

U. S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-341/84-59(DRS)

Docket No. 50-341

License No. CPPR-87

Licensee: Detroit Edison Company
2000 Second Avenue
Detroit, MI 48224

Facility Name: Enrico Fermi Nuclear Power Plant, Unit 2

Inspection At: Enrico Fermi 2 Site, Monroe, MI

Inspection Conducted: November 13-15, 26-29, 1984; January 7-10, 21-23, and
February 5-7, and 12, 1985

Inspectors: P. D. Kaufman

P. D. Kaufman

2/15/85

Date

D. H. Danielson

for M. Jacobson

2/15/85

Date

D. H. Danielson

Approved By: D. H. Danielson, Chief
Materials & Processes Section

2/15/85

Date

Inspection Summary

Inspection on November 13-15, 26-29, 1984; January 7-10, 21-23, and
February 5-7, and 12, 1985 (Report No. 50-341/84-59(DRS))

Areas Inspected: Routine, unannounced safety inspection on previously
identified inspection items; allegation; Sargent & Lundy design practices;
and pipe break outside primary containment. The inspection involved a total
of 149 inspector-hours by two NRC inspectors, including 19 inspector-hours
during offshifts, and 34 inspector-hours of in-office review.

Results: No items of noncompliance or deviations were identified.

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DETAILS

1. Persons Contacted

Detroit Edison Company (DECo)

S. Noetzel, Assistant Manager, E. F. 2
W. H. Jens, Vice President
W. R. Holland, Vice President
W. J. Fahrner, Manager, E. F. 2
R. A. Vance, Assistant Project Manager/Engineering
*G. M. Trahey, Director NQA
D. L. Schweikhart, Supervisor Engineering
*W. M. Street, Supervising Engineer/Civil
M. S. Williams, Senior Engineer/Project Design
*J. F. Malaric, Supervisor/Field Engineering
L. P. Bregni, Engineer/Licensing
O. K. Earle, Supervisor/Licensing
S. E. Martin, Engineer/Licensing
F. M. Sondgeroth, Engineer/Nuclear Engineering
T. Young, Lead Design Field Engineer
R. C. Moore, Work Leader/Engineering Mechanics
J. Mullins, Welding Engineer
J. Contoni, Principal Resident Engineer/Mechanical
R. G. Baldwin, Field Engineer/Design Engineering
R. L. Tassell, Field Engineer/Small Bore Design
L. Bertani, Supervising Engineer/Mechanical
R. Markovich, Safeteam Investigator
A. K. Lim, Systems Engineer
*J. Conen, Engineer Licensing
B. Wickman, Supervisor Maintenance & Modification QA
R. Lenart, Superintendent/Nuclear Production
*F. Agosti, Manager/Nuclear Operations
*A. Colandrea, Principal Resident Engineer/A/C
*E. P. Griffing, Assistant Manager/Nuclear Operations

Multiple Dynamics Corporation (MDC)

D. Lehnert, Vice President
K. Borregard, Engineer

*Denotes those attending the final onsite exit interview on February 7, 1985.

2. Licensee Action on Previous Inspection Findings

- a. (Closed) Unresolved Item (341/84-31-01): Organizational responsibilities for verifying operability of snubbers differed from the licensee response to FSAR Appendix E, Item 121.14. The inspector reviewed FSAR Change Notice 84-453, dated August 11, 1984, which has been submitted to NRR as a Supplemental Response to Item 121.14

to properly reflect organizations and their responsibilities with regard to snubbers. The inspector reviewed a sample of Wismer & Becker's snubber checklists, which Project Construction utilizes to document the verification of proper snubber operation (stroke testing). This item is considered closed.

- b. (Closed) Open Item (341/84-31-02): Acceptance criterion on variable spring hanger movement does not preclude exceeding the variability limit per FSAR Appendix E, Item 413.16. The inspector determined DECo's Startup Test Phase Procedure STUT.HUA.017, Revision 2, "System Expansion-Visual Inspection/Hanger Readings," acceptance criteria (Level 2) for variable supports to be consistent with the FSAR. This item is considered closed.
- c. (Closed) Unresolved Item (341/84-31-03): Installed condition of pipe support E11-2184-G05 did not agree with the latest as-built documentation and exceeded allowable installation tolerances. The inspector examined portions of the following corrective actions taken by the licensee to resolve the identified discrepancies:
 - . Nonconformance Report 84-1429 was prepared and issued.
 - . Design Change Request (DCR) P-4569, Revision C was issued and approved.
 - . Sargent & Lundy calculation No. 786-5, Revision 4 was prepared, approved and issued to incorporate DCR No. P-4569, Revision C.
 - . A Work Assignment Sheet Material Notice (WASMN) was issued to Bechtel for completing the required work activities.

The documentation and plant walkdown revealed that the established steps were performed and completed in accordance with the licensee's QA program. This item is considered closed.

- d. (Closed) Noncompliance (341/84-38-01): Sargent & Lundy (S&L) inter-office memorandum, related to the design of U-Bolts, which had not been reviewed for adequacy or approved for release was utilized for design purposes. The S&L interoffice memorandum has subsequently been reviewed and approved for use with no discrepancies to its contents. The design information in the interoffice memorandum has been issued in Design Information Transmittal F2-EMD-0016 dated September 6, 1984. This item is considered closed.
- e. (Closed) Open Item (341/84-27-03): Seismic concerns regarding high range containment monitor and liquid monitor installations where lead shielding blankets, surrounding the sodium iodide detectors, were attached to and supported by the general service water and reactor building component cooling water (RBCCW) piping. Design Calculation (DC) No. 2898 was generated to document the analysis for fastening the lead pipe shield of D11-N009 liquid monitor, drawing 5S721-3146 was updated, and DCR No. P-3896 was issued

subsequent to the NRC inspector's finding. DC No. 2064 and drawing 6I721-2514-42 Revision C existed to document the mounting of D11-N443A high range containment radiation monitor to seismic pipe support 6M721-4095-605. This item is considered closed.

- f. (Closed) Noncompliance (341/84-09-01): Failure to assure that documents, including changes thereto, prescribing activities affecting quality were properly reviewed for adequacy or approved for release in the area of pipe support design calculations and applicable procedures. Stone & Webster (S&W) procedures CHOC EMTS 10-1 (currently superseded by CHOC EMDM 82-39) and CHOC EMDM 81-27 have been revised to incorporate all changes thereto which had been promulgated by methods such as tel-con notes, memoranda, and letters. These documents have been reviewed for adequacy, approved for release, and distributed properly. This item is considered closed.
- g. (Closed) Noncompliance (341/84-09-02): Failure to follow procedures related to the design and installation of QA Level 1 large bore pipe supports. A review of the licensee's response to the noncompliance was conducted and the corrective actions taken to resolve the deficiencies and inadequacies were inspected. The licensee's corrective actions along with the present procedures were determined to be adequate and satisfactory, and the special evaluation has verified Fermi 2 large bore pipe support designs comply with applicable codes and design criteria. This item is considered closed.
- h. (Closed) Open Item (341/84-21-05): Loose pump pressure boundary bolting and incomplete thread engagement. The licensee completed a random sampling of flanged joints of various piping systems and mechanical equipment to determine if full thread engagement exists for the bolting material. The results of this random inspection of 14 pumps, valves and flanges indicted that no lack of thread engagement existed at any bolted pressure boundary inspected. Bolting torque was checked on 6 safety-related pump casings and 6 safety-related valve body to bonnet joints.

The bolting torques on 3 of the 12 components checked were found to be less than the manufacturer's recommendations. The licensee evaluated the as-found torque in each case and determined that sufficient bolt preload necessary to maintain component integrity existed.

In addition, visual observations for leakage of bolted pressure boundary joints were made during hydrostatic testing and initial operation of the systems. Periodic observations will be made as the plant begins operation and during operation; any leaking joints will be retorqued. Based on the licensee's evaluation performed as indicated in DECo letter dated December 27, 1984 from L. Bertani to S. Noetzel and actions taken, this item is considered closed.

- i. (Closed) Unresolved Item (341/81-04-02): Excessive restraint gaps. The licensee revised DCR No. 5757C, dated November 14, 1980 as

referenced by RIII inspection report 50-341/82-08. The licensee re-inspected all related gaps and clearances under Stone & Webster (S&W) Task 64, Hanger Inspection Program. A total of 8,027 QA Level 1 supports were inspected, evaluated, and dispositioned by S&W under Phase I and Phase II of the referenced program. Upon discussions in the Region III office, it was concluded the maximum gap clearance of 5/32" would not invalidate the piping stress calculations. Based on the above actions, the QA Level 1 pipe supports and piping systems will serve their intended functions, and this item is considered closed.

- j. (Closed) Noncompliance (341/80-02-01): Inadequate control of small bore piping suspension design. This item was reviewed and closed out in Region III inspection report 50-451/84-09, Section V, but incorrectly stated as Noncompliance 341/82-08-01. This item is considered closed.

3. Licensee Action on 10 CFR 50.55(e) Items

- a. (Closed) 50.55(e) Item 129 (341/84-21-EE): "Lack of Design Calculations for HVAC Duct Supports". During an as-built structural loading assessment, DECo discovered that some uniquely designed safety-related ductwork supports, which differed from the standardized supports done by the Fluor-Pioneer Company, were missing calculations to justify their structural adequacy. DECo reanalyzed 567 affected safety-related HVAC ductwork supports. Eleven of the 567 HVAC duct supports required modifications to meet seismic qualification criteria. The modifications consisted of adding braces, replacing structural members and reinforcing existing support members. Hopper and Associates verified the methodology, organization of calculations and assumptions of the reanalysis. The reviewed reanalysis, nonconformance reports, and design changes were determined to be adequate and satisfied design requirements for seismic qualification of HVAC duct supports. The necessary field modifications are presently underway and were sampled by the NRC inspector and found acceptable. This item is considered closed.
- b. (Closed) 50.55(e) (341/84-31-EE): Deficient shop weld in a flued head structure. This item is also associated with allegation 8-1-A-129 concerning improper ultrasonic examination of flued head structures.

Flued head structures are steel frames composed of built-up box members. These structures are used to anchor the containment penetration flued head fittings. The structures were designed and fabricated to AISC requirements and welded in accordance with AWS D1.1 code. Nondestructive examination, however, was specified by the licensee to be done in accordance with the more stringent requirements of ASME Section III, Article NB-5000. This section of the Code applies to pressure vessels and piping, not structural frames where AWS D1.1 is more applicable. The licensee will revise the applicable documents to reflect the examination requirements of D1.1.

A shop performed weld was inadvertently ultrasonically examined during examination of field welds on steam tunnel flued head structures. The weld was found to be rejectable although the weld had been examined and accepted by the supplier. An NCR was generated, the weld repaired, re-examined and found acceptable.

As follow-up action, the licensee re-examined 21 shop welds in accordance with ASME, NB-5000. Of the 21 welds examined, 5 welds were found to be unacceptable. These 5 welds were again re-examined in accordance with the more applicable AWS D1.1 code and found to be acceptable.

An initial review of NDE reports of shop welds found 80 documentation problems out of approximately 1600 welds. A decision was made to re-examine all accessible welds with documentation deficiencies. Thirteen out of 50 welds requiring UT were accessible and all found to be acceptable. Eighteen out of 30 welds requiring MT were visually examined. Out of 18 welds, 15 were found to be visually rejectable. All of the rejectable welds were fillets occurring on the 9 X 20 cross bracing channel to box member connections of anchor structures #6 and #7. An engineering analysis demonstrated that in all cases the channels transfer only axial forces, and that the existing length of acceptable weld is more than adequate to maintain structural integrity. Further analysis showed that the stress on the existing acceptable length of welds does not exceed 33% of the allowable stress. Based on the low number of loading cycles expected during the design life and the low stress levels on each connection, it was concluded that existing visual defects will not propagate and do not require repair.

Upon further investigation concerning deficient NDE documentation of 80 welds, alternate documentation, showing completed successful NDE was found on all but seven welds. The alternate documentation was in the form of supplier NDE as-built weld maps. These maps indicate completed, acceptable NDE and are signed by a Level II tester and approved by a Level III. Although specific NDE technique sheets could not be located for these welds, the NDE weld maps appear to demonstrate acceptable NDE.

Based on the inspector's review of the above documentation and visual inspection of several flued head structures, it is concluded that a safety problem with the flued head structures does not exist. This item is considered closed.

- c. (Closed) 50.55(e) Item 132 (341/84-24-EE): "Potential Deficiency in Final Design of Large Bore Pipe Supports". DECo directed Stone and Webster of Michigan (SWMI) to perform a special in-depth evaluation to verify that Fermi 2 large bore pipe support designs comply with applicable codes and design criteria and are structurally and functionally adequate. The evaluation method and program was used to provide a statistical basis for the confidence in the adequacy of the large bore pipe support designs. The evaluation

team was made up of Engineering Assurance (EA) and Pipe Support Engineers from Stone & Webster Engineering Corporation's (SWEC) Boston office. The evaluation entailed an extensive review of a random sample of 125 of approximately 1750 Fermi 2 large bore pipe support calculations prepared by SWMI. This sample size was used to provide the statistical basis for determining the acceptability of the pipe supports. The results of this assessment demonstrated successfully that the pipe supports comply with applicable codes and design criteria and are acceptable. Thus, DECo informed Region III on August 6, 1984, that they were withdrawing their potential 50.55(e) since the assessment showed the supports to be structurally sound, functionally adequate, and no hardware modifications resulted from this effort. To substantiate the licensee's position for cancellation, the inspector reviewed the special evaluation report which documented the EA audit effort. The program, methodology, and conclusions were agreed with. This item is considered closed.

- d. (Closed) 50.55(e) Item 115 (341/84-07-EE): "Possible Impingement of Essential Piping During Pipe Break". RIII inspection report 50-341/84-47 addresses the licensee's actions and assessments for the dynamic effects associated with the postulated rupture of piping inside containment. Multiple Dynamics Corporation (MDC) performed a reassessment of the pipe break locations inside containment utilizing the approved Fermi 2 Design Criteria and the NRC criteria BTP-MEB 3-1. MDC's post installation evaluations have adequately indicated that safe shutdown capability of the plant had not been impaired and licensing commitments properly addressed. The inspector concludes that MDC's documentation and program to deal with this matter was found to be satisfactory. This item is considered closed.
- e. (Closed) 50.55(e) Item 130 (341/84-22-EE): "As-Built Deviation for the Main Steam Pipe Deflection Clearance". The licensee documentation dealing with this problem has been reviewed and a plant walkdown of the three modified pipe whip restraints was conducted and found to be acceptable. Also, the cold position gaps between each main steam line and its pipe whip restraint were field verified and found satisfactory. This item is considered closed.

4. Licensee Action on IE Bulletins

- a. (Closed) IE Bulletin 79-14, Revision 1, Revision 2, and Revision 3 (341/79-14-BB, 341/79-14-1B, 341/79-14-2B, 341/79-14-3B): "Seismic Analysis for As-Built Safety-Related Piping Systems". Data for closure of this bulletin is addressed in RIII inspection reports (50-341/84-09, 50-341/84-31, 50-341/84-38, 50-341/84-55) and DECo letters EF2-70229 dated January 8, 1985 and EF2-70381 dated January 31, 1985. Based on the above information this bulletin is considered closed.

- b. (Closed) IE Bulletin 79-07 (341/79-07-BB): "Seismic Stress Analysis of Safety-Related Piping". Licensee has responded to the bulletin. Analyses have been performed, computer programs listings have been provided by the following consultants/vendors:

- . Stone & Webster Michigan, Inc., Cherry Hill
- . Sargent & Lundy Engineers, Chicago
- . General Electric Company, San Jose
- . NUTECH, Inc., San Jose
- . Atomics International, Canoga Park
- . Teledyne Engineering Services, Waltham

Piping computer programs used in seismic analysis have been verified and methods of verification provided. Modal responses due to earthquake motion and spatial components in seismic response analysis were combined using the methods described in Regulatory Guide 1.92, Revision 1. This bulletin is considered closed.

- c. (Open) IE Bulletin 79-02 (341/79-02-BB, 341/79-02-1B, 341/79-02-2B, 341/79-02-3B): "Pipe Support Base Plate Designs using Concrete Expansion Anchor Bolts". RIII inspection report 50-341/84-30 addresses the licensee's program, actions taken and a remaining action item to be completed by the licensee. This action item was to test and inspect 100% all remaining (untested) shell anchors in QA1 large bore supports due to the reject rate of the first group as documented in Daniel International Construction letter DIC81-0851. Only 79 of the original 266 supports still have shell anchors installed, and thus needed testing/inspection. The results of these tests/inspections have been accomplished and are documented on DECo letter FE4-0792.

While performing a field walkdown to sample the remaining shell anchor installations the inspector noted numerous deviations of the minimum anchor bolt spacing and edge distance requirements as outlined in DECo's Project Specification 3071-226, Revision F. The licensee was requested to demonstrate that the subject installed anchor violations are fully QC documented and qualification calculations performed to account for the reduced capacity of the anchors. In addition, the licensee was requested to perform the following actions per a telephone conversation on February 12, 1985 between Region III and Mr. Frank Agosti, Manager/Nuclear Operations:

- . Verify that the as-built reconciliation stress report loads have been accounted for in the reduced capacity anchor qualification calculations.
- . Perform an anchor bolt surveillance walkdown of the drywell area.
- . Compile the 885 Anchor Bolt Surveillance Reports (ABSRs) generated by the Systems Completion Organization and all necessary qualification calculations.

These actions which were agreed to by the licensee will be reviewed during a future inspection.

5. Region III Staff Request for Information

Duke Power Construction Assessment Team items #63, #54, #53, #124, and #21. During the Duke audit, an MT exam was conducted on 7 penetration sleeve to containment shellwelds on the inside of the drywell. Indications were found on 3 penetrations, resulting in one relevant linear indication after grinding. An additional 27 penetrations were either visually and/or MT examined. Five additional penetrations had unacceptable indications, 3 of which had relevant linear indications after blend grinding. All relevant indications were repaired in accordance with ASME Section XI.

It is believed that the defects are a result of the original as-welded condition and not a result of subsequent piping of construction loads. Typical indications were found on spare, non-loaded penetrations. A fracture mechanics analysis was performed to show that the worst case identified would not propagate. The largest indication was found on penetration X-13A.

The defect size was conservatively assumed to be equal to the size of the excavation required to remove the defect. This defect was then superimposed on a sample of 10 drywell penetrations, including the highest stressed. Using the methodology of ASME B&PV Code, Section XI, it was determined that the postulated defects were stable and will not propagate. A minimum factor of safety of 2.25 was calculated.

The inspector visually examined 8 penetration welds, including those used for the Residual Heat Removal System, Main Steam, High Pressure Coolant Injection, and Feedwater. Weld quality in general appeared to be acceptable. This item is considered closed, based on analysis review and weld examination performed by the inspector.

6. Allegation (RIII-84-A-175)

An allegation received by the Fermi 2 Safeteam on August 12, 1983, concerning radiography of reactor internal welds was reported to the NRC Resident Inspector as follows: The NDE contractor was asked to radiograph the field installed Jet Pump Diffuser to Adapter weld on positions #2, #7, #11 and #18. Oversize film was used and a shop tailpipe to diffuser weld was also inadvertently radiographed. Upon developing the film, a decision to trim the unwanted portion was made. The inadvertently radiographed weld showed porosity. The allegor states that the film was trimmed to hide unacceptable welding.

The welds inadvertently radiographed were performed in the shop by General Electric and required a dye penetrant and visual examination only.

The licensee contacted G.E. and were assured that the shop welds met all requirements and that it was inappropriate to impose RT acceptance criterion after the fact. To further assure acceptability of the welds in question, the licensee had the film read and evaluated using ASME Section III-1975. The report states that porosity exists on all views of the welds; however, the porosity is within acceptance standards. The NRC inspector also read the film and verified acceptability.

Investigation substantiated the alleged cutting of the film. Based on the fact that there are no Code requirements prohibiting the trimming of film, licensee action, NRC inspector findings following his examination of the film and Code acceptability of the porosity, this item is considered closed.

7. Potential Concerns with Sargent & Lundy (S&L) Design Practices

An assessment was conducted by S&L into their structural design practices at the Fermi 2 project in the following three areas:

- . Use of the " ϕ " factor in the design of structural steel.
- . Use of the PFRAME (2-D) computer program.
- . Excessive Kl/r ratios for members in compression and excessive l/t ratios of angle sections in bending.

The above evaluations were performed since certain design deficiencies at other sites have shown problems in these areas.

The only applicable deficiency was with cable tray supports whose members Kl/r ratios exceeded AISC requirements of 200 for members subjected to compressive loads. S&L's reevaluation of cable tray supports in the Reactor/Auxiliary buildings found twenty-eight supports requiring modification.

The licensee initiated Engineering Design Package (EDP) 1920 to facilitate and implement the field modifications required to reduce the Kl/r ratio to below 200. The modifications consisted of bolting/welding additional channels/plates to one or two members of each cable tray support. Documentation associated with the licensee's program to repair the existing cases was reviewed and found acceptable. Also a plant walkdown of some of these modifications was conducted and found satisfactory.

S&L's assessment regarding their " ϕ " factor and PFRAME (2-D) computer program usage on the Fermi 2 project have been addressed and discussed in two separate letters from Sargent & Lundy, T. G. Longlais to Region III, J. Muffett dated December 31, 1984. The letters were reviewed and found to be acceptable.

No violations or deviations were identified.

8. High and Moderate Energy Pipe Break Outside Primary Containment

The licensee's program and documents regarding protection of safety-related equipment from the effects of postulated high and moderate energy pipe breaks outside primary containment were reviewed to assure correct implementation to FSAR Appendix C. Subsequent to this review, it was noted that Multiple Dynamics Corporation's (MDC) assessment of pipe break outside containment, contained in MDC report No. DECo 04-519, Revision 1, dated December 1984 has identified certain issues which require licensee action to resolve this matter. The inspector informed the licensee that these issues have to be evaluated and corrective actions taken, if required, prior to exceeding 5% power operation. Pending further review, this matter is identified as an Open Item. (341/84-59-01)

No violations or deviations were identified.

9. Open Items

Open items are matters which have been discussed with the licensee, which will be reviewed further by the inspector, and which involve some action on the part of the NRC or licensee or both. Open Items disclosed during the inspection are discussed in Paragraph 4.c. and 8.

10. Exit Interview

The inspectors met with licensee representatives (denoted in Paragraph 1) at the conclusion of each onsite portion of the inspection and discussed the scope and concerns of this inspection. The inspectors also discussed the likely informational content of the inspection report with regard to documents or processes reviewed by the inspector during the inspection. The licensee did not identify any such documents/processes as proprietary. Additional information was discussed telephonically licensee representative on February 12, 1985.