

REGULATORY OPERATIONS, REGION III

A. RO Inspection Report No. 050-331/72-09

Transmittal Date : November 15, 1972

Distribution:  
RO Chief, RT&OB or RO Chief, RCB  
RO:HQ (5)  
DR Central Files  
Regulatory Standards (3)  
Licensing (13)

Distribution:  
RO Chief, M&FFB  
RO:HQ (4)  
L:D/D for Fuel & Materials  
DR Central Files

B. RO Inquiry Report No. \_\_\_\_\_

Transmittal Date : \_\_\_\_\_

Distribution:  
RO Chief, RT&OB or RO Chief, RCB (2)  
RO:HQ (5)  
DR Central Files  
Regulatory Standards (3)  
Licensing (13)

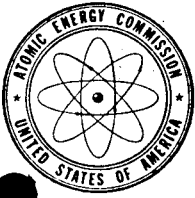
Distribution:  
RO Chief, M&FFB  
RO:HQ  
DR Central Files

C. Incident Notification From: \_\_\_\_\_  
(Licensee & Docket No. (or License No.))

Transmittal Date : \_\_\_\_\_

Distribution:  
RO Chief, RT&OB or RO Chief, RCB  
RO:HQ (4)  
Licensing (4)  
DR Central Files

Distribution:  
RO Chief, M&FFB  
RO:HQ (4)  
L:D/D for Fuel & Materials  
DR Central Files



UNITED STATES  
ATOMIC ENERGY COMMISSION  
DIRECTORATE OF REGULATORY OPERATIONS  
REGION III  
799 ROOSEVELT ROAD  
GLEN ELLYN, ILLINOIS 60137  
November 13, 1972

TELEPHONE  
(312) 858-2660

Iowa Electric Light and Power Company  
ATTN: Mr. Charles W. Sandford  
Vice President, Engineering  
Security Building  
P. O. Box 351  
Cedar Rapids, Iowa 52405

Docket No. 50-331

Gentlemen:

This refers to the inspection conducted by Messrs. Hayes, Rohrbacher, and Young of this office on October 18 - 20, 1972, and to the follow-up inspection conducted by Messrs. Vetter and Hayes on October 26, 1972, of construction activities at the Duane Arnold site authorized by AEC Construction Permit No. CPPR-70 and to the discussion of our findings at the conclusion of the inspection on October 18 - 20 with Messrs. Root, Kacer, and Essig of your staff and to the discussion of our findings at the conclusion of the follow-up inspection on October 26 with you and Messrs. Root and Cook of your staff.

Areas examined during the inspections included the receipt, storage, installation, inspection, and testing of instrumentation; quality records, installation, and protection of electrical components, recirculation system pumps, and other Class I components; installation records and protection of the reactor vessel internals; welding records for the recirculation system piping; and the status of efforts to: (1) resolve previously identified enforcement and unresolved items, (2) replace deficient core plate bolts and to identify the cause of the deficiency to prevent recurrence, (3) repair a defect found in the main steam line piping, and (4) verify that Class I valve wall thicknesses meet design requirements. Within these areas, the inspection consisted of selective examination of procedures and representative records, interviews with plant personnel, and observations by the inspectors.

The inspectors also examined actions you have taken with respect to the item identified in your letter of September 20, 1972, relating to a matter previously brought to your attention. With respect to this matter we find that, while the corrective action outlined in your September letter appears to have been accomplished, written instructions were not provided to personnel responsible for the

control and issuance of weld rod. Failure to issue these written instructions is inconsistent with verbal commitments provided at the conclusion of the inspection on August 8 - 10, 1972. We understand that you will expedite issuance of the subject written instructions. We will examine your action on this matter during our next routine inspection.

During this inspection, it was found that certain of your activities appear to be in noncompliance with 10 CFR Part 50, Appendix B, and in nonconformance with statements in a Bechtel field inspection procedure. The item and references to the pertinent requirements are listed in the enclosure to this letter.

This letter is a notice of violation sent to you pursuant to the provisions of Section 2.201 of the AEC's "Rules of Practice," Part 2, Title 10, Code of Federal Regulations. Section 2.201 requires you to submit to this office within thirty (30) days of the date of this letter, a written statement or explanation in reply including: (1) corrective steps which have been taken by you, and the results achieved; (2) corrective steps which will be taken to avoid further violations; and (3) the date when full compliance will be achieved. In addition to the need for corrective action regarding these specific deficiencies, we continue to be concerned about the implementation of your quality assurance program that permitted these deficiencies to occur. Consequently, in your reply, you should describe in particular, those actions taken or planned to improve the effectiveness of your quality assurance program.

With regard to questions raised during this inspection, we understand that you intend to investigate the circumstances related to an apparent breakdown in quality assurance/quality control programs common to two of your suppliers concerned with: (1) questionable implementation of an engineering change memo covering corrective action related to overbore of 17 of the 30 reactor pressure vessel in-core housing penetrations, (2) failure to detect a defective piping elbow with a wall thickness below minimum code requirements; and (3) failure to identify a defect in the main steam line piping. We will examine your action on these matters during our next routine inspection.

Iowa Electric Light  
and Power Company

- 3 -

November 13, 1972

Should you have questions concerning this inspection, we will be glad to discuss them with you.

Sincerely yours,

Boyce H. Grier  
Regional Director

**Enclosure:**  
**Description of Violation**

bcc: RO Chief, RCB  
RO Chief, RT&OB  
RO:HQ (4)  
Licensing (4)  
DR Central Files  
OGC, Beth, P-506A  
PDR  
Local PDR  
NSIC  
DTIE

ENCLOSURE

Docket No. 50-331

One of your activities appears to be in noncompliance with AEC regulations and in nonconformance with weld and field inspection procedures, as identified below:

10 CFR Part 50, Appendix B, Criterion V, states, in part, that: "Activities affecting quality shall be prescribed by documented instructions, procedures, . . . . . and shall be accomplished in accordance with those instructions, procedures, . . . . ." Bechtel's Weld Procedure P8-AT-AG, Revision 13, and the filler metal withdrawal authorization forms for welds A-22 and B-10, in the recirculation system, specified that stainless steel type filler material was to be used. Bechtel's Field Inspection Procedure WFMC-1, states, in part, that the craft supervisors shall be responsible for informing the welders and fitters of the correct filler materials for each welded joint, and that welders shall have in their possession, at any one time, only the type and classification of welding filler materials as specified in the applicable welding procedure specification.

Contrary to the above, several carbon steel welding electrodes (number of electrodes apparently unknown) were inadvertently issued and deposited onto weld No. B-10 on the ten-inch stainless steel recirculation system riser piping, and onto weld No. A-22 on the four-inch stainless steel bypass line on the A-loop pump discharge valve.

U. S. ATOMIC ENERGY COMMISSION  
DIRECTORATE OF REGULATORY OPERATIONS

REGION III

RO Inspection Report No. 050-331/72-09

Licensee: Iowa Electric Light and Power Company  
Security Building  
P. O. Box 351  
Cedar Rapids, Iowa 52405

Duane Arnold Energy Center  
Palo, Iowa

License No. CPPR-70  
Category: B

Type of Licensee: BWR (GE) - 538 Mwe

Type of Inspection: Routine, Unannounced

Dates of Inspection: October 18 - 20, 1972

Follow-up Inspection: October 26, 1972

Dates of Previous Inspection: October 4 - 5, 1972

Principal Inspector:

D. W. Hayes

*W. E. Vetter FOR*

11-13-72

(Date)

Accompanying Inspectors:

*R. A. Rohrbacher*

R. A. Rohrbacher

October 18 - 20, 1972

11/13/72

(Date)

*C. M. Young*

C. M. Young

October 18 - 20, 1972

11/13/72

(Date)

Other Accompanying Personnel:

W. E. Vetter

October 26, 1972

Reviewed By:

W. E. Vetter, Chief

Reactor Construction Branch

11-13-72

(Date)

SUMMARY OF FINDINGS

Enforcement Action

A. Violations

Construction activities appeared to be inconsistent with 10 CFR Part 50, Appendix B, and site procedures in that several carbon steel welding electrodes were inadvertently deposited onto weld Nos. A-22 and B-10 of the stainless steel reactor coolant recirculation system. (Paragraph 1)

B. Safety Items:

No safety items were identified

Licensee Action on Previously Identified Enforcement Matters

A. Improper Receipt Inspection and Installation of Nonconforming (Quality Deficient) Equipment (RO Report Nos. 050-331/72-05 and 050-331/72-07)

Four control room control panels were apparently installed contrary to instructions, even though deficiencies in regard to quality of workmanship and switch seismic requirements were known to exist. Moreover, portions of the licensee's response in regard to this matter, in a letter dated June 27, 1972, were not considered adequate, and additional comments were requested in an RO:III letter dated August 8, 1972.

During the inspection of August 8 - 10, 1972, records were examined and found to establish that the workmanship deficiencies had been corrected. During the current inspection, records were reviewed which established that the seismic capabilities report has been amended and that the switches in question meet the seismic requirements. Further, the licensee's letter dated September 1, 1972, providing additional comments as requested by RO:III, has been reviewed and is considered responsive. This matter is considered to be closed.

B. Carbon Steel Weld Material in Stainless Steel Weld (RO Report No. 050-331/72-07)

As previously reported, repairs had been started without benefit of written procedures and a nonconformance report had not been

written to document the facts associated with the inadvertent deposit of carbon steel welding electrodes onto weld No. A9 of the 22-inch stainless steel recirculation system piping.

During the current inspection, actions taken by Bechtel Corporation (Bechtel) and General Electric Company (GE) and the licensee's response in regard to this matter in a letter dated September 20, 1972, were reviewed and were considered to be adequate with the exception that written instructions were not provided to personnel responsible for the control and issuance of weld rod. This is inconsistent with verbal commitments provided at the conclusion of the inspection on August 8 - 10, 1972. This matter remains open pending the issuance and review of these written instructions.

Design Changes

No new design changes were identified.

Unusual Occurrences

No unusual occurrences were identified.

Other Significant Findings

A. Current Findings

Status of Construction (October 13, 1972)

| <u>Components - Systems</u>              | <u>Percent Complete</u> |
|--|-------------------------|
| <u>Piping (Greater Than 2½")</u>         |                         |
| Main Steam . . . . .                     | 57%                     |
| Feedwater. . . . .                       | 90%                     |
| Recirculation (Reactor Coolant). . . . . | 77%                     |
| CRD. . . . .                             | 69%                     |
| Total (Process Piping) . . . . .         | 72%                     |
| <u>Electrical Cable</u>                  |                         |
| Trays . . . . .                          | 96%                     |



|                                       | <u>Percent Complete</u> |
|---------------------------------------|-------------------------|
| Conduit. . . . .                      | 50%                     |
| Cables Pulled. . . . .                | 33%                     |
| <u>Instrumentation</u>                |                         |
| Installation . . . . .                | 35%                     |
| Initial Calibration. . . . .          | 15%                     |
| Loop Checks. . . . .                  | 2%                      |
| <u>Overall Construction</u> . . . . . | 70.8%                   |
| <u>System Hydro</u> . . . . .         | April 1, 1973           |

Personnel Changes

Mr. L. E. Rosetta has replaced Mr. Daubenheyer as the Bechtel Project Superintendent. Mr. Daubenheyer recently suffered a heart attack and was reassigned.

Messrs. C. R. Edwards and F. Manley have been added to the Bechtel Field Quality Control Group.

Unresolved Items

1. Main Steam Pipe Defect

A defect was found in the 20-inch primary steam pipe during a routine inspection of an adjacent field weld. (Paragraph 2)

2. Defective Elbow on CRD Return Line

A three-inch Class I elbow on a CRD return line was found to have a wall thickness less than that required by code. (Paragraph 3)

3. Overbore of In-Core Housing Penetrations

Seventeen of the 30 in-core housing penetrations were bored oversize and this fact was properly documented. The resolution was to be implemented by the issuance of a Field

Deviation Instruction (FDI) by the GE San Jose, California, engineering office. However, the FDI was not issued to the field until after the condition was again detected. In the meantime, six of the housings had been installed. (Paragraph 4)

4. Instrument Calibration Procedures

Written procedures for instrument calibration have not been completely established, reviewed, and approved. (Paragraph 7(a))

B. Status of Previously Reported Unresolved Items

1. Quality Documentation for Reactor Pressure Vessel Internals (RO Report Nos. 050-331/72-05 and 050-331/72-07)

There is no change in the status in the subject documentation. At the time of the previous inspection, available documentation at the site was not sufficient to determine that the GE manufactured reactor pressure vessel internals met quality requirements.

Quality requirements specifications are being developed by GE and are expected to be in effect by the end of October 1972. At that time, the licensee plans to retrofit the new documentation to GE manufactured items previously received at the site. This matter remains open pending the receipt and review of the additional documentation.

2. Use of Improper Procedures (RO Report No. 050-331/72-05)

During the inspection of May 10 - 12, 1972, it was learned that two switches had been replaced in control panel No. 1C08 to facilitate early operation of the diesel generators. The replacement of switches was documented on nonconformance report (NCR) No. 441. However, the wording of the NCR related only to the lack of seismic documentation and it was learned, through questioning by the inspectors, that the replacement was necessary not because of lack of seismic documentation, but because of an insufficient number of contacts. At that time, the licensee was informed by the inspector that an NCR was not the proper procedure for replacement but that a design or engineering change notice should have been issued. Subsequent to the inspection, information was provided which

established that Bechtel engineering in San Francisco, California, had issued a design change but that copies had not been received at the site.

During the current inspection, although apparently unknown previously to the site QA/QC personnel, it was established that an engineering memo, specifying the purchase and installation of two additional stages for the original switches, had been approved and issued to the field on February 11, 1972. The original switches with two additional stages have been re-installed. This matter is considered closed.

3. Valve Wall Thickness Verification (Reopened)

The licensee has initiated a program to measure wall thicknesses of Class I valves consistent with the RO:III letter dated June 29, 1972. To date, 77 valves installed or to be installed in the Duane Arnold facility have been identified as requiring wall thickness verification. Wall thickness measurements for 12 of the 77 valves will be made onsite by the use of ultrasonics. The balance of the measurements have been or will be made in the manufacturer's shop, and copies of the records will be sent to the site. This matter remains open pending completion of the measurement program and review of the records.

4. Core Support Bolts Found Not to Meet Hardness Requirements (Inquiry Report No. 050-331/72-02)

GE notified Iowa Electric Light and Power Company (IEL&P) on August 31, 1972, that information obtained during activities not directly related to the Duane Arnold facility had established that the core support bolts (54) supplied to Duane Arnold did not meet the specified material hardness requirements.

Replacement bolts meeting specifications, including material surface hardness requirements, have since been received at the site and installed. Forty-four of the original bolts were returned to the NSSS vendor. The remaining ten, installed prior to discovery of the defect, have been removed, clearly identified as nonconforming and stored in the warehouse quarantine area.

GE's investigation of this incident revealed that the condition occurred because of a misinterpretation of the specification by an NSS System subvendor. The subvendor supplied material

certifications based on subsurface hardness readings, rather than on surface hardness readings. To assure that this will not recur, the quality system for this item was changed by GE to include verification by laboratory analysis for surface hardness of all bolt materials. In addition, the material specification is being modified to indicate the requirements of uniform hardness throughout. This matter is considered to be closed.

Management Interview (October 18 - 20, 1972 Inspection)

A. Personnel in Attendance

Iowa Electric Light and Power Company (IEL&P)

L. D. Root, Assistant Project Engineer  
R. D. Essig, Quality Assurance Engineer  
W. J. Kacer, Quality Assurance Engineer  
D. E. Gembler, Quality Assurance Engineer

Bechtel Corporation (Bechtel)

L. E. Rosetta, Project Superintendent  
M. J. Jacobson, Project Quality Assurance Engineer  
D. W. Hutton, Quality Assurance Engineer  
J. R. Zimmerschied, Quality Assurance Engineer  
J. R. Behres, Lead Quality Control Engineer

General Electric Company (GE)

J. H. M. Miller, Site Manager  
W. A. Kruse, Mechanical Engineer

B. Items Discussed

1. Carbon Steel Weld Material in Stainless Steel Weld No. A-9

The inspector stated that he had reviewed the action taken by Bechtel and GE, and the licensee's letter of response, in regard to the inadvertent deposit of carbon steel welding electrodes onto weld No. A-9 in the stainless steel primary coolant recirculation system. He added that there were no further questions on the action taken but noted that written instructions to personnel responsible for the control

and issuance of welding material had not been issued and that this was inconsistent with the verbal commitment made at the conclusion of the inspection on August 8 - 10, 1972.

The licensee stated that they did not recall the verbal commitment but that written instructions would now be issued. The inspector stated that the commitment was made by the Bechtel welding engineer, and it had been assumed that the commitment was acceptable to the licensee since the licensee's QA engineer, who was present, did not object. The inspector added that this subject would remain open pending completion and review of the written instructions.

2. Overbore of In-Core Housing Penetrations

The inspector discussed the problems related to the overbore of 17 of the 30 in-core housing penetrations and the apparent failure of GE engineering and QA in San Jose, California, to issue the necessary field instructions to accomplish the approved resolution. The inspector stated he had no further questions at this time but that this item would be reviewed again, pending completion of GE's investigation and their response to a IEL&P letter, dated October 17, 1972, covering this subject.

3. Thin Wall Elbow in CRD Return Line and Main Steam Pipe Defect

The inspector stated that he had reviewed the nonconformance reports associated with the discovery of a defect in the 20-inch primary steam pipe, and an elbow in the 3-inch CRD return line with a wall thickness less than code requirements. He noted that both the pipe and elbow had been purchased from Southwest Fabrication and Welding. The licensee stated that both of these items were under investigation and that the action necessary to prevent recurrence, as well as any possible reinspection of piping and fittings required, would be determined when all the facts were known. The licensee added that both of these matters would be reported to the Commission in accordance with the requirements of 10 CFR Part 50.55(e).

4. Release of Inspection Reports to the Public Document Room

Those present were informed of the new procedures to release inspection reports to the Public Document Room after the licensee has had an opportunity to review the reports for proprietary information.

Management Interview (October 26, 1972 Follow-up Inspection)

A. Personnel in Attendance

Iowa Electric Light and Power Company (IELP)

C. W. Sandford, Vice President - Engineering  
L. D. Root, Assistant Project Manager  
G. A. Cook, Quality Assurance Manager

B. Item Discussed

The inspectors discussed the results of their investigation of the inadvertent issuance and subsequent deposit of carbon steel welding electrodes onto weld Nos. A-22 and B-10 in the stainless steel primary coolant recirculation system. Mr. Sandford was informed that information obtained during the investigation appeared to differ in a number of instances with respect to information contained in the preliminary reports by Bechtel and oral information provided by IELP. The inspectors pointed out that this was the third such occurrence at the Duane Arnold site and that a need for prompt, positive action to prevent a recurrence of this nature was indicated. Mr. Sandford was also informed that, as a result of repeated instances of improper use of weld rod, the overall quality of welding could be seriously questioned and that a "special effort" to assure the acceptability of certain welds may be in order. Mr. Sandford emphasized that the IELP investigation of this matter was in the preliminary stages and that investigative personnel had been hampered in the area of personnel interviews, etc., by the three-day holiday weekend and the work stoppage (strike) which resulted from the dismissal of the welder involved in the incident. He added that he was in agreement with the inspectors and that a number of positive steps to preclude recurrence had already been initiated and that a program for re-examination of welds performed by the welders involved in the improper use of weld rod would be initiated but that the extent of this effort would depend upon completion of an investigation of the incident.

The inspectors stated that this matter would remain open, pending completion and review of the corrective action program, that there appeared to be a violation of Regulations involved, and that a notice of violation would be issued.

Subsequent to the inspection (telephone conversation on November 3, 1972) the licensee stated that a report of this matter will be submitted in accordance with 10 CFR Part 50.55(e).

## REPORT DETAILS

### Persons Contacted

The following persons were contacted during the inspection:

#### Iowa Electric Light and Power Company (IEL&P)

L. D. Root, Assistant Project Engineer  
G. A. Cook, Quality Assurance Manager  
K. V. Harrington, Site Construction Manager  
G. G. Hunt, Plant Chief Engineer (Operations)  
J. H. Gebert, Electrical Maintenance Supervisor  
R. D. Essig, Quality Assurance Engineer  
W. J. Kacer, Quality Assurance Engineer  
D. E. Gembler, Quality Assurance Engineer

#### Bechtel Corporation (Bechtel)

M. J. Jacobson, Project Quality Assurance Engineer  
D. W. Hutton, Quality Assurance Engineer  
J. R. Zimmerschied, Quality Assurance Engineer  
J. R. Behres, Lead Quality Control Engineer  
R. S. Love, Quality Control Engineer  
C. R. Edwards, Quality Control Engineer  
M. P. Roller, Lead Electrical Engineer  
R. E. Lightbody, Lead Instrument Engineer  
W. J. Putman, I&C Group Leader  
R. W. Cote, Supervisor - Startup Engineering  
F. (NMI) Adamek, Preoperation Test Engineer  
W. J. Pons, Mechanical Supervising Engineer (Vessel Internals)  
R. S. Maes, Welding Engineer  
J. A. Miller, Welding Engineer  
B. J. Collins, Electrical Engineer  
T. R. Smith, Field Engineer (Responsible for GE Components)

#### General Electric Company (GE)

T. M. LeVasseur, Quality Assurance Representative  
W. A. Kruse, Mechanical Engineer

### Results of Inspection

#### 1. Carbon Steel Welding Material in Stainless Steel Welds

Carbon steel welding electrodes were inadvertently issued on two

separate occasions and deposited onto two separate welds within the stainless steel reactor coolant system. The events are discussed, chronologically, below:

- a. Weld No. A-22, on the four-inch loop "A" pump discharge valve bypass line, had been previously completed and accepted. Because of an alignment problem, it was decided to grind out a 180° segment of this weld about ¼ inch deep and then redeposit weld filler material into the area to affect alignment. This work was started by welder "A" at about 3 p.m. on October 18, 1972, and continued on overtime until about 6 p.m. The "Filler Metal Withdrawal Authorization" (Form WR-6) was properly filled out and signed and specified the correct 308 type weld rod per weld procedure P8-AT-AG, Revision 13. The weld rod was issued by weld rod crib attendant "A" in portable heater No. R-54. However, the heater contained Type 7018 carbon steel (CS) weld material, not Type 308 stainless steel (SS) weld material as specified.

Normally, the lower numbered heaters (up to R-77) are used for CS type electrodes, and the higher numbered heaters (R-77 and above) are used for SS type electrodes. The heaters used for the SS electrodes are further identified by the word "stainless" written on tape which is fixed to the handles or, alternately, the type of SS rod contain in the heater is written on the tape. Frequently, the heaters are filled with a shift's supply of welding rod prior to issuance.

Neither the welder nor the crib attendant were aware that the heater had a low number or that the word stainless was not on the tape placed on the heater handle.

A review of the welding records by the inspector revealed that welding materials had again been issued for weld No. A-22 to welder "B" by crib attendant "B" on the morning of October 19, 1972. This time, the proper SS weld electrodes in heater No. R-81 were issued. (The WR-6 form was properly completed and signed, but by a different welding engineer.)

An interview with welder "B" indicated that, contrary to Bechtel management information, weld No. A-22 had not been completed the night before, instead, only one pass about 2 - 2½ inches long had been deposited into the ground-out area, with an accumulation of flux still in place. Welder "B" stated that he had asked his "pipefitter" to chip off the flux and to prepare the area for continued welding. In doing this, the pipefitter told the welder he was running



into a lot of "porosity." Welder "B" told him to continue grinding until all the porosity had been removed. This resulted in the removal of all the weld material deposited the night before and increasing the depth of the 180° ground-out area almost into the weld root pass. Welder "B" reported that he was in the process of making his first pass, using the TIG process, when the work was stopped because it had been discovered that CS rod had been deposited into the weld the night before.

- b. Three minor subsurface defects had been ground-out from weld No. B-10, located on a 10-inch riser in the reactor coolant system. The repair of the ground-out areas was assigned to welder "A" on the morning of October 19, 1972. The "Filler Metal Withdrawal Authorization" was properly signed and specified SS type welding material per weld procedure, P-8AT-AG, Revision 13. The welding material was issued by weld rod crib attendant "C" in heater No. R-55. The heater contained Type 7018 CS...not SS type 308 weld rod as specified. Again, neither the welder or the person issuing the rod noted the low heater number or that it was not identified as containing SS welding electrodes.

Crib attendant "C" stated, during an interview with the RO inspectors, that he was rushed that morning and failed to notice he issued the wrong welding rod.

- c. Welder "A" completed the repairs to weld B-10 and returned to the crib, to withdraw additional welding material for another welding assignment, and requested crib attendant "B" to place the new electrodes into the heater (R-55) already in his possession. Crib attendant "B" told welder "A" that the heater was for CS rod and his WR-6 form specified SS rod. It was not until then that welder "A" realized that the wrong welding material had been issued and deposited onto both welds (Nos. A-22 and B-10.) He reported this fact to the welding engineer, and all welding work on the recirculation system was immediately stopped. The time was about 9:30 a.m. on October 19, 1972.

Welder "A" left the site at about 10 a.m. on the morning of the follow-up inspection (October 26, 1972) and was not available for an interview.

- d. The Bechtel Project Superintendent stated that the Bechtel Lead QC Engineer apparently first learned of these matters

from a General Electric QA representative at about 10 a.m. on October 19. He added that the GE QA Engineer learned about the incident independently, through visual observation of the welds. The GE QA Engineer was not available for interview. Iowa Electric Light and Power Company (IELP) QA personnel, were notified at about 1 p.m. on October 19, 1972, by Bechtel QA/QC personnel, and immediately confirmed that welding work on the reactor coolant system had been stopped and that nonconformance reports were being prepared.

The RO:III inspector was informed of the matter at about 10 a.m. on October 20, 1972. The IELP QA manager stated that the incident was being investigated and that the facts would be made available as soon as possible, probably by Tuesday, October 24, 1972. He added that, at present, he only knew that CS weld material had been deposited onto two separate SS welds within the primary coolant recirculation system.

- e. The welder and welding material crib attendants involved were discharged by Bechtel on Friday, October 20, 1972. Monday morning, October 23, 1972, the construction site was picketed, and construction activities were halted for two days. To bring an end to the strike, Bechtel rehired all three men with an understanding that the welder would not be used on critical work and that the two weld rod crib attendants would be reassigned to other work.
- f. During the follow-up inspection, it was established that the following corrective action had been initiated:
  - (1) Nonconformance reports, Nos. 636 (weld A-22) and 637 (weld B-10), had been issued and properly documented the discrepancies and the proposed resolution. No repair work had started.
  - (2) A wire fence had been installed within the weld material crib to separate the SS and CS welding materials.
  - (3) The welding engineers are temporarily double checking all welding rod issued before critical weld work is allowed to start.
  - (4) Written instructions were being prepared for issuance to the welders and weld material crib attendants to assure that only the specified welding material is issued and used.

The following additional corrective action is under consideration:

- (1) Color code the metal ends of the welding rods, with one color for SS and another for CS.
- (2) Establish a position description with minimum requirements for personnel controlling and issuing welding materials.
- (3) Provide more positive identification of the weld rod heaters.
- (4) Review all or part of the critical SS field welds for ferrite content and other quality considerations. It is generally agreed that a minimum effort here would include all welds made by welder "A" and the welder who earlier deposited CS weld material into weld No. A-9 (see Item B under "Licensee Action on Previously Identified Enforcement Matters" in the Summary Section). Several welds in the primary coolant system were surveyed for ferrite content by the IEL&P construction manager, subsequent to the incident involving weld No. A-9 during August 1972, but this effort was an effort to standardize ferrite detection devices during the process of accepting weld A-9.

2. Main Steam Pipe Defect

The licensee informed the inspector by telephone, on October 12, 1972, that Bechtel personnel had identified a defect in the 20-inch primary steam pipe during a routine inspection of an adjacent weld. The pipe was supplied by General Electric (GE) and manufactured by Southwest Fabrication and Welding.

During the current inspection, the defect, located on a vertical leg of the steam pipe a short distance above the reactor vessel on spool piece No. PS-1-B1, was examined. The defect is about 3/4" by 1 1/4" in size, depth unknown, and appears to be an inclusion of metal pressed into the surface of the pipe. The deficiency is documented on nonconformance report No. 609, dated September 29, 1972. Start of repair work is pending completion of an investigation and development and approval of repair procedures.

3. Defective Elbow on CRD Return Line

A three-inch 90° elbow (ASME SA 234 WPB, Schedule 80) was found by Bechtel, during a routine fitup inspection, to have a wall thickness of 0.225", compared to nominal wall thickness of 0.300"

and the code required thickness of 0.263". The elbow was located in spool piece No. DBA-6-1-1 in the CRD return line, within the drywell. The elbow was supplied by Southwest Fabrication and Welding, and manufactured to ANSI B31.7, Class I, by Taylor Forge Division of Gulf and Western Industries. The defective elbow was removed and replaced with one meeting specifications. A decision whether to check similar elbows for proper wall thickness is awaiting the results of an investigation by IEL&P. This matter will be reviewed during a subsequent inspection.

4. Overbore of In-core Housing Penetrations

During fabrication of the reactor pressure vessel, 17 of the 30 in-core housing penetrations were bored oversize. This deviation from drawings and specifications was properly documented by the Chicago Bridge and Iron Company (CB&I) on nonconformance report No. 6, dated January 1, 1972.

The deviations were reviewed by GE engineering in San Jose, California, and a resolution was specified and approved on Engineering Data Sheet No. H1289-NCR-6, dated April 10, 1972. The resolution was to be implemented by Field Deviation Instruction (FDI) No. 14/21771. However, the FDI was not issued to the field until after the condition was again, independently, detected, and the Bechtel engineers responsible for installation of the in-core housing were not aware of the problem or the resolution. That is, following installation of six of the housings, Bechtel installation personnel detected that several of the penetrations were oversized. Concurrently, GE QA personnel, during a review of computer data sheets listing the status of all FDI's, discovered that FDI No. 14/21771 had not been completed.

Six of the oversized penetrations exceeded specifications by amounts up to a maximum of 0.025". The remaining exceeded specifications by 0.005" or less.

The engineering resolution (which has now been implemented) specified the purchase of six oversized housings and selectively locating the remaining to prevent exceeding the maximum allowed clearance of 0.020" between the housing and penetration. As-built penetration drawings were reviewed and the outside diameter of the six housings, already installed before the overbore condition was again discovered, were carefully measured to establish that the maximum allowed clearance had not been exceeded.

The licensee has asked GE to investigate the circumstances surrounding the incident, the steps to be taken to prevent recurrence, and the consequences of exceeding the maximum allowed clearance between the in-core housing and vessel penetration. This matter remains open pending receipt and review of a GE response.

5. Vessel Internals

a. Follow-up Record Review

(1) Installation and installation inspection records were reviewed for the following vessel internals. The records established that the installations met applicable engineering specifications and drawings.

(a) Jet Pumps, including inlet mixer and diffuser.

(b) Jet pump riser brace.

(c) Jet pump bolts (see note below).

(d) Core plate and replacement core plate bolts.

(e) Shroud.

(2) Material certification records for the core plate bolts (54) and for the welding material (Inconel) used for the shroud-to-shroud support weld, were reviewed and established that the material met the specifications.

NOTE: Because of a recent event at another nuclear facility (involving a jet pump failure) added care was used in tack welding the keepers onto the beam bolt assemblies. The extra precautions included: (a) review of the welding procedure for adequacy by GE engineering, (b) using one welder for all of the welds, (c) qualifying the welder only after he completed four consecutive acceptable welds, (d) immediately completing the production welds after qualification with no down time, (e) carefully controlling the time, welding current, and cover gas flow rate, (f) retesting the welder on a mock-up assembly after completion of the production welds, and (g) careful visual examination of each weld with a 10x lens.

It was also determined that the jet pump design used for the Duane Arnold Plant is different from that used in the facility sustaining the jet pump failure.

b. Follow-up Observation of Work

The vessel internals, both installed and in storage, were inspected for proper protection and for identification and quarantine of nonconforming components. No deficiencies were identified. Installation techniques and workmanship appeared to meet the specifications. Vessel entry and cleanliness control was adequate.

The welding mockup for the machine weld between the CRD stub and housing tubes was examined. This mockup is one of nine used, in conjunction with vessel internal installations, for welder qualification and training. The mockup for ultrasonic (UT) examination of this weld was reviewed, including provisions for a permanent record of the UT trace, and no problem areas were encountered.

6. Electrical Components

a. Follow-up Record Review

(1) Installation Inspection

Circuit breaker checklists (including vendor representative data), field inspection checklists, and Megger data sheets for the following 4160-volt circuit breakers (14) were reviewed:

152-101, 102, 201, 202

152-109, 110, 207, 209

152-302, 303, 311, 402, 403, 411

Installation inspection records for an additional twelve 4160-volt circuit breakers were scanned and spot checked. The records appeared to establish that the breaker installation met applicable specifications.

Field inspection reports, and/or field inspection checklists, were reviewed for the following transformers: 1X3, 1X31, and 1X41. These records appeared to be adequate and established that the installations conformed to engineering drawings and specifications.

Installation inspection records, including relay calibration check and acceptance records, were reviewed for Types 50 and 51 protective relays for breakers 152-301, 302, and

152-303 and for the Type 87 protective relays for the diesel generators. No discrepancies were identified.

(2) Material Certifications

Material certification records, including material receiving instructions, material receiving reports, and vendor material certifications and test reports (including seismic analysis certification per Revision 1 of the Bechtel general project requirements for Class I equipment in control buildings, dated September 1971) were reviewed for the circuit breakers listed under 6.a.(1), above. All appeared to meet applicable requirements.

Certification and calibration records of selected electrical test instruments were reviewed. Records pertaining to two AC ammeters and one cycle timer were reviewed in detail. No deficiencies were noted.

(3) Motor and Battery Surveillance Records

The RHR pump motor surveillance records for the period November 30, 1971, to August 30, 1972, were reviewed and found to be acceptable. The records included data regarding resistance measurements, rotation, and oil and heater condition.

Battery surveillance records for the 125-volt station battery No. 1D1 were checked in detail. Records for other station batteries were scanned and spot checked. Weekly battery check logs and monthly battery reports reviewed included a record of cell voltage, specific gravity, ground check, and operation of the vent fan. The records, which included adjustment and maintenance items, appeared to be adequate and no unresolved items were noted.

b. Follow-up Observation of Work

(1) Installation Techniques

Conformance to location, separation, and protection requirements were reviewed for selected circuit breakers, protective relays, and transformers. No deviations from requirements were noted.

(2) Protection of Installed Components

Selected circuit breakers, protective relays, and transformers were observed to be adequately protected after installation.

(3) Quarantine of Nonconforming Components

No violation of applicable procedures or good work practices was noted during the current inspection.

7. Instrumentation

a. Review of QC System

The following procedures were reviewed, which included requirements for special handling and storage, quarantine of nonconforming components, installation specifications, and inspecting and testing provisions.

- (1) Bechtel Field Inspection Procedure No. M-3. Installation Inspection of Instrumenattion (Revised July 1972).
- (2) Bechtel Field Inspection Procedures No. G-3, Processing of Nonconforming Items.
- (3) Bechtel Field Inspection Procedure No. G-4, Calibration of Construction Tools, Instruments, and Equipment.
- (4) Bechtel Field Inspection Procedure No. G-5, Control of Material.
- (5) Bechtel - Documentation of System Deficiencies and Irregularities.
- (6) Bechtel - Instrument Calibration Procedures.

The above procedures appear to adequately cover all aspects of the QC system, except that all required instrument calibration procedures have not been completed and approved. Additional review of this matter will be performed during subsequent inspections.

b. Follow-up Record Review

Certification and calibration records for selected test



instruments, including pressure gauges, dead weight testers, ammeters, and differential voltmeters, were reviewed. Stickers showing the last calibration date were properly attached to each instrument.

8. Other Class I Components

(a) Review of QC System

The quality control specifications and procedures and provisions for records applicable to the receipt, handling, storage, protection, identifications, quarantine of nonconforming components, installation, and installation inspection of Class I components were reviewed. The documents reviewed appeared to meet the requirements of the licensee's QA/QC program and 10 CFR Part 50, Appendix B.

(b) Follow-up Record Review

Records, including installation, installation inspection, and material and fabrication reports were reviewed for the equipment listed below. The records indicated that the equipment was built and tested to requirements and installed in accordance with applicable engineering drawings and specifications.

- (1) Recirculation pumps (2) - pump internals not installed.
- (2) Recirculation system valve No. MO-4601 (suction valve for recirculation pump No. 1P201A)
- (3) Core spray pumps (2)
- (4) RHR pumps (2)
- (5) Main steam steam isolation valve No. CV4420.
- (6) RHR system valve No. MO-2298.
- (7) HPCI system valve No. MO-2321.

(c) Follow-up Observation of Work

The installations of the above listed equipment was inspected. No deficiencies were noted.

Protection provided to both the installed components and the stored recirculation pump internals was considered to be adequate.