U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Report No. 50-341/84-50(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, Michigan

Inspection Conducted: October 23-26, 1984

Inspectors: R. Mendez — 11/27/84 Date

Z. Falevits — 11/27/84 Date

A. S. Gautam — 11/27/84 Date

Approved By: C. C. Williams, Chief, Plant Systems Section — 11/27/84 Date

Inspection Summary

Inspection on October 23-26, 1984 (Report No. 50-341/84-50(DRS))
Areas Inspected: Followup of previous inspection findings. Review of instrumentation records, as-built program and electrical design and observation of instrumentation cable terminations. The inspection involved a total of 100 inspector-hours by three NRC inspectors, including 15 inspector-hours during off-shifts.
Results: In the areas inspected, one potential item of noncompliance was identified. Failure to assure that documents, including changes, are reviewed for adequacy - paragraph 4.

DETAILS

1. Persons Contacted

Detroit Edison Company (DECo)

*W. R. Holland, Vice President
*W. Jens, Vice President Nuclear Operations
*F. Agosti, Manager Nuclear Operations
*E. R. Bosetti, Project Engineer, Electrical
*J. W. Nunley, Director Project Design
*S. Zoma, Field Engineer
*S. Martin, Licensing Engineer
*R. S. Lenart, Superintendent, Nuclear Production
*L. P. Bregni, Engineer
*N. Singh, Dielectric Scientist
*J. S. Dudets, Supervising Engineer I&C
*G. M. Trahey, Director NQA
*W. M. Street, Supervising Engineer, Civil
*L. G. Ferguson, Resident Engineer I&C
*A. Gooshian, Superintendent Plant Completion
*P. Acharya, Director
P. A. Hanuscak, Engineer
J. Bunge, Electrical Design, Site Work Leader

*Denotes those who attended the exit meeting on October 26, 1984.

2. Licensee Action on Previous Inspection Findings

a. (Closed) Noncompliance (341/78-10-02): It was previously identified that a non-seismic fire main pipe was installed across Class 1E cable tray systems. A fire main pipe had been observed to be installed without seismically qualified hangers across redundant safety-related cable trays 1P068 (orange division) and 2C095 (blue division). The licensee committed to seismically qualify a 4" fire protection line over those portions of cable trays in question. The initial QC inspection performed on the hangers identified unacceptable findings in which two adjoining hangers did not have adequate seismic clearances. The seismic clearance problem was subsequently documented on Documentation Deficiency Notice (DDN) and closed on October 4, 1984. The inspector observed that the clearance problem was corrected and found the hanger installations to be in accordance with the applicable drawings. This item is considered closed.

b. (Closed) Open Item (341/81-10-07): This Safety Evaluation Report (SER) item required that electrical penetration assemblies be designed to withstand the maximum available fault current versus time conditions given failures of circuit overload protective devices. It was required that redundant and independent fault current protective devices be provided on each circuit which penetrates the containment and to document the maximum fault current versus time characteristics the penetration conductors can withstand

without affecting containment integrity. For low-energy penetrations no backup protection was required since the maximum fault current does not approach the time current characteristics (I^2t) of the penetration conductor. Backup protection was to be provided by one of the two following methods for the rest of the penetrations:

- If adequate backup protection can be obtained from the feeder position and the fault can be cleared in sufficient time to prevent reaching the I^2t of the penetration conductor - no additional redundant protective devices would be necessary.

- Where the feeder position cannot provide adequate clearing time, an additional protective device would be provided.

The licensee performed calculations and developed acceptance criteria to determine whether the conductors in the Conax electrical penetrations had adequate fault current protection and whether additional protection was required. Assumptions, criteria and results of the backup protection analyses are documented on Design Calculation approval sheets DC Number 535, and DC Number 988, both dated September 2, 1982. Analyses were provided for the following types of penetrations:

(1) Medium Voltage Penetrations

(a) Reactor recirculation pump
(b) Weld service receptacles
(c) Drywell platform ground

(2) Low Voltage Power Penetrations

(a) Continuous duty motors
(b) Intermittent duty motors
(c) Reactor recirculation pump motor heaters
(d) Detector drive motors
(e) Drywell cooling fan heaters
(f) Under reactor vessel equipment handling platform receptacles
(g) Lighting circuits

(3) Low Voltage Switching Penetrations

(a) 24V DC alarm circuits
(b) 24V AC circuits
(c) 120V AC circuits
(d) 130V DC circuits

(4) Control Rod Drive

(5) Low Level Signal

(6) Thermocouples

(7) Neutron Monitoring Instrumentation

(8) Torus-Thermocouples

(9) Airlock - Low Voltage Switching

Results of the analyses are documented on Design Calculation Approval Sheet DC Number 988. The licensee analyzed for maximum fault current versus time and the worst case fault heating time for each penetration and compared these against the clearing times of the protective devices. Additionally the licensee provided single line diagrams and the time current characteristics together with the allowable fault current curves for the particular Conax conductors.

As a result of the analyses, the licensee determined that in most instances adequate backup protection had already been provided through breakers, relays, fuses, and in some cases the fault levels could not reach the I^2t of the conductor and therefore no additional protection was required. However, it was determined that normal backup protection for 480V motors, which consisted of air circuit breakers in 480V switchgear feeding motor control centers were not adequate. The licensee concluded that given the time current characteristics of all these switchgear breakers, they would not be able to provide the necessary backup protection to maintain the mechanical integrity of the penetration assembly.

Consequently, additional protection was also required for low voltage power continuous duty motors, intermittent duty motors and reactor recirculation pump motor heaters. Also requiring additional protection were: drywell cooling fan heaters (120V), under reactor vessel equipment handling platform receptacles, 130V DC circuits and the torus-low voltage switching circuits which carry 24V DC signals. All circuits requiring additional protection were either #12 or #4 penetration conductors, for #12 penetration conductors, 20 amp fuses were to be provided and for #4 conductors, 60 amp fuses were required.

The design calculations, acceptance criteria and basis for sizing the backup protective devices appeared acceptable as documented in Design Calculation reports DC numbers 535 and 988. However, verification of the proper protective devices in each circuit were not verified by the inspectors. This issue was previously addressed in item of noncompliance 84-17-01B which identified several circuits containing the wrong size protective devices. The licensee has committed to performing a 100% verification of the proper fuse size for all safety related circuits and those non-class 1E circuits which penetrate the containment. This issue is considered closed since verification of the protective devices will also result in addressing item of noncompliance 84-17-01B.

c. (Open) Unresolved item (50-341/81-12-02): This item addressed the cross over of various BOP cables from a common BOP tray to two redundant divisional trays, although, no same BOP cable crosses over to both redundant divisional trays. It was postulated that an

electrical fault in the common BOP tray could be transmitted through the cross over BOP cables, to cause a loss of power and redundant safety functions among the division cables.

The licensee analysed and documented in report EF2-72796, dated September 4, 1984, all cables in question and prepared a list of the cross over BOP cables and the protective devices justifying their cross overs. A total of 8 groups of cables were identified (Groups A, B, C, D, E, F, G and H) with a total of 215 cables.

Group A cables were for control circuits and were shown to have 5A to 20A fuses. This protection appears adequate.

Group F cables are also used for control circuits but are listed as spares with no protective devices. The licensee was asked to justify future inadvertent use of these cables without any protective devices.

Remaining Groups B, C, D, E, G and H carry low voltage cables without any apparent fusing. These cable functions include output of transducers, thermocouples or resistive temperature devices, plant sequence recorder/annunicator system, plant process computer, and operating voltage to the fire alarm bells in the RHR complex. The operating voltages in these cables range from 100 mV to 28V. The licensee was asked to confirm maximum voltage and current in these cables under worst case conditions.

IEEE 384 paragraph 4.5 requires associated circuits to remain with or be separated the same as those class 1E circuits with which they are associated. A second alternative allows isolation devices to be installed in the part of the associated circuit running from the class 1E equipment to and including the isolation device. However, it must not become associated with cables of another class 1E system.

A third alternative is to demonstrate by analysis or testing that the class 1E circuits are not degraded below an acceptable level. This third alternative shall be further reviewed with the licensee. Pending further review, this item remains unresolved.

d. (Closed) Open Item (341/81-17-01): This item concerns procedures for testing operability of interlocks on reactor pressure isolation valves in the RHR system. It also relates to SER 7.4.2 which states that acceptable procedures for testing interlocks of pressure isolation valves during plant operation must be provided to make the Fermi 2 design an acceptable alternative to the recommendation in the Instrumentation and Control System Branch (ICSB), Technical Position ICSB-3 (NUREG-75/087) for diverse pressure sensors to the interlocks.

(1) The inspector reviewed Instrument and Control (I&C) procedure - surveillance 44.020.301, Revision 1, dated October 11, 1984, titled, NSSS-Reactor Pressure-Shutdown Cooling Isolation

Permissive, Division I Functional Test (B31-N611A) and procedure 44.020.302, Revision 1, dated October 11, 1984, for Division II instruments (B31-N611B).

The purpose of this procedure is to satisfy the once per 31 days testing requirements of Fermi 2 Technical Specification 4.3.2.1, table 4.3.2.1-1, Item 5.b by verifying thru a functional test that when an abnormal reactor steam dome pressure is sensed, the appropriate contacts in the shutdown and head spray valve control logic are actuated.

The inspector reviewed the actual test data obtained by the licensee during a control logic test. The inspector reviewed loop A functional logic and schematic diagrams and step by step review of interlocks associated with Division I trip unit B31-N611A. The control logic appears to achieve the intent of the procedures except for some minor typographical errors, the procedures and the test results reviewed appear to be adequate.

(2) The inspector reviewed procedures 44.020.303 and 44.020.304 both revision 1, dated October 18, 1984, whose purpose is to satisfy the once per 18 months testing requirements of Fermi 2 Technical Specification 4.3.2.1, table 4.3.2.1-1, Item 5.b by verifying the calibration of the Reactor Pressure Master Trip Units B31-N611A and B and Transmitters B31-N111A and B.

The following drawings and documents were reviewed to determine the adequacy of the control logic and functional interlocks.

(a) Technical Specification 3/4.6.3 (Primary Containment Isolation Valves Limited Condition for Operation) Table 3.6.3-1.

(b)

Schematic Diagram	Revision	Title
6I721-2205-2	"J"	RHR Relay logic "A" Circuit-Part 1
6I721-2205-5	"J"	RHR Relay logic "B" Circuit-Part 1
6I721-2201-5	"J"	Reactor Recirculation Extractor to RHR Outboard Valve E1150-F008
6I721-2201-12	"G"	Reactor Recirculation Extractor Isolation to RHR Valve E1150-F009
6I721-2201-16	"E"	Head Spray Outboard Isolation Valve and RHR extractor to VLV E1150-F023
6I721-2201-15	"J"	Head Spray Inboard Isolation Valve and RHR Extractor to Equipment Drain Valve E1150-F022

(c) P&I diagram 6M721-2083, Revision "R" - Residual Heat Removal, Division II.

No deficiencies were identified in the areas inspected.

These issues are considered closed.

e. (Open) Noncompliance (341/82-10-13): It was previously identified that field modifications were not being reviewed with regard to the effects of seismic qualifications. The modifications involved replacing motor connection boxes and installing site fabricated cable supports on top of safety related cabinets. These changes however, were not subject to design control measures commensurate with those applied to the original design. A subsequent design review performed by the licensee indicates that qualification of the motors is maintained if the boxes are mounted properly and if the same hardware and mounting arrangements of the original boxes were used. As-built verification of the motor connection boxes and cable support mounting could not be accomplished during this inspection and will be followed up in a subsequent inspection.

f. (Closed) Unresolved Item (341/84-14-03): Pertained to missing documentation for the installation of valves V13-2322 and V13-2396. This issue was escalated to an item of noncompliance in report 84-17 and is closed as an unresolved item.

g. (Closed) Unresolved item (341/84-17-04): This item addressed two divisional cables, 232042-2C and 232035-1C, entering the same panel H11-P611 in the relay room and run bundled together until they were terminated to their respected terminal blocks.

A review was performed by the licensee to verify if these cables were redundant. The following schematic and wiring drawings were reviewed to establish cable functions and their redundant cables:

6I721-2095-15, Revision G
6I721-2095-13, Revision G
6I721-2095-14, Revision F
6I721-2095-33, Revision I
6I721-2095-13A, Revision O
6I721-2045-14, Revision L
6I721-2045-16, Revision N
6I721-2045-19, Revision K
6I721-2045-21, Revision L
6I721-2055-10, Revision F
6I721-2055-1, Revision H
6I721-2001-15, Revision H
6I721-2105-10, Revision E
6I721-2265-3, Revision F
6M721-2833, Revision K

The following observations were made:

Cable 232042-2C: Installed in conduit NA019-1C. Function-RPS power indication circuit for scram groups 3 and 4. Gives indication to the operator on control panel H11-P603C522 (Drawing 6I721-2155-10). The respective redundant cable is 232041-1C.

Cable 232035-1C: Installed in conduit NA024-2C.
Function - Logic circuit for following systems.
(2 wires) - RHR inboard isolation valve E11-F022
(8 wires) - Main Steam Supply Shutoff System trip systems A and B;
Drywell High Pressure, Reactor Water Level 3 (2 wires);
Main Steam Line High Radiation, High Flow, High Temperature or Low Pressure (2 wires);
Reactor Water Sample Inboard Isolation Valve G33-F019 (2 wires);
Reactor Water Level Cleanup Isolation Valve G3352F1 (2 wires).
The cable which provides the redundant function is identified as 232033-2C.

Based on the above review it was concluded that cables 232042-2C and 232035-1C were not redundant. A further review was performed to verify that their respective redundant cables 232041-1C and 232033-2C were routed with adequate separation to perform their redundant functions. This item is closed.

h. (Closed) Unresolved item (341/84-17-06): This item addressed the qualification of electrical equipment and instrumentation to class 1E requirements. This issue resulted from an NRC review on May 29 thru June 29, 1984, documented on report numbers 50-341/84-17. During that review equipment supplied by three suppliers was selected to verify equipment qualification to Class 1E (IEEE 323) requirements.

One supplier, General Electric, maintained all its documentation at San Jose, in accordance with NEDO-11209 (Class 1)-04A. The NRC inspector was concerned that since the licensee had no conclusive audits verifying GE performing "in process inspections" and documentation of testing done by GE's sub tier suppliers, instrumentations systems supplied by GE may not meet Class 1E qualification requirements.

The inspector identified specific instrumentation (report 50-341/84-17) to the licensee and requested qualification records be requested to be available at GE, in the event the NRC decided to audit GE.

Following this request, the licensee sent an audit team to the GE San Jose office to verify that adequate documentation existed. In their conclusions, the licensee observed that GE did not specify requirements for individual control, equipment or equipment loop performance to GE's subvendors, nor did GE require specific reports from its subvendors documenting the selection process of each instrument. However the licensee found that ample test results were available to verify the specified engineering parameters of the GE purchased instruments. The licensee also reported that ample test results were available validating the performance of equipment, such as the HPCI turbine, which apparently validated the engineering

parameters of its control components. Thus, even though the specific instrumentation identified by NRC could not be verified, credit was taken for the qualification testing reviewed for the Terry (the manufacturer) turbine HPCI flow control.

Review by licensee, for quality assurance, in process inspections, and quality reviews by GE, revealed that documentation was not easily accessible for specific instruments and components. However, GE source inspections were confirmed for the major components.

Based on the results of the engineering audit performed by Detroit Edison I&C and QA staff from October 9 through October 11, 1984. The documents that the licensee examined and relied on for their conclusion were examined in part by the Region III staff. This item is closed.

i. (Open) Unresolved item (341/84-35-02): This item concerned discrepancies in the insulation and jacket thickness values of cables and missing performance test data. During a previous inspection, the air pressure heat aging test was apparently not performed for Okonite cables supplied with Receipt Inspection Report (RIR) 7-2-80-3. Okonite traced back through its records and confirmed that the heat aging test was conducted for the cables. The inspector reviewed a corrected copy of the test report submitted by Okonite, and the report appeared to be acceptable. Additionally, a review by the licensee of test reports associated with Okonite cables in the period from 1979 to 1981 revealed that heat aging test data was missing in five other cases. Okonite was contacted and has submitted the corrected test reports which contained the missing data. With respect to the Rockbestos cables received on RIR 4-19-79-3, the measured insulation and jacket thickness values were listed as being below the minimum acceptance value. This particular issue appears to be resolved, since the test reports erroneously listed both minimum and maximum insulation and jacket thicknesses. Further, the cable manufacturer has stated that the insulation wall thickness is calculated to be 90% of the specified nominal insulation wall thickness and the minimum wall thickness is calculated to be 80% of the specified nominal jacket wall thickness. However, some test reports reviewed during this inspection indicate that corrected insulation and jacket thickness values of some cables were derived from the total outer diameter of the cable and not measured directly to determine the actual thickness. This matter remains open pending review of selected cables to determine their actual thickness.

3. Functional Areas Inspected

a. Review of Instrumentation Records (Module 252056B)

Eighteen traveler packages were reviewed for documentation recording the installation of instrumentation racks H21-P005 and H21-P021 and their associated instruments, valves and fittings. Evaluation of documents included the following areas.

- Preparation, review and maintenance of records
- Records to reflect work accomplishment in accordance with 10 CFR 50, Appendix B, Criterion XVII
- References of any nonconforming conditions and their controlling documents

The following traveler packages were reviewed:

Instrument rack H21-P005 - Traveler Submittal Numbers:

39402, Revision 0
39586, Revision 0
39137, Revision 1
39962, Revision 0
131029, Revision 0
68973, Revision 0
68011, Revision A
68694, Revision 0
68013, Revision A
68693, Revision 0

Instrument rack H21-P021, Traveler Submittal Numbers:

69325, Revision 1
80248, Revision 0
130554, Revision 0
68684, Revision 1
68707, Revision 1
68006, Revision 0
40247, Revision 0
39353, Revision 0

Significant documentation reviewed included:

Operation process travelers listing activities to be performed, acceptance criteria, responsible inspectors and QC hold points for installation of the instrument racks.

Weld process and Bill of Material, drawing 6WI-E117019-4, Revision C, listing weld process requirements, filler material, pre weld requirements, welder identifications and sign off, authorized inspectors and hold points. Also, as a result of design changes weld filler material issue sheets were verified for traceability to the traveler packages.

Operation process traveler 68211-3 and associated instrumentation weld data sheet for welds on tubing lines E11-L417B and L418B shown on isometric drawing 6WI-E11-7019-1, Revision C.

Deviation disposition request (DDR) #6178 dated May 5, 1984, outlining deviations and rework on various instrumentation racks including H21-P005 and H21-P021.

During this review it was observed that the QC inspectors signature and dates were only recorded on activities listed on the operation traveler having QC hold points. Wismer and Becker (W&B) procedure WB-E-109, Revision 19 section 3.2, on the preparation of traveler packages, required the project quality manager to be responsible for approving the traveler package, "for adequacy of content, establish hold points, and verify all work performed".

The lack of QC acceptance on activities not having hold points was questioned by the NRC as an indication that all work was not being verified. The W&B project manager, Mr. Dave Jamtosik, reported that all work was in fact verified and this was indicated by a QC signoff for the activity, "Final installation acceptance" on each traveler. The NRC inspector reviewed all travelers for this activity and found them satisfactorily completed.

No deficiencies were identified in these areas.

b. Observation of Instrument Cable Terminations (Module 252063B)

Five instrument cables were reviewed for terminations. Areas reviewed included:

Material used: size, type, and rating.
Material identification cable tags, wire markers, and wire color codes. Installation as per schematic, wiring drawings and pull cards for locations, termination points, workmanship and separation (IEEE 384, FSAR).

The following cables were reviewed:

214494-2C 2/C #12 AWG, 600V rating, light blue jacket, Division 2, from termination cabinet H11-P820 terminal block (TB) C 70 and 71 (black and white), to instrument rack H21-P021 TB AA 10 and 11 (black and white), schematic drawing 6I721-2201-11, Revision F.

232609-2K: 4/C #16 shielded pairs, 600V, light blue jacket, Division 2, from RHR channel R rack H21-P021 TB AA 2, 1, 4, 3 and 7 (black, white, red and green), to conductivity cell E11-N0018 pigtails (black, white, red and green), schematic drawing 6I721-2205-9, Revision I and FMR 7013, Revision A.

234759-2C: 2/C #12 AWG, 600V, light blue jacket, division 2 from outboard valve relay cabinet H11-P623 TB AA 30 and 31 (black and white) to RHR Channel B rack H21-P021 TB CC 16 and 17. (black and white), schematic drawing 6I721-2205-17, Revision K.

232605-2K: 2/C #16 shielded twisted cable, light blue jacket, from instrument rack H11-P612 TB BB 13, 14, 15 (black, white and shielded) to RHR channel B rack H21-P021, TB DD 13 and 14 (black and white), schematic drawing 6I721-2205-9, Revision 1.

232606-2K: 2C #16 shielded twisted cable, light blue jacket. From instrument rack H11-P612 TB BB 16, 17 and 18 (black, white and shielded), to instrument rack H21-P021 TB DD 10 and 11 (black and white), schematic drawing 6I721-2205-9, Revision 1.

During this review it was observed that terminal strips identifying terminal blocks were missing in the terminal box on H21-P021. The inspector reviewed a program being implemented by the licensee, where terminal boxes, distribution panels and cabinets were being checked for internal and external component damage, identification, and mounting, as well as other activities. The inspector reviewed one example of this program PN21-568617 for terminal box H21-P528 and found no discrepancies.

No deficiencies were observed in these areas.

4. Review of the As Built Program (Module 37051B)

The purpose of this NRC review of the licensee's as built program was to verify that a program was being implemented, to prepare and provide as-built drawings and related documentation, in a timely manner, to plant operations and maintenance. These drawings should accurately reflect the actual plant design, for the safe operation of the plant.

Implementation of the licensee's as built program was reviewed to determine component installation of instrumentation racks and their associated instruments, valves, tubing, and supports. The review included:

a. Two tubing lines FTL-L417B and FTH-L418B, RHR discharge header flow from rack H21-P021 to flow element FEE11-N014B, were reviewed by the inspector against as built isometric drawing 6WI-E11-7019-1, Revision F, for size, routing, supports, dimensions and separation. No discrepancies were found in regard to as built conditions shown on the isometric.

b. Instrument racks H21-P021 Elevation 562' and H21-P005, Elevation 613'6" were randomly selected and reviewed in the field against the latest as built drawings 6I721-2281-19, Revision J and 6I721-2281-5, Revision H respectively. Each of these drawings encompassed two GE drawings, one showing the rack arrangement while the other indicating tubing runs and connections to instruments. Both drawings had part lists, identification tables for rack components, and tables showing tubing connections to instruments and other components.

The following discrepancies were found in regard to as built conditions shown on general arrangement drawings 6I721-2281-19 Revision J and 6I721-2281-5, Revision H.

(1) Twelve discrepancies were identified between catalog numbers and quantities of items listed on drawings and the actual installed parts reviewed in the field. The discrepancies are described below:

(a) Rack H21-P021, Drawing 6I721-2281-19 Revision J

Item 120: Drawing required catalog number 158B7183P002
Field actual installed catalog number 63053MT

Item 122: Drawing required catalog number 159C4621P007
Field actual installed catalog number 670356FDT

Item 123: Drawing required catalog number 159C4621P002
Field actual installed catalog number 670356FDT

Similar deficiencies were identified for items 105, 106, 107, 109, 110, 131.

(b) Rack H21-P005, Drawing 6I721-2281-5 Revision H

Item 105: Drawing required catalog number 670N-5-5-75W6-D
Field actual installed catalog number 670N557W6

Item 109: Drawing required catalog number 670N-0-5-6-D
Field actual installed catalog number 670N356

Item 108: Quantity listed on drawing (10)
Quantity found in field (12)

The inspector was also concerned that discrepancies in the catalog numbers could inadvertently lead to replacement of items with unqualified parts during maintenance.

(2) Eight discrepancies were found in the identification of instruments, valves and tubing including missing identification tags of instruments and tubing actually installed in the field. Discrepancies are described below:

Rack H21-P021, Drawing 6I721-2281-19 Revision J

Item 400: Drawing identification - RHR CHB, Rack H21-P021, ESSII
Field Identification - H21-P021, RHR System 1B, Division II

Item 105: Drawing identification - 05
Correct identification - 105

Item 416: Drawing did not designate name tag data or instrument location for rack H21-P021. Identification tags were found missing in the field for the following instruments - Item Nos. 413, 415, 417; and on tubing lines A13 and A12.

(3) Six discrepancies were identified in tubing locations and connections shown on the above drawings, including a missing tubing section. Discrepancies are described below:

(a) Rack H21-P021, Drawing 6I721-2281-19 Revision J

Drawing shows tubing A6 entering the rack while A6 was found deleted in the field. Tubing lines A1 and A3 were listed on drawing as feeding instruments E11R002B and E11R002D, respectively. These tubing lines were found abandoned in the field.

Tubing lines A1 and A5 were shown on the drawing as entering the rack. Field installation shows lines capped and disconnected. This was not reflected on the drawing.

(b) Rack H21-P005, Drawing 6I721-2281-5 Revision H

Detail No. 1 of above drawing shows a 3/8" tubing section running from the existing valve to the next available fitting. Review in the field identified this tubing section to be missing.

(4) Seven discrepancies were identified in the instrument locations shown on the drawings and the field instrument locations reviewed in the field. These discrepancies included missing instruments and parts. The discrepancies are described below:

(a) Rack H21-P021, Drawing 6I721-2281-19 Revision J

Drawing calls for four (4) item 117, "Quick Connects" connected to the end of tubing sections. Review in field observed these items to be missing.

(b) Rack P005, Drawing 6I721-2281-5 Revision H

Items 400, 401 and 108, Drawing locations in the rack did not match field installed locations.

The licensee was informed that the numerous discrepancies, identified in paragraph 4. above, indicates the licensee's failure to take measures to assure that as built documents, including changes, are reviewed for adequacy, and is an item of noncompliance in accordance with 10 CFR 50, Appendix B, Criterion VI (341/84-50-01).

5. Followup on Regional Project Request

The inspector reviewed Duke Power CAT finding #66. This finding deals with missing valve actuators brake information on the DECo generated valve electrical schematic diagrams.

The inspector interviewed two electrical maintenance engineers who indicated that if a brake fails, the whole valve will need to be replaced. Additionally, the maintenance engineers stated that there are no specific requirements to service or test these brakes, since they are internally connected and are part of the valve internal to the motor.

The inspector reviewed Limitorque Corporation drawing 1S-477-4533-3 that contained a schematic diagram of valve V8-3531 showing the motor brake wired internally to points T7 and T8 of the valve motor. Review of Environmental Qualification document F2E-84-0022 dated August 13, 1984, and Purchase Specification No. 3071-012-PUR-118 dated September 28, 1984, indicates that all safety related electrical motor brakes located in a harsh environment will be replaced with mechanical brakes that are environmentally qualified for post-accident operation.

The licensee stated the following reasons for not showing the motor brakes on the electrical schematics:

- Does not change the power feed sizing requirements
- Does not affect sizing of the thermal overloads
- Does not affect sizing of the power fusing
- Does not affect the electrical testing requirements

It appears that no safety impact could be realized on maintenance or operation of the plant, due to the fact that motor brakes are not shown on schematic diagrams.

No deficiencies were identified in this area.

6. Independent Inspection

a. Design Review

(1) The inspector reviewed Design Instruction (DI) No. 50, Revision F, relating to sizing of wire and cable for control and power feeds. Table 1 of DI-50, specifies ampacities of EF-Hypalon or EP-Neoprene insulated cable, which do not conform to FSAR Table 8.3-1 specifications. This matter was discussed with the licensee's engineering staff but could not be resolved since the licensee could not explain why the design calculations differed from the FSAR. This matter will remain open pending licensee response (341/84-50-02).

(2) The inspectors reviewed the control logic and outgoing electrical interlocks of Reactor Recirculation Extractor Isolation to RHR valve E1150-F009, shown on schematic diagram drawing 6I721-2201-12 Revision "G". It was observed that limit switch #8 of valve E1150-F009 interlocks into RHR relay logic "A" (relay K63A) which interlocks into Division I RHR loop "A" Recirculation Inboard Isolation valve E1150-F015A. Similarly, limit switch #16 mounted on valve E1150-F009, interlocks into RHR relay logic "B" (relay K63B) which interlock into Division II RHR loop "B" recirculation inboard isolation valve E1150-F015B. It should be noted that identical logic also applies to valve E1150-F008.

The inspector expressed the concern that both loop A and B valves E1150-F015A and E1150-F015B are actuated thru permissive limit switch contacts from valve E1150-F009. Malfunction of

E1150-F009 limit switches will compromise the operation of both valves E1150-F015A and E1150-F015B which are redundant to each other. Similarly, malfunction of the limit switches mounted on valve E1150-F008 will also compromise redundant loop A and B valves. Pending further review by the licensee and by the NRC inspector this item remains open (341/84-50-03).

b. Review of Stop Valve Limit Switch Inputs

During a previous inspection in May 1984, the inspector identified a separation violation relating to the turbine stop valve limit switch inputs into the four RPS scram channels A1, A2, B1, B2 reported in detail in inspection report 341/84-17. Fermi specification 3071-33, Revision "R" page 115 and the FSAR require that redundant RPS protective scram channels be separated, specifically A1 be separated from A2 and B2 and that B1 be separated from A2 and B2. IEEE 279-1971 states that "Channels that provide signals for the protective functions shall be independent and physically separated to accomplish decoupling of the effects of...electrical transients...and to reduce the likelihood of interaction between channels...."

Contrary to the above requirements the inspector observed that channels A1 and B2 cables are routed into turbine stop valve #2 limit switch, and channels B1 and A2 are routed into stop valve #3 limit switch. Within the limit switch itself the redundant channels are within a 1/4" of each other.

This matter was subsequently discussed between Region III and the licensee. During the first week of October while on a routine inspection, the licensee presented the inspector with an analysis written by GE dated July 27, 1984, addressing this concern. Review of the analysis by the NRC inspector and a phone conversation on October 30, 1984, between Region III staff and licensees management and engineering staff resulted in the following inspectors concerns that need further review:

(1) A short across both contacts could tie RPS trip system "A" power to RPS trip system "B" power. The GE analysis states that this will likely result in the protective function of the RPS.

(2) Could any unforeseen scenario, not assumed in the GE analysis, compromise a scram?

Pending licensee review and action in this matter, this item will remain unresolved (341/84-50-04).

c. Observation of Testable Check Valve Indication

During a review of a previous inspection finding (84-07-01), the inspector observed additional problems not addressed by the original concern. This issue involved lack of indications on testable check valves C41-F006 and C41-F007 during the preoperational test of the Standby Liquid Control System to verify flow and Squib Valve actuation (Pret. C4100.001).

(1) The inspectors identified the following deficiencies regarding check valves during a walkdown inside and outside the drywell and review of control room valve indication status.

(a) Valve C41-F007

1 Limit switch retainer spring missing
2 Limit switch retainer spring off
3 Bent QA Level I stainless steel actuator supply air tubing (approximately 10' needed to be replaced)
4 Protective cover missing

(b) Valve C41-F006

1 Control room indication of the actuator was observed to be both in the open (R) and closed (G) position and closed (G) disc position which may indicate mid-position of the valve. The correct position should have been close position of the valve, i.e. close actuator (G) and close disc (G) only.
2 Test Pushbutton S3 installed upside-down in MCB Panel H11-P603.
3 Protective covers for the valves were found missing.

(c) Valve G33-F121

1 A bucket was observed hanging from the limit switch Disc stem.
2 Control room indication indicating open actuator (R), close actuator (G), and close Disc (G), indicating mid-position (should have indicated close actuator and close Disc only, indicating closed position).

(d) Valve G33-F120

Control room indication same as item (c)2 above.

(e) Valve E11-F050B

1 Control room indication same as item (c)2 above.
2 Protective covers not installed.

(f) Valve B21-F076A

Control room indication same as item (c)2 above.

(g) Valve E21-F006A

1 A broken flex conduit was observed connected to the limit switch.

2 A scaffold support cable was found pressing against the stainless steel actuator [illegible] tubing.

(2) Review of test and calibration sheets for above valves indicated that some had been recalibrated four and five times within the last six months. Discussion with the test engineers on these systems indicated that some valves have been found with limit switches out of calibration due to the way they were manufactured, and due to the fact that existing covers are removed and craftsmen had stepped on these limit switches.

During this review the inspector reviewed letter SU-84-1193, describing the licensee's disposition of Duke CAT finding #165, indicating that pilot solenoid valve C41-F007 stuck in the open position during operation (equipment malfunction). The licensee's disposition cited this as an isolated case.

On October 26, 1984, the licensee presented the inspector with startup letter SU-84-1673 dated October 26, 1984, stating that the necessary paper work to resolve identified discrepancies have been generated. Open item 84-07-01 remains open pending NRC resident inspector review. Pending licensee corrective action and NRC review, the above items 6.C.(1) and 6.C.(2) will remain unresolved (341/84-50-05).

7. 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 Paragraphs 6.a.(1) and 6.a.(2).

8. Unresolved Items

Unresolved items are matters about which more information is required in order to ascertain whether they are acceptable items, items of noncompliance or deviations. Unresolved items disclosed during the inspection are discussed in Paragraphs 6.b. and 6.c.

9. Exit Interview

The inspectors met with the licensee's representatives (denoted in paragraph 1) on October 26, 1984, and summarized the scope and findings of the inspection. The applicant acknowledged the statements made by the inspectors and agreed to take corrective action on all of the outstanding items of concern.