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

REGION III

Report No. 50-358/79-32

Docket No. 50-358 License No. CPPR-88

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

Facility Name: Wm. H. Zimmer Nuclear Power Plant

Investigation At: Zimmer Site, Moscow, OH

Investigation Conducted: October 17 and 18, 1979

Investigator: J. E. Foster 12/4/79
J. E. Foster (Date)

Inspector: C. M. Erb 12/4/79
C. M. Erb (Date)

Reviewed by: C. E. Norelius 12/4/79
C. E. Norelius (Date)
Assistant to the Director

D. H. Danielson 12/4/79
D. H. Danielson, Chief (Date)
Engineering Support Section 2

Investigation Summary

Investigation on October 17 and 18, 1979 (Report No. 50-358/79-32)
Areas Investigated: Special, unannounced investigation into allegations concerning improper modification of structural steel within the Zimmer containment area; inspection of ongoing structural steel modifications, interviews with personnel, review of pertinent records, drawings, specifications, and discussions with licensee and contractor engineering personnel. The investigation involved 24 inspector-hours on site by two NRC personnel.
Results: One item of noncompliance (infraction) was identified relative to design change control, see paragraph 10, details section.

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REASON FOR INVESTIGATION

On August 22, 1979, Mr. Howard Ain, of television station WKRC, Cincinnati, contacted the Nuclear Regulatory Commission Region III Office (RIII), advised he had received an allegation concerning the Zimmer Nuclear Plant, and indicated that he would recontact RIII when he had more information. Mr. Ain was contacted by an RIII Investigation Specialist on September 3, 1979. He stated he had talked to and received a letter from an individual who worked at the Zimmer Plant who wished to remain anonymous. This individual (Individual "A") had stated to him that structural steel at the Zimmer Plant had "sagged" during (hydrostatic) testing and was being reinforced. However, Individual "A" indicated that while beams had been reinforced, the beam's supports (or connections) had not been similarly reinforced. On the basis of this information, an NRC investigation was initiated.

SUMMARY OF FACTS

The RIII investigation specialist requested Mr. Ain to contact Individual "A" and provide specific locations, if possible, of the structural steel in question. On September 19, 1979, Mr. Ain advised that Individual "A" had agreed to provide him with specific locations and pictures of some of the areas Individual "A" felt were questionable. Mr. Ain subsequently advised on October 3, 1979, that he had received a letter describing the locations in question and pictures of the installations which had been provided to him by Individual "A".

RIII personnel met with Mr. Ain at the WKRC offices on October 17, 1979, reviewed two letters which he had received, and examined eleven photographs of structural steel. Mr. Ain provided RIII personnel with copies of the letters, and black and white copies of the photographs were made on a standard copy machine.

On October 17, 1979, WKRC personnel were allowed to photograph the entry of the RIII personnel into the plant site and interview the investigation team at the end of their visit to the plant that day. RIII personnel visited the Zimmer site on October 17 and 18, 1979, toured the primary containment area, reviewed drawings and specifications, and held discussions with licensee and contractor personnel.

Locations identified by Individual "A" were located in the plant primary containment area in and around the main steam piping. Several of the specific areas photographed by Individual "A" were inspected and other examples of structural steel undergoing reinforcement were observed. Some of the reinforcing work was in-progress, and some work had apparently been completed for several months and had been painted. It was observed that none of the connections for the structural steel had been modified by similar reinforcing.

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Review of the work and discussions with representatives of Sargent and Lundy, Kaiser Engineers, and licensee personnel indicated that this work was related to strengthening of the suppression pool and related equipment to accomodate postulated accident loadings. This work is a part of the boiling water reactor (BWR) Mark II Pressure Suppression Containment evaluation and modification program initiated due to identified suppression pool and safety relief valve loadings which has been monitored by the NRC for several years. Appropriate drawings and approvals were found for the work observed by the RIII personnel.

Licensee and contractor personnel indicated that much of the reinforcing work is yet to be accomplished, including stress analysis and possible modification of structural steel connections.

No evidence was found to indicate that any of the structural steel had "sagged" at any time or that the reinforcing work was in any way related to the hydrostatic testing of reactor systems. Reinforcement modifications had been begun after the hydrostatic test was performed; however, the analysis and drawings for the structural steel modifications were apparently begun well prior to the hydrostatic test, which was performed on Saturday, July 1, 1978.

During review of material specifications for the reinforcing work, it was observed that a different grade of steel plate than that specified had been utilized for some of the reinforcement work. As no design change document was available to approve this deviation, this was considered an item of noncompliance.

This investigation received television coverage on WKRC-TV on October 17 and 18, 1979.

DETAILS

1. Personnel Contacted

Cincinnati Gas and Electric (CG&E)

R. Ehas, Quality Assurance and Standards
D. Kramer, QA Inspector - Civil
L. Wood, QA Inspector - Mechanical
H. Brinkman, Principal Mechanical Engineer
B. A. Gott, Construction Engineer
B. Culver, Site Project Manager

Kaiser Engineering (KEI)

K. Shinkle, QA Engineer

Sargent and Lundy Engineers (S&L)

R. Walters, Structural Engineer

2. Technical Background

The Zimmer facility utilizes a General Electric Mark II containment system design, which includes a pressure suppression pool in the lower levels of the containment building. During large scale testing of the subsequent Mark III containment design system, and actual Mark I operating experiences related to safety relief valve actuations, new suppression pool hydrodynamic loads associated with postulated loss-of-coolant accidents (LOCA) were identified that had not been explicitly considered in the original design of the Mark II containment system. These newly identified loads result from the dynamic effects of drywell air and steam being rapidly forced into the suppression pool during a postulated LOCA, or safety relief valve actuation. When this possible problem was identified, both General Electric, the NRC and its consultants, performed an in-depth review of the General Electric Mark II containment system design. Utilities owning facilities which would utilize the Mark II containment system also formed an owners group so that calculations, evaluations, and acceptable modifications to the BWR Mark II containments could be shared. The NRC effort in reviewing the new dynamic loads was divided into two programs, a short term evaluation program for the lead plants (Zimmer, La Salle, Shoreham) and a long term program for final detailed evaluation of the adequacy of modifications. The description of the NRC load evaluation is available in NUREG-0487, published in November, 1978. This document indicates that the lead plants, those first to utilize the Mark II containment system, would be reviewed by the NRC to determine the acceptability of modifications made in their design to accomodate the identified loads. NUREG-0474, issued in July 1978, entitled "A Technical Up-Date on Pressure Suppression Type Containments in Use in U.S. Light Water Reactor Nuclear Power Plants" details the ongoing NRC monitoring of the

modification and analysis program. NUREG-0371, issued November 1978, entitled "Task Action Plans for Generic Activities (Category A)" identifies review of the Mark II pressure suppression containment as Generic task A-8. NUREG-0510 issued January 1979, titled "Identification of Unresolved Safety Issues Relating to Nuclear Power Plants, Report to Congress," identifies two generic tasks (task A-8, A-39) as being related to the analysis of suppression pool dynamic loads and safety relief valve loads/temperature limits for BWR containments.

The NRC, in the lead plant program load evaluation, approved of the design basis used for modifications to the suppression pool system, including a device known as a "T quencher" as part of the piping system, and additional equipment such as base and wall plates to support these new installations.

3. Scope

This investigation was conducted to review the allegations of Individual "A" relative to his comments that structural steel in the containment area of the Zimmer Plant was being modified without proper consideration of modifications to the structural steel supports or connections. During the investigation, reviews of drawings, specifications, and observations of the installations were made.

4. Receipt of Allegations

During a visit to the Zimmer site (See IE Investigation Report No. 358/79-26) on August 17, 1979, Mr. Michael Ward, Legal Counsel for the Subcommittee on Energy and Power, advised an RIII investigation specialist that he had received an allegation concerning the Zimmer Plant. Mr. Ward advised that a media representative had contacted him and advised that a site ironworker was concerned about pipe supports on the "secondary system." This information was insufficient for initiation of an investigation, and Mr. Ward was requested to have the media representative contact RIII.

On August 22, 1979, Mr. Howard Ain of television station WKRC, Cincinnati, Ohio, contacted RIII and left a message that he had received an allegation concerning Zimmer. He advised he was awaiting more information and would call again.

On September 13, 1979 RIII personnel contacted Mr. Ain by telephone. He stated that a Zimmer site workman had called and written to him concerning structural steel beams at the plant. Mr. Ain read a letter, dated August 9, 1979, to RIII personnel (see Exhibit I). Mr. Ain stated that the site worker, Individual "A", wished to be anonymous, and no attempt was made to determine the individual's identity during the investigation. Mr. Ain was requested to contact Individual "A" and obtain specific locations of structural steel for inspection.

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On October 3, 1979, following several contacts, Mr. Ain indicated that Individual "A" had provided him with a letter describing the locations of reinforced structural steel beams which Individual "A" noted as having unreinforced connections and eleven color photographs of this equipment. Mr. Ain read a letter from Individual "A" dated September 24, 1979 (see Exhibit II). In this letter the individual stated that his concern was not that the beams were being strengthened but that the connections used to connect the structural steel either to other steel or to the containment wall imbeds had not been similarly reinforced.

5. Visit To Television Station WKRC

On October 17, 1979, RIII personnel visited the WKRC station offices in Cincinnati, Ohio. Mr. Ain discussed the allegations he had received, interviewed RIII personnel, and provided them with copies of the anonymous letters he had received. Copies of the photographs Mr. Ain had received were made on a standard black-and-white copy machine and provided to RIII personnel.

Mr. Ain and a cameraman accompanied the RIII investigation team to the Zimmer site, and photographed their entry.

6. Site Visit

On October 17 and 18, 1979, RIII personnel visited the Zimmer site, inspected equipment in the primary containment and steam tunnel, interviewed licensee and contractor personnel, reviewed drawings and specifications for structural reinforcing modifications.

Areas described and photographed by Individual "A" were easily identifiable, and additional structural beams in the main steam piping area of the primary containment were observed to have been modified by similar reinforcing. Reinforcing consisted of several approaches, including adding plates to the sides of beams, additional plates on the flanges of beams, and deposits of weld metal. It was observed that beam connections had not been similarly modified and reinforced at the time of the inspection.

7. Discussion With Licensee and Contractor Personnel

Discussion with licensee and contractor personnel indicated that the observed beam reinforcement modification was being performed as part of the BWR Mark II modifications outlined earlier in this report. From discussions with licensee personnel these modifications were not related in any way to the hydrostatic test of the reactor system which had taken place prior to the initiation of reinforcing modifications. Licensee personnel advised that reinforcing modifications were not complete and additional modifications were still pending.

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Sargent and Lundy (S&L) personnel indicated that stress analysis of loads on beam connections were either in-process or were yet to be performed, and beam connections would be revised if required by their final analysis. S&L representatives indicated that the theoretical loads used in performing the stress analysis both for the modified beams and for the connections would be conservative in that they would consider the simultaneous loadings of main steam isolation valve actuation, loss of coolant accident, and design basis earthquake. They stated that meetings with the NRC Office of Nuclear Reactor Regulation (NRR) to discuss and examine specific BWR Mark II modifications are scheduled for the near future.

8. Review of Hydrostatic Documentation

RIII personnel reviewed documentation for the reactor pressure vessel hydrostatic test conducted on July 1, 1978 (Saturday). This test is performed by filling various systems with water and increasing pressure to a design pressure, in this case 1,270 pounds per square inch, and observing whether any welds or other connections leak. Documentation indicated that this test was conducted between 11:00 a.m. and 8:00 p.m. on the date indicated, and four welds were found to leak during the test. NCR (Nonconformance Report) E-1126 dated July 3, 1978 documented the four welds which leaked during the reactor pressure vessel test and the repairs to these welds.

Documentation indicated that the reactor pressure vessel test was witnessed by various personnel including the hydro test leader, representatives from the Quality Assurance Branch, Quality Assurance and Standards Branch, and the Authorized Nuclear Inspector, Mr. Buton.

Interviews with Quality Assurance personnel indicated that no "sagging" or other deformations of structural steel had been observed during the reactor pressure vessel hydrostatic test.

9. Drawing Review

A sample of drawings and change documents related to structural beam modifications were reviewed by RIII personnel. Drawings reviewed included:

Design document change SLS-317 dated August 31, 1979
Design document change SLS-319 dated October 16, 1978
Drawing S-446, drawing S-447, drawing S-448, drawing S-398, drawing S-399

S&L personnel advised that calculations and revised drawings had been in progress well prior to August 31, 1978, when design document change SLS-317 was issued.

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Revision "a" of drawing S-446 (Drywell Framing Sections and Details, sheet No. 1) was issued on August 28, 1978, which was indicated as the approximate date on which structural steel modifications were initiated.

All the drawings reviewed indicated appropriate reviews and approval signatures as required. No items of noncompliance with NRC requirements were observed in this area.

10. Specification Review

During the investigation, materials specified for use during the modifications were reviewed. Reviewed were reinforcement materials for structural beams at the 535 ft. level reactor primary containment. The bill of material for reinforcing steel on the drawing (S-398) called for use of SA-36 plate except where noted (50) and in those instances, SA-572 Grade 50 should be used.

Material certification for reinforced beams identified by numbers 802P53440, 801E04680, and 74292 were examined and found to be in order except that steel plates to specification SA-588 Grade B had been used. The inspector asked to review the written authorization for the substitution but none was available. While the substituted plate is generally viewed as of superior strength, the substitution was apparently not authorized, and this is an item of noncompliance with 10 CFR Part 50, Appendix B, Criterion III and Paragraph 17.1.3.2 of the Zimmer FSAR. (No. 358/79-32-01)

11. Media Contacts

RIII personnel were interviewed by WKRC personnel following the site visit of October 17, 1979, and contacted them by telephone to further discuss their findings on October 18, 1979. An additional visit to the WKRC offices was made on October 19, 1977 to discuss the significance of the investigation findings.

Attachments: Exhibits I and II

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August 9, 1979

Howard Ain:

Confirming our telephone conversation, this date, I would like you to investigate what I consider a serious construction fault at the William H. Zimmer plant, Moscow, Ohio

Inside of the secondary containment vessel, the structual steel that carries all of the weight of the high pressure steam piping, reactor feed water supply, reactor control rod piping and all electrical wiring and controls sagged when the weight of the above mentioned piping and controls were supported off of it.

The structual steel work is now being reinforced by welding plates on the top, bottom and sides of the structual beams. No attempt has been made to strengthen the joints that inter-connect with other steel work. Should this supporting steel fail, there is grave danger of steam pipe rupture and reactor control rod piping rupture and total electric power failure.

Steel

EXHIBIT I
page 1 of 1

September 24, 1979

Mr. Howard Ain
WKRC - TV
Cincinnati, Ohio

As per our phone conversation of 9-23-79, I am including color positives #1 thru 11, with negatives, and would like to apologize for the quality as it was done under adverse conditions.

This photography was done inside of the primary containment at elevation 535'.0" and up to approximately 550'.0"at an azimuth of 330 to 250 degrees.

Photograph #1 - Sides of beam were boxed by welding plates to the edges of the beam. No reinforcement was done for attachment of beam to support.

#2 - Same as #1 except plates welded to top and bottom of beam in an attempt to strengthen the attachment.

#3 - Same as #2

#4 - Same as #2

#5 - Same as #2 but this steel work holds the main steam piping hangars.

#6 - Plates welded to top and bottom flanges of beam and nothing done to increase strength of it's attachment.

#7 - Same as #6

#8 - Same as #6 and holds reactor feed water piping.

#9 - Same as #6

#10- Same as #2

#11- Same as #2

To get to this elevation and azimuth, you enter the containment from the construction entrance, take the construction ladder to the left, walk across elevation 535'.0" to approximately 250 degrees azimuth and you will be in one of the areas where this photography was done.

There are many more that I was not able to photograph due to camera, time and circumstances. A further inspection of the total primary containment will show up the balance.

EXHIBIT II
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STEEL