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

REGION III

Report No. 50-483/77-11

Docket No. 50-483 License No. CPPR-139

Licensee: Union Electric Company
P. O. Box 149
St. Louis, MO 63166

Facility Name: Callaway, Unit 1

Investigation At: Callaway Site, Callaway County, MO

Investigation Conducted: December 13-14, 18-22, 1977, and January 3-6, 1978

Investigator: J. E. Foster — 2/10/78

Inspector: E. J. Gallagher — 2/10/78

Approved by: R. L. Spessard, Chief, Engineering Support Section 1 — 2/10/78

Investigation Summary

Investigation on December 13-14, 18-22, 1977, and January 3-6, 1978 (Report No. 50-483/77-11)

Areas Inspected: Special, announced investigation into allegations regarding deficiencies in quality control and improper concrete reinforcement; review of pertinent records, inspections of construction activities, and interviews with personnel. The investigation involved 160 inspector-hours onsite by two NRC inspectors.

Results: Of the areas investigated, three items of noncompliance were identified in the area of quality control (Findings section).

INTRODUCTION

The Callaway Unit 1 nuclear power plant, licensed to the Union Electric Company, is under construction in Callaway County, Missouri. Bechtel Power Corporation is the Architect-Engineering firm for the plant, which is being constructed by Daniel International Corporation. The facility will be the first of a number of Standard Nuclear Unit Power Plants, or SNUPPS units.

REASON FOR INVESTIGATION

Following completion of an earlier investigation into allegations of improper practices at the Callaway construction site, representatives of NRC Region III (RIII) met with Individual "A", on December 13, 1977, to discuss the findings of that investigation. Individual "A" indicated that he did not accept certain of the NRC investigation findings (see IE Investigation Report No. 50-483/77-10), and provided additional information relating to the allegations investigated. In addition, Individual "A" made new allegations concerning construction practices at the Callaway site. Following receipt of this information, RIII re-examined the findings of the previous investigation in light of the new information provided, and initiated investigation into the additional allegations received.

SUMMARY OF FACTS

On October 14, 1977, Mr. E. F. Porter, of the St. Louis Post-Dispatch, contacted RIII by telephone and indicated that he had received allegations concerning construction at the Callaway, Unit 1 plant from Individual "A". On October 19, 1977, two RIII reactor construction inspectors interviewed Individual "A" at his residence. Also present during that interview were Mr. E. F. Porter and Ms. Kay Drey. A RIII Investigation Specialist, accompanied by two reactor construction inspectors conducted a subsequent interview at Individual "A's" residence on October 28, 1977, to assure that all pertinent concerns had been identified. During both of these interviews, Individual "A" made statements alleging improper construction practices at the Callaway site. Twelve specific allegations were derived from the statements made by Individual "A" during the interviews.

On November 19, 1977, Ms. Kay Drey contacted RIII and indicated that Individual "A" had made allegations concerning the adequacy of reinforcement in the third lift (a ten foot high circular section) of the reactor containment wall. Individual "A" was again contacted, and two additional allegations were obtained.

These allegations were investigated by RIII personnel during visits to the Callaway construction site on October 26-28, November 2-4, and 21-22, 1977, and the findings of that investigation are reported in IE Investigation Report No. 50-483/77-10. One item of noncompliance with NRC regulations, related to control of construction drawings, was developed as a result of that investigation.

On December 13, 1977, RIII personnel met with Individual "A" to discuss the findings of the earlier investigation. After long discussions, RIII personnel made arrangements with the licensee to visit the Callaway site with Individual "A", so that he could point out areas of his concern. At the site, discussions were held among Individual "A", licensee and contractor personnel, and the NRC representatives.

During these discussions, Individual "A" made additional allegations regarding construction and provided clarifying information relative to allegations previously investigated.

The allegations were discussed with Individual "A" during the December 13, 1977 evening meeting until early morning, and were again discussed with Individual "A" during the normal day shift working period on December 14, 1977. Two additional allegations were developed during the course of investigation.

Representatives of RIII visited the Callaway construction site during December 18-22, 1977, and conducted interviews, reviewed records, and were present during meetings between Individual "A", licensee and contractor representatives. Audio tape recordings were made during two confidential interviews between Individual "A" and NRC representatives. Audio tape recordings were also made during meetings where Individual "A" discussed his allegations with NRC, Union Electric, and Daniel International representatives. A transcript of the recordings made during these meetings is attached as Attachment A. Confidential interviews were also held with ironworkers and Quality Control personnel.

During January 3-6, 1978, RIII representatives visited the Callaway site to continue the investigation.

The investigation findings indicate that Individual "A" was correct, or partially correct, in many of his observations of construction activities at the Callaway site. However, the NRC's evaluation of the investigation findings, with the possible exception of some of the embedments (a matter identified previously by the NRC), is that the structural integrity of the containment building is not impaired. Notwithstanding the above, three items of noncompliance with NRC requirements, and other matters requiring licensee attention were identified during the investigation.

The allegations and a brief summary of the investigation findings follow.

1. At zero degrees azimuth, sheathing for the horizontal tendons was improperly positioned.

   Finding: The placing of horizontal tendon sheaths was permitted to deviate from the design drawings in certain locations. This deviation was reviewed and approved by Bechtel Power Corporation and was covered by a Design Change Notice (DCN).

   Items of noncompliance: None.

2. At 340 degrees azimuth, vertical reinforcement bars were moved so that the concrete cover for the bars was inadequate. The supporting bars for the horizontal tendon sheathing also had inadequate concrete cover.

   Finding: Concrete cover was less than that required by NRC interpretation of the concrete cover requirements, but within the concrete cover requirements as interpreted by the licensee and contractors. This matter remains under review by the NRC staff, and will be resolved by the sixth lift of the reactor containment wall.

   Items of noncompliance: None, pending resolution.

3. Identifying tags were switched on twelve #18 reinforcement bars, which are sixty feet long. These bars were then misplaced in the third lift of the reactor containment wall.

   Finding: Reinforcement bars were improperly placed in the third lift, as charged, but were later removed and then placed in their proper location. No conclusive evidence was developed that identifying tags were switched or destroyed.

   Items of noncompliance: None.

4. At fifteen degrees azimuth, six horizontal reinforcement bars were cold bent.

   Finding: The horizontal reinforcement bars were sprung into place in an acceptable manner, per the disposition of a Nonconformance Report (NCR).

   Items of noncompliance: None.

5. Quality Control personnel falsified cadwelding records.

Finding: The investigation determined that the proper identifying die stamp had been applied to the cadwelds. However, the stamp was not applied by the individual who performed the cadwelds. In that the proper die stamp was affixed, the NRC legal staff has determined that this did not constitute falsification.

Items of noncompliance: Failure to have the cadweld inspection criteria match the cadweld production requirements. The cadweld inspection criteria did not include verifying that the cadweld was stamped with an identifying stamp on the cadweld sleeve.

6. It was planned to cover up improperly placed reinforcement bars in a control room wall pour.

Finding: The NRC investigation was unable to confirm or disprove the allegation. The control room wall pour was delayed when it was found that some of the reinforcement bars in the wall were incorrectly placed. The pour was delayed so that an engineering review could be made of the rebar placement. The engineering review allowed the use of the reinforcement bars as placed.

Items of noncompliance: None.

7. Shear bars were generally not placed according to the construction drawings. Identifying tags were switched to allow the use of the incorrect shear bars.

Finding: Overlength shear bars were, in fact, placed in some areas of the third lift of the reactor containment wall. According to Bechtel Power Corporation this matter was reviewed by Bechtel and found acceptable. This action was not properly documented as a nonconformance. The structural considerations were subsequently reviewed by Bechtel and the NRC and were found to be acceptable. Individual "A" later indicated that tags had not been switched, and no evidence was found to indicate that identifying tags had been switched or destroyed.

Items of noncompliance: Failure to document the identification and engineering approval for the existence of overlength shear bars in the third lift of the reactor containment wall.

8. A nonconforming concrete embed was not controlled properly, and was almost placed in a wall before it was known that it was unacceptable.

Finding: A nonconforming embed was found to have been properly inspected and controlled.

Items of noncompliance: None.

In addition, during the investigation, one additional item of noncompliance was developed due to an NRC inspection. The inspection identified one instance where reinforcement bars were spaced one half inch beyond allowed spacing tolerances.

CONCLUSIONS

Based on the findings of the total investigation, including those contained herein, the following conclusions have been drawn:

1. The structural adequacy of the containment, with the possible exception of some of the embedments, is not in question. The adequacy of the embedments will be determined by the NRC and reported in future inspection reports.

2. Although certain weaknesses in Quality Assurance and Quality Control were identified, the Quality Control and Quality Assurance programs of the licensee and contractor are basically sound.

3. Although the allegations were determined not to affect the structural adequacy of the containment, the identification of allegations over a period of several months has led the NRC to implement a program of augmented inspections to assure that the Quality programs of the licensee will be more effective when further safety-related work is undertaken.

DETAILS

Persons Contacted

Union Electric Company

J. K. Bryan, Vice President, Nuclear
D. W. Capone, Assistant Manager, Nuclear Engineering
*M. I. Doyne, General Superintendent, Callaway Construction
F. D. Field, Manager, Quality Assurance
*T. McFarland, Construction Supervisor
*R. L. Powell, Site Quality Assurance Group Leader
*D. F. Schnell, Manager, Nuclear Engineering
B. D. Stecko, Assistant Engineer
*W. Weber, Manager, Nuclear Construction
W. H. Zvanut, Supervisory Engineer, Nuclear Engineering

Daniel International Corporation

D. L. Bettenhausen, Civil Quality Control Supervisor
T. Bordeaux, Lead Area Civil Engineer
*J. R. Britt, Senior Area Engineer
J. R. Cook, Project Mechanical Quality Control Engineer
R. E. Hilyer Construction Manager
*J. A. Holland, Project Quality Assurance Manager
J. R. Lee, Civil Quality Control Inspector
W. R. Loburk, Assistant Area Engineer
W. Malisch, Civil Quality Control Inspector
M. McDaniel Audit Coordinator
E. Nelson, Reactor Building Area Engineer
M. Osterhoff, Civil Engineer
*H. J. Starr Project Manager
D. D. White, Reactor Building Area Superintendent

Bechtel Power Corporation

P. H. Divijak, Site Project Manager
C. L. Miller, Civil Engineer
A. G. Pecroa, Civil Engineer
E. W. Thomas, Civil Engineer
J. S. Whitcraft, Civil Engineer

Individuals

Individuals "A" through "M"

*Denotes those attending the site exit briefings.

Scope

This investigation focused on several aspects of the construction program conducted at the Callaway construction site. Principal areas of investigation included reinforcement steel placement, quality control records, control of nonconforming items, and material control.

1. Allegation

At zero degrees azimuth, sheathing for the horizontal tendons was improperly positioned.

Findings

Individual "A" indicated that the construction drawings for placing horizontal tendon sheathing allowed a placing tolerance of one-half inch from the liner plate, and that, in some locations, the sheathing had been located two or three inches away from the design location.

In reviewing the matter, NRC inspectors found that a Design Change Notice (DCN) had been issued by Bechtel Power Corporation concerning the placement of horizontal tendon sheathing. A DCN is an accepted method for modifying a design which has been found to be deficient in some way. The DCN (DCN C-0101-2-1) permitted the tendon sheathing to be placed within a tolerance of as much as four inches from the design location, in areas where the reactor containment wall was recessed, if required. Documents reviewed at the Callaway construction site indicated that this DCN was received at the Callaway construction site on November 10, 1977, and was issued for construction useage on the following day.

Discussions with Bechtel Power Corporation personnel indicated that the DCN had been prepared when the reactor containment wall tendon sheathing positioning was reviewed and found to be unworkable without the additional tolerance for some locations. The NRC review showed that the DCN was processed, reviewed, and approved in accordance with the Licensee's Quality Assurance Program.

Individual "A" indicated that he had not seen nor been advised of the particular DCN. Individual "B", a General Foreman for the day shift, also indicated that he had not been aware of the DCN, but had followed the orders of the Area Superintendent. The Reactor Building Area Superintendent stated that he had been aware of the DCN, and had issued his construction orders to the ironworkers based on the contents of the DCN.

Individual "A" commented that the DCN covered certain areas, and that outside of those areas, the design location for the sheathing, within the original one-half inch placing tolerance, should be maintained. While this is correct, tendon sheathing is relatively rigid, and cannot be kinked. Therefore, a transition area is allowed from where one placing tolerance is required to the areas where the other placing tolerance is required.

No items of noncompliance with NRC regulations were identified.

2. Allegation

At 340 degrees azimuth, vertical reinforcement bars were moved so that the concrete cover for the bars was inadequate. The supporting bars for the horizontal tendon sheathing also had inadequate concrete cover.

Findings

Individual "A" stated that some of the vertical reinforcement bars in the third lift of the reactor containment wall had been moved outward a distance of up to four inches, in some locations. He indicated that this repositioning of the bars had resulted in a decrease in distance from the concrete forms, and lessened concrete cover for the bars in the finished wall. Individual "A" stated that at the buttress at 41 degrees azimuth, concrete cover was insufficient, as the concrete cover in that area was less than one inch. He stated that he had not taken any measurements of the concrete cover, but had made estimates based on his observations of the distances between the reinforcement bars and the concrete forms. He also stated that the small bars used to support the horizontal tendon sheathing had inadequate concrete cover.

Daniel International personnel indicated that the supporting bars for the horizontal sheathing (relatively small bars which support the sheathing while concrete is being poured) are not safety-related items, but are treated as main reinforcement as far as concrete coverage requirements are concerned. This is a conservative approach, as applicable code requirements require less concrete cover for smaller sizes of reinforcement bars.

A review of the requirements for concrete coverage by NRC inspectors indicated that the minimum cover requirements vary for different sections of the containment wall, depending on the amount of cover specified for the area. The minimum concrete cover required for a

#18 reinforcement bar, in the containment wall, was found to be two inches. It was indicated that this minimum could be reduced by one-third, to give an absolute minimum concrete cover of one and one-third inches. A review of the drawings for the buttress at 41 degrees azimuth indicated that the two-inch cover requirement would be the minimum cover requirement for that area, as the outside vertical reinforcement bars are #18 bars.

Discussions with Daniel International Quality Control (QC) inspectors, who had inspected the concrete forms prior to concrete placement, indicated that they had not observed any areas where concrete coverage would be less than the minimum required by the specifications. Representatives of Union Electric and Bechtel Power Corporation had also made inspections of the reinforcement bar placement in the third lift, and found it to be acceptable.

In an effort to resolve the issue, Individual "A" was asked to delineate two areas of the reactor containment wall where concrete cover problems could be located. A verbal request was then made to Union Electric representatives to have these two areas chipped down to the depth of the minimum required concrete cover for the areas, to verify that adequate concrete cover is present.

Union Electric officials indicated that they felt that there was no legitimate reason for the requested chipping, and that no action would be taken without a formal written request from the NRC. As the issue was not of safety significance, Union Electric was advised that a written request for the chipping would not be made.

The NRC inspectors, upon further review, did not accept the interpretation that the minimum concrete cover requirement could be further reduced as was indicated. The requirements for concrete cover were discussed during a meeting between NRC, Union Electric, Bechtel Power Corporation, and Daniel International personnel on January 23, 1978. Bechtel Power Corporation personnel repeated that their interpretation of the cover requirements was that the two-inch cover requirement can be reduced to an absolute minimum of an inch and one third per a provision of the specifications which allows a reduction of the specified cover by one-third. NRC personnel indicated that their interpretation of the requirement was that the two-inch cover minimum cannot be further reduced.

NRC personnel cited a draft Code case covering the same subject, which had been submitted to the American Concrete Institute Technical Committee on Concrete Pressure Components for Nuclear Service. The draft Code case decision agrees with the NRC interpretation of the requirements for minimum concrete cover.

Union Electric representatives were informed that they would be expected to comply with the NRC interpretation of the cover requirements. NRC representatives indicated that it would be acceptable if the cover requirements were fully met in the area of the sixth lift, utilizing the fifth lift as a transition area.

To summarize, the Bechtel understanding of the cover requirements was that a minimum cover of one and one-third inch, for a #18 reinforcement bar, was acceptable for the third lift. Individual "A" estimated that actual cover was approximately one and three-quarters inch, which is within the requirements as used at that time by Bechtel. As Union Electric has been advised to comply with the NRC interpretation of the requirement, a two-inch minimum concrete cover will be required for the sixth and subsequent lifts, utilizing the fifth lift as a transition area. Union Electric is evaluating this position.

Since the pour had been completed prior to the investigation, the NRC staff was unable to determine conclusively whether or not there was any noncompliance with NRC regulations associated with this allegation.

3. Allegation

Identifying tags were switched on twelve #18 reinforcement bars, which are sixty feet long. These bars were then misplaced in the third lift of the reactor containment wall.

Findings

A review of procedures indicated that site construction procedures require that each bundle of reinforcement bars have one identifying tag, or have more than one tag if the bundle contains readily distinguishable bars, of different types, in which case each bar type must have a tag.

Site procedures also require that the identifying tag for a bundle of reinforcement bars remain with any bars which are in the "pit" area adjacent to the construction area itself. Site personnel stated that workers sometimes mark the ends of the reinforcement bars to assure that bars lifted to the work platform do not become unidentifiable. When a work shift changes, the general foreman and foremen for the shift arrive at the jobsite early, so as to learn from the departing shift where they have been working, and what is the location of the reinforcement bars that they have been using.

Through discussions with Individual "A" and a review of construction drawings, it was found that the allegation concerned #14 reinforcement bars, bar marks C-1004 and C-1049, which are sixty feet in length, and identical in shape except for a four inch difference in radius. The difference in the two bars is minimal, and could not be detected by visual inspection of the bars. Both bars would be identical in their stiffening capacity, so that an interchange of the bars would not affect the integrity of the reactor containment.

A review of construction blueprints (drawings R-0232-069 and R-0231-070) indicated that nine C-1004 and seven C-1049 reinforcement bars were included in the third lift of the reactor containment wall.

Site records indicated that eight C-1004 reinforcement bars were issued for construction on November 14, 1977, and five C-1049 bars were issued on November 15, 1977, the other bars in the section having been installed prior to the placement of concrete in the second lift of the reactor containment wall. The warehouse records for issue of the C-1004 and C-1049 reinforcement bars indicated that there would be one identifying tag on each bundle of bars. In accordance with site procedures, if less than the entire bundle of bars were lifted to the work platform for placement, the identifying tag for the bundle of bars would stay with the remaining bars in the "pit" area.

Interviews were held with all available second shift ironworkers who were involved in the alleged incident. From their statements, the alleged reinforcement bar misplacement took place on the night of November 14, 1977. The crew foreman's Daily Time Card for the night indicated that sixteen man-hours (eight men working two hours each) were expended to "lay out and installing horizontal bars". No particular area or elevation for this work was noted on the time card.

Second shift ironworkers, with minor variations, indicated that at the start of their shift on the night of November 14, 1977, the C-1004 bars were already on the work platform, near the area where they were to be installed, which was area 2A. The ironworker crew was to work in area 1A, and install C-1049 reinforcement bars in that area, but could not locate the C-1049 bars. The workers then used rollers to move the C-1004 reinforcement bars to the 1A area, and began installing the bars in place manually.

Interviews with Individual "A" and Individual "C", the crew Foreman, indicated that the Daniel International Superintendent had ordered the workers to install the C-1004 reinforcement bars in the incorrect location, and throw the identifying tags away. Individual "C" made a written statement to this effect, but noted in his statement that he had not removed any tags. (Exhibit I)

Individual "D", the Daniel International Superintendent, stated that the crew had not been sure which reinforcement bar was on the work platform, as the bars were not tagged, and he felt that the ironworkers were looking for an excuse for not doing any work on reinforcement bar placement. He stated that he and Individuals "A" and "C" had decided that the bars were the correct bars to be installed, and he had ordered that they be installed. Individual "D" made a written statement to the effect that he had not ordered any worker to switch identifying tags on reinforcement bars. (Exhibit II)

Interviews with ironworkers indicated that before the shift finished work on November 14, 1977, the C-1004 reinforcement bars were taken down from the incorrect area of the reactor containment wall and re-erected in the correct location. The ironworkers interviewed noted that they had to hurry and get some of the bars placed in the correct area so that they could show that some work had been done during their shift. Two ironworkers made written statements to the effect that the reinforcement bars had been taken down and erected in the proper location on the reactor containment wall. Typed transcripts of these statements are attached to this report as Exhibit III and IV.

No items of noncompliance with NRC regulations were identified.

4. Allegation

At fifteen degrees azimuth, six horizontal reinforcement bars were cold bent.

Findings

Through discussions with Individual "A" and with Daniel International personnel, it was found that Nonconformance Report (NCR) #1042 deals with the six horizontal bars in question. The report indicates that during construction of the first lift of the reactor containment wall, it was found that the bends on a particular reinforcement bar had been detailed incorrectly. To install the reinforcement bars and maintain the necessary clearances and concrete cover, it was necessary to spring the ends of the bars into place.

A review of NCR #1042 indicated that the report was initiated on August 8, 1977, and the recommended action of springing the bars into place was approved on August 17, 1977.

RIII representatives calculated that the ends of the reinforcement bars were moved in a relatively small arc, springing the bars into place without permanently deforming them.

Individual "A" indicated that he was unaware of the NCR, and stated that he felt that the bars were damaged by pulling them into position as indicated by the disposition of the NCR.

No items of noncompliance with NRC regulations were identified.

5. Allegation

Quality Control personnel falsified cadwelding records.

Findings

A review of the site cadweld production procedures indicated that a cadweld is required to be stamped with an identifying stamp which indicates which cadwelder made the cadweld, the splice number, and the cadweld number. A two-part cadweld identification tag, each half of which includes the same information, and in addition, the date spliced, sleeve lot number, and powder lot number, is also attached to the cadweld. One half of the two-part tag is used to generate the as-built cadweld drawing, and the other half of the tag is removed by the QC inspector when the cadweld is inspected. Acceptable cadwelds are sprayed with white paint, and the information on the half of the tag removed by the QC inspector is recorded in the Daily Cadweld Inspection Report. It was observed by the NRC inspectors that the cadweld inspection procedure did not include checking for the cadweld identification stamp as an inspection criteria.

Documents reviewed and statements received during the NRC review indicated that Individual "E", a Civil QC inspector, while making a double-check of the cadwelds on Cadweld As-Built drawing CAD-2003 (reactor building), on the night of September 20, 1977, found two cadwelds, in separate locations, one of which lacked a cadweld identification stamp, and one which had an illegible letter as part of the stamp. He stated that both cadwelds had been sprayed with white paint, indicating that they had previously been inspected by a QC inspector and found acceptable. By comparing the information on the As-Built cadweld drawing with the Daily Cadweld Inspection Report pertaining to the cadwelds,

the QC inspector stated that he could logically determine the correct identification for the two cadwelds. He indicated that he felt the cadwelds should have an identification stamp, as the cadweld production procedure called for the stamp, even though the cadwelds had been properly inspected and would soon be encased in concrete. Individual "E" generated a memo indicating the above sequence, which is attached as Exhibit V.

Statements received indicated that on the night in question, Individual "E" had Individual "F", a fellow QC inspector, go to the second shift Superintendent and request that an ironworker go to the reactor building to stamp some cadwelds. Individual "F" stated that he accompanied the ironworkers to the reactor building entrance, then went about his own inspections.

Interviews with the two ironworkers involved in the incident, Individuals "G" and "H", indicated that Individual "E" showed them the cadwelds to be marked, and told them the identification stamp which should be applied to each cadweld. Individual "G" stated that he had to return to the ironworker's shed to obtain a letter stamp, as the letters to be stamped were not those assigned to him. Individual "G" indicated that he did not apply his own letter stamps to the cadweld, but could not definately recall the letters or numbers of the stamps applied to the cadwelds. When asked if "AR or "BE", the letters indicated on the As-Built cadweld drawing, could be the letters applied, he indicated that the letters sounded right, but he could not positively recall. Individual "G" also stated that he had been asked to stamp other cadwelds on other occasions, and had stamped several other cadwelds on those occasions. He indicated that he had not felt that what he had done was improper.

Discussions with Individual "E" indicated that this was not a singular instance, and he stated that he was aware that other QC inspectors had occasionally followed the same procedure. Individual "D" provided a written statement indicating that he was aware of seven cadwelds his ironworkers had stamped when the identifying numbers were illegiole. (Exhibit VI)

Individual "A" stated that he had not gone with the ironworkers who had stamped the cadwelds, nor witnessed the stamping of the cadwelds. He indicated that he believed

that the men had been marking cadwelds with their own identification letters, to falsely indicate that they had performed the cadwelds. When the sequence of events as found were discussed with Individual "A", he indicated that he still felt that the procedure was not "legitimate", and constituted falsification.

The question of whether the procedure constituted falsification was explored in detail by the NRC. It was felt that there was no motivation for the falsification of the cadweld identification stamp, as the QC inspector could have allowed the cadweld to remain unstamped and be covered with concrete. The method of marking the cadweld, involving several QC inspectors and several iron workers, did not indicate that there was any attempt to conceal the procedure. Also, the QC inspector involved in the incident did not attempt to conceal what had been done, but gave details of what had occurred, and produced documents to substantiate his statements. It was noted that the end result of the procedure outlined would be that a properly inspected and identified cadweld would be encased in concrete as a part of the plant. It was concluded that the actions taken did not constitute falsification.

A review of the cadwelding procedures indicated that the marking of the cadwelds with an identification stamp was included in the cadweld production procedures, but inspection for the stamp had not been made a requirement or hold point in the cadweld QC inspection procedure. This deficiency may have contributed to the incidents described above, by allowing a cadweld to be inspected without verifying that the identifying stamp had been made, and indicates a failure by the licensee to have an adequate cadweld inspection procedure. This is an item of noncompliance with NRC regulations in that it is contrary to 10 CFR 50, Appendix B, Criterion V, which indicates, in part, that "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions."

The licensee, by copy of a memo dated January 5, 1978 (PQC-1437), advised the RIII representatives that the cadweld QC inspection procedure would be amended to include a requirement for verifying that the cadweld has been properly stamped with an identifying stamp. It was indicated that the amended procedure would require that if the identifying stamp is not present, and the cadwelder who made the cadweld could not be located to stamp the cadweld, then the cadweld will be rejected and replaced.

This corrective action is acceptable, and no response to this item of noncompliance is required.

6. Allegation

It was planned to cover up improperly placed reinforcement bars in a control room wall pour.

Findings

A check of the status of the indicated wall (placement 2C361W02) was made, and it was found that a nonconformance report (NCR#2-1782-C) had been generated against the wall, delaying concrete placement pending disposition of the NCR. The wall was inspected by RIII personnel, who observed the nonconforming reinforcement bar placement which was the subject of the NCR. In addition, a weld on a nelson stud attached to a concrete embed in the wall appeared questionable to the RIII inspector.

The disposition of the NCR, to use the reinforcement bars as placed, was reviewed by the RIII representatives when it was received at the site, and was found to be acceptable. The nelson stud whose weld was questioned by the RIII inspector was tested, by bending it to fifteen degrees, and was also found to be acceptable. After the review of the NCR and the weld test, the RIII representatives indicated to the licensee that they had no reason to request that the placement of concrete be delayed, and concrete was placed.

Individual "A" indicated that the concrete placement crew was in place and concrete placement for the wall was about to proceed when he showed the Civil QC inspector the location of the nonconforming reinforcement bar placement.

The QC inspector involved in the incident indicated that he had not completed his final Civil QC inspection of the wall when he was approached by Individual "A" and told of nonconforming reinforcement bar placement around a door frame. The QC inspector indicated that he had already observed that the reinforcement bar placement was partially incorrect on one side of the door frame, and was on his way to review his construction drawings when Individual "A" advised him that the reinforcement was incorrect on both sides of the door frame, which he immediately verified by inspection. The QC inspector stated that he then generated the nonconformance report which delayed concrete placement.

Individual "I", the Civil QC inspector involved in the incident, stated that final Civil QC inspections are always made immediately before concrete is placed, to preclude the possibility that reinforcement bars could be moved prior to concrete placement. He noted that it is not unusual for this final inspection to reveal problems which require delaying concrete placement.

No items of noncompliance with NRC regulations were identified.

7. Allegation

Shear bars were generally not placed according to the construction drawings. Identifying tags were switched to allow the use of the incorrect shear bars.

Findings

Discussions with Individual "A" indicated that identifying tags had not actually been switched on the shear bars, but that shear bars of improper length had been placed in the third lift of the reactor containment wall. Individual "A" stated that, in some cases, shear bars which were approximately five and a half inches overlength were utilized in areas of the reactor containment wall.

Through discussions, it was found that overlength shear bars had been placed in the third section of the reactor containment wall, in the area of the electrical penetrations, and possibly other locations. Daniel International personnel stated that Daniel Civil QC inspectors had identified the presence of the long shear bars, and had consulted with a Bechtel Power Corporation engineer, who had advised them that the shear bars were acceptable, even though overlength. Telephone contact with the Bechtel engineer verified that he had observed the shear bars and advised that they were acceptable.

Bechtel Power Corporation representatives indicated that the placement of shear bars is at the discretion of the client, as long as the "design intent" of their placement is met. By copy of memo BLSE-5384, Bechtel advised that the design document for the reactor containment wall, Bechtel Topical Report BC-TOP-5A, in paragraph CC-3532.1, allows the placement of a shear bar without the hook of the bar being in contact with principal reinforcement. This design document does allow the use of overlength shear bars, and Bechtel has incorporated a clarifying note to the construction drawings to this effect by Design Change Notice C-0003-10-5.

While the use of the overlength shear bars is permitted by the design document, the placement of overlength shear bars was not in accordance with the construction drawings for the third lift of the reactor containment wall, and therefore should have been documented as a nonconformance and dispositioned as such. This is an item of noncompliance with NRC regulations, as it is contrary to 10 CFR 50, Appendix B, Criterion XV, which states, in part, that "Nonconforming items shall be reviewed and accepted, rejected, repaired or reworked in accordance with documented procedures."

8. Allegation

A nonconforming concrete embed was not controlled properly, and was almost placed in a wall before it was known that it was unacceptable.

Findings

RIII personnel accompanied Individual "A" to the location of the embed, and found that the embed did not have a "hold" tag, although a small portion of a hold tag was found attached to the embed. Visual inspection of the embed gave no indication that it was unacceptable.

Through discussions with Individual "A", the day shift Assistant Ironworker Superintendent, and QC personnel, it was found that two embeds had been heat-straightened at the ironworker fabrication shop without an approved nonconformance report. This condition was observed by QC inspectors, an NCR (NCR#2-1592-C-A) was generated, and "hold" tags were placed on the embeds. The disposition of the NCR was to use the embeds "as is", since the procedure used to straighten the embed was acceptable, and the degree of embed plate warpage was within the allowable tolerance limits.

The "hold" tags were removed from the embeds following the disposition of the NCR, but the day shift Assistant Superintendent was not advised that the "hold" tags were removed from the embeds. From statements received, Individual "A" and other ironworkers were in the process of placing the embed in the plant when the day shift Assistant Superintendent noticed that the plate which they were placing was one of two embeds which had been on "hold". The Assistant Superintendent then ordered the crew to place the embed to one side, and indicated his belief that it was a nonconforming embed.

Following discovery of the above sequence of events. Individual "A" and the Assistant Superintendent were informed that the embed was acceptable.

No items of noncompliance with NRC regulations were identified.

OTHER FINDINGS

During the investigation, on January 4, 1978, an inspection was made of the reinforcement bars in the fourth lift of the reactor containment wall. Several discrepancies were noted during the inspection, and the RIII inspector requested copies of any NCR's pertaining to the lift. Although all discrepancies were not covered by NCR's, it was noted that work remained to be done in several areas of the containment wall section, and final Civil QC inspections had not been performed.

During the inspection conducted of the fourth lift of the containment wall, it was noted that some sections of reinforcement bars appeared to be spaced more widely than allowed by applicable codes. A review of the reinforcement placing drawings indicated that the reinforcement bars had been placed as per the drawings, and within the applicable placement tolerances, with one exception.

The exception was noted to be at approximately 229 degrees azimuth, where two #11 reinforcement bars at either side of electrical penetration E-225 were found to be twenty-six and one-half inches apart. This spacing violates the maximum reinforcement spacing, including spacing tolerance, by one half inch. This is an item of noncompliance with NRC regulations in that the licensee failed to identify the nonconforming condition, as required by 10 CFR 50, Appendix B, Criterion XV. Criterion XV states, in part, that "Nonconforming items shall be reviewed and accepted, rejected, repaired or reworked in accordance with documented procedures."

Subsequent to the inspection by the RIII personnel, the licensee inspected the area questioned by the NRC inspector, and agreed that the spacing of the reinforcement bars exceeded applicable tolerances. A NCR was generated concerning the spacing of the reinforcement bars (NCR 2-1901-C-A), which recommends that the bars be deflected to obtain the required spacing for the upper sections of the containment wall. The half inch spacing error is not viewed as significant, and there is no question regarding the structural integrity of the containment wall. Complete inspection of the fourth lift of the containment wall was postponed, and will be documented in a subsequent inspection report.

Attachments:
1. Attachment A
2. Exhibits I through VI

I, Individual "C", make the following written statement to James Foster, who has identified himself to me as an Investigation Specialist of the NRC. I understand that I do not have to make a statement and that it may be used by the NRC.

I installed five or six C-1004 reinforcement bars instead of C-1049 reinforcement bars in the third lift reactor containment wall. This was done because my men could not locate C-1049 rebar, and Individual "D" told me to place the C-1004 bars in the pour. He said that he would take the responsibility. He also asked me to remove the identifying tags on the bars. I did not remove the tags.

The wrong size shear bars were also used and when we ran out of short size bars, both Individual "A" and Individual "D" told me to have my men put in the longer size shear bars. These shear bars were placed in area B1 and B2 of the third lift reactor containment wall.

I have read this written statement consisting of two pages, and it is accurate.

Individual "C"
12/21/77

Witness: James E. Foster 12/21/77

Exhibit I

To whom it may concern:

I have never instructed an Ironworker General Foreman, Foreman, or Ironworker to switch tags on rebars at this Callaway Plant.

Thanks,

Individual "D"

Witness: Individual "M"

Exhibit II

I, Individual "K", hereby make the following voluntary statements to C. C. Williams, identified to me as an inspector with the U. S. Nuclear Regulatory Commission.

Between November 10, 1977, and Thanksgiving day, an error in rebar installation location occured. The misinstalled rebar was in quadrant No. 1-A. The rebar was corrected. I observed that the rebar was removed from this (the wrong) location. I was involved in the installation of this rebar. I later observed that this error had been corrected.

I have read the comments and statement on this page and conclude that it is a true representation of the facts as I know them.

Individual "K" 1/12/78

Exhibit III

January 12, 1978

I. Individual "L", hereby make the following voluntary statements to C. C. Williams identified to me as an inspector with U. S. Nuclear Regulatory Commission:

About 2 weeks before Thanksgiving (1977) I helped install rebar which was later determined to be at the wrong location. This rebar was installed in the area of quadrant 1A of the containment wall. The next shift I worked, I saw that the rebar had been removed from this (wrong) location. As I recall, I helped install different (correct) rebar in this same area. I also helped in the installation of the removed rebar, in the correct location.

I have read the comments and statements on this (1) page and conclude that it is a true representation of the facts, as I know them.

Individual "L"

Exhibit IV

DANIEL INTERNATIONAL

Form 16-99 (Rev. 6-75)

INTER-OFFICE COMMUNICATION

TO: D. C. Wilson (26)

DATE: December 19, 1977
PQC-1404

FROM: Individual "E"(26)

SUBJECT: Stamping of Cadweld Sleeves

While verifying Cadweld As-Built CAD-2003 on September 20, 1977 it was found that an I.D. was not stamped on one of the six sleeves in area #6. By comparing the As-Built (see page 1, attachment A) with the Daily Cadweld Inspection Report (see page 1 & 2, attachment B) the missing I.D. was established.

Also one of the cadweld sleeves in either section 22 or 23 (see page 2, attachment A) did not have a legible letter, as the die was not rolled, to conform to the cadweld sleeve, as it was struck.

We requested that the missing I.D. be stamped and the illegible letter be re-stamped. We observed the stamping of the cadweld sleeves and verified the correct I.D's by visual inspection.

Individual "Z" _____

Civil QC Inspector
(Structural)

File: A37.10-08 & 13

cc: W. G. Westhoff (4)
H. J. Starr (1)

Attachments

Log

Exhibit V

December 16, 1977

TO: BOB HILYER

FROM: Individual "D"

Dear Mr. Hilyer,

This letter is concerning the accusations made on falsifying Cadwelds on Second Shift.

I have no knowledge of any such happenings other than seven Cadwelds that the letters took but the numbers did not show clear. QC asked the Foreman (Individual "C") to let a Cadwelder make the numbers more visible.

Thank you.

Individual "D"

Second Shift
Assistant Rebar
Superintendent

Exhibit VI

ATTACHMENT 3