

APPENDIX

U. S. NUCLEAR REGULATORY COMMISSION

REGION IV

Report: STN 50-482/82-11

Docket: STN 50-482

Category A2

Licensee: Kansas Gas and Electric Company
P. O. Box 208
Wichita, Kansas 67201

Facility Name: Wolf Creek Generating Station

Inspection At: Wolf Creek Site, Coffey County, Burlington, Kansas

Inspection Conducted: July 1 through August 31, 1982

Inspector: *for D M Hunnicutt* T. E. Vandell, Senior Resident Inspector, Reactor Project Section C 9/20/82
Date

Inspector: *for D M Hunnicutt* J. F. Norton, Reactor Inspector, DETP Region III (Paragraph 3) 9/20/82
Date

Approved: *D M Hunnicutt* D. M. Hunnicutt, Acting Chief, Reactor Project Section C 9/20/82
Date

Inspection Summary

Inspection During July 1-August 31, 1982 (Report STN 50-482/82-11)

Areas Inspected: Routine, announced inspection by the Senior Resident Reactor Inspector and by a Region III Reactor Inspector covering followup to previous inspection findings; observations of work and records review for posttensioning system installation; observations of installation activities of installed raceways and power cables for Class 1E electrical installations; installation observations and qualifications verification for electrical cable terminations in electrical penetrations; and general plant tours. The inspection activity involved 96 inspector-hours by the Senior Resident Reactor Inspector and by a Region III Reactor Inspector.

Results: Of the eight areas inspected, no violations or deviations were identified.

1. Persons ContactedPrincipal Licensee Personnel

- *D. W. Prigel, QA Manager, Wolf Creek Generating Station
- *C. E. Parry, QA Systems Supervisor
- *E. Anderson, Contracts Supervisor, Construction
- *J. L. Nix, Contracts Coordinator, Construction
- *H. J. Moody, QA Engineer
- *P. M. Burch, QA Engineer
- *D. A. Colwell, QA Technologist
- *J. L. Stokes, Project Support Supervisor
- *O. L. Thero, QA Surveillance Supervisor

Other Personnel

- *G. Jewell, Project Manager, Inryco Company
- *W. Schneider, Lead QC Inspector, Inryco Company
- N. A. Schryer, Project Quality Inspection Manager, Daniel International Corporation (DIC)
- C. D. Mauldin, Project Quality Engineer, DIC
- J. C. Grill, Project Piping Engineer, DIC
- R. S. Calabro, Jr., Area Hanger Engineer, DIC
- C. L. McDonald, Hanger Engineering Supervisor, DIC

*The above listed personnel attended one or more of the management meetings held on July 27 and 29, and September 3, 1982.

Other licensee and contractor personnel were also contacted during the course of this inspection.

2. Licensee Action on Previous Inspection Findings

(Closed) Unresolved Item (482/82-04-02): This unresolved item addressed unlocated vents and/or drains in six tendon sheaths. All of the vents/drains have either been located and cleared, or appropriately treated in nonconformance reports.

(Closed) Unresolved Item (482/79-09 Paragraph 14): This unresolved item expressed concern regarding procedural adequacy for handling of incomplete safety related items received on site. Daniel International Corporation (DIC) Procedure AP-VIII-02 "Material and Equipment Receiving" provides clear instruction regarding discrepancies in receipts against a purchase order that cannot be accounted for. The case cited was one of a vendor identifying, on shipment documents, those items not shipped in the shipment that would complete the order, not a discrepancy. It is noted that the vendor did subsequently ship the unshipped items which DIC received on March 23, 1979, issuing MRR 27351. No problems were established with the procedure and no changes were necessary. This item is closed.

(Closed) Unresolved Item (482/80-05-02, 482/80-11, 80-15, 80-24): Expansion anchors placed in close proximity to a repaired area where an old abandoned anchor had been cut off and left in the hole with cosmetic surface grouting. The NRC inspector questioned the practice of not qualifying such a configuration or performing an appropriate design review.

Bechtel letter BLKE-640 dated April 9, 1981, and the KG&E Interoffice Memo LNLKQ 82-053 dated June 30, 1982, were reviewed. A publication, issued by ASCE in April 1982, entitled "Effect of Abandoned Holes on Capacity of Wedge Bolts", was included as an attachment. This publication documents the results of tests conducted at the University of Tennessee, performed for the Grand Gulf Nuclear Project (in response to similar NRC questions at the jobsite). In these tests, the abandoned anchors were driven to the bottom of the hole, but the remaining portion of the hole was not filled with grout, as is required by SNUPPS project procedures. A measureable reduction in ultimate load capacity, of 10.5 percent, was experienced when two abandoned anchors were located 1.5 diameters from the loaded anchor, and 19.8 percent when four abandoned anchors were located 2.0 diameters from the loaded anchor, measured centerline to centerline. The NRC inspector agreed with the KG&E Interoffice memo that the magnitude of these reductions is not significant when one considers the severity of the test conditions, and, in addition, that in-situ concrete strength generally exceeds the design value, commonly 20 percent or greater.

This matter is considered resolved.

(Closed) Unresolved Item (482/81-05-01): NK batteries installation lacked cell spacers as called for on manufacturer drawings E-050-0006-02 and E-050-0009-02. Deficiency Report (DR) Number 1SD6527E was issued on April 7, 1981, identifying and controlling the battery cell spacers concern and QC hold tags were attached to the equipment. Further the rework was completed, reinspection performed, and the DR closed on August 17, 1981. Followup surveillance by a KG&E QA Engineer confirmed the installation completion on June 23, 1982. The NRC inspector reviewed the KG&E Test and Startup Department documentation for the control of this rework, as follows:

- . Construction Work Permit NK-4-E July 27, 1981
- . Equipment Work Assignment WA-E1-341-14
- . Electrical Equipment QC checklist for equipment NK-11, NK-12, NK-13, and NK-14 (4 separate completed checklists)

All work was completed satisfactorily and appropriately signed off.

This item is resolved.

(Closed) Unresolved Item (482/82-01-01): Concern regarding a non-safety related oily waste pipe LE-11-P132/331 that had been installed inside electrical tray hangers at support A318. A nonconformance report (NCR) was issued April 8, 1982, documenting the condition of concern. In addition, a KG&E QA Surveillance Report S-482, issued on April 14, 1982, verified the installed locations of pipe and raceway support and established clearance valves. The A-E issued disposition, issued on June 3, 1982, stated "Use As Is, Pipe LE-246-XND-4" and Associated Support LE-11-C225-C located 12 inches north of subject Tray Support have a very nominal movement, therefore, the pipe will have no effect on the Tray Support." The NCR was closed out on May 21, 1982, on basis of a category B disposition to accept as is by DIC.

This matter is considered resolved.

(Closed) Unresolved Item (482/8209-01): Concern regarding the lack of identification of sensing lines and appropriate separation requirements. A meeting was held at the Bechtel Offices in Gaithersburg, Maryland, on August 17, 1982, to discuss the design criteria for separation and physical protection of sensing lines for redundant protection systems. The selected example for the discussion was the reactor coolant crossover legs flow transmitters (FT414, 415, 416, 424, 425, 426, 434, 435, 436, 444, 445, and 446) sensing lines enroute from the crossover leg piping sensors.

The NRC ICSB Engineers in attendance at the meeting informed the Resident Inspector that the identification and redundant channel color coding of sensing lines has been turned over to the NRR Division of Safety Technology.

3. Posttensioning System

The inspection consisted of in-process buttonheading and tendon stressing and QA inspection activities. The storage area for tendons and appurtenant hardware was inspected. Quality records associated with posttensioning were reviewed. Details of the functional and program areas inspected are documented in the following sections of this report.

a. General

The design of the Wolf Creek containment unit utilizes the Inryco System BBRV 170 wire unbonded posttensioning system. Individual tendons are capable of developing over 2000 kips ultimate force. The containment vessel is a cylinder with three buttresses, topped by a hemispherical dome. This design eliminates the need for a dome

ring. The vertical and dome tendons are combined into an inverted "U" shape running vertically from the tendon gallery over the top of the dome and down the opposite wall to the tendon gallery below. Circumferential tendons run 240 degrees around the circumference. Three tendons form a band of two loops.

Inryco, Inc., (Inryco) of Melrose Park, Illinois, is the Wolf Creek Generating Station contractor responsible for installation, stressing, and first line QC inspection of the posttensioning system. Inryco commenced site construction activities in November 1981. The work is on schedule. Approximately 75 circumferential tendons remain to be completed as of this inspection.

b. Observation of Work Activities - Containment Posttensioning

(1) Tendon Buttonheading

Tendon buttonheading was observed on July 28, 1982. Head Number TCAU21 was installed on tendon 18BA. Buttonhead gun 8815 was utilized. Selected individual buttonheads were checked by a qualified QC inspector for verification of acceptable fillet radius and flashing width, and to assure that split, slip, and eccentricity tolerances were not exceeded. The Region III inspector reviewed the QC inspection sheets and buttonheading procedure and verified that equipment calibration was current. The buttonheading operation was being accomplished in accordance with applicable specifications and procedures.

(2) Tendon Stressing

Stressing operations were observed July 27, 1982, on circumferential tendons 6BA and 8BA with Jack Numbers 8805 (at "A" buttress) and 8783 (at "B" buttress). Each tendon was simultaneously stressed from each end in accordance with applicable specifications and procedures. The inspector verified that the stressing sequence was being followed and that calibration of stressing equipment was current. A quality control inspector was present to observe and document stressing. All pertinent data was being recorded and checked. Tendon stressing cards were reviewed and discussed with the QC inspector.

(3) Storage

Posttensioning components are stored in an open area at the site. The area is built up with crushed stone to ensure surface and infiltrating drainage. The tendons and appurtenant hardware are stored on dunnage, heavily coated with corrosion protection grease, and covered with waterproof plastic sheeting arranged to provide protection while affording air circulation and drainage. Several tendons were visually checked for condensation, rust and/or corrosion, with none being evidenced. The storage area meets requirements for Level D storage, as described in ANSI N45.2.2.

c. Review of Quality Records

(1) Review of Records for Installation, Buttonheading, Stressing, and Greasing

Records of several tendons were reviewed. The review verified that all pertinent information was inspected and recorded according to procedures. The records were complete and in order. Data recorded included installation particulars; buttonheading records with details of deficient or atypical heads; stressing ram pressures; shim thicknesses; tendon elongations; and greasing records verifying the annular casing areas were approximately filled with Viconorust 2090P-4.

(2) Calibration of Measuring and Test Equipment

The calibration/verification records of the following equipment were reviewed:

- (a) Heise Master Stressing Gauge S7-5233.
- (b) Field Stressing Gauges: N74, N107, N131, N134, N154, N174, N233, N240, and N275.
- (c) Stressing Jacks: 8783, 8794, 8805, and 8813.
- (d) Eccentricity Gauges: ECC8 and ECC19.
- (e) Feeler Gauges: F17 and F18.

- (f) GO-NO-GO Gauges: BH2, BH20, BH41, and BH50.
- (g) Rulers: R8, R9, and R10.
- (h) Thermometers: 1060 (Capillary), T32 (Stem), PK40, PK41, PK42, PK43, and PK44 (Grease thermometers).

(3) Grease Shipments

Records of the following grease and solvent shipments were reviewed:

(a) Nuclear Grade Casing Filler - Viconorust 2090P-4

<u>Batch/Lot No.</u>	<u>Quantity</u>	<u>Date Received</u>
79	40,000 lb.	January 7, 1982
1198	40,000 lb.	May 16, 1982
1472	40,000 lb.	June 15, 1982
1557	40,000 lb.	June 24, 1982
1580	40,000 lb.	June 29, 1982

(b) Industrial Solvent - Viscor No. 16

05262	330 gallon	June 1, 1982
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(c) Grease - Viconorust 1702

01151	330 gallon	March 17, 1982
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The inspector verified that the records properly documented appropriate physical and chemical properties and that the materials were certified in accordance with Bechtel Specification 10466-C157.

(4) Personnel Certification/Qualification Records

The qualification file for one QA/QC inspector was reviewed. The individual met Level 1 requirements in accordance with ANSI N45.2.6 and was certified accordingly.

(5) Receiving and Storage Inspection Records

Receiving and storage inspection records of posttensioning materials were reviewed. All records were in order and verified that timely storage inspections have been accomplished and apparent problems promptly addressed.

(6) Posttensioning Audits by KG&E

Audits of posttensioning activities were accomplished by KG&E on February 22, 1982, and June 15, 1982. The February audit specifically addressed the following:

- (a) QC Personnel
- (b) Stressing
- (c) QC involvement in stressing
- (d) Greasing activities
- (e) QC involvement in greasing
- (f) QA records
- (g) Nonconformances
- (h) Drawings
- (i) Calibration
- (j) Audits

Also, compliance to the following standards and procedures was checked:

- (a) ANSI N45.2 - 1971, "QA Program Requirement for Nuclear Power Plants"
- (b) ANSI-N45.2.6 - 1973, "Qualifications of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants"
- (c) ANSI N45.2.11 - 1973, "QA Requirements for Design of Nuclear Power Plants"
- (d) Inryco, "Quality Assurance Manual" (Rev. 3)
- (e) Inryco, "Field Installation Manual" (Rev. 2)

The audit accomplished in June addressed the following four items:

- (a) Appropriate use of contract design documents by the Inryco field organization.
- (b) Adherence to correct design documents

(c) Disposition of required procedures

(d) Design document control

The audits were timely and comprehensive. Followup was accomplished on open items and recommendations, and verification of deficiency correction was documented.

(7) Surveillance Inspections by KG&E

Reports of six KG&E surveillance inspections were reviewed. The reports reflect timely, in-depth inspections of post-tensioning controls and installation activities and effective licensee implementation of QA/QC in construction. Deficiencies identified in the inspections were corrected and followup verification was accomplished.

(8) Nonconformance Reports

A review was made of all Inryco NCR's which have been generated since the posttensioning inspection accomplished in March 1982. During this period, 15 NCR's (F19WC thru F33WC) were recorded. The nonconforming conditions are briefed in the following.

<u>NCR No.</u>	<u>Nonconformance</u>
F19WC	Bags on 8 tendons torn and loose on receipt
F20WC	Tendon CB45 - one bent wire
F21WC	Tendon burned on transport truck (rejected)
F22WC & F23WC	Tendon AC26 and CB35 - one wire sheared on each during buttonheading
F24WC & F25WC	Tendons CB3, CB23, and BA17 - one wire smashed on each during buttonheading
F26WC & F27WC	Tendon CB31 and V30 - one wire gouged on each during buttonheading
F28WC	Water in tendon V83 sheath

<u>NCR No.</u>	<u>Nonconformance</u>
F29WC	Tendons 52BA and 54BA - stressed 61 days following installation (60-day limitation in procedures)
F30WC	Tendon BA40 - not greased within 15 days after stressing as required by procedures
F31WC & F32WC	Tendons BA29 & CB2 - one wire damaged and removed on each during installation
F33WC	Tendons BA18 and BA27 - approximately 10-15 feet of sheathing unraveled on each during rabbiting operations. Both sheaths cleared, and installation accomplished.

The NCR's were properly dispositioned in accordance with control procedures and good construction practice.

4. Electrical

Observations of electrical installations were conducted by the SRI during the reporting period. The results of those observations are as follows:

a. Electrical Penetations

Electrical penetrations work in progress was observed as follows:

- (1) Penetration ZSE-218 repair work observed was dispositioned in NCR 1SN4406E for repairs of existing Bunker Ramo materials. Item 9 of 17 deficiencies listed (i.e.; reinspect the manufacturer splices of penetration cables size #2 and #4 single conductor) was being performed. General Work Instruction WA-II-144-11, dated July 19, 1982, was also being followed.
- (2) Penetration ZS1-253 repair activities per NCR 1SN-4420E was observed. Cleaning, removal of rust, and painting of bare surfaces with a Galvanox paint (Qualified for electrical application).

- (3) Penetration ZS1-250 was also observed being cleaned. Terminal strips were being cleaned and a protective coating being applied.
- (4) Penetration ZSE-233 - The NRC inspector observed applying terminal lugs (Brundy YA-6) to the new Conax penetration modules wires, Number 6 AWG single conductor, and then terminating the wiring on terminal block AA.

b. Termination Qualification Records

The inspector reviewed the qualification record file for the E-53 terminations crew. The qualification folder for electrician 80-347 (the electrician observed performing the above listed terminations work) was selected for detailed review. It was found that the electrician has been qualified and certified to terminate:

- . 5kV power cables
- . 600 volt and below cables except motors
- . 600 volt and below instrumentation
- . thermo couple extensions
- . 600 volt and below motors
- . special certification of taping of terminations and bus for 5kV and 15kV.
- . 5kV kerite terminating and splicing kits

The electrician has completed all training sessions required for his qualification certifications.

c. Raceways and Cables

Completed installation of electrical cable trays and cables installed above Class 1E 4160 volt switchgear. Cable tray observed were as follows:

- . 1J1C37
- . 1J1C45
- . 1V1C37
- . 1V1C45
- . 4V1C20
- . 4J1C22
- . 4V1C22
- . 4J1C24
- . 4V1C24
- . 4J1C26
- . 4V1C26

Rigid conduit installations, to the Class 1E switchgear, observed were as follows:

- . 5C3074 non-Class 1E conduit providing and intertie into 1E switchgear cubicle NB0112
- . 1V3054 red channel conduit providing redundant channel intertie into Class 1E switchgear cubicle NB0210
- . 6C3087 non-Class 1E intertie into cubicle NB0212

The following observations were made:

- . Grounding properly installed
- . Identification tagging in place
- . Physical protection being provided for other construction activity
- . Physical separation and color coding of redundant circuits acceptable
- . Cable bending radius minimums were observed
- . Flexible conduit installations were complete and appropriate

No violations or deviations were identified.

5. Exit Interviews

The NRC inspector met with licensee representatives identified in paragraph 1 to discuss the various inspection findings, in conjunction with Mr. J. F. Norton, Region III Engineering Inspector, on July 27, and 29, 1982, and with Mr. C. Johnson, RIV inspector on September 3, 1982.