

U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

REGION III

Report No. 50-483/77-06

Docket No. 50-483

License No. CPPR-139

Licensee: Union Electric Company
Post Office Box 149
St. Louis, MO 63166

Facility Name: Callaway Unit 1

Inspection at: Callaway Site, Callaway County, MO

Inspection Conducted: June 29 - July 1, 1977

Inspectors: T. E. Fandel

K. R. Naicu

T. C. Elsasser, RI

A. A. Varella, RI

C. R. Ober, RI

Approved by: D. W. Hayes, Chief
Projects Section

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Inspection Summary

Inspection June 29-July 1, 1977. (Report No. 50-483/77-06)

Areas Inspected: (1) review of procedures, observation of work activities, and review of records for containment structures and other safety related structures; (2) procedural review and observation of work activities relative to safety related piping; (3) procedural review, observation of storage area relative to containment penetrations; (4) review of structural concrete records, observation of structural concrete repair activities and review of implementation of contractor's indoctrination and training program. The inspection involved 106 inspection-hours onsite by five NRC inspectors.

Results: Of the eight areas inspected no apparent items of noncompliance were identified in five areas. Two items of noncompliance were identified relative to receipt inspection and improper storage of fuel transfer tube sleeve, improper handling/storage of containment liner plates and lack of adequate concrete placement procedures and records. (Sections I, II and V).

DETAILS

Persons Contacted

Chicago Bridge & Iron (CBI)

- *W. A. Spaulding, CNQA Auditor
- *W. A. Wright, QA and Welding Supervisor
- N. Westervig, NDE Inspector

Daniel International Company (Daniel)

- T. Antweiler, Mechanical Material Control
- *C. B. Bleisener, QC Manager
- D. Poulin, Warehouse Office Supervisor
- J. Hrapchak, Chief Civil Engineer
- *E. J. Starr, Assistant Project Manager
- *R. E. Hillyer, Construction Manager
- *W. van der Zalm, QA Manager
- J. K. Williams, Lead Receiving QC Inspector
- C. R. Xanders, Lead Documentation Coordinator
- P. Lacarter, Lead Civil QC administrator
- W. G. Westhoff, Civil QC Engineer
- J. Hritz, QC Training Coordinator

Union Electric Company (UE)

- *H. I. Doyne, General Superintendent
- *S. M. Hogan, QA Engineer
- *R. I. Povers, QA Engineer
- *C. E. Slizewski, QA Engineer
- *H. S. Strothman, QA Engineer
- K. Ruechtemeister, Assistant Engineer
- *W. Weber, Manager Nuclear Construction

*denotes those persons who attended the management exit interview.

1. Licensee Action on Previous Inspection Findings

- a. (Closed) Unresolved items: Three items relating to placement of safety related concrete. (Reference NRC - Region III Inspection Report No. 50-483/77-03, Details Paragraphs 9.a, 9.b, and 10.c)
 - (1) Work Procedure WP-109 was revised, Revision 5 dated June 11, 1977, to require that previously prepared horizontal construction joints should be checked for cleanliness and restored

where found unsatisfactory. (Reference Details Paragraphs 9.a as above)

- (2) The Periodic Maintenance Requirements (PMR) were revised to include the inspection of B series castweld sleeves on prefabricated assemblies at receiving inspection and periodically during storage. (Reference Details Paragraph 9.b as above)
- (3) Work Procedure WP-118 was revised, Revision 3 dated June 7, 1977 to limit the permanent marking in castweld preparation for splicing to draw file only. (Reference Details Paragraph 10.c as above)

b. (Open) Unresolved items: Three items relating to placement of safety related concrete. (Reference NRC - Region III Inspection Report No. 50-483/77-03, Details Paragraphs 9.c, 9.d, and 9.e)

- (1) The resolution of these items is dependent upon the issuance of a change to QCP 109 which is still in preparation. These items remain unresolved pending review of the revised QCP 109 by an NRC inspector.
- (2) Item 9.e identified a lack of definition in Specification C-103 regarding the degree of major imperfections in concrete after removal of forms where engineering review and evaluation is required prior to approval of the repair. Also, WP-109 and QCP-109 did not require engineering evaluation of major imperfections in concrete after removal of forms.

The licensee intended to revise only WP-109 and QCP-109 and leave C-103 as it is. However, in light of the problems encountered with concrete defects in the containment tendon gallery discussed in Section V, paragraph 4 of this report, a revision to C-103 is also deemed necessary in order to provide comprehensive evaluation of nonconforming conditions.

2. Functional or Program Areas Inspected

Details of functional or program areas inspected are documented in Sections I through V.

SECTION I

Prepared by T. E. Vandell

Review of Containment Penetrations

- a. A review was conducted of procedures and specifications for containment penetrations as follows:

Specification	10466-C151(A)	Rev. 9 April 26, 1977
Specification	10466-C151A(Q)	Rev. 7 April 26, 1977
Specification	10466-C171	Rev. 5 March 2, 1977
Specification	10466-C171B(Q)	Rev. 5 March 7, 1977
Specification	10466-M203(Q)	Rev. 1 January 14, 1977
Specification	10466-E033(Q)	Rev. 2 December 7, 1976

- b. Review was conducted of the Fuel Transfer Tube Sleeve and appurtenances material presently stored onsite procured under contract 10466-C171-2/171B-2. Material receiving Report (MRR) No. B00669 was assigned to the material and the inspector observed that QC accept tags were affixed to the material dated January 17, 1977. The MRR showed that nine pieces of material had been received marked 2-25 T1 and T2, and 2-25 M1 through M7 and documents as follows:

- (2) Material test reports
- (3) Inspection procedures and verification reports
- (4) RT exam verification report
- (5) RT film (1 set)
- (6) Joseph T. Byerson release for shipment

The specifications appeared to be in conflict with the material received in that only six pieces were required. A check of the engineering drawings showed that neither six nor nine were the correct number of pieces. Drawings reviewed included 10466-C-OL2921, 2922, 2924, 2925, 2931 and Drawing C-OL6905. Vendor Drawings 72-28, -21, -25 disclosed that the nine delivered included both safety and nonsafety related material. A check of the field engineering prepared MRR to be utilized in the receipt inspection of the material called out only one lot of material therefore all material was inspected and accepted by the QC receiving inspector as being safety related.

SECTION II

Prepared by K. R. Naicu

1. Review of CBI QA Implementing Procedures

The inspector reviewed the Chicago Bridge & Iron (CBI) quality assurance implementing procedures to ascertain whether the quality assurance plans, instructions and procedures established by CBI conform to the NRC requirements and TSAR commitments relative to the component steel structures and supports. During the review, the inspector determined the following:

a. Inspection Points

Inspection points and work performance procedures are identified in the Record Drawing Table. For ASME Code items, such as equipment hatch, inspection hold points are determined with the concurrence of the Authorized Inspector.

b. QC Release Forms, which certify that the structural steel components are in conformance with purchase specifications, are used in lieu of material certifications.

c. Receipt Inspection Procedure

Procedure QRS-(74-0750/33), Revision 3, dated June 21, 1976 titled "Shop Shipping/Receiving & Field Receiving/Storage/Handling of Nuclear Reactor Material Parts and Assemblies" issued to control the receipt, inspection and storage at site.

d. Unresolved Item

Though receipt inspections are to identify "evidence of damage to items from tie down failure and/or rough handling" as required on page 3 of the above procedure, in paragraph 12, titled "Receiving - Field Subsection b," no acceptance criteria was furnished. During a visit to the storage area, the inspector observed a liner plate with a portion of the corner bent and subsequently verified that this item was not documented as a nonconformance. On further inquiry, the CBI site Welding and QA Supervisor stated that no guidance was available specifying the extent to which the

plate could be bent prior to being reported as a nonconformance. The inspector requested the licensee and CBI cognizant personnel to provide additional information on the acceptance criteria to evaluate "Evidence of damage to items from tie down failure and or rough handling." This is considered an unresolved item and will be reviewed during a subsequent inspection.

a. Welding Activities

- (1) Record Drawing identifies mandatory hold points where witnessing or inspection is required.
- (2) Provisions are available to assure that welding procedures are properly qualified; Welding procedures require Bechtel (AE) approval.
- (3) Provisions are available to assure that only CBI qualified weldors are utilized for welding operations.
- (4) The following NDE procedures, reviewed and approved by Bechtel (AE) are being used:
 - (a) Magnetic Particle Test - Prod Method - MTP-12B, Revision 10, dated April 2, 1975, approved on September 25, 1975.
 - (b) Magnetic Particle Test - Loke Method - MTP-13B, Revision 10, dated April 2, 1975 approved on July 30, 1975.
 - (c) Liquid Penetrant Test - RTP-(74-3750/59)-10B, Revision 1, June 20, 1975 approved on October 29, 1975.
 - (d) Radiograph Test - Liner Plate-RTP-(74-3750/59), Revision 1, March 25, 1976 approved on August 9, 1976.
 - (e) Radiograph Test - Equipment hatch and other applications-RTP-(74-3750/59)-9B, Revision 1 January 25, 1976 approved on August 9, 1976.
- (5) Provisions have been established to assure that NDE personnel are qualified to CBI requirements.
- (6) Provisions have been established to assure that NDE equipment is of the proper and specified type, within current calibration and to periodically check that

the equipment is properly maintained and used as specified.

- (7) The following items are documented in the Record Drawing:
 - (a) Weld location, weld number
 - (b) Welder's initials
 - (c) Weld procedures used
 - (d) Weld filler material used; traceability is not required
 - (e) Nondestructive examinations performed
 - (f) NDE technician's initials
 - (g) NDE results
 - (h) Inspection requirements
- (8) Inspection procedures cover the following:
 - (a) Preheat
 - (b) Interpass temperature monitoring with temperature
- (9) Work performance procedures provide for the evaluation of weld quality using approved NDE procedures and the evaluation of radiograph quality.
- (10) General Repair Procedure - GRP-10B Revision 13 dated August 1, 1975 is used to control defect repair where necessary and provides:
 - (a) Defect removal techniques
 - (b) Defect removal verification
 - (c) Acceptance of repair
- (11) Weldrod control encompasses the following:
 - (a) Receipt verification of identity and conformance with specifications.
 - (b) Control of pre-issue storage conditions.

- (c) Storage identification and issue control, so that only acceptable material is issued and used.
- (d) Disposition of issued but unused weldrod.

Note: CBI permits one days supply of weldrod type E7018 to be stored in a pouch without the benefit of portable electrode holding ovens. At the end of the shift, unused electrodes are returned to the baking ovens where they are baked at 250° F for eight hours. They are then returned to holding ovens from which weldors draw their supplies.

No items of noncompliance or deficiencies were identified within the above areas.

2. Observation of Containment Steel Structures Work and Work Activities

a. Storage of Components

The inspector observed the following in the storage area designated for CBI components:

- (1) The storage area was not identified and roped off as required by CBI procedure SHP-(74-3730/58), Revision 3, dated January 21, 1978. A section of the storage area was adjacent to a heavily travelled construction road.
- (2) One section of a penetration sleeve assembly was not on dunnage.
- (3) Several pipe penetration sleeves contained pools of stagnant water.
- (4) A liner plate was observed with one of its corners bent about 20°. A CBI corporate QA person who was on site during the inspection concurred with the RIII inspector that the subject liner plate was nonconforming. Contrary to CBI Nuclear QA Manual, Issue 6, Division 4, paragraph 4.4.2 titled "Material Identification" the liner plate was not identified as a nonconforming item. Also, contrary to paragraph 14.3.3 titled "Corrective Action" corrective action in the form of engineering evaluation had not been initiated. The liner plate was being stored along with other acceptable liner plates. In addition, one liner plate with a questionable kink was observed. Note: An unresolved item related to a handling procedure which could aid identification nonconformances of this nature in future is discussed in preceding paragraph 1.d of this section of this report.

b. Unacceptable Storage Conditions - Infraction

The inspector informed the licensee and cognizant CBI personnel that failure to follow CBI storage procedure resulted in the adverse storage conditions enumerated in the above paragraph a., and that this was contrary to the requirements of 10 CFR 50, Appendix B, Criterion V and the SNUPPS Standard QA Manual Section B-8, paragraph 8.2.b.

Prior to the conclusion of the inspection, NCR #17 was generated, identifying that shell plate-309-A-60 had a corner bend approximately 20°.

c. Installation of Liner Plates

The inspector observed work performance on liner plates, on which welding activities were either in progress or completed. No adverse findings were observed.

d. Observation of Radiography Activities

The inspector observed radiographs being shot for a 10 feet vertical qualification weld identified as 3c, between liner plates 309-A-5 and 309-A-6. Iridium 192 source with approximately 15 curies was used. Eastman Kodak Type AA with .005 and .010 thick lead intensifying screens were used on the front and back of the film respectively. The radiography was performed in accordance with CBI procedure RTP-(74-3730/59), Revision 1, dated March 26, 1976 during off shift hours.

e. Inspections

Inspections were being conducted as prescribed in the record drawing by qualified individuals.

f. Qualifications of NDE and Inspection Personnel

The inspector reviewed the qualifications of the inspectors and radiography technician and determined them to be current.

g. Calibration of Test Equipment

The inspector observed a Macbeth densitometer without a sticker indicating that it was calibrated. On further examining the calibration and "Verification Checks" records for the densitometer, the inspector determined that

the subject densitometer identified with Serial #2159C was calibrated as per manufacturer's recommendations every week during July 1, 1977 to July 27, 1977 period using a step wedge supplied by the manufacturer. The CBI representative informed the licensee that erroneously, a sticker, indicating the date it was last calibrated and the due date, was not affixed..

3. Review of CBI Quality Records - Containment Steel Structures

The inspector reviewed the following records relative to the CBI activities.

a. Certification Records

(1) Liner Plates

Selective review of liner plate receipt inspection records indicated that Quality Release Forms were duly signed by the CBI Cordova Shop authorized representative and that liner plates identified by 309-A-5 and 309-A-1 were shipped on May 19 and 24, 1977 and were receipt inspected on June 10 and May 19, 1977, respectively.

(2) Weldrod

Receipt inspection records dated April 19, 1977 indicated that:

- (a) AIRCo supplied 4200 lbs of 5/32" Ø Type E6010 (SFAS.1) weldrod which conformed to CBI specifications WMS 435, Revision 2 and QAS 311, Revision 8.
- (b) Chemtron supplied 5000 lbs of 1/8" Ø Type E7018 (SFAS.1) weldrod which conformed to CBI specifications WMS 501, Revision 1 and QAS 311, Revision 8.

b. Installation Records

Record Drawing indicated that Shell Liner Plates 309-A-5 and 309-A-8 were welded with a vertical seam weld identified as 5C, the welder was identified by his initials, the fit up was checked, all the NDE other than radiography was completed, reviewed and determined acceptable.

c. Inspection Records

Inspection records were completed by CBI qualified personnel indicating that the necessary inspections were performed, evaluated and determined acceptable.

d. Qualification Records

The inspector reviewed the relevant records and determined that the NDE technician performing the Radiography, the welder who performed weld 5C and the welding supervisor were qualified to CBI procedures.

No items of noncompliances or deficiencies were identified in the above area.

4. Observation of Work Activities - Safety Related Structures (Structural Steel Supports)

The inspector selected two completed welds in the Auxiliary Building area at elevation 1988. Installation drawings K6720-Revision 2-201 and J6720-E-204 were used. The welds had been visually inspected and determined acceptable. Welding activities related to structural steel erection were not in progress during the inspection.

5. Review of Quality Records - Safety Related Structures

The inspector reviewed the quality records for the above two welds and determined the following:

a. Record Drawings

- (1) Notation on Drawing K6720-Revision 2-201 - Auxiliary Building indicated that three welds on beam 23123, joint between Columns A-13 and CA were completed.
- (2) Notation on Drawing K6720-E-204 - Auxiliary Building indicated that one of the four welds on beam 25851, joint between Columns AG and AH2, AB1 and A14 was completed.

b. Inspection Reports

The Welding QC Surveillance Reports for the respective welds identified the drawing #, piece #, weld #, welder ID, welding procedure used, and the weld material and indicated that

the welds were acceptable. The documentation of the welding inspection will be reviewed further during a subsequent inspection to determine compliance with AWS D1.1 requirements.

c. Unresolved Item

A system providing cross reference between the welds/drawings and the inspection reports is to be developed to facilitate orderly retrieval of welding inspection reports. Such a system would reduce time expended in locating relevant inspection reports where in a particular weld inspection was documented.

6. Observation of Site Storage Areas

Storage of Stainless Steel Material

During a tour of the storage area, the inspector observed several unpacked stainless steel components unprotected from stagnant rain water. It could not be readily identified from the material identification tags whether these were safety related material. The licensee stated that he would investigate this matter further with the Plant cognizant personnel vested with storage inspections. This matter will be reviewed during subsequent inspections.

Structural Steel Components Without Identification Tags

The inspector observed several structural steel components in the vicinity where repairs to steel components were in progress, without identification tags. The licensee informed the inspector that this discrepancy was already identified. The inspector reviewed Quality Assurance Audit Finding (QAIF) #77-06-01-01 dated June 16, 1977 which identified "Twenty-five safety related structural pieces in the outside laydown yard 1 that were not released to construction and had no indication of inspection status. Due to the large number of unidentified pieces discovered, this presents a breakdown in the QC system." Corrective action recommended was to identify the cause of the problem and correct. Corrective action taken was to hold the inspectors who remove the QC Hold Tag responsible for retagging. The RIIT inspector informed the licensee that implementation of this matter will be reviewed during subsequent inspection. No items of noncompliance or deficiencies were identified in the above area.

7. Review of QA Audits

a. Daniel QA Audits

The inspector reviewed a QA audit performed by Daniel and documented in QAR #74-01-01 dated May 2, 1977. The audit addressed four items namely: (a) Evaluation and summary, (b) new items, (c) previous open items, (d) previous open items closed. One of the items the audit identified in (b) was relative to CBI storage inadequacies. However, the storage deficiencies were reported corrected immediately. There was no evidence that the benefit of CBI storage procedural requirements was consulted. The inspector informed the licensee that the circumstances leading to the noncompliance identified in paragraph 2.b of this section should have been avoided if the CBI procedure was consulted and appropriate corrective action to prevent recurrence was taken. The inspector plans to review the Daniel audits further during subsequent inspections.

b. UE Audits

The inspector reviewed an audit performed by UE QA personnel during the period November 1-4, 1976. Several discrepancies were identified in the audit. However, no corrective action was taken by the appropriate UE management personnel. The licensee representative stated that the delay was due to changes in QA personnel. The inspector informed the licensee that he will review the corrective action taken to resolve the discrepant items identified in the above audit during a subsequent inspection.

SECTION III

Prepared by C. R. Oberg, RIV

Review of Daniel QC Organization and Procedures

The inspector reviewed the general organizational structure of the Daniel International Quality Control Organization, including the QC indoctrination and training program and its implementation; qualification of selected QC personnel; assignment of stop-work authority; selected work and quality inspection procedures; corrective action procedures; selected material control procedures; and selected document control procedures.

In amplification of the above, the following Daniel documents, procedures, and records were reviewed by the inspector:

- a. Organizational Chart (Quality Control)
FS-C-0242 Revision C, June 1977
- b. AP-11-01, Revision 1 (November 10, 1976) Site Organization and Position Description
- c. AP-11-04, Revision 1 (April 29, 1977) Start/Stop-Work Authority
- d. AP-VII-02, Revision 3 (February 10, 1977) Control of Nonconformances
- e. AP-VII-07, Revision 0 (January 12, 1977) Nonconformance Trend Analysis
- f. AP-VII-08, Revision 0 (May 19, 1975) Corrective Action
- g. Corrective Action Reports #2-0027-c
#2-0029-c
#2-0031-c
#2-0032-c
#2-0033-c
#2-0034-c
- h. Corrective Action Log (current)
- i. AP-VII-03, Revision 0 (May 7, 1976) Material and Equipment Receiving and Inspecting
- j. Indoctrination/Training Program for QC Personnel (undated, unsigned)
- k. Qualification/Training records for five (5) QC (civil) Personnel
The inspector determined that approximately 87 personnel are

assigned to the QC Department. They are of various disciplines including civil, welding, mechanical, electrical and general services. The QC Manager reports to the Project Manager with liaison authorized with the site QA Manager. The QA Manager reports to the Corporate Director of QA.

Assignment of stop-work authority is vested in Project Manager and Construction Manager. The QC Manager commands stop/start work only. Adequate procedures exist for this activity. Other QC procedures for corrective action, material control, document control and QC work and inspection procedures have been issued and implemented.

The inspector also determined that the detailed training program for the QC (civil) Department has not been formally established and approved. This is required to be consistent with the intent of ANSI N45.2.6, paragraph 2.3. A general administrative procedure does exist. Training has been conducted and personnel have been appropriately qualified. However, the progress of training does not appear to be consistent with the progress of the facility. This matter is considered to be unresolved and was discussed at the exit interview.

SECTION IV

Prepared by T. C. Elsasser, RI

1. Review of Quality Assurance Implementing Procedures for Welding of Safety Related Piping

The following documents were reviewed which pertain to the welding of safety related piping:

- Bechtel Specification M-024, "Specification for the Field Fabrication and Installation of Piping and Pipe Supports to ASME Section III, Revision 9.
- Daniel Work Procedures
 - WP-200 Revision 2, May 13, 1977
 - WP-205 Revision 2, May 2, 1977
 - WP-502 Revision 2, March 28, 1977
 - WP-503 Revision 2, January 18, 1977
 - WP-504 Revision 0, January 7, 1977
- Daniel Quality Control Procedures
 - QCP-502 Revision 1, January 12, 1977
 - QCP-503 Revision 1, February 11, 1977
 - QCP-508 Revision 0, January 16, 1977
- Daniel Welding Procedure Specifications
 - N-1-1 Revision 7, June 10, 1976
 - N-1-8 Revision 0, March 17, 1977
 - N-8-8 Revision 0, May 19, 1976
- Daniel Nondestructive Examination Procedures
 - NDE 7.1 Revision 0, February 12, 1977
 - NDE 7.3 Revision 0, February 12, 1977
 - NDE 7.4A Revision 0, February 12, 1977
 - NDE 7.5 Revision 0, February 12, 1977
 - NDE 7.6 Revision 0, February 12, 1977

The inspector determined that adequate procedures were included or referenced in the QA manual to assure that activities relative to the welding of safety related piping are controlled and performed according to NRC requirements, SAR commitments and applicable portions of the ASME Code Sections III and IX.

No items of noncompliance were identified.

2. Safety Related Piping - Observation of Work and Work Activities

The inspector observed the installation of a piping support for the essential service water system and verified that the following requirements were met for installation of piping support 2-EF01-R002/311-Q.

- Conformance with inspection and work procedures
 - Conformance with record keeping requirements
 - Conformance with installation specifications
 - Issuance and use of materials as specified
- a. The inspector made the following inspection of work and work activities to determine conformance with the applicable work procedures, quality control procedures and installation drawings.
- Observation of welding in progress.
 - Direct measurement of weld sizes and support dimension for conformance with the applicable drawing.
 - Visual inspection of completed welds.
 - Control of weld filler material by welder and issuing activity including storage conditions.
- b. The following related documents were reviewed by the inspector:
- Qual. test report for welder N-13 dated June 3, 1977.
 - Weld con. report for support EF01-R002/311Q.
 - Applicable and material weld requirements (W-100).
 - Weld procedure W-1-1 and W-6-6.
 - Bechtel letters dated 1981 and 1990 approving Daniel weld procedure qualification for procedures W-1-1 and W-6-6.

No items of noncompliance were identified.

3. Review of Safety Related Pipe Welding Quality Records

The inspector reviewed records for EDW Weld 2-EF-01-P-00 to ascertain whether the records reflected work accomplishment consistent with NRC requirement and SAR commitments.

The following records were reviewed by the inspector:

- Weld Control Record F101
- Weld Procedure W-1-1-BA-1
- Qualification Records for Welder T-1
- NDE Report (Form 276-5) dated April 21, 1977
- Qualification Records For The NDE Inspector Performing The Magnetic Particle Examination
- Applicable Weld Material Field Requisitions (W-100)

No items of noncompliance were identified.

The following records were reviewed by the inspector:

- Weld Control Record F101
- Weld Procedure W-1-1-BA-1
- Qualification Records for Welder T-1
- NDE Report (Form 276-5) dated April 21, 1977
- Qualification Records For The NDE Inspector Performing The Magnetic Particle Examination
- Applicable Weld Material Field Requisitions (W-100)

No items of noncompliance were identified.

SECTION V

Prepared by A. A. Varela, RI

1. Review of Reactor Base Mat Concrete Records

The inspector reviewed the pertinent work and quality records associated with the continuous (monolithic) placement of the reactor containment base mat. Except as identified in enforcement items, unresolved items, and in paragraph on tendon gallery roof honeycombs, these records were found by the inspector to be in conformance with established procedures and that work was accomplished consistent with applicable requirements.

a. Preplacement Preparation

- Location preparation
- Preplacement inspection

b. Delivery and Placement

- Mix specified was delivered and placed
- Records of batches delivered
- Required tests of placement taken and found acceptable
- Qualifications of inspection personnel

c. Curing

- Temperature records
- Form removal
- Inspection records

d. Concrete Materials

- Records confirm that materials met specifications
- Inspection records meet established requirements relative to control of material - receipt, handling, storage, identification
- audits of testing laboratory activities

e. Batch Plant Operation

- Batch plant certification records
- Production records for base mat placement
- Calibration records
- Inspection records
- Qualification of inspection (QC) personnel

With the exceptions noted above, no items of noncompliance were identified.

2. Review of Structural Concrete Quality Assurance Implementing Procedures

The inspector reviewed the Daniel implementing procedures relative to structural concrete to assure that the following specific activities are controlled and performed according to NRC requirements and SAR commitments. Except as identified in enforcement items, unresolved items, and in the paragraph on tendon gallery honeycombs, these procedures appear adequate.

a. Control of Specific Materials

- Rebar and rebar splicing materials
- All materials used in concrete mix
- Receipt inspection
- Material certifications
- Cement and aggregate storage
- Proof tests of concrete mix designs

b. Control of Specific Processes

- Manufacture and transportation of concrete and limitation on temperature and delivery time
- Preparation for and placement of concrete
- Rebar splicing and testing
- Concrete testing at placement location
- Concrete curing
- Concrete placement
- Material testing
- Batch plant equipment calibration
- Documentation of inspection and testing results

With exceptions noted above, no items of noncompliance were identified.

3. Review of Documentation Regarding Disposition of Circumferential Concrete Crack in Reactor Cavity Moat

The inspector reviewed and evaluated documentation regarding disposition of NCR #2-0631-C-A, dated May 20, 1977, on a non-conformance described as a circumferential crack (up to 1/4 inch wide) occurring in the reactor cavity moat area, approximately 42 inches from cavity liner and extending through approximately 270 degrees arc. (It was reported by licensee by telephone on May 10, 1977, in accordance with 10 CFR 50.55.e that an investigation had been initiated to determine the safety related

significance of the crack.) The inspector visited the subject area on June 28, 1977 and observed that, in accordance with the conclusion of the investigation and after repairs required by the NCR had been completed and accepted by QC, work had progressed to the extent that physical inspection of the repair was not possible. The inspector therefore augmented his documentation review for evaluation of the nonconformance disposition by interviews with responsible QC personnel.

The following documents and correspondence were reviewed by the inspector:

- Trip Report May 10-11, 1977 - Investigation of Concrete Crack at the Reactor Pit Moat Area by C. L. Miller, SNUPPS Civil Group Supervisor (Bechtel).
- NCR No. 2-0631-C-A dated May 20, 1977.
- Concrete Record of Repair - Grouting and Drypack Inspection Report dated June 2, 1977, Unit 1 Reactor Cavity Moat Block-Out Elev. 1998'-5 3/4".

The NCR was closed when repairs were completed in accordance with prescribed disposition and approved by QC June 7, 1977.

The inspector observed no deficiencies in the above documentation.

Tendon Gallery Roof Honeycombed Concrete

The inspector reviewed documentation and inspected the tendon gallery to evaluate the conditions reported by licensee in accordance with 10 CFR 50.36 on June 17, 1977. Specification C103 Section 16, Repair of Concrete, states that, damaged or honeycombed concrete shall be removed to sound concrete by chipping prior to application of concrete repair by drypack filling or concrete replacement in accordance with conditions encountered. On removal of the tendon gallery roof forms following placement of the base slab, concrete imperfections were encountered and drypack repairs were undertaken at approximately twenty-five locations in the tendon gallery until May 31, 1977. Honeycombed areas found deeper than six inches and in close proximity to and in back of the tendon templates were encountered. An additional repair procedure was needed for these more extensive areas of honeycomb. The contractor therefore initiated an NCR on May 11, 1977 requesting disposition by Bechtel for the above repairs. On June 27, 1977, after all honeycombed areas were chipped to

sound concrete, a map of each area was sent to Bechtel. The inspector reviewed the dimensional sketches for each of the nineteen areas where chipping had occurred behind bearing plates and behind rebar. The inspector visited the tendon gallery and verified the locations and observed that sound concrete (evidenced by well bonded broken coarse aggregate), surrounded the cavity in each area. The inspector also observed that only minor rebar damage (indentations of about 1/16" by pointed chipping tool held in one hand) resulted from the chipping operation. The inspector observed that the non-conforming areas occur in a 90° arc northerly and 100° arc southerly and vary in size and depth, the worst of which appears to be at azimuth 210° to 213°. It covers an irregular area affecting two tendon bearing plates and exposes four layers of horizontal rebar at the bottom of the base mat to a maximum depth of 17". The NCR states the cause of the nonconformance to be insufficient vibration of the toe of the first concrete lift by concrete placing crews in the congested areas over the tendon gallery. The NCR adds that the mobility of crews was hampered by the trumplate wall dowels, the main steel, rebar supports and form ties. The NCR's recommended disposition and basis for recommendation requested from Bechtel was not available at this inspection. The inspector will review the recommended disposition which is expected to accompany the licensee's thirty-day follow-up report required by 10 CFR 40.43(e).

5. Base Mat Pour Records - Lack of Concrete Placing Reports

Quality Control Procedure, QC-119, Revision 6, Concrete Placement, Grouting and Post Pour, states in Section 3.4 that, a civil QC inspector shall be present at all times during concrete placement and grouting operations and Section 4.5 identifies thirteen significant attributes or details of concrete disposition, flow, placement, consolidation and use of vibrators which the QC inspector must verify. This procedure adds that after placing and finishing is completed in a pour, the civil QC inspector that monitored and verified these activities shall complete a Concrete Placing Report. The base mat placement took 62 hours during which approximately thirteen QC inspectors, alternating on twelve hour shifts, monitored the base mat placement. However, the documentary records on the base mat produced for the NRC inspector to review contain only one Concrete Placing Report. This report is signed by the inspector present at the termination of the pour. The report contains no information regarding verification of work performed on shifts when this one inspector was not present.

This failure to properly document quality control inspection activities is not in accordance with 10 CFR 50, Appendix B, Criterion V.

6. Quality Control Concrete Placing Report Lacks Acceptance Criteria

Quality Control Procedure QCP-109 identifies thirteen significant attributes for the control of concrete disposition, flow, placement, consolidation and use of vibrators for verification by the civil QC inspector. The procedure states that after concrete placing and finishing (as applicable) is completed in a pour, the civil QC inspector that monitored and verified these activities shall complete a Concrete Placing Report. (CPR). However, the CPR and its instructions for completing the CPR (Exhibit G of QCP-109) lists only one of the thirteen significant attributes required by the procedure. (The CPR contains twenty-eight other items of a summary nature for a pour.) The civil QC inspector is required to sign this report. Although the procedure states that the QC inspector signature on the CPR is documentation that all of the applicable inspections per QCP-109, Section 4.5 were verified, the CPR and its instructions do not list nor otherwise identify the QC inspector his responsibility to provide quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

This failure to identify acceptance criteria is not in accordance with 10 CFR 50, Appendix B, Criterion V.

7. Work Procedure Lacks Instructions on Consolidation

Work procedure WF-109, Revision 5, Concrete Placement, Grouting, and Post Pour, states in the scope that the purpose of the procedure is to define and establish duties, standards and documentation to insure that the placing, finishing, curing, protection, repair and grouting of safety related permanent plant concrete is performed in accordance with plans and specifications. WF-109 references C-10 (technical specifications for forming, placing, finishing, and curing of concrete), also references QCP-109. The former, in Section 10.0 (Consolidation of Concrete) establishes detailed requirements for concrete consolidation by mechanical (internal type) vibrators and requires frequency of vibrators to conform to ACI 309 recommended practice. However, WF-109 provides no implementation of the specification requirements on consolidation. Except for the fact that WF-109 charges the

concrete superintendent with responsibility to insure that sufficient standby equipment such as spare vibrators are available, there is a total lack of any additional information on concrete consolidation in WP-109.

This is not in accordance with 10 CFR 50, Appendix B, Criteria V, which requires that activities affecting quality shall be prescribed by documented procedures, instruction, or drawings.

8. Instructions Lacking in Quality Control Surveillance of Concrete Repairs

Technical Specification for forming, placing, finishing and curing of concrete, Q-103, Revision 7, establishes requirements in Section 15 for repair of concrete, and in Section 17 states that, inspection is required of any concrete repair or patching of concrete imperfections. QCP-109, Concrete Placement, Grouting, and pour up, provides two forms identified as Exhibits H and I which are applicable to post pour inspection by QC of minor repairs. However, major repairs which are the subject of an NCR should be identified in a special QC procedure in order to identify verifying correction activities that implement significant required quality attributes. The applicability of using Forms H and I and possibly I in QCP-109 requires additional instructions which should interface with AP-VII-02, Control of Nonconformances.

This is an unresolved item.

9. Quality Control and Work Procedures Lack Instruction on Concrete Placement/Consolidation in Congested and Difficult Locations

Regulatory Guide 1.15, Concrete Placement in Category I Structures is committed in the SHUPPS PSAR. Consistent with this guide, special instruction/provisions are required for concrete placement and consolidation in congested and difficult locations. QCP and WP-109, Revisions 6 and 5, respectively, do not identify the need for special attention, training or the use of a special technique. This is an unresolved item.

10. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance, or deviations. Unresolved items disclosed during the inspection are discussed in Section II, Paragraphs 1.d, 5.c, Section III, and Section V, paragraphs 8 and 9.

11. Exit Interview

The inspectors met with the licensee and contractor representatives (denoted with an asterisk under Persons Contacted) at the conclusion of the inspection on July 1, 1977. The inspectors summarized the purpose and scope of the inspection and the findings, and discussed the items of noncompliance and unresolved items identified during the inspection.