

ORGANIZATION: INRYCO INC.  
BEDFORD PARK, ILLINOIS

REPORT NO.: 99900731/85-01	INSPECTION DATE(S): 3/5-8/85	INSPECTION ON-SITE HOURS: 68
CORRESPONDENCE ADDRESS: INRYCO Inc. ATTN: Mr. D. W. Waitkus Supervisor, Quality Assurance 72005 Narragansett Avenue Bedford Park, Illinois 60638  ORGANIZATIONAL CONTACT: Mr. D. W. Waitkus, Supervisor, Quality Assurance TELEPHONE NUMBER: (312) 594-7300		
PRINCIPAL PRODUCT: Post tensioning systems for reactor containments.  NUCLEAR INDUSTRY ACTIVITY: Less than 10%. Activities are limited to providing services for the surveillance of tendons. Inryco currently has an active contract for tendon surveillance at Farley, including replacement of damaged anchor heads.		
ASSIGNED INSPECTOR: <u>K. Naidu</u> <u>4/29/85</u> K. Naidu, Reactive Inspection Section (RIS) Date  OTHER INSPECTOR(S): T. Burns, Brookhaven National Laboratory (BNL)  APPROVED BY: <u>E. W. Merschoff</u> <u>5/16/85</u> E. W. Merschoff, Chief, RIS, Vendor Program Branch Date		
INSPECTION BASES AND SCOPE:  A. BASES: 10 CFR Part 21 and 10 CFR 50 Appendix B.  B. SCOPE: This inspection was made as a result of failed tendons at the J. M. Farley Nuclear Power Station in Alabama, to verify the implementation of INRYCO's QA program relative to procurement document control (Criterion IV), control of purchased material, equipment and services (Criterion VII), quality assurance records (Criterion XVII), and audits (Criterion XVIII). The inspection included visits to two of Inryco's suppliers of material or services.		
PLANT SITE APPLICABILITY: J.M. Farley Nuclear Station (50-364); Marble Hill Nuclear Station Unit 1 (50-546); and Marble Hill Nuclear Station Unit 2 (50-547).		

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A. INSPECTION ISSUES:

During an inspection of post-tensioning systems in January 1985 at the Unit 2 J. M. Farley Nuclear Power Station, tendon anchor head abnormalities were observed. INRYCO supplied components for the post-tensioning systems. The objective of this inspection was to verify the implementation of INRYCO's QA program relative to the control of purchased material, equipment and services.

B. INSPECTION FINDINGS:

1. Violations:

None.

2. Nonconformances:

Contrary to Criterion VII of 10 CFR 50 Appendix B and section 7 of the INRYCO QA manual which requires the establishment of measures to assure that purchased material, equipment, and services, whether purchased directly or through contractors and subcontractors, conform to purchase documents. Specifically:

- (a) INRYCO failed to assure that their purchase order to Machine Specialities for the procurement of tendon anchor heads reflected the requirements of Purchase Specification Y 2721, issued to INRYCO, by not including the relevant sections of the specification which required the vendors and subvendors to conform to 10 CFR Part 21 and 10 CFR 50 Appendix B.
- (b) INRYCO's measures to assure that material supplied by Western Concrete Structures (WCS) conform to purchase documents were inadequate in that INRYCO did not take timely corrective action to bring WCS in compliance with the training requirements for WCS QC personnel.
- (c) Measures established by INRYCO to assure that the services supplied by Downey Heat Treating facilities (DOWNEY), subvendor to WCS, were inadequate in that neither audits nor surveillances were performed and documented which would indicate that Downey followed INRYCO's heat treatment procedure and that the furnaces conformed to MIL-Spec #6875F.

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C. OTHER FINDINGS AND COMMENTS:

1. Background Information:

The two unit J. M. Farley (Farley) Nuclear Power Station is operated by Alabama Power Corporation (APC). APC was preparing to perform the 5-year integrated leak rate test (ILRT) on Unit 2 during January 1985. While visually inspecting the tendons, one broken and one cracked field anchor head were observed on 1/25/85 and 1/30/85 respectively. On 2/26/85, APCO reported an additional broken anchor head. Each anchor head retains 170 tensioned tendons. INRYCO supplied the tendons, anchor heads, and other post-tensioning components for Farley Units 1 and 2. INRYCO procured the tendon anchor heads from Western Concrete Structures (WCS). WCS fabricated the tendon anchor heads from steel manufactured by Republic Steel. The fabricated tendon anchor heads were heat treated by Downey Heat Treatment company to INRYCO's specification. The replacement tendon anchor heads at Farley were originally procured and supplied by INRYCO for installation at the Marble Hill Nuclear Power Plant. These anchor heads were not installed and were purchased as spares for the Fort St. Vrain Nuclear Power Plant. Documents reviewed indicate that these tendon anchor heads were fabricated by Machine Specialities and heat treated by FPM Heat Treating Company and supplied by INRYCO.

2. Review of Audits

The NRC inspectors ascertained whether licensees or their representatives audited INRYCO to evaluate the adequacy of the INRYCO QA program and its implementation by selectively reviewing the following audits:

- a. Preaward audit performed by Bechtel during 1976 for the supply of post-tensioning components for J. M. Farley Nuclear Plant.
- b. Four audits performed by South Carolina Electric & Gas Company between 1981 and 1985.
- c. Three audits performed by Commonwealth Edison Company between 1977 and 1984.
- d. One audit performed by Tennessee Valley Authority during 1975.
- e. One audit performed by Carolina Power and Light Company in 1984.
- f. One audit performed by Baltimore Gas and Electric Company in 1984.

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It was not readily discernable that any of the above audits scrutinized the INRYCO's implementation of 10 CFR 50 Appendix B Criterion IV and VII which relate to procurement document control and control of purchased material.

3. Review of INRYCO's Audits on Western Concrete Structures

The inspectors reviewed the surveys, audits, and surveillances performed by INRYCO on Western Concrete Structures (WCS) to assure that WCS had an acceptable QA program which was implemented at WCS and its subvendors. Records indicate that WCS supplied anchor heads to INRYCO during the years 1975-1981. WCS subcontracted Downey to heat treat post tensioning components including anchor heads. INRYCO qualified WCS in 1974 based on historical data. WCS was placed on INRYCO's approved vendors list (AVL) and continued to be on the AVL until 1981. INRYCO made available the following audits.

- a. INRYCO audited WCS on 12/15/76 and identified the following adverse findings:
  1. The INRYCO auditor questioned the qualifications of a QC inspector. WCS stated that he was a graduate mechanical engineer with demonstrated ability. The INRYCO auditor stated that this satisfied the immediate question but needed other documentary evidence to be presented during a subsequent audit.
  2. The shop was not furnished with up-to-date INRYCO drawings and procedures. It was determined that the quality of the components was not being affected because the later revisions only corrected typographical errors and did not influence the design.
- b. INRYCO performed a followup audit on 8/15/77 and identified the following findings:
  1. Heat or furnace charts were being submitted as objective evidence that the INRYCO procedures were being followed without evidence that the furnace thermocouples had been calibrated.
  2. INRYCO observed that while WCS used qualified procedures to accomplish special processes, the qualifications of personnel were questionable.

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3. Similarly, INRYCO determined that while the equipment and procedures used in the special process complied with the applicable codes and standards, the qualifications of the personnel were questionable.
  4. In the QA records section, the question "Do records include closely related data such as qualifications of personnel" was answered with an individual's name and a statement that "The inspector is now in training."
- c. INRYCO letter dated May 21, 1979, to WCS indicates the following:
- Field anchor head (170 W 1B) identified PC 048 was found with extensive cracking through the walls of 80% of the wire holes and were very visible to the naked eye. The anchor head was sent to an outside laboratory (Lab). The Lab was of opinion that the cracks were caused by the quenching operating during heat treatment. INRYCO personnel observed that the inner surface of the wire holes of the shop and field anchor heads do not have the 0.500R completed. INRYCO stated that they would complete the operation. INRYCO personnel observed one anchor head where the holes had drifted together from top to bottom. This anchor head was scrapped. INRYCO requested WCS to increase their inspection in the above areas to eliminate the shipment of defective or unfinished products.
- d. INRYCO's telex to WCS dated 11/21/79 stated that one field head 170 W1B, INRYCO heat code PY 136, heat #18381 supplied under a purchase order 21T 781-5 broke into two separate pieces, approximately 10 days after stressing. The failures noted here and in c. above, though not related to the Farley tendon problem, indicate deficiencies in the control of heat treatment.
- e. INRYCO interoffice memorandum from D. Waitkus (QA Supervisor) to G. Davis (Project Manager) dated August 18, 1980, recommended the termination of Western Concrete Structures (WCS) as a source of supply of anchor heads or any other services based on the following:

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1. WCS did not maintain the requirements of their QA program including controls of their subtier suppliers and documentation.
  2. The WCS staff was reduced to a minimum and only one inspector was available to check their incoming and fabricated products. The person who acted as the Quality Control (QC) inspector spent less than 10% of the time on QC activities. Review and verification of paper work including heat treatment records was inadequate resulting in incomplete documentation packages.
  3. WCS had various problems with two numerical controlled drills, which resulted in incorrect holes being drilled.
- f. The NRC inspectors informed INRYCO of the information furnished in subparagraphs a and b, INRYCO identified an inadequacy in WCS training program in 1976 and this inadequacy continued in 1977 without being corrected; therefore, INRYCO's corrective actions to bring WCS in compliance with training requirements were not timely. INRYCO's purchase documents required WCS to implement a QA program meeting the requirements of 10 CFR 50 Appendix B. Section VII of the INRYCO QA program established measures to assure that vendors comply with requirements in the procurement documents. The inspectors informed INRYCO that failure to take timely corrective action to bring WCS in compliance with procurement documents was in noncompliance with Criterion VII of 10 CFR 50 Appendix B and Section VII of the INRYCO QA manual.
- g. Relative to the heat treatment services provided by Downey Heat Treatment Company (DOWNEY), no objective evidence was provided to the NRC inspectors that either INRYCO or WCS verified (through surveys by independent agencies) that the heat treatment furnaces were in conformance with MIL SPEC 6875F. Records furnished to the NRC inspectors indicated that INRYCO relied on the furnace heat treatment charts to verify compliance with their procedures without knowledge that the thermocouples in the furnaces were within calibration limits. The inspectors informed INRYCO that inadequate measures were established to verify the Downey, the subvendor to WCS complied with the purchase order requirement, specifically, compliance to MIL SPEC 6875F and that this was another example contrary to 10 CFR 50 Appendix B Criterion VII.

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One item of nonconformance with two examples was identified in the above area.

4. Review of Management Audits

Audits were performed by INRYCO upper management to review the status and adequacy of the Concrete Systems Division. Audits performed by their customers and results of internal audits were used in the performance of the review. The results of the audits were reviewed by the Vice President as acknowledged by his signature on the document. This audit complies with the requirement stated in paragraph 7 of Criterion 2 of the INRYCO QA manual.

No noncompliances were identified in the above area.

5. Review of INRYCO's Purchase Orders

The inspectors reviewed the purchase orders initiated by INRYCO to vendors including vendors to sub-vendors relative to the procurement of post-tensioning components and services to comply with Purchase Specification Y2721 titled "Specification for Post-Tensioning Work (Sargent & Lundy, Agent for Public Service Company of Indiana Inc., Marble Hill Generating Stations Unit 1 and 2). Paragraph 115 of this specification states that the Quality Assurance criteria including 10 CFR Part 21 applies to both contractors and subcontractors. INRYCO attaches their Form D-904 to their purchase order to convey requirements specified in Y2721. Form D-904 is a checklist containing numerous general and special requirements including the applicability of 10 CFR Part 21 and 10 CFR Part 50 Appendix B. The objective of this review was to ascertain whether INRYCO conveyed the applicability of compliance to 10 CFR Part 21 and 10 CFR Part 50 Appendix B to their vendors and whether the vendors in turn forwarded these requirements to their subvendors.

a. The following purchase orders (PO) were reviewed.

- (1) INRYCO PO 45 ST 2742 dated 3/25/80 to Copper Weld Steel Company for the supply of A322 Grade 4140 low alloy steel tubing.
- (2) INRYCO PO 45 ST 2749 dated 5/16/80 to Timken Company for the supply of low alloy steel tubing.

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- (3) INRYCO PO 45 ST 2749 dated 11/14/80 to Timken Company for the supply of A519 Grade 4140 low alloy steel tubing.
  - (4) INRYCO PO 45 ST 2757 dated 9/5/80 to Machine Specialities for the supply of various quantities of field tendon anchor heads and bushings. Fourteen separate specifications/procedures were attached which covered the complete fabrication and heat treatment of the fabricated components.
  - (5) INRYCO PO 41 MS 00015 dated 3/24/81 to Machine Specialities for various quantities of field tendon anchor heads and bushings.
  - (6) INRYCO PO 45 SY 2756 dated 4/5/80 for material for 170W1A (398 feet) and 170W15 (616 feet) to be saw cut.
  - (7) Machine Specialities PO 9913 dated 12/3/80 to their subvendor FPM Heat Treating Company (FPMHTC) for the heat treatment of 700 bushings to the requirements of INRYCO procedure PT 5.2.1, Revision 0.
  - (8) Machine Specialities PO 9924 dated 3.2.81 to their subvendor FPM HTC for the heat treatment of 500 pieces 171W1B type field anchor heads to INRYCO specification PT 5.2.1, Revision 0.
  - (9) Machine Specialities PO 9931 dated 4/28/81 to their subvendor FPM HTC for the heat treatment of 1100 pieces of shop anchor heads to INRYCO specification PT 5.2.1.
  - (10) INRYCO POs 45 T 938-81 and 45 T 938-80 both dated 9/12/78 to Rode Welding Service Inc. to fabricate 324 pieces of type 170 W 50 B and 186 W 50 type trumplates. Eleven separate specifications/procedures were attached to the purchase order.
- b. The results of the review indicated the following.
- (1) For items a (2) and a (3), INRYCO did not attach Form D-904 to the PO. The reason documented in a telecon dated 4/25/80 is that Timken Company refused to comply with 10 CFR Part 21 and 10 CFR Part 50 Appendix B requirements.

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(2) For items (4), (5) and (6) in the above paragraph a, there was no objective evidence at INRYCO that INRYCO forwarded D-904 with the applicable requirements checked to Machine Specialities. Examination of the POs received at Machine Specialities indicated that Form D-904 was not received.

(3) Consequently, for items (7), (8) and (9) Machine Specialities did not convey the applicability of 10 CFR Part 21 and 10 CFR 50 Appendix B to FPMHTC.

(4) For item (10) there was no indication that INRYCO forwarded D-904 to Rode Welding Services imposing the requirements of 10 CFR 50 Appendix B.

c. The inspectors informed INRYCO that based on the above results, INRYCO failed to assure that applicable regulatory requirements specified in Technical Specification Y2721, which are necessary to assure adequate quality, were included or referenced in the procurement documents to control the procurement of post-tensioning equipment, material and services and that this was another example of noncompliance to Criterion IV to 10 CFR 50 Appendix B.

One nonconformance was identified in this area.

D. PERSONS CONTACTED:

1. INRYCO Bedford Park, Illinois

\*W. Corson, Manager of Sales  
\*H. F. Hendrickson, Project Manager  
\*J. Heise, Manager, Contract Management  
C. E. Matykiewicz, Controller  
R. Kujawa, Sales Engineer

2. Machine Specialities, Berkley, Illinois

E. W. Vehrs, President

3. FPM Heat Treating Company Elk Grove Village, Illinois

D. Guy, Quality Control Manager

\*Denotes the individuals who attended the exit meeting at INRYCO on 3/7/85