U. S. ATOMIC ENERGY COMMISSION
DIRECTORATE OF REGULATORY OPERATIONS

REGION III

Report of Construction Inspection

RO Inspection Report No. 050-358/73-07

Licensee: Cincinnati Gas and Electric Company
139 East 4th Street
Cincinnati, Ohio 45201

William H. Zimmer Nuclear Power Station
Moscow, Ohio

License No. CPPR-88
Category: A

Type of Licensee: BWR (GE) - 807 Mwe

Type of Inspection: Routine, Announced

Dates of Inspection: November 19 - 21, 1973

Dates of Previous Inspection: June 27 - 29, 1973

Principal Inspector: J. W. Sutton — 1-7-74 (Date)

Accompanying Inspector: D. W. Hayes — 1-7-74 (Date)

Other Accompanying Personnel: None

Reviewed By: W. E. Vetter, Chief
Reactor Construction Branch — 1-7-74 (Date)

SUMMARY OF FINDINGS

Enforcement Action

A. Violations

1. 10 CFR Part 50, Appendix B, Criterion V, states, in part, that: "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings . . . . and shall be accomplished in accordance with these instructions . . . .". Moreover, Kaiser Engineers, Incorporated, Quality Assurance - Construction Methods Instruction No. G-3, R.1, Titled "Material Receiving and Warehousing Operations", Section 1.9, "Document Deficiency Notice", states, in part, that, "A yellow "hold" tag will be attached to material" when a document deficiency exists.

   Contrary to the above, material was received at the site warehouse that was determined to have a document deficiency and was not tagged as required by the receiving procedure. (Paragraph 1, Report Details)

2. The Preliminary Safety Analysis Report for the William H. Zimmer Nuclear Power Station states, in Section 12.4.2, that fly ash used for all concrete work will comply with ASTM Specification C618.

   Criterion VII, Appendix B, 10 CFR Part 50, states, in part: Documentary evidence that material and equipment conform to the procurement requirements shall be available at the nuclear power plant site prior to installation or use of such material and equipment.

   Contrary to the above, documentation was not available at the site to establish that all fly ash delivered and used for Class I concrete met the requirements of ASTM Specification C618. (Paragraph 5.b, Appendix A)

Both of the above violations are considered to be of Category II severity.

B. Safety Matters

No safety matters were identified.

Licensee Action on Previously Identified Enforcement Matters

1. The Associated Piping and Engineering Company's (AP&E) drawing control

was not being implemented as outlined in the procedure. (RO Inspection Report No. 050-358/73-06).

2. The required reaudit of deficient departments, to verify corrective action, had not been conducted following the last semiannual QA audit. (RO Inspection Report No. 050-358/73-06).

The corrective actions, for the above items, outlined in the Cincinnati Gas and Electric Company (CG&E) letter of October 25, 1973, in response to the RO:III letter and enclosure dated October 1, 1973, was found to have been satisfactorily accomplished and documented. These matters are considered to have been resolved. (Paragraph 2, Report Details)

Design Changes

No design changes were identified.

Unusual Occurrences

No unusual occurrences were identified.

Other Significant Findings

A. Current Findings

1. Status of Design - Percent Completed

General Electric Company (GE) - 95%
Sargent and Lundy Engineers (S&L) - 72%

2. Status of Construction

a. The reactor pressure vessel and internals have been delivered to the site and are being stored. (Paragraph 3, Report Details)

b. Installation of the primary containment liner has started.

c. Class I concrete placement work is continuing in the reactor, auxiliary, and turbine building areas.

d. Installation of Class I piping for phase I is 98% completed. Installation of piping for phase II will commence during the spring.

3. Personnel Changes

Kaiser Engineering, Incorporated (KEI) has appointed Mr. W. J. Kacer as Site Electrical QA Engineer.

KEI presently has 16 QA/QC inspectors assigned to the site. All Class I civil, mechanical, and electrical site activities are being monitored by these personnel. Additional inspection personnel are to be added as construction progresses.

4. Contracts

Contracts have been awarded for the following:

a. Fuel Fabrication
b. Off-gas System
c. Phase II Piping
d. Main Control Boards

5. Overall Plant Contruction

Percent Complete - 7%, October 1973.

6. Zimmer Unit No. 2

The licensee stated that, on October 11, 1973, CG&E announced their intent to construct Zimmer Nuclear Power Station Unit No. 2 for commercial operation in 1981 - 1982. No letter of intent has been signed with an NSSS supplier. Under present plans, Unit No. 2 will share some nonsafety related equipment with Unit No. 1 but no structures.

B. Unresolved Matters

1. Nonconforming Material Hold Areas

Receiving areas designated as hold areas were found not to be completely secured. (Paragraph 6, Report Details)

2. Chicago Bridge and Iron Company (CB&I) Weld Rod Issuance Areas

The weld rod issuance area was not completely isolated from the main employee locker room section of the warehouse building. (Paragragh 5, Report Details)

3. Concrete Batch Plant - Scale Calibration

Certificates of inspection were available for the concrete batch plant scales. However, the certificates were not directly traceable to a specific scale, nor was the certificate of accuracy for the scale test weights directly traceable to the weights used. (Paragraph 6.3, Appendix A)

4. Audit Followup

No systematic method appeared to exist to verify that deficiencies indentified during site and vendor audits were properly corrected, documented, and reviewed. (Paragraph 9, Appendix A)

C. Status of Previously Reported Unresolved Matters

Clarification of ACI Code Commitment (RO Inspection Report No. 050-358/73-04)

The inspector was informed that CG&E had contacted their A-E, Sargent & Lundy (S&L), to clarify this item. CG&E engineering personnel stated that a revision to the S&L job specification, No. H-2174 R6, "Concrete Work", would be issued to indicated the date of issuance of the ACI Code that would be applicable for each section of the specification. This change also would be reflected in the FSAR. Followup of this item is planned during the next scheduled inspection.

Management Interview

A. The following persons attended the management interview at the conclusion of the inspection.

Cincinnati Gas & Electric Company (CG&E)

A. E. Rothenberg, Manager - General Engineering Department
E. C. Pandorf, Principal Quality Assurance and Standards Engineer
J. N. Hoffman, Quality Assurance Engineer - Civil
R. L. Wood, Quality Assurance Engineer
B. A. Gott, Structural Engineer
H. E. Crail, Assistant Principal Structural Engineer
J. D. Flynn, Project Manager
G. M. Pemberton, Principal Staff Engineer

Kaiser Engineers, Incorporated (KEI)

D. R. McSparrin, Project Manager

W. J. Friedrich, Quality Assurance Manager - Site
C. A. Smith, Inspection Supervisor

B. Matters discussed and comments, on the part of management personnel, were as follows:

1. The inspector stated that, during inspection of the nuclear components stored at the site warehouse, it was noted that recently received GE purchased components, had not been yellow "hold" tagged, as required by the KEI Receiving and Warehouse Procedure No. G-3, R1. The inspector added that this was an apparent violation of 10 CFR Part 50, Appendix B, Criterion V requirements and would be brought to the attention of corporate management in our letter summarizing the results of this inspection. The inspector also stated that no reply in regard to this violation would be required, as adequate, corrective action had been accomplished prior to the completion of the inspection and was verified by the inspector. (Paragraph 1, Report Details)

   The licensee stated that followup, regarding implementation of the receiving procedures, was planned by CG&E and KEI QA engineers.

2. In regard to quality documentation for fly ash, the inspector stated the certificates, supplied with each fly ash shipment to the site, only certified that the fly ash came from the approved source and did not appear to establish that the material conformed to the ASTM C618 specification, as committed in the PSAR. The inspector acknowledged that a full set of tests, per ASTM C618, had been taken to qualify the source of fly ash supply and that user tests, for loss of ignition, fineness, and soundness, were being taken for each 120 tons or each month. However, the inspector added that this did not appear to meet the tests requirements of the ASTM C618 specification or the sampling frequency requirements of ASTM C311 specification referenced by ASTM C618.

   The licensee stated that they felt they were in compliance with the applicable S&L specification, but added that they would review the matter and take appropriate action.

   The inspector stated that this matter would be reviewed in more detail in the office, in view of the previously unresolved matter concerning which issue of the American Concrete Institute (ACI) Code applied (see paragraph C, "Status of Previously Reported Unresolved Matters", above) and that CG&E would be notified by phone of the results of this review.

Subsequently, the licensee was notified that this matter appeared to be in violation of Criterion VII, Appendix B, 10 CFR Part 50, and in nonconformance with statements in the PSAR. (Paragraph 5.b, Appendix A)

3. The inspector stated that the "hold" areas, now provided for nonconforming items, did not constitute a secured area. The licensee indicated that this matter would be discussed with KEI. (Paragraph 5, Report Details)

4. The inspector stated that procedures for the storage and dispersment of welding materials by CB&I should be reevaluated for security and accountability methods. The licensee stated that this matter would be discussed with KEI. (Paragraph 6, Report Details)

   In regard to cranes and other equipment, used for moving essential components, the inspector stated that they should be tested and certified prior to use. The licensee stated that KEI had prepared a Quality Assurance - Construction Methods Instruction (QACMI) for rigging and testing of equipment used for essential lifts. A draft copy of this QACMI was made available to the inspector. (Paragraph 4, Report Details)

5. The inspector stated that, during review of Nonconforming Reports (NCR's) it was noted that the original signed copy of the NCR was not being returned to the site QA Department resulting in holding open NCR's that could be legitimately closed out. The licensee stated that this matter would be discussed with KEI, and a system would be devised to get the original copy returned to the site. This matter will be reviewed during the next scheduled inspection.

6. The inspector stated that it appeared a lag existed in getting approved construction drawings to the site prior to the start of construction. A recent example of this was noted during the inspector's review of NCR's. The licensee stated that steps would be taken to prevent recurrence. The inspector indicated that this matter would be reviewed during the next scheduled inspection.

7. In regard to the concrete batch plant scales, the inspector stated that the certificates of inspection were not directly traceable to the scales and only referenced the scales as water, cement, and aggregate, rather than by serial number or other distinct indentification. The certificate of accuracy for the test weights also was not directly traceable to the weights used and referenced the weights

as "one set of weights". The inspector added that it was his understanding that the acutal calibration records, which specifically identified the scales and weights, were located at the Hilltop Concrete Corporation office in Cincinnati, Ohio, and would be made available for review at the site.

The licensee's representative stated that this was correct. The inspector stated that followup of this matter would be scheduled for a subsequent inspection. (Paragraph 6.c, Appendix A)

8. The inspector stated that he had reviewed the reports of audits of site activities and vendors performed by CG&E personnel between June 29 and October 3, 1973, and that the audits appeared to be thoroughly prepared and conducted. The inspector added, however, that there did not appear to by a systematic method of assuring that corrective action, relative to deficiencies identified during the audits, was properly completed, documented, and reviewed.

   The licensee stated that they understood the problem and would take appropriate, corrective action.

REPORT DETAILS

Persons Contacted

The following persons, in addition to individuals listed under the Management Interview Section of this report, were contacted during the inspection.

Kaiser Engineers, Incorporated (KEI)

H. R. Good, Quality Assurance Engineer - Weld/NDE
M. G. Franchuk, Quality Assurance Engineer - Mechanical
V. C. Griffin, Quality Assurance Engineer - Supplier
C. M. Makowsky, Supervisor - Site Document Center
R. Falcon, Mechanical Engineer
W. A. Ferree, Warehouse Superintendent
F. N. Norton, Warehouse Manager

Chicago Bridge & Iron Company (CB&I)

W. F. Hiser, Project Quality Assurance Supervisor
P. Richards, Project Superintendent

Results of Inspection

1. Material Receiving and Warehousing

During inspection of the site warehouse facilities, the inspector noted that main steam piping and hangers had been received and were being stored. Review of the storage procedures indicated that the steam line hangers had not been yellow "hold" tagged, as required. The KEI Receiving and Warehouse Operation QACMI, G3, R1, Section 1.9, titled "Document Deficiency Notice" (DDN) requires that, "when material is received and it is determined, by the inspector or QAE, that a document deficiency exists, a yellow 'hold' tag will be attached to the material. QA personnel will fill out a DDN and forward it to the Site Document Center (SDC). When SDC obtains the required documentation, it will be forwarded to warehouse inspection department, who will remove the yellow 'hold' tag and release the material."

This matter was discussed with the CG&E and KEI QA personnel, and it was determined that a document deficiency did exist and that the hangers were required to have been yellow "hold" tagged. The KEI QA manager indicated that all essential equipment received to date at the site would be inspected and, if required, a "hold" tag would be attached to those items that were found to be in nonconformance. It should be noted that the above shipments of

essential items were initial shipments received onsite. Prior to this shipment, all items have been stored offsite.

Prior to the conclusion of this inspection, the inspector reinspected the warehouse storage area, and it was noted that all nonconforming material had been yellow "hold" tagged, and additional instructions were issued to receiving inspection personnel to provide assurance that similar future violations would not occur.

The inspector stated that failure to follow the procedure in tagging nonconforming material was an apparent violation of Criterion V, 10 CFR Part 50, Appendix B. However, no reply would be required in regard to this violation in view of the fact that satisfactory corrective action, including steps to prevent reoccurrence, was completed prior to the conclusion of the inspection.

2. Associated Piping and Engineering Company's (AP&E) Drawing Control and Corrective Action Reaudit (RO Inspection Report No. 050-358/73-06)

The inspector reviewed a letter from GE to CG&E, dated October 17, 1973. The letter indicated the action GE had taken at AP&E to correct the deficiencies that were found during the RO inspection of August 6 - 8, 1973. The action taken by GE appeared to correct the deficiencies. The inspector was informed by CG&E that, during their next audit of GE at San Jose, California, the documentation relating to the GE audit would be reviewed and documented in the CG&E audit.

3. Reactor Pressure Vessel (RPV) Site Storage

The William H. Zimmer RPV was received onsite on October 18, 1973. The RPV was barged by river from the fabrication shop of CB&I Nuclear Company (CBIN) located in Memphis, Tennessee. Prior to the vessel being shipped, a meeting was held at the office of CBIN on June 14, 1973. The meeting was attended by all parties that would be involved in the movement and storage of the RPV. Two quality assurance meetings were held with sub-contractors during October 1973. One with Bristol Steel on October 11, the other with CBIN on October 25, 1973. The Aycoch Company was awarded the contract to transport the vessel and related accessories from the barge to the storage area. KEI had prepared QACMI's to cover all activities covering movement and storage of the RPV and accessories. The following procedures were reviewed:

a. KEI QACMI No. M3, Titled "Procedures for Unloading, Transporting to Storage Reactor Pressure Vessel, RPV Head, and Related Accessories"

The procedure consisted of three sections: (1) Unloading and Hauling Operations, (2) Storage Operations, and (3) Barge Cleanup.

The procedure was dated and approved prior to use. The unloading, hauling and storage operations were successfully concluded on October 31, 1973.

b. KEI QACMI No. M1, Titled "Reactor Pressure Vessel Site Receiving and Storage Procedure"

The procedure consisted of four sections: (1) Scope, (2) Required Documents, (3) Description, and (4) Requirements.

The Requirements Section was subdivided into Receiving Inspection, Vessel Storage, Protective Measures (Vessel), Protective Measures (Head), Access Control, Monitoring of Storage Conditions, and Post Storage Cleaning.

The vessel and accessories are to be housed in an air inflated building. During the current inspection, the air building was in the process of being erected. The receiving and storage procedure was found to have been dated and approved prior to any work being performed. The inspector was informed that, after the air building is erected, final cleaning and inspection of the RPV and accessories, as required by the procedure, are to be completed. This item will be reviewed during the next scheduled inspection.

4. Hoisting Equipment

The inspector reviewed documentation relating to the hoisting and rigging equipment used during the movement of the RPV head and accessories. Certification was available for the slings, blocks, and safety anchor shackles of the equipment. The components had been examined by ultransonic and radiographic methods. Certification for the crane boom and cables was not available for review. The documents had been filed at the Cranes Company's (Crane) main office and are to be made available to the inspector as soon as received by the KEI QA Department. The hoisting equipment was new and had not been used prior to lifting of the RPV head. This matter will be reviewed during the next scheduled inspection.

5. Receiving Warehouse Quarantine Areas

During inspection of the site warehouse, it was noted that the area designated for storage of nonconformance components appeared to be inadequate from a separation viewpoint. The present storage area is separated from the main warehouse areas by means of chains and stands. Physical protection, to prevent unauthorized personnel from entering the area, was not evident. This matter was discussed with CG&E and KEI QA personnel, and the inspector was informed that steps would be taken to improve the control of the area. This matter will be reviewed during the next scheduled inspection.

6. CB&I Weld Rod Control

During the inspection of CB&I's control and issuance of weld material, it was noted that the weld rod issuance room was located in the main CB&I construction building. The room was physically separated from the main area on only three sides. The fourth side was separated from the main warehouse by the weld rod ovens, which were on a movable platform. It would be possible for unauthorized persons to enter the main storage room. This condition was discussed with CG&E, KEI, and CG&I personnel. The inspector was informed that a barrier would be installed to completely isolate the area from the warehouse.

Welding materials are presently being issued by the QA supervisor and two foremen. The CB&I QA supervisor stated that documented withdrawal slips were not being used. The inspector was informed that it was the foreman's responsibility to check each welder prior to his welding, to determine if the welder had correct welding material. Each welder is given a four-hour supply of weld rods. At present, the welders verbally request the type of rods needed. This matter was discussed with CG&E, KEI and CB&I QA personnel. The inspector was informed that this matter would be thoroughly reviewed. Other aspects of weld material control and storage, presently in force, appeared to be acceptable. The matter of weld material control and issuance will be reviewed during the next scheduled inspection.

7. PSAR Wording, Structural Steel Supporting Class I Equipment (RO Inspection Report No. 050-385/73-04)

The inspector reviewed a CG&E letter sent to S&L pertaining to this matter. The letter was dated August 28, 1973, and requested that S&L include the revised wording in the FSAR. Followup will be made during subsequent inspections.

8. Clarification of Wording "Time of Placement", KEI QACMI C2 for Concrete Placement (RO Inspection Report No. 050-385/73-04)

The inspector reviewed current concrete placement tickets to determine if the 24-hour time designation is being used to record the placement time. The tickets reviewed indicated that the 24-hour time schedule is being used. The inspector was also informed that a new stamp, reflecting a 24-hour time schedule, would be ordered and used on the placement tickets. This matter is considered closed.

9. Nonconforming Reports (NCR's)

The inspector reviewed KEI's open nonconformance and document deficiency report summary dated November 16, 1973. The reports are being classified as essential and nonessential to facilitate priority justification of work completion. A master list is being maintained, and a monthly report is prepared. A sample review of the reports indicate that they are being properly prepared, with sufficient information being provided to facilitate proper corrective action. A review of closed out NCR reports indicated that the reports are being resolved according to the KEI procedure. A continuing review of NCR's is planned for subsequent inspection.

10. Offsite Warehouse (Basle)

The leased, offsite warehouse was inspected to determine that storage and maintenance controls are being implemented for the stored nuclear equipment. During the inspector's previous inspections, the majority of equipment had been found to be yellow "hold" tagged. Subsequently, quality documentation has been received by CG&E and sent to KEI QA Department. The yellow "hold" tags have been removed. The inspector examined the maintenance records for the equipment being stored at this location and considered them to be complete. The inspector was informed that further storage of new equipment at this location is not planned at this time. Equipment is now being delivered to the construction site.

11. Pozzoleth Admixture (RO Inspection Report No. 050-385/73-04)

The inspector reviewed a certification received by CG&E from Master Builders, the Pozzoleth supplier. The certification indicated the following: "Pozzoleth 300N meets the requirement of S&L specification No. H-2174, Section 3-2, Concrete Work. The Pozzoleth 300N conforms with all the requirements of ASTM C494-71, AASHO M-194, and Corps of Engineers CRD-C87 specifications for chemical admixtures for concrete Type A water reducing admixtures. The Pozzoleth 300N, represented by the lot number, has not been changed in composition or concentration

since being tested for the Zimmer Project." This matter is considered resolved.

12. KEI Site QA Audits

The inspector reviewed QA audits that had been conducted by KEI QA personnel since the last RO inspection. Thirty-one audits, covering those areas in which work activity is being performed, were conducted during this period. The KEI Audit Schedule, issued March 15, 1972, for audit activities, is being followed. The audits reviewed were found to be comprehensive and thorough, and the followup of deficient items has been documented. A master audit log is being maintained. Site audit activities will be given continuing review by RO inspectors during subsequent inspections.

Attachment:
Appendix A

APPENDIX A

Prepared By: D. W. Hayes

Reviewed for Information: J. W. Sutton

Reviewed By: W. E. Vetter

Persons Contacted

The following persons, in addition to individuals listed under the Management Interview Section of this report, were contacted during the inspection.

Kaiser Engineers, Incorporated (KEI)

W. J. Kacer, Electrical Quality Assurance Engineer
V. R. Christensen, Document Control Center

Hilltop Concrete Corporation (Hilltop)

D. D. McKinley, Batch Plant Manager

H. C. Nutting Company (Nutting)

R. E. Abbott, Laboratory Supervisor
K. L. Kopp, Inspector

F. A. Klinger Company (Klinger)

O. Shulz, Civil Engineer

1. General

Reactor building base slab concrete pour No. AMI-B was selected to evaluate the implementation and effectiveness of the QA/QC program for Class I concrete work. The pour, consisting of 2,600 cubic yards, was made on September 7, 1973. No nonconformances were identified or documented by the licensee or his contractors. However, two Design Document Changes (DDC's) were issued in regard to this pour. Both DDC's concerned S&L

Specification H-2174, Section 3-2, Concrete Work" and were properly reviewed and approved. DDC No. S55 involved changes to air entrainment requirements for concrete not exposed to weather, and DDC No. S60 involved changes to finishing requirements.

Documents, procedures, and specifications examined during this inspection included:

a. S&L Specification No. H-2174, Division 3 - Concrete and Grout.

   (1) Section 3-1 - Concrete Mix Requirements, Revision R4, dated August 31, 1973.

   (2) Section 3-2 - Concrete Work, Revision R5, dated May 14, 1973.

b. S&L Standard Specification for Concrete Work (Form 1715-Q).

c. S&L Standard Requirements for Shop Drawings (Form SSD-A).

d. S&L Standard Requirements for Specified Products and List of Approved Manufacturers (Form 1707-B).

e. KEI QA Procedure No. 10, "Control of Special Processes", dated August 10, 1973.

f. KEI Quality Assurance - Construction Methods Instructions (QACMI) No. C-1, "Receiving and Inspecting Concrete Materials", Revision 2, dated November 7, 1973.

g. KEI, QACMI No. C-2, "Concrete Control Testing", R-5, dated June 28, 1973.

h. KEI, QACMI No. C-3, "Cadweld Splicing", R-1, dated July 5, 1973.

i. KEI, QACMI No. C-4, "Rebar Control", R-0, dated March 8, 1973.

j. KEI, QACMI No. C-5, "Concrete Preplacement Inspection Procedure", R-1, dated November 7, 1973.

k. KEI, QACMI No. C-6, "Concrete Placement Inspection", R-2, dated November 7, 1973.

l. KEI, QACMI No. C-7, "Post Placement Inspection", R-0, dated March 6, 1972.

m. Quality Control Procedure Manual for Production of Ready Mixed Concrete, Hilltop Concrete Corporation.

n. AEC Regulatory Guide 1.10, "Mechanical (Cadweld) Splices in Reinforcing Bars of Category I Concrete Structures", R-1, dated January 2, 1973.

o. AEC Regulatory Guide 1.15, "Testing of Reinforcing Bars for Category I Concrete Structures", R-1 dated December 28, 1972.

p. ASTM Standards.

q. American Concrete Institute (ACI) Codes.

2. Reinforcement Steel

The Inland Ryerson Company (INRYCO) fabricates and supplies rebar for the Zimmer project. The H. C. Nutting Company samples and tests the rebar prior to fabrication. KEI conducts receiving inspection of the fabricated rebar to assure only acceptable materials are delivered. Rebar accepted at the site is painted on one end for identity. In addition, several selected bars, in each bundle, are stamped. Records reviewed established that sampling, testing, and inspection of rebar were being performed in accordance with the specification and applicable procedures.

A rebar delivery log is maintained and lists the total tons of steel delivered for each heat. Mill test reports were reviewed for eight randomly selected "heats" for rebar installed in pour No. AM1-B. User test reports, associated with the selected "heats" were also reviewed. No deficiencies were identified.

3. Cadwelds

Cadwelding is performed under the direction of Klinger. Installation drawings (INRYCO) No. Q-A2, No. Q-A2A, and No. Q-A2G for the bottom and second layer of rebar installed in the subject pour were reviewed. Test report results for nine "production" and five "sister" Cadweld splices were randomly selected, reviewed, and found to meet specification requirements. Cadweld splices were selected for testing in accordance with approval procedures. Cadwelder test and qualification records were reviewed. No deficiencies were identified. All Cadweld splices reviewed were performed by welders qualified in accordance with established procedures. Daily Cadweld inspection reports for August 20 - 24 and 27, 1973, were examined, in addition to inspection report for proper

prewelding conditions.

Each Cadweld splice is inspected for soundness, filler metal voids, proper size sleeve, centering, and spacing. In the area reviewed, records indicated four splices were rejected, cut out, and replaced with accepted splices.

Material certification records for Cadweld sleeves and powder, received on May 4, 1973, and June 20, 1973, were examined. No discrepancies were identified.

4. Concrete Pour Site Inspection

Records were reviewed which established that preplacement, placement, and post placement inspections were performed for the selected pour. The inspection reports were properly signed by the QA engineer, and no discrepancies were identified. Preplacement examination included inspection for: placement of forms and rebar, Cadwelds, cleaniness, and electrical, mechanical, and other embedments. Placement examination included: verification that the preplacement inspection was completed, surface temperatures are proper, adequate and sufficient placement equipment is present, cement mortar is properly placed, vibrators are used correctly, and the surface treatment, curing procedures, and weather protection is proper. Post placement examination included verification of acceptability of initial cure, that shoring is not removed prematurely and that surface treatment and finish complies with specifications.

5. Concrete Material Tests and Certifications

a. Cement

Cement is supplied to the project by the Southwestern Portland Cement Company. Certification of test results for Type II cement milled into silo No. 17, on August 31, 1973, and delivered to the site on August 31 and September 7, 1973, on truck tickets, including Nos. 13743, 13744, and 13753, were reviewed. Test results established that the cement met physical and chemical requirements of ASTM Specification No. C150-72. User test results for samples no. 33 and no. 35 from cement delivered on truck tickets No. 13744 and No. 13753 were also reviewed. The results for chemical and physical properties met specification requirements.

b. Fly Ash

Fly ash is supplied from the CG&E W. C. Beckjord Station at New Richmond, Ohio. Initial tests were made to qualify the source of supply and the results of these tests established that, at that time, the fly ash met requirements of ASTM C-618. Subsequent sampling and testing, however, is not performed for each 100 tons, as required by ASTM C-311 (referenced by ASTM C-618). Certificates, supplied for each shipment of fly ash, establish only that the fly ash was supplied from the approved source and not that it met the requirments of the ASTM C-618 specification, as committed in the PSAR (Section 12.4.2).

Users tests for: (1) loss of ignition, (2) fineness, and (3) soundness are being performed for each 120 tons of fly ash received at the site. Results of these tests were reviewed and found to meet specification requirements.

The licensee's representative was informed that the lack of documentation, to establish that the fly ash met the requirements of ASTM C-618, appeared to be in violation of the requirements of 10 CFR Part 50, Appendix B, and inconsistent with statements in the PSAR for the Zimmer Nuclear Power Station.

c. Aggregate

Initial tests to qualify the source of aggregate supply were performed on October 12, 1972. Results of these tests established that aggregate met specification requirements. Subsequent tests results were also reviewed for aggregate samples taken, as follows:

(1) From conveyer No. M-23 to barge No. 126 (gravel) on August 21, 1973.

(2) From conveyer No. M-23 to barge No. 1561 (sand) on August 22, 1973.

(3) Sample 53 (sand) and sample 54 (gravel) from batch plant conveyer belt (For gradation tests) on September 7, 1973.

Test results were consistent with requirements.

d. Admixtures

(1) Air Entraining Admixture (Darex)

Certification of conformance to the requirements of ASTM C-260, for "Darex" supplied by the W. R. Grace Company on August 8, 1973, were reviewed and considered acceptable.

(2) Water Reducing Admixture (Pozzoleth 300N)

Certification of conformance to the requirement of ASTM C-494 and AASHO M-194, for "Pozzoleth 300N supplied by the Master Builders Company on July 24, 1973, were reviewed and considered acceptable.

e. Water and Ice

Water used in the production of concrete is supplied from a well located onsite. Test results, including cube tests from samples taken November 22, 1972, were reviewed and appeared consistent with requirements. Tests were also performed for water derived from the ice supplied for hot weather concreting. Test results met requirements.

6. Batch Plant and Test Laboratory

a. Reports and other records were reviewed, which indicated that the batch plant was properly qualified and that inspections of concrete mixing and handling equipment, including trucks, and of concrete material supplies, on hand, were performed in accordance with procedure and specification requirements. Included were:

(1) Daily inspection of scales for zero balance and condition of knife edges.

(2) At least daily measurement of aggregate moisture content and setting of moisture compensation dial.

(3) Daily check of mix timer.

(4) Daily inspection of mixer and trucks for excessive mortar buildup.

b. Laboratory equipment, concrete test cylinder storage, and moist curing room temperature records were examined and considered satisfactory and in conformance with requirements.

c. Calibration procedures and records were not reviewed during this

inspection. However, calibration stickers were observed on equipment indicating that periodic inspections and calibration were being performed.

Certificates of inspection for the concrete batch plant scales (three) were examined, and the certificates were not directly traceable to a specific scale, nor was the certificate of accuracy for the test weights directly traceable to the weights used. The Hilltop representative stated that the calibration records for the scales and initial certificate for the weights, located at their main offices, did specifically identify the scales and weights by serial number. He added that copies of these records would be made available for review at the site. Follow-up review of this matter and review of equipment calibration procedures and records are planned for a subsequent inspection.

7. Concrete Mixing, Placement, and Testing

a. Concrete Mix

Records were reviewed which established that the design mix specified, including the bonding mortar, were properly tested, qualified, and approved for use.

b. Concrete Placement

About 100 of the nearly 300 transit tickets, associated with the subject pour, were examined in detail, and the remainder were spot checked. The transit tickets established that inspections, including verification of proper mix, were made by QA/QC personnel at both the batch plant and pour site and that placement time limits were not exceeded (both time of mix and time of placement were documented). Apparent errors were noted on the transit tickets but, in each case, they were traceable to malfunction of the printout equipment, and each apparent error was initialed by the batch plant inspector.

c. Concrete Testing

Transit tickets and other records were reviewed and established that slump and air entrainment tests were performed at the specified intervals. Test results reviewed indicated the specified limits were not exceeded.

Seven-day and twenty-eight-day break test results were reviewed for test cylinders taken at the point of placement during the subject

pour. Average break results were 3,820 and 5,977 psig, respectively, well above the specified strength requirement of 4,500 psig at 90 days.

Concrete compression test logs are maintained, and moving averages for strength are calculated and plotted daily.

8. Observations

The site of concrete pour No. AM1-B was inspected. Concrete sufaces appeared free of major defects, and no evidence of excessive cavities were observed along the pour edges or penetrations.

No Class I concrete placement was in progress at the time of this inspection. A Class II pour was observed in progress, and proper placement practices appeared to be in effect. Forms for Class I walls, in the reactor and auxiliary buildings were in place and were examined. The forms and rebar were clean and properly tied and supported.

The aggregate stock piles and batch plant were also inspected. No deficiencies were observed.

9. CG&E Audit Reports

Reports of three site, eleven vendor, and one management audit were reviewed. The audits were performed between June 29, 1973, and November 16, 1973, by CG&E personnel. The reports indicated adequate preparation for the audit, thorough inspection of the area(s) selected for examination, and proper distribution of the reports and findings.

One or more deficiencies were identified in over 50% of the audits Although corrective action appeared to be completed or in progress for each of the deficiencies, verification required review of scattered record files and discussions with several personnel. With the exception of the management audit, no systematic method or procedure appeared to be in effect for timely followup to assure that corrective action was initiated, completed, documented, reviewed, and approved. The licensee's representative stated that they would review the matter and take indicated, corrective action. Followup is planned during a subsequent inspection.