Record ram area and ram identification number (I.D.) in Column 3 of Data Sheet 1 or 2.

d. Measure and record thickness of shim stack in Column 10 of Data Sheet 1 or 2.

e. Lubricate anchorage washer threads with a small amount of bulk filler grease as required.

f. Thread ram onto anchorage washer per ram operating instructions.

g. Attach stressing jack to stressing washer and bearing plate per jack manufacturer's instructions. Ensure full thread engagement of the coupler to the stressing washer.

h. Visually examine jack prior to each use for damage or deformation.

WARNING

Jack is being operated up to 1,600 KIPS of force. Exercise extreme caution and strict adherence to all safety regulations as contained in operating manual. DO NOT stand behind hydraulic jack while stressing a tendon. Exercise extreme caution if fingers or hands are required near tendon anchorage head during testing.

CAUTION

DO NOT exceed 70% of ultimate tensile stress (equivalent to a jack force of 1393 KIPS (for a tendon with 169 effective wires) when performing lift-off test (IWL-2523.3).

i. IF lift-off is not achieved at jack force of 1393 KIPS, **STOP**, unload jack and notify COGNIZANT MECHANICAL/STRUCTURAL ENGINEER.

j. Observe the position of the anchorhead prior to applying pressure. Count the anchorhead revolutions about the tendon axis, if any, during lift-off. Record the number of revolutions on Data Sheet 10.

k. Begin applying pressure to jack, and continue applying pressure until stressing washer (anchorhead) lifts off shim pack just enough to insert (2) - 0.030" thick feeler gages, located approximately 180 degrees apart, between anchor head and shim pack or shim pack and bearing plate.

l. Reduce jack pressure to achieve corresponding force reduction of approximately 100 KIPS. Obtain relationship between jack pressure and force from Calibration Equation recorded on Data Sheets 1 or 2.

m. Slowly increase jack pressure until both feeler gages becomes loose enough to move. When this occurs, STOP increasing jack pressure and record jack pressure reading and corresponding force in Column 4 of Data Sheet 7.

n. Complete Column 8 of Data Sheet 7.

o. Repeat lift-off measurement tests until 3 consecutive force measurements (Column 4) are all within 25 KIPS.

NOTE

When tests are all within 25 KIPS of each other, official lift-off force for tendon end is the mean of the 3 consecutive force measurements, which is obtained from Column 8 of Data Sheet 7.

p. CONTRACTOR shall record information on Data Sheet 7 and attach Data Sheet 7 to Data Sheets 1 and 2.

q. Record gage pressure corresponding to official lift-off force on Data Sheet 1 or 2, Column 6.

r. Record official lift-off force in Column 7 of Data Sheet 1 or 2.

s. Slowly decrease pressure on jack to allow stressing washer to reseat onto shims. No additional shims are to be added at this time.

NOTE

DO NOT detension either end until lift-off has been recorded for both ends.

t. Repeat lift-off test at other end of tendon.

u. Calculate average value of forces required to achieve lift-off of tendon, and enter in Column 8 of Data Sheet 1 or 2.

v. Verify force meets Acceptance Criteria specified in Step 9.3.

w. Record RB internal and external temperature during lift-off tests in Columns 14 and 15 of Data Sheets 1 and 2.

NOTE

Use value recorded from RTD TE 655I, TE 655U or TE 655P in Control Room for RB internal temperature.

x. Enter lift-off force from Column 8 of Data Sheet 1 or 2 in Column 1 of Data Sheet 5.

y. After lift-off tests are completed for all selected tendons in a group, e.g., all dome tendons, complete Data Sheet 5.

z. Verify average of all normalized lift-off forces in a group meets Acceptance Criteria of Step 9.3.

Engineering

aa. The COGNIZANT MECHANICAL/STRUCTURAL ENGINEER shall review the results and trends of the measured prestress forces from consecutive surveillances for the control tendons and tendons as a group. Complete Data Sheets 12, 13, and 14 by plotting average normalized force for each group. Plot lift-off for control tendons on force vs. time curves.

bb. Verify the best fit straight line projection through the points on Data Sheets 12, 13, or 14 meets the Acceptance Criteria of Step 9.3.

8.2.8 Detension Tendon

CAUTION

1. **DO NOT** exceed 70% of ultimate tensile stress (equivalent to a jack force of 1393 KIPS (for a tendon with 169 effective wires) (IWL-2523.3).
2. During plant operation, detension ONLY ONE tendon at a time.

NOTE

1. To prevent holding jacks under pressure for periods of time, it is recommended that both ends of tendon be detensioned simultaneously.
2. Shims are paired and must be stacked in pairs.

a. Increase pressure to jacks until shims can be removed.

b. Remove split shims from shim stacks.

c. Slowly decrease pressure (rate < 2000 PSIG/MIN) on jacks to completely detension tendon.

NOTE

DO NOT uncouple jacks until tendon is completely detensioned.

d. Uncouple jack, while minimizing twisting of tendon to 1/2 of a revolution.

e. Record on Data Sheet 10 the number of revolutions of the anchorhead (if any) during uncoupling.

8.2.9 Remove Wire and Test

a. Perform VT-1 inspection of the detensioned tendon anchorage assembly for missing, broken, and/or damaged wires protruding from the anchorhead.

b. Record results on Data Sheets 1 and 2 in Enclosure 6 specifically noting any results observed after detensioning.

c. Remove a randomly selected wire that had been stressed prior to detensioning from each selected detensioned tendon listed in Enclosure 2, Table 2.

d. Also remove all broken or damaged wires (if any). Remove enough of each broken or damaged wire to allow tensile testing and visual examination to evaluate the cause of breakage or damage.

e. Follow procedure in Enclosure 4 for testing and examining all removed wires and completing Data Sheets.

8.2.10 Retension Tendon

CAUTION

DO NOT exceed 80% of ultimate tensile stress (equivalent to a jack force of 1593 KIPS (for a tendon with 169 effective wires).

a. Retension both ends of a tendon approximately simultaneously, such that force difference between ends does not exceed 250 KIPS at any time during retensioning.

b. Prior to starting retensioning, complete Column 1 of Data Sheet 6 for each end of tendon by recording greater of:

(1) Force in Column 7 of Data Sheet 1 or 2, or

(2) Base force determined from applicable Force versus Time curve in VM-TM-2485.

c. Verify Rows 2 through 6, 8, 9, 10 and 12 of Data Sheet 4 have been completed.

d. At each tendon end, stress tendon to gauge pressure recorded in Row 6 on Data Sheet 4.

e. Record ram extension in Row 7 of Data Sheet 4.

f. Stress tendon to gauge pressure recorded in Row 10 of Data Sheet 4.

g. Record ram extension in Row 11 of Data Sheet 4.

h. Stress tendon to gauge pressure recorded in Row 12 of Data Sheet 4.

i. Record ram extension in Row 13.

j. Stress tendon to gauge pressure recorded in Row 9 of Data Sheet 4.

k. Record ram extension in Row 14.

l. Record tendon force at overstress in Row 15.

m. Reduce tendon force to within – 0%, + 5% of force recorded in Column 1 of Data Sheet 6, insert shims, and seat anchorhead on shim rack.

n. Perform lift-off to determine actual tendon force and corresponding gauge pressure.

o. Record final lift-off (Lock-Off) force in Column 2 of Data Sheet 6.

p. Verify final lift-off (Lock-Off) force within – 0%, + 5% of force in Column 1 of Data Sheet 6.

q. Complete Data Sheet 6 for all detensioned tendons.

r. Record final gauge pressure, force, and shim stack thickness in Columns 11, 12, and 13 of Data Sheet 1 or 2..

s. For comparison of tendon elongations occurring at Original Stressing and Retensioning, complete Rows 16, 17 and 18 on Data Sheet 4.

t. Verify percent difference in Row 18 on Data Sheet 4 is within ± 10%. Indicate whether this criterion has been met in Row 19 on Data Sheet 4.

u. **IF** NOT within ± 10%, notify COGNIZANT MECHANICAL/STRUCTURAL ENGINEER and investigate to determine if cause is wire failure or slip of wire in anchorage(s). Difference of more than 10% requires identification in the ISI Summary Report per IWA-6000 (10CFR50.55a).

8.2.11 Restore Tendon Force

> **NOTE**
>
> Following steps apply to any tendon which has lift-off force below its specified 90% Base Value, and has not been required to be detensioned.

a. Retension both ends of tendon to within – 0%, + 5% of specified Base value of force as determined from applicable Force versus Time curve in VM-TM-2485.

b. Determine final lift-off force (lock-off).

c. Complete Data Sheet 6 for all such tendons.

d. Record final gauge pressure, lock-off force, and shim thickness in Columns 11, 12, and 13 of Data Sheets 1 and 2.

8.2.12 Reinstall Grease Can and Regrease per 1410-Y-83.

8.3 Vertical Tendon Inspection

a. Follow same steps for dome and hoop tendons with following exceptions:

❶ Working platforms remain stationary during test of one tendon.

❷ Access to opposite end of tendon is from tendon gallery.

❸ Entire column of grease may drain from tendon conduit. Ensure sufficient receptacles available to contain up to 81 gallons of drained grease from each tendon.

❹ Lift-off, detensioning, and retensioning of vertical tendon will be performed from one end only; i.e., from top of ring girder.

❺ Data to be filled in on Data Sheet 3.

8.4 Concrete Cracks at Dome Tendon Anchorage Area

a. After tendon surveillance begins, select 9 dome tendon anchorage areas for inspection.

b. Visually inspect the 9 selected dome tendon anchorage areas per Enclosure 6.

c. Complete Data Sheets 8 and 9 of Enclosure 6.

8.5 Grease Can Seal Repairs

NOTE

To maintain tendon grease seals, scope of work includes replacement of leaky seals, even on tendons which are not part of surveillance scope listed in Table 1 and Table 2 of Enclosure 2.

KEEP TRACK OF LOST GREASE

8.5.1 Perform repairs per 1410-Y-83 (Reference 2.15).

8.6 Recalibrate all calibrated equipment at end of tendon surveillance.

9.0 <u>ACCEPTANCE CRITERIA</u>

9.1 Tendon Anchorage inspection meets criteria specified by Enclosure 6.

9.2 Tendon Physical Condition meets criteria specified by Enclosure 4.

9.3 Tendon Prestress Force Confirmation Test (IWL-3221.1)

9.3.1 The average of all normalized tendon lift-off forces, including those measured in 9.3.2.2, for each type of tendon (vertical, dome, or hoop) is equal to or greater than the required minimum average tendon force at the anchorage for that type of tendon.

NOTE

Required minimum average tendon force is:

1010 Kips for Vertical Tendons
1040 Kips for Dome Tendons
1121 Kips for Hoop Tendons

9.3.2 The measured force in each individual tendon is not less than 95% of the Predicted Base Value (Predicted Force) obtained from VM-TM-2485, unless the following conditions are satisfied.

9.3.2.1 the measured force in not more than one tendon is between 90% and 95% of the predicted force;

9.3.2.2 the measured forces in two tendons located adjacent to the tendon in 9.3.2.1 are not less than 95% of the predicted forces (Predicted Base Values); and

8.3.2.3 the measured forces in all the remaining sample tendons are not less than 95% of the predicted force.

9.3.3 IF the requirements of 9.3.1 and 9.3.2 are not met extent of investigation into cause, including additional lift-off testing to determine cause and extent of such occurrence, shall be determined by COGNIZANT MECHANICAL/STRUCTURAL ENGINEER.

9.3.4 IF average value of selected tendon end forces required for lift-off falls below 90% Base Value, tendon should be detensioned and an investigation conducted to determine extent and cause.

9.3.5 IF minimum group average normalized tendon force is NOT MET on Data Sheet 5, an additional sample of 4% with a minimum of 4 and a maximum of 10, of same group of tendons, should be inspected. (GPUN Guidance/not Reg. Guide).

9.3.6 IF the trend of prestress force loss indicates that the resulting prestress forces will be less than the minimum required prestress forces prior to the next scheduled surveillance, additional lift-off testing to determine the cause and extent of such occurrence shall be done as directed by the COGNIZANT MECHANICAL/STRUCTURAL ENGINEER. This evaluation shall be reported per Engineering Evaluation Report prescribed in IWL-3300.

9.3.7 IF total population of each group of sampled tendons meets criteria, structural integrity of containment shall be considered acceptable.

9.3.8 IF structural integrity of containment has not been demonstrated to be acceptable within 72 hours, then be in at least HOT STANDBY within next 6 hours and in COLD SHUTDOWN within following 30 hours.

9.4 Corrosion Protection System Inspection.

9.4.1 Maximum grease contaminant levels of Enclosure 3 not exceeded.

9.4.2 Water in grease sample shall be that ratio of water to dry weight does not exceed 10%.

9.4.3 Amount of grease replaced does not exceed 4 gallons more than the amount of grease removed.

9.4.4 Presence of free water.

9.4.5 Grease leakage detected during general examination of the containment exterior surface has been evaluated for housekeeping, fire safety and personnel safety concerns.

9.5 Post Test Calibration

9.5.1 The post test calibration shall not differ from the pre-test calibration by more than the specified accuracy tolerance of hydraulic rams and gauges (IWL 2522[b]).

9.6 All Data Sheets complete and signed off.

9.7 IF the Acceptance Criteria of 9.1, 9.2, 9.3, 9.4 and 9.5 are not met, it shall be considered as a possible abnormal degradation of the containment structure. The condition shall be evaluated by the COGNIZANT MECHANICAL/STRUCTURAL ENGINEER and addressed in the tendon surveillance report submitted to the NRC.

10.0 REPORTS

10.1 CONTRACTOR shall prepare written report of results and conclusions for inspection period for GPUN within 30 days of test and inspection completion.

10.1.1 CONTRACTOR shall include pre and post-test calibration records in CONTRACTOR'S final report.

10.2 GPUN shall ensure Enclosure 7 is kept updated with extra commitments for inspections as a result of abnormal conditions in each inspection period.

10.3 GPUN shall submit a report on tendon surveillance to NRC within 90 days following completion.

10.4 GPUN shall submit an ISI Summary Report per IWA-6000. It should include the following conditions, if found (10CFR50.55a).

10.4.1 Sampled sheathing grease contains chemically combined water exceeding 10% by weight or the presence of free water.

10.4.2 The absolute difference between amount of grease removed and amount replaced exceeds 10% of the tendon net duct volume.

10.4.3 Grease leakage is detected during general visual examination of containment surface.

10.4.4 When conditions in accessible areas could indicate the present of, or the result of degradation in inaccessible areas, those inaccessible areas shall be evaluated for --

10.4.4.1 description of the type and extent of degradation, and the conditions that led to the degradation

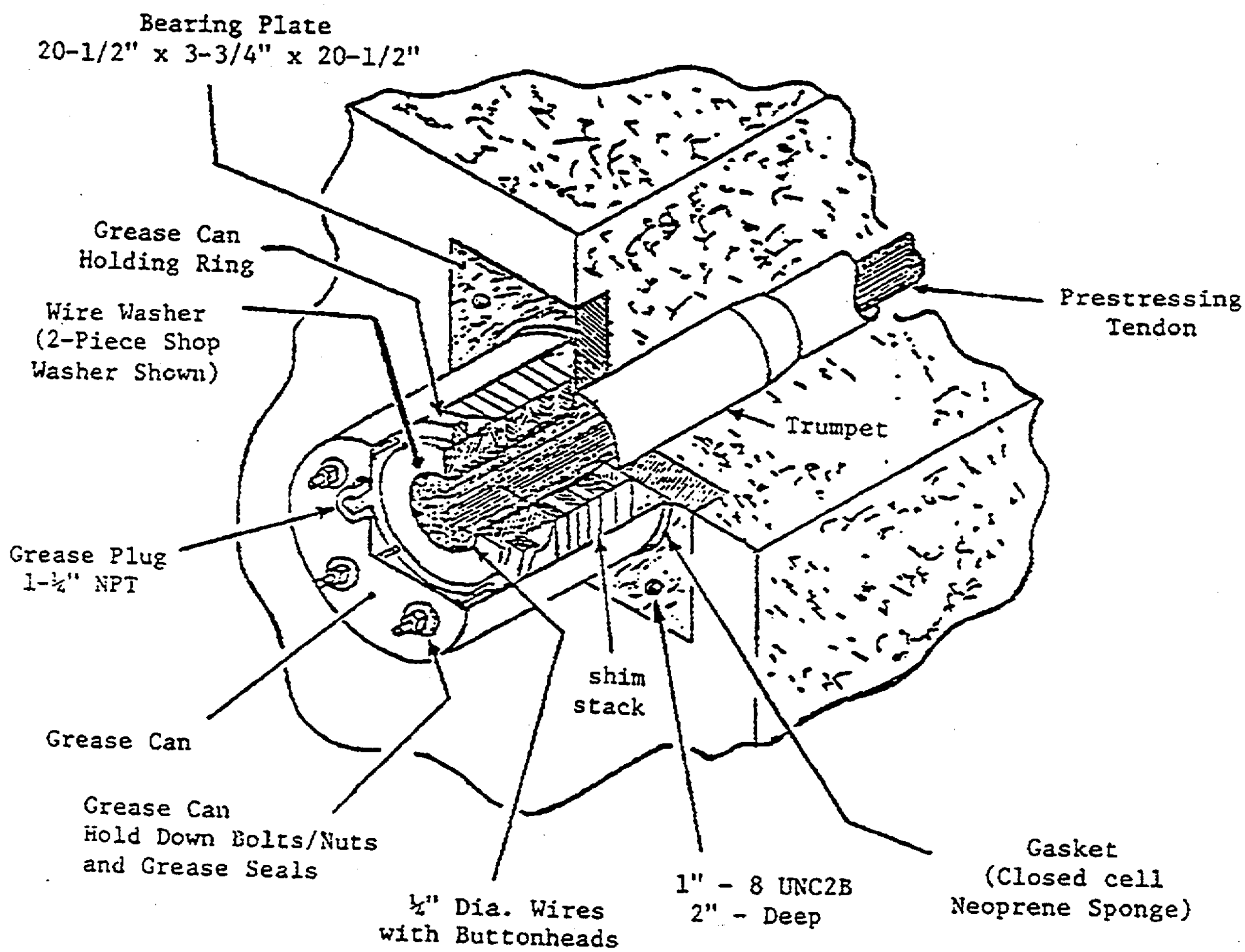
10.4.4.2 an evaluation of each area and results of same

10.4.4.3 a description of necessary corrective actions.

GPU NUCLEAR	TMI Surveillance Procedure	Number F25 of 273 1301-9.1
Title RB Structural Integrity Tendon Surveillance		Revision No. 14

FIGURE 1

Tendon Details Typical Hoop/Dome



NOTE
Vertical tendons have a different type of grease can.

DATA SHEET 1
Prestress Force Confirmation Test
Dome Tendons

INSPECTION PERIOD______________

TENDON					LIFT-OFF CONDITION					RETENSIONING			REACTOR BLDG. TEMP.		DATE INSP.	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV. INSP.
I.D.	LOCATION	RAM ID/AREA (SQ.IN.)	PREVIOUS FORCE (KIPS)	EXPECTED LIFT-OFF FORCE (KIPS)	GAGE PRESS. (KSI)	FORCE (KIPS)	FORCE AVG. OF 2 ENDS (KIPS)	SHIM THICKNESS (IN.) PREVIOUS	AS-FOUND	GAGE PRESS. (KSI)	FORCE (KIPS)	FINAL SHIM THICKNESS (IN.)	°F INT.	EXT.		SIGNATURE	SIGNATURE
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.		/															
2.		/															
3.		/															
4.		/															
5.		/															
6.		/															

NOTE A:

FORCE CALCULATION: FORCE @ LIFT-OFF = JACK PRESSURE X RAM AREA
OR
FROM CALIBRATION EQUATION

CALIBRATION EQUATIONS	
RAM ID	EQUATION

LEGEND:

LOCATION: NW, NE, SW, SE QUADRANT

SHIM THICKNESS: CLEAR DISTANCE BETWEEN BEARING PLATE AND STRESSING WASHER.

PREVIOUS: AT TIME OF ORIGINAL INSTALLATION OR, IF APPLICABLE, FROM PREVIOUS SURVEILLANCE

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY______________________ DATE:______________

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DATA SHEET 2
Prestress Force Confirmation Test
Hoop Tendons

INSPECTION PERIOD______________

TENDON					LIFT-OFF CONDITION					RETENSIONING			REACTOR BLDG. TEMP. °F		DATE INSP.	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV. INSP.
I.D.	LOCATION	RAM ID/AREA (SQ.IN.)	PREVIOUS FORCE (KIPS)	EXPECTED LIFT-OFF FORCE (KIPS)	GAGE PRESS. (KSI)	FORCE (KIPS)	FORCE AVG. OF 2 ENDS (KIPS)	SHIM THICKNESS (IN.) PREVIOUS	AS-FOUND	GAGE PRESS. (KSI)	FORCE (KIPS)	FINAL SHIM THICKNESS (IN.)	INT.	EXT.		SIGNATURE	SIGNATURE
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.___		/															
2.___		/															
3.___		/															
4.___		/															
5.___		/															
6.___		/															

NOTE A:

FORCE CALCULATION: FORCE @ LIFT-OFF = JACK PRESSURE X RAM AREA
OR
FROM CALIBRATION EQUATION

CALIBRATION EQUATIONS	
RAM ID	EQUATION

LEGEND:

LOCATION: 1 to 6 - NUMBER OF BUTTRESS NEARER TO END OF TENDON

SHIM THICKNESS: CLEAR DISTANCE BETWEEN BEARING PLATE AND STRESSING WASHER.

PREVIOUS: AT TIME OF ORIGINAL INSTALLATION OR, IF APPLICABLE, FROM PREVIOUS SURVEILLANCE

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY______________________ DATE:______________

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DATA SHEET 3
Prestress Force Confirmation Test
Vertical Tendons

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INSPECTION PERIOD_______________

TENDON					LIFT-OFF CONDITION					RETENSIONING			REACTOR BLDG. TEMP.		DATE INSP.	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV. INSP.
I.D.	LOCATION	RAM ID/AREA (SQ.IN.)	PREVIOUS FORCE (KIPS)	EXPECTED LIFT-OFF FORCE (KIPS)	GAGE PRESS. (KSI)	FORCE (KIPS)	FORCE AVG. OF 2 ENDS (KIPS)	SHIM THICKNESS (IN.) PREVIOUS	AS-FOUND	GAGE PRESS. (KSI)	FORCE (KIPS)	FINAL SHIM THICKNESS (IN.)	°F INT.	EXT.		SIGNATURE	SIGNATURE
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1.		/															
2.		/															
3.		/															
4.		/															
5.		/															
6.		/															

NOTE A:

FORCE CALCULATION: FORCE @ LIFT-OFF = JACK PRESSURE X RAM AREA
OR
FROM CALIBRATION EQUATION

CALIBRATION EQUATIONS	
RAM ID	EQUATION

LEGEND:

LOCATION: T OR B - TOP OR BOTTOM OF VERTICAL TENDON

SHIM THICKNESS: CLEAR DISTANCE BETWEEN BEARING PLATE AND STRESSING WASHER.

PREVIOUS: AT TIME OF ORIGINAL INSTALLATION OR, IF APPLICABLE, FROM PREVIOUS SURVEILLANCE

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY______________________________ DATE:__________________

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. ________________ Inspection Period ______________

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	ORIGINAL STRESSING DATA[a]						
1	Tendon Force @ 1000 psi (Kips)						
2	Tendon Force @ 80% ULT (Kips)						
3	Tendon Elongation @ Installation (Inches)						
4	Tendon Elongation Sum (3), Shop Plus Field Ends						
	RETENSIONING DATA						
5	Tendon Force (Kips) From Row 1						
6	Initial Gauge Pressure[b] at Tendon Force In Row 5 (PSI)						
7	Ram Extension @ Initial Gauge Press., (Inches)						
8	Overstress Tendon Force (Kips)[c]						
9	Overstress Gauge Pressure[d] for Row 8 Tendon Force (PSI)						

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. ______________ Inspection Period ______________

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	MEASURED ELONGATION DATA						
10	Gauge Pressure at 1/3 Overstress Force, PSI [(9) x 1/3]						
11	Ram Extension at Gauge Pressure [from (10)] (Inches)						
12	Gauge Pressure at 2/3 Overstress Force, PSI [(9) x 2/3]						
13	Ram Extension at Gauge Pressure [from (12)] (Inches)						
14	Ram Extension at Overstress Gauge Pressure, (Inches) [from (9) x 1.0]						
15	Tendon Force at Overstress (Kips)						

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DATA SHEET 4
Elongation/Tendon Force Record
Retensioning Data For Detensioned Tendons

Tendon I.D. ________________ Inspection Period ______________

Row No.	Data Field	Tendon Shop End	Inspected By	Date	Tendon Field End	Inspected By	Date
	CALCULATED DATA						
16	Tendon Elongation (14) - (7), inches						
17	Total Elongation Sum (16), Shop plus Field Ends						
18	% Difference Retention vs. Original Elongation $\frac{(17) - (4)}{(4)} \times 100$						
19	Acceptance Criteria -10% < (18) < +10%						

a - OBTAIN FROM ORIGINAL STRESSING RECORDS. SEE TABLE 7 OF VM-TM-2485
b - VALUE CORRESPONDING TO TENDON FORCE IN ROW (1). NOTE THE GAUGE PRESSURE DEPENDS ON THE SPECIFIC STRESSING GAUGE AND RAM BEING USED AND THE RESULTING CALIBRATION PRESSURE-FORCE RELATIONSHIP.
c - VALUES FROM ROW (2).
d - VALUE CORRESPONDING TO TENDON FORCE IN ROW (8). SEE NOTE UNDER FOOTNOTE b.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY ______________________ DATE:__________

PERFORMED BY: ______________________ DATE:__________

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DATA SHEET 5
AVERAGE OF THE NORMALIZED LIFT OFF FORCE

Tendon ID	(1) Lift Off Force	(2) Normalizing Factor (NF)	(3) Normalized Lift Off (1) + (2)	(4) Acceptance Yes No
Dome Tendons				
1.				
2.				
3.				(Average Equal to or greater than 1040 kips)
4.				
5.				
6.				
		Total		
		Average		
Vertical Tendons				
1.				
2.				(Average Equal to or greater than 1010 kips)
3.				
4.				
5.				
6.				
7.				
		Total		
		Average		
Hoop Tendons				
1.				
2.				
3.				(Average Equal to or greater than 1121 kips)
4.				
5.				
6.				
7.				
8.				
9.				
10.				
		Total		
		Average		

Cognizant Mech/Struct Engineer
Reviewed By: ______________________ Date: ____________

Performed By: ______________________ Date: ____________

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DATA SHEET 6
Retensioning Criteria Confirmation

TENDON ID.	GREATER OF BASE FORCE* OR LIFT-OFF** FORCE	LOCK-OFF FORCE	Δ FORCE (2) - (1)	x 100%	COL. 4 WITHIN MINUS 0% PLUS 5% AND YES OR NO
DOME TENDONS					
______ SHOP END					
FIELD END					
______ SHOP END					
FIELD END					
______ SHOP END					
FIELD END					
VERTICAL TENDONS					
______ SHOP END					
______ SHOP END					
______ SHOP END					
HOOP TENDONS					
______ SHOP END					
FIELD END					
______ SHOP END					
FIELD END					
______ SHOP END					
FIELD END					

* Applicable Force from Base Curve in VM-TM-2485.
** Lift-Off Force is obtained from column 7 of Data Sheets 1, 2 or 3.

Cognizant Mech/Struct Engineer
Reviewed By: ______________________ Date: ____________

Performed By: ______________________ Date: ____________

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DATA SHEET 7
Tendon Force Measurement Record
Gage Pressure (PSIG)/Force (KIPS)

Inspection Period ___________ Tendon I.D. ___________

END LOCATION	MEASURE-MENT NUMBER	FEELER GAGE WITHDRAWAL	RUNNING AVERAGE	DATE INSP.	INSP. BY CONTR. FOREMAN	VERIFIED BY COGNIZANT QV INSP.
1	2	4	8	9	10	11
________	1	/	/	/	/	/
	2	/	/	/	/	/
(SHOP	3	/	/	/	/	/
OR	4	/	/	/	/	/
FIELD)	5	/	/	/	/	/
	6	/	/	/	/	/
	7	/	/	/	/	/
	8	/	/	/	/	/
	9	/	/	/	/	/
	10	/	/	/	/	/

RUNNING AVERAGE:

ENTER IN COLUMN 8 THE AVERAGE OF THE GAGE PRESSURES AND FORCES FROM COLUMN 4 OF THE CURRENT AND PREVIOUS TWO MEASUREMENTS. STOP LIFT-OFF FORCE MEASUREMENTS WHEN THE VALUES OF FORCE IN COLUMN 4 OF THE CURRENT AND TWO PREVIOUS MEASUREMENTS ARE ALL WITHIN 25 KIPS OF EACH OTHER. ENTER FINAL GAGE PRESSURE AND FORCE VALUE FROM COLUMN 8 IN COLUMN 6 AND 7 OF DATA SHEETS 1, 2, OR 3.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: ______________________ DATE: ____________

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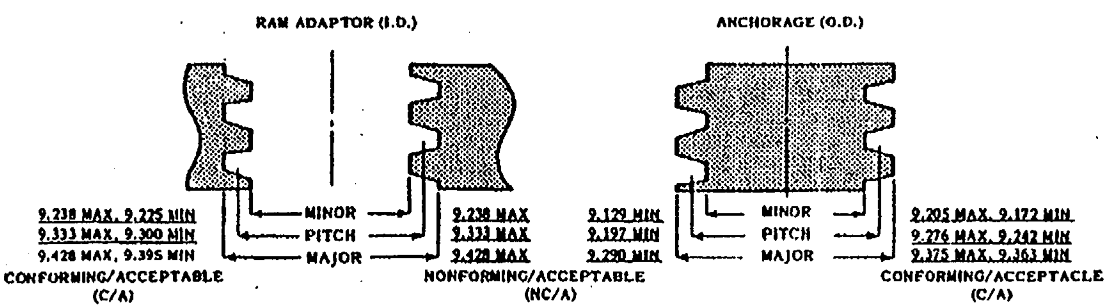
DATA SHEET 8
Minor, Major, and Pitch Diameter Checks - Anchorage and Ram Adapter

			MAJOR O.D. AND MINOR I.D. DIAMETER CHECK							MINOR O.D. AND MAJOR I.D. DIAMETER CHECK						PITCH DIAMETER CHECK				TOTAL				
UNIT	IDENTITY OF ANCHORAGE OR ADAPTOR	DIA.	3RD THREAD	6TH THREAD	9TH THREAD	AVERAGE DIA.	C/A	NC/A	NA	3RD THREAD	9TH THREAD	AVERAGE DIA.	C/A	NC/A	NA	PITCH DIA.	C/A	NC/A	NA	C/A	NC/A	NA	INSP.BY CONTR. FOREMAN	VERIF.BY COGNIZANT QV INSP.
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						
		O.D.																						
		I.D.																						

CALIBRATION CONTROLS:
O.D. MICROMETER NO. ______ CAL.DATE ______
I.D. MICROMETER NO. ______ CAL.DATE ______
MICROMETER NO. ______ CAL.DATE ______
SHIM SIZE ______ NO. ______ CAL.DATE ______
WIRE SIZE ______ NO. ______ CAL.DATE ______
WIRE SIZE ______ NO. ______ CAL.DATE ______

GO-GAUGE NO. ______ CAL.DATE ______
NO GO-GAUGE NO. ______ CAL.DATE ______

NOTE: NOT ACCEPTABLE (NA)



COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY: ______________________

DATE: ______________

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DATA SHEET 9
Tendon Anchorage Area Moisture/Free Water Inspection

Inspection Period ________________

	Tendon No.	Location	Moisture/Water (Yes or No)	Description of Free Moisture/Water-Quantity, Location	Date Insp.	Inspect. By (Initials)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector
Verification By: ______________________ Date: ____________

Cognizant Mech/Struct Engineer
Review By: ______________________ Date: ____________

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DATA SHEET 10
Tendon Anchor Head Rotation Inspection

Inspection Period ______________

		LIFTOFF			DETENSIONING			RETENSIONING		
Tendon No.	Location	No. of Turns	Dir.*	Insp.By/ Date	No. of Turns	Dir.*	Insp.By/ Date	No. of Turns	Dir.*	Insp.By/ Date
1.										
2.										
3.										
4.										
5.										
6.										

NOTE: Location:

Hoop Tendons:	1 to 6 -	Buttress number at end of tendon
Vertical Tendons:	T or B -	Top or Bottom
Dome Tendons:	1 to 6 -	Number of buttress nearest to end of tendon

Cognizant QV Inspector
Verification By: ______________________ Date: __________

Cognizant Mech/Struct Engineer
Review By: ______________________ Date: __________

Turn = a revolution of anchorhead about axis of tendon.
* Direction - Clockwise (CW) or Counter Clockwise (CCW) when looking at anchor head.

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DATA SHEET 11
Bulk Filler Grease Removal and Replacement

Inspection Period ________________

		Gallons Removed*				Gallons Replaced*				
	Tendon No.	Shop End	Field End	Shop & Field End	Comments	Shop End	Field End	Shop & Field End	Diff.** Between Removed & Replaced	Acceptable (Yes or No)
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										

* Only one end of vertical tendons may be used for removal and replacement of grease.
** Differences greater than 4 gallons require GPUN evaluation.

Cognizant QV Inspector
Verification By: ______________________ Date: ____________
Cognizant Mech/Struct Engineer
Review By: ______________________ Date: ____________

Due to the relatively high coefficient of thermal expansion of the grease that is installed at a high temperature, experience during surveillances has been that the quantity of replacement grease frequently exceeds the arbitrary acceptance criteria. Exceeding the acceptance criteria is primarily an indication that an inspection and assessment for possible grease leakage within the structure is necessary. The visual examination of the anchorage and wire will determine whether the corrosion protection system is functioning effectively.

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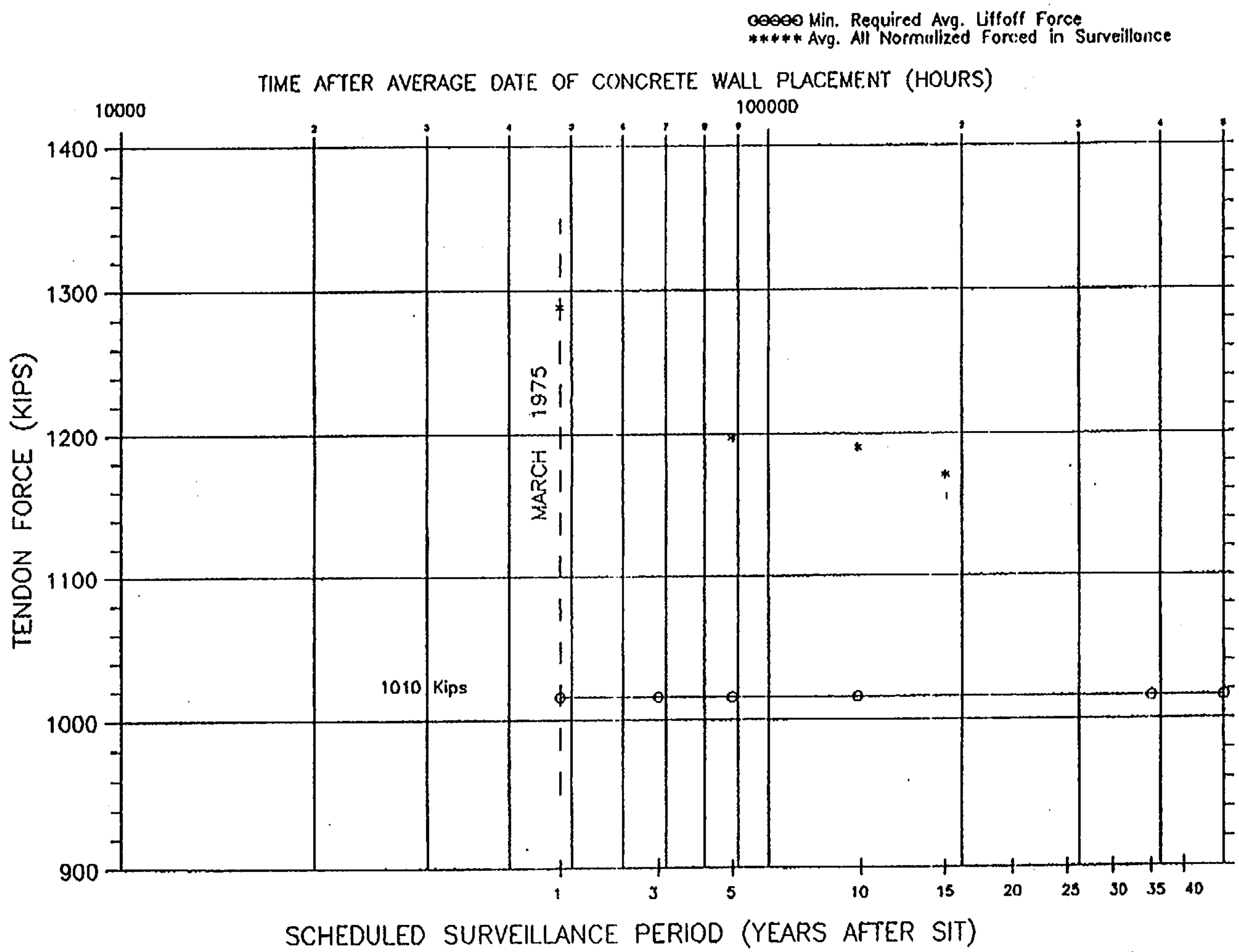
DATA SHEET 12
Tendon Surveillance Program
Vertical Group Trend of Losses



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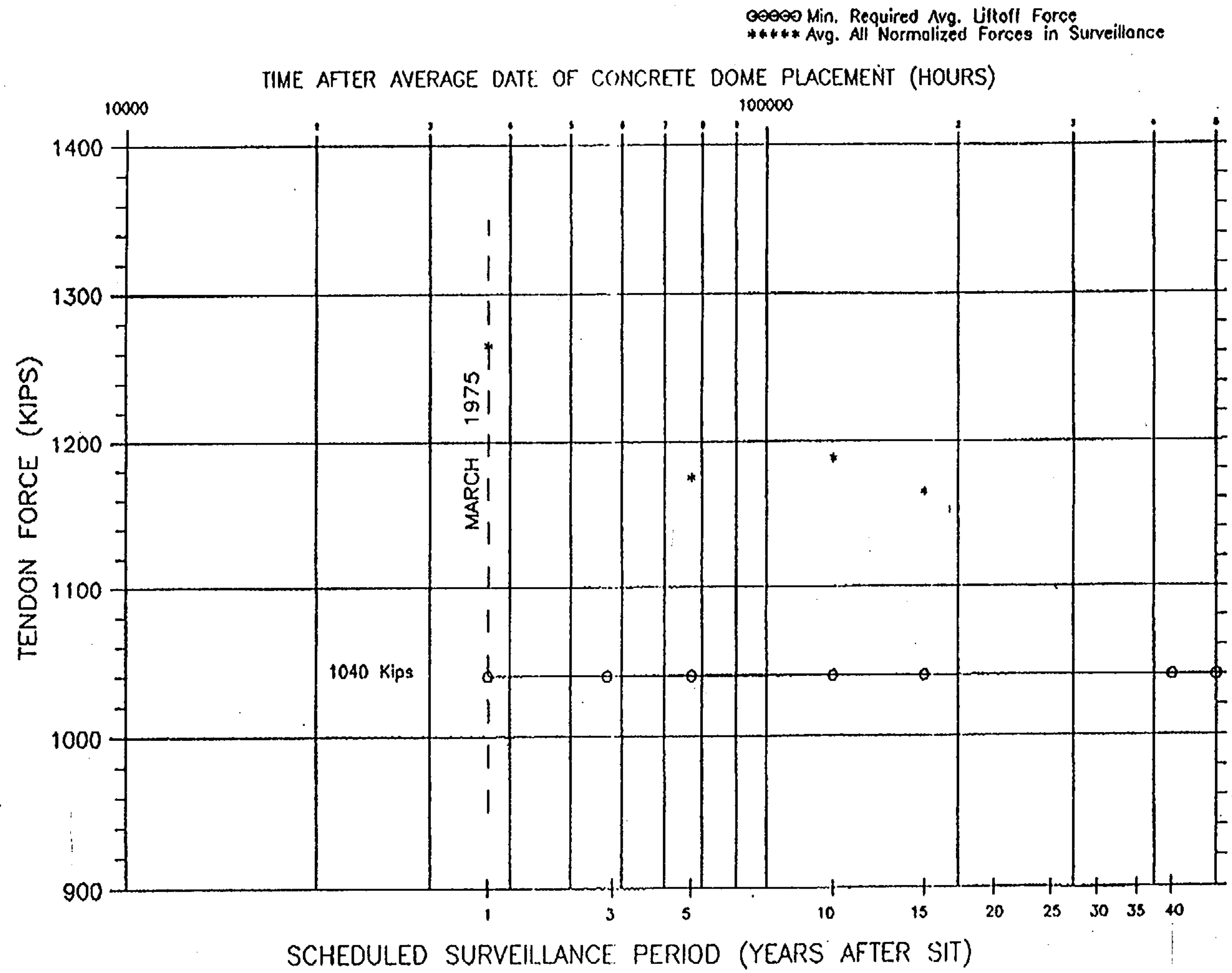
DATA SHEET 13
Tendon Surveillance Program
Dome Group Trend of Losses



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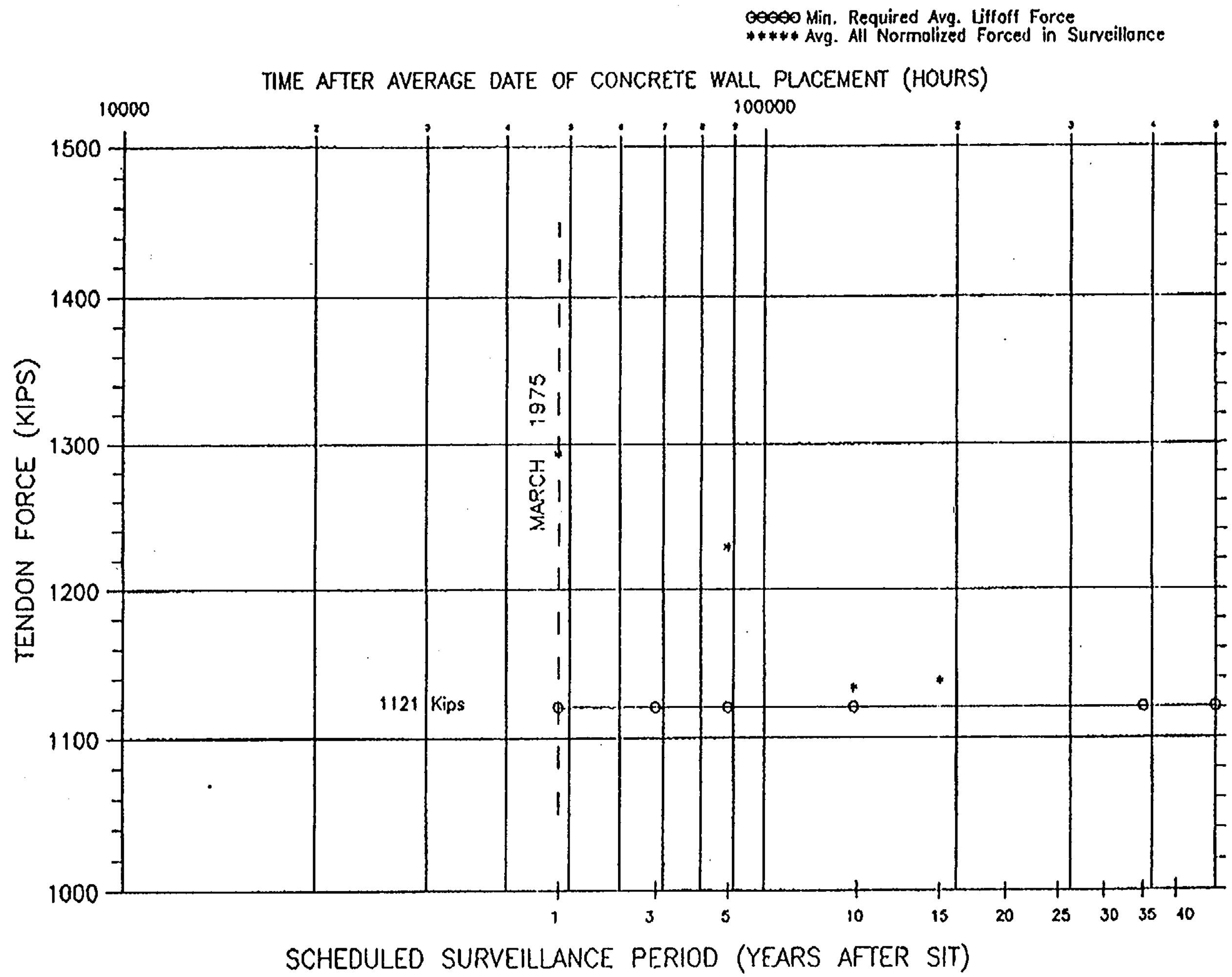
DATA SHEET 14
Tendon Surveillance Program
Hoop Group Trend of Losses



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ENCLOSURE 1

Stressing Ram Calibration

170 Wire Stressing Equipment

NOTE

Calibration will demonstrate a ± 1.5% accuracy of complete stressing unit within the calibration range specified in this enclosure.

1. Attach entire stressing system to a 1600 K load cell which has been calibrated traceable to NIST.
2. Check unit at 3 ram extensions of 2", 4" and 6" at loads specified on attached data sheet.
   2.1 Bring stressing unit to gauge pressures equivalent to pressures listed on Data Sheet of this enclosure, and record actual force as read from load cell.
3. Record and plot values on a Gauge Pressure versus Force Chart to establish a current ram area for each jack.
4. Date all calibrations and paint (or inscribe, attach cal sticker, etc.) calibration date on stressing unit.
5. Maintain 1 copy of current calibration with stressing unit at job site.
6. Include calibration data and certificate in surveillance report.

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ENCLOSURE 1
Data Sheet
Stressing Ram Calibration

RAM DESCRIPTION________________________ THEORETICAL RAM AREA__________IN.^{2}

LOAD CELL CONSTANT________________________

RAM TARGET LOAD (KIPS)	CALCULATED TARGET PRESS. (PSIG)	AT 2" LOADING #1		AT 4" LOADING #2		AT 6" LOADING #3		AVERAGE LOAD (KIPS)	CALCULATED RAM AREA (IN.^{2})
		LOAD CELL	(KIPS)*	LOAD CELL	(KIPS)*	LOAD CELL	(KIPS)*		
150K									
300K									
500K									
600K									
700K									
800K									
900K									
1000K									
1100K									
1200K									
1300K									
1400K									
1500K									
1600K									

RAM AREA = LOAD CELL x LOAD CELL CONSTANT/PRESSURE *LOAD CELL X LOAD CELL CONSTANT
ATTACH CERTIFICATIONS OF NBS TRACEABILITY FOR TESTING APPARATUS

APPROVED BY COGNIZANT MECH/STRUCT ENGINEER: ________________________ DATE__________

PREPARED BY LABORATORY TECHNICIAN: ________________________ DATE__________

VERIFIED BY LABORATORY SUPERVISOR: ________________________ DATE__________

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Title RB Structural Integrity Tendon Surveillance		Revision No. 14

ENCLOSURE 2

Scope of Each Scheduled Surveillance (Random Selection Per GAI DC-5930-225.02-SE)

TABLE 1

Selected Tendons and Corresponding Inspection Periods

VERTICAL TENDONS												
	INSPECTION PERIOD											
Tendon	1	2	3	4	5	6	● 7	8	9	10	Times Insp.	Comments (Adjacent Tendons)
11									X		1	
14				X							1	Done
16	X										1	Done
18			X								1	Done
22					X						1	Done
24		X									1	Done
27	X										1	Done
30				X							1	Done
31			X								1	Done
32				X		X	● X	X	X	X	6	31, 33 Control
40							● X					39, 41
48		X									1	Done
50					X						1	Done
53								X			1	52, 54
55			X								1	Done
61	X										1	Done
66								X				65, 67
72		X									1	Done
78						X					1	Done
84				X	X						2	Done
86	X										1	Done
90									X		1	89, 91
97		X									1	Done
105			X								1	Done
108										X	1	107, 109
114							● X				1	113, 115
119		X									1	Done
126						X					1	Done
132									X			131, 133
138			X								1	Done
140								X			1	139, 141
146										X	1	145, 147
152										X		151, 153
158	X										1	Done
160					X						1	Done
164							● X				1	163,165
TOTAL	5	5	5	5	3	3	4	4	4	4	42	X = Lift-Off

X (shaded) = Lift-Off & Wire Test

● Insp. Period #7 Tests/Insp. To Be Performed. [initials] 8-13-99

GPU NUCLEAR

TMI
Surveillance Procedure

Number F45 of 273
1301-9.1

Title
RB Structural Integrity Tendon Surveillance

Revision No.
14

ENCLOSURE 2
Table 1 (Cont'd)
Selected Tendons and Corresponding Inspection Periods

HOOP TENDONS												
	INSPECTION PERIOD											
Tendon	1	2	3	4	5	6	• 7	8	9	10	Times Insp.	Comments (Adjacent Tendons)
13-11								X			1	13-10, 13-12
13-28	X										1	Done
13-34	X										1	Done
13-36				X							1	Done
13-41									X		1	13-40, 13-42
13-46	X										1	Done
13-50							• X				1	13-49, 13-51
24-19		X									1	Done
24-20			X								1	Done
24-21	X										1	Done
24-23										X	1	24-22, 24-24
24-26				X							1	Done
24-28			X								1	Done
24-30					X						1	Done
24-33									X		1	24-32, 24-34
24-40						X					1	Done
24-47	X										1	Done
24-48		X									1	Done
24-49			X								1	Done
24-50										X	1	24-49, 24-51
24-51					X						1	Done
35-10	X										1	Done
35-11		X									1	Done
35-16			X								1	Done
35-23						X					1	Done
35-26				X							1	Done
35-28	X										1	Done
35-29		X									1	Done
35-33							• X				1	35-32, 35-34
35-47						X					1	Done
35-49								X			1	35-48, 35-50

X = Lift-Off
X = Lift-Off & Wire Test

• INSP. PERIOD #7 TEST/INSP. TO BE PERFORMED.
[initials] 8-13-99

ENCLOSURE 2
Table 1 (Cont'd)
Selected Tendons and Corresponding Inspection Periods

HOOP TENDONS (Cont'd)												
	INSPECTION PERIOD											
Tendon	1	2	3	4	5	6	● 7	8	9	10	Times Insp.	Comments (Adjacent Tendons)
46-24		X									1	Done
46-25								X				46-24, 46-26
46-28		X									1	Done
46-30			X								1	Done
46-32			X								1	Done
46-34					X						1	Done
46-37							● X				1	46-36, 46-38
46-50									X		1	46-49, 46-51
51-11			X								1	Done
51-12	X										1	Done
51-13		X									1	Done
51-16										X	1	51-15, 51-17
51-43							● X				1	51-42, 51-44
51-49									X		1	51-48, 51-50
62-10	X		X								1	Done
62-11		X									1	Done
62-13					X						1	Done
62-16	X										1	Done
62-18								X			1	62-17, 62-19
62-26				X	X	X	● X	X	X	X	7	62-25, 62-27 Control
62-28			X								1	Done
62-30				X							1	Done
62-41										X	1	62-40, 62-42
62-47		X									1	Done
62-49						X					1	Done
62-51			X								1	Done
62-53		X									1	Done
TOTAL	10	10	10	5	5	5	5	5	5	5	65	X = Lift-Off

X = Lift-Off & Wire Test (shaded)

● Insp. Period #7 Tests / Insp. To Be Performed.
[initials] 8-13-99

ENCLOSURE 2 (Cont'd)
Table 1 (Cont'd)
Selected Tendons and Corresponding Inspection Periods

DOME TENDONS												
	INSPECTION PERIOD											
Tendon	1	2	3	4	5	6	● 7	8	9	10	Times Insp.	Comments (Adjacent Tendons)
101	X										1	Done
102							● X				1	101,103
104											1	Exempt *
116	X										1	Done
122									X		1	121, 123
130		X									1	Done
131			X								1	Done
133				X							1	Done
141						X					1	Done
143										X	1	142, 144
145					X						1	Done
147			X								1	Done
148		X									1	Done
201	X										1	Done
202		X									1	Done
203			X								1	Done
213								X			1	212, 214
218			X		X						2	Done
219		X									1	Done
220	X										1	Done
225				X		X	● X	X	X	X	6	224, 226 Control
230								X			1	229, 231
237										X	1	236, 238
248						X					1	Done
301	X										1	Done
303										[X]	1	302, 304
313							● X				1	312, 314
314				X							1	Done
316	X										1	Done
322									X		1	321, 323
334		X									1	Done
336			X								1	Done
342								[X]			1	341, 343
346			X								1	Done
347					X						1	Done
348		X									1	Done
TOTAL	6	6	6	3	3	3	3	3	3	3	39	

X = Lift-Off
X (shaded) = Lift-Off and Wire Test

[X] = For plant on-line, inspect for corrosion, wire breakage and grease quality on end away from main steam relief valve zone. For plant off-line, perform all inspections including lift off measurements.

* D104 is exempt from detensioning as insufficient clearance from the adjoining vent stack (Buttress 5) to successfully access the tendon end exists. D102 has been selected as D104's (Cycle 7) substitute tendon per IWL-2521.1. D104 shall be examined per Sections 8.2.1 through 8.2.6 and associated enclosures/data sheets completed (IWL-2521.1.[c]).

● INSP. PERIOD #7 TEST/INSP. TO BE PERFORMED [initials] 8-13-99

ENCLOSURE 2 (Cont'd)

Table 2

Tendons Selected for Detensioning and Tendon Wire Removal/Lab Tests

Inspection Period	Tendon Location		
	Vertical	Hoop	Dome
1	V-27	H-35-10	D-301
2	V-119	H-62-47	D-202
3	V-18	H-46-30	D-336
4	V-14	H-35-26	D-314
5	V-50	H-46-34	D-145
6	V-78	H-35-47	D-248
• 7	V-164	H-13-50	D-102
8	V-140	H-46-25	D-213 [D-342]*
9	V-90	H-51-49	D-322
10	V-146	H-24-23	D-237

*[See Enclosure 2, Table 1]

• Wire Removal & Test Required.
8-13-99

ENCLOSURE 3

COLLECTION/LAB ANALYSIS OF FILLER GREASE

PURPOSE: Confirm the ability of filler grease to perform its intended corrosion protection function.

LIMITS AND PRECAUTIONS:

1. Use Wooden or plastic paddles or spatulas to scoop out bulk filler grease from around the anchorage. **DO NOT** use metal implements.

PROCEDURE:

1. Inspection Grease

   1.1 Contact TESTING LABORATORY to determine size of sample required.

   1.2 Take one random sample of bulk filler grease from tendon end and put into clean container supplied either by TESTING LABORATORY or TENDON SURVEILLANCE CONTRACTOR.

   1.3 Attach an identification tag to container with tendon group, tendon number, and tendon end specified. (Example: Dome 105NW)

2. Fresh Grease

   2.1 Commercial Grade Dedication of new bulk filler grease requires that at least 25% of the barrels for <u>each</u> grease lot number be sampled for lab analysis.

   2.2 Attach an identification tag to each sample and corresponding identification on each drum sampled.

3. <u>Old Grease</u> (to be reused)

   3.1 If grease obtained from tendons is intended to be reused to refill tendons (termed "old grease") perform lab analysis on "old grease".

   3.2 Heat each container of old grease to be reused to approximately 150° F to ensure a homogeneous mixture.

   3.3 Attach an identification tag to each sample and corresponding identification to each drum.

4. Package all samples and ship to TESTING LABORATORY in such a way that condition of grease is not adversely affected or altered.

5. Test lab perform corrosion protection medium analysis as follows (excerpt Table IWL-2525-1):

Characteristic	Test Method	Acceptance Limit
Water Content	ASTM D 95	10% by weight
Water Soluble Chlorides	ASTM D 512 (Note [1])	10 ppm maximum
Water soluble nitrates	ASTM D 992 (Note [1])	10 ppm maximum
Water soluble sulfides	APHA 427 (Note [1]) (Methylene Blue)	10 ppm maximum
Reserve Alkalinity	ASTM D 974 Modified (Note [2])	(Note [3])

NOTES:

(1) Water Soluble Ion Tests. The inside (bottom and sides) of a one (1) liter beaker, approximate OD 105 mm, height 145 mm, shall be thoroughly coated with between 90 and 110 grams of the sample. The coated beaker is to be filled with approximately 900 ml of distilled water and heated in an oven at a controlled temperature of 100 degrees F +/- 2 degrees F for 4 hours. Water extraction is tested by the noted test procedures for the appropriate water soluble ions. Results are to be reported as PPM in the extracted water.

(2) ASTM D 974 Modified. Place 10 g of sample in a 500 ml Erlenmeyer flask. Add 10 cc isopropyl alcohol and 5 cc toluene. Heat until sample goes into solution. Add 90 cc distilled water and 20 cc 1NH_2SO4. Place solution on a steam bath for 1/2 hour. Stir well. Add a few drops of indicator (1% phenolphtalein) and titrate with 1NNaOH until the lower layer just turns pink. If acid or base solutions are not exactly 1N, the exact normalities should be used when calculating the base number. The Total Base Number (TBN) expressed as miligrams of KOH per gram of sample, is calculated as follows:

$$TBN = \frac{[(20)(N_A)-(B)(N_B)]56.1}{W}$$

Where,

B = milliliters NaOH
N_A = normality of H_2S04
N_B = normality of NaOH solution
W = weight of sample in grams

(3) The base number shall be at least 50% of the as-installed value, unless the as-installed value is 5 or less, in which case the base number shall be no less than zero. If the tendon duct is filled with a mixture of materials having various as-installed base numbers, the lowest number shall govern acceptance. Two kinds of bulk filler grease were used for the initial fill at TMI-1. These are 2090P and 2090P-2 both by Viscosity Oil Co. The 2090P was essentially neutral with a Base Number of zero. The 2090P-2 has a Base Number of 3. Expected Base Number for 2090P and 2090P-2 is zero or higher with a tolerance of -.5. Since reserve alkalinity was not reported on the certifications for 2090P and 2090P-2, the testing of samples of this grease is primarily to detect significant changes in Base Number over a period of time that might indicate abnormal degradation of the corrosion inhibiting properties, e.g., a trend developing where the grease is progressively becoming acidic over time.

Fresh new grease is 2090P-4 by Viscosity Oil Co. with a Base Number of 35. Acceptance Criteria for the fresh grease before it is mixed with existing grease is a Base Number of 17.5 or higher.

ENCLOSURE 3

Data Sheet 1

Laboratory Analysis of Bulk Filler Grease

Dome Tendons

INSPECTION PERIOD____________________

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES[1] (PPM)	NITRATES[1] (PPM)	SULFIDES[1] (PPM)	WATER/DRY WEIGHT (2) %	RESERVE[1] ALKALINITY (BASE NUMBER)
1.						
2.						
3.						
4.						

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: ____________________ DATE:__________

LABORATORY SUPERVISOR
VERIFIED BY: ____________________ DATE:__________

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: ____________________ DATE:__________

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ENCLOSURE 3

Data Sheet 2

Laboratory Analysis of Bulk Filler Grease

Vertical Tendons

INSPECTION PERIOD____________________

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES(1) (PPM)	NITRATES(1) (PPM)	SULFIDES(1) (PPM)	WATER/DRY WEIGHT (2) %	RESERVE(1) ALKALINITY (BASE NUMBER)
1.						
2.						
3.						
4.						

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: ____________________ DATE:__________

LABORATORY SUPERVISOR
VERIFIED BY: ____________________ DATE:__________

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: ____________________ DATE:__________

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ENCLOSURE 3

Data Sheet 3

Laboratory Analysis of Bulk Filler Grease

Hoop Tendons

INSPECTION PERIOD____________________

SAMPLE IDENTIFICATION	TENDON END	CHLORIDES[1] (PPM)	NITRATES[1] (PPM)	SULFIDES[1] (PPM)	WATER/DRY WEIGHT (2) %	RESERVE[1] ALKALINITY (BASE NUMBER)
1.						
2.						
3.						
4.						

(1) ACCEPTANCE CRITERION IS GIVEN ON SHEET 2 OF ENCLOSURE 3.

(2) ACCEPTANCE CRITERION IS 10% MAXIMUM BY WEIGHT.
TENDON END: NW, NE, SW, SE

LABORATORY TECHNICIAN
PREPEARED BY: ____________________ DATE:__________

LABORATORY SUPERVISOR
VERIFIED BY: ____________________ DATE:__________

COGNIZANT MECH/STRUCT ENGINEER
APPROVED BY: ____________________ DATE:__________

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TENDON RANDOM WIRE REMOVAL/PHYSICAL TESTING

(See Table 2 of Enclosure 2 for three tendons which require wire removal).

LIMITS AND PRECAUTIONS

1. Ensure proper identification of tendon before cutting and pulling test wire.
2. Use care to avoid damage to adjoining wires/buttonheads.
3. Avoid unnecessary marks on wire while removing it.

PROCEDURE

1. IDENTIFY ONE PULLABLE WIRE

   Select one of the protruding wires (with tendon totally detensioned) and tap on it or pull while observing movement of buttonhead at other end to identify both ends. Confirm wire identification before cutting.

2. CUT

   Cut off button head at opposite end from where puller will be installed.

3. INSTALL PULLER

   Install wire puller and slowly commence pulling. Verify cut end starts moving through end washer.

4. PULL AND COIL

   Use a come-along or some similar method to pull approximately 170 feet of wire. A cable gripper may be used to grip wire but avoid as much as possible making surface marks on the wire.

   While pulling, coil wire to approximately six foot diameter and secure coil from unwinding.

   > **WARNING**
   >
   > **A coiled tendon wire has considerable spring force. Inadequate binding could result in violent uncoiling which could injure people.**

5. TAG

   Attach metal tag indicating following:

   a. Tendon Number

b. At tagged end:

1. TOP for vertical tendons.

2. BUTTRESS NUMBER for hoop tendons.

3. NW, NE, SW, or SE for dome tendons.

6. PACKAGE/STORE/SHIP

NOTE
DO NOT clean wire in field. TESTING LABORATORY will do this just prior to visual inspection and tensile testing.

Wrap wire with plastic sheeting and tape securely to protect from elements.

7. LABORATORY TESTING

NOTE
None of this is done in field

7.1 Clean and carefully inspect entire length of wire for pitting, corrosion, or other signs of deterioration, using categories shown in the attached Table 1. Record this information on Data Sheet 1 of this enclosure.

7.2 CUT SAMPLES

Cut three (3) samples from each wire, one from each end and one from middle. A fourth sample shall be cut from the area of worst corrosion, if any (IWL-2523.2b). Length of each sample shall be maximum length acceptable for test apparatus being used. Areas shall be representative of any significant corrosion or pitting but should not include any cable gripper marks.

7.3 IDENTIFY LOCATION OF SAMPLES

Show on Data Sheet 1 of this enclosure, location along wire length where each sample was taken.

7.4 TENSILE TEST

a. Determine YIELD STRENGTH, ULTIMATE TENSILE STRENGTH, and PERCENT ELONGATION AT ULTIMATE TENSILE STRENGTH.

b. Record this data on the Data Sheet 2 of this enclosure.

c. Produce stress strain curves for each test section.

NOTE

Yield stress shall be defined as stress at one (1) percent elongation.

<u>ACCEPTANCE CRITERIA - TENDON RANDOM WIRE PHYSICAL TESTING</u>

1. No failure below minimum guaranteed ultimate stress of 240,000 psi.

2. Wire in Category A, B, C, or D (See Table 1 of this enclosure) is acceptable. Wire in Category E is rejectable.

3. If there is rejectable corrosion or pitting on the wire, or the wire fails the tensile test, the <u>Cognizant GPUN Engineer</u> must evaluate. Each case shall be treated as an abnormal degradation of the containment structure and reported to the NRC.

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ENCLOSURE 4
Table 1

CRITERIA AND CATEGORIES FOR RATING DEGREES OF CORROSION FOR SELECTED WIRES

Condition Rating	Cleaning Required for Inspection	Wire Color	Foreign Matter	Rust	Pitting*	Sanding Required to Expose Bright Metal (100 grit sand paper)
A (Excellent)	None	Color Uniform along length	None	None	None	None or not more than 2 heavy passes
B (Good)	Rag wipe	Loss of color in local areas	Small Amount	Small quantity of light rust	None	No more than 5 heavy passes
C (Fair)	Rag or steel wool	Loss of color over large areas	Moderate Amount	Large quantity of light rust	None	No more than 10 heavy passes
D (Usable)	Rag, steel wool, or sand paper	Loss of color over most of wire length	Large Amount	Small quantity of heavy rust in form of red oxide dust	None	No more than 20 heavy passes
E (Reject)	Heavy Sanding or scraping	Loss of color over entire wire length	Large Amount	Areas of hard, crusty, scaly red oxide	Yes	Thirty (30) or more heavy passes

*For wires, pits are defined as indentations of a depth of 1/64" or deeper and a minimum of 1/32" in diameter

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ENCLOSURE 4
Data Sheet 1
Tendon Wire Inspection Data

INSPECTION PERIOD______________________________

Tendon Identification:____________________

0 ______________________________ 25'

25' ______________________________ 50'

50' ______________________________ 75'

75' ______________________________ 100'

100' ______________________________ 125'

125' ______________________________ 150'

150' ______________________________ 175'

175' ______________________________ 180'

Sample for Tensile Test(2)	Wire Sample Diameters At 1/4-Points	At Breaking Points
Sample 1:____ft to ____ft	____ ____ ____	______
Sample 2:____ft to ____ft	____ ____ ____	______
Sample 3:____ft to ____ft	____ ____ ____	______

NOTE

1. Corrosion Categories (See Table 1 of this enclosure), or any signs of deterioration shall be indicated full length as shown on the above chart.
2. Sample shall include areas representative of significant corrosion or pitting if they exist on removed tendon wire.
3. Diameter at Breaking Point is to be interpolated from 1/4-point diameters on either side of breaking points.

Laboratory Technician prepared by:________________________ Date______

Laboratory Supervisor Verified by:________________________ Date______

Cognizant Mech/Struct Engineer Approved by:____________________ Date______

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ENCLOSURE 4
Data Sheet 2
Tendon Wire Test Results

INSPECTION PERIOD ____________________

TENDON WIRE [1] SAMPLE NO.	LOCATION [2] FROM END OF WIRE	YIELD [3] STRESS (ksi)	ULTIMATE STRESS (ksi)	PERCENT [4] ELONGATION	COMMENTS
DOME					
1. ______	______	______	______	______	______
2. ______	______	______	______	______	______
3. ______	______	______	______	______	______
VERTICAL					
1. ______	______	______	______	______	______
2. ______	______	______	______	______	______
3. ______	______	______	______	______	______
HOOP					
1. ______	______	______	______	______	______
2. ______	______	______	______	______	______
3. ______	______	______	______	______	______

NOTES:

(1) See Section 7 of this enclosure.
(2) End starts from end of zero length as indicated on Data Sheet 1 of this enclosure.
(3) Yield stress is defined as stress at 1 percent elongation, i.e., 192,000 psi minimum.
(4) At Ultimate Tensile Strength.

Laboratory Technician
Prepared By: ____________________ Date ________

Laboratory Supervisor
Verified By: ____________________ Date ________

Cognizant Mech/Struct Engineer
Approved By: ____________________ Date ________

GPU NUCLEAR	TMI Surveillance Procedure	Number FC1 of 273 1301-9.1
Title RB Structural Integrity Tendon Surveillance		Revision No. 14

ENCLOSURE 5

GREASE CAN REMOVAL/REPLACEMENT/REGREASING

DELETED

Refer to 1410-Y-83 (Reference 2.15)

ANCHORAGE AND CONCRETE INSPECTIONS

A. NORMAL ANCHORAGE AND CONCRETE INSPECTIONS

1. PURPOSE

Visual inspection/documentation of physical condition of anchorage assembly components, i.e., buttonheads, washers, bearing plates.

2. LIMITS AND PRECAUTIONS

> **WARNING**
>
> **Each tendon wire is tensioned to nearly 8000 lb. DO NOT strike tendon end assembly with any metal object while tendon is tensioned. Avoid getting in a direct line with the tendon end while it is tensioned.**

3. PROCEDURE

3.1 PRIOR TO LIFT-OFF TEST

3.1.1 Observe each tendon anchorage for buttonheads which are missing or which protrude. Document on Data Sheets 1, 2, 3, and 4 of this enclosure.

3.1.2 Check anchorheads for any sign of cracking or serious degradation. Cracks, resulting in failure of anchorheads, have occurred at other plants. Before applying hydraulic ram the condition of each tendon anchorhead should be inspected to avoid potential personnel hazard. Notify Cognizant Mechanical/Structural Engineer immediately if degradation is noted. Be advised that this has been a problem at other plants in the past.

3.2 WHILE DETENSIONED, IF APPLICABLE

Inspect for buttonheads which protrude much farther than adjoining one. Make note of these on Data Sheet 4 of this enclosure to facilitate location (for reinspection after retensioning).

3.3 AFTER LIFT-OFF TEST AND, IF APPLICABLE, AFTER RETENSIONING

3.3.1 Inspect for buttonheads which are missing or which protrude. Document on the Data Sheet 1, 2, 3, and 4 of this enclosure.

3.3.2 Perform VT-1 inspection of buttonheads. Document cracks and damage using letter codes from Table 1, "CRITERIA FOR EVALUATING BUTTONHEAD DAMAGE".

3.3.3 Perform VT-1 inspection of buttonheads. Document corrosion using number codes from Table 2, "CATEGORIES FOR RATING CORROSION ON TENDON ANCHORAGE ASSEMBLIES" of this enclosure.

3.3.4 Document buttonhead inspection results on Data Sheets 1, 2, 3, and 4 of this enclosure.

3.3.5 For tendons violating any of Table 1 and Table 2 criteria, detail all cracks and/or splits on Data Sheet 4 of this enclosure.

3.3.6 Perform VT-1 inspection of anchorage washer/shims/bearing plates. Document cracks and corrosion on Data Sheets 1, 2, and 3 of this enclosure by using number codes from Table 2, "CATEGORIES FOR RATING DEGREE OF CORROSION ON TENDON ANCHORAGE ASSEMBLIES" of this enclosure.

3.3.7 Perform VT-1C of concrete for a distance of 2 feet extending outward from the bearing plate, for cracking or voids and for gaps between bearing plate and concrete. Use an optical comparator or feeler gages.

3.3.8 Document findings on Data Sheets 5, 6, or 7 of this enclosure. Use grid paper and Data Sheet 9, of this enclosure as necessary to identify significant crack patterns and widths.

3.3.9 Immediately after inspection of the buttonheads, butter the end of the anchorhead with clean bulk filler grease completely coating all buttonheads to provide temporary corrosion protection until the tendon is bulk filled.

4. ACCEPTANCE CRITERIA

4.1 No evidence of cracking in anchor heads, shims, washers, or bearing plates (IWL 3221.3).

4.2 Anchorage assembly shims or washers in corrosion Categories 1, 2, or 3 are acceptable (see Table 2, "CATEGORIES FOR RATING CORROSION ON TENDON ANCHORAGE ASSEMBLIES" of this enclosure.)

4.3 Anchorage assembly shims or washers in corrosion Categories 4, 5, or 6 or where evidence of active corrosion is present, are subject to rejection and shall be further evaluated by the Cognizant Mechanical/Structural Engineer.

4.4 Bearing plates in corrosion Categories 7, 8, 9, 10 are acceptable (see Table 2, "CATEGORIES FOR RATING CORROSION ON TENDON ANCHORAGE ASSEMBLIES" of this enclosure).

4.5 Bearing plates in Corrosion Categories 11 or 12 or where evidence of active corrosion is present, are subject to rejection and should be further evaluated by the Cognizant Mechanical/Structural Engineer.

4.6 Cracks in surrounding concrete face greater than 0.010 inch wide shall receive engineering evaluation.

4.7 Cracks in surrounding concrete face greater than/equal to 0.050 inch wide shall be repaired after appropriate engineering evaluation. Repair per TMI-1 approved repair procedure.

4.8 Cracks larger than 0.020 should be monitored in future Tendon Surveillances until repaired.

4.9 Buttonhead acceptance criteria for cracks and damage is covered in Table 1, "CRITERIA FOR EVALUATING BUTTONHEAD DAMAGE" of this enclosure. Buttonhead acceptance criteria for corrosion is: Buttonheads in corrosion Categories 1, 2, or 3 are acceptable (see Table 2, "CATEGORIES FOR RATING CORROSION ON TENDON ANCHORAGE ASSEMBLIES" of this enclosure). Failures to meet these criteria, or where evidence of active corrosion is present, must receive <u>Cognizant Mechanical/Structural Engineer</u> Review.

NOTE

A review of tendon pulling cards and tendon stressing cards has shown that all tendons were corrosion rating Category 1 at installation. In addition, buttonhead cracking which was acceptable per the criteria was not documented.

4.10 IF any missing, broken and/or damaged wires are detected, check inspection reports from previous inspections to determine if damage was noted previously. Record findings on Data Sheets 1, 2, and 3 under "comments" section and on Data Sheet 4 of this enclosure.

4.11 Ensure Data Sheets 1 through 10 of this enclosure are filled out and signed.

B. CONCRETE CRACKS AT 9 SELECTED DOME TENDON ANCHORAGE AREAS IDENTIFIED ON DATA SHEET 8 of this enclosure (Periods 4, 5 6, and 7)

1. PURPOSE

Inspection for concrete crack growth at Ring Girder anchorage areas. Required per Tech. Spec. 4.4.1.2.5 and also per report to NRC for 15 year Tendon Surveillance.

2. PROCEDURE

2.1 Perform VT-1C of concrete around dome tendon anchorage areas for crack growth for a distance of 2 feet extending outward from the bearing plate during 10 (Period 4), 15 (Period 5), 20 (Period 6), and 25 (Period 7) year inspections by monitoring cracks greater than 0.005 inch in width.

2.2 Measure width, depth (if depth can be measured with simple existing plant instrument, i.e. feeler gauges, wires) and length of selected cracks by charting, as necessary.

2.3 Use Data Sheets 8 and 9 of this enclosure to document inspection results.

NOTE

Results of crack measurements made during the 3 years after SIT are filed under 1301-8.2, "Ring Girder Surveillance Program". (The procedure has since been cancelled and the procedure number was re-assigned to a different procedure).

3. ACCEPTANCE CRITERIA

3.1 Data Sheets 9 and 10 of this enclosure filled out and signed.

3.2 Submit completed Data Sheets 9 and 10 of this enclosure to Cognizant Mechanical/Structural Engineer for evaluation. This inspection may be discontinued if the concrete cracks show no sign of growth. If, however, these inspections indicate crack growth, an investigation of the causes and safety impact shall be performed.

3.3 Cracks in surrounding concrete face greater than 0.010 inch wide shall receive engineering evaluation.

3.4 Cracks in surrounding concrete face greater than/equal to 0.050 inch wide shall be repaired after appropriate engineering evaluation. Repair per TMI-1 approved repair procedure. (1440-Y-23).

C. VISUAL INSPECTION OF CONTAINMENT

1. PURPOSE

Visual inspection of 100% of all accessible surfaces of the exterior concrete surfaces of containment, and examination of tendon end caps for grease leakage or end cap deformation.

2. PROCEDURE

NOTE

Areas that have suspect indications or require more sensitivity shall receive a VT-1C inspection. All potentially unacceptable indications shall have a sketch generated detailing the indication's size and location, for trending or Engineering Evaluation purposes.

2.1 Perform VT-3C visual examination of the exterior concrete surface of the containment including the foundation mat around the bottom vertical tendon anchorages noting results of examination on DATA SHEET 10 of this enclosure.

2.2 The VT-3C examination shall detect, describe, and locate evidence of conditions defined in ACI 201.1R-92 and any of the following indications of possible abnormal degradation: Large spill, severe scaling, D-cracking in an area of 25 square feet or more, grease leakage, other surface deterioration.

2.3 Visually inspect all tendon end caps for grease leakage or grease cap deformation. Removal of grease caps is not necessary for this inspection.

> **NOTE**
>
> Areas considered inaccessible, shall be evaluated when conditions exist in accessible areas that indicate the presence of, or result in degradation of inaccessible areas.

3. ACEPTANCE CRITERIA

3.1 Concrete surface indications meeting the surface condition attributes listed in Section 5.1 of ACI 349.3R-96, are generally acceptable without further Engineering Evaluation. Conditions non-compliant with Section 5.1 shall be submitted to Cognizant Mechanical/Structural Engineer in order to ascertain if there is evidence of damage or degradation sufficient to warrant further evaluation or repair.

3.2 Tendon end grease caps shall show no evidence of active grease leakage.

3.3 Tendon end grease caps shall show no evidence of grease cap deformation, which may be indicative of anchorage hardware deterioration.

Table 1

Criteria For Evaluating Buttonhead Damage

Certain flaws were considered normal and acceptable when buttonheading the tendons. They were not, therefore, recorded. Following criteria was used by the installer in determining need for corrective action and/or documentation. It will also serve as guidance for periodic inspections. Cognizant Mechanical/Structural Engineer will evaluate any failure to meet these criteria. See Figures 1, 2, and 3 of this enclosure for examples of buttonhead problems.

When upsetting certain steel wires, which otherwise have fully satisfactory properties, cracks become noticeable at the side of the head. The influence of these cracks is of little significance with respect to the buttonhead developing the ultimate strength of the wire providing the following requirements are held:

A. A split is defined as a crack resulting from a defect in wire. Normally, splits are oriented parallel to axis of wire.

B. A slip is defined as a shear crack resulting from excessive cold working. Slips are normally oriented at approximately 45° to the wire axis and will appear on both sides of the buttonhead.

C. In no event shall two inclined splits occur in same plane.

D. No more than two splits in each head formed with splits inclined more than 20° but less than 45°.

E. Sum total of all splits or opening of one split less than 20° to vertical axis shall not exceed 0.060".

F. Splits shall not intersect.

G. Slips which occur at approximately 45° are acceptable if open less than 0.002". If open greater than 0.002", it shall be considered a split with acceptable criteria applied.

H. Sum of widths of all splits shall not exceed 0.060".

NOTE
Missing, broken, and/or damaged wire criteria is based on original quantity of 169 wires per tendon.

Table 2

Categories For Rating Corrosion On Tendon Anchorage Assemblies

<u>Categories of Corrosion for Shims, Washers, and Buttonheads</u>

1. Bulk filler material intact and bright metal, no visible oxidation.

2. Change of color in bulk filler material and/or metal reddish brown color, no pitting. (Standard or comparison for bulk filler shall be fresh grease.)

3. Change of color in bulk filler material and/or metal having patches of red oxide, removable but ready to start pitting.

4. Change of color in bulk filler material and/or metal having patches of red oxide, not removable and/or leaving noticeable pits.

5. Change of color in bulk filler material and/or metal having heavy rusting, dark red, and about to form an extremely hard crust which when removed leaves very noticeable pitting.

6. Conditions more severe than category 5.

<u>Categories of Corrosion for Face of Bearing Plate</u>

7. No visible oxidation.

8. Slight pitting.

9. Pitting more that 1/32" deep.

10. Uniform surface corrosion more than 1/32" deep.

11. Uniform surface corrosion more than 1/8" deep.

12. Pitting to a depth or 5/16" below original plate face.

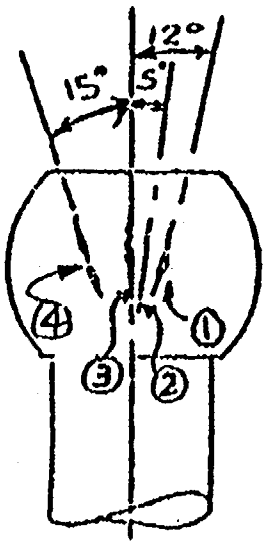
<u>Definition</u>

<u>Pit</u> - For inspection items in this table, a pit is defined as an indentation visible to the naked eye.

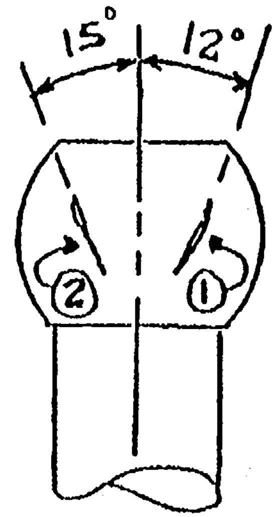
ENCLOSURE 6

Figure 1
Buttonhead Splits

A. Sum of the widths of all splits shall be 0.06 inches with inclinations less than 20° to the axis of the wire.



OK



NO GOOD

Split ① at 12° has 0.015" Width

Split ② at 5° has0.010" Width

Split ③ Vertical has 0.005" Width

Split ④ at 15° has 0.020" Width
Total: 0.050"

0.050" Is less than 0.06"

Split ① at 12° has 0.035" Width

Split ② at 15° has 0.026" Width

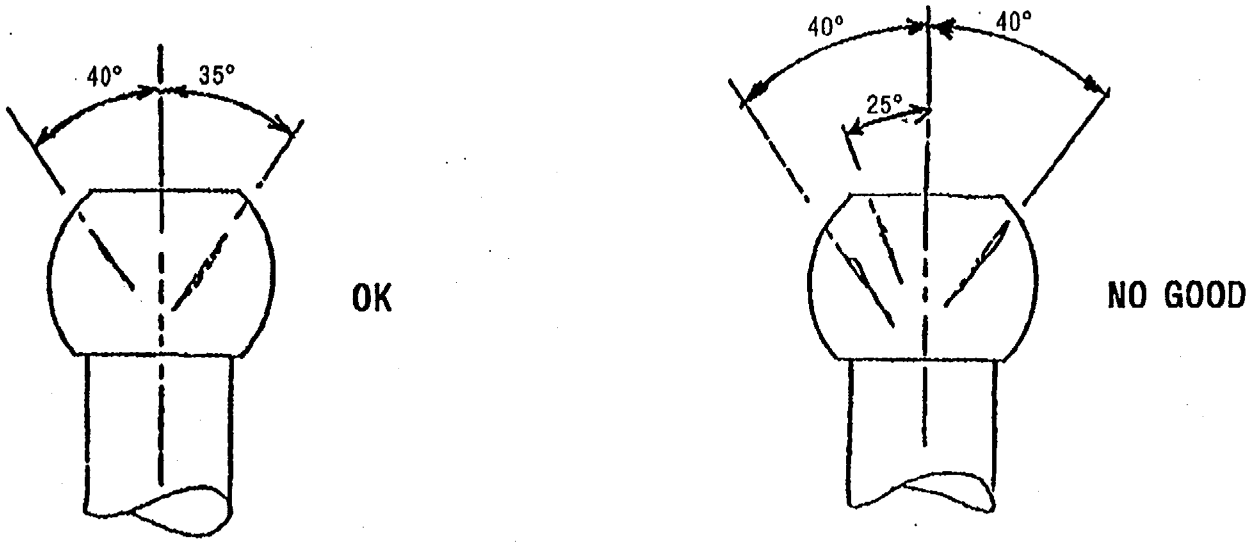
Total 0.061"

0.061 is greater than 0.06"

ENCLOSURE 6

Figure 2
Buttonhead Splits

B. No more than two splits shall occur in buttonheads which have splits inclined more than 20° but less than 45° to the axis of the wire.



NOTE
In no event shall the two splits occur in the same plane or the sum of the split openings exceed 0.06 inches.

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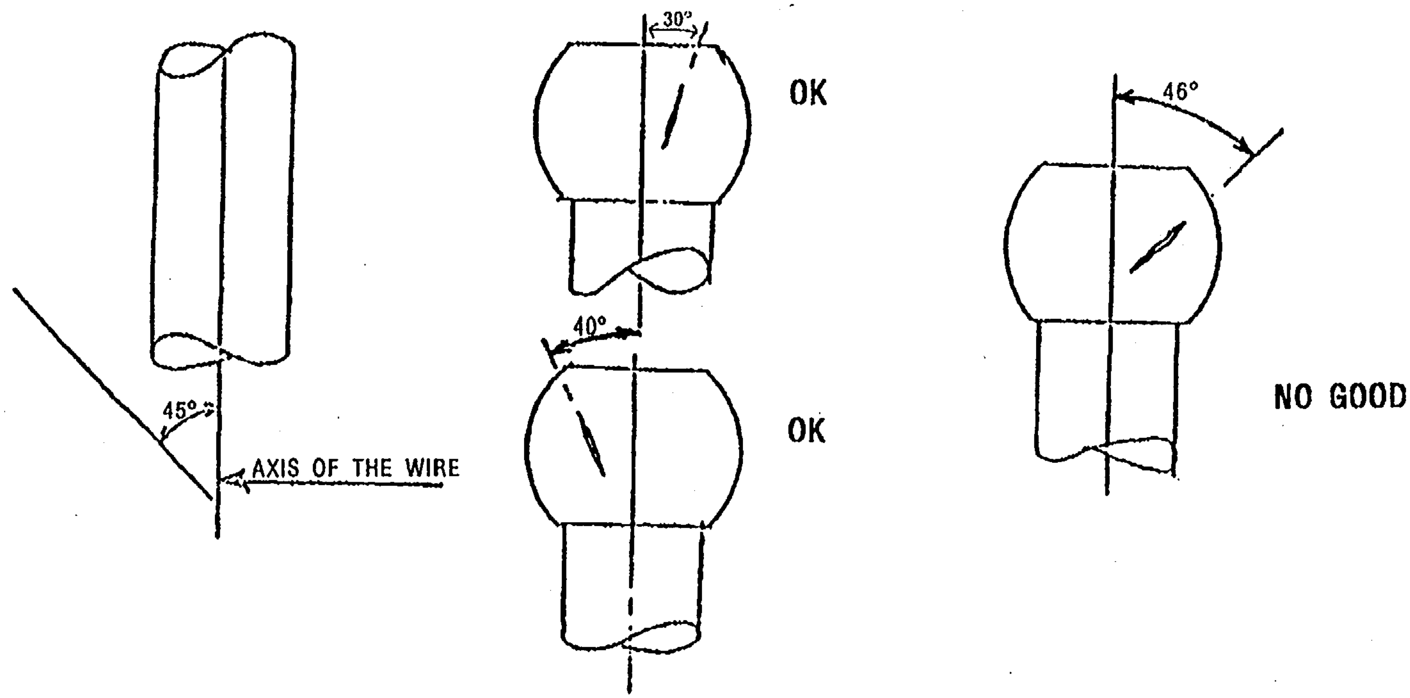
ENCLOSURE 6

Figure 3
Buttonhead Splits

C. Splits shall not be inclined more than 45° to the axis of the wire.



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ENCLOSURE 6

Data Sheet 1
Anchorage Assembly Surveillance Inspection
Dome Tendons

INSPECTION PERIOD________________

TENDON	END		BUTTONHEADS				STRESSING WASHER & NUT			SHIMS			BEARING PLATE			DATE INSP.	COMMENTS	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV INSP.
I.D. 1	Location 2	Corr. Cat. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	CATEGORY OF CRACKS 5	PROPERLY FORMED 6	SKETCHED 7	CORR. CAT. 8	CRACKS 9	SKETCHED 10	CORR. CAT. 11	CRACKS 12	SKETCHED 13	CORR. CAT. 14	CRACKS 15	SKETCHED 16	17	18	19	20
1.																			
2.																			
3.																			
4.																			
5.																			
6.																			

LEGEND

GENERAL — TENDON END-LOCATION

Y = YES
N = NO

IDENTIFY TENDON END (SHOP OR FIELD) AND NW, NE, SW, SE

NOTE:
SEE TABLE 2 FOR CORROSION CATEGORIES.
SEE TABLE 1 FOR ACCEPTANCE CRITERIA FOR BUTTONHEADS.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY ______________________ DATE:______________

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ENCLOSURE 6

Data Sheet 2
Anchorage Assembly Surveillance Inspection
Vertical Tendons

INSPECTION PERIOD________________________

TENDON	END			BUTTONHEADS			STRESSING WASHER & NUT			SHIMS			BEARING PLATE			DATE INSP.	COMMENTS	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV INSP.
I.D. 1	Location 2	Corr. Cat. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	CATEGO-RY OF CRACKS 5	PROPERLY FORMED 6	SKETCHED 7	CORR. CAT. 8	CRACKS 9	SKETCHED 10	CORR. CAT. 11	CRACKS 12	SKETCHED 13	CORR. CAT. 14	CRACKS 15	SKETCHED 16	17	18	19	20
1.																			
2.																			
3.																			
4.																			
5.																			
6.																			

LEGEND

GENERAL

Y = YES
N = NO

TENDON END-LOCATION

IDENTIFY TENDON END (SHOP OR FIELD) AND TOP (T) OR BOTTOM (B) OF TENDON

NOTE:

SEE TABLE 2 FOR CORROSION CATEGORIES.
SEE TABLE 1 FOR ACCEPTANCE CRITERIA FOR BUTTONHEADS.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY ________________________ DATE: ____________

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ENCLOSURE 6

Data Sheet 3
Anchorage Assembly Surveillance Inspection
Hoop Tendons

INSPECTION PERIOD____________________

TENDON	END		BUTTONHEADS				STRESSING WASHER & NUT			SHIMS			BEARING PLATE			DATE INSP.	COMMENTS	INSP. BY CONTR. FOREMAN	VERIF. BY COGNIZANT QV INSP.
I.D. 1	Location 2	Corr. Cat. 3	NO. OF MISSING, BROKEN, AND/OR DAMAGED WIRES 4	CATEGO-RY OF CRACKS 5	PROPERLY FORMED 6	SKETCHED 7	CORR. CAT. 8	CRACKS 9	SKETCHED 10	CORR. CAT. 11	CRACKS 12	SKETCHED 13	CORR. CAT. 14	CRACKS 15	SKETCHED 16	17	18	19	20
1.																			
2.																			
3.																			
4.																			
5.																			
6.																			

LEGEND

GENERAL — **TENDON END-LOCATION**

Y = YES
N = NO

IDENTIFY TENDON END (SHOP OR FIELD) AND NUMBER OF BUTTRESS (1 TO 6) NEAREST TO TENDON END

NOTE:

SEE TABLE 2 FOR CORROSION CATEGORIES.
SEE TABLE 1 FOR ACCEPTANCE CRITERIA FOR BUTTONHEADS.

COGNIZANT MECH/STRUCT ENGINEER
REVIEWED BY ____________________ DATE:__________

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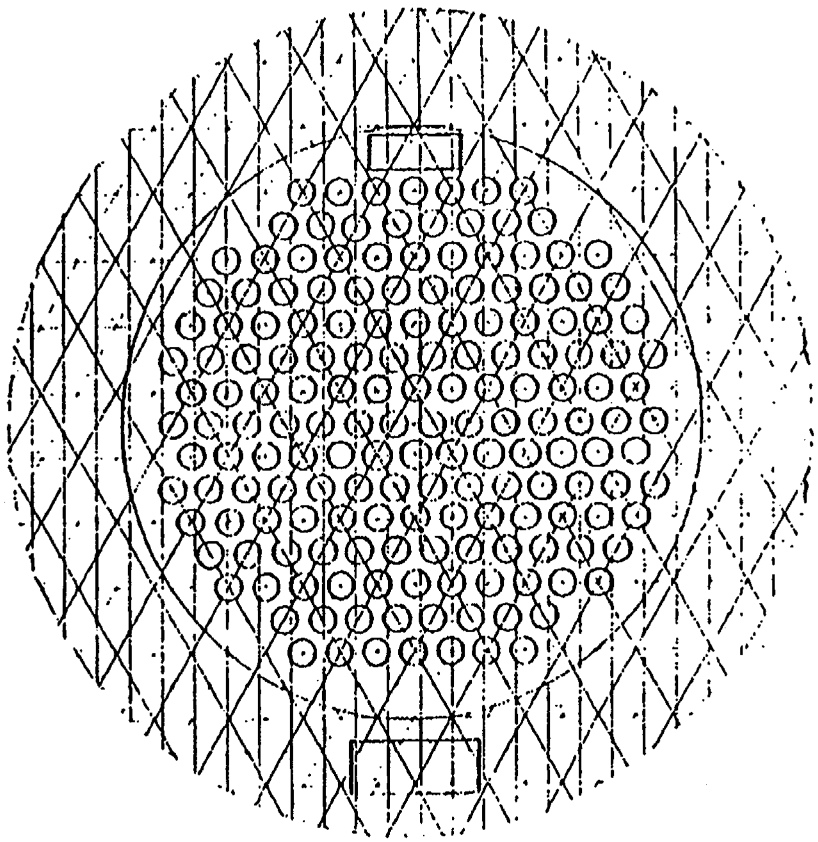
ENCLOSURE 6
Data Sheet 4

Tendon Buttonhead Inspection



RB Tendon Surveillance

COMMENT:

INSPECTED BY
CONTRACTOR FOREMAN________________ Date________
VERIIFIED BY
COGNIZANT QV INSPECTOR________________ Date________
COGNIZANT MECH/STRUCT ENGINEER________________ Date________
REVIEWED BY

INSPECTION PERIOD_____

Tendon # ________________
END: FIELD_____(1 piece washer)
SHOP_____(2 piece washer)

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ENCLOSURE 6

Date Sheet 5
Tendon Anchorage Area Crack Inspection
Dome Tendons

Inspection Period ____________________

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location	Width (IN.)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. ____	____	____	____	____	____	____	____
	____	____	____	____			
2. ____	____	____	____	____	____	____	____
	____	____	____	____			
3. ____	____	____	____	____	____	____	____
	____	____	____	____			
4. ____	____	____	____	____	____	____	____
	____	____	____	____			
5. ____	____	____	____	____	____	____	____
	____	____	____	____			
6. ____	____	____	____	____	____	____	____
	____	____	____	____			

NOTE: Location

Identify Tendon End (Shop or Field) and NW, NE, SW, SE

Cognizant Mech/Struct Engineer
Reviewed By: ____________________ Date: __________

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ENCLOSURE 6
Data Sheet 6
Tendon Anchorage Area Crack Inspection
Vertical Tendons

Inspection Period ______________________________

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location	Width (IN.)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. ______	______	______	______	______	______	______	______
	______	______	______	______			
2. ______	______	______	______	______	______	______	______
	______	______	______	______			
3. ______	______	______	______	______	______	______	______
	______	______	______	______			
4. ______	______	______	______	______	______	______	______
	______	______	______	______			
5. ______	______	______	______	______	______	______	______
	______	______	______	______			
6. ______	______	______	______	______	______	______	______
	______	______	______	______			
7. ______	______	______	______	______	______	______	______
	______	______	______	______			

NOTE: Location
Identify Tendon End (Shop or Field) and
T or B - Top or Bottom of Vertical Tendon

Cognizant Mech/Struct Engineer
Reviewed By:______________________________ Date:______________

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ENCLOSURE 6
Date Sheet 7
Tendon Anchorage Area Crack Inspection
Hoop Tendons

Inspection Period ____________

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location	Cracks with width >0.01" Width (IN.)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1. ____	____	____	____	____	____	____	____
	____	____	____	____			
2. ____	____	____	____	____	____	____	____
	____	____	____	____			
3. ____	____	____	____	____	____	____	____
	____	____	____	____			
4. ____	____	____	____	____	____	____	____
	____	____	____	____			
5. ____	____	____	____	____	____	____	____
	____	____	____	____			
6. ____	____	____	____	____	____	____	____
	____	____	____	____			
7. ____	____	____	____	____	____	____	____
	____	____	____	____			
8. ____	____	____	____	____	____	____	____
	____	____	____	____			
9. ____	____	____	____	____	____	____	____
	____	____	____	____			
10. ____	____	____	____	____	____	____	____
	____	____	____	____			

NOTE: Location
Identify Tendon End (Shop or Field) and
1 to 6 - Number of Butress Nearest to End of Tendon

Cognizant Mech/Struct Engineer
Reviewed By:______________________ Date:____________

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ENCLOSURE 6

Date Sheet 8
Crack Growth Inspection
Dome Tendons

Inspection Period ______________________________

Tendon No.	Location	Remarks about Cracking Pattern	Cracks with width >0.01" Location	Width (IN.)	Date Insp.	Insp. By Contr. Foreman	Verify. By Cognizant QV Insp.
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							

NOTE: Location

Identify Tendon End (Shop or Field) and
NW, NE, SW, Se

Cognizant Mech/Struct Engineer
Reviewed By:______________________________ Date:______________

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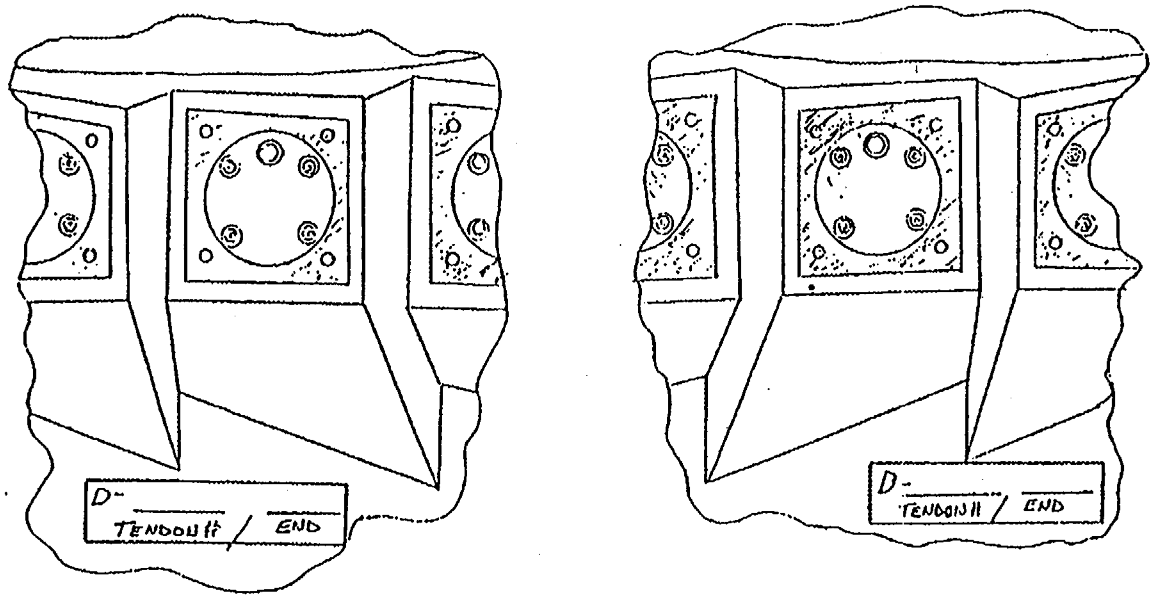
ENCLOSURE 6
DATA SHEET 9
Crack Growth Inspections



Choose the sketch which is most appropriate and plot the observed cracks.

INSPECTED BY CONTRACTOR ______________________________ DATE__________

VERIFIED BY COGNIZANT QV INSPECTOR ______________________________ DATE__________

REVIEWED BY COGNIZANT MECH/STRUCT ENGINEER ______________________________ DATE__________

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Mat Foundation in Tendon Gallery

Tendon Grease Caps

Buttress 1 to 2

Buttress 2 to 3

Buttress 3 to 4

Cognizant Mech/Struct Engineer
Reviewed By: ______________________ Date: __________

Performed By: ______________________ Date: __________

Buttress 4 to 5

Buttress 5 to 6

Buttress 6 to 1

Dome Area

Cognizant Mech/Struct Engineer
Reviewed By: ____________________ Date: __________

Performed By: ____________________ Date: __________

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ENCLOSURE 7

Additional Inspection Commitments Due to Abnormalities Previously Documented in 1301-9.1

Inspection Period	Abnormality Noted	Commitment	Comments
1 5/21/75 - 7/02/75	NONE	NONE	NONE
2 8/17/77 - 11/11/77	Tendon H-51-13 had numerous cracked buttonheads.	Inspect H-51-13 buttonheads in period 3 to determine if cracking continues.	NONE
3 4/17/89 - 8/6/80	V31 Lift off 3 kips low and adjacent tendons not lifted off. V138 Category 4 Corrosion	Do lift off on V30 and V32 in period 4. Reinspect V138 in period 4 to better document the corrosion and evaluate.	LER 81-010 sub - to document incom- plete inspect. during 1980 surveillance. H-51-13 inspection showed no continued cracking.
4 5/85 - 6/85	NONE	NONE	Lift off of V30 & V32 was performed with acceptable results. The corrosion on V138 was evaluated & found acceptable.
5 10/89 - 1/90	Some cracks appeared to have grown slightly from previous.	During period 6 repeat the concrete cracks inspection as required in Enclosure 6.	NONE
6 9/94 - 11/94 and 9/95	As captured in SDR's 1 through 6	None	All SDR's accept condition(s) found with no further action required
7			
8			
9			
10			

FIGURE 2

THREE MILE ISLAND UNIT ONE TEMPORARY CHANGE NOTICE (TCN)

Due Date: ______________________

11. TCN No. 1 - 9 9 - 0 1 0 4 (From TCN Log Index)

Refer to instructions and guidelines in AP 1001A when completing this form.

12. Implementation Date 8/17/99

SS/SF Signature [signature]

1. 1301-9.1 (Procedure Number) 14 (Present Rev. No.) RB Structural Integrity Tendon Surveillance (Title)

2. Change: • Include page numbers, paragraph numbers, and exact wording of change.
   • Attach additional sheets if necessary. Pgs. 7, 8, 14, 15, 19, 62 8/16/99

3. Reason for Change: Vendor ISI inspection manual/procedures req'd to supplement 1301-9.1

4. Duration of TCN - No longer than 90 days from implementation date of TCN or as in a or b below, whichever occurs first.

   a. TCN will be cancelled by a procedure revision issued as a result of a Procedure Change Request to be submitted by ______________________ (Submit PCR as soon as possible) ☐
   Individual Submitting PCR

   b. TCN is not valid after ______________________ ☐
   (Fill in circumstances which will result in TCN being cancelled)

5. Is procedure within QA Plan scope? .... Yes ✓ No ___

6. Does the change affect the intent of the original procedure? .... Yes ✓ No ___

- IF answers to #5 AND 6 are NO, the change may be approved by the Shift Supervisor (Section 10.c)
- IF answer to #6 is YES, the change must be reviewed and approved in accordance with Table 2 prior to implementation (Section 10.b).
- IF answer to #6 is NO, AND answer to #5 is YES change may be EITHER (1) two member reviewed (Section 10.a) OR (2) reviewed and approved in accordance with Table 2 (Section 10.b).

7. Prepared By: JOHN J. PIAZZA Date 8-16-99

Review Signatures:

8. Procedure Owner Concurrence* [signature] Date 8-16-99

*RTR, Responsible Office Department Head/Designee may concur if Procedure Owner is unavailable.
*May be by telecon.

9. Engineering Rep. Notified (If req'd.) ______________________ Date ______

10. Approval(s):

a. Two Members of the GPUN Mgmt. Staff Route (RTRs shall be different from the preparer in line 7)

(RTR) Signature [signature] Date 8/16/99

(RTR) Signature [signature] Date 8/16/99

Within 14 days, approval per AP 1001A must occur [signature] 8/16/99

(ISR) Signature ______ Date ______

(Approver) Signature ______ Date ______

b. Normal Route (Per AP 1001A):

Resp. Office [signature] Date 8/16/99

(RTR) Signature [signature] Date 8/16/99

(ISR) Signature Not Req'd per SEDR (50.59) [signature] Date

(Approver) Signature Gordon R Skillman Date 8/17/99

c. SS Approval Only: (This approval only used if answers to questions #5 and 6 are "No")

(RTR) Signature ______ Date ______

(Approver) Signature ______ Date ______

13. TCN is Cancelled ______________________ ______________
Shift Supervisor/Shift Foreman Date

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FIGURE 4

THREE MILE ISLAND

SAFETY DETERMINATION

This determination is required for all documents within 1001A applicability/scope.

☐ New Procedure ____-____-____ ☒ TCN 1-99-0104

☐ PCR ____-____-____ ☐ STP ____-____-____

Document No. 1301-9.1	Rev. No. 14

1. Is this a substantive change? Indicate "YES" for new procedures and STP's — Yes ✓ No ___

   If Box 1 is "No", sign and date this form. The remainder of the form need not be completed.

2. Does this change involve any non-radiological environmental impact? (Refer to Definitions Section of this procedure.) — Yes ___ No ✓

   - If "Yes", complete an Environmental Determination (Figure 7, AP 1001A) and ensure the change is submitted to Environmental Affairs for review.
   - Complete the remainder of this form.

3. Does this change have the potential to adversely affect nuclear safety or safe plant operations? (Refer to Paragraph 4.2.2) — Yes ___ No ✓
4. Does this make changes in the facility as described in the safety analysis report? — Yes ___ No ✓
5. Does this make changes in the procedures as described in the safety analysis report? — Yes ___ No ✓
6. Are tests or experiments conducted which are not described in the safety analysis report? — Yes ___ No ✓
7. Does this change conflict with the requirements of the plant Technical Specifications? — Yes ___ No ✓

   If ANY of the answers to 3, 4, 5, 6 OR 7 are YES, you must fill out Figure 5 AND provide a written safety evaluation. Sign and date this form.

If the answers to 3, 4, 5, 6 AND 7 are ALL NO, this precludes the existence of an Unreviewed Safety Question or Technical Specification change.
Provide the basis for the answers to each of the questions (3, 4, 5, 6, 7) on one or more separate sheets.
Sign and date this form.

Prepared By: [signature] JOHN J PIAZZA Date: 8/6/99

RTR By: [signature] JOHN JANDOVITZ Date: 8/16/99

Safety Determination
(Continued)

3.0 Does this change have the potential to adversely affect nuclear safety or safe plant operations?

No. This change,

1) supplements 1301-9.1 with additional clarification to apply both 1301-9.1 and PSC ISI Manual Procedures.
2) Revises thread measurement and jack/ram calibration methods to utilize PSC procedure in lieu of 1301-9.1. This change allows PSC to utilize their SQ7.1 procedure in lieu of 1301-9.1 for performing thread dimensional checks. It is already permitted via 1301-9.1 Section 4.2 "NOTE" for PSC to use an alternative method (PSC Procedure QA12.8G-W) to perform jack/ram calibrations, provided GPUN approves.

GPUN has reviewed PSC ISI Manual and finds it acceptable for use. Most of the Manual had been previously reviewed during previous surveillances.

4.0 Does this change make changes in the facility as described in the SAR?

No facility changes are involved. This change incorporates reviewed vendor procedures into procedure 1301-9.1 to govern the conduct of tendon surveillance.

5.0 Does this make changes in the procedures as described in the SAR?

No. This change does not affect the procedural descriptions/commitments made in the SAR. 1301-9.1 remains compliant to RG 1.35 Rev. 3. Tensile testing acceptance criteria stated in 1301-9.1 and the FSAR remain unchanged. FSAR excerpts are provided herein.

5.7.5.2 Current Inservice Tendon Surveillance Program Requirements And Criteria

The current inservice tendon surveillance program requirements and acceptance criteria are described in TMI-1 Surveillance Procedure No. 1301-9.1. These requirements and acceptance criteria are in accordance with NRC Regulatory Guide 1.35, Revision 3 and will be implemented for the 20 year surveillance and all subsequent surveillances.

5.7.5.2.4 Tendon Material Tests and Inspection

c. If any wire sample fails to achieve a minimum ultimate tensile strength of 240,000 psi or if there is rejectable corrosion or pitting as defined in Procedure 1301-9.1, this condition shall be evaluated and considered potentially reportable as an abnormal degradation of the containment structure.

6.0 Are tests/experiments conducted which are not described in the SAR?

This change does not conduct/authorize tests (as described in 10CFR50.59).

7.0 Does this change conflict with the requirements of Plant Technical Specifications?

No. Plant Technical Specifications remain unaffected by this change. This change supplements or revises 1301-9.1 to ensure that the appropriate Vendor methods are applied for jack/ram calibration and cap water examination, thread dimensional checks, field testing of tendon wires, and buttonhead exams

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GPU NUCLEAR

	TMI Surveillance Procedure	Number 1301-9.1
Title: RB Structural Integrity Tendon Surveillance		Revision No. 14
Applicability/Scope: TMI Division	Responsible Office: Mgr., Mech. Structural Engrng.	Effective Date 08/06/99

This document is within QA plan scope [X] Yes [ ] No
Safety Reviews Required [X] Yes [ ] No

CONTROL ROOM WORKING COPY

Info Only

List of Effective Pages

Page	Revision	Page	Revision	Page	Revision	Page	Revision
1	14	21	14	41	14	61	14
2	14	22	14	42	14	62	14
3	14	23	14	43	14	63	14
4	14	24	14	44	14	64	14
5	14	25	14	45	14	65	14
6	14	26	14	46	14	66	14
7	14	27	14	47	14	67	14
8	14	28	14	48	14	68	14
9	14	29	14	49	14	69	14
10	14	30	14	50	14	70	14
11	14	31	14	51	14	71	14
12	14	32	14	52	14	72	14
13	14	33	14	53	14	73	14
14	14	34	14	54	14	74	14
15	14	35	14	55	14	75	14
16	14	36	14	56	14	76	14
17	14	37	14	57	14	77	14
18	14	38	14	58	14	78	14
19	14	39	14	59	14	79	14
20	14	40	14	60	14	80	14

	Signature	Date
Originator	[signature]	8-6-99
Procedure Owner	[signature]	8-6-99
PRG	for J. Schork	8-6-99
Approver	[signature]	8/6/99

2.25 ACI 201.1R-92 and ACI 201.1R-68, "Guide for Making a Condition Survey of Concrete In Service"

2.26 ACI 349.3R-96, "Evaluation of Existing Nuclear Safety Related Concrete Structures"

3.0 PLANT STATUS

3.1 Operating or Shutdown.

> **NOTE**
>
> RB entry not necessary for tendon inspection.

3.2 For safety reasons, during plant operation no tendons with end caps located above steam safety valves are to be scheduled for surveillance.

4.0 PREREQUISITES

4.1 TENDON SURVEILLANCE CONTRACTOR (CONTRACTOR) shall perform tendon surveillance in accordance with this procedure, GPUNC OQA Plan and 1101-23-007, latest revision.

4.1.1 CONTRACTOR shall have a quality assurance program in place which meets requirements of 10 CFR 50, Appendix B.

4.1.2 CONTRACTOR shall be on GPUN Supplier Quality Classification List (SQCL).

4.2 CONTRACTOR shall ensure TESTING LABORATORY equipped to perform following services shall be available for this surveillance:

- Inspection of removed wires for corrosion and other defects, and to perform required tensile tests. (See Enclosure 4.)
- Inspection of bulk filler grease samples and test for chlorides, sulfides, nitrates, and moisture content. (See Enclosure 3.)
- Calibration (traceable to NIST) of all hydraulic rams and gauges to be used.

> **NOTE**
>
> 1. Stressing ram shall be calibrated per Enclosure 1, prior to mobilization to TMI-1 and within 15 days after demobilization from TMI-1 (IWL-2522), or CONTRACTOR may propose an alternative method.
> 2. IF alternative used, CONTRACTOR shall submit method for TMI-1 approval at least 30 days prior to start of tendon surveillance and procedure must then be included in CONTRACTOR report.
> 3. CONTRACTOR's QA program shall be imposed on Testing Laboratory.

8.1.8 IF working in areas exposed to steam vents, verify plant is shut down.

8.2 Hoop and Dome Tendon Inspection

NOTE

Once inspection of a given tendon has started, it should be completed as soon as possible to avoid unnecessary exposure of anchorage head.

8.2.1 Protect roof surface as required prior to starting inspection.

8.2.2 Place platforms in position at ends of tendon to be inspected.

8.2.3 IF tendon inspection is not completed during a work shift, protect anchorage area and grease cans from exposure to moisture, dirt and any other potentially damaging materials.

8.2.4 Tendons shall be regreased (filled) within 30 days maximum after removal of an end cap.

8.2.5 Corrosion Protection System

a. Depressurize and remove end caps per 1410-Y-83. and PSC ISI Manual Procedure SQ 6.1.

b. Inspect for presence of free water in end cap and at anchorage area. per PSC ISI Manual Procedure SQ 6.1.

c. Enter inspection results on Data Sheet 9.

CAUTION

When removing grease to make visual inspection, ensure no damage to steel (by scratching) and no increase of corrosion effects occurs.

NOTE

Free water shall not be included in the grease sample (IWL-2525.1[a]).

d. Take a representative grease sample from each end anchorage of selected tendons.

e. When present, free water sample shall be taken where water is present in quantities sufficient for lab analysis. Record quantity of free water and request lab analysis for PH (IWL-2525.2[b]).

f. Have grease sample tested per Enclosure 3.

g. Verify sample meets acceptance criteria specified in Enclosure 3.

h. Remove and collect remaining bulk filler from tendon anchorage area using wooden or plastic scoops and cleanup using solvent and rags.

i. Record the total amount of bulk filler grease removed up until reinstallation of the end cap per the guidelines of 1410-Y-83.

8.2.6 Inspect Anchorage prior to Lift-Off test.

a. Perform VT-1 inspection of tendon anchorage assemblies and associated hardware (bearing plates, stressing washers, stressing shims, buttonheads, etc.) for signs of corrosion, cracks, missing wires, broken wires, and cracked buttonheads. If broken or damaged wires are detected, the tendon shall be detensioned and the wire removed for testing as specified in Section 8.2.9.

b. Perform VT-1C inspection of the concrete around tendon anchorage area, and for a distance of 2 feet extending outward from the bearing plate for crack width and general cracking pattern and for indications of abnormal material behavior.

c. Complete data sheets in Enclosure 6.

d. IF crack widths in concrete > 0.010" are identified, record and report to COGNIZANT MECHANICAL/STRUCTURAL ENGINEER for evaluation and resolution.

NOTE

Crack widths in concrete > 0.010" are potentially reportable per 10 CFR 50.72.

e. IF crack widths > 0.05" are identified, record and report to COGNIZANT MECHANICAL/STRUCTURAL ENGINEER for IMMEDIATE evaluation and investigation to determine amount of structural impairment upon containment structure and its continued integrity.

f. IF any condition not meeting acceptance criteria in Enclosure 6 is noted, document using sketches, photographs, etc. as applicable.

g. CONTRACTOR shall ensure TMI-1 has evaluated any out-of-specification condition prior to making condition inaccessible. A written evaluation will be provided to CONTRACTOR for his report.

h. Cracks ≥ 0.050" must be repaired after TMI-1 Engineering does an evaluation. Repair will be per 1440-Y-23, "RB Concrete Surface Crack Repairs".

8.2.7 Lift-Off Test

NOTE
In lieu of performing thread dimensional checks per this Procedure, it is acceptable to perform them in accordance with FSC ISI Manual Procedure SQ 7.1.

a. Perform dimensional check of threads on stressing ram adaptor and anchorhead per VM-TM-2485. Complete Data Sheet 8, indicating if major minor and pitch diameters for anchorage and stressing ram adaptor are:

1. CONFORMING AND ACCEPTABLE (C/A),
2. NONCONFORMING BUT ACCEPTABLE (NC/A), or

e. Record on Data Sheet 10 the number of revolutions of the anchorhead (if any) during uncoupling.

8.2.9 Remove Wire and Test

a. Perform VT-1 inspection of the detensioned tendon anchorage assembly for missing, broken, and/or damaged wires protruding from the anchorhead.

b. Record results on Data Sheets 1 and 2 in Enclosure 6 specifically noting any results observed after detensioning.

c. Remove a randomly selected wire that had been stressed prior to detensioning from each selected detensioned tendon listed in Enclosure 2, Table 2.

d. Also remove all broken or damaged wires (if any). Remove enough of each broken or damaged wire to allow tensile testing and visual examination to evaluate the cause of breakage or damage.

e. Follow procedure in Enclosure 4 and PSC ISI Manual Procedure SQ10.3 for testing and examining all removed wires and completing Data Sheets.

8.2.10 Retension Tendon

CAUTION
DO NOT exceed 80% of ultimate tensile stress (equivalent to a jack force of 1593 KIPS (for a tendon with 169 effective wires).

a. Retension both ends of a tendon approximately simultaneously, such that force difference between ends does not exceed 250 KIPS at any time during retensioning.

b. Prior to starting retensioning, complete Column 1 of Data Sheet 6 for each end of tendon by recording greater of:

(1) Force in Column 7 of Data Sheet 1 or 2, or

(2) Base force determined from applicable Force versus Time curve in VM-TM-2485.

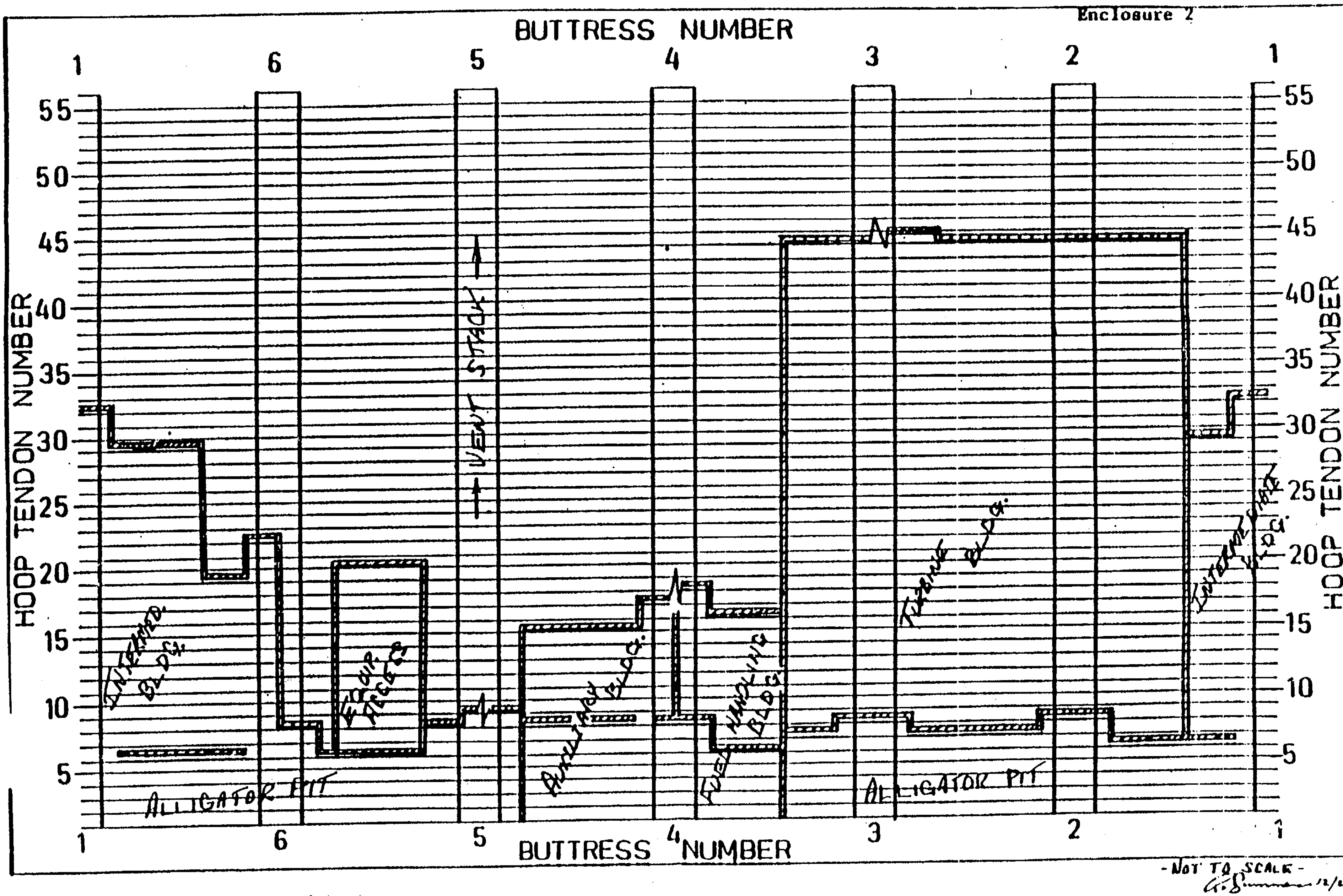
c. Verify Rows 2 through 6, 8, 9, 10 and 12 of Data Sheet 4 have been completed.

d. At each tendon end, stress tendon to gauge pressure recorded in Row 6 on Data Sheet 4.

e. Record ram extension in Row 7 of Data Sheet 4.

f. Stress tendon to gauge pressure recorded in Row 10 of Data Sheet 4.

Enclosure 2



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ANCHORAGE AND CONCRETE INSPECTIONS

A. NORMAL ANCHORAGE AND CONCRETE INSPECTIONS

1. PURPOSE

Visual inspection/documentation of physical condition of anchorage assembly components, i.e., buttonheads, washers, bearing plates.

2. LIMITS AND PRECAUTIONS

> **WARNING**
>
> **Each tendon wire is tensioned to nearly 8000 lb. DO NOT strike tendon end assembly with any metal object while tendon is tensioned. Avoid getting in a direct line with the tendon end while it is tensioned.**

3. PROCEDURE

NOTE
In addition to this Enclosure, utilize PSC ISI Manual Procedure SQ 8.0 to perform buttonhead inspections.

3.1 PRIOR TO LIFT-OFF TEST

3.1.1 Observe each tendon anchorage for buttonheads which are missing or which protrude. Document on Data Sheets 1, 2, 3, and 4 of this enclosure.

3.1.2 Check anchorheads for any sign of cracking or serious degradation. Cracks resulting in failure of anchorheads, have occurred at other plants. Before applying hydraulic ram the condition of each tendon anchorhead should be inspected to avoid potential personnel hazard. Notify Cognizant Mechanical/Structural Engineer immediately if degradation is noted. Be advised that this has been a problem at other plants in the past.

3.2 WHILE DETENSIONED, IF APPLICABLE

Inspect for buttonheads which protrude much farther than adjoining one. Make note of these on Data Sheet 4 of this enclosure to facilitate location (for reinspection after retensioning).

3.3 AFTER LIFT-OFF TEST AND, IF APPLICABLE, AFTER RETENSIONING

3.3.1 Inspect for buttonheads which are missing or which protrude. Document on the Data Sheet 1, 2, 3, and 4 of this enclosure.

3.3.2 Perform VT-1 inspection of buttonheads. Document cracks and damage using letter codes from Table 1, "CRITERIA FOR EVALUATING BUTTONHEAD DAMAGE".

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GPU Nuclear

TMI-1
Corrective Maintenance Procedure

Number F94 of 273
1410-Y-83

Title
RB Tendon End Cap Installation

Revision No.
5

Applicability/Scope
TMI-1 Division

Responsible Office
Analyst Sr., Mechanical

Effective Date
05/17/96

This document is within QA plan scope	X	Yes		No
Safety Reviews Required	X	Yes		No

PLANT MAINT.
(cm mgr.)

List of Effective Pages

Page	Revision	Page	Revision	Page	Revision	Page	Revision
1.0	5						
2.0	3						
3.0	1						
4.0	4						
5.0	3						
6.0	5						
7.0	3						
8.0	3						
E1-1	0						
E2-1	1						
E3-1	3						

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eb 8/25/99 eb 10/5/99
eb 9/1/99 eb 10/12/99
eb 9/7/99
eb 9/14/99
m 9/21/99

	Signature	Date
Originator	RM Pierce	5/7/96
Procedure Owner	RM Pierce	5/7/96
PRG	McA Nelson	5/13/96
Approver	RR Harper	5-10-96

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1.0 **PURPOSE**

1.1 This procedure provides guidance for the installation and/or modification of the tendon end caps on the TMI-1 Reactor Building.

2.0 **REFERENCES**

2.1 1002, "Rules for the Protection of Employees Working on Electrical and Mechanical Apparatus"

2.2 1440-Y-3, "Scaffold Construction/Inspection and Use of Extension Ladders"

2.3 CMR 93-035, "RB Tendon End Cap Modification"

2.4 1301-9.1, "Reactor Building Structural Integrity Tendon Surveillance"

2.5 1410-Y-11, "Threaded Piping and Fitting Maintenance"

3.0 **PLANT STATUS**

3.1 Operating or shutdown.

4.0 **PREREQUISITES**

4.1 Obtain Shift Supervisor/Shift Foreman permission prior to commencing this maintenance and request he specify any Tech. Spec. limitations or limitations due to plant operation applicable during performance of this procedure.

4.2 Initiate RWP if working in a radiologically controlled area.

4.3 If lifting and handling equipment is to be used, ensure rigging and lifting devices have been inspected/approved for use.

5.0 **LIMITS AND PRECAUTIONS**

5.1 Tendon end caps located in the vicinity of the Main Steam safety relief valve discharge stacks may not be worked on while the plant is at power.

5.2 Care should be exercised while working from scaffolds, platforms, ladders, high or restricted access locations. Respect for the safety and well-being of other personnel in the area must be observed.

5.3 During grease replacement the grease could be hot and direct contact with the grease should be avoided.

5.4 The grease could be under pressure. Remove plugs and nuts slowly to allow pressure, if any, to vent off.

5.5 Spilled grease could create a slipping safety hazard and damage roof surfaces. During all operations, it should be cleaned up and placed into waste containers.

5.6 Tendons located near hot MS or FW penetrations may contain hot, thin grease which makes end cap work more difficult and possibly hazardous. It may be preferable to work on those during a plant outage, if practical.

6.0 DESCRIPTION AND LOCATION OF SYSTEM/ASSEMBLY

6.1 The original RB tendon end cap design is as shown in Attachment 2.

6.2 The latest RB tendon end cap design is as in Attachments 3 and 4.

6.3 All tendon end caps are accessible from outside the Reactor Building. The end caps for the hoop tendons are located on both sides of each of six buttresses evenly spaced around the Reactor Building. The end caps for the dome tendons are located on the outside diameter of the dome. The vertical tendon end caps are located in the tendon access gallery under the RB wall and under the removable deck plates on top of the ring girder.

7.0 SPECIAL TOOLS. MATERIALS AND PERSONNEL QUALIFICATIONS

7.1 The supervisory personnel for administering the progress of this work and directing manpower shall be fit by skill, training and/or experience to implement this procedure.

7.2 The craft personnel responsible for the physical activities associated with this procedure shall be fit by skill, training or experience to perform their duties.

7.3 Miscellaneous hand tools.

7.4 Greasing Equipment (only required if end cap is being removed).

7.4.1 Come-alongs and associated rigging. The end caps weigh approximately 200# when filled with grease.

7.4.2 Drum belt heaters.

7.4.3 Hand pump for pumping hot grease from a 55 gallon drum.

7.4.4 Thermometer (calibrated) to measure replacement grease temperature 0-300°F).

7.4.5 Viscosity Oil Co. Visconorust 2090P-4 Casing Filler Grease.

7.5 Plastic bags, plastic sheeting, rags, buckets and drums for waste grease.

7.6 Solvent - for removing grease and cleaning equipment. (EPA 2000 is acceptable to GPUN).

7.7 Goodyear pliobond adhesive with brush top can or approved equal gasket cement. Commercial grade.

7.8 Spray galvanizing type paint made by LPS Research Laboratories, Inc. or approved EQUAL Commercial grade.

7.9 Modified 1 1/16" socket sets with body approximately 3" long in order to clear end cap hold-down studs on original type end cap hold-down configuration.

7.10 Cleaning rags.

7.11 Tendon End Cap fasteners, gaskets, and clamps.

7.11.1 Top Vertical End Cap Materials:

❶ Flat Under-Can Gaskets, 1 per end cap, SS # 286-110-0500-1 (Inland Ryerson Drawing No. 170WAC5) - 1/2 inch thick, closed cell neoprene, 17 1/2" O.D. (+1/16, -0) x 14 1/2" I.D. (+0, -1/16), Manufacturer - Rubatex Corp. or equal.

❷ Stud Gaskets, 4 per end cap, SS# 929-031-3000-1. 1/8 inch thick neoprene, 3/8" O.D. x 5/8" I.D. Manufacturer - J.D. Rohrback Company of Lancaster or equal.

❸ Belleville Spring Washers, 4 per end cap, SS# 929-030-6000-1. 5/8" standard, Manufacturer - Rolex Co. Hillside, NJ. or equal.

7.11.2 Bottom Vertical End Cap Materials:

❶ O-Ring Gaskets, 1 per end cap SS# 459-046-7500-1. 5/8" cross-section, 17 1/4" I.D., 60 - 80 durometer neoprene.

7.11.3 Hoop and Dome Tendon End Cap Materials:

❶ Flat Under-Cap Gaskets, 1 per end cap, SS# 286-110-0500-1 (Inland Ryerson Drawing No. 170WAC5) - 1/2 inch thick, closed cell neoprene, 17 1/2" O.D. (+1/16, -0) x 14 1/2" I.D. (+0, -1/16), Manufacturer - Rubatex Corp. or equal.

❷ End Cap Pipe Plugs, 4 per end cap, 1/2" NPT Galvanized.

❸ End Cap Pipe Plugs, 1 per end cap, 1/4" NPT Galvanized.

❹ Hold-Down Clamps, 4 per end cap, Ref. P.O. 0436005), Manufacturer - Precision Surveillance or equal.

❺ Hold-Down Bolts and Washers, 4 per end cap. 1" - 8UNC x 2 1/2" Galvanized.

❻ POP-A-PLUG, P/N PSC-0750-S, SSN 000-478-0820-1

❼ POP-A-PLUG Installation Tool

❽ Teflon tape thread sealant

8.0 PROCEDURE

General:

The RB tendon end caps may be installed in any one of the five following configurations depending upon which tendon group they are in:

❶ Preferred Configuration for Hoop and Dome (See Attachment 3) The cap is removed and the main gasket is replaced with the conventional Rubatex gasket, but the original through-cap mounting bolting is replaced with hold down clamps. A 1/4" vent plug is installed. The end cap is then filled with new filler grease.

❷ Alternative #1 for Hoop and Dome (See Attachment 3) Without removing the cap, hold down clamps are installed and the bolt holes are plugged. This method does not allow for the installation of a vent plug. No grease change is involved in this option.

❸ Alternative #2 (See Attachment 2) (Primarily used on the upper end of vertical tendons). This alternative makes no changes to the existing design. A Rubatex gasket and "thru-can" bolting are used.

❹ Alternative #3 (Used on vertical tendon lower end caps). This alternative makes no modifications to the existing design. An O-ring is installed in an end cap which bolts directly into the bearing plate.

8.1 On Data Sheet 1, record the tendon identity and the end of the tendon which is having its end cap installed. (Not used if a modification is being made without cap removal).

8.2 Initial installation of hold down clamps and plugging of bolt holes. (This step is only for the initial conversion to the hold down clamp configuration).

8.2.1 Using a 1"-8 UNC tap or thread chaser, clean up the four bolt holes in the base plate around the end cap.

8.2.2 With the end cap in position, install the four hold down clamps and tighten the bolts evenly (no torquing required). Metal-to-metal contact between the flange and the retaining plate, if installed, is desired (although due to irregularities in the end cap flange, this may not be achievable all the way around). When the Rubatex main gasket is installed, it should be evenly compressed to approximately 1/8" all the way around.

8.2.3 Slowly remove the grease inlet plug to vent off any pressure that may be present. Reinstall the plug after depressurization using teflon thread sealing tape on the threads.

8.2.4 If not already done, the four hold down stud holes are to be plugged. The preferred method of plugging is with Pop-a-plugs, however, 1/2" NPT plugs may be substituted.

CAUTION

To minimize grease loss, remove only one hold-down stud at a time, and be ready to plug it immediately.

8.2.4.1 Prior to installing a Pop-a-Plug, ensure that the hole in the can is free of gouges or scoring that would affect its ability to effect a seal.

8.2.4.2 Install the Pop-a-Plug in accordance with the manufacturer's instructions. Use <u>no</u> pipe sealant.

8.2.4.3 If unable to install a Pop-a-Plug, tap the hole to accept a 1/2" NPT Galvanized Pipe plug. Apply teflon tape and install the plug.

NOTE

Past experience has shown that it is easier to tap the bolt holes for the pipe plugs prior to removal of the end cap.

8.3 End cap removal. (For tendon inspection or for replacement of main gasket).

8.3.1 Vent off pressure as in 8.2.3, if not already done.

8.3.2 During the removal of the tendon end cap and until the reinstallation of the modified cap, keep track of the amount of grease lost or scrapped and record this amount on the data sheet for the tendon end cap being worked.

8.3.3 Remove the four end cap hold down nuts and washers. Pull the tendon end cap off and set it down in a secure location.

8.3.4 Remove the hold down studs from the anchorage if they exist. If a stud cannot be removed from the anchorage, the entire ring may be removed although it is preferable to leave the ring in place.

8.3.5 Clean and discard the old grease from the end cap and from the anchorage head and bearing plate as necessary to provide for proper placement of the new gasket or O-ring and retaining plate.

8.3.6 Clean and dry the gasket seating surface of the tendon end cap and bearing plate using Viscor Industrial NO. 16A solvent or other approved cleaner.

8.3.7 If not already installed, in the OD of the cap, approximately 6" from the flange and in line with the fill plug, drill and tap for a 1/4" NPT vent plug. Apply teflon tape and install plug. Note that the step is not applicable for vertical tendons.

8.4 Installation of replacement Rubatex Gasket preferred configuration for hoop and dome tendons.

8.4.1 Bond the Rubatex gasket to the face of the flange using pliobond.

8.4.2 Align the tendon end cap over the anchorage against the bearing plate using care to avoid damaging or misaligning the gasket which has been glued to the end cap flange.

8.4.3 Secure four tendon end cap hold down clamps with bolts and washers to the bearing plate holes and hand tighten them.

8.4.4 Recheck that the gasket has not slipped or become crimped and that the tendon end cap and hold down clamps are aligned properly.

8.4.5 Tighten each bolt, equalizing the load on each as much as possible, to evenly compress the Rubatex main gasket to approximately 1/8". (No torquing is required)

8.4.6 Heat grease to 120°F to 220°F using a calibrated thermometer to obtain temperature and record on Data Sheet 1.

8.4.7 For horizontal and dome tendons, attach a vendor supplied Y-device to the grease inlet of the tendon end cap and hand pump hot grease (120°F - 220°F) into the tendon end cap until it reaches a level 1 1/2" to 2" below the vent hole to allow for the expansion of the grease. Record grease information on Data Sheet 1.

8.4.8 Install the grease inlet plug and the vent plug and tighten them securely using an approved thread sealant.

8.4.9 Verify that no grease is leaking and record it on the data sheet. If leakage does exist, correct the deficiency.

8.5 Installation of Rubatex gasket with top vertical "through-can" bolting (Alternative #3)

8.5.1 Bond the Rubatex gasket to the face of the flange using Pliobond.

8.5.2 Align the tendon end cap over the anchorage against the bearing plate using care to avoid damaging or misaligning the gasket which has been glued to the end cap flange.

8.5.3 Install the four tendon end cap hold down nuts (with gaskets and conical washers) on the studs and hand tighten them.

8.5.4 Recheck that the gasket has not slipped or become crimped and that the tendon end cap is properly aligned.

8.5.5 Tighten each nut, equalizing the load on each stud as much as possible, to evenly compress the Rubatex main gasket to approximately 1/8". (No torquing is required.)

8.5.6 Refill the tendon end cap as in 8.4.6 through 8.4.9.

8.6 Installation of O-Ring gaskets on lower vertical tendons with bearing plate bolting (Alternative #3)

8.6.1 Bond the O-Ring gasket in place using Pliobond.

8.6.2 Align the tendon end cap over the anchorage against the bearing plate using care to avoid damaging or misaligning the O-ring which has been glued to the end cap.

8.6.3 Install the four tendon end cap hold down bolts and hand tighten them.

8.6.4 Tighten each bolt, equalizing the load on each bolt as much as possible, to evenly compress the O-ring main gasket. The flange should be pulled up tight against the bearing plate, although no torquing is required.

8.6.5 Refill the tendon end cap.

9.0 ACCEPTANCE CRITERIA

9.1 No grease leakage from the tendon end cap.

9.2 End cap verified to have an air space at the top to allow for expansion of the grease. (See 8.4.8)

9.3 The work area has been cleaned of all debris and grease spilled during the work process.

9.4 A data sheet (Attachment 1) is completed for each end cap that has had a grease change and is included in the work package. A copy of each data sheet is forwarded to the Lead Mechanical Engineer.

10.0 POST MAINTENANCE TESTING

10.1 Visual inspection to verify leak tightness.

11.0 ATTACHMENTS

11.1 Attachment 1 - Data Sheet 1

11.2 Attachment 2 - "Original Can Hold-Down Design"

11.3 Attachment 3 - "Tendon End/End Can Assembly Latest Design"

11.4 Attachment 4 - "Flat Rubatex Under-Can Gasket"

ATTACHMENT 1

Data Sheet 1

Regressing of RB Tendon End Caps

8.1 Tendon Identity:__________ Tendon End:__________

Date End Cap Removed: __________

8.3.2 Amount of grease removed: __________gallons

8.4.8 Replacement grease type: __________

8.4.8 Replacement grease temperature: __________°F

8.4.9 1 1/2" to 2" air space at top of can after filling (Initial) __________

8.4.9 Amount of grease replaced: __________gallons

10.0 P.M.T.: Sat__________ Unsat__________

Comments:__________

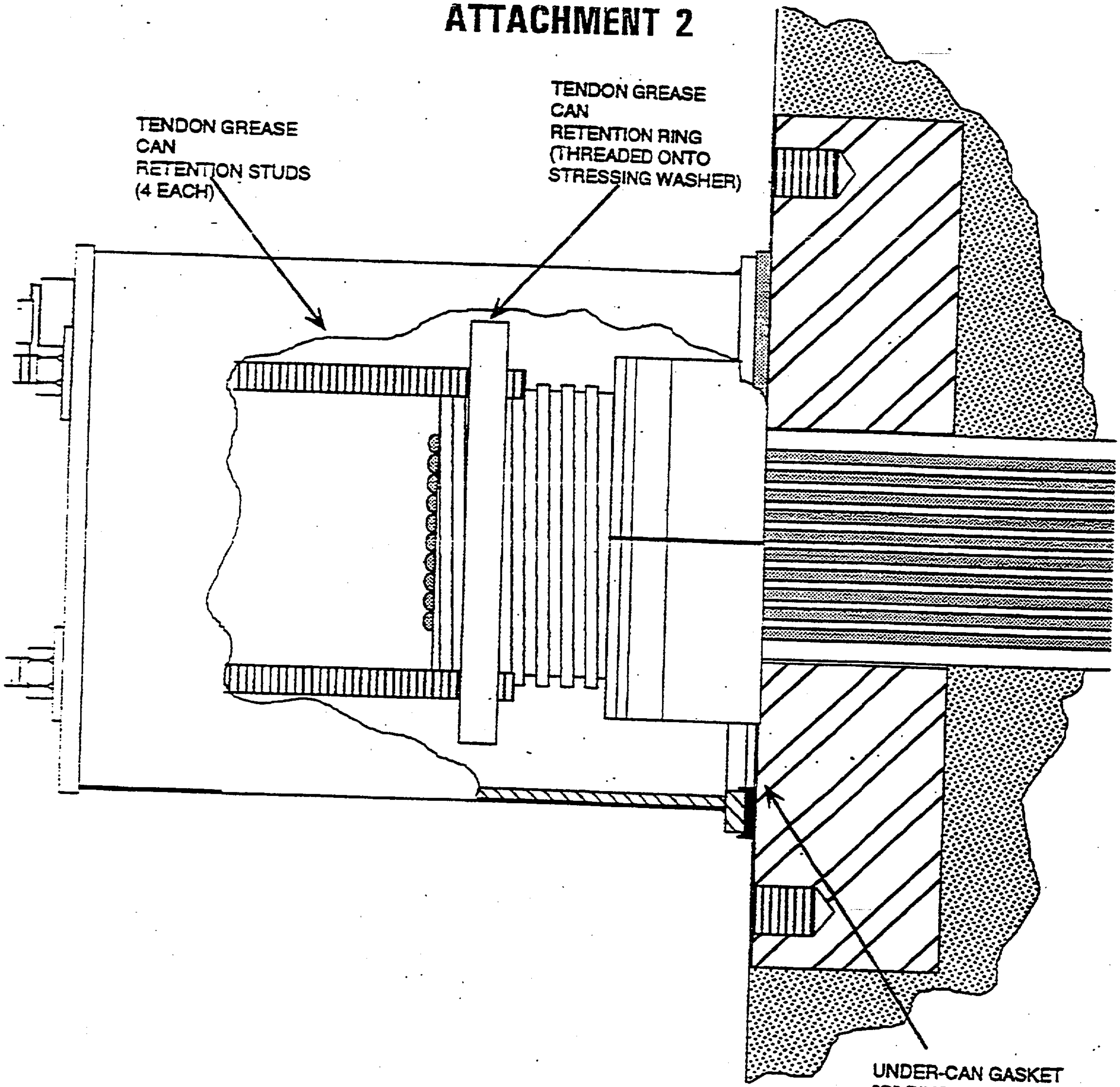
Calibrated Test Equip.:__________ Cal. Due Date:__________

Supervisor Signoff:__________ Date:__________

Attach filled out and signed copies of this data sheet to the Job Ticket Closeout Package for any end caps which have been removed/regreased.

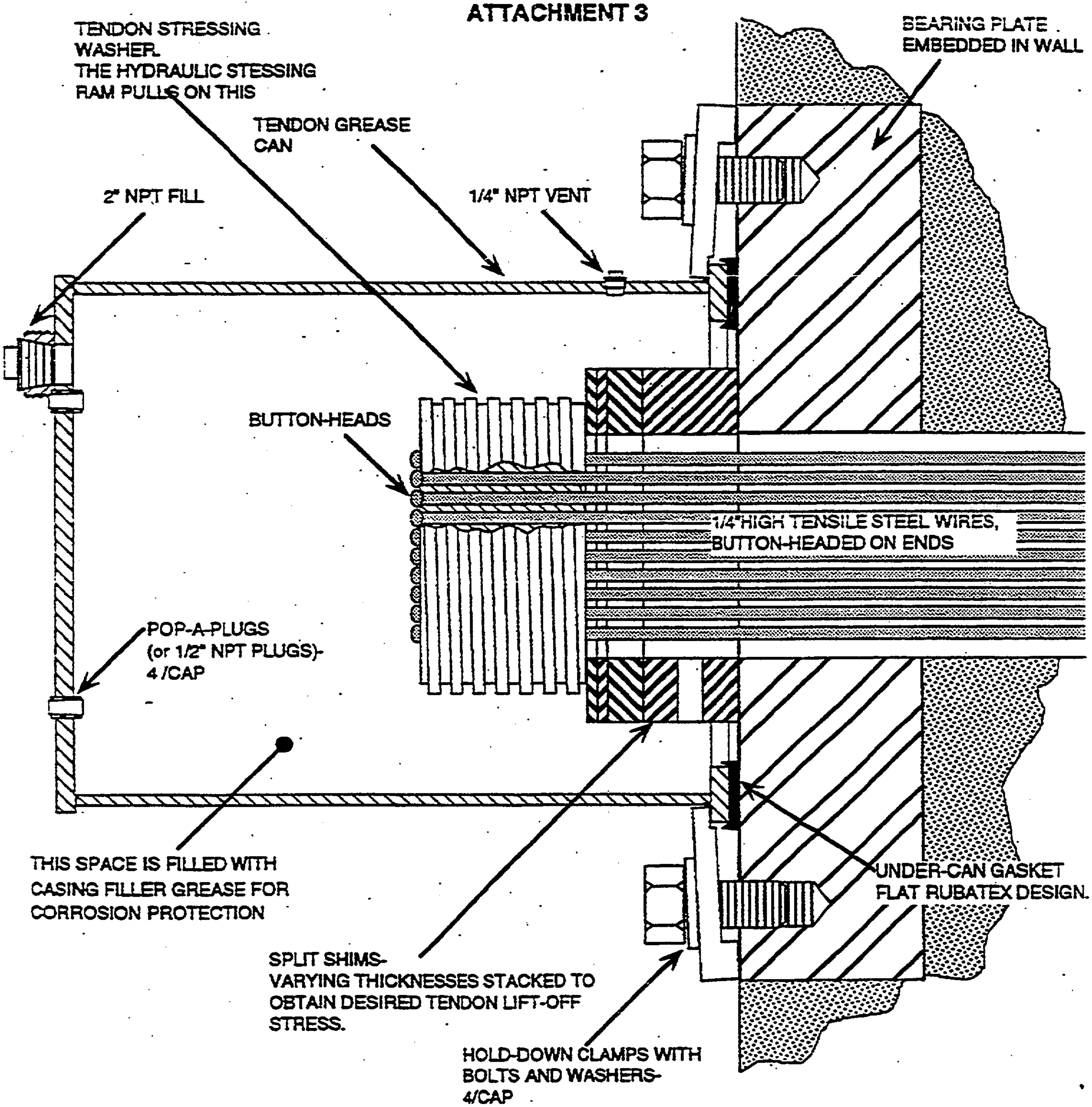
cc: Lead Mechanical Engineer

ATTACHMENT 2



ORIGINAL CAN HOLD-DOWN DESIGN

ATTACHMENT 3



TENDON END / END CAN ASSEMBLY LATEST DESIGN

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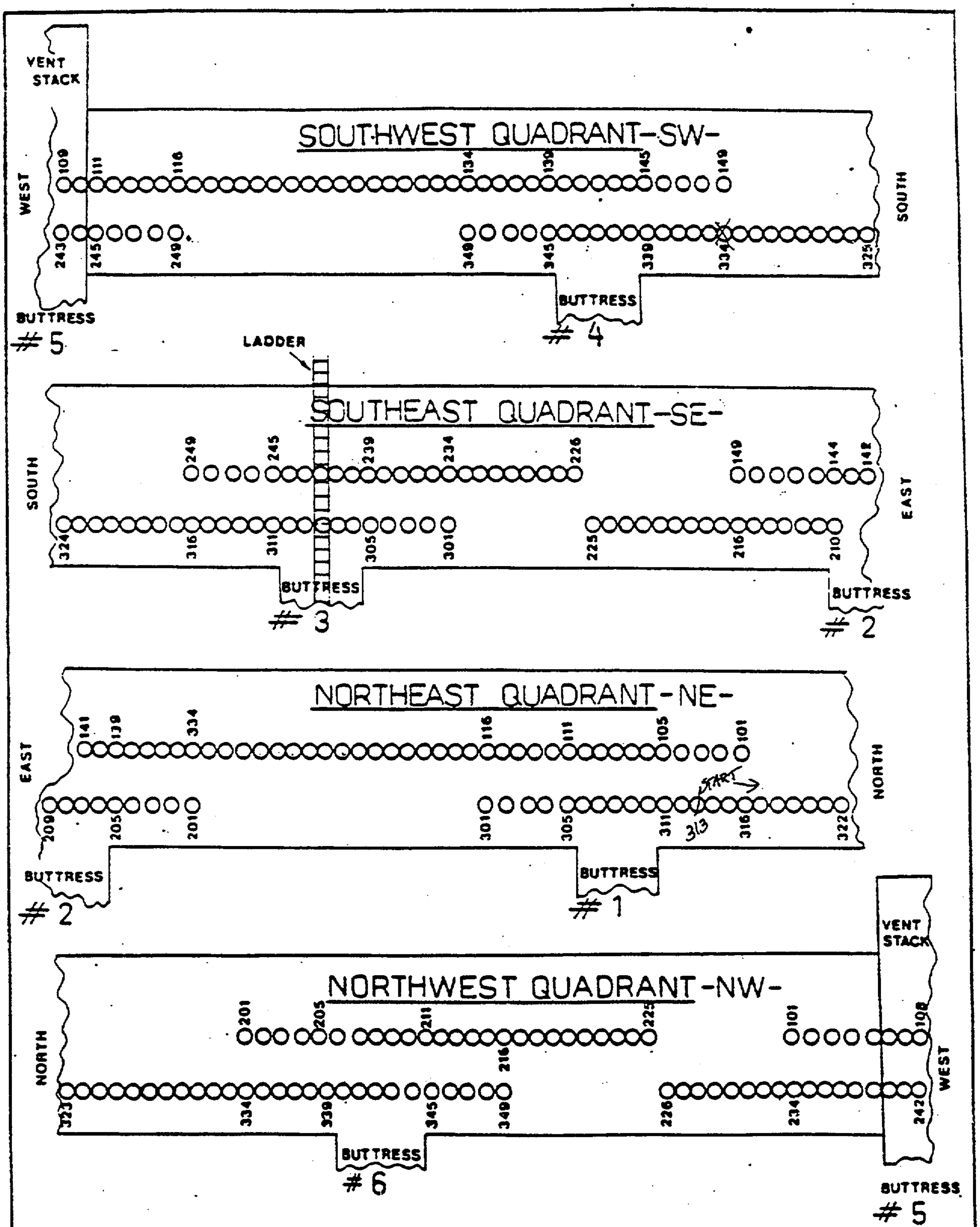
FOR INFORMATION ONLY

W. 8-16-99

LAYOUTS OF TENDON SYSTEM



NUMBERING SCHEME
DOME TENDON GREASE CANS

FIGURE 20

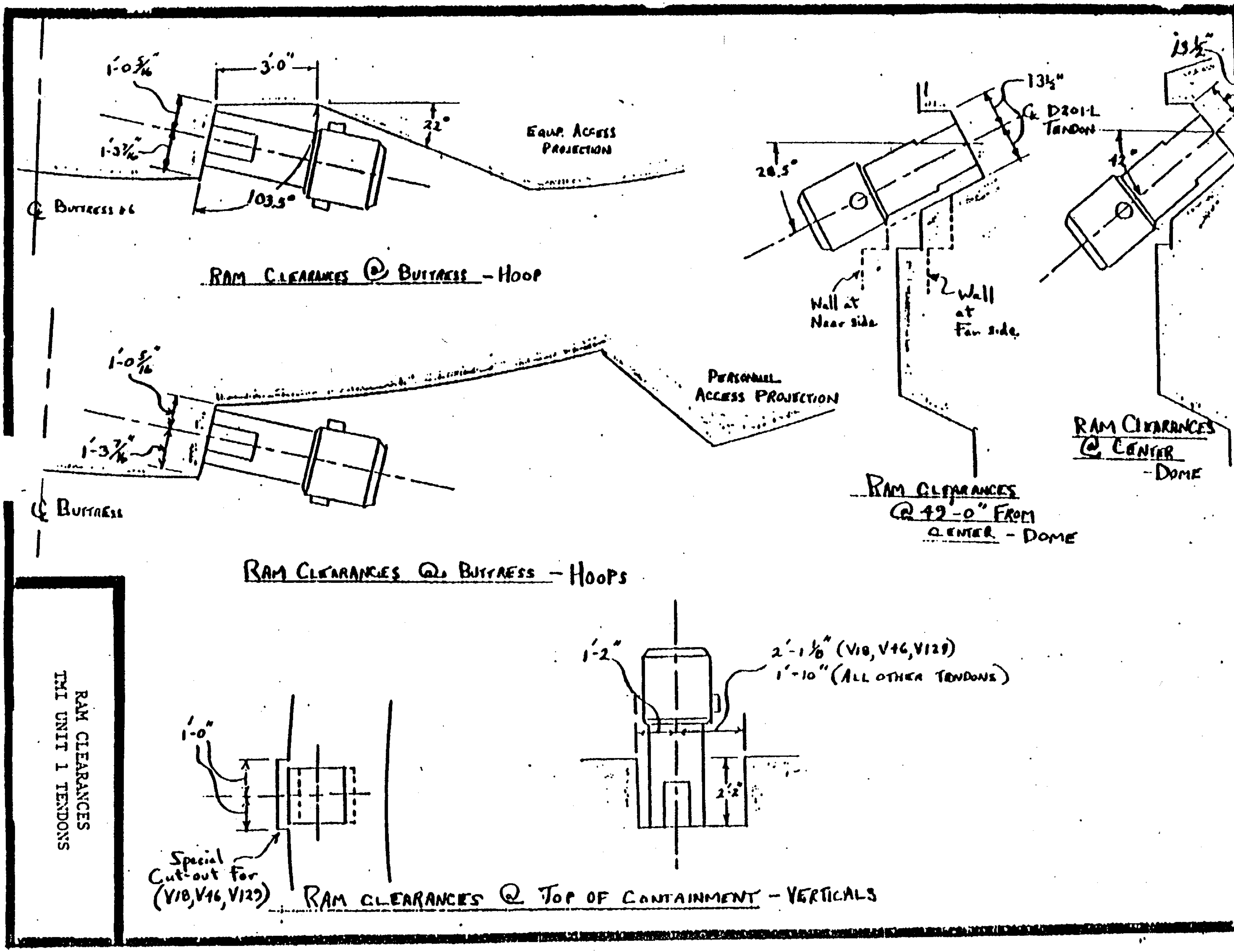

1'-0 5/16"
3'-0"
22°
1'-3 7/16"
103.5°
℄ Buttress #6
Equip. Access Projection
RAM CLEARANCES @ BUTTRESS - HOOP
13½"
℄ D201-L Tendon
28.5°
Wall at Near side
Wall at Far side
RAM CLEARANCES @ 49'-0" FROM CENTER - DOME
13½"
42°
RAM CLEARANCES @ CENTER - DOME
1'-0 5/16"
1'-3 7/16"
℄ Buttress
Personnel Access Projection
RAM CLEARANCES @ BUTTRESS - HOOPS
1'-0"
Special Cut-out For (V18, V46, V129)
1'-2"
2'-1 1/8" (V18, V46, V129)
1'-10" (ALL OTHER TENDONS)
2'-2"
RAM CLEARANCES @ TOP OF CONTAINMENT - VERTICALS
RAM CLEARANCES
TMI UNIT 1 TENDONS

Fig 7 of 273 3

SAFETY RELATED

PSC PRECISION SURVEILLANCE CORPORATION

IN-SERVICE INSPECTION MANUAL

FOR: GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
7th INSPECTION PERIOD

EFFECTIVE DATE 8-10-99

REVISION △0 8-10-99

△

△

CONTROLLED MANUAL NO.

PREPARED BY H. K. Hendrickson TITLE MGR, Q.A. DATE 8-10-99

APPROVED BY Paul C... TITLE Project Manager DATE 8-10-99

APPROVED BY Ronald Hough TITLE G.M. DATE 8-10-99

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Quality Assurance Section
3468 Watling Road
East Chicago, IN 46312
Attention: H. F. Hendrickson

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Project TMI-UNIT #1 I.S.I

Contract GPU #0741762
PSC # N6C9

In-Service Inspection Manual

Issue Date 8-10-99

Revision △

F1101/273

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C. The responsibility for keeping the uncontrolled Manuals up to date shall be incumbent on the person acknowledging receipt of the Controlled Manual.

D. Reproduction of the Manual <u>IS NOT AUTHORIZED</u> without the expressed written consent of the Precision Surveillance Corporation Quality Assurance Section responsible for the maintenance of the Manual.

E. Where required, uncontrolled manuals shall be submitted at the pre-bid stage of the project. In the event of non-award of the project to Precision Surveillance Corporation, the uncontrolled Manual shall be returned to the Quality Assurance Section.

F. <u>INTERNAL</u>
Those Precision Surveillance Corporation personnel receiving Controlled Manuals or revisions thereto, shall be responsible for reviewing and understanding those portions of the Quality Program that they and their subordinates are responsible for. The return of the Acknowledgement of Receipt shall constitute certification that the person receiving that Program/Revision has reviewed the contents and has taken appropriate action to notify or train those personnel under his control that are affected by that document or the revisions thereto.

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IN-SERVICE INSPECTION SURVEILLANCE PROGRAM INDEX STATUS SHEET	

SECTION	Pages	Original Issue		Revised Status	
		Rev.	Date	Rev.	Date
Title	1	0	8-10-99		
Receipt - To be returned	1	0	8-10-99		
Manual Control Policy	1	0	9-6-94		
Index Status Sheets	1 thru 3	0	8-10-99		
Revision Control Sheet	1	0	N/A		
Definitions	1 thru 3	N/A	N/A		
Safety Comments	1 thru 3	N/A	N/A		
SQ 2.0 - Scope	1 - 2	0	8-10-99		
SQ 6.1 - Inspect. F/Water	1 thru 6	0	9-6-94		
Data Sheet 6.1	1	0	9-6-94		
SQ 7.1 - Anchorage Meas.	1 thru 6	0	9-6-94		
Data Sheet 7.1	1	0	9-6-94		
Appendix 1	1	0	9-6-94		
Appendix 2	1-2	0	9-6-94		
Appendix 3	1 thru 5	0	9-6-94		
Appendix 4	1 thru 4	0	8-10-99		
SQ 8.0 - Buttonhead Data	1 thru 3	0	9-6-94		
Data Sheet 8.0	1	0	9-6-94		
SQ 10.3 - Testing of Wires	1 thru 5	0	9-6-94		
Data Sheet 10.3	1	0	9-6-94		
Figure D.1	1	0	9-6-94		
Figure D.2	1	0	9-6-94		
SQ 11.1 - Engineering Data	1-2	0	9-6-94		

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IN-SERVICE INSPECTION SURVEILLANCE PROGRAM
INDEX STATUS SHEET

SECTION	Pages	Original Issue		Revised Status	
		Rev.	Date	Rev.	Date
PSC QUALITY ASSURANCE PROCEDURES					
QA 1.0 - Program Purpose	1-2	0	9-6-94		
QA 2.0 - Program Scope	1-2	0	9-6-94		
QA 3.0 - Organization	1-2	0	9-6-94		
QA 4.0 - QC Responsibility	1-2	0	9-6-94		
QA 4.1 - Qualifications	1-2	0	9-6-94		
QA 5.0 - Training	1-2	0	9-6-94		
QA 6.0 - Procurement	1-2	0	9-6-94		
QA 7.0 - Field Change Request	1 thru 3	0	9-6-94		
FCR Form	1	N/A	N/A		
FCR Index Log	1	N/A	N/A		
QA 8.0 - Document Control	1-2	0	9-6-94		
QA 8.1 - Revision Control	1 thru 5	0	9-6-94		
Revision Control Sheet	1	0	9-6-94		
QA 9.0 - Nonconformances	1 thru 7	0	9-6-94		
Tags and Sample Logs	1	0	9-6-94		
Sample NC/CA Report	1	0	9-6-94		
NC/CAR Form	1	N/A	N/A		
NCR Index Form	1	N/A	N/A		
Hold Tag Log Form	1	N/A	N/A		
Reject Tag Log Form	1	N/A	N/A		
QA 10.0 - Calibrations	1 thru 6	0	9-6-94		
QA 10.1 - Calibration Verification	1 thru 5	0	9-6-94		
Gauge Calib. Record Form	1	N/A	N/A		
QA 11.0 - Inspections	1 thru 3	0	9-6-94		
QA 12.0 - Audits	1-2	0	9-6-94		

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SECTION	Pages	Original Issue		Revised Status	
		Rev.	Date	Rev.	Date
PSC CALIBRATION PROCEDURES					
Q 12.2 - General	1-2	0	9-19-86		
Q 12.5 - Calibration Recall	1	0	9-19-86		
Q 12.8.B-W - Micrometer	1-2	0	6-17-87		
Calibr. Form - Exhibit A	1	N/A	N/A		
Calibr. Record - Exhibit B	1	N/A	N/A		
Q 12.8.C-W-- Pressure Gauge	1 thru 3	0	6-17-87		
Calibr. Form - Exhibit A	1	0	N/A		
Calibr. Record - Exhibit B	1	0	N/A		
Q 12.8.D-W - Thermometers	1	0	6-17-87		
Thermometer Calib. Record	1	N/A	N/A		
Calibr. Record - Exhibit B	1	N/A	N/A		
Q 12.8.E-W - Feeler Gauge	1-2	0	6-17-87		
Calibr. Form - Exhibit C	1	N/A	N/A		
Calibr. Record - Exhibit B	1	N/A	N/A		
Q 12.8.F - Dail Incicator	1-2	0	9-19-86		
Calibr. Form - Exhibit C	1	N/A	N/A		
QA 12.8.G-W - Rams	1 thru 5	1	6-28-90		
Ram/Jack Calibration Record	1	N/A	N/A		
Appendix 1 - Linear Regr.	1 thru 4	1	6-28-90		
Appendix 2 - Sample Printout	1-2	N/A	N/A		
QA 12.8.K - Hardened Wire Gauges	1 thru 6	0	5-01-87		
Calibr. Form QA 12.8K	1	N/A	N/A		
Calibr. Record - Exhibit B	1	N/A	N/A		
QA 12.8.L - Pee Dee Wire Gauges	1-2	0	5-01-87		
Calibr. Form - Exhibit C	1	N/A	N/A		
Calibr. Record - Exhibit B	1	N/A	N/A		
QA 12.8.N - Bar Standards	1-2	0	5-01-87		
Calibr. Form - Exhibit C	1	N/A	N/A		
Calibr. Record - Exhibit B	1	N/A	N/A		
QA 12.8.P - Optical Comparator	1 thru 4	0	9-19-86		
Calibr. Form - Exhibit C	1	N/A	N/A		
Calibr. Record - Exhibit B	1	N/A	N/A		

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REVISION CONTROL SHEET

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REVISED PROCEDURES/CRITERIA

Procedure No.	Pg. No.	Rev. Date	Sub. Dt.	Procedure No.	Pg. No.	Rev. Date	Sub. Dt.	Procedure No.	Pg. No.	Rev. Date	Sub. Dt.
		△				△				△	

Revision being submitted at this time

Page Number of Rev. Con. Sheet

Procedure/Criteria number being revised

Date of submittal of this revision

Page number of revision

Revision number (Current Status)

Date of revision

When revisions are provided for this Manual, this page will be used to show all the documents being submitted for approval, which will bring this Manual to a current status.

The pages supplanted by this revision shall then be removed and appropriately disposed of.

Revision number to this Manual

Date of the revision to this Manual

Description of or reason for revision

Date the revision is approved

Initials of authority making this revision

No.	Date	Revision	By	Date Appd.	No.	Date	Revision	By	Date Appd.
△					△				
△					△				
△					△				
△					△				

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ANCHORAGE

The combination of components of the tendon that retain the elongation and distribute the force of the tendon.

ANCHORHEAD (Stressing Washer)

The round machined steel piece at the end of the tendon through which the tendon wires are passed and upon which the buttonheads bear.

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.

BUTTONHEAD

The upset portion at the end of the tendon wire, which seats on the anchorhead.

CORROSION PROTECTION COMPOUND Grease, Casing Filler)

A blend of waxes and oils used to fill the tendon void with the tendon in place which acts as a corrosion preventative.

ELONGATION

The distance a tendon/wire stretches when being stressed.

GREASE CAN (Architectural Cap)

Steel container bolted to the bearing plate. A grease can encases the anchorage assembly to provide permanent corrosion protection.

GUTS

Term used to designate the minimum Guaranteed Ultimate Tensile Strength of the wire or tendon and is meant to be no less than 240,000 pounds per square inch or 11,781 pounds for a 1/4" (0.25") diameter wire.

JACK (Ram)

A cylindrical, hydraulic device used to stress the tendon. Also referred to as a "Ram".

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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.

LIFTOFF

That force or pressure that is required to lift the anchorhead off the shim stack and representative of the force in that tendon.

LOCKOFF

That point where the force or pressure is transferred to the shim stack. A force slightly less than liftoff.

MONITORING OF FORCE

That series of operations that determine the force or pressure remaining in the tendon.

OVERSTRESS

A point of force in wire specification ASTM A421, that is approximately equal to the yield strength of the wire or 80% of the minimum Guaranteed Ultimate Tensile Strength of the wire or 9,425 pounds for a 1/4" diameter wire.

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, Void)

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, void.)

SHIMS

Steel plates upon which the stressed anchorhead rests transmitting the force of the tendon wires through the bearing plate into the concrete.

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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.

TENDON

The bundle of wires assembled together with anchorheads.

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, anchorages and wire.

TENDON LOCATION NUMBER

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

WIRE

1/4" diameter wire manufactured to ASTM A421.

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1. PURPOSE

The purpose of this document is to create an awareness for those safety considerations that must be observed by those personnel working around or directly involved in Post-Tensioning System operations.

2. GENERAL

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. SAFETY

3.1. WIRE

The wire used for fabricating the tendons has a minimum breaking strength of 240,000 pounds per square inch. This means that each 1/4 inch diameter wire is capable of withstanding a minimum breaking load of 11,781 pounds per wire. Multiply this by the number of wires in a tendon and you are dealing with forces in excess of 1 million pounds for a 90 wire tendon and in excess of 2 million pounds for a 170 wire tendon.

3.1.1.

CAUTION

NEVER CONNECT A WELDING GROUND, PERFORM WELDING ON, OR STRIKE AN ARC NEAR A STRESSED TENDON.

NEVER APPLY AN OPEN FLAME OR LIGHTED TORCH TO THE BUTTONHEADS, THE WIRES OR ANCHORAGES OF A STRESSED TENDON.

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

3.1.1.1. The above actions could cause a buttonhead or wire to fail. During tendon tensile testing, broken wires or buttonheads have been observed to penetrate hard lumber in excess or 4 inches in thickness, about the equivalent of a .32 caliber bullet.

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3.2. STRESSING OPERATIONS

During detensioning or stressing operations the following cautions shall be observed.

3.2.1.

CAUTION

NEVER EXCEED THE OVERSTRESS FORCE OR PRESSURE - 80% OF TENDON GUTS FOR THE AMOUNT OF EFFECTIVE WIRES IN A TENDON.

3.2.2.

CAUTION

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

KEEP FINGERS OUT OF ANY PINCH AREAS.

BE ALERT DURING SHIM PLACEMENT AND REMOVAL.

3.3. STRESSING ADAPTOR (COUPLER)

Prior to applying ANY FORCE to the tendon, the stressing adaptor, coupler, must be fully engaged with the anchorage to be stressed or detensioned. No more than 3/8 of an inch of the anchorage shall protrude beyond the bottom face of the stressing adaptor, to constitute full engagement.

3.3.1.

CAUTION

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

3.4. ANCHORAGE ENGAGEMENT

During coupling and uncoupling of the stressing adaptor with the bushing and the small anchorhead, and especially where some difficulty is encountered with the actually coupling, there is a possibility that the small anchorhead may become partially or completely unthreaded from the bushing. Therefore, where any difficulty has been encountered in coupling the adaptor to any anchorage, especially where repeated thread-on and unthreading is noted, before any load or jacking force is applied to that tendon, the proper engagement of the shop anchorhead to the bushing shall be checked. This shall be done by visually verifying that the small anchorhead does not protrude beyond the bottom face of the bushing. The uncoupling could occur as a result of tight, sticking or slightly damaged threads.

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3.4.1. ______

CAUTION

BE SURE THAT THE SMALL ANCHORHEAD REMAINS FULLY ENGAGED WITH THE BUSHING.

______

3.5. GREASING OPERATIONS

During greasing operations the grease may be pumped under pressure and may have temperatures in excess of 150^0F and injury could occur through carelessness. It is therefore essential to avoid direct contact with the hot grease and to make sure all connections are secure.

3.5.1. ______

CAUTION

DURING GREASING, BE AWARE THAT THE GREASE IS HOT AND MAY BE PUMPED UNDER PRESSURE.

______

3.6. CONSTRUCTION SAFETY

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.

3.6.1. ______

CAUTION

DO NOT STAND UNDER LOADS WHILE STATIONARY OR DURING HOISTING.

DO NOT PERMIT OTHERS TO STAND UNDER LOADS.

DO NOT THROW OR DROP OBJECT FROM THE SCAFFOLD.

______

3.7. If there are any doubts or questions concerning a point of operation, safety or quality, refer to PSC Construction or Quality Control personnel before starting that operation or proceeding any further.

GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

SURVEILLANCE SCOPE

Prepared by H. F. Hendricksen	Title MLL, Q.A.	Date 8-10-99
Approved by Paul C[illegible]	Title Project Manager	Date 8-10-99
Approved by R. D. Hough	Title G. M.	Date 8-10-99

1. SCOPE - UNIT 1

1.1. The required Inspections, Testing and evaluations for the 7th. Inspection Period of the Post-Tensioning System of the Three Mile Island - Unit 1 Nuclear Power Plant shall be performed for the tendons and types of activities as shown or referenced in GPU Procedure 1301-9.1.

GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

INSPECTION FOR WATER IN THE TENDON VOID, IN THE GREASE CAN AND AROUND THE TENDON ANCHORAGE

Prepared by H. F. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R. Hough Title GEN. MGR. Date 9-6-94

Approved by Thomas J. Dobrowski Title MGR., ENG. Date 9-6-94

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1. PURPOSE

This procedure will establish the requirements for performing an inspection of the Post-Tensioning Tendon System for evidence of water during the scheduled In-Service Inspection of the Tendon System of Three Mile Island - Unit 1.

2. SCOPE

This procedure will be limited to performing and documenting the inspection for water from the tendon void or around the tendon anchorage assembly, including the grease can. This inspection shall be performed just prior to removal of the grease can and during the physical inspection of the tendon anchorage assembly.

3. RESPONSIBILITY

As stated in PSC Procedure QA 4.0.

4. QUALIFICATION

As stated in PSC Procedure QA 4.1.

5. EQUIPMENT

5.1. CONSTRUCTION

No special equipment is required. It is expected that this inspection take place as part of procedure 1301-9.1, Tendon Anchorage Areas Moisture/Free Water Inspection or RB Tendon End Cap Installation procedure 1410-Y-83.

5.2. QUALITY CONTROL EQUIPMENT

5.2.1. Suitable quantities of clean, unused non-metallic containers for obtaining water samples.

5.2.2. Clean unused rags or wipers.

5.2.3. Indelible permanent marking devices and/or labels for the sample containers.

5.2.4. Flashlights and batteries.

5.2.5. Pens; Markers; Data Sheets; Tendon Inspection List.

6. PRECAUTIONS

Review the Safety Comments provided in the Surveillance Program Quality Control Manual for the following items that shall apply both for tendon force control and personnel safety.

6.1. Section 3.1: Tendon Wire Breaking Strength

6.2. Section 3.2.2: Personnel Safety

6.3. Section 3.6: Construction Safety: Personnel Safety

6.4. A tendon grease can weighs in excess of 90 pounds and may contain about 100 pounds of grease. Be prepared to support this weight when the grease can is unbolted and removed.

6.5. The sheathing filler, grease, may be in liquid, gel or solid form. Tendons in the area of steam or feed penetrations in operating plants, may contain hot grease and some caution should be exercised. It is not necessary to drain all the grease from a tendon void and is to be avoided, if possible.

6.6. CAUTION - **NEVER STRIKE THE BUTTONHEADS, THE WIRES, OR THE ANCHORAGES OF A STRESSED TENDON WITH A HAMMER OR ANY OTHER OBJECT.**

6.7. Have sufficient quantities or sizes of containers on hand to catch the grease, as it may fall from the tendon void, anchorage or grease can.

6.8. **IF AT ANY TIME A CRACKED OR BROKEN ANCHORHEAD IS DETECTED AS A RESULT OF THESE INSPECTIONS, ALL WORK SHALL STOP. ALL PERSONNEL SHALL BE MOVED AWAY FROM THAT AREA. THE PSC CONSTRUCTION SUPERVISOR SHALL BE NOTIFIED. THE WORK AND/OR INSPECTIONS SHALL CONTINUE AFTER A SAFETY EVALUATION HAS BEEN MADE AND ONLY AT THE DIRECTION AND CONTROL OF THE PSC CONSTRUCTION SUPERVISOR AND THE RESPONSIBLE ENGINEER REPRESENTING GPU NUCLEAR CORPORATION DURING THE THREE MILE ISLAND - UNIT 1 IN-SERVICE INSPECTION.**

7. QUALITY CONTROL

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 6.1.

7.1. The Quality Control Inspector shall be responsible for properly identifying any water samples that may have been collected. The Inspector shall also be responsible for controlling those samples until they are turned over to the Owner or his agent or sent out for testing.

8. PREREQUISTES

8.1. QCD- Document the tendon identification, tendon end , buttress number, unit number and other information on Data Sheet 6.1.

8.2. Provide support for the Grease Can. Be prepared to catch any grease that may fall during loosening and removal. Be aware that a steel gasket retainer rests between the bearing plate and the grease can and could cause injury or damage by falling out once the bolts are removed.

8.3. Care shall be exercised to avoid splashing or spilling grease on concrete and other surfaces. Spilled grease shall be removed and cleaned using Viscosity Oil, Viscor #16 industrial solvent or equivalent. It may be advantageous to tape plastic sheeting around the bearing plate and concrete to lessen the effect of spilled grease.

8.4. This inspection will be performed as a prelude to the removal of the grease can. It is expected that all the tools and preparation for the removal of the grease can will be in place or have been performed. As the main purpose of this procedure is to detect the presence of water in the tendon void, the Inspector shall be afforded access to the tendon during loosening of the grease can bolts to see if water is in evidence.

9. <u>GREASE CAN REMOVAL</u>

If upon removal of the grease can, it is determined that the anchorhead is broken, all work shall stop on that tendon and all personnel shall leave the area of the tendon. The PSC Construction Supervisor and the Responsible Engineer of the Owner or his agent shall determine the seriousness of this event and evaluate the feasibility and safeness of continuing operations on that tendon.

9.1. Position platform, as required, at the end of the tendon to be inspected.

9.2. Place a container and/or a protective cover under the tendon grease can to protect adjacent areas from dripping grease.

9.3. Have a clean dry plastic container available for catching water samples.

9.4. As the main purpose of this procedure is to determine the presence of water in the grease can or around the anchorhead, the Inspector shall be alert to obtain samples of that water as the can is loosened and removed and to estimate the quantity detected.

9.4.1. QCD- Document the quantity of water detected and if a sample was collected.

9.5. Remove the bolts holding the grease can to the bearing plate. The grease can must be fully supported as the bolts are being removed. Care should be taken when removing the end cap since the bulk filler may drop off or drip as a liquid of medium viscosity. Allow the Inspector the opportunity to obtain water samples, if any water is present.

9.6. <u>CAUTION</u> - **BE PREPARED TO SUPPORT THE GREASE CAN. IT MAY WEIGH UP TO 200 POUNDS.**

9.7. Carefully remove the grease can to avoid spilling the contents. The Inspector shall inspect the interior of the can for the presence of water and if possible collect a sample of that water.

9.7.1. QCD- Document the quantity of water detected and if a sample was collected.

9.8. Inspect the tendon anchorage assembly, shims, bearing plate, anchorhead and buttonheads for the presence of water.

9.8.1. QCD- Document the quantity of water detected and if a sample was collected.

9.9. Work shall continue for the In-Service Inspection as regularly scheduled or as required by the Procedures in the Surveillance Program Quality Control Manual.

9.10. The next point that water could be encountered would be during or just after Detensioning the Tendon. Therefore, the Inspector shall be especially vigilant during this portion of the In-Service Inspection to detect the presence of water. Inspect for the presence of water during or after Detensioning the Tendon.

9.10.1. QCD- Document the quantity of water detected and if a sample was collected.

10. DISTINGUISHING CHARACTERISTICS

The quantity of water observed in or on the tendon during the In-Service Inspection is important from the standpoint of the Corrective Action which could be required by the Owner or his agent. The quantity could vary from condensation, wetness without running off, to that condition where water pours out from the tendon void. The following terms will be used to describe the condition of moisture that will be reported to the Owner or his agent.

10.1. OBSERVABLE MOISTURE

"Observable Moisture" is defined as that quantity of water which has been immediately observed by the Inspector to be concentrated, collected or draining out from the grease can or tendon anchorage assembly. While this is intended to describe that moisture condition associated with condensation, it could be present in quantities of less than 8 ounces.

10.2. SIGNIFICANT MOISTURE

"Significant Moisture" is defined to be a quantity of water 1/2 pint (8 ounces) or more which has collected, concentrated or observed to be draining out of the tendon anchorage assembly or grease can. This quantity is considered to be from a condition other than water formed through condensation.

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11. NOTIFICATION

The Owner or his agent shall be formally notified when water, regardless of quantity, has been detected during the In-Service Inspection. This Notification shall define the condition detected referencing Section 10 of this Procedure and the specific quantity detected.

11.1. The Owner or his agent shall be responsible for any corrective action and/or Notification of the NRC should that be required.

11.2. The work and inspection shall continue until completed or formal notification by the Owner or his agent halt the work at some agreed on point.

12. SAMPLE RETENTION/TESTING

The samples shall be temporarily retained by the PSC Quality Control Inspector until such time that the method of testing can be determined or the samples are turned over to the Owner or his agent.

12.1. QCD- Verify that the water samples are adequately identified.

12.2. QCD- Document the location of storage for the samples.

13. DOCUMENTATION

The items in this procedure requiring documentation shall be documented on Data Sheet 6.1.

13.1. The Data Sheet references the applicable section number of the procedure for each QCD Point.

14. ATTACHMENTS

14.1. Data Sheet 6.1.

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PROJECT: THREE MILE ISLAND ________ DATE: ________

TENDON NO.: ________ TENDON END/BUTTRESS NO.: ________ SURVEILLANCE 6TH

OTHER TENDON END LOCATION INFO ________

(9.4) DURING LOOSENING OF GREASE CAN

(9.4.1) Water Detected Yes No Quantity ________ Sample Taken Yes NO

Comments ________

(9.7) IN GREASE CAN

(9.7.1) Water Detected Yes No Quantity ________ Sample Taken Yes NO

Comments ________

(9.8) AROUND TENDON ANCHORAGE

(9.8.1) Water Detected Yes No Quantity ________ Sample Taken Yes NO

Comments ________

(9.10) DURING DETENSIONING

(9.10.1) Water Detected Yes No Quantity ________ Sample Taken Yes NO

Comments ________

(11.) OWNER/AGENT NOTIFIED Yes No Date ________

CONDITION: OBSERVABLE ________ SIGNIFICANT ________

(12.1) SAMPLES ADEQUATELY IDENTIFIED Yes NO

(12.2) SAMPLES STORED AT ________

QC Signoff ________ Level ________ Date ________

QC Review ________ Level ________ Date ________

Title ________

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GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

THREAD MEASURING OF POST-TENSIONING ANCHORAGES

Prepared by H.F. Hendrickson Title MGR., Q.A. Date 9-6-94
Approved by R. J. Hough Title GEN. MGR. Date 9-6-94
Approved by Thomas J. Dobrowski Title MGR., ENG Date 9-6-94

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1. PURPOSE

This procedure will be used as the means of measuring anchorage thread diameters to assure that the external threads of a tendon anchorage meet a minimum strength requirement of 110% of the minimum Guaranteed Ultimate Tensile Strength (GUTS) of a tendon, when coupled with a specific Stressing Adaptor. Refer to Section 5.6 of this Procedure for those anchorages that may be excluded from measurement.

2. SCOPE

This procedure shall address only those anchorages that have a 4 pitch stub ACME Thread (Class 2G). The anchorage material shall be a Grade 4140 steel, heat treated to a Brinell Hardness of 355 to 401. Furthermore, this procedure shall be limited to those anchorages of tendons to be monitored or detensioned for retensioning.

2.1. If the anchorage material is not of the type mentioned above, then the thread strength prediction equations shall be adjusted accordingly by the PSC Engineering Department.

3. RESPONSIBILITY

A PSC Quality Control Inspector or designee shall be responsible for taking thread measurements. The PSC Manager of Engineering, or his designee, shall be responsible for generating tables listing allowable external thread diameters for a specific Stressing Adaptor.

4. DOCUMENTATION

All measurements shall be recorded, signed and dated by the Inspector on the form provided with this procedure. The only Hold Point in this procedure is the acceptability of the measurements and acceptable match up with a stressing adaptor.

4.1. QCD- All measurements, gauge identification and calibration status shall be documented on Data Sheet 7.1 as required.

5. MEASURING INSTRUMENTS

The following instruments shall be necessary for thread measurements.

5.1. Standard Outside Measuring Micrometer capable of reading to 0.001" or better.

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5.2. Standard Inside Measuring Micrometer capable of reading to 0.001" or better.

5.3. Special Pitch Diameter Go and No-Go Thread Plug Gauges.

5.4. A set of three hardened standard stub ACME thread wires (diameter 0.129" to 0.162").

5.5. Shims, used in the three-wire method of measurement.

5.6. MEASUREMENT EXCLUSION

It shall not be necessary to remeasure those anchorages that have never been used in an In-Service Inspection since the original installation and where the Inryco preinstallation fabrication measurements are available.

6. MEASURING THREAD DIAMETERS

Two readings in perpendicular directions shall be taken for each thread measured. A centering head and rule should be used to assure that the readings are perpendicular to each other. Crayon or soapstone can be used to mark locations, but care should be taken so as not to place the marks exactly where readings are taken, which would interfere with the accuracy of the measurements.

6.1. EXTERNAL MAJOR DIAMETERS

External Major Diameters shall be measured for the 3rd, 6th and 9th threads. Measurements shall be made with an Outside Micrometer as shown in Figure 1 of Appendix 1.

6.1.1. The Major Diameter is given directly by the micrometer reading.

6.2. EXTERNAL PITCH DIAMETERS

External Pitch Diameters shall be measured for the 3rd and 9th threads. Measurements shall be made with an Outside Micrometer and three stub ACME thread wires of equal diameters as shown in Figure 2 of Appendix 1. Standard stub ACME thread wires of diameters ranging from 0.129" to 0.162" shall be used. Wire diameters shall be selected such that: (1) the wire rests on the tapered sides of the thread, not on the root flat, and (2) the wire protrudes beyond the crest of the thread as shown in Figure 2 of Appendix 1.

6.2.1. The Pitch Diameter Constant dimension shall be determined from Appendix 2 for the wire diameter used. The shim thickness shall be added to the constant and the total subtracted from the micrometer reading to give the pitch diameter.

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6.3. EXTERNAL MINOR DIAMETERS

External Minor Diameters shall be measured for the 3rd and 9th threads. Measurements shall be made with an Outside Micrometer and three wires of equal diameters as shown in Figure 3 of Appendix 1. Wire diameter shall be selected such that: (1) the wire rests on the root flat, not on the tapered sides of the thread, and (2) the wire protrudes beyond the crest of the thread as shown in Figure 3 of Appendix 1.

6.3.1. The sum of twice the selected wire diameter and shim thickness shall be subtracted from the micrometer reading to give the minor diameter.

6.4. INTERNAL MAJOR DIAMETERS

Internal Major Diameters shall be measured for the 3rd and 9th threads. Measurements shall be made with an Inside Micrometer with needle points as shown in Figure 4 of Appendix 1. Precautions shall be taken to reduce the angularity of the micrometer to a minimum, as shown. The angular reading overestimates the diameter by 0.00013" or less. This small discrepancy shall be ignored.

6.4.1. The Major Diameter is given directly by the micrometer reading.

6.5. INTERNAL PITCH DIAMETERS

Internal Pitch Diameters shall not be measured. However, a check shall be made using Go and No-Go Plug Gauges to ensure that pitch diameters fall within specified limits. If the Go gauge does not go, or the No-Go gauge goes, that fact shall be recorded.

6.6. INTERNAL MINOR DIAMETERS

Internal Minor Diameters shall be measured for the 3rd, 6th and 9th threads. Measurements shall be made with an Inside Micrometer as shown in Figure 5 of Appendix 1.

6.6.1. The Minor Diameter is given directly by the micrometer reading.

7. ANCHORAGE DISPOSITION

7.1. STRESSING ADAPTOR (INTERNAL THREADS)

The Stressing Adaptor shall have been accepted by PSC based on acceptance of the NO-GO thread plug gauge test fit. Actual major and minor thread diameters shall be documented.

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7.2. <u>BUSHING, FIELD ANCHORHEAD (EXTERNAL THREADS)</u>

For purposes of expediency the bushing or field anchorhead external threads shall be identified as external threads in this section of the procedure since the measurements and requirements are identical, but shall be documented for specific identity.

7.2.1. Once an adaptor has been measured, the PSC Engineering Department shall generate a Stressing Adaptor Disposition Table for that Adaptor. These tables list allowable external thread diameters for a bushing or field anchorhead to be coupled to a specific adaptor and still meet the minimum strength requirements.

7.2.1.1. These tables are based on calculations that consider that it shall be necessary <u>to maintain full engagement with the adaptor and external thread (bushing or field anchorhead) at all times during stressing or detensioning operations.</u>

7.2.2. Select a stressing adaptor and external thread to be dispositioned.

7.2.3. Select the Stressing Adaptor Disposition Table, Appendix 4, for the adaptor to be evaluated. The Adaptor Identification will appear near the top of the table.

7.2.4. Using the major diameter of the external thread and referring to the columns under the heading Major Ranges, within the first two lines representing the range of major dimensions, locate that range into which the major dimension of the external thread will fall. This shall establish the Major control vertical column for that external thread.

7.2.5. With the pitch diameter of the external thread and using the Pitch Range column at the left edge of the table, read down to that range of dimensions into which the pitch diameter measurement of the external thread will fall. This shall establish the Pitch control horizontal line for that external thread.

7.2.6. The intersection of the Pitch control horizontal line with the Major control vertical column shall provide the Minor diameter control dimension.

7.2.6.1. If the Minor diameter control is less than the measured minor dimension of the external thread, then that combination of external thread and stressing adaptor is acceptable.

7.2.6.2. If the Minor diameter control dimension is greater than the measured minor dimension of the external thread, that combination is not acceptable and another stressing adaptor shall be selected to be mated to the external thread. Therefore, Section 7.2.6. shall be repeated until acceptable matches are provided.

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8. DOCUMENTATION

The items requiring documentation in this Procedure shall be documented on Data Sheet 7.1 as each might apply.

9. ATTACHMENTS

9.1. Data Sheet 7.1

9.2. Appendix 1 - Figures for Thread Diameter Measurements (These figures are used to illustrate the manner of measuring thread diameters.)

9.3. Appendix 2 - Pitch Diameter Constant For 3 Wire Method(This table lists the pitch diameter constant dimensions necessary for calculating an external pitch diameter.)

9.4. Appendix 3 - NBS Allowable Diameter Ranges(This is a computer generated table of allowable external and internal diameter ranges for 4 pitch stub ACME threads (Class 2G) as specified by Federal Standard Publication FED-STD-H28/13.)

9.5. Appendix 4 - Stressing Adaptor Disposition Tables(These tables shall be used for dispositoning a bushing or field anchorhead paired with a specific Stressing Adaptor. One table shall be computer generated for each Adaptor. Since these tables cannot be generated until the Adaptors are measured, it is likely these tables will be added to this procedure at a later date than initial submittal of this procedure. However, these tables shall be supplied as soon as possible.)

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ANCHORAGE THREAD MEASUREMENT - PROCEDURE SQ 7.1

DATA SHEET 7.1 - INSPECTION DOCUMENTATION

PSC Precision Surveillance Corporation

PROJECT ________ SURVEILLANCE NO. ________ YEAR ________

TENDON NO. ________ TENDON END/BUTTRESS NO. ________ UNIT ________

ANCHORAGE I.D. ________ ADAPTOR I.D. ________

1. EQUIPMENT

THREAD	MICROMETER IDENT.	MICROMETER RECAL DATE	WIRE NO.	WIRE RECAL DATE	SHIMS NO.	SHIMS RECAL DATE
EXT. MAJOR						
EXT. PITCH						
EXT. MINOR						
INT. MAJOR						
INT. MINOR						

2. MEASUREMENTS

THREAD	READ	THREAD 3RD	THREAD 6TH	THREAD 9TH	AVG.	WIRE CONST.	WIRE DIAM.	SHIM SIZE	AVG DIAM.
EXT. MAJOR	1								
	2								
EXT.[1] PITCH	1								
	2								
EXT.[2] MINOR	1								
	2								
INT. MAJOR	1								
	2								
INT. MINOR	1								
	2								

INT. PITCH GO GAUGE # ________ RECAL DATE ________ RESULT ________
NO-GO GAUGE # ________ RECAL DATE ________ RESULT ________

NOTES: 1. EXT. PITCH DIAM. = AVG. - WIRE CONSTANT - SHIM SIZE
2. EXT. MINOR DIAM. = AVG. - (2 x WIRE DIAM.) - SHIM SIZE

3. DISPOSITION

	TRIAL 1	TRIAL 2	TRIAL 3	TRIAL 4
ADAPTOR MARK				
MIN. MINOR DIAM. FROM ADAPTOR TABLE				
ACCEPTABLE? (YES, NO)				

Q.C. Signoff ________ Date ________

Q.C. Review ________ Level ___ Date ________

Title ________

Effective Date: 9-6-94	Previous Revision: △	Revision: △0 9-6-94	Page 1 of 1

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APPENDIX 1 - PROCEDURE SQ 7.1

FIGURES FOR THREAD DIAMETER MEASUREMENTS

PSC Precision Surveillance Corporation

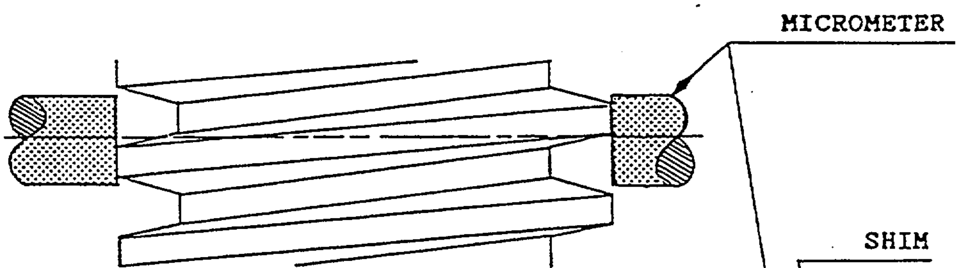

FIG. 1 EXTERNAL MAJOR DIAMETER

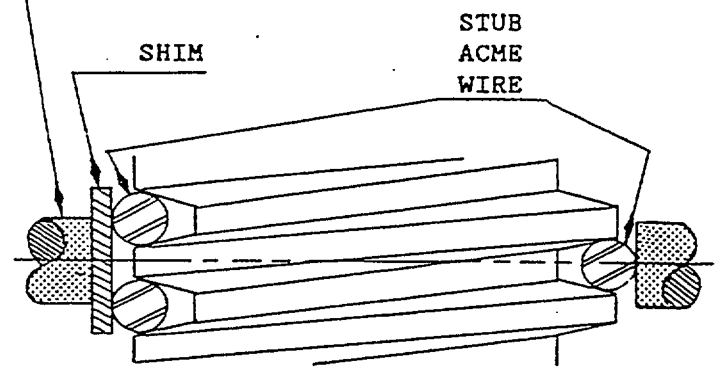

FIG. 2 EXTERNAL PITCH DIAMETER
(NOTE WIRES REST ON SIDE OF THREAD AND PROTRUDE BEYOND CREST)

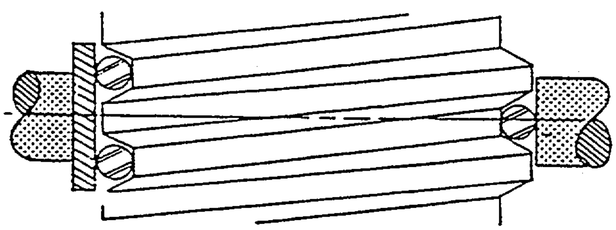

FIG. 3 EXTERNAL MINOR DIAMETER
(NOTE WIRES REST ON ROOT AND PROTRUDE BEYOND CREST)

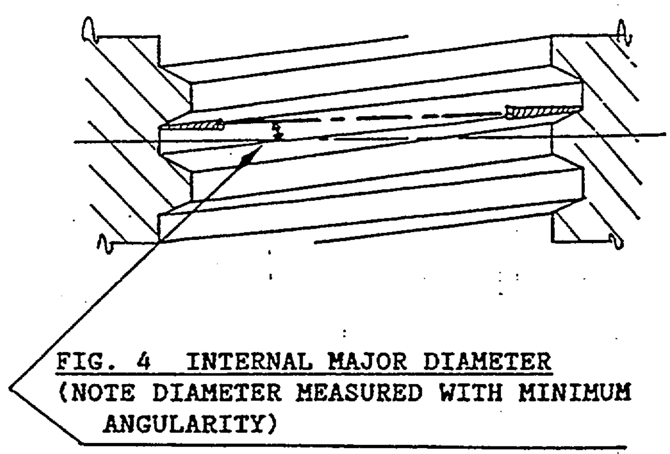

FIG. 4 INTERNAL MAJOR DIAMETER
(NOTE DIAMETER MEASURED WITH MINIMUM ANGULARITY)

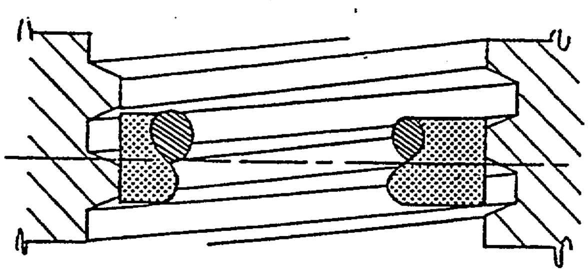

FIG. 5 INTERNAL MINOR DIAMETER

PITCH DIAM CONST FOR 3 WIRE METHOD

WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.
.1290	.161	.1325	.178	.1360	.196	.1395	.213	.1430	.231
.1291	.161	.1326	.179	.1361	.196	.1396	.214	.1431	.231
.1292	.162	.1327	.179	.1362	.197	.1397	.214	.1432	.232
.1293	.162	.1328	.180	.1363	.197	.1398	.215	.1433	.232
.1294	.163	.1329	.180	.1364	.198	.1399	.215	.1434	.233
.1295	.163	.1330	.181	.1365	.198	.1400	.216	.1435	.233
.1296	.164	.1331	.181	.1366	.199	.1401	.216	.1436	.234
.1297	.164	.1332	.182	.1367	.199	.1402	.217	.1437	.234
.1298	.165	.1333	.182	.1368	.200	.1403	.217	.1438	.235
.1299	.165	.1334	.183	.1369	.200	.1404	.218	.1439	.235
.1300	.166	.1335	.183	.1370	.201	.1405	.218	.1440	.236
.1301	.166	.1336	.184	.1371	.201	.1406	.219	.1441	.236
.1302	.167	.1337	.184	.1372	.202	.1407	.219	.1442	.237
.1303	.167	.1338	.185	.1373	.202	.1408	.220	.1443	.237
.1304	.168	.1339	.185	.1374	.203	.1409	.220	.1444	.238
.1305	.168	.1340	.186	.1375	.203	.1410	.221	.1445	.238
.1306	.169	.1341	.186	.1376	.204	.1411	.221	.1446	.239
.1307	.169	.1342	.187	.1377	.204	.1412	.222	.1447	.239
.1308	.170	.1343	.187	.1378	.205	.1413	.222	.1448	.240
.1309	.170	.1344	.188	.1379	.205	.1414	.223	.1449	.240
.1310	.171	.1345	.188	.1380	.206	.1415	.223	.1450	.241
.1311	.171	.1346	.189	.1381	.206	.1416	.224	.1451	.241
.1312	.172	.1347	.189	.1382	.207	.1417	.224	.1452	.242
.1313	.172	.1348	.190	.1383	.207	.1418	.225	.1453	.242
.1314	.173	.1349	.190	.1384	.208	.1419	.225	.1454	.243
.1315	.173	.1350	.191	.1385	.208	.1420	.226	.1455	.243
.1316	.174	.1351	.191	.1386	.209	.1421	.226	.1456	.244
.1317	.174	.1352	.192	.1387	.209	.1422	.227	.1457	.244
.1318	.175	.1353	.192	.1388	.210	.1423	.227	.1458	.245
.1319	.175	.1354	.193	.1389	.210	.1424	.228	.1459	.245
.1320	.176	.1355	.193	.1390	.211	.1425	.228	.1460	.246
.1321	.176	.1356	.194	.1391	.211	.1426	.229	.1461	.246
.1322	.177	.1357	.194	.1392	.212	.1427	.229	.1462	.247
.1323	.177	.1358	.195	.1393	.212	.1428	.230	.1463	.247
.1324	.178	.1359	.195	.1394	.213	.1429	.230	.1464	.248

PITCH DIAM CONST FOR 3 WIRE METHOD

WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.	WIRE SIZE	CON.
.1465	.248	.1500	.266	.1535	.283	.1570	.301	.1605	.318
.1466	.249	.1501	.266	.1536	.284	.1571	.301	.1606	.319
.1467	.249	.1502	.267	.1537	.284	.1572	.302	.1607	.319
.1468	.250	.1503	.267	.1538	.285	.1573	.302	.1608	.320
.1469	.250	.1504	.268	.1539	.285	.1574	.303	.1609	.320
.1470	.251	.1505	.268	.1540	.286	.1575	.303	.1610	.321
.1471	.251	.1506	.269	.1541	.286	.1576	.304	.1611	.321
.1472	.252	.1507	.269	.1542	.287	.1577	.304	.1612	.322
.1473	.252	.1508	.270	.1543	.287	.1578	.305	.1613	.322
.1474	.253	.1509	.270	.1544	.288	.1579	.305	.1614	.323
.1475	.253	.1510	.271	.1545	.288	.1580	.306	.1615	.323
.1476	.254	.1511	.271	.1546	.289	.1581	.306	.1616	.324
.1477	.254	.1512	.272	.1547	.289	.1582	.307	.1617	.324
.1478	.255	.1513	.272	.1548	.290	.1583	.307	.1618	.325
.1479	.255	.1514	.273	.1549	.290	.1584	.308	.1619	.325
.1480	.256	.1515	.273	.1550	.291	.1585	.308	.1620	.326
.1481	.256	.1516	.274	.1551	.291	.1586	.309	.1621	.326
.1482	.257	.1517	.274	.1552	.292	.1587	.309	.1622	.327
.1483	.257	.1518	.275	.1553	.292	.1588	.310	.1623	.327
.1484	.258	.1519	.275	.1554	.293	.1589	.310	.1624	.328
.1485	.258	.1520	.276	.1555	.293	.1590	.311	.1625	.328
.1486	.259	.1521	.276	.1556	.294	.1591	.311	.1626	.329
.1487	.259	.1522	.277	.1557	.294	.1592	.312	.1627	.329
.1488	.260	.1523	.277	.1558	.295	.1593	.312	.1628	.330
.1489	.260	.1524	.278	.1559	.295	.1594	.313	.1629	.330
.1490	.261	.1525	.278	.1560	.296	.1595	.313	.1630	.331
.1491	.261	.1526	.279	.1561	.296	.1596	.314	.1631	.331
.1492	.262	.1527	.279	.1562	.297	.1597	.314	.1632	.332
.1493	.262	.1528	.280	.1563	.297	.1598	.315	.1633	.332
.1494	.263	.1529	.280	.1564	.298	.1599	.315	.1634	.333
.1495	.263	.1530	.281	.1565	.298	.1600	.316	.1635	.333
.1496	.264	.1531	.281	.1566	.299	.1601	.316	.1636	.334
.1497	.264	.1532	.282	.1567	.299	.1602	.317	.1637	.334
.1498	.265	.1533	.282	.1568	.300	.1603	.317	.1638	.335
.1499	.265	.1534	.283	.1569	.300	.1604	.318	.1639	.335

4 PITCH STUB ACME THREADS (CLASS 2G)

<---- EXTERNAL THREADS					---->	<---- INTERNAL THREADS					---->		
MAJOR DIAMETER MAX	MAJOR DIAMETER MIN	PITCH DIAMETER MAX	PITCH DIAMETER MIN	MINOR DIAMETER MAX	MINOR DIAMETER MIN	MAJOR DIAMETER MIN	MAJOR DIAMETER MAX	PITCH DIAMETER MIN	PITCH DIAMETER MAX	MINOR DIAMETER MIN	MINOR DIAMETER MAX	STRESS AREA	SHEAR AREA
0.2500	0.2375	0.1710	0.1530	0.0800	0.0620	0.2700	0.2880	0.1750	0.1930	0.1000	0.1125	0.0091	0.2605
0.3750	0.3625	0.2951	0.2764	0.2050	0.1863	0.3950	0.4137	0.3000	0.3187	0.2250	0.2375	0.0420	0.4692
0.5000	0.4875	0.4193	0.4001	0.3300	0.3108	0.5200	0.5392	0.4250	0.4442	0.3500	0.3625	0.0992	0.6774
0.6250	0.6125	0.5437	0.5239	0.4550	0.4353	0.6450	0.6647	0.5500	0.5697	0.4750	0.4875	0.1806	0.8850
0.7500	0.7375	0.6681	0.6479	0.5800	0.5598	0.7700	0.7902	0.6750	0.6952	0.6000	0.6125	0.2864	1.0922
0.8750	0.8625	0.7925	0.7719	0.7050	0.6844	0.8950	0.9156	0.8000	0.8206	0.7250	0.7375	0.4164	1.2988
1.0000	0.9875	0.9170	0.8960	0.8300	0.8090	1.0200	1.0410	0.9250	0.9460	0.8500	0.8625	0.5708	1.5050
1.1250	1.1125	1.0415	1.0202	0.9550	0.9336	1.1450	1.1664	1.0500	1.0714	0.9750	0.9875	0.7495	1.7107
1.2500	1.2375	1.1661	1.1443	1.0800	1.0583	1.2700	1.2917	1.1750	1.1967	1.1000	1.1125	0.9526	1.9160
1.3750	1.3625	1.2906	1.2686	1.2050	1.1830	1.3950	1.4170	1.3000	1.3220	1.2250	1.2375	1.1801	2.1208
1.5000	1.4875	1.4152	1.3929	1.3300	1.3077	1.5200	1.5423	1.4250	1.4473	1.3500	1.3625	1.4319	2.3253
1.6250	1.6125	1.5398	1.5172	1.4550	1.4324	1.6450	1.6676	1.5500	1.5726	1.4750	1.4875	1.7082	2.5293
1.7500	1.7375	1.6644	1.6415	1.5800	1.5571	1.7700	1.7929	1.6750	1.6979	1.6000	1.6125	2.0088	2.7330
1.8750	1.8625	1.7890	1.7658	1.7050	1.6818	1.8950	1.9182	1.8000	1.8232	1.7250	1.7375	2.3338	2.9363
2.0000	1.9875	1.9137	1.8902	1.8300	1.8065	2.0200	2.0435	1.9250	1.9485	1.8500	1.8625	2.6833	3.1393
2.1250	2.1125	2.0383	2.0146	1.9550	1.9313	2.1450	2.1687	2.0500	2.0737	1.9750	1.9875	3.0571	3.3419
2.2500	2.2375	2.1630	2.1390	2.0800	2.0560	2.2700	2.2940	2.1750	2.1990	2.1000	2.1125	3.4554	3.5441
2.3750	2.3625	2.2877	2.2634	2.2050	2.1808	2.3950	2.4192	2.3000	2.3242	2.2250	2.2375	3.8780	3.7461
2.5000	2.4875	2.4124	2.3879	2.3300	2.3055	2.5200	2.5445	2.4250	2.4495	2.3500	2.3625	4.3251	3.9477
2.6250	2.6125	2.5370	2.5123	2.4550	2.4303	2.6450	2.6697	2.5500	2.5747	2.4750	2.4875	4.7967	4.1490
2.7500	2.7375	2.6617	2.6368	2.5800	2.5551	2.7700	2.7949	2.6750	2.6999	2.6000	2.6125	5.2926	4.3499
2.8750	2.8625	2.7864	2.7613	2.7050	2.6798	2.8950	2.9202	2.8000	2.8252	2.7250	2.7375	5.8130	4.5506
3.0000	2.9875	2.9111	2.8858	2.8300	2.8046	3.0200	3.0454	2.9250	2.9504	2.8500	2.8625	6.3578	4.7510
3.1250	3.1125	3.0359	3.0103	2.9550	2.9294	3.1450	3.1706	3.0500	3.0756	2.9750	2.9875	6.9271	4.9511
3.2500	3.2375	3.1606	3.1348	3.0800	3.0542	3.2700	3.2958	3.1750	3.2008	3.1000	3.1125	7.5208	5.1509
3.3750	3.3625	3.2853	3.2593	3.2050	3.1790	3.3950	3.4210	3.3000	3.3260	3.2250	3.2375	8.1389	5.3504
3.5000	3.4875	3.4100	3.3838	3.3300	3.3038	3.5200	3.5462	3.4250	3.4512	3.3500	3.3625	8.7815	5.5496
3.6250	3.6125	3.5348	3.5083	3.4550	3.4286	3.6450	3.6714	3.5500	3.5744	3.4750	3.4875	9.4485	5.7484

Effective Date: 9-6-94
Previous Revision: △
Revision: △0 9-6-94

Formerly "Inryco Surveillance"

PSC
Precision Surveillance Corporation

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4 PITCH STUB ACME THREADS (CLASS 2G)

EXTERNAL THREADS						INTERNAL THREADS						STRESS AREA	SHEAR AREA
MAJOR DIAMETER		PITCH DIAMETER		MINOR DIAMETER		MAJOR DIAMETER		PITCH DIAMETER		MINOR DIAMETER			
MAX	MIN	MAX	MIN	MAX	MIN	MIN	MAX	MIN	MAX	MIN	MAX		
3.7500	3.7375	3.6595	3.6329	3.5800	3.5534	3.7700	3.7966	3.6750	3.7016	3.6000	3.6125	10.1400	5.9473
3.8750	3.8625	3.7843	3.7574	3.7050	3.6782	3.8950	3.9218	3.8000	3.8268	3.7250	3.7375	10.8559	6.1457
4.0000	3.9875	3.9090	3.8820	3.8300	3.8030	4.0200	4.0470	3.9250	3.9520	3.8500	3.8625	11.5963	6.3438
4.1250	4.1125	4.0338	4.0066	3.9550	3.9278	4.1450	4.1722	4.0500	4.0772	3.9750	3.9875	12.3611	6.5418
4.2500	4.2375	4.1585	4.1311	4.0800	4.0526	4.2700	4.2974	4.1750	4.2024	4.1000	4.1125	13.1503	6.7394
4.3750	4.3625	4.2833	4.2557	4.2050	4.1775	4.3950	4.4225	4.3000	4.3275	4.2250	4.2375	13.9640	6.9368
4.5000	4.4875	4.4080	4.3803	4.3300	4.3023	4.5200	4.5477	4.4250	4.4527	4.3500	4.3625	14.8022	7.1340
4.6250	4.6125	4.5328	4.5049	4.4550	4.4271	4.6450	4.6729	4.5500	4.5779	4.4750	4.4875	15.6648	7.3309
4.7500	4.7375	4.6576	4.6295	4.5800	4.5519	4.7700	4.7981	4.6750	4.7031	4.6000	4.6125	16.5519	7.5276
4.8750	4.8625	4.7823	4.7541	4.7050	4.6768	4.8950	4.9232	4.8000	4.8282	4.7250	4.7375	17.4635	7.7240
5.0000	4.9875	4.9071	4.8787	4.8300	4.8016	5.0200	5.0484	4.9250	4.9534	4.8500	4.8625	18.3995	7.9202
5.1250	5.1125	5.0319	5.0033	4.9550	4.9264	5.1450	5.1736	5.0500	5.0786	4.9750	4.9875	19.3599	8.1162
5.2500	5.2375	5.1567	5.1279	5.0800	5.0513	5.2700	5.2987	5.1750	5.2037	5.1000	5.1125	20.3449	8.3119
5.3750	5.3625	5.2815	5.2525	5.2050	5.1761	5.3950	5.4239	5.3000	5.3289	5.2250	5.2375	21.3543	8.5074
5.5000	5.4875	5.4062	5.3772	5.3300	5.3009	5.5200	5.5491	5.4250	5.4541	5.3500	5.3625	22.3881	8.7027
5.6250	5.6125	5.5310	5.5018	5.4550	5.4258	5.6450	5.6742	5.5500	5.5792	5.4750	5.4875	23.4464	8.8978
5.7500	5.7375	5.6558	5.6264	5.5800	5.5506	5.7700	5.7994	5.6750	5.7044	5.6000	5.6125	24.5292	9.0927
5.8750	5.8625	5.7806	5.7511	5.7050	5.6755	5.8950	5.9245	5.8000	5.8295	5.7250	5.7375	25.6365	9.2873
6.0000	5.9875	5.9054	5.8757	5.8300	5.8003	6.0200	6.0497	5.9250	5.9547	5.8500	5.8625	26.7682	9.4817
6.1250	6.1125	6.0302	6.0004	5.9550	5.9252	6.1450	6.1748	6.0500	6.0798	5.9750	5.9875	27.9244	9.6759
6.2500	6.2375	6.1550	6.1250	6.0800	6.0500	6.2700	6.3000	6.1750	6.2050	6.1000	6.1125	29.1050	9.8699
6.3750	6.3625	6.2798	6.2497	6.2050	6.1749	6.3950	6.4251	6.3000	6.3301	6.2250	6.2375	30.3101	10.0637
6.5000	6.4875	6.4046	6.3743	6.3300	6.2997	6.5200	6.5503	6.4250	6.4553	6.3500	6.3625	31.5397	10.2573
6.6250	6.6125	6.5294	6.4990	6.4550	6.4246	6.6450	6.6754	6.5500	6.5804	6.4750	6.4875	32.7938	10.4507
6.7500	6.7375	6.6542	6.6236	6.5800	6.5494	6.7700	6.8006	6.6750	6.7056	6.6000	6.6125	34.0723	10.6439
6.8750	6.8625	6.7790	6.7483	6.7050	6.6743	6.8950	6.9257	6.8000	6.8307	6.7250	6.7375	35.3753	10.8369
7.0000	6.9875	6.9038	6.8730	6.8300	6.7991	7.0200	7.0509	6.9250	6.9559	6.8500	6.8625	36.7028	11.0296
7.1250	7.1125	7.0286	6.9976	6.9550	6.9240	7.1450	7.1760	7.0500	7.0810	6.9750	6.9875	38.0548	11.2222

4 FITCH STUB ACME THREADS (CLASS 2G)

EXTERNAL THREADS						INTERNAL THREADS							
MAJOR DIAMETER		PITCH DIAMETER		MINOR DIAMETER		MAJOR DIAMETER		PITCH DIAMETER		MINOR DIAMETER		STRESS AREA	SHEAR AREA
MAX	MIN	MAX	MIN	MAX	MIN	MIN	MAX	MIN	MAX	MIN	MAX		
7.2500	7.2375	7.1535	7.1223	7.0800	7.0488	7.2700	7.3012	7.1750	7.2062	7.1000	7.1125	39.4312	11.4146
7.3750	7.3625	7.2783	7.2470	7.2050	7.1737	7.3950	7.4263	7.3000	7.3313	7.2250	7.2375	40.8321	11.6068
7.5000	7.4875	7.4031	7.3717	7.3300	7.2986	7.5200	7.5514	7.4250	7.4564	7.3500	7.3625	42.2575	11.7988
7.6250	7.6125	7.5279	7.4963	7.4550	7.4234	7.6450	7.6766	7.5500	7.5816	7.4750	7.4875	43.7073	11.9906
7.7500	7.7375	7.6527	7.6210	7.5800	7.5483	7.7700	7.8017	7.6750	7.7067	7.6000	7.6125	45.1817	12.1822
7.8750	7.8625	7.7776	7.7457	7.7050	7.6732	7.8950	7.9268	7.8000	7.8318	7.7250	7.7375	46.6805	12.3737
8.0000	7.9875	7.9024	7.8704	7.8300	7.7980	8.0200	8.0520	7.9250	7.9570	7.8500	7.8625	48.2038	12.5649
8.1250	8.1125	8.0272	7.9951	7.9550	7.9229	8.1450	8.1771	8.0500	8.0821	7.9750	7.9875	49.7515	12.7560
8.2500	8.2375	8.1520	8.1198	8.0800	8.0478	8.2700	8.3022	8.1750	8.2072	8.1000	8.1125	51.3238	12.9469
8.3750	8.3625	8.2768	8.2445	8.2050	8.1726	8.3950	8.4274	8.3000	8.3324	8.2250	8.2375	52.9205	13.1375
8.5000	8.4875	8.4017	8.3692	8.3300	8.2975	8.5200	8.5525	8.4250	8.4575	8.3500	8.3625	54.5417	13.3281
8.6250	8.6125	8.5265	8.4939	8.4550	8.4224	8.6450	8.6776	8.5500	8.5826	8.4750	8.4875	56.1874	13.5184
8.7500	8.7375	8.6513	8.6186	8.5800	8.5473	8.7700	8.8027	8.6750	8.7077	8.6000	8.6125	57.8575	13.7086
8.8750	8.8625	8.7762	8.7433	8.7050	8.6721	8.8950	8.9279	8.8000	8.8329	8.7250	8.7375	59.5522	13.8985
9.0000	8.9875	8.9010	8.8680	8.8300	8.7970	9.0200	9.0530	8.9250	8.9580	8.8500	8.8625	61.2713	14.0883
9.1250	9.1125	9.0258	8.9927	8.9550	8.9219	9.1450	9.1781	9.0500	9.0831	8.9750	8.9875	63.0149	14.2780
9.2500	9.2375	9.1507	9.1174	9.0800	9.0468	9.2700	9.3032	9.1750	9.2082	9.1000	9.1125	64.7830	14.4674
9.3750	9.3625	9.2755	9.2421	9.2050	9.1716	9.3950	9.4284	9.3000	9.3334	9.2250	9.2375	66.5756	14.6567
9.5000	9.4875	9.4003	9.3668	9.3300	9.2965	9.5200	9.5535	9.4250	9.4585	9.3500	9.3625	68.3926	14.8458
9.6250	9.6125	9.5252	9.4916	9.4550	9.4214	9.6450	9.6786	9.5500	9.5836	9.4750	9.4875	70.2342	15.0347
9.7500	9.7375	9.6500	9.6163	9.5800	9.5463	9.7700	9.8037	9.6750	9.7087	9.6000	9.6125	72.1002	15.2235
9.8750	9.8625	9.7749	9.7410	9.7050	9.6711	9.8950	9.9289	9.8000	9.8339	9.7250	9.7375	73.9907	15.4121
10.0000	9.9875	9.8997	9.8657	9.8300	9.7960	10.0200	10.0540	9.9250	9.9590	9.8500	9.8625	75.9057	15.6006
10.1250	10.1125	10.0245	9.9905	9.9550	9.9209	10.1450	10.1791	10.0500	10.0841	9.9750	9.9875	77.8452	15.7888
10.2500	10.2375	10.1494	10.1152	10.0800	10.0458	10.2700	10.3042	10.1750	10.2092	10.1000	10.1125	79.8091	15.9769
10.3750	10.3625	10.2742	10.2399	10.2050	10.1707	10.3950	10.4293	10.3000	10.3343	10.2250	10.2375	81.7976	16.1649
10.5000	10.4875	10.3991	10.3646	10.3300	10.2956	10.5200	10.5544	10.4250	10.4594	10.3500	10.3625	83.8105	16.3526
10.6250	10.6125	10.5239	10.4894	10.4550	10.4204	10.6450	10.6796	10.5500	10.5846	10.4750	10.4875	85.8480	16.5403

4 PITCH STUB ACME THREADS (CLASS 2G)

EXTERNAL THREADS						INTERNAL THREADS							
MAJOR DIAMETER MAX	MAJOR DIAMETER MIN	PITCH DIAMETER MAX	PITCH DIAMETER MIN	MINOR DIAMETER MAX	MINOR DIAMETER MIN	MAJOR DIAMETER MIN	MAJOR DIAMETER MAX	PITCH DIAMETER MIN	PITCH DIAMETER MAX	MINOR DIAMETER MIN	MINOR DIAMETER MAX	STRESS AREA	SHEAR AREA
10.7500	10.7375	10.6488	10.6141	10.5800	10.5453	10.7700	10.8047	10.6750	10.7097	10.6000	10.6125	87.9099	16.7277
10.8750	10.8625	10.7736	10.7388	10.7050	10.6702	10.8950	10.9298	10.8000	10.8348	10.7250	10.7375	89.9963	16.9150
11.0000	10.9875	10.8985	10.8636	10.8300	10.7951	11.0200	11.0549	10.9250	10.9599	10.8500	10.8625	92.1072	17.1021
11.1250	11.1125	11.0233	10.9883	10.9550	10.9200	11.1450	11.1800	11.0500	11.0850	10.9750	10.9875	94.2425	17.2891
11.2500	11.2375	11.1482	11.1130	11.0800	11.0449	11.2700	11.3051	11.1750	11.2101	11.1000	11.1125	96.4024	17.4759
11.3750	11.3625	11.2730	11.2378	11.2050	11.1698	11.3950	11.4302	11.3000	11.3352	11.2250	11.2375	98.5867	17.6626
11.5000	11.4875	11.3979	11.3625	11.3300	11.2947	11.5200	11.5553	11.4250	11.4603	11.3500	11.3625	100.7956	17.8491
11.6250	11.6125	11.5227	11.4873	11.4550	11.4195	11.6450	11.6805	11.5500	11.5855	11.4750	11.4875	103.0289	18.0354
11.7500	11.7375	11.6476	11.6120	11.5800	11.5444	11.7700	11.8056	11.6750	11.7106	11.6000	11.6125	105.2867	18.2216
11.8750	11.8625	11.7724	11.7368	11.7050	11.6693	11.8950	11.9307	11.8000	11.8357	11.7250	11.7375	107.5690	18.4077
12.0000	11.9875	11.8973	11.8615	11.8300	11.7942	12.0200	12.0558	11.9250	11.9608	11.8500	11.8625	109.8758	18.5936
12.1250	12.1125	12.0221	11.9863	11.9550	11.9191	12.1450	12.1809	12.0500	12.0859	11.9750	11.9875	112.2071	18.7793
12.2500	12.2375	12.1470	12.1110	12.0800	12.0440	12.2700	12.3060	12.1750	12.2110	12.1000	12.1125	114.5629	18.9649
12.3750	12.3625	12.2719	12.2358	12.2050	12.1689	12.3950	12.4311	12.3000	12.3361	12.2250	12.2375	116.9432	19.1503
12.5000	12.4875	12.3967	12.3605	12.3300	12.2938	12.5200	12.5562	12.4250	12.4612	12.3500	12.3625	119.3479	19.3356
12.6250	12.6125	12.5216	12.4853	12.4550	12.4187	12.6450	12.6813	12.5500	12.5863	12.4750	12.4875	121.7772	19.5207
12.7500	12.7375	12.6464	12.6100	12.5800	12.5436	12.7700	12.8064	12.6750	12.7114	12.6000	12.6125	124.2309	19.7057
12.8750	12.8625	12.7713	12.7348	12.7050	12.6685	12.8950	12.9315	12.8000	12.8365	12.7250	12.7375	126.7092	19.8906
13.0000	12.9875	12.8962	12.8595	12.8300	12.7934	13.0200	13.0566	12.9250	12.9616	12.8500	12.8625	129.2119	20.0752
13.1250	13.1125	13.0210	12.9843	12.9550	12.9183	13.1450	13.1817	13.0500	13.0867	12.9750	12.9875	131.7391	20.2598
13.2500	13.2375	13.1459	13.1090	13.0800	13.0432	13.2700	13.3068	13.1750	13.2118	13.1000	13.1125	134.2908	20.4442
13.3750	13.3625	13.2707	13.2338	13.2050	13.1681	13.3950	13.4319	13.3000	13.3369	13.2250	13.2375	136.8670	20.6284
13.5000	13.4875	13.3956	13.3586	13.3300	13.2930	13.5200	13.5570	13.4250	13.4620	13.3500	13.3625	139.4677	20.8126
13.6250	13.6125	13.5205	13.4833	13.4550	13.4179	13.6450	13.6821	13.5500	13.5871	13.4750	13.4875	142.0929	20.9965
13.7500	13.7375	13.6453	13.6081	13.5800	13.5428	13.7700	13.8072	13.6750	13.7122	13.6000	13.6125	144.7426	21.1804
13.8750	13.8625	13.7702	13.7329	13.7050	13.6677	13.8950	13.9323	13.8000	13.8373	13.7250	13.7375	147.4168	21.3640
14.0000	13.9875	13.8951	13.8576	13.8300	13.7926	14.0200	14.0574	13.9250	13.9624	13.8500	13.8625	150.1155	21.5476
14.1250	14.1125	14.0199	13.9824	13.9550	13.9175	14.1450	14.1825	14.0500	14.0875	13.9750	13.9875	152.8386	21.7310

Effective Date: 9-6-94
Previous Revision:
Revision: 0 9-6-94

Formerly "Inryco Surveillance"

PSC Precision Surveillance Corporation

F1430f 273

4 PITCH STUB ACME THREADS (CLASS 2G)

EXTERNAL THREADS						INTERNAL THREADS							
MAJOR DIAMETER MAX	MAJOR DIAMETER MIN	PITCH DIAMETER MAX	PITCH DIAMETER MIN	MINOR DIAMETER MAX	MINOR DIAMETER MIN	MAJOR DIAMETER MIN	MAJOR DIAMETER MAX	PITCH DIAMETER MIN	PITCH DIAMETER MAX	MINOR DIAMETER MIN	MINOR DIAMETER MAX	STRESS AREA	SHEAR AREA
14.2500	14.2375	14.1448	14.1072	14.0800	14.0424	14.2700	14.3076	14.1750	14.2126	14.1000	14.1125	155.5863	21.9142
14.3750	14.3625	14.2697	14.2319	14.2050	14.1673	14.3950	14.4327	14.3000	14.3377	14.2250	14.2375	158.3584	22.0974
14.5000	14.4875	14.3945	14.3567	14.3300	14.2922	14.5200	14.5578	14.4250	14.4628	14.3500	14.3625	161.1551	22.2803
14.6250	14.6125	14.5194	14.4815	14.4550	14.4171	14.6450	14.6829	14.5500	14.5879	14.4750	14.4875	163.9762	22.4632
14.7500	14.7375	14.6443	14.6062	14.5800	14.5420	14.7700	14.8080	14.6750	14.7130	14.6000	14.6125	166.8219	22.6459
14.8750	14.8625	14.7691	14.7310	14.7050	14.6669	14.8950	14.9331	14.8000	14.8381	14.7250	14.7375	169.6920	22.8284
15.0000	14.9875	14.8940	14.8558	14.8300	14.7918	15.0200	15.0582	14.9250	14.9632	14.8500	14.8625	172.5867	23.0109
15.1250	15.1125	15.0189	14.9806	14.9550	14.9167	15.1450	15.1833	15.0500	15.0883	14.9750	14.9875	175.5058	23.1932
15.2500	15.2375	15.1438	15.1053	15.0800	15.0416	15.2700	15.3084	15.1750	15.2134	15.1000	15.1125	178.4494	23.3753
15.3750	15.3625	15.2686	15.2301	15.2050	15.1665	15.3950	15.4335	15.3000	15.3385	15.2250	15.2375	181.4175	23.5574
15.5000	15.4875	15.3935	15.3549	15.3300	15.2914	15.5200	15.5586	15.4250	15.4636	15.3500	15.3625	184.4102	23.7392
15.6250	15.6125	15.5184	15.4797	15.4550	15.4163	15.6450	15.6837	15.5500	15.5887	15.4750	15.4875	187.4273	23.9210
15.7500	15.7375	15.6433	15.6044	15.5800	15.5412	15.7700	15.8088	15.6750	15.7138	15.6000	15.6125	190.4689	24.1026
15.8750	15.8625	15.7681	15.7292	15.7050	15.6661	15.8950	15.9339	15.8000	15.8389	15.7250	15.7375	193.5350	24.2841
16.0000	15.9875	15.8930	15.8540	15.8300	15.7910	16.0200	16.0590	15.9250	15.9640	15.8500	15.8625	196.6256	24.4655

ALLOWABLE EXTERNAL DIAMETER RANGES

MINIMUM MINOR DIAMETER

PROJECT: THREE MILE ISLAND 08-02-1999

BASIC DIAMETER= 9.3750 ENGAGEMENT LENGTH = 3.000 170 WIRES
150 YIELD 110 % G.U.T.S.
INTERNAL MARK : C6001 MAJOR DIAMETER= 9.4240 MINOR DIAMETER= 9.2260

<---------------------M A J O R R A N G E S--------------------->

PITCH RANGES	9.345 9.354	9.355 9.364	9.365 9.374	9.375 9.384	9.385 9.394	9.395 9.404	9.405 9.414	9.415 9.424	9.425 9.434	9.435 9.444
9.150 9.163	8.789	8.752	8.715	8.678	8.640	8.603	8.566	8.528	8.491	8.454
9.164 9.177	8.771	8.732	8.694	8.655	8.616	8.578	8.539	8.500	8.461	8.422
9.178 9.191	8.753	8.713	8.673	8.633	8.592	8.552	8.512	8.471	8.431	8.390
9.192 9.205	8.735	8.694	8.652	8.610	8.569	8.527	8.485	8.443	8.401	8.359
9.206 9.219	8.718	8.675	8.631	8.588	8.545	8.502	8.458	8.415	8.371	8.328
9.220 9.233	8.700	8.655	8.611	8.566	8.521	8.476	8.432	8.387	8.342	8.297
9.234 9.247	8.682	8.636	8.590	8.544	8.498	8.451	8.405	8.359	8.312	8.266
9.248 9.261	8.665	8.617	8.570	8.522	8.474	8.427	8.379	8.331	8.283	8.235
9.262 9.275	8.648	8.598	8.549	8.500	8.451	8.402	8.352	8.303	8.254	8.204
9.276 9.289	8.630	8.580	8.529	8.478	8.428	8.377	8.326	8.275	8.225	8.174
9.290 9.303	8.613	8.561	8.509	8.457	8.405	8.353	8.300	8.248	8.196	8.143
9.304 9.317	8.596	8.542	8.489	8.435	8.382	8.328	8.274	8.221	8.167	8.113
9.318 9.331	8.579	8.524	8.469	8.414	8.359	8.304	8.248	8.193	8.138	8.083
9.332 9.345	8.562	8.505	8.449	8.392	8.336	8.279	8.223	8.166	8.109	8.052
9.346 9.359	8.545	8.487	8.429	8.371	8.313	8.255	8.197	8.139	8.081	8.023

Computed By: Paul C Smith 8/02/99 Chkd. By Ronald Hoyle 8-3-99

ALLOWABLE EXTERNAL DIAMETER RANGES

MINIMUM MINOR DIAMETER

PROJECT: THREE MILE ISLAND

08-02-1999

BASIC DIAMETER= 9.3750 ENGAGEMENT LENGTH = 3.000 170 WIRES
150 YIELD 110 % G.U.T.S.
INTERNAL MARK : C6002 MAJOR DIAMETER= 9.4170 MINOR DIAMETER= 9.2320

	<-------------------------M A J O R				R A N G E S				------------------------>
PITCH RANGES	9.345 9.354	9.355 9.364	9.365 9.374	9.375 9.384	9.385 9.394	9.395 9.404	9.405 9.414	9.415 9.424	9.425 9.434	9.435 9.444
9.150 9.163	8.824	8.788	8.751	8.715	8.678	8.642	8.605	8.568	8.531	8.495
9.164 9.177	8.807	8.769	8.731	8.693	8.655	8.617	8.579	8.540	8.502	8.464
9.178 9.191	8.790	8.751	8.711	8.672	8.632	8.592	8.553	8.513	8.473	8.433
9.192 9.205	8.773	8.732	8.691	8.650	8.609	8.568	8.527	8.485	8.444	8.403
9.206 9.219	8.756	8.714	8.671	8.629	8.586	8.543	8.501	8.458	8.415	8.372
9.220 9.233	8.740	8.696	8.652	8.607	8.563	8.519	8.475	8.431	8.386	8.342
9.234 9.247	8.723	8.677	8.632	8.586	8.541	8.495	8.449	8.404	8.358	8.312
9.248 9.261	8.706	8.659	8.612	8.565	8.518	8.471	8.424	8.376	8.329	8.282
9.262 9.275	8.690	8.641	8.593	8.544	8.496	8.447	8.398	8.350	8.301	8.252
9.276 9.289	8.673	8.623	8.573	8.523	8.473	8.423	8.373	8.323	8.272	8.222
9.290 9.303	8.657	8.605	8.554	8.502	8.451	8.399	8.348	8.296	8.244	8.192
9.304 9.317	8.640	8.587	8.535	8.482	8.429	8.376	8.323	8.269	8.216	8.163
9.318 9.331	8.624	8.570	8.515	8.461	8.407	8.352	8.298	8.243	8.188	8.134
9.332 9.345	8.608	8.552	8.496	8.441	8.385	8.329	8.273	8.217	8.160	8.104
9.346 9.359	8.592	8.534	8.477	8.420	8.363	8.305	8.248	8.190	8.133	8.075

Computed By: Paul Chute 8/02/99 Chkd. By Ronald D. Hough 8-3-99

ALLOWABLE EXTERNAL DIAMETER RANGES

MINIMUM MINOR DIAMETER

PROJECT: THREE MILE ISLAND 08-02-1999

BASIC DIAMETER= 9.3750 ENGAGEMENT LENGTH = 3.000 170 WIRES
150 YIELD 110 % G.U.T.S.
INTERNAL MARK : D-4 MAJOR DIAMETER= 9.3940 MINOR DIAMETER= 9.2370

	<--	-------	-------	M A J O R	R A N G E S	-------	-------	-------	-------	-->
PITCH RANGES	9.345 9.354	9.355 9.364	9.365 9.374	9.375 9.384	9.385 9.394	9.395 9.404	9.405 9.414	9.415 9.424	9.425 9.434	9.435 9.444
9.150 9.163	8.853	8.817	8.781	8.745	8.709	8.673	8.637	8.601	8.565	8.528
9.164 9.177	8.837	8.799	8.762	8.724	8.687	8.649	8.611	8.574	8.536	8.498
9.178 9.191	8.820	8.781	8.742	8.703	8.664	8.625	8.586	8.547	8.508	8.468
9.192 9.205	8.804	8.764	8.723	8.683	8.642	8.601	8.561	8.520	8.479	8.438
9.206 9.219	8.788	8.746	8.704	8.662	8.620	8.578	8.536	8.493	8.451	8.409
9.220 9.233	8.772	8.728	8.685	8.641	8.598	8.554	8.511	8.467	8.423	8.379
9.234 9.247	8.756	8.711	8.666	8.621	8.576	8.531	8.486	8.440	8.395	8.350
9.248 9.261	8.740	8.694	8.647	8.601	8.554	8.507	8.461	8.414	8.367	8.320
9.262 9.275	8.724	8.676	8.628	8.580	8.532	8.484	8.436	8.388	8.340	8.291
9.276 9.289	8.708	8.659	8.610	8.560	8.511	8.461	8.411	8.362	8.312	8.262
9.290 9.303	8.693	8.642	8.591	8.540	8.489	8.438	8.387	8.336	8.284	8.233
9.304 9.317	8.677	8.625	8.572	8.520	8.467	8.415	8.362	8.310	8.257	8.204
9.318 9.331	8.661	8.608	8.554	8.500	8.446	8.392	8.338	8.284	8.230	8.176
9.332 9.345	8.646	8.591	8.535	8.480	8.425	8.369	8.314	8.258	8.203	8.147
9.346 9.359	8.630	8.574	8.517	8.460	8.403	8.347	8.290	8.233	8.176	8.118

Computed By: Paul Chut 8/02/99 Chkd. By Ronald Hough 9-3-99

APPENDIX 4 - PROCEDURE SQ 7.1

STRESSING ADAPTOR DISPOSITION TABLES

PSC Precision Surveillance Corporation

ALLOWABLE EXTERNAL DIAMETER RANGES

MINIMUM MINOR DIAMETER

PROJECT: THREE MILE ISLAND 07-30-1999

BASIC DIAMETER= 9.3750 ENGAGEMENT LENGTH = 3.000 170 WIRES
150 YIELD 110 % G.U.T.S.
INTERNAL MARK : FSV-1 MAJOR DIAMETER= 9.4270 MINOR DIAMETER= 9.2360

<----------------------M A J O R   R A N G E S---------------------->

PITCH RANGES	9.345 9.354	9.355 9.364	9.365 9.374	9.375 9.384	9.385 9.394	9.395 9.404	9.405 9.414	9.415 9.424	9.425 9.434	9.435 9.444
9.150 9.163	8.847	8.811	8.775	8.739	8.703	8.667	8.631	8.594	8.558	8.522
9.164 9.177	8.831	8.793	8.756	8.718	8.680	8.643	8.605	8.567	8.529	8.491
9.178 9.191	8.814	8.775	8.736	8.697	8.658	8.619	8.579	8.540	8.501	8.461
9.192 9.205	8.798	8.757	8.717	8.676	8.636	8.595	8.554	8.513	8.472	8.431
9.206 9.219	8.782	8.740	8.698	8.655	8.613	8.571	8.529	8.486	8.444	8.401
9.220 9.233	8.765	8.722	8.678	8.635	8.591	8.547	8.503	8.460	8.416	8.372
9.234 9.247	8.749	8.704	8.659	8.614	8.569	8.524	8.478	8.433	8.388	8.342
9.248 9.261	8.733	8.687	8.640	8.594	8.547	8.500	8.453	8.407	8.360	8.313
9.262 9.275	8.717	8.669	8.621	8.573	8.525	8.477	8.429	8.380	8.332	8.283
9.276 9.289	8.701	8.652	8.602	8.553	8.503	8.453	8.404	8.354	8.304	8.254
9.290 9.303	8.685	8.635	8.584	8.533	8.481	8.430	8.379	8.328	8.276	8.225
9.304 9.317	8.670	8.617	8.565	8.512	8.460	8.407	8.354	8.302	8.249	8.196
9.318 9.331	8.654	8.600	8.546	8.492	8.438	8.384	8.330	8.276	8.222	8.167
9.332 9.345	8.638	8.583	8.528	8.472	8.417	8.361	8.306	8.250	8.194	8.138
9.346 9.359	8.623	8.566	8.509	8.452	8.395	8.338	8.281	8.224	8.167	8.110

Compared By Paul C Smith 7/31/99 Chkd. By Ronald Hough 8-3-99

Effective Date: 8-10-99	Previous Revision: △	Revision: △C 8-10-99	Page 4 of 4

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GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

GUIDE FOR DOCUMENTATION OF BUTTONHEAD INSPECTION
SUPPLEMENT TO ENCLOSURE 6 AND
DATA SHEET 1, 2, 3 & 4 of TMI Procedure 1301-9.1

Prepared by H.F. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R.D. Hough Title GEN. MGR. Date 9-6-94

Approved by Thomas J. Dobrauck Title MGR., ENG. Date 9-6-94

1. PURPOSE

The intention of the following inspections is to acquire information on the function of the tendon since the original installation. All conditions for buttonheads and wires, whether missing or defective, shall be documented. This Guide is intended to supplement Enclosure 6 and Data Sheets 1, 2, 3 and 4 of TMI Procedure 1301-9.1 which do not provide the means for detailed documentation.

2. INSPECTION DOCUMENTATION

Wire and buttonheads shall be inspected for the following information and documented by the appropriate code on Data Sheet 8.0. The circle represents the buttonhead location on the anchorhead. To correctly orient the buttonhead 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 8.0.

2.1. = Malformed buttonhead.

2.1.1. Malformed buttonheads shall be documented as cited below for that malformation observed during the Buttonhead Inspection.

2.1.2. To further identify specific deficiencies, a Category Code letter shall be used. An arrow shall point at the deficient buttonhead and the Category Code letter shall be placed at the tail end and in such a location so as not to obscure information.

2.1.2.1. M = More than 2 splits inclined more than 20 degrees but less than 45 degrees to the wire axis.

2.1.2.2. K = Cracked (In excess of 0.060" for all splits).

2.1.2.3. S = Split inclined in excess of 45 degrees to wire axis.

2.1.2.4. P = 2 or more splits in the same plane.

2.2. = Protruding/Unseated Wire/Buttonhead

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

2.3. = Broken/Missing Wire/Buttonhead

2.3.1. This code shall be used to identify occurrences for this surveillance, where those wires are not removed. See Section 2.5 for Code after removal.

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

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

2.6. = Each wire that was removed during this surveillance for purposes of physical testing.

3. QCD - Document the Buttonhead Inspection on the Sketch shown on Data Sheet 8.0 in accordance with the Buttonhead Code shown on Data Sheet 8.0 and as explained in Section 2 of this procedure.

4. QCD - Document the Heat Number Code Identification Number for each anchorage component on Data Sheet 8.0.

5. If it is readily apparent that a buttonhead is missing (compare the original or previous buttonhead inspection records to the current records) and cannot be located around the anchorage, it is possible that it may be in the grease of the grease can or other lost grease.

5.1. If it is necessary to search for missing buttonheads, the grease shall be strained through a mesh screen of not greater than 1/4" grids.

5.2. QCD - Document whether the buttonhead has been found or not, on Data Sheet 8.0.

5.3. QCD - Document the total amount of Effective Buttonheads.

6. <u>DOCUMENTATION</u>

The items in this procedure requiring documentation shall be documented on Data Sheet 8.0.

6.1. The Data Sheet references the applicable section number of the procedure for each QCD point.

7. <u>ATTACHMENTS</u>

7.1. DATA SHEET 8.0

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PROJECT: THREE MILE ISLAND SURVEILLANCE 6th YEAR: 1994

TENDON NO.: ________ TENDON END/BUTTRESS NO.: ________ UNIT 1

ANCHORHEAD I.D. ____________ BUSHING I.D. ____________

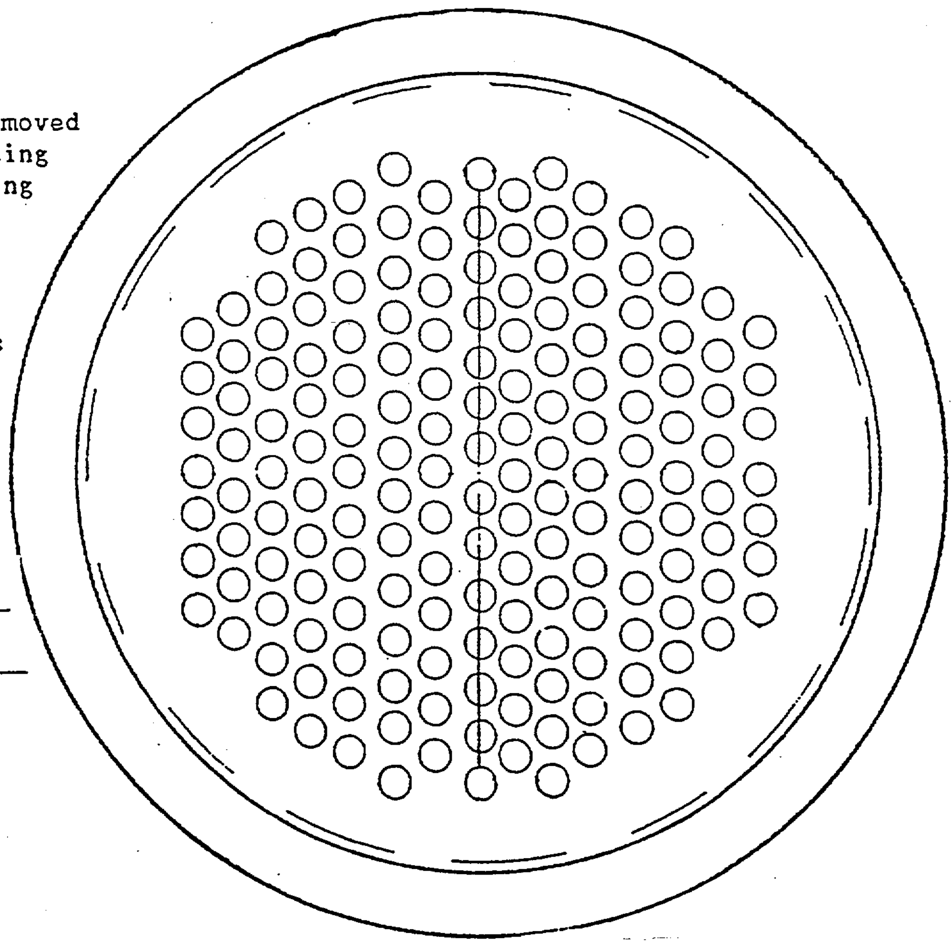
(3) BUTTONHEAD DATA
- = Discontinuous-Removed
- = Removed for Testing
- = Previously Missing
- = Protruding
- = Broken/Missing
- = Malformed

M = More than 2 splits
K = Cracked
S = Split Inclined
P = Plane/splits

(4) Locate Anchorage Heat Code on Sketch

(5.2) Buttonhead Found ____

(5.3) Total Effective BH ____



QC Signoff ____________________
Title ____________ Level ___
Date ____________________

QC Review ____________________
Title ____________ Level ___
Date ____________________

GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

PHYSICAL TESTING OF TENDON WIRES

Prepared by H.T. Hendricksen	Title MGR., Q.A.	Date 9-6-94
Approved by R.D. Hough	Title GEN. MGR.	Date 9-6-94
Approved by Thomas J. Dobrack	Title MGR. ENG.	Date 9-6-94

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1. PURPOSE

This procedure will establish the requirements for the Physical Testing of tendon wires removed from Post-Tensioning System Tendons for purposes of testing and evaluation, during In-Service-Inspections (surveillance) of Three Mile Island - Unit 1.

2. SCOPE

The intention of this procedure is to provide the means of physically testing an Acceptable Wire removed from a tendon. However, this Procedure shall also apply for the physical testing of wires which may have been found to be Broken or in an Unacceptable Corrosion Condition, should that be required by the Project Specification.

3. RESPONSIBILITY

As stated in PSC Procedure QA 4.0.

4. QUALIFICATIONS

As stated in PSC Procedure QA 4.1.

5. EQUIPMENT

Steel tapeline, steel ruler, 1" O.D. Micrometer, Wire Test Apparatus, Pressure Gauge.

6. QUALITY CONTROL

There are no Hold Points in this procedure, however all Quality Control Documentation (QCD) points shall require documentation as required on Data Sheet 10.3.

7. PRECAUTIONS

7.1. Avoid looking into the test apparatus while the wire is being tensioned.

7.2. Always maintain identification control of the samples so that the tendon identification is maintained, the direction of removal of the wire and the location of that sample as it was removed from the tendon wire.

7.2.1. As a means of maintaining consistency for testing, the end of the sample that is tagged (closest to pulling or buttonhead end) shall always be placed into the Wire Test Apparatus (Figure D 1) opposite or away from the ram end.

8. PHYSICAL TESTING

The following steps shall be used to test any tendon wire removed from the tendon, whether that is an Acceptable Wire, a Broken Wire or a Wire of an Unacceptable Corrosion Condition.

8.1. The specimen wires will be cut to a length of 108" plus or minus 1/4", after being removed during the performance of GPU Procedure 1301-9.1, Enclosure 5. Develop a separate Data Sheet for each sample tested. It will be acceptable to cut the sample to the Buttonheading Length of 101 inches plus or minus one inch. (See Section 8.3 of this Procedure.)

8.1.1. <u>ACCEPTABLE WIRE</u>

Three specimens shall be tested. One sample shall be taken from approximately the middle of the tendon wire length, with the two remaining samples being taken, one from approximately each end of the tendon wire.

8.1.2. <u>BROKEN WIRE</u>

If Broken Wires require testing, three specimens shall be tested. One sample shall be taken from the wire length about one foot from either side of the break. The two remaining samples shall be taken, one from approximately each end of the tendon wire.

8.1.3. <u>UNACCEPTABLE CORROSION CONDITION</u>

If Unacceptable Corrosion Condition Wires require testing, at least one specimen shall be tested, with that sample being taken from what is judged to be the worst representative section of the wire length. Other samples may be selected and/or tested at the request of the Owner or his agent.

8.1.4. QCD- Document the wire identification, location of removal and overall length on Data Sheet 10.3 from Data Sheet 4 of GPU Procedure 1301-9.1.

8.2. Measure the diameter of the wire in 3 locations, each end and the middle.

8.2.1. QCD- Document the measurement of the wire and the measuring device on Data Sheet 10.3. Calculate and document the average of the 3 measurements.

8.3. Cut each wire test sample to 101" plus or minus 1" long; this must be a square, neat cut to permit buttonheading.

8.3.1. Slide two Wire Test Stressing Washers (see Figure D 2) onto the wire, making sure the chamfered seats face to the outside of the wire.

8.3.2. Buttonhead both ends of the wire.

8.3.2.1. QCD- Document the acceptance of the buttonheads on Data Sheet 10.3 using the acceptance criteria shown in GPU Procedure 1301-9.1, Enclosure 7, Table 4.

8.4. Measure the Gauge length of the wire; from inside of the buttonhead at one end to the inside of the buttonhead at the other end within an accuracy of plus or minus 0.050".

8.4.1. QCD- Document the Gauge length of the wire and the identification and recalibration date for the measuring device.

8.5. Place the specimen into the Wire Test Apparatus and check for proper seating of the Stressing Washers in the pulling adaptors.

8.6. Preload the wires to about 2.45 kips +0,-10% to seat the buttonheads in the Stressing Washers.

8.6.1. QCD- Document the preloading pressure and force, the identification and recalibration date of the Wire Test Apparatus.

8.6.1.1. To obtain pressure when the force is specified, divide the force in pounds (kips X 1000) by the ram area to provide the required or actual gauge pressure.

8.7. Reduce the preload force to 0 force.

8.7.1. QCD- Document the release of the preload force.

8.8. Load the wire to 1.42 kips plus or minus 5%; this will provide 0.1% elongation.

8.8.1. QCD- Document the initial loading of the wire in force, pressure and actual elongation at this point. Elongation shall be measured to an accuracy of 0.050".

8.9. Preset the Dial Indicator on the Wire Test Apparatus to measure 0.9% elongation. (0.9 in a Gauge length of 100")

8.9.1. QCD- Document the setting of the Dial Indicator.

8.10. Load the wire until the Dial Indicator shows signs of movement, signaling the 0.9% elongation (pressure at 1% elongation).

8.10.1. QCD- Document the force and pressure at 1% elongation.

8.11. Remove the Dial Indicator.

8.11.1. QCD- Document the "Rule" dimension reading at 1% elongation (approximately 1") to an accuracy of 0.050".

8.12. Continue to load the wire to failure.

8.12.1. QCD- Document the maximum elongation measurement from the "Rule" to an accuracy of 0.050".

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8.12.2. QCD- Document the maximum force or pressure reading at failure.

8.13. Remove the sample wire (two pieces) and remove the Stressing Washers.

8.13.1. QCD- Document the type of failure, ductile or brittle, and the location of the wire break from the tagged end of the wire (opposite the ram).

8.14. Calculate the following and document on Data Sheet 10.3.

8.14.1. QCD- Calculate the ultimate stress.

8.14.2. QCD- Calculate yield stress from the pressure reading at 1% elongation.

8.14.3. QCD- Calculate the percent of elongation under load at the point of failure, based on the actual Gauge length of the wire.

9. <u>NOTIFICATION - UNACCEPTABLE CONDITIONS</u>

The Owner shall be formally notified when each one or more of the following unacceptable conditions are detected as a result of the inspection or Physical Testing of a Tendon Wire.

9.1. The diameter of the wire exceeds 0.250" plus or minus 0.002".

9.2. The Corrosion Condition of the wire is "E" Reject Condition as described in GPU Procedure 1301-9.1, Table 3.

9.3. The wire fails to meet the ultimate strength of 240,000 psi.

10. <u>DOCUMENTATION</u>

The items in this procedure requiring documentation shall be documented on Data Sheet 10.3.

10.1. The Data Sheet references the applicable section number of the procedure for each QCD Point.

10.2. Some information from Data Sheet 4 of GPU Procedure 1301-9.1 shall require posting to Data Sheet 10.3.

11. <u>ATTACHMENTS</u>

11.1. Data Sheet 10.3

11.2. Figure D.1

11.3. Figure D.2

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WIRE TEST DOCUMENTATION

PROJECT ____________ SURVEILLANCE NO. ________ YEAR ______

TENDON NO. ________ TENDON END/BUTTRESS NO. ________ UNIT ______

Q.C. SIGNOFF ____________ TITLE ____________ DATE ________

(8.1.4) Wire ID and Location of removal ____________ Length ________

(8.2.1) Wire Diameters: Tag End ______ Middle ______ Ram End ______ Avg. ______
Measuring Device ID ____________ Recal Date ____________

(8.3.2.1) Buttonhead Inspection: Tag End ________ Ram End ____________

(8.4.1) Gauge Length of Wire ______ Measuring Device ID ______ Recal Date ______
(8.6.1) Preload force ______kips
Preload Pressure______psi Pressure Gauge ID________ Recal Date________
Ram Identification________Ram Area______ K =______ Recal Date________

(8.7.1) Force reduced to 0 ________

(8.8.1) Initial load of wire force________kips(@.1% elongation)
Initial load of pressure________psi. Elongation ________in.

(8.9.1) Preset Dial Indicator _____(0.9% elongation) Indicator ID_____ Recal Date _____

(8.10.1) Force at 1% elongation ________ kips; Pressure ________ psi

(8.11.1) "Rule" reading measurement at 1% elongation ____________ in.

(8.12.1) Maximum elongation at failure, from "Rule" reading ____________in.

(8.12.2) Maximum force at failure ________ kips; Pressure ________ psi

(8.13.1) Type of break ____________ Location of break ____________

(8.14) CALCULATIONS:

(1) Ultimate Stress ____________ Max.Force $\div$ (π Diam.$^2 \div$ 4)

(2) Yield Stress at 1% elongation ____________ Force @ 1% $\div$ (π Diam.$^2 \div$ 4)

(3) Percent elongation at failure ____% [1 +("Rule"Dim @ Failure -"Rule"Dim @ 1%)]

(9) Sample: Accept ______ Unacceptable ______ Engr. Notified ____________

Q.C. Review ____________ Level _____ Date ____________

Title ____________

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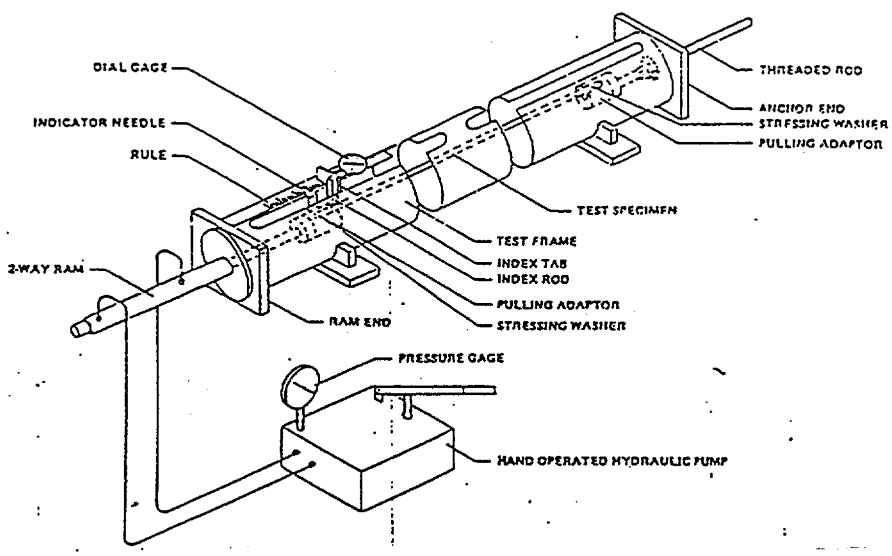
WIRE TEST APPARATUS - FIGURE D.1



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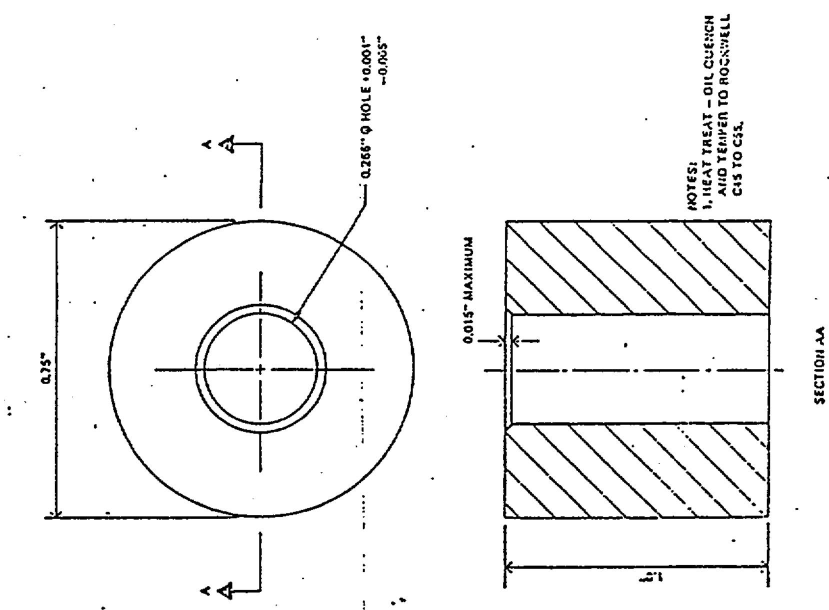
WIRE TEST STRESSING WASHER - FIGURE D.2



GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY CONTROL PROCEDURE

PSC ENGINEERING DATA

Prepared by H. F. Hendrickson Title MGR, Q.A. Date 9-6-94
Approved by R. D. Hough Title GEN. MGR. Date 9-6-94
Approved by Thomas J. Dobrowski Title MGR., ENG. Date 9-6-94

1. USE OF "K" (CONSTANT)

With the use of regression analysis for the calibration of ram area, as seen in the PSC Ram Calibration Procedure where error calculation is also considered within the computer program, the ram area no longer reflects the ram size, but instead provides an area measurement with a correction factor related to pressure. This correction factor becomes a "Constant" (K), related only to that ram being calculated for area. The constant is a factor that considers the amount of force necessary to overcome internal resistance. This Constant will vary from ram to ram and could be positive or negative; that is, it may have to be added or subtracted from the total force to provide the true actual force measurement, whether that force is PreTensioning Force, OverStress Force, or LockOff Force.

2.1. FORMULA AND WORKING RELATIONSHIPS

The basic formula for determining stressing force or stressing pressure when three factors are known is:

$$F = \frac{A \times P}{1000} + K$$ (Remember that "K" could be plus or minus.)

2.1.1. Only P or F could be unknown and remain to be determined. The other three factors will always be provided before beginning the calculations.

2.2. EXAMPLE - To find force in Kips

Where F = Force in Kips; A = Ram Area in square inches; P = Gauge Pressure in psi; K = Constant (given in Kips). Let A = 336; P = 4147.86; K = 8.32; then:

$$F=\frac{(336 \times 4147.86)}{1000} + (+8.32) \text{ or } F=1393.68 + (+8.32) \text{ or } F=1402 \text{ Kips}$$

2.3. EXAMPLE - To find Gauge Pressure

Where it becomes necessary to determine P when 1437 Kips is the known force; A = 336; K = (-8.32); then:

$$P = \frac{(F-K) \times 1000}{A} \text{ or}$$

$$P = \frac{(1437 - (-8.32)) \times 1000}{336} \text{ or}$$

$$P = \frac{1445.32}{336} \times 1000 \text{ or}$$

$$P = 4301.55$$

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PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

PROGRAM PURPOSE

Prepared by H.L. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R.D. Hough Title GEN. MGR. Date 9-6-94

Approved by Thomas J. Dobrowski Title MGR., ENG. Date 9-6-94

1. PURPOSE

This section of the Surveillance Quality Control Manual shall outline the Quality Assurance/Quality Control activities necessary to insure that the In-Service Inspection operations are performed in accordance with approved procedures and provide the required quality level, consistent with the project specifications, industry standards, regulatory code requirements and the Precision Surveillance Corporation Quality Assurance Program.

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PROGRAM SCOPE

Prepared by H.F. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R.D. Hough Title GEN. MGR. Date 9-6-94

Approved by [illegible] Title MGR., ENG. Date 9-6-94

1. SCOPE

The Quality Assurance Procedures within this Section of the Surveillance Program Quality Control Manual are intended to be supplemental to the Precision Surveillance Corporation (PSC) Quality Assurance Manual. They are not intended to replace any Criteria of the Quality Assurance Manual. The Quality Assurance Manual remains as the highest category of document within the Quality Assurance Program hierarchy of documents.

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PRECISION SURVEILLANCE CORPORATION
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QUALITY ORGANIZATION

Prepared by H. F. Hendrickson Title MGR, Q.A. Date 9-6-94

Approved by R. D. Hough Title GEN. MGR. Date 9-6-94

Approved by Thomas J. Dobecki Title MGR, ENG. Date 9-6-94

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1. ORGANIZATION

PSC Field Quality Control Inspectors operate under the immediate direction of the Lead Field Quality Control Inspector, who in turn reports to the PSC Manager, Quality Control.

1.1. The Field Quality Control Inspectors shall have full authority and responsibility in all matters pertaining to or affecting the quality control function for the Surveillance of the Post-Tensioning System. These Inspectors shall have the authority to accept, reject, or recommend changes to the field operations or performance.

1.2. The Field Quality Control Inspectors, and the Quality Assurance personnel shall have the authority to issue a "Stop Work Order" for any activity, material, or procedure not in conformance with the project specifications, the Quality Assurance Manual or the Surveillance Quality Control Manual. The stop work action shall be coordinated through the PSC Manager of Quality Assurance.

1.3. The Quality Control Procedures section of this manual shall serve to further outline the duties and responsibilities of those personnel engaged in performing the quality control functions for the Surveillance of the Post-Tensioning System.

1.4. All personnel engaged in those activities that affect the quality function for the Surveillance operations, shall be qualified by experience or training, prior to the initial performance of their assignments.

1.5. Documentation of qualification and/or training shall be maintained in the quality files on site for those personnel engaged in quality activities.

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PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

QUALITY CONTROL RESPONSIBILITY

Prepared by H. F. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R. D. Hough Title GEN. MGR. Date 9-6-94

Approved by Thomas J. Dobrowski Title MGR., ENG. Date 9-6-94

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1. <u>QUALITY CONTROL RESPONSIBILITY</u>

1.1. The responsibility for the Quality Assurance and Quality Control functions for this project shall be incumbent on those organizations performing that portion of the work described within the various sections of this manual, or as otherwise agreed to in the contract documents.

1.2. Portions of the work not performed by PSC, but where PSC supplies only the equipment or material, shall be subject to the quality requirements specified within the applicable PSC Quality Manual, where that Quality Manual has been developed to comply with the project specifications or contract documents.

1.2.1. The development of the Quality Assurance and Quality Control procedures for the Surveillance operations shall be the responsibility of those organizations performing that portion of the work, unless otherwise agreed to in the contract documents.

1.3. PSC Field Quality Control Personnel shall provide the Quality Control actions for that portion of the work, where PSC or its subcontractors are performing the work or as agreed to in the project specifications or contract documents. All subcontractors performing work as an agent of PSC, shall be subject to the Quality requirements of the project specifications and the applicable PSC Quality Program.

1.4. PSC and its subcontractors and vendors, shall maintain open access for Inspection, Survey and Audit by the Owner or his authorized agent for all portions of the work being performed for the project.

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PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
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PERSONNEL QUALIFICATIONS

Prepared by H.K. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R. D. Hough Title GEN. MGR. Date 9-6-94

Approved by Thomas J. Dobrash Title MGR., ENG. Date 9-6-94

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1. QUALIFICATIONS

1.1. QUALITY CONTROL INSPECTORS

All Quality Control Inspectors performing Inspections and Tests shall be qualified to minimum of Level I capability in accordance with the requirements of ANSI N45.2.6-1978.

1.1.1. All Lead Field Quality Control Inspectors shall be qualified to a minimum of Level II capability in accordance with the requirements of ANSI N45.2.6-1978.

1.1.2. All Field Quality Control Inspectors performing reviews of Quality Control Documentation for the various procedures in the PSC Surveillance Quality Control Manual shall be qualified to a minimum of Level II in accordance with the requirements of ANSI N45.2.6-1978.

1.1.3. All Quality Control Inspectors shall be certified to specific skill Levels by a Quality Control Inspector who has been qualified as Level II or III in accordance with the requirements of ANSI N45.2.6-1978.

1.2. CONSTRUCTION PERSONNEL

Precision Surveillance Corporation Field Construction Personnel shall be responsible for the physical activities associated with the Surveillance of Post-Tensioning System Tendons. Construction Personnel shall be fit by skill, training and/or experience to perform these activities.

1.3. CONSTRUCTION SUPERVISION

PSC Supervisory and Field Representative Personnel shall be responsible for administering the progress of the work and directing PSC Field Construction Personnel as necessary. These Personnel shall be fit by skill, training and/or experience to perform these duties.

1.3.1. Construction Personnel or Construction Supervision need not be qualified to ANSI N45.2.6 as they are supervised or overseen by a qualified individual participating in the inspection, examination, or test.

1.4. AUDITORS

PSC Personnel performing audits of field operations shall be qualified as auditors in accordance with the requirements of ANSI N45.2.23-1978.

2. DOCUMENTATION

Records of training and personnel skill certifications shall be documented in accordance with the requirements of the governing ANSI N45.2 or daughter specifications and shall be retained on site for those personnel so certified and/or trained.

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PRECISION SURVEILLANCE CORPORATION
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PERSONNEL TRAINING

Prepared by H. F. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R. D. Hough Title GEN. MGR Date 9-6-94

Approved by Thomas J. Doherty Title MGR., ENG. Date 9-6-94

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1. TRAINING

Precision Surveillance Corporation personnel on site involved in the surveillance of the Post-Tensioning System, shall be qualified and experienced in all phases of Post-Tensioning operations.

1.1. All training activities shall be conducted and coordinated by qualified, experienced, PSC personnel.

1.2. At the start of the work and usually at the beginning of each new phase of the Post-Tensioning operations, the field crews shall be instructed to perform the work in a safe manner and in accordance with the approved surveillance procedures manual. They shall further, be trained in the use of the Post-Tensioning equipment for the operation for which they are being qualified, and for any subsequent actions during those operations that may affect the quality or integrity of the Post-Tensioning System.

1.3. The duration of the training period shall not be of a predetermined period of time, but shall instead be of such a length of time, that the PSC training personnel feel confident that the personnel being trained are sufficiently knowledgeable in the methods and procedures of the operation for which they are being trained. Each trainee shall be oriented by on-the-job training prior to the initial performance of any quality oriented function and each time he performs a different job assignment not previously trained or qualified for.

1.4. A list of the trained and qualified personnel shall be maintained on site, indicating the training received and the dates of training. Newly trained personnel shall be added to the list as the training is completed. This list shall be reviewed and controlled by PSC Field Quality Control personnel. Crew proficiency shall be verified during the progress of the work, through the mediums of inspection, surveillance or audit.

1.5. Procedures shall be used for training those personnel not familiar with Post-Tensioning Systems or Surveillance activities.

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PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

PROCUREMENT

Prepared by H. F. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R. P. Hough Title GEN. MGR. Date 9-6-94

Approved by Thomas J. Dubrowski Title MGR., ENG. Date 9-6-94

1. PROCUREMENT

1.1. SAFETY - RELATED

The purchase of any safety-related material or service to be used for the Post-Tensioning System or surveillance operation shall be performed by the Procurement Section of the Precision Surveillance Corporation in accordance with the requirements of the Quality Assurance Program requirements in effect at that time and the requirements stated below.

1.1.1. Field personnel shall initiate a procurement request by a written or verbal order to the Construction or Project Management Section.

1.1.2. A requisition shall be prepared and submitted to the PSC Quality Assurance Section for attachment of applicable quality documents and/or comments and returned to the Project Management Section.

1.1.3. The requisition shall be sent to the Procurement Section for drafting of the purchase order, pricing, vendor selection, etc.

1.1.4. The purchase order shall be submitted to the Quality Assurance Section for review of quality content, approved vendor selection and sign-off. Other pertinent quality documents may be attached or referenced and then the purchase order shall be returned to the Procurement Section.

1.1.5. The purchase order shall be submitted to the vendor and copies of the order distributed to appropriate personnel.

1.1.6. Changes to the original purchase order shall be provided through the use of a Supplemental Purchase Order, which shall be subject to the same review and control process as the original purchase order.

1.2. NON-SAFETY-RELATED

Miscellaneous non-safety-related field purchases may be initiated by the field personnel or ProcurementSection within the confines of the operating procedures established by the Operating or Construction Departments, independent of this manual.

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PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

FIELD CHANGE REQUEST

Prepared by H.L. Hendrickson	Title MGR., Q.A.	Date 9-6-94
Approved by R. D. Hough	Title GEN. MGR.	Date 9-6-94
Approved by Thomas J. DeBruck	Title MGR., ENG.	Date 9-6-94

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1. FIELD CHANGE REQUEST

The Field Change Request shall be the mechanism for requesting rapid evaluation and approval for those operations that must be changed to accommodate field conditions. The FCR shall be approved by the Owner or his agent prior to that change being put into effect.

1.1. Field Changes that take place prior to the approval of the FCR shall be documented by a Nonconformance Report and subject to a "STOP WORK" order, depending on the magnitude of the change and the impact on the quality program. It shall not be necessary to generate an NCR where it has become necessary to return or move to a safe condition of the tendon or personnel.

1.2. Revisions to this manual shall be performed according to the Revision Control procedure found in the prologue of the Surveillance Manual. The following information will supplement those procedures for Field Change Request Activity.

1.2.1. When field operating procedures, as stated in this manual, become impractical to follow exactly for any reason, that portion, and any other affected portion of the manual shall be revised to provide the appropriate procedures. Where possible, revisions shall be made prior to performing the work.

1.2.2. When revisions become necessary, they shall be formally drafted by the PSC Quality Assurance Section and submitted to the Owner or his agent for formal approval. Where applicable, the responsible PSC Field Quality Control Personnel shall prepare a Field Change Request document to expedite approval from the Owner's Field Quality Organization, Maintenance Engineer or such other authority as designated by the Owner, in order to continue operations without extraordinary delays. The change document may then be transmitted to the Owner or his agent for formal approval or to issue a change order notice type of document.

1.2.3. Approval of the Field Change Request or emergency revision shall be obtained from the appropriate Site Quality Assurance Authority representing the Owner, before starting any Field Changes or Revisions.

1.2.4. Copies of the Field Change Request shall be submitted to the PSC Quality Assurance Section for review and where necessary for development of formal procedures to be included in the Surveillance Quality Control Manual.

1.2.5. The approval of the FCR shall be considered as the acceptance for the Revised Procedures unless gross changes occur during the Revision drafting, that affect other portions of the Surveillance Manual.

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1.2.5.1. If gross changes occur, the Surveillance Quality Control Manual affected procedures shall be submitted for formal review and approval. Otherwise, the FCR Revision shall be considered as approved and submitted on a controlled basis for inclusion in the Surveillance Manual.

1.2.6. As the PSC Quality Assurance Section and the Engineering Department are responsible for drafting Revisions, whether a result of the FCR process or Specification Changes, it shall not be necessary for either function to provide a formal review and signoff. It shall be necessary for the Originator or PSC Field Quality Control personnel to call the PSC Home Office to acquire agreement and acceptance of the FCR before submitting it to the Owner's agent. This way Quality Assurance and Engineering can evaluate the impact of the FCR on Quality Control, Engineering features and other subsequent Surveillance activities.

1.2.6.1. The Originator or PSC Quality Control personnel shall document the review and acceptance of the PSC Home Office personnel by printing the name of the person accepting that FCR and the date of acceptance at the bottom of the Recommended Change area on the FCR form.

1.2.7. The original FCR shall be maintained with the Field Quality Control records.

1.2.7.1. The remaining distribution shall be completed, using the Distribution Listing shown at the bottom of the FCR form once the FCR is formally approved by PSC and the Owner.

1.2.7.2. The FCR shall be entered into the FCR Index Log for

1. FCR Number
2. Brief Description
3. Date Written
4. Date Approved
5. Date of Revision (to Surveillance Manual, if applicable)

1.3. <u>DOCUMENTATION</u>

Included with this procedure are the various forms and control sheets described in this procedure.

2. <u>ATTACHMENTS</u>

2.1. Field Change Request Form

2.2. Field Change Request Index Form

SPECIAL FIELD REVISION CONTROL	PSC Precision Surveillance Corporation
FIELD CHANGE REQUEST NO. FCR	

Requested By: Title: Date:

Originator:

PROCEDURE NUMBER: REV. NO.: PROCEDURE TITLE:

AFFECTED SECTION: Revision to Manual Required Yes [ ] No [ ]

NCR REQUIRED: Yes [ ] No [ ] NCR. No. Hold Tag No.

DETAILED DESCRIPTION OF EXISTING CONDITION: (use extra pages or write on back)

RECOMMENDED CHANGE:

PSC Approval: Quality Assurance Sign & Date	Quality Control	Engineering

ON SITE OWNER/AGENT, APPROVAL OR COMMENTS:

APPROVED SITE QA AUTHORITY: TITLE: DATE:

DISPOSITION PSC QC: HOLD TAG APPLIED ______ HOLD TAG REMOVED ______

Q.C. INSPECTOR: DATE:

Distribution:
- ____ Quality Assurance Owner
- ____ Quality Assurance PSC
- ____ Engineering Owner
- ____ Engineering PSC
- ____ Project Manager PSC
- ____ Quality Control Owner
- ____ Quality Control PSC

FIELD CHANGE REQUEST

INDEX LOG

PSC Precision Surveillance Corporation

FCR No.	Item	Date Written	Date Approved	Date Rev.

GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

DOCUMENT CONTROL

Prepared by H.K. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R. D. Young Title GEN. MGR. Date 9-6-94

Approved by Thomas J. Dobrowski Title MGR., ENG. Date 9-6-94

1. DOCUMENT CONTROL

The responsibility for control and retention of all documentation and records, related to the quality control functions for the project within the limitations of the contract documents shall be incumbent on those organizations performing that portion of the work and as further stated in PSC Procedure QA 3.0.

1.1. All documentation, which includes inspections, tests, certifications,drawings, purchase orders, specifications, procedures, correspondence and audits, etc. shall be prepared in accordance with the procedures as described in the applicable job related manuals and procedures.

1.2. All inspection records shall be reviewed, initialed or signed and dated by the personnel responsible for the quality control functions.

1.3. All quality related documents pertaining to the project shall be retained in the field office file, jobsite vault, or both and maintained in such a manner so as to permit retrieval and prevent loss.

1.4. Document distribution or retention shall be in accordance with the requirements of the project specifications, or as agreed to in the contract documents.

1.4.1. All documents such as Data Sheets, Nonconformances, verification records, calibration records, certified mill test reports, engineering analyses, etc. generated during the course of the In-Service Inspection, shall be included in the Final Report for that Nuclear Generating Station being surveyed or appended to that Final Report.

1.5. Copies of Non-Conformance Reports shall be distributed in accordance with the project specifications or as noted on the Non-Conformance/Corrective Action form; refer to PSC Procedure QA 9.0.

1.6. All records shall be sent to the responsible Quality Control Section for further distribution in accordance with the project specifications, or as agreed to in the contract documents, or the PSC Quality Assurance Manual.

1.7. The following numbering system, as extracted from the Quality Assurance/Quality Control filing index may be used to control the Field Quality Control Files as applicable.

1201 Q.A. Manual
1202 Q.C. Manual
1204 Field Manual
1205 Project Specs.
1207 Inspection-Field Records
1208 Audits
1209 Calibrations
1210 Q.C. Documentation (Receiving)
1213 Non-Conformance/Corrective Action
1214 Purchase Orders
1215 Training/Qualifications
1216 Testing
1218 Miscellaneous

GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
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PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

REVISION CONTROL

Prepared by H.F. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R. D. Hough Title GEN. MGR. Date 9-6-94

Approved by [signature] Title MGR., ENG. Date 9-6-94

1. GENERAL

The statements within this Manual are representative of the Precision Surveillance Corporation quality program activities in effect at the time of issue. The construction phase of the project and other delays have a direct influence on the amount of time that will transpire between the actual startup of fabrication and termination of the construction life of the contract. It may therefore become necessary to review and upgrade or revise the various quality procedures or manuals, as a means of accommodating changes in the specifications, codes, operating procedures, material procurement, or as a means of transmitting intent, information or clarification. Correction of misspelled words or typographical errors that do not affect intent, shall not be considered as revisions.

2. TRANSMITTAL

Submittal of revisions to the Owner or his agent, shall be in conformance with Criteria VI, Document Control, of the Quality Assurance Manual.

3. REVISION CONTROL

3.1. If a revision is submitted where a Quality Control Manual has been issued, only those procedures being revised shall be affected for approval status. The remainder of the Quality Control Manual shall still remain approved. The original or previous revision of the affected procedure shall remain in effect, unless unworkable, until the revised procedure has been approved.

3.2. When a revision is submitted, the entire manual shall then become "Revision One" for example. Included in the revision package are all those documents required to bring the original version of that manual to "Revision One" status.

3.3. A Revision Control Sheet shall show all the documents being submitted, with the correct revision status of each page. The Revision Control Sheet provides a chronological history of development for the manual while the Index Status Sheet indicates all the original documents contained within the original submittal of the manual.

3.4. The Index Status Sheet shall not be revised to any extent greater than to show a date and revision number in the Revision Status column on the Index Status Sheet.

3.5. It is unlikely that any document within any PSC Quality Manual shall be of an unrevised status or of the same revision status as the Manual itself. Therefore, the document and manual revision numbers will not be the same. The Index Status Sheet will establish the revision status of each Manual or document issued.

3.6. When a revision is made to a procedure, the entire procedure will revert to that revision number, even if there are no editorial or format changes to that procedure. Unaffected pages will be marked at the bottom of the page with a triangle (delta) , with the revision number and comments as to the status of that page.

3.6.1. Revisions to a Section/Paragraph of a procedure will be identified with a triangle appearing at the left edge of the page near the Section/Paragraph which has been affected and revised. Inside the triangle will appear the revision number for that current change. The triangle will appear only for those Sections/Paragraphs that have changed.

3.6.2. It will not be necessary to delete the triangle from the previous revision, even though it is generally recommended that signs of a previous revision be removed to avoid confusion. It will be acceptable to erase, white-out, or tape over signs of the previous revision, where that page has not been revised and is not being reproduced as a new document.

3.6.3. It will not be necessary to apply a revision number to the top of each of those pages that comprise the body of the procedure. The revision number and date need only appear at the top of the Title Page and Data Sheets.

3.6.4. <u>No Change</u> will be taken to mean, that no changes have occurred to that page and that the revision number indicates the current status of that page. No dates other than the original effective date will appear on individual pages. Only the Title Page and Data Sheets shall show revision status and date of that revision, along with the triangle at the bottom of the page.

3.6.5. <u>No Editorial Change or Format Change</u> will be taken to mean, that the text of that procedure has not changed and that the change affects the page number, section/paragraph number or that information has shifted from one page to another. This will be noted along side the triangle at the bottom of the page.

3.7. Where drawings are included in the manual, such as post-tensioning fabricated components, these drawings shall be controlled through the quality manual for that product, except where otherwise agreed to in writing. This system utilizes the drawings and procedures from a controlled quality manual for fabrication and inspection control of that component and shall accompany the purchase order to the vendor, where applicable.

4. <u>OWNER RESPONSE</u>

4.1. Once the revision is received by the Owner or his agent, the Acknowledgement of Receipt or a facsimile, shall be returned to the Precision Surveillance Corporation, Quality Assurance Section.

4.2. Owner comments shall be referred to the PSC Quality Assurance Section or those personnel responsible for contract coordination.

4.3. Owner approval without comments shall be transmitted in writing to either party noted in Section 4.2 above, however verbal approval shall be sufficient to start work using the approved revision.

4.3.1. Section 4.2 or 4.3 above, may be replaced by other means of control which have been established and formally agreed to by PSC and the Owner.

5. <u>OWNER CONTROL (SUGGESTED)</u>

As a means of maintaining the controlled manual and revisions at the Owner or his agents facility, it is recommended that the submitted documents be verified for accuracy of inclusion, by comparing them to the Revision Control Sheet. PSC is not immune to errors, regardless of the amount of controls imposed or implied.

6. <u>EXPEDITING CONSTRUCTION</u>

6.1. In order to expedite the construction schedule and with the Owner's approval, it may become necessary or advantageous to fabricate materials prior to the approval of the revision. All materials fabricated in this situation shall be tagged "Hold" and retained on that status until approval of the revision. At the time of approval the "Hold" tag shall be removed. Also see Criteria II Quality Assurance Program, Section 3.4.

6.2. If, for some reason, the revision is not approved, the material fabricated or installed under the controls of the revised procedure shall be maintained on Hold status until the revision is approved. Adjustments to the material shall be made, where required, after approval.

7. <u>VOID DOCUMENTS</u>

Once approved, the document being revised shall be marked void and dated to reflect the revision date. This void copy will be removed from the manual and placed into a dead or void file for retention as part of the Quality Assurance records.

7.1. As a temporary measure, the void copy may be turned backwards in the manual, until removal to the file.

7.2. Items fabricated or installed with the use of the previous revisions will not require any subsequent change once fabricated or installed. The date of the document approval shall determine the point of fabrication change-over and therefore, the applicable quality requirements.

7.3. PSC does not require that void documents be returned.

8. FORMS/DATA SHEETS

Any of the forms contained in this Manual or any Quality Control Procedure used as a means of providing quality control or inspection documentation, are subject to change at any time without prior approval of the Owner or his authorized agent, providing that the amount of information shown on the original form is not diminished in any way.

8.1. These revised forms shall be submitted for approval at the convenience of PSC with the next revision of that procedure that effects the change, but in no case later than 30 days from the first use of that form.

8.2. If the information required of the original or previous revision of that form is to be diminished in any way, that form shall be submitted for approval prior to use.

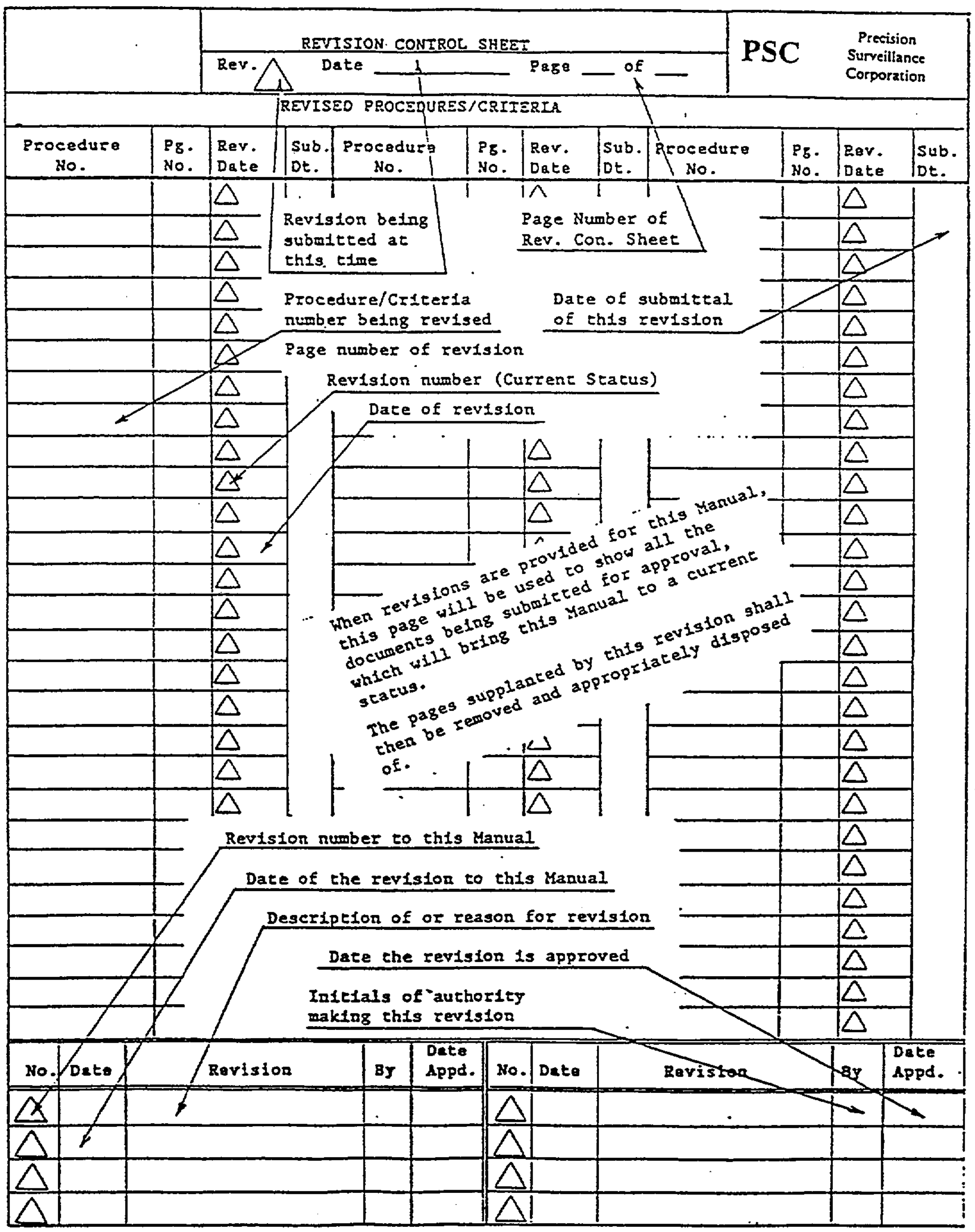
8.3. Forms may be provided at any time where not shown in any procedure in order to provide the required quality control or inspection documentation, without prior approval and at the option of the PSC Quality Control or Quality Assurance Sections.

9. ATTACHMENTS

9.1. Sample Revision Control Sheet

REVISION CONTROL SHEET

Shown below is a reduced size sample of the Revision Control Sheet.



GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

NONCONFORMANCE REPORTING

Prepared by H. F. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R. D. Hough Title GEN. MGR. Date 9-6-94

Approved by [signature] Title MGR., ENG. Date 9-6-94

1. NONCONFORMANCE REPORTING

1.1. Any item, service, activity or procedure not conforming to the approved drawings, specifications, instructions or other project requirements as related to the PSC contract for the project, shall be documented as a nonconformance. A non-conformance report shall be written by the authority responsible for quality, discovering the nonconformance, regardless of the location where the deficiency was discovered or the source of origin.

1.1.1. This reporting shall be completed on a timely basis, preferably immediately upon discovery and consultation. In no case shall the reporting action exceed 30 days from discovery to actual distribution.

1.2 All nonconforming items shall be suitably identified or tagged as "HOLD", and where physical segregation is practical, that item shall be removed to a segregated area. Where size or quantity do not permit segregation, the nonconforming items shall be identified so as to prevent that item from being incorporated into the production or process flow.

1.3. The nonconformance report shall be distributed to the appropriate parties noted on the distribution list shown on the PSC Nonconformance/Corrective Action Report Form, which is shown at the end of this procedure. A typical Nonconformance Report Index shall also be seen.

1.3.1. The Owner or his agent shall receive copies of those nonconformance reports that indicate a loss of control for the manufacturing process, field construction, or quality control system and where it has been determined by PSC Quality Assurance, Quality Control, and/or possibly the Owner, that a measure of input shall be required by the Owner or his agent to resolve the deficiency.

1.3.1.1. The Recommended Corrective Action for the nonconformance reports noted in Section 1.3.1 above, shall be submitted to the Owner or his agent for review and approval prior to the execution of that action, for all items to be dispositioned as "Repair" or Use-As-Is.

1.3.1.2. There is no intention to submit all nonconformance reports to the Owner or his agent, whether for review and/or approval where these deficiencies do not impact on the quality of the product being supplied and are generated as a matter of additional control or to report internal administrative deficiencies.

1.4. Acceptance of the nonconforming item, after completion of the corrective action, shall be by inspection.

1.5. Once the corrective action has been determined, the Quality Control or Quality Assurance personnel shall make arrangements for the completion of the nonconformance, including verification. The completion of this action shall be documented in the Disposition area provided on the NC/CA Report Form.

1.5.1. Once the nonconformance has been corrected and the disposition completed on the NC/CA Report Form, the formal close-out of that report shall be documented in the NCR Index Log. All nonconformance reports shall be closed-out.

1.5.2. In some circumstances, the corrective action may be completed on another document, such as an Owner nonconformance report. In that case, the PSC NC/CA Report may be closed-out immediately as a result of the Owner's document, and shall be so noted in the Index Log.

1.6. Only Quality Control or Quality Assurance personnel shall have the authority to remove the "HOLD" tag or other identifying marks from the nonconforming item, once disposition of the corrective action has been completed and accepted by that Quality authority.

1.7. In addition to the normal reporting system for Nonconforming Material and Services, supplemental reports shall be submitted for deficiencies whether a result of design, conformance, fabrication, or performance, that represent a significant breakdown in the Quality Assurance Program and, were they to remain uncorrected, could adversely affect the operation of the item at any time throughout the expected lifetime of the item. These written reports shall be prepared by the PSC Quality Assurance, Quality Control, and/or Engineering Department and submitted to the Owner or his agent documenting the cause of the deficiency and the formal corrective action to prevent repetition.

1.8. The Nonconformance Reports shall be retained in the appropriate Quality file on site.

2. DRAFTING THE REPORT

The following outline shall be used as a guide for developing the Nonconformance Report. Refer to the example at the end of this procedure.

2.1. The Nonconformance Report shall indicate the identification of the nonconforming item, the deficiency noted, preferably with reference to the requirement in violation, in the area marked Nonconformance on the NC/CA Report Form.

2.2. The Apparent Cause Known shall be entered onto the form, if it can be readily discerned. Overly restrictive or unworkable procedures or specifications may be listed as the cause, as well as changes in working conditions not considered by the procedures or specifications. If this cannot be satisfactorily resolved by the initiator of the report, then it shall be completed by Quality Assurance, Quality Control or the Engineering Department.

2.3. The area marked Recommended Corrective Action on the NC/CA Report Form shall indicate the action necessary to immediately correct the deficiency. Usually noted as Use-As-Is; Repair; Rework; Scrap; and any appropriate commentary to substantiate that action.

2.3.1. Where nonconforming items are to be corrected by repairing the stated deficiency, the repairs shall be accomplished through the use of an approved repair procedure. This may be shown directly on the NC/CA Report Form or attached to it as a separate document.

2.3.2. Nonconforming items shall be rejected, repaired, reworked or accepted for corrective action after evaluation by the PSC Quality Assurance, Quality Control, Engineering and/or the Owner or his agent.

2.4. Where possible, the Corrective Action to Prevent Recurrence area of the NC/CA Report Form, shall provide the long range action that may be instrumental in preventing recurrence of that deficiency entered onto the form.

2.5. The determination of Significant Condition status shall be performed by the Quality Assurance, Quality Control and/or the Engineering Department. The identification of significant conditions adverse to quality, their cause and the appropriate corrective action to resolve the condition shall be documented on the NC/CA Report Form or in a separate report as noted in Section 1.7 of this procedure.

2.5.1. A significant condition adverse to quality shall exist if one or more of the following elements are required:

2.5.1.1. A significant investigation is necessary to determine the cause.

2.5.1.2. Significant redesign, repair or rework of the item.

2.5.1.3. A significant evaluation of the QA/QC Program implementation.

2.5.1.4. Significant evaluation for determining generic implication.

3. NONCONFORMANCE REPORT NUMBERING

3.1. All Nonconformance Report Numbers shall be prefixed with the PSC project Contract Number.

3.2. All Field originated NCR's shall prefix the project Contract Number with the letter "F".

3.3. Non-project oriented NCR's shall be prefixed with QA and shall only be issued through the Quality Assurance Section.

3.4. All NCR's shall be assigned a sequential control number, to follow the prefix number, which shall be applied in ascending order from the previous report and originating with the number "1".

4. PROCESSING NONCONFORMANCE REPORTS

This is intended to provide PSC Field Quality Control personnel with the means of approving processing or closing out NCR's where they are not in close proximity to the home office.

4.1. The report may be drafted by independent action or with the assistance of the Engineering or Quality Assurance Sections. Where input has been provided by the assistance of others, the Quality Control person drafting the report shall print the name of that person assisting and the date in the respective area of that Section of the Nonconformance/Corrective Action Report Form. The report should be distributed as soon as it is drafted, unless the disposition of the corrective action takes place within 5 days after discovery of the deficiency; in this instance, the distribution will probably take place after the disposition is complete.

4.2. The PSC Approval for QA, QC and/or Engineering may be communicated by telephone to expedite corrective action. In which case the Quality Control person on site would print the name of the person approving that action and the date. Those NCR's could be initialed at a later date to formally complete the approval actions.

5. HOLD & REJECT TAGS - CONTROLLED

The following procedures shall explain the operation of the controlled Hold or Reject tags. The application of a Hold or Reject tag may be the result of the action of a NCR. Tags may be removed and replaced by other tags prior to the disposition of corrective action should it be determined that an incorrect tag has been applied. A Hold tag may also be used where a nonconformance is not indicated or warranted to control any item or condition, where Quality Control personnel determine that need. This system shall be controlled by Quality Control personnel.

5.1. The two-part sequentially numbered tags shall be issued in a controlled manner, so that traceability and control can be exhibited through the respective Control Log. The tags shall also be issued sequentially so that significant gaps do not appear in the Control Log.

5.2. Two-part numbered tags shall be used to control those items that are to be placed on Hold or Reject status. The tag shall be written to explain the condition and attached to the discrepant item, by the Quality Control or personnel discovering the condition.

5.3. After the tag has been attached to the item identifying the condition, the face portion of the tag shall be detached and returned to Quality Control.

5.4. The discrepant items shall be moved to the segregated area or otherwise appropriately identified, if it is too large to be placed in the segregated area, so as to prevent its inadvertent use in the production flow.

5.5. The face portion of the tag shall be used by Quality Control personnel, to post the appropriate information into the respective Control Log Sheet, to best describe the condition of the discrepant item.

5.5.1. It shall not be necessary to enter an elaborate description into the Reason Held area of the log if detailed information has already been presented in any other controlling document such as a Nonconformance Report.

5.5.2. A copy of a typical log sheet is included in this procedure. These are interchangeable for either system, the only difference being the heading or title of the sheet.

5.6. Upon approval or acceptance of a held item, Quality Control personnel shall remove the Hold tag and place an Accepted tag on the item. That item may then be moved into the production or construction process.

5.6.1. In the event that the held item is rejected, the Hold tag shall be removed and a Reject tag placed on the item, where disposition of the reject is not immediate.

5.6.2. When a held item has been placed into Reject status, a Nonconformance Report shall be written to detail the control and disposition of that item. It shall not be necessary to re-enter the Reject/Hold item information into the Reject Log if that item has already been entered into the Hold Log. It shall be necessary to indicate the disposition of the Hold to Reject status, in the Hold Log.

5.7. If the original condition of the discrepant item was entered as a reject into the Reject Log, then the date of disposition of that item shall be noted in the Reject Log. This will be the result of clearing the Nonconformance Report.

5.8. The date of the tag removal shall be entered into the respective log along with the initials of the Quality Control personnel performing that activity, to close out the condition of that item.

5.9. Once the disposition of the Hold or Reject item has been completed and documented in the respective log, then the face portion of the tag may be disposed of.

5.10. A Nonconformance Report can be written by Quality Control personnel any time that it is desirable to exercise a greater degree of control over any item or material on Hold status.

5.10.1. A Nonconformance Report shall be mandatory to control or disposition a reject item or any item changing from Hold to Reject status.

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6. DOCUMENTATION

Included with this procedure are the various tags and control sheets described in this procedure.

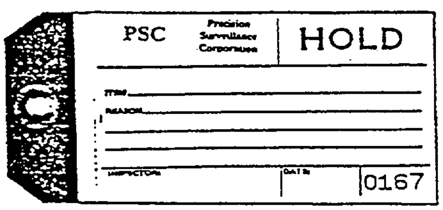
7. ATTACHMENTS

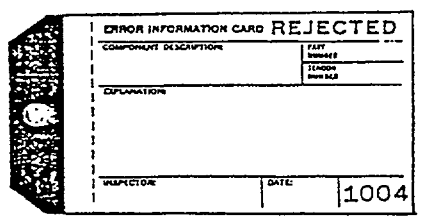
7.1. Tags and Sample Logs
7.2. Sample NC/CA Report
7.3. NC/CAR Form
7.4. NCR Index Form
7.5. Hold Tag Log Form
7.6. Reject Tag Log Form

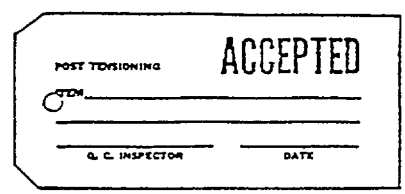
NONCONFORMING MATERIALS, PARTS OR COMPONENTS

TAGS

- Shown below are typical examples of the various types of tags used in the Hold and Reject Tag System. These may vary in appearance from the devices actually being used but are generally representative of the format and information to be provided. All but the Accepted tag, are two-part tags.







SAMPLE LOG ENTRIES

Shown below are reduced size examples of entries into the respective log. Note that some are cross-referenced such as: Hold 1100 to Reject 1700; Hold 1103 to Reject 1701.

QUALITY ASSURANCE PROGRAM — HOLD TAG LOG — PSC Precision Surveillance Corporation

Tag No.	Date Issued	Description of Condition	Date Removed	Q.C. Signoff
1100	5-1-84	Anchor RP101 Damaged	5-2-84	CB
1101	5-6-84	Documentation Incomplete - RT1036	5-8-84	DWW
1102	6-4-84	Tendon AC101 - Field End Cutoff	6-10-84	CB
1103	6-15-84	Rusty Tendon V135	6-16-84	JWK
1104	7-2-84	Unable to Couple to Tendon V141		

FOR INFORMATION ONLY

QUALITY ASSURANCE PROGRAM — REJECT TAG LOG — PSC Precision Surveillance Corporation

Tag No.	Date Issued	Description of Condition	Date Removed	Q.C. Signoff
1700	5-2-84	See Hold Tag 1100 - Scrap Head	5-4-84	JWK
1701	6-16-84	See Hold Tag 1103 - Scrap Tendon	6-30-84	DWW
1702	6-21-84	Drum of Grease Contaminated - Scrap	6-22-84	CB
1703	6-30-84	Anchor HH203 Damaged - Scrap	6-30-84	CB
1704	7-2-84	Shims Damaged - Heat 43691 - Scrap	7-2-84	CB

FOR INFORMATION ONLY

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NONCONFORMANCE/CORRECTIVE ACTION REPORT FORM - SAMPLE

NONCONFORMANCE/CORRECTIVE ACTION REPORT FORM

PSC Precision Surveillance Corporation

HOLD TAG NO. ________ NC/CA NO. ________

NONCONFORMANCE:_

Enter the nonconformance preferably referencing the quality program requirement that has been violated.

Refer Section 2.1.

APPARENT CAUSE KNOWN ☐ YES ☐ NO - If yes, describe:

May require consultation with QA, QE and/or Engineering.

Refer Section 2.2.

RECOMMENDED CORRECTIVE ACTION:

The immediate corrective action that will be taken to correct the stated nonconformance. One of the following dispositions shall be noted for the deficiency as it applies: "Use As Is"; "Repair"; "Rework"; or "Scrap".

Refer Section 2.3.

Any nonconforming item to be repaired shall have an approved repair procedure.

CORRECTIVE ACTION TO PREVENT RECURRENCE:

The long range corrective action that may be useful in eliminating the deficiency or reducing the frequency.

Refer Section 2.4.

Initiator ________ Title ________ Date ________

SIGNIFICANT CONDITION: ☐ YES ☐ NO - If yes, refer QAM Section 4 Criteria XV.

APPROVAL COMMENTS:

Enter any comments that might be pertinent to effecting the approval of the corrective action.

Refer Section 2.5.

PSC APPROVAL SIGN & DATE	QC	QA	Engineering

OWNER/AGENT APPROVAL REQUIRED ☐ YES ☐ NO Engineer ________ QA ________
Date ________ Date ________

COMMENTS: This area to be input only by the Owner or his agent.
Refer Section 1.3.1.1.

DISTRIBUTION			DISPOSITION COMPLETED
☐ QA Section	☐ Vice President	☐ Vendor	Signed ________
☐ QE Section	☐ Contr. Mgmt.	☐ ________	Title ________
☐ Engineering	☐ Owner/Agent	☐ ________	Date ________

Enter Control Number and into NCR Index Log. Prefix with project Contract Number. Field NCRs will be prefixed with "F".

Hold tag number, if applied will be entered here. If a tag was applied, note the removal of that tag in the Disposition Completed.

To be entered and evaluated only by or with consultation of QA, QE and/or Engineering.

To be signed by Dept. shown. May be signed by initiator only if the Dept. designated was notified of NCR and approved action.

To be entered upon completion of Corrective Action to close-out NCR. Also close-out in NCR Index Log.

NONCONFORMANCE/CORRECTIVE ACTION REPORT FORM	PSC Precision Surveillance Corporation
HOLD TAG NO. ________ NC/CA NO. ________	

NONCONFORMANCE: ____________________

APPARENT CAUSE KNOWN ☐ YES ☐ NO - If yes, describe: ____________________

RECOMMENDED CORRECTIVE ACTION: ____________________

Any nonconforming item to be repaired shall have an approved repair procedure.

CORRECTIVE ACTION TO PREVENT RECURRENCE: ____________________

Initiator Title Date

SIGNIFICANT CONDITION: ☐ YES ☐ NO - If yes, refer QAM Section 4 Criteria XV.

APPROVAL COMMENTS: ____________________

PSC APPROVAL SIGN & DATE	QC	QA	Engineering

OWNER/AGENT APPROVAL REQUIRED ☐ YES ☐ NO

Engineer ________ QA ________

Date ________ Date ________

COMMENTS: ____________________

DISTRIBUTION			DISPOSITION COMPLETED
☐ QA Section	☐ Vice President	☐ Vendor	Signed ________
☐ QE Section	☐ Contr. Mgmt.	☐ ________	Title ________
☐ Engineering	☐ Owner/Agent	☐ ________	Date ________

QUALITY ASSURANCE PROGRAM

NONCONFORMANCE REPORT INDEX

PSC Precisio Surveillar Corporati

NCR No.	Item	Date Written	Date Submitted	Date Approved	Date Compl

PSC Precision Surveillance Corporation

QUALITY ASSURANCE PROGRAM

REJECT TAG LOG

Tag No.	Date Issued	DESCRIPTION OF CONDITION	Date Removed	Q.C. Signoff

PSC Precision Surveillance Corporation

QUALITY ASSURANCE PROGRAM

HOLD TAG LOG

Tag No.	Date Issued	DESCRIPTION OF CONDITION	Date Removed	Q.C. Signoff

GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

CALIBRATION OF MEASURING AND TEST EQUIPMENT

Prepared by H. F. Hendrickson	Title MGR., Q.A.	Date 9-6-94
Approved by R. D. Hough	Title GEN. MGR.	Date 9-6-94
Approved by [illegible]	Title MGR., ENG.	Date 9-6-94

1. This procedure will establish the requirements for calibration of the Quality Control Test and Measuring Equipment to be used for inspection, testing and evaluation, during In-Service Inspections (surveillance) of the Post-Tensioning System Tendons.

2. <u>CONTROLS</u>

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.

2.1. 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.

2.2. The Quality Assurance Section shall review calibration records during audits of that operation being audited.

2.3. 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.

2.4. 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.

2.5. 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.

2.6. 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.

2.7. 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.

2.8. The Rams which have been used for Monitoring Force, Detensioning or Retensioning operations for the In-Service Inspection of the Post-Tensioning System Tendons shall be verified for calibrated status after the completion of the work.

2.9. The documents for the calibration of Rams prior to starting the work and after completing the work shall be included with the Final Report for the In-Service Inspection.

3. OUT OF CALIBRATION

3.1. Devices out of calibration shall be processed as nonconformances. Devices out of calibration that are determined to have an adverse effect on quality shall have copies of that nonconformance report submitted to Executive Management for review, and comments where applicable.

3.1.1. Nonconformance Reports shall be drafted, submitted and distributed in accordance with the requirements of PSC Procedure QA 9.0.

3.2. Instruments that are found to be out of calibration shall be re-calibrated and a comparison made of the results of the new calibration and the out-of-calibration variance, if any. If no significant variation exists, the instrument shall be put back into service. In the event that a discrepancy exists, then the Engineering and/or Quality Assurance and Quality Control Sections shall make an evaluation of the discrepancy and the possible effect on the items processed with the out-of-calibration device, with regard to quality, accuracy or reliability. If it is determined that a serious problem exists, then the Quality Assurance Section shall determine what items checked with the out-of-calibration device shall be rechecked with an effective calibrated device.

3.3. Instruments that are found to be in excess of the required accuracy or tolerance band after being returned from Field Service, shall be controlled with Nonconformance Reports as required of Sections 3.1 and 3.2 of this Procedure.

4. TOOL AND GAUGE CONTROL

4.1. The calibration standards used to calibrate measuring and test equipment 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 0.0001"

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. EQUIPMENT

5.1. The Equipment List shown in Section 5.2 of this Procedure contains those devices that are required for the In-Service Inspection or are used to calibrate devices that will be used during the In-Service Inspection. The required accuracy and frequency of calibration are stated for each device. It should be noted that the accuracy requirement is meant to be the tolerance band to which the device is being calibrated and not the original accuracy or the accuracy between calibration frequencies.

5.1.1. The term "DISS" in the Accuracy Column is defined as, "Division of that Instrument's Smallest Scale."

5.1.2. Where an asterisk "*" follows the accuracy dimension, this is meant to be that the dimension shown shall be verified with a Micrometer that reads to 0.0001".

5.1.3. The procedures that are used to calibrate the various types of equipment, gauges or instruments used during the In-Service Inspection, will accompany this procedure in the Surveillance Program Quality Control Manual. These procedures provide information relative to the calibration of each device and may be used for purposes of calibrating these devices in the field, should that become necessary.

5.2. EQUIPMENT LIST

DEVICE	FREQUENCY	ACCURACY
Load Cell (3000 Kips)	5 Years	± .1% Entire System
Load Cell (Approx 50 Kips)	8 Years	± .1% Entire System
Rams/Jacks (Stressing, Testing, etc.	Beginning & End (B & E) of Project	Calculated to within ± 0.01" for Ram Area
Dead Weight Tester	5 Years	± 0.10%
Heise Digital Gauge	3 Years	± 0.10%
Pressure Gauge-Master (1/4%)	B & E of Project	± 30 psi
Pressure Gauge-Stressing (1/4%)	B & E of Project	± 30 psi of Heise
Pressure Gauges (1/2%) (Not used for Stressing)	1 Year	± 55 psi of Heise
Micrometer	6 months	± 1 DISS
Micrometer-Checking Bar Standard		± 0.0001"
Thickness (Feeler) Gauge		
Under 0.005"	6 months	± 0.0005"*
0.005" and Over	6 months	± 0.0010"
(* Verified with a 0.0001" micrometer)		
Steel Ruler	1 Year	± 0.0100"
Steel Tapeline	1 Year	± 1/16"/100' of lgth.
Thermometer	1 Year	± 1 DISS
Optical Comparator (0.005")	1 Year	± 0.0010"
Dial Indicator	1 Year	± 1 DISS
3 Wire Thread Gauges		
Hardened (HRC50 or Over)	1 Year	± 0.0005 Roundness ± 0.0001 Diameter
PD Type (less than HRC50)	6 months	± 0.0010 Diameter
THREAD PLUG GAUGE (Stressing Adaptor Pitch Dia.)		
No-Go Gauge	3 Years	+ 0.0000" - 0.0011"
Go Gauge	3 Years	+ 0.0020" - 0.0030"

6. DOCUMENTATION

The various types of documents generated for calibration and/or status of calibrations will be described in the General Procedures for Calibration or contained within that Procedure for a particular device. Others may be added as the need arises. Quality Control personnel shall prepare or assist in the preparation of these records. A copy of the calibration record shall accompany the calibrated device to the field.

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GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

VERIFICATION OF CALIBRATED STATUS OF HYDRAULIC PRESSURE GAUGES

Prepared by H. K. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R. D. Hough Title GEN. MGR. Date 9-6-94

Approved by [signature] Title MGR, ENG. Date 9-6-94

FIELD VERIFICATION OF PRESSURE GAUGES

The following procedure shall be used to verify the calibration of hydraulic pressure gauges during field operations. These gauges may be used in stressing operations with the rams or other devices that require a measure of accuracy to produce quality results. Frequency and Accuracy of Calibration shall be controlled as stated in Section 5.2 of Procedure QA 10.0 Equipment List. The Verification frequency shall be controlled as stated in Section 1.5 of this Procedure, while the Verification Accuracy shall be controlled as stated in Sections 2.6 or 2.7.

1. GENERAL

1.1. 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.

1.2. In addition to the pressure gauges used during the surveillances, 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.

1.3. PSC Quality Control personnel shall maintain the controls for distribution and recall of each Pressure Gauge being used on site.

1.4. 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.

1.5. Pressure Gauges used for Detensioning or Retensioning (Stressing) tendons of Post-Tensioning Tendon Systems during In-Service Inspections of Nuclear Power Plants, shall be Verified for Calibrated status at least once a day during the operational use of those gauges.

2. VERIFICATION OF CALIBRATION

2.1. Clean and remove any dirt, grease or residue that could affect the accuracy of the calibration or use of the pressure gauge.

2.2. At the option of the PSC Quality Control Section it shall be acceptable to use a Heise Digital Pressure Indicating Gauge for Calibration Verification of Pressure Gauges, rather than a Master Gauge.

2.3. Attach the Pressure Gauge to the Calibration Pump of the Heise Indicator or Master Gauge.

2.4. Close the back pressure valves before pressurizing the system.

2.5. 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.

2.6. MASTER GAUGE (1/4% Accuracy)

2.6.1. 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.

2.6.2. 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.

2.7. HEISE DIGITAL GAUGE

2.7.1. A Pressure Gauge may be verified for calibration by connecting that gauge and the Heise Digital Gauge to a common line, which is in turn connected to a hydraulic pump and pressurized to the same values noted in 2.6.1 above.

2.7.2. 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.

2.7.3. Pressure Gauges with an accuracy of 1/2 percent or greater shall not be used for Monitoring Force, Detensioning or Retensioning operations of the Post-Tensioning Tendon System during In-Service Inspections.

2.8. With the Verification and Documentation of the Pressure Gauge being acceptable, the pump and gauge shall be depressurized and prepared for disassembly.

3. UNACCEPTABLE CONDITIONS

If a Pressure Gauge fails to meet the accuracy requirements of Section 2.6.2 or 2.7.2 after being used for Stressing or Detensioning operations, it shall be necessary to draft a Nonconformance Report in accordance with the requirements of Section 3 of Procedure QA 10.0, to control that Gauge and any Tendons worked with that Gauge.

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3.1. Any Pressure Gauge not capable of meeting the stated accuracy requirements of Section 2.6.2 or 2.7.2 for the method of calibration being used, shall be returned to the PSC shop for adjustment or repair. Any repaired or adjusted Gauge shall be recalibrated before use.

3.2. <u>ZERO ALIGNMENT (Zero Beating)</u>

On occasion, the Pressure Gauge Indicating Needle may not be in precise alignment with the Zero mark on the Gauge Face, necessitating realignment. Before realignment takes place, a complete Verification shall be performed and documented on the Gauge Calibration Record. Then, the Inspector shall perform the realignment. With the realignment completed, a new Verification shall be performed and documented. This realignment shall not be considered and adjustment or repair, as long as that gauge meets the stated accuracy requirement of Section 2.6.2 or 2.7.2.

4. <u>ACCURACY VARIATIONS</u>

Even though Pressure Gauges that have been calibrated or verified for calibration, variations in excess of the requirements of Sections 2.6.2 and 2.7.2 may be detected between calibrations or verifications. In an effort to explain and control this deficiency, this Section shall be reviewed before the Verification of any Pressure Gauges.

4.1. 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.

4.1.1. 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

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4.1.2. The requirements for Stressing or Detensioning Tendons do not require the Pressure to be read any finer than 10 psi during In-Service Inspections. The Hydraulic Ram Calibration Procedure takes the reading error into account for Stressing or Detensioning along with any other errors that may occur as a result of calibration or gauge reading, thereby maintaining the accuracy or integrity of the work being performed. It is therefore necessary to document any minor variations during calibration or verification activities, so as to maintain the integrity of the accuracy of the Pressure Gauges.

5. <u>DOCUMENTATION</u>

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.

5.1. Calibration or verification documents shall be retained in the appropriate jobsite Quality file.

6. <u>ATTACHMENTS</u>

6.1. Gauge Calibration Record Form

PSC Formerly
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GAUGE CALIBRATION RECORD

JOB ______________________

JACK GAUGE NO ______________________

MASTER GAUGE NO ______________________

DATE CHECKED ______________________

CHECKED BY ______________________

REMARKS ______________________

MASTER GAUGE (PSI)	JACK GAUGE (PSI)

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB ______________________

JACK GAUGE NO ______________________

MASTER GAUGE NO ______________________

DATE CHECKED ______________________

CHECKED BY ______________________

REMARKS ______________________

MASTER GAUGE (PSI)	JACK GAUGE (PSI)

GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

QUALITY CONTROL INSPECTION

Prepared by H. R. Hendrickson Title MGR., Q.A. Date 9-6-94

Approved by R. S. Hough Title GEN. MGR. Date 9-6-94

Approved by [illegible] Title MGR., ENG. Date 9-6-94

1. QUALITY CONTROL INSPECTIONS

1.1. Where Precision Surveillance Corporation is not acting as the General Contractor for the Post-Tensioning operations, Quality Control Inspections shall be performed by the organization responsible for the quality control function of that portion of the work they are performing, as stated in PSC Procedure QA 4.0 of this manual, or as agreed to in the contract documents.

1.2. It is PSC's intent to provide the Quality Control activities for the Surveillance Inspection of the Post-Tensioning Tendon System as agreed to in the contract documents and as stated in the Surveillance Quality Control Manual.

1.3. Quality Control documents shall NOT BE SIGNED until all information for the inspections or tests for which that document is being generated have been entered onto that document.

1.3.1. Partially completed inspection or tests, those where the operation cannot be completed on the same day, shall be initialed and dated by the Inspector for those items that have been completed and require documentation.

1.3.2. Partially completed inspections or tests, those where the operation is interrupted by a temporary condition such as lunch or a break and where the operation shall be completed the same day, may be initialed completed by the Inspector to that point, for those items that have been completed and require documentation.

1.4. Quality Control documents that are being reviewed for completeness but were not witnessed by the reviewer shall be signed for that review ONLY AFTER completion of the review and NOT BEFORE.

1.5. A Quality Control document is defined as any document or record that contains a Quality Control Inspector signature requirement.

1.6. All inspections shall be documented on the appropriate inspection form for those operations witnessed on that day. All inspection documents shall be signed or initialed, dated and retained in the appropriate Quality file at the jobsite.

1.7. Quality Control Documentation shall be completed and turned in for review as soon as possible after completion of that Inspection Test or Evaluation.

1.8. Reviews of Quality Control Documentation should be completed within 24 hours of receipt or sooner to verify that the information is accurate and complete. Errors or deficiencies shall be resolved without delay.

1.9. There are a number of Quality Control Documents that may not be completed in one day or require posting to another document. It is advisable to make reproductions of these documents and use these to complete whatever actions are necessary, while retaining the original document, even though incomplete, in a Quality Control file. The additional information can be entered onto the original document until completed. Leave the reproduced copies attached to the back of that document until the review is completed, at which time the reproductions may be disposed of.

1.10. It may be necessary to generate more than one original copy of a Quality Control Document for an Inspection or Test on a tendon. This shall be acceptable just so the total quantity of pages and the page number appear on each document.

2. INSPECTION

The term Inspection is meant to include:

2.1. The witnessing of an operation that generates Quality Control Data which is documented by the Inspector.

2.2. The performance of some operation by the Inspector, such as measuring or other Quality Control Data, which is documented by the Inspector.

GPU NUCLEAR CORPORATION
THREE MILE ISLAND - UNIT 1
NUCLEAR POWER PLANT

PRECISION SURVEILLANCE CORPORATION
IN-SERVICE INSPECTION
QUALITY ASSURANCE PROCEDURE

AUDITS

Prepared by H. F. Hendrickson Title MGR., Q.A. Date 9-6-94
Approved by R. D. Hough Title GEN. MGR. Date 9-6-94
Approved by [signature] Title MGR., ENG. Date 9-6-94

1. AUDITS

Surveillance operations shall be audited as required by the project specifications or as agreed to in the contract documents, to verify conformance with the approved job related manuals and procedures.

1.1. Audits shall be performed by qualified personnel of the Precision Surveillance Corporation Quality Assurance Section and who shall be independent of the area being audited.

1.2. Audits shall be performed using a checklist prepared prior to the audit, with the results documented on a Jobsite Audit Summary Sheet and a commentary noted on an Audit Finding Report form or similar type documents.

1.3. Audits shall be performed on a random basis and shall be scheduled when a variety of operations are being performed or as a specific activity occurs.

1.4. Subsequent audits shall provide a review of previously noted deficiencies or program non-compliance to ensure appropriate action has been taken to resolve those areas of concern.

1.5. Copies of the audit report shall be maintained in the appropriate jobsite quality files and distributed in accordance with the project specifications or distribution list on the audit checklist.

1.6. The audits shall be performed as early in the life of the In-Service Inspection, as is practical, and must consider the limitations of the scaffolding or platforms.

1.7. The elements to be audited shall be commensurate with the status and importance associated with the In-Service Inspection activities.

GENERAL

Calibrations of equipment will be performed for the frequency and accuracy as described in the respective quality control manual for those devices used for the control of the project materials or tests.

Calibrations are only provided for equipment in service at any one time for any number of projects. Because of the quantity of original equipment as gauges, and measuring devices, and subsequent back up or replacement equipment, no attempt will be made to keep all the equipment calibrated at one time.

IN-SERVICE EQUIPMENT:

Equipment classified as "in-service", regardless of location, will be kept in a calibrated condition for the frequency and accuracy specified for that piece of equipment.

Vendor:

Equipment will be calibrated for the frequency and accuracy specified whenever work is being performed for any PSC Post Tensioning component and prior to startup of that work.

Shop - PSC

Equipment will be calibrated for the frequency and accuracy specified whenever tendons are being manufactured and prior to the startup of the work.

Field - PSC

Equipment will be calibrated for the frequency and accuracy, specified whenever tendon installation operations are being performed and prior to the startup of that operation.

OUT-OF-SERVICE EQUIPMENT

When no operations are being performed for work of a post tensioned nature, components are not being manufactured, or equipment is classified as being in storage, no attempt will be made to keep the equipment in a calibrated condition. The calibration records may show gaps indicating non-continuity of calibration, but this should not be construed as a lapse of Quality Control. Specific items in use will be used to verify continuity of calibration and control.

RECALL

Equipment will be controlled for recall by the Quality Control Section of the area responsible for calibrations and will generally follow the requirements of PSC Procedure Q 12.5.

1. CONTROL COLOR FLAGS

1. As a means of porviding a control of items requiring calibration, after any device has been calibrated, a control color flag will be attached to the folder into which the calibration record has been placed.

2. The following list is the monthly color code:

1.	January	–	Orange
2.	February	–	Red
3.	March	–	Blue
4.	April	–	Dark Red
5.	May	–	Light Blue
6.	June	–	Light Green
7.	July	–	Yellow
8.	August	–	Dark Green
9.	September	–	Pink
10.	October	–	Black
11.	November	–	Brown
12.	December	–	White

3. The color flag will indicate that a calibration is due for that month.

4. The following procedure will be followed when the color flag indicates that a calibration is due.

   1. Remove and store the control color flag.
   2. Recalibrate the gauge.

      a. If the gauge is not to be put back into service at that time, it will be returned to storage and so documented on the calibration record. It will not be calibrated until it goes into active service.

   3. Document the calibration on the calibration record.
   4. Return the calibrated gauge to active service.
   5. Attach the control flag to signal the new month for calibration.

5. At the end of a month, the files will be checked to determine what calibrations are due.

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1. <u>MICROMETER 0" to 2"</u>

The following procedures will be used as a means of calibrating micrometers.

1. 1. Clean micrometer of all dirt, oil, residue, etc.

1. 2. Remove the old calibration sticker.

1. 3. A calibrated Surveillance Kit Step Block, traceable to the National Bureau of Standards will be used for calibrating small micrometers.

1. 3. 1. Take the various readings and enter them onto the Calibration Form - Exhibit A.

1. 3. 2. The measurements on the current PSC Surveillance Kit Step Block are:

.2430"
.3460"
.6550"
.9640"

1. 3. 2. 1. These measurements will vary according to the Step Block being used and the final size of the micrometer; those capable of reading in excess of 2".

1. 3. 3. Record all actual readings on the reading column on the Calibration Form - Exhibit A, the accuracy shall be within ± one division of the smallest reading on that instrument to be acceptable.

1. 3. 4. Record any variations in the error column, provided that the errors are within the acceptable tolerance band.

1. 3. 4. 1. If the error is outside the tolerance band, then the micrometer shall be adjusted following the instructions and using the tools for adjusting the micrometer, by Quality Control personnel. Once adjusted the micrometer shall be recalibrated in accordance with the requirements of this procedure.

1. 3. 5. Larger micrometers shall be calibrated by using larger Step Blocks or Bar Gauges in unison with the Step Block.

1. 3. 6. No less than three readings shall be taken for a micrometer calibration. These readings should occur somewhere at the minimum, middla and maximum spindle or measuring capabilities.

6·19·87 DSB

2. LARGE MICROMETERS

2. 1. Micrometers larger than described in Section 1 above may be calibrated with the us of Step Blocks large enough to facilitate the size of the micrometer being calibrated or any one of the following options:

2. 1. 1. Use the calibrated standard supplied with that micrometer and combine that device with the calibrated master feeler gauges or a large calibrated Step Block.

2. 1. 2. Use a series of calibration standards or inidvidual gauge blocks.

2. 2. In any circumstance stated above, no less than three different measurements shall be taken and preferably at the low, middle, and high ranges of that micrometer.

2. 2. 1. Each calibration standard stated above shall be calibrated and to an accuracy magnitude of 10 times finer, (0.10), than the device being calibrated is capable of measuring. For example, an 0.001" micrometer shall be verified for accuracy by another device that is capable of being read to or is calibrated t 0.0001".

3. INSIDE MICROMETERS

Inside micrometers shall be calibrated with a calibrated outside measuring micrometer capable of reading to 0.0001" and in general compliance with Section 2.2 above.

4. DOCUMENTATION AND CONTROL

4. 1. If all the readings are acceptable, they shall be documented on the Micrometer Calibration Record. The record shall be signed and dated by the person performing the calibration.

4. 2. Document the calibration on the Gauge Calibration Record and also note where that micrometer is being used. See Exhibit B attached - Gauge Calibration Record.

4. 3. After all records have been filled out and are correct, including the correct date for re-calibration, fill out the PSC Calibration Sticker and attach it to the micrometer and release it to its respective function in the shop.

4. 4. If the micrometer is to be put into field service, follow the procedures below:

4. 4. 1. Put the original calibration documents into the calibration file.

4. 4. 2. A facsimile copy of the documents shall go to the Field Quality Control representative or respective PSC Agent, where that gauge is to be placed into service.

4. 4. 3. The Gauge Calibration Record shall also contain, in the Remarks column, the project name, contract number and date.

4. 5. Attach a control color flag as noted in Procedure Q12.5 as a means of controlling calibration recall.

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QUALITY CONTROL "EXHIBIT A"

CALIBRATION FORM

PSC Formerly
Inryco Surveillance

Project ______________________ Contract ______________ Date __________

CALIBRATION DATA

Recall Date __________

Gauge or Device Name ______________________________ Number __________

Manufacturer ________________ Type or Model ____________ Range __________

Master Calibration Device ______________________________ Number __________

Master Device Calibration Date: ________________

Test Range	Reading	Error

Method of Calibration (Procedure number or describe other) ____________________

Comments: ____

Calibrated By: ______________________ Title: ______________ Date: __________

EFFECTIVE DATE	PREV.REV. △	REVISION △	PAGE

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"EXHIBIT B"

GAUGE CALIBRATION RECORD

GAUGE/INSTRUMENT	IDENTI-FICATION	DATE CAL	RE-CAL DUE	ERROR	REMARKS (PROJECT, PART NO., REPAIR, ETC.)

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1. PRESSURE GAUGES

The following procedures will be used as a means of calibrating pressure gauges to be used during stressing or detensioning operations.

1. 1. Clean and remove all dirt, oil, residue, etc.

1. 2. Remove the old calibration sticker.

1. 3. Put the gauge on the calibration pump of the Mansfield & Green Dead Weight Tester and follow the procedures below.

1. 3. 1. Remove the front glass or plastic from the face of the gauge, or remove the rubber grommet in the back of the gauge, to make any adjustment, if needed, but only after all 9000 lbs. have been gauged.

1. 3. 2. Place the gauge oin the pump, fitting adaptors as needed to conform to the gauge outlets.

1. 3. 3. Close the oil port by moving the lever forward.

1. 3. 4. Place a dish type weight onto the cylinder carefully (all weights are numerically marked 1 through 9) starting with Number One.

1. 3. 5. Push the button in for a fast build up of pressure on the gauge.

1. 3. 6. Pull the button out for a slow incline of oil being pumped into the gauge.

1. 3. 7. Read the gauge in 1000 psi graduations and record on the Calibration Record Sheet (Exhibit A).

1. 3. 8. Continue to add weights and pump pressure into the gauge until all the weights have been placed on the cylinder, a total of 9 weights.

1. 4. If the gauge readings are not consistent with the required weights, the initial calibration shall be completed. If the gauge is reading uniformly over or under, an adjustment of the gauge is necessary.

1. 4. 1. GAUGE ADJUSTMENT

1. 4. 1. 1. Place a screwdriver on the back of the gauge and into a small port hole or on the face of the gauge.

1. 4. 1. 2. Match the gauge reading with the amount of weights on cylinder by turning the screw.

1. 4. 1. 3. If the gauge cannot be adjusted, it will be repaired or properly disposed of.

1. 5. After the adjustments, if any, have been made, release the pressure by moving the lever back to the original position. The calibration will now be completed by checking all the required increments.

1. 6. Take the dish type weights off one by one, and put them back into the box in their respective slots, taking care not to damage the weights.

1. 7. Fill out a new PSC Calibration Sticker and attach it to the face of the gauge making sure that the re-calibration date is correct.

1. 8. Put the glass or plastic back on the face of the gauge or install the rubber grommet into the back of the gauge.

1. 9. Document the calibration on the Gauge Calibration Record (Exhibit B) also noting where the gauge is being used.

1. 10. With the gauge now calibrated, it may be released to its area of intended use.

1. 11. If the pressure gauge is put into field service, follow the procedure below:

1. 11. 1. Put the original calibration documents into the Calibration File.

1. 11. 2. A facsimile copy of the documens will go to the Field Quality Control representative or respective PSC Agent where that gauge is to be placed into service.

1. 11. 3. The Gauge Calibration Record will also contain, in the Remarks Column, the project name, contract number and date.

1. 12. Attach a control color flag as noted in Procedure Q12.5 as a means of controlling calibration recall.

2. <u>HEISE DIGITAL PRESSURE INDICATOR</u>

Rather than using the Dead Weight Tester for calibration, a Heise Digital Pressure Indicator may be substituted.

2. 1. Close back pressure valves before pressurizing the system.

2. 2. Increase the hydraulic pressure to the point of the desired reading on the pressure gauge, usually 1000 psi ± 100 psi increments. Take a reading of the pressure gauge and the Heise Indicator and document both on the gauge calibration form.

2. 3. Section 2.2 shall be repeated until all the required readings have been taken usually to a maximum of the next even 1000 psi increment above the highest overstress pressure required for the stressing operations, i.e., 7600 psi overstress will require calibration to 8000 psi.

3. <u>GAUGE ACCEPTANCE</u>

The pressure gauge to be used for stressing or detensioning of tendons will be acceptable if it meets the following requirements.

3. 1. A 1/4% (0.25) gauge shall read to no greater than plus or minus 30 psi for any scale face reading of the calibrating gauge.

3. 2. A 1/2% (0.50) gauge shall read to no greater than plus or minus 50 psi for any scale face reading of the calibrating gauge. This type gauge shall not be used as a master gauge.

4. <u>TEMPERATURE</u>

The ambient temperature during calibration of the pressure gauge shall be documented on the Calibration Record Sheet.

EXHIBIT A

PSC Precision Surveillance Corporation

Calibration Record Sheet JOB NO. F228/273

GAUGE NO.

DATE

AMBIENT TEMPERATURE °F

ACTUAL GAUGE P.S.I.

10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000

1,000 2,000 3,000 4,000 5,000 6,000 7,000 8,000 9,000 10,000

THEORETICAL PSI TESTER WEIGHTS

Weights	Gauge P.S.I.
1,000	
2,000	
3,000	
4,000	
5,000	
6,000	
7,000	
8,000	
9,000	
10,000	

Mansfield & Green
Dead Weight Pressure
Model R100 Serial #1422

Calibrated By:

46 1320

K&E 10 X 10 TO 1/2 INCH 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

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" EXHIBIT B"

GAUGE CALIBRATION RECORD

GAUGE/INSTRUMENT	IDENTI-FICATION	DATE CAL	RE-CAL DUE	ERROR	REMARKS (PROJECT, PART NO., REPAIR, ETC.)

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PROCEDURE Q 12.8.D-W	PSC Precision Surveillance Corporation
CALIBRATION - THERMOMETERS	

1. THERMOMETERS
The following procedures will be used as a means of calibrating thermometers.

1. 1. Clean thermometer of all dirt, oil, residue, etc.

1. 2. Remove the old calibration sticker.

1. 3. Master and test thermometer shall be immersed in an agitated liquid for at least 3 minutes, and at least 3 inches of sensing or sending unit shall be submerged in the liquid. Comparisons will be made at 3 temperature variances in the range of the temperatures expected to be used, but in no case less than 50^{o} F. between variances.

1. 3. 1. Where temperatures below freezing apply, it shall be acceptable to place the masster thermometer and the thermometer to be calibrated into a freezer compartment, such as that of a refrigerator, for no less than the required time period.

1. 3. 2. The accuracy shall be within one graduation of the smallest reading on the scale. If not, adjust the thermometer to the same reading as the master and continue to calibrate.

1. 3. 3. If no adjustment can be made, the thermometer shall be returned to Quality Control or Quality Assurance for repair or destruction.

1. 4. If the readings are acceptable, complete the Thermometer Calibration Record (Exhibit A). The record shall be signed and dated by the person performing the calibration.

1. 5. Document the calibration on the Gauge Calibration Record (Exhibit B) and note where that thermometer is being used.

1. 6. After all records are filled out, including the correct date for re-calibration, fill out the psc Calibration Sticker and attach it to the thermometer.

1. 7. If the thermometer is put into field service, follow the procedures below:

1. 7. 1. Put the original calibration documents into the calibration file.

1. 7. 2. A facsimile copy of the documents shall go to the Field Quality Control representative or respective psc Agent.

1. 7. 3. The Gauge Calibration Record shall also contain in the Remarks column, the project name, contract number and date.

1. 8. Attach a control color flag as noted in Procedure Q12.5 as a means of controlling calibration recall.

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Effective Date: 6-17-87 H.F.H.	Previous Revision: 0 Q 12.8.D 9/19/86	Revision: 0 6-17-87 H.F.H.	Page 1 of 1

THERMOMETER
CALIBRATION
RECORD

"EXHIBIT A"

PSC Formerly
Inryco Surveillance

Customer Name:	Project Name:	Contract Number:

Thermometer I.D. #:	Date of calibration:
Manufacture:	Recalibration due date:
Type or model:	Master thermometer I.D.:
Range:	Master calibration due date:
Location:	

CALIBRATION DATA

Master Actual Temperature	Test Reading Temperature

Calibration Method:

Master and test thermometer to be immersed in agitated liquid for at least 3 minutes, and at least 3 inches of sensing or sending unit to be submerged in liquid. Comparison will be made at 3 temperature variances of no less than 50 degrees F.

Accuracy must be within one graduation of the smallest reading on the scale. If not, adjust to same reading as master. If there is no adjustment, thermometer will be returned to Quality Assurance for repair or destruction.

NOTE: Accuracy will be within 5% of the total guage face value or one unit of the smallest scale graduation whichever is smaller.

Condition:

Remarks:

Calibrated By: Date: Page of Pages

PSC formerly
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"EXHIBIT B"

GAUGE CALIBRATION RECORD

GAUGE/INSTRUMENT	IDENTIFICATION	DATE CAL	RE-CAL DUE	ERROR	REMARKS (PROJECT, PART NO., REPAIR, ETC.)

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1. FEELER GAUGES

The following procedures will be used as a means of calibrating feeler gauges or shim stock. Feeler gauges are described as metal strips of various lengths and/or widths supplied or measured to a specific thickness.

1. 1. Clean each strip to remove dirt, oil or other residue that may unduly affect the calibration accuracy.

1. 2. Remove old calibration sticker.

1. 3. The means of calibrating each gauge strip shall be provided through the use of a calibrated micrometer capable of reading in units of 0.0001".

1. 3. 1. Place the feeler gauge strip between the micrometer spindle and anvil.

1. 3. 2. Adjust the thimble and sleeve assembly, by using the barrel hub or ratchet, to the thickness of the gauge strip.

1. 3. 3. Read the barrel and vernier to determine the thickness. Repeat the adjustment and reading to verify the thickness. If necessary use the Instructions for Reading a Micrometer, attached.

1. 4. If the accuracy is within the specified tolerance, document the calibration on the Calibration Form provided. (Exhibit C)

1. 4. 1. If the measured thickness of the gauge strip during calibration, is in excess of 0.0005" of the specified or required thickness, that gauge strip shall be re-marked to show the new dimension or that strip may be scrapped.

1. 5. After each gauge strip has been calibrated and all records are filled out and correct, fill out the PSC Calibration Sticker and attach it to the gauge strip, the gauge holder, or the container in which the gauge is stored.

1. 5. 1. Document the calibration on the Gauge Calibration Record (Exhibit B) and note where that device is being used.

1. 6. If the gauge strip is to be put into field service, follow the procedures below:

1. 6. 1. Place the original calibration documents into the calibration file.

1. 6. 2. A facsimile copy of the documents shall go to the Field Quality Control representative or respective PSC Agent.

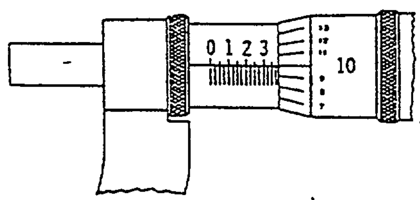
1. 6. 3. The Calibration Form shall also carry in the Remarks column or other suitable area, the project name, contract number and date.

6-10-87 DSB

7. Attach a color control flag as noted in Procedure Q12.5, as a means of controlling calibration recall.

Instructions For Reading A Micrometer

EXAMPLE: .375 + .010 = .385



Your reading is taken by FIRST—read the barrel including the last visible line—then add the amount shown on the thimble. EXAMPLE—.375 + .010 equals .385.

A micrometer is a measuring gage operated by a screw having 40 threads per inch. Therefore one complete revolution of the screw advances one thread exactly or one fourtieth of an inch. 1/40" equals 25 thousandths of an inch or .025". Thus each line on the barrel equals .025". The beveled edge of the thimble is divided into 25 equal parts. Each line equals 1/25 of .025" or .001". (one thousandths of an inch.) One complete revolution of the thimble therefore equals .025" or one line on the barrel scale.

Instructions For Reading A Micrometer to Ten-Thousandths of An Inch

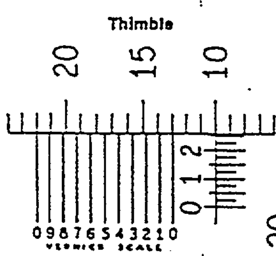


Figure 1

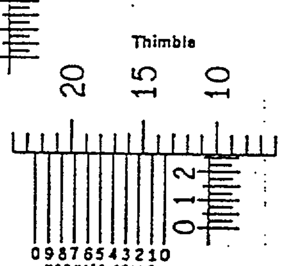
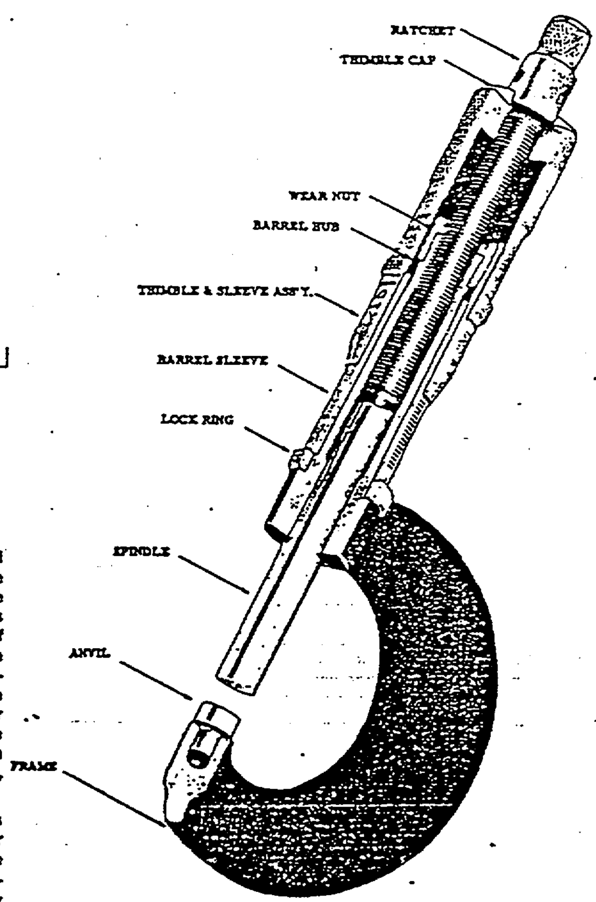


Figure 2

Readings in ten-thousandths of an inch can be obtained by use of a vernier scale. The vernier scale, marked on the barrel, has ten divisions which equal nine divisions on the thimble. Since each graduation on the thimble equals 1/1000 of an inch, then each vernier division is 1/10 of 9/10,000 of an inch. The difference between a thimble division and a vernier division is 1/10,000 of an inch. Therefore, when the zero lines of the vernier exactly coincide with thimble lines (Figure 1), the number on the vernier lines is the difference between the vernier line and the next thimble line in ten-thousandths of an inch. Thus when the fifth line on the vernier coincides with a thimble line, the thimble has moved 5/10,000 of an inch.

Example: First determine the number of thousandths, as with an ordinary micrometer. Then find a line on the vernier that exactly coincides with a thimble line. By adding the vernier reading to the thousandths reading the actual reading in ten-thousandths of an inch is obtained. The reading shown in Figure 2 is .250 plus .0005 or .2505.



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QUALITY CONTROL	PSC Formerly Inryco Surveillance
CALIBRATION FORM "EXHIBIT C"	

Project ______________ Contract ______________ Date ______________

CALIBRATION DATA

Recall Date ______________

Gauge or Device Name ______________ Number ______________

Manufacturer ______________ Type or Model ______________ Range ______________

Master Calibration Device ______________ Number ______________

Master Device Calibration Date: ______________

Test Range	Reading	Error

Method of Calibration (Procedure number or describe other) ______________

Comments: ______________

Calibrated By: ______________ Title: ______________ Date: ______________

EFFECTIVE DATE	PREV.REV. △	REVISION △	PAGE 1 of

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"EXHIBIT B"

GAUGE CALIBRATION RECORD

GAUGE/INSTRUMENT	IDENTI-FICATION	DATE CAL	RE-CAL DUE	ERROR	REMARKS (PROJECT, PART NO., REPAIR, ETC.)

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1. DIAL INDICATOR GAUGES

The following procedures will be used to calibrate Dial Indicator gauges. The gauge may be used for a variety of measurements and may require that the gauge be dismounted from some other device before calibration.

1. Dismount the gauge where necessary.

2. Clean the gauge of any dirt, oil or other residue that may unduly affect the calibration accuracy.

3. Attach the Dial Indicator to the Indicator Stand, with the probe pointing down towards the stand base.

4. Adjust the Dial Indicator gauge so that it rests on the Indicator Stand base with no pressure exerted on the probe. Set the dial face to read zero on the gauge, with the rotating bezel.

5. Using calibrated feeler gauge strips, slide the gauge strips between the stand base and the probe and note the reading on the Dial Indicator.

   a. A range of four readings will be taken. These will be 0.002", 0.005", 0.010" and 0.015".

6. If the accuracy is within the specific tolerance, document the calibration on the Calibration Form provided. (Exhibit C)

   a. If the accuracy is in excess of ± one division of the smallest reading on the gauge, the gauge will be adjusted, repaired or scrapped.

7. After the Dial Indicator gauge has been calibrated and all records are filled out and correct, fill out the PSC Calibration Sticker and attach it to the gauge, gauge holder, or the gauge storage container.

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1. 8. If the gauge is to be put into field service, follow the procedures below:

   a. Place the original calibration documents into the calibration file.

   b. A facsimile copy of the documents will go to the Field Quality Control representative of respective PSC Agent.

   c. The Calibration Form will also carry in the remarks column or other suitable area, the project name, contract number and date.

9. Attach a color control flag as noted in Procedure Q12.5, as a means of controlling calibration recall.

1.14.87 DJB

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QUALITY CONTROL	PSC Formerly Inryco Surveillance
CALIBRATION FORM "EXHIBIT C"	

Project ____________ Contract ____________ Date ____________

CALIBRATION DATA

Recall Date ____________

Gauge or Device Name ____________ Number ____________

Manufacturer ____________ Type or Model ____________ Range ____________

Master Calibration Device ____________ Number ____________

Master Device Calibration Date: ____________

Test Range	Reading	Error

Method of Calibration (Procedure number or describe other) ____________

Comments: ____________

Calibrated By: ____________ Title: ____________ Date: ____________

EFFECTIVE DATE	PREV.REV. △	REVISION △	PAGE 1 of 1

1. STRESSING RAM/JACK - HYDRAULIC

The following procedures will be used as the means of calibrating or determining the area of hydraulic stressing rams.

1. 1. Clean the ram of excessive dirt, oil, or other residue that may unduly affect the calibration accuracy.

1. 2. The load cell or testing machine shall be set up so that the loads will be applied in a uniform accuracy.

1. 3. The ram shall be attached to the load cell or testing machine and centered so that the loads will be applied concentrically and uniformly.

1. 4. The ram shall be loaded to the target increments shown on Form 12.8.G. This will be in about 1000 psi increments for 1000 tons rams and about 500 psi increments for 1400 ton rams. This will also vary according to the size of the ram and accuracy requirements for a project.

1. 4. 1. Gauge pressures shall not be reduced to meet a target increment once a target increment has been exceeded. Readings will be acceptable when they are within 100 psi of the target increment.

1. 4. 2. A minimum of three runs shall be made for each of the required target increments. These runs shall occur at about 1/4, 1/2, and 3/4 of the total ram extension for each ram.

1. 4. 3. The maximum ram pressure has been pre-determined for each size ram to be calibrated and normally will not be exceeded, to avoid damaging the ram.

1. 4. 4. Readings of the load cell readout and the pressure gauge shall be taken at the same time.

1. 5. During ram calibration a calibrated hydraulic pressure gauge having the smallest reading equal to or less than 20 psi or a Heise Electronic Digital pressure indicator shall be used. The hydraulic pressure reading to the nearest 10 or less psi or the actual digital readout shall be recorded on the calibration form.

1. 5. 1. The load cell or testing machine readout shall also be entered onto the calibration record to the nearest 0.1 reading.

1. 6. All other information areas of the calibration form shall be completely filled in by the calibration technician or the witnessing agent. The form shall be signed and dated. The calibration record shall then be handed over to the Engineering Section for final computation.

2. COMPUTATION OF RAM AREA

Regression analysis shall be used to compute the ram area once initial, raw data, information has been documented on the Jack Calibration Record Form. The personnel performing the computation and verification checks shall sign and date the Calibration Form and the computer printout.

2. 1. Computation shall be performed by the computer. All data entered into the computer will also be printed out. This data, as well as the computer results, shall be verified by someone other than the person operating the computer.

2. 2. In the event that the computer is temporarily unavailable, computations may be performed manually observing the same methods being used by the computer. These manual computations shall be verified and/or corrected by a computer computation as soon as practical. The manual computations shall only be performed by the Engineering Department personnel.

2. 3. Omitted readings, dropouts, are automatically considered by the computer. An explanation will be found in Appendix 1, Section 8.

3. STRESSING CARD PREPARATION - APPLIES FOR ORIGINAL TENDON INSTALLATION ONLY

The regression equation shall be used in the preparation of stressing cards for each jack. As a means of providing a uniform area calculation where more than one jack is used in simultaneous stressing operations, the following procedures will be used.

3. 1. The mean ram area of all the jacks being sent to the jobsite shall be calculated.

3. 1. 1. If any ram in a group of rams varies from the mean ram area by more than ± 2 percent, those rams with variations in excess of the specified tolerance shall be recalibrated or separate individual Stressing Cards shall be used for that ram.

3. 2. The mean ram area will be encoded into the PSC computer for use in preparation of the Stressing Cards for determining ram area. This will eliminate the need for manual calculation on the Stressing Cards.

3. 2. 1. Rams that cannot meet the ± 2 percent control tolerance and are not to be recalibrated, will have separate Stressing Cards prepared based on that individual ram area.

3. 2. 2. In conditions of urgency, the Stressing Cards may be hand written.

3. 3. It is therefore possible to have more than one set of Stressing Cards for use in the stressing operations. Each set of cards shall have the appropriate information documented, following the requirements of the fabrication and quality control procedures for that project.

4. <u>CALIBRATION DOCUMENT DISTRIBUTION</u>

After completion of the verification check of the ram area calculations, the following distribution of the Calibration Record shall be made.

4. 1. The original Calibration Record shall be sent to Quality Control for retention in the Calibration file.

4. 2. Quality Control shall prepare a Ram Calibration Shipping Document Package and submit copies of this package for inclusion in the;

4. 2. 1. Quality Assurance Contract File.

4. 2. 2. Project Management Files.

4. 2. 3. Engineering Jack Calibration Files.

4. 3. Copies of the Calibration Record shall be distributed to:

4. 3. 1. Project Management or Coordinators/Project Managers.

4. 3. 2. Equipment Maintenance, Jack Number File.

4. 3. 3. Equipment Maintenance, Jack Calibration File.

4. 3. 4. Detailing/Engineering Departments, for preparation of field records.

4. 4. At least one copy will accompany the jack for shipment to the field. This copy shall be retained in the appropriate quality or documentation file on site.

4. 5. <u>RAM CALIBRATION DOCUMENT PACKAGE</u>

1

Included in the Ram Calibration Document Package will be the NIST Calibration Data Sheet for the Load Cell; the Gauge Calibration Data Sheet traceable to the NIST, for the gauge used during calibration; Calibration Record Form 12.8.G and the Computer Printout. Where required by the Contract Documents, a Certificate of Compliance shall be included attesting to the traceability of the various instruments to the NBS.

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5. OTHER CONTROLS

5. 1. Calibration stickers or any other calibration information may or may not be applied to the rams. The nature of the jacks plus the constant handling make it very difficult, if not impossible, to retain any markings or temporarily attached devices.

5. 2. Calibration frequency and recall control shall be found in the appropriate Field Installation Manual, Surveillance Program Quality Control Manual, Fabrication Quality Control Manual or as separate Quality Control Procedures.

5. 3. Requirements for other conditions mandating recalibration shall be specified in the Quality Assurance Manual, Fabrication Quality Control Manual, Field Installation Manual, Surveillance Program Quality Control Manual or as separate Quality Control Procedures.

6. DOCUMENTATION

The calibration of a ram shall be documented on the Ram/Jack Calibration Record Form 12.8.G or a similar document. The computation will be in the form of computer printout sheets.

7. APPENDIX

Attached to this procedure are the following documents that will detail the computation of ram force as a function of gauge pressure using Linear Regression, computation of errors, examples and computer program used for calibration:

7. 1. Appendix 1 - Jack Calibration Using Linear Regression

7. 2. Appendix 2 - Examples 1 & 2; 2 pages

7. 3. Appendix 3 - Program Listing: 3 pages, dated 3-3-81

7. 4. Appendix 4 - Definition of Variables: 2 pages, dated 3-3-81

7. 5. Appendix 5 - Program Operation & Flow Chart: 5 pages, dated 3-3-81

Not included with any Q.C. Manual submittals.

8. DEFINITIONS

8. 1. A ram is defined as the piston part of a force pump. It is the area of the piston which is to be measured as the means of calibration.

8. 2. A jack is defined as the entire force pump with the various attachments that permit it to pull or lift. For Post-Tensioning operations the applied force pulls one end of a tendon.

9. **WITNESSING**

9. 1. Where the project documents require the witnessing of ram calibration, raw data, PSC shall notify the Owner or his agent to perform the witnessing.

9. 1. 1. If it is acceptable to the Owner, PSC shall have an independent inspection/laboratory source, who is acceptable to the Owner, perform the witnessing function.

9. 1. 2. If it is acceptable to the Owner, PSC shall have an PSC Level II Q.C. Inspector perform the witnessing function.

9. 2. Where the project documents do not specify a witnessing requirement, PSC may or may not provide witnessing, at PSC's option.

10. **WITNESSING ACTIVITY**

The witnessing activity consists of a visual observation of those operations that are associated with the calibration of the ram.

10. 1. The witness shall be a certified Level II Inspector per the requirements of ANSI N45.2.6-1978 from an independent inspection or laboratory source. The Owner shall retain the option of having a certified Level II Inspector from his Organization perform the witnessing function.

10. 2. The witnessing function shall consist of:

10. 2. 1. Verifying that the information posted on the calibration form is representative of the device being calibrated.

10. 2. 2. Verifying the readings taken of the load cell readout and pressure gauge at each increment.

10. 2. 3. Signing the Calibration Record Form in the Witness Area attesting to the accuracy and acceptance of the raw data being entered.

10. 2. 4. Rejecting any activity not in conformance with the accumulation of the raw calibration data or not in compliance with Section 1 of PSC Calibration Procedure QA 12.8.G-W.

10. 3. The witness does not verify the actual computation of the ram area as this is a computer controlled function based on the "JKCALNR9 Jack Calibration Program."

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RAM/JACK CALIBRATION RECORD — FORM 12.8.G — PSC Formerly Inryco Surveillance

PROJECT ______ CONTRACT/PART NO. ______

Jack Description ______ Size ______ Tons Register No. ______

Theoretical Ram Area ______ Max. Pressure ______ PSI

Calibrating Device ______ Register No. ______ Constant ______

Calibrating Gauge ______ Register No. ______ Date ______

Raw Data By ______ | WITNESS ______

Mean Ram Area ______ sq.in. K= ______ Kips | Agency ______ Date ______

Computed By ______ | QC Check ______

Title ______ Date ______ | Title ______ Date ______

Target PSI	Gauge Reading PSI	Load Cell Readout	COMMENTS
			RUN ______ POSITION ______
			RUN ______ POSITION ______
			RUN ______ POSITION ______

1. THEORY OF LINEAR REGRESSION

The theory of Linear Regression, which uses the principle of Least Square to obtain the line of best fit, will be used to determine the relationship between ram force and gauge pressure. The equation of such a line is

$y = a + bx$ = prediction ram forces,

where $b = \dfrac{\sum(xy) - \dfrac{(\sum x)(\sum y)}{n}}{\sum x^2 - \dfrac{(\sum x)^2}{n}}$ = slope of the line of best fit (regression line)

$a = \bar{y} - b\bar{x}$ = y - intercept of the line

$\bar{x} = (\sum x)/n$ = mean of all x-readings (gauge pressures)

$\bar{y} = (\sum y)/n$ = mean of all y-readings (measured ram forces)

n = Number of pairs of x, y readings. All readings for all three ram positions will be considered together.

2. COMPUTATION OF RESIDUALS (ERRORS)

For each pair of readings, the residual quantity unexplained by regression, Y res. = $\hat{y} - y$, will be determined. The percentage residual will also be determined as E_1 = (Y res./$\hat{y}$ x 100). Note that $\hat{y}$ is the force computed from the Load Cell readout and the Constant (K).

3. OTHER ERRORS

⚠ All other errors due to calibration such as interpolation, accuracy and/or repeatability of the Standards certified by the National Institute of Standards and Technology repeatability of gauges used in calibration or in the field, etc. shall be listed. As a minimum, the following items will be considered.

3. 1. AT JACK CALIBRATION

3. 1. 1. Error in Standard (varies between repeatability of 3 psi to maximum guaranteed value of 10 psi).....use S=(K+.003)ksi or actual value.

3. 1. 2. Interpolation error of calibration gauge against which the jack is compared with the standard......use (Gc/4)ksi or actual value.

3. 1. 3. Accuracy and repeatibility of calibration gauge = 0, since the calibration gauge is adjusted to match the Standard each time.

3. 2. AT GAUGE CALIBRATION

3. 2. 1. Interpolation error in Master.......use (Gm/4)ksi or actual value.

3. 2. 2. Interpolation error in Field Gauge..use (Gf/4)ksi or actual value.

3. 2. 3. Accuracy of Master.................use M=(S/2+Am)ksi or act. value.

3. 2. 4. Accuracy of Field Gauge..............use F=(M+Af+Am)ksi or act. value.
Note: It is expected that the various gauges can be interpolated to any one of 4 division between incremental markings.

3. 3. AT FIELD USE OF GAUGE

3. 3. 1. Interpolation error................use (Gf/4)ksi or actual value.

3. 3. 2. Accuracy...........................use E=(M+Af+Am)ksi or act. value.

4. DEFINITIONS

K = Actual calibration value of Standard.

△1 S = Error in Standard (traceable to NIST).

G = Smallest Gauge scale face reading. (Graduations.)

A = Manufactured guaranteed accuracy.

M = Calibrated accuracy of Master Gauge.

F = Calibrated accuracy of Field Gauge.

E = Calibration error in field.

c = Calibration Gauge.

m = Master Gauge.

f = Field Gauge.

5. ERROR CALCULATION - EXAMPLE

Let K = .007 ksi; Gc = .010 ksi; Gm = .050 ksi; Gf = .050 ksi;
M = (.010/2 + .025) or .030 ksi; E or F = (.030 + .050 + .025) or .105 ksi.
S = (K + .003) or .010 ksi; Am = .025 ksi; Af = .050 ksi.

5. 1. From the above list of values the most probable sum of the "other" errors will be calculated as the square root of the sum of squares. For the stated values

$$\pm \sqrt{\Sigma \text{ (errors)}^2} = \pm .1534 \text{ ksi}$$

5. 2. The most probable error will be input and calculated as a percentage of the maximum gauge pressure expected to be used for that ram at Overstress.

Example: Maximum gauge reading = 10 ksi (10,000 psi for a 750 T ram)

The most probable error as a percentage of the maximum gauge pressure to be used at Overstress for the above example would be:

$$E_2 = \frac{.1534 \times 100}{10} = 1.534\%$$

6. COMBINED ERRORS

The residuals from the regression (jack calibration errors) will be combined with the "other" errors to result in the most probable total error.

Most probable total error, $E = \sqrt{E_1{}^2 + E_2{}^2}$

7. RECALIBRATION

If the most probable total error, E is greater than 1.5% the jack will be recalibrated or more accurate gauges will be used to reduce the value of E to 1.5% or less. If the jack has any repairs performed that could affect the ram area then that jack will be recalibrated.

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8. OMITTED READINGS (Computer Dropouts)

During the calibration of the ram using the Jack Calibration - Linear Regression Program - JKCALNR9 simultaneous readings of the gauge pressure and the load cell indicator are taken. If plotted, these readings would form a scatter diagram from which a "line of best fit" could be drawn. Most of these points will be reasonably close to the "line of best fit", however, one or two may not be close enough and may be considered to be in error. Therefore these "error" points will be automatically discarded by the computer and recomputed as stated in the JKCALNR9 program. If more than one-third of the points are eliminated in this manner, the data is considered unsatisfactory and recalibration performed.

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JACK CALIBRATION - LINEAR REGRESSION

PROJECT. V. C. SUMMER
JACK DESCRIPTION.
THEORETICAL RAM AREA.
CALIBRATING DEVICE USED.
CALLIBRATING GAUGE DESCRIPTION.

CONTRACT/PART NO.
TONS REGISTER NO. 9366
MAX PRESSURE. PSI
REGISTER NO. CONSTANT. 1600
REGISTER NO.

INPUT

ACTUAL GAUGE READING (PSI)	LOAD CELL READOUT	COMPUTED FORCE (K)
6100	79.50	1272.000
7010	91.00	1456.000
7900	103.00	1648.000
5990	78.00	1248.000
7030	91.80	1468.800
7700	101.80	1628.800
6080	79.70	1275.200
7010	91.90	1470.400
7740	101.60	1625.600

FOR INFORMATION ONLY

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL CALCULATIONS

ERRORS IN JACK CALIBRATION
    ERROR IN STANDARD *************** 0.0100 KSI
    INTERPOLATION IN GAUGE ********** 0.0025 KSI
    ACCURACY OF GAUGE ************** 0.0000 KSI
ERRORS IN GAUGE CALIBRATION
    INTERPOLATION IN MASTER ********* 0.0125 KSI
    INTERPOLATION IN FIELD GAUGE **** 0.0125 KSI
    ACCURACY OF MASTER ************** 0.0300 KSI
    ACCURACY OF FIELD GAUGE ********* 0.1050 KSI
ERRORS IN FIELD USE OF GAUGE
    INTERPOLATION ERROR ************* 0.0125 KSI
    ACCURACY ERROR ****************** 0.1050 KSI

MAXIMUM GAUGE READING USED *********** 10.0000 KSI

***** FORCE(K)= 213.438 X GAUGE READING(KSI) -28.878 *****

CORRELATION = 0.9988227 N/NO = 1.0000 (NOT < .6667)
MAXIMUM ERROR RATIO IN JACK *********** .0088
MAXIMUM ERROR RATIO IN GAUGES ********* .0153
MAXIMUM TOTAL ERROR RATIO ************ .0177

COMPUTED BY. TRW CHECKED BY.

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JACK CALIBRATION - LINEAR REGRESSION ANALYSIS

PROJECT CAL PROCEDURE

CONTRACT NO. EXAMPL

JACK DESCRIPTION: PINE TONS: 1000

REGISTER NO.: 9365

THEORETICAL RAM AREA (sq.in): 212.65

MAX PRESSURE (psi): 8440

CALIBRATING DEVICE USED: TELEDYNE REGISTER NO.: 4734 CONSTANT= 32991.2

CALIBRATING GAUGE DESCRIPTION: HEISE REGISTER NO.: S9-27

ACTUAL GAUGE READING (psi)	INPUT LOAD CELL READOUT	COMPUTED FORCE (k)
1013	8.44	278.446*
2116	12.84	423.607
3155	19.20	633.431
4007	27.60	910.557*
5140	31.98	1055.059
6002	41.32	1363.196*
7107	44.64	1472.727
8016	50.92	1679.912
1004	7.66	252.713*
2100	12.78	421.628
3004	17.26	569.428*
4006	25.60	844.575
5088	31.00	1022.727
6005	41.58	1371.774*
7255	44.88	1480.645
8002	51.28	1691.789
1010	6.34	209.164*
2009	12.78	421.628
3010	16.22	535.117*
4108	25.62	845.235
5300	38.46	1268.842*
6004	38.46	1268.842
7003	41.86	1381.012
8005	51.22	1689.809

* - - THESE READINGS HAVE BEEN OMITTED FROM THE FINAL COMPUTATIONS

ERRORS IN JACK CALIBRATION

ERROR IN STANDARD .... 0.0100 ksi

INTERPOLATION IN GAUGE .... 0.0000 ksi

ACCURACY OF GAUGE .... 0.0000 ksi

ERRORS IN GAUGE CALIBRATION

INTERPOLATION IN MASTER .... 0.0000 ksi

INTERPOLATION IN FIELD GAUGE .... 0.0050 ksi

ACCURACY OF MASTER .... 0.0100 ksi

ACCURACY OF FIELD GAUGE .... 0.0275 ksi

ERRORS IN FIELD USE OF GAUGE

INTERPOLATION ERROR .... 0.0050 ksi

ACCURACY ERROR .... 0.0275 ksi

MAXIMUM GAUGE READING USED .... 8.0160 ksi

CALIBRATION DEVIATIONS ARE NOT WITHIN 1.5%

RECALIBRATE JACK

COMPUTED BY: DATE: CHECKED BY: DATE:

1. THREAD MEASURING WIRE GAUGES

The following procedures will be used for calibrating Thread Measuring Wire Gauges. These wire gauges are commonly used for verifying the pitch diameter of threads.

1. MIL-STD-120 Section 8 and FED-STD-H28 Appendix A13 have been used as guides to preparing these procedures. While these documents propose five place decimal accuracy for diameter (0.00001"), roundness (0.00002" to 0.00005") and dimensional relationship of wires to each other (0.00002"), this procedure will only require those accuracy requirements to be maintained to four decimal places, 0.0001", as measured with a micrometer that reads to 0.0001". As the acceptance controls for the thread measurement of anchorages is only required to three decimal places, 0.001", there is no need for greater accuracy.

2. Wire gauges are obtained in sets of three pieces and will be acquired in a calibrated condition to at leat four decimal places, within an accuracy of 0.0001" for the specified diameter. This means that the roundness will also be maintained at the same requirement.

3. Prior to calibration the wire gauge will be carefully cleaned of any surface residue that could unduly influence the accuracy of the calibration.

4. The previous calibration sticker will be removed from the wire storage container.

2. DIAMETER

1. Place the wire gauge between the anvil and spindle of the micrometer.

2. Bring the spindle assembly into contact with the wire, while the wire is in contact with the anvil, by rotating the rachet or the Thimble cap. The wire must be fairly placed between the plug and anvil to effect an accurate and true reading. It may be necessary to do this more than once for each reading in order to obtain correct results.

3. Document the reading to 0.0001".

2. 4. Open the spindle slightly and move the wire to a new location. Repeat Step 2.2 to obtain a measurement at this location. Document that reading.

5. The wire will be measured at no less than six locations, over no less than a ½ inch length near the center of the wire, to verify that the diameter is within the limits over that entire portion.

6. The diameter of that wire is acceptable if all six measurements are identical and that dimension will be used as the control dimension for the final size of that wire.

3. ROUNDNESS

The condition of roundness for a wire may be measured with a 0.0001" micrometer or verified by rotating that wire under a dial indicator mounted on a test stand.

1. MICROMETER

The roundness of a wire will be verified by measuring the wire as it rests in a "V" grove of a hardened and lapped surface. When the wire is rotated and measured at various points about its circumference, in the same general location as noted in Step 2.5 above, the dimensions will be documented.

1. At least three readings will be taken at each measuring location about 120 degrees apart.

2. The wire will be moved to a new location and measured. This will be performed at no less than four locations in the approximate center of the wire, a total of 12 readings.

3. FED-STD-H28 APPENDIX A13 recommends that the wire be rotated in an anvil with flank angles of 14 degrees 30', to approximate the condition of an actual Acme thread, while MIL-STD-120 Section 8 only requires a "V" groove. Because the measurements are taken at 120 degree angles to each other at the same location, the "V" groove may be 29 or 60 degrees, just so 3 point contact is maintained and wedging conditions avoided.

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3. 1. 4. Figure 1 shows the general configuration of this type of measuring device.

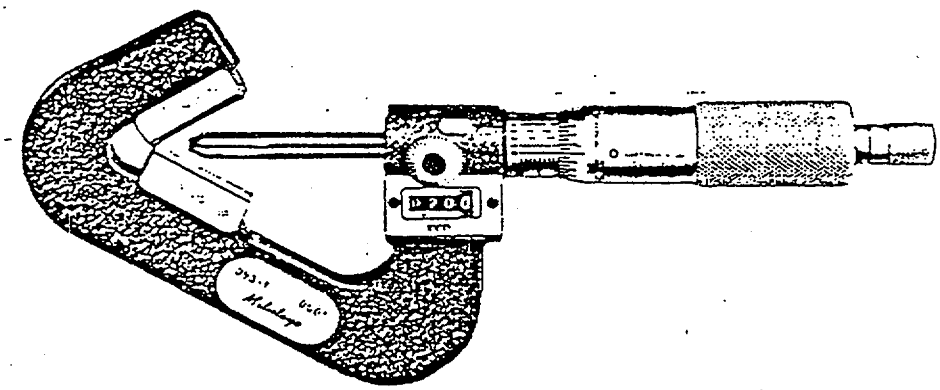

Figure 1

2. <u>DIAL INDICATOR</u>

The roundness of the wire will be verified by rotating the wire as it rests in a "V" groove of hardened and lapped material, with the opposite surface of the wire in contact with the contact point of the dial indicator. The dial indicator rests in a fixed position on the test stand, while the device with the "V" groove may be fixed to the test stand base or may be movable.

1. Regardless of the mounting of the "V" groove device, it will be necessary to be sure that the contact points of the "V" groove are in nearly perfect alignment with the centerline of the indicator contact points, otherwise wide variations in readings will be noted.

2. Care shall be taken while rotating the wire to avoid tipping the wire up or down while resting in the "V" groove as this will only result in incorrect readings.

3. 2. 3. Some care should be exercised to prevent moving the wire laterally while being rotated, in order to effect a correct reading at any one location. This would have a tendency to produce readings of a helical nature rather than circumferential, while undesirable, these readings are still acceptable.

4. At least eight locations will be verified over no less than a ½ inch length near the center of the wire.

5. The greatest variation in reading the indicator dial will be documented for each of the eight locations.

6. It should be noted that dial indicators are manufactured in a variety of dimensional controls, therefore, any dial face may be used, just so an increment reading no larger than 0.0001" can be discerned; a scale reading 0.00005" will be acceptable as this is finer than 0.0001".

7. Figure 2 below shows a typical dial indicator test stand. Figure 3 shows typical dial indicator face graduations.

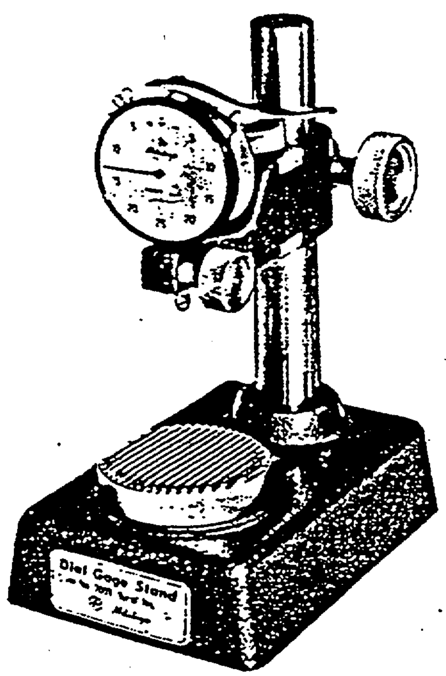

Figure 2

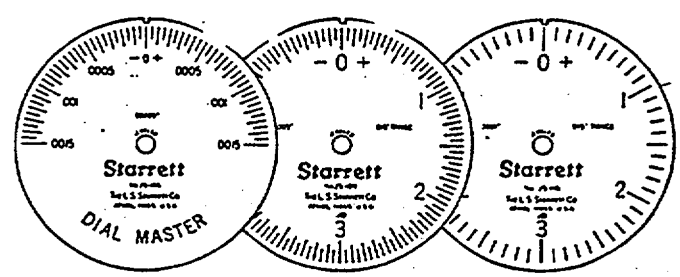

Figure 3

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3\. 3. ROUNDNESS ACCEPTANCE

The roundness of a wire is unacceptable when any reading for roundness exceeds 0.0001" or if the roundness dimension is 0.0001" more or less than the calibrated dimension of that wire.

4\. WIRE SETS

Thread measurements require three wires, therefore a three wire set shall be made of three wire gauges of the same dimensional measurement, accurate to the fourth decimal place 0.0001" for diameter and roundness.

5\. WIRE HARDNESS

Two types of wire sets were available for use in measurements. The "Pee Dee" type wire gauge are relatively soft, about Rockwell C20 and they tend to wear faster. Therefore these wires will be calibrated every six months.

1. A hardened set of wires in excess of Rockwell C50, are also used. They are obtained, originally certified to 5 decimal places 0.00001". As these wires are harder than the threads being measured, the calibration frequency will be established at 12 months.

6\. DOCUMENTATION AND CONTROL

1. If the accuracy is within the specified tolerances, document the calibration on the Thread Wire Calibration Documentation Form 12.8.K.

    1. If the measured diameter of the gauge wire varies from the previous calibration by more than 0.0001" of the stated diameter, that gauge wire will be re-marked to show the new dimension or that wire may be scrapped.

    2. After each gauge wire has been calibrated and all records are completely posted, fill out the PSC Calibration Sticker and attach it to the gauge wire, the gauge holder, or the container in which the gauge is stored.

    3. The original copy of the calibration form will be retained in the QC/QA files.

6\. 1. 4. A facsimile copy of the calibration record will go to the Field Quality Control representative or respective PSC Quality Agent wherever that Wire Gauge shall be placed into service.

5\. The calibration form will also carry in the remarks column or other suitable area, the project name, contract number and date.

6\. Attach a control color flag as noted in Procedure Q12.5 as a means of controlling calibration recall.

7\. The Wire Gauges or its container will be marked to provide traceability to the individual calibration records for a set of wires.

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THREAD WIRE CALIBRATION - PROCEDURE QA 12.8.K	PSC Formerly Inryco Surveillance
DOCUMENTATION FORM 12.8.K	

GENERAL INFORMATION

RECALL DATE __________

Project Assigned __________ Date __________

Gauge ID __________ Supplier/Manufacturer __________

Gauge Type: Hardened Pee Dee Original Diameter __________

Calibrated Roundness __________ Calibrated Diameter __________

CALIBRATION DATA

DIAMETER Micrometer No. __________ Calibration Date __________

LOCATIONS

1	2	3	4	5	6	

ROUNDNESS Micrometer No. __________ Calibration Date __________

LOCATIONS

Reading	1	2	3	4		
1						
2						
3						

ROUNDNESS Indicator No. __________ Calibration Date __________

LOCATIONS - POST TOTAL VARIATION

1	2	3	4	5	6	7	8	

Comments __________

Calibrated by: __________ Title __________ Date __________

EFFECTIVE DATE	PREV.REV. △	REVISION △0	PAGE 1 of 1

PSC Formerly
Inryco Surveillance

"EXHIBIT B"

GAUGE CALIBRATION RECORD

GAUGE/INSTRUMENT	IDENTI-FICATION	DATE CAL.	RE-CAL DUE	ERROR	REMARKS (PROJECT, PART NO., REPAIR, ETC.)

F259/273

PROCEDURE QA 12.8.L	PSC Precision Surveillance Corporation
CALIBRATION - Pee Dee WIRE GAUGES	

1. WIRE GAUGES

The following procedure will be used as the means of calibrating wire gauges, usually a type known as Pee Dee, which will be used in the measuring of the minor diameter of threads. These gauges are acquired in sets of three and normally used for taking various types of thread measurements. There is no need for great accuracy of the measurement of the diameter or for roundness as these dimensions are later deleted from the measurements to provide the actual root of the thread dimension. The wire diameter will be documented to four decimal places, 0.0001", as read with a micrometer that measures to 0.0001".

1. Prior to calibration, the wire gauge will be carefully cleaned of any surface residue that could unduly influence the accuracy of the calibration.

2. The previous calibration sticker will be removed from the wire storage container.

2. DIAMETER MEASUREMENT

1. Place the wire gauge between the anvil and spindle of the micrometer.

2. Bring the spindle assembly into contact with the wire, while the wire is in contact with the anvil, by rotating the rachet or Thimble cap. The wire must be fairly placed between the spindle and anvil to effect an accurate and true reading. It may be necessary to do this more than once for each reading in order to obtain correct results.

3. Document the reading to 0.0001".

4. Open the spindle slightly and move the wire to a new location. Repeat Step 2.2 to obtain a measurement at this location. Document the reading.

5. The wire will be measured at no less than four locations, over no less than a ½ inch length near the center of the wire, to verify that the diameter is within the limits over that entire portion.

6. The diameter of that wire is acceptable if all four measurements are within 0.0005" of one another. The most frequent occurring measurement will be used as the diameter of that wire. It may be necessary to take additional readings to establish a majority dimension.

3. DOCUMENTATION

All measurements, as well as other pertinent information, will be posted on the Calibration Form Exhibit C, which includes signing and dating.

1. If the measured diameter of the gauge wire varies from the previous calibration by more than 0.0005" of the stated diameter, that gauge wire will be re-marked to show the new dimension or that wire may be scrapped.

2. After each gauge wire has been calibrated and all records are completely posted, fill out the PSC Calibration Sticker and attach it to the gauge wire, the gauge holder, or the container in which the gauge is stored.

3. The original copy of the calibration form will be retained in the QC/QA files.

4. A facsimile copy of the calibration record will go to the Field Quality Control representative or respective PSC Quality Agent wherever that Wire Gauge shall be placed into service.

5. The calibration form will also carry in the remarks column or other suitable area, the project name, contract number and date.

6. Attach a control color flag as noted in Procedure Q12.5 as a means of controlling calibration recall.

7. The Wire Gauges or its container will be marked to provide traceability to the individual calibration records for a set of wires.

4. WIRE SETS

Thread measurements require three wires, therefore a three wire set shall be made of three wire gauges of the same dimensional measurement, accurate to the fourth decimal place 0.0001" for diameter.

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QUALITY CONTROL

CALIBRATION FORM "EXHIBIT C"

PSC Formerly Inryco Surveillance

Project ____________ Contract ____________ Date ____________

CALIBRATION DATA

Recall Date ____________

Gauge or Device Name ____________ Number ____________

Manufacturer ____________ Type or Model ____________ Range ____________

Master Calibration Device ____________ Number ____________

Master Device Calibration Date: ____________

Test Range	Reading	Error

Method of Calibration (Procedure number or describe other) ____________

Comments: ____________

Calibrated By: ____________ Title: ____________ Date: ____________

EFFECTIVE DATE	PREV.REV. △	REVISION △	PAGE 1 of

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Inryco Surveillance

"EXHIBIT B"

GAUGE CALIBRATION RECORD

GAUGE/INSTRUMENT	IDENTIFICATION	DATE CAL	RE-CAL DUE	ERROR	REMARKS (PROJECT, PART NO., REPAIR, ETC.)

1. MICROMETER - BAR CHECKING STANDARD CALIBRATION

The following procedure will establish the requirements for the verification of the calibration of Bar Checking Standards that will be used for the purposes of calibrating or verifying the calibrated status of outside measuring micrometers.

1. 1. The Bar Checking Standard will be used to verify or provide the means of calibrating outside micrometers where it is not possible to access a Master Bar Standard.

1. 1. 1. A micrometer capable of reading to 0.0001" will be calibrated with a Master Standard in accordance with the requirements of PSC Procedure Q12.8.B. This micrometer will then be used to verify or provide the means of calibrating the Bar Checking Standard.

1. 2. Remove the end cushions from the Bar Checking Standard to be calibrated and thoroughly clean the ends to be measured.

1. 3. Remove the old calibration sticker if one exists.

1. 4. Place the Standard between the anvil and the spindle of the micrometer. It would be advantageous to use a micrometer stand to assure accurate and correct alignment.

1. 5. Take at least 3 separate readings of that Standard; open the micrometer, remove the Standard and re-install the Standard for each reading. Be sure that the Bar Standard is fairly engaged between the anvil and spindle of the micrometer otherwise accurate measurements will not be possible or repeatable. Unfair readings will be discarded immediately.

1. 6. Acceptability of the measurement will be based on the 3 readings not exceeding the smallest measuring division on the micrometer.

1. 7. Record the actual readings and errors/variations on the Calibration Record Form. The Form shall be signed and dated by the person performing the calibration.

1. 8. Document the calibration on the Gauge Calibration Record and also note where that Bar Checking Standard is being used. See Exhibit B attached - Gauge Calibration Record.

1. 9. After all records have been filled out and are correct, including the correct date for re-calibration, fill out the PSC Calibration Sticker and attach it to the Bar Standard or its Storage Case and release it to its respective function.

1. 10. If the Standard is to be put into field service, follow the procedure below:

1. 10. 1. Put the original calibration documents into the calibration file.

1. 10. 2. A facsimile copy of the documents shall go to the Field Quality Control representative or respective PSC Agent, where that gauge is to be placed into service.

1. 10. 3. The Gauge Calibration Record shall also contain, in the Remarks column, the project name, contract number and date.

1. 11. Attach a control color flag as noted in Procedure Q12.5 as a means of controlling calibration recall.

2. COMMENTS

It should be noted that the Bar Checking Standard is only being verified to 0.0001" with a micrometer that only reads to 0.0001". The measurements being performed in the field will only be taken to 0.001" therefore the Bar Checking Standard will meet the requirements of Criteria XII of the PSC Quality Assurance Manual under the Section entitled "Accuracy".

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QUALITY CONTROL	PSC Formerly Inryco Surveillance
CALIBRATION FORM "EXHIBIT C"	

Project ______________________ Contract ______________ Date ____________

CALIBRATION DATA

Recall Date ____________

Gauge or Device Name ____________________________ Number ______________

Manufacturer ________________ Type or Model ____________ Range __________

Master Calibration Device ________________________ Number ______________

Master Device Calibration Date: ________________

Test Range	Reading	Error

Method of Calibration (Procedure number or describe other) ____________________

____

____

Comments: ____

____

____

Calibrated By: ______________________ Title: ________________ Date: __________

EFFECTIVE DATE	PREV.REV. △	REVISION △	PAGE 1 of 1

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Inryco Surveillance

"EXHIBIT B"

GAUGE CALIBRATION RECORD

GAUGE/INSTRUMENT	IDENTIFICATION	DATE CAL	RE-CAL DUE	ERROR	REMARKS (PROJECT, PART NO., REPAIR, ETC.)

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1. MAGNIFYING COMPARATOR RETICLES

The following procedure will establish the requirements for performing the verification of the status of accuracy of those Reticles that will be used with Magnifying Comparators.

1. 1. Remove the old calibration label if one was applied.

1. 2. Remove the Reticle from the Magnifying Comparator and carefully clean it. Do not use solvents or abrasives. Do not excessively rub the Reticle during cleaning or calibrating. This could displace the scale graduations which are flash plated onto the glass or plastic.

1. 3. Remove the Precision Glass Reticle Calibration Scale from its case and plastic bag. If necessary, carefully clean it in the manner described in Section 1.2 above. As this is a glass device, do not use excessive force during cleaning; do not drop this scale, as it could break.

1. 4. Place the Calibration Scale onto a sheet of clean, white or otherwise light colored paper. It is advisable to use a flashlight or other auxiliary lighting to assist in illuminating the Reticle and Scale.

1. 5. Place the Reticle to be calibrated into the Magnifying Comparator. The Magnifying Comparator should be in a range of 5 to 10 power magnification.

1. 6. Adust the Magnifying Comparator for focus after placing it onto the Calibration Scale. Adjust the auxiliary lighting as necessary.

1. 7. Align the Reticle on the Calibration Scale so that the 0.005" graduations are between the 0.004" to 0.006" graduation lines on the Calibration Scale. This should be done in about the center of the magnified viewing area to avoid problems with parallax at the outer edges of the viewing area. It would be advantageous to align a numbered 0.100" graduation line of the Calibration Scale with a numbered 0.100" graduation line of the Reticle. This would eliminate a need to count graduations between viewing areas of both devices. Refer to the sketches of the Reticle and Scale shown in Section 2 of this Procedure.

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1\. 8. Align the Reticle on the Scale so that the 0.005" Reticle graduation lines are just above the 0.004" to 0.006" graduation lines of the Scale. The 0.005" Reticle graduation lines will appear to emanate out of the 0.004" to 0.006" Scale graduation lines, making it a simple matter to verify that the Reticle has the correct dimensional spacing.

1\. 9. Continue to verify that the 0.005" Reticle graduations intercept the 0.004" to 0.006" graduation lines and the 0.010" graduation lines through out the incremental 0.100" range being checked.

1\. 10. Verify the correct dimensional alignment of the remaining incremental 0.100" ranges that are to be considered for this calibration. It may be necessary to shift the Reticle on the Scale so that it becomes easier to perform the verifications.

1\. 11. It will not be practical to use those portions of the Reticle that are affected by parallax, those portions near the edges verified nor will they be used during inspections due to the parallax condition. Therefore only those portions of the Reticle that are not affected by parallax shall be verified.

1\. 11. 1. There are a number of different configurations for the 0.005" increment Reticle, varying from 0.500" to 0.800" in length. The 0.500" Reticle is not affected by parallax to a great extent, so it can be verified for full value across the 0.500" length.

1\. 11. 2. For those Reticles with lengths over 0.500", it will only be necessary to verify the center portion of the Reticle, typically the range of 0.200" to about 0.600".

1\. 11. 3. The intent here is to provide some latitude regarding the range to be verified. Whichever range is verified shall be documented on the Calibration Record Form. That portion of the Reticle not verified shall be appropriately marked to prevent its accidental use. It would be best to place a piece of tape on the unflashed (unmarked) side of those portions of the Reticle ranges that were not verified and therefore not to be used.

1\. 11. 4. The Reticle shall be verified for each 0.005" increment within each of the 0.100" Test Ranges to be used.

1. 11. 5. Record the actual readings for each Test Range on the Calibration Record Form. Due to the large amount of readings it will be acceptable to document these as Test Range readings for the ranges being verified, with a notation to indicate the increments between the Test Ranges being checked.

1. 11. 6. Acceptability of the verification of the Reticle shall be based on the Reticle matching the 0.010" graduations on the Scale throughout all the Test Ranges. As the Reticle is primarily used to identify cracks in concrete which are not less than 0.010" in width, the 0.005" Reticle graduation is of less importance and could be in error, but not in excess of 0.001" for any one 0.005" Reticle graduation.

1. 11. 7. Record any variations in the error column, provided that the errors are within the acceptable tolerance cited in Section 1.11.6 above.

1. 11. 8. If the Reticle does not meet the required acceptance criteria that Reticle shall be scrapped or destroyed.

1. 12. If all the readings are acceptable, they shall be documented on the Calibration Record Form. The record shall be signed and dated by the person performing the calibration.

1. 13. Document the calibration on the Gauge Calibration Record and also note where that Comparator/Reticle is being used. See Exhibit B attached - Gauge Calibration Record.

1. 14. After all records have been filled out and are correct, including the correct date for re-calibration, fill out the PSC Calibration Sticker and attach it to the Comparator or its Storage Case and release it to its respective function.

1. 15. If the comparator/reticle is to be put into field service, follow the procedure below:

1. 15. 1. Put the original calibration documents into the calibration file.

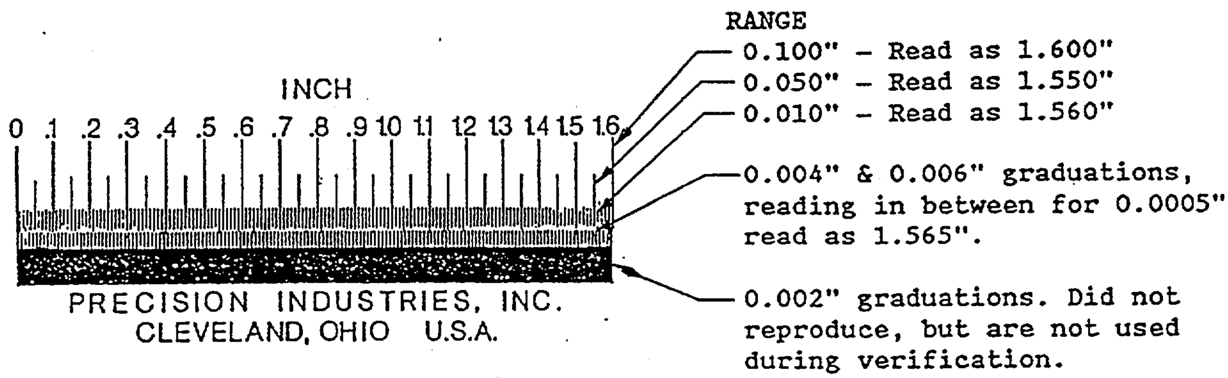
1. 15. 2. A facsimile copy of the documents shall go to the Field Quality Control representative or respective PSC Agent, where that gauge is to be placed into service.

1. 15. 3. The Gauge Calibration Record shall also contain, in the Remarks column, the project name, contract number and date.

1. 16. Attach a control color flag as noted in Procedure Q 12.5 as a means of controlling calibration recall.

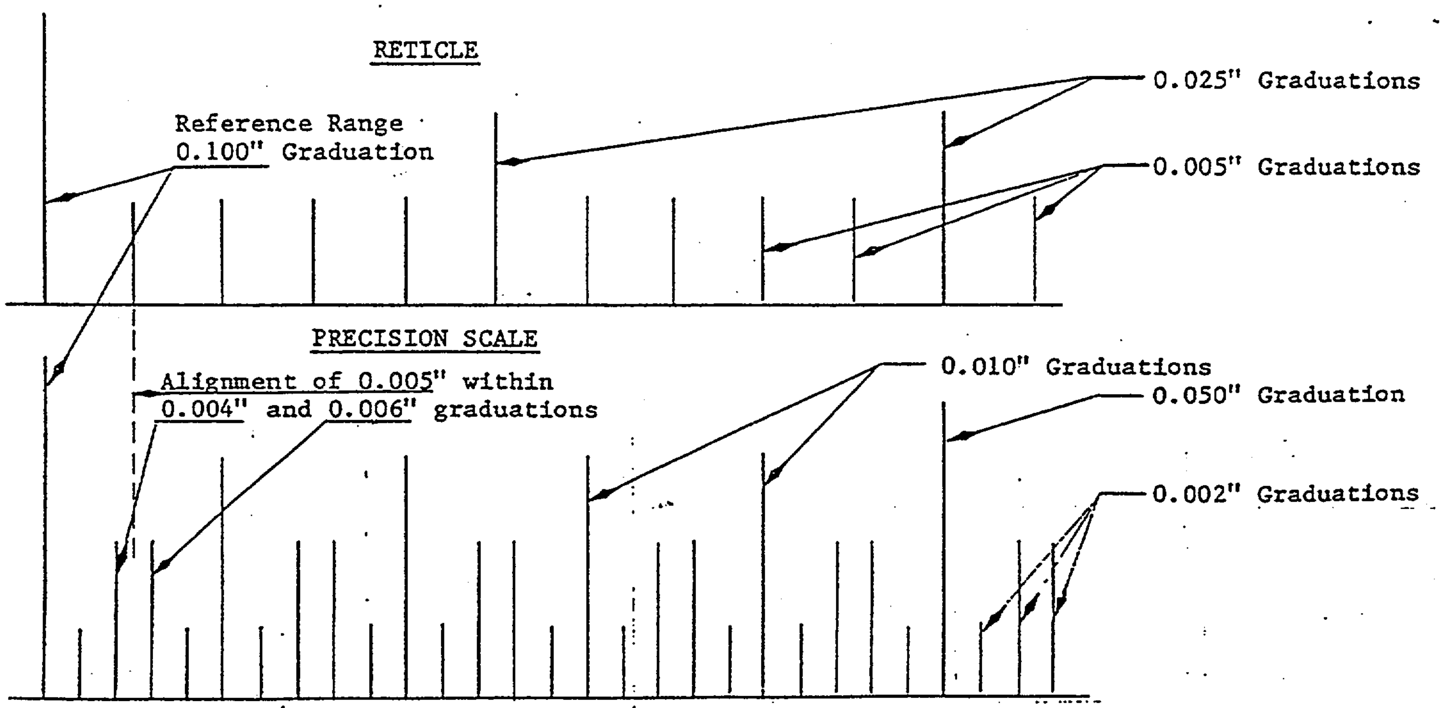
2. PRECISION GLASS RETICLE CALIBRATION SCALE

Shown below are enlarged copies of the Scale and the ranges. Some of the ranges do not reproduce well on facsimile machines and other Scale range examples are also shown. The Metric Scale is not used and therefore not shown or discussed.



2. 1. ENLARGED GRADUATIONS OF RETICLE AND SCALE

Shown below are enlarged portions of each graduation so as to provide a reference fo purposes of comparison.



1-14-87 DSB

QUALITY CONTROL

CALIBRATION FORM "EXHIBIT C"

PSC Formerly Inryco Surveillance

Project ____________ Contract ____________ Date ____________

CALIBRATION DATA

Recall Date ____________

Gauge or Device Name ____________ Number ____________

Manufacturer ____________ Type or Model ____________ Range ____________

Master Calibration Device ____________ Number ____________

Master Device Calibration Date: ____________

Test Range	Reading	Error

Method of Calibration (Procedure number or describe other) ____________

Comments: ____________

Calibrated By: ____________ Title: ____________ Date: ____________

PSC Formerly
Inryco Surveillance

" EXHIBIT B"

GAUGE CALIBRATION RECORD

GAUGE/INSTRUMENT	IDENTIFICATION	DATE CAL	RE-CAL DUE	ERROR	REMARKS (PROJECT, PART NO., REPAIR, ETC.)

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PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 9-14-99

CHECKED BY [illegible]

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7000
8,000	8,000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB

JACK GAUGE NO

MASTER GAUGE NO

DATE CHECKED

CHECKED BY

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)

PSC Formerly
Inryco Surveillance

52/96

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 9-10-99

CHECKED BY [illegible]

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 9-13-99

CHECKED BY [illegible]

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

PSC Formerly
Inryco Surveillance

93/916

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 9-3-99

CHECKED BY [illegible]

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 9-7-99

CHECKED BY [illegible]

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

94/916

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 9-1-~~88~~ 99 [initials] 9-2-99

CHECKED BY [initials]

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 9-2-~~88~~ 99 [initials] 9-2-99

CHECKED BY [initials]

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

95/96

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC 125169

MASTER GAUGE NO 57-5233

DATE CHECKED 8-30-99

CHECKED BY [illegible]

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC 125169

MASTER GAUGE NO 57-5233

DATE CHECKED 8-31-99

CHECKED BY [illegible]

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7000
8,000	8,000

PSC Formerly
Inryco Surveillance

95/916

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 8-26-99

CHECKED BY [illegible] 8-26-99

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 8-27-99

CHECKED BY [illegible] 8-27-99

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

PSC Formerly
Inryco Surveillance

96/916

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 8-23-99

CHECKED BY cf. 8-23-99

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI

JACK GAUGE NO CC-125169

MASTER GAUGE NO 57-5233

DATE CHECKED 8-25-99

CHECKED BY cf. 8-25-99

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1,000	1,000
2,000	2,000
3,000	3,000
4,000	4,000
5,000	5,000
6,000	6,000
7,000	7,000
8,000	8,000

PSC Formerly
Inryco Surveillance

97/916

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125169

MASTER GAUGE NO 57-5233

DATE CHECKED 9-22-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125169

MASTER GAUGE NO 57-5233

DATE CHECKED 9-23-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000

PSC Formerly
Inryco Surveillance

98/916

GAUGE CALIBRATION RECORD

JOB TMI N649

JACK GAUGE NO CC125169

MASTER GAUGE NO 57-5233

DATE CHECKED 9-30-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N649

JACK GAUGE NO CC125169

MASTER GAUGE NO 57-5233

DATE CHECKED 10-1-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000
8500	8500

PSC Formerly
Inryco Surveillance

59/G16

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO ~~Former #2~~ DRESSER #3 DPO 10-1-99

MASTER GAUGE NO 57-5233

DATE CHECKED 10-1-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	5990
7000	6990
8000	7980
8500	8480

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO DRESSER #3

MASTER GAUGE NO 57-5233

DATE CHECKED 10-2-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8010
8500	8510

PSC Formerly
Inryco Surveillance

910/916

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125169

MASTER GAUGE NO ~~DR~~ 57-5233 ARO 10-1-99

DATE CHECKED 10-2-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000
8500	8500

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125169

MASTER GAUGE NO 57-5233

DATE CHECKED 10-5-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000

PSC Formerly
Inryco Surveillance

911/916

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125169

MASTER GAUGE NO 57-5233

DATE CHECKED 10-6-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125169

MASTER GAUGE NO 57-5233

DATE CHECKED 10-7-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000
8500	8500

9 12/9 16

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO DRESSER #3

MASTER GAUGE NO 57-5233

DATE CHECKED 10-7-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7010
8000	8010
8500	8510

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125769

MASTER GAUGE NO 57-5233

DATE CHECKED 10-8-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000
8500	8500

PSC Formerly
Inryco Surveillance

913/916

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO DRESSER #3

MASTER GAUGE NO 57-5233

DATE CHECKED 10-8-99

CHECKED BY Daniel P. O'Hara

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000
8500	8500

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125/69

MASTER GAUGE NO 57-5233

DATE CHECKED 10-11-99

CHECKED BY Daniel P. O'Hara

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000
8500	8500

914/916

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO DRESSER #3

MASTER GAUGE NO 57-5233

DATE CHECKED 10-11-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7010
8000	8010
8500	8520

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125169

MASTER GAUGE NO 57-5233

DATE CHECKED 10-~~20~~ 21-99 DPO 10-21-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000

915/916

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125169

MASTER GAUGE NO 57-5233

DATE CHECKED 10-22-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	998
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125169

MASTER GAUGE NO ~~CC125169~~ 57-5233

DATE CHECKED 10-25-99

CHECKED BY Daniel P. O'Shea

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000
9000	9000

916/916

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB TMI N669

JACK GAUGE NO CC125169

MASTER GAUGE NO 57-5233

DATE CHECKED 10-26-99

CHECKED BY [signature]

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)
1000	1000
2000	2000
3000	3000
4000	4000
5000	5000
6000	6000
7000	7000
8000	8000
9000	9000

PSC Formerly
Inryco Surveillance

GAUGE CALIBRATION RECORD

JOB

JACK GAUGE NO

MASTER GAUGE NO

DATE CHECKED

CHECKED BY

REMARKS

MASTER GAUGE (PSI)	JACK GAUGE (PSI)