

U. S. ATOMIC ENERGY COMMISSION
REGION I
DIVISION OF COMPLIANCE

Report of Inspection

CO Report No. 289/71-2

Licensee: Metropolitan Edison Company (Met. Ed.)
Three Mile Island Unit No. 1
License No. CPPR-40
Category A

Date of Inspection: April 5 - 8, 1971

Date of Previous Inspection: January 18 and 19, 1971

Inspected by: *D. M. Hunnicutt (for)* 4-29-71
D. M. Hunnicutt, Reactor Inspector (Principal) Date

E. M. Howard 4-29-71
E. M. Howard, Senior Reactor Inspector Date

J. H. Tillou 4-29-71
J. H. Tillou, Reactor Inspector (Construction) Date

Wm. M. Hayward 29 April 71
W. M. Hayward, Reactor Inspector (Construction) Date

Reviewed by: *E. M. Howard* 4-29-71
E. M. Howard, Senior Reactor Inspector Date

Proprietary Information: None

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SCOPE

A routine, unannounced inspection was made of Unit No. 1, one of the two 2535 Mw pressurized water reactors (B&W) under construction on Three Mile Island, near Middletown, Pennsylvania. The inspection effort was directed toward an appraisal of the performance of the licensee-contractor effort of various items listed in 3800/2 and included an inspection of Attachment F - Reactor Coolant Pressure Boundary Piping, Attachment G - Other Class I Piping, Attachment H - Instrumentation, Attachment I - Electrical, and a review of outstanding items from previous inspections.

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SUMMARY

Safety Items - None

Nonconformance Items

1. Gilbert Associates, Inc., drawing S-211-002 states in part, "The computer will select the path between the beginning and end trays and will print the route on the computer circuit routing summary and the pull slips. The intermediate locations (path between the beginning and end trays) is not in all cases provided on the computer routing summary and the pull slips."
2. Two redundant 480 volt power centers were found to be approximately five feet apart with no separating barrier as required by the FSAR.

A CDN was issued on April 20, 1971 to cover these two deficiencies.

Other Significant Items

1. Core Flooding Tanks

Met-Ed has rejected both of the Core Flooding Tanks originally fabricated for installation in Unit No. 1. Both of these tanks failed to meet the NDTI requirement for unrestricted service at $\leq 40^{\circ}$ F and 60° F as required in Volume 3, Section 6 of the FSAR. The two core flooding tanks scheduled for Unit No. 2 appear to meet these requirements and are scheduled to be installed in Unit No. 1 in late 1971. (See Section H.)

2. Insulation Studs on Primary System Components

No procedures have been prepared nor have any quality control processes or surveillance plans been developed for use during installation of the studs to be used to secure insulation onto the exterior surfaces of the steam generators and the pressurizer. (See Section I.2)

3. Quality control procedures relative to confirmation that the specified cable has been issued and installed have not been developed. (See Section M.)
4. The stated commitments in the FSAR relative to physical separation of wireways and conduits does not appear to be adequately controlled. (See Section M.)
5. Procedures require that each equipment ground bond be checked between the ground grid and the equipment or structure to which the terminal lug is attached, and that all field assemblies, bolted connections and welded connections be checked and/or tested for physical and/or electrical continuity. Procedures to provide qualitative evidence have not been prepared. (See Section M.)

6. Procedures for color coding of cable and cable trays, which are an FSAR commitment, have not yet been developed. (See Section M.)
7. Procedures have not been prepared describing the minimum frequency at which cable trays are to be numbered or the frequency of recurrence of color coding. (See Section M.)
8. The UE&C draft checklist does not provide for verification that the design objective physical fill of the cable trays has not been exceeded. (See Section M.)

Status of Previously Reported Problems

1. "Certificate of Conformance" for individual items in lieu of certifications, which will be issued upon completion of the contract by Grinnell Company has not been resolved. (See Section C.)
2. Inspection and evaluations of the damage to three reactor vessel nozzles which were marred during transit has not been completed. This item is not considered resolved. (See Section D.)
3. One core sample has been compression tested and one core sample has been tensile pulled in an effort to determine the concrete strength and bonding along the joint between cured concrete and concrete poured, when the measured surface temperature of the surfaces to be in contact with newly placed concrete was below 32° F. Apparently, Met-Ed has no plans to take additional samples for evaluation and/or comparison or to perform additional tests on these samples. (See Section F.)
4. Met-Ed will use grease (NO-OX-ID manufactured by the W. R. Grace Company) instead of grout for the tendon sheathing fill. This item is considered resolved. (See Section G.)

Management Interview

The management interview was held in the corporate offices in Reading, Pennsylvania with Messrs. J. C. Miller, George Bierman, Earl Allen, M. J. Stromberg, H. I. Stewart and J. L. C. Bachoffer, Jr. on April 8, 1971.

Mr. Miller stated that there was an apparent misunderstanding on his part as to the organizational structure in the Division of Compliance and requested that the organization be explained. The inspectors gave a blackboard presentation to the group.

The inspectors stated that the Division of Compliance did make unannounced inspections of licensed facilities, since QC procedures, work performance techniques and documentation should be implemented in order to obtain a quality product rather than to be prepared solely for AEC review. Mr. Miller was told that the AEC had revised their inspection plans several times in order to accommodate General Public Utilities, the parent organization of Metropolitan

Edison, in the QA re-inspection of Forked River, and further the planned inspection dates are changed due to a need for personnel for a specific and unplanned inspection.

The inspector stated that the Construction Deficiency Notice was not intended to "point a finger", but rather to provide the licensee with an opportunity to respond in writing concerning the corrective action or justify their position. It was further pointed out that a nonconformance item, unless corrected, would be written as a CDN without any distinction as to who discovered the nonconformance.

Mr. Miller stated that Metropolitan Edison intended to meet their commitments. The inspector responded that the inspection effort on the part of Compliance coincides with this expressed intent.

Mr. Miller was told that he should feel free to contact anyone in the Division of Compliance, if an area of concern should arise, which he feels has not been satisfactorily resolved by the Compliance inspectors. He was also informed that the assigned inspector and the senior would be available for discussions.

The items which were found deficient during the inspection were discussed. Mr. Miller was informed that the concrete problem in the fuel handling building would be forwarded to Compliance Headquarters for additional review and action, if considered necessary. Mr. Miller asked if DRL was aware of the problem. The inspector stated that Mr. Ross had contacted him concerning the problem after reading our previous report. Mr. Miller wanted to know what action he could take to get early resolution. The inspectors stated that if DRL was not satisfied with the extent of Met Ed's testing as reported by CO, resolution would come from DRL. Mr. Miller asked if he could contact DRL. The inspectors stated that Met Ed should take whatever action they considered necessary and in their interest.

The failure of the computer program to provide complete routing information was discussed by the inspector. Mr. Miller asked Mr. Allen if this was a problem at the site. Mr. Allen replied that it was. Mr. Bierman stated that this item would be included in a forthcoming meeting with GAI.

The failure of the licensee to maintain separation of redundant power systems was discussed by the inspector. Mr. Miller stated that appropriate action would be forthcoming to assure fulfillment of Met Ed's commitments concerning this and similar type problems.

The inspector stated that there appeared to be little or no guidance given to CONAM inspectors concerning visual inspections prior to sign-off of "Weld History Records". Messrs. Allen and Stromberg stated that this matter would be evaluated and appropriate action taken.

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The inspector stated that there was no procedure or process control for installation of studs on the steam generators and pressurizer. Mr. Miller stated that any welding performed on these vessels would be in compliance with B&W procedures and the applicable codes.

The inspector stated that no detailed assignment or responsibility for preparation of procedures for piping system hydrostatic testings was available for review. Mr. Allen stated that the operations group of Met Ed had been assigned the responsibility for preparation of procedures and that this group would witness the hydrostatics tests.

340 The inspector stated that rusty welds and rust along the heat affected zone on pipe spool No. SF-32 had been observed. Also, there was no indication in the Bechtel Release Report or the site receiving report that this violation of UE&C procedure QC-11, Grinnel Specification No. FS-350-5 (Supplement SS-980-E) or GAI Specification No. SP-5550 had been identified. A "QC Release for Construction" tag was attached to this pipe spool to indicate its acceptance for construction use. Mr. Allen stated that the problem had been identified and that Met Ed had a copy of a letter from Mr. L. D. Schmer, Metallurgist, GAI, to UE&C, dated 7/28/69, which stated that the rust stain observed on the piping near welds is the result of free iron surface contamination and will cause no corrosion or other problems in drain pipe service. He said that this letter also stated that magnet tests showed weld metal to be 9 - 10% ferrite, acceptable for ER 308 grade weld metal.

The licensee had no further comments concerning the results of the inspection and the meeting was concluded.

DETAILS

A. Persons Contacted

Met Ed

- *Mr. J. C. Miller, Vice President, Engineering
- *Mr. H. I. Stewart, Assistant Construction Manager
- *Mr. George Bierman, Project Manager
- *Mr. John L. C. Bachoffer, Jr., Assistant Project Manager for Engineering and Construction
- **Mr. Earl Allen, Resident QA Supervisor
- **Mr. Matt J. Stromberg, Resident QA Supervisor (Replacement for Mr. Allen)
- Mr. Vern Stuebner, Resident Engineer, Electrical
- Mr. W. Shepard, Resident Engineer, Mechanical
- Mr. Gene Hreczuch, Construction Engineer
- Mr. L. Lunstrom, Site QA Monitor for Welding and Piping

*Attended the Management Interview in Reading, Pa., only.

**Attended the Management Interview in Reading, Pa., and contacted at the construction site during the inspection.

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CONAM

Mr. John Luksic, Site Supervisor for CONAM Inspection Laboratory, Inc.
Mr. Don Hilfiger, CONAM Site Inspector on the Spent Fuel Storage System

UE&C

Mr. J. E. Fant, Senior Site QC Engineer and Supervisor
Mr. Guy Kopp, QC Engineer (Electrical)
Mr. J. Walsh, Site Welding Engineering
Mr. Harold Finlan, Site QC Engineer, Welding and NDT
Mr. J. Ellson, Site Piping Engineer
Mr. Robert Schmeidel, Foreman Stainless Steel Welding
Mr. George Schmidt, Field Supervisor for Installation of Hangers, Supports
and Restraints

B: Construction Status

Mr. Shepard estimated that Unit No. 1 was approximately 65% complete, based on man hours expended. Initial reactor fueling is estimated for late 1972, according to Mr. Shepard.

J. Grinnell Documentation*

Mr. Hreczuch stated that Grinnell Company will submit "Certificates of Conformance" with individual items which require documentary evidence of conformance with a code throughout the life of the contact. Grinnell Company will submit the certifications whenever the contract on a specific system has been completed. The inspector re-emphasized the provisions stated in Appendix B, 10 CFR 50, concerning adequate documentation prior to installing components.

D. Reactor Vessel**

Mr. Hreczuch stated that Met Ed and B&W have completed the inspection and evaluation and are preparing procedures for the repair of the three nozzles that were slightly marred during transit. The repairs will be done concurrently with installation of the primary system piping, according to Mr. Hreczuch. The inspector does not consider this item resolved. The item will be carried as an outstanding item until adequate repairs have been completed.

E. Primary Coolant System Piping (PCSP)

1. Rust Observed Inside One 28 Inch Pipe Assembly

Site records indicate that an NSSS system deviation report was issued on December 23, 1970 for one piece of 28 inch diameter inlet piping for

*CO Report No. 289/71-1, paragraph C.
**CO Report No. 289/71-1, paragraph D.

the primary coolant system. This pipe assembly (A-67-205-50-1) was marked "A-67" and fabricated to B&W Drawing 131945E-9 was received at the construction site with both ends uncovered. A film of rust was observed inside the pipe. The interior surface of the pipe was ground and wire brushed at the construction site. The entire clad surface was penetrant tested and the weld preparation surface was magnetic particle tested subsequent to completion of manual removal of the rust film. No indications of deleterious conditions were observed, when a visual inspection for Class C cleanliness and a six hour wet cloth test were performed. The dessicant was replaced inside the pipe and the end caps secured.

2. Mockup for Procedure and Welder Qualification

Mr. Allen stated that the Primary Coolant System weld procedures and welder qualifications will be performed, using full sized mockups in the positions expected during actual installation.

3. Cladding of PCSP After Field Welding Has Been Completed

Mr. Allen stated that all PCSP field welds will be clad with stainless steel overlay subsequent to completion of the field welding. The cladding will be performed according to B&W Weld Data Sheet WJ-7 and B&W Specification W-50.

4. Receiving, Unloading and Installation of the PCSP

B&W Specification No. FS-III-3 (8/1/70) provides the guidelines for receiving, unloading and installation of the PCSP and the Primary Coolant System Pump Casings.

Prior to start of installation of the PCSP and pump casings, the erection contractor is requested to submit to the B&W representative, for review, detailed procedures which are to outline the method and sequence of installation and specifications that are to be used for preheat, welding, post-weld heat treatment and NDT.

Backing rings will be removed after completion of the field welding and magnetic particle testing conducted. In addition, radiography of the weld joints will be performed.

Lifting lugs will be torch cut approximately 1/2 inch from the PCSP or pump casings, then ground flush with the surface. The areas ground will be examined by either liquid penetrant or magnetic particle tested.

F. Concrete Pour When the Measured Surface Temperature in Contact With the Concrete Was Less Than 32° F.*

Site records and discussions with various Met Ed and UE&C personnel revealed the following:

On January 8, 1971, approximately 230 cubic yards of concrete was placed in a fuel handling building wall at elevation 331 to 346 feet running north and south from 17 feet west of the reactor centerline. At the time of this placement, the measured surface temperature of the surfaces to be in contact with the concrete was below 32° F at the beginning of the scheduled pour.

The concrete placement under the conditions stated above is contrary to Volume II, Section 5 of the FSAR which invokes ACI 318-63 and 301-66. A CDN was issued by CO:I and answered by the licensee as the intended corrective action, which was considered adequate.

Subsequent to the issuance of the CDN and the licensee's reply, the four core samples were removed from the fuel handling building wall along the joint between the concrete below 32° F and the 230 cubic yard scheduled pour for evaluation. These samples were designated TC1a, TC2a, TC3a and TC4a. The imensions of samples No. TC1a and TC4a which were damaged during removal are not recorded in the PTL Test Report, PG-2642, dated March 19, 1971, nor other available documentation at Three Mile Island.

Sample No. TC2a was 3.75 inches in diameter and the capped length was 7-1/2 inches. The sample was tested for compressive strength per ASTM C-42 and failed at 4050 psi. The direction of loading was parallel to the construction joint. The age of the sample was nine weeks. (Unit No. 1 FSAR, Volume II, states that Class I concrete will have a minimum strength of 5000 psi at 28 days.)

Sample No. TC3a was 3.75 inches in diameter and the length was reported to be 8.12 inches. The splitting tensile strength (per ASTM C-496) of the sample was 395 psi. A double split occurred during the test simultaneously, one in the construction joint and another approximately 1/2 inch from, but parallel to the construction joint in the adjacent concrete. The age of the sample was nine weeks.

All four of the core samples were examined under 10 power magnification at the bonded and fractured surfaces to determine any signs of freezing. There were no frost prints or other indications of freezing which would adversely affect the concrete bond.

PTL Test Report No. FH-87, dated February 10, 1971, states that the test cylinders were seven day moist cured and the balance of the curing period was in air. All ten of the test cylinders taken during the 230 cubic yard pour failed at greater than 5000 psi during the compressive strength tests on the 28 day old cylinders.

*CO Report No. 289/71-1, paragraph E and Inquiry Memorandum No. 289/71-A, dated April 13, 1971.

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The licensee stated that the wall was accepted on the basis of PTL's "Test and Evaluation Program", Order No. PG-2642, dated March 19, 1971, and a research paper by TYNES entitled "Investigation of Methods of Preparing Horizontal Construction Joints in Concrete", Technical Report No. 6-518, U. S. Army Engineers, Waleway's Experimental Station, published in July, 1959.

One sample was compression tested and one sample was tensile pulled. There appears to be no basis on which to accept or refute a one sample evaluation. No sample cores were removed from the central portion of the five foot thick wall for evaluation, and cores were not taken from previously accepted concrete pours for comparison and/or evaluation. Apparently, Met Ed has no plans to take additional samples for evaluation and/or comparison or perform additional tests, such as density measurements on these samples.

G. Containment Vessel Tendons and Sheathing*

Mr. Hreczuch stated that Gilbert Associates, Inc., (GAI) has completed an evaluation that compared the use of grease (NO-OX-ID, manufactured by the W. R. Grace Company) with grouting. Met Ed will fill the tendon sheathings with grease. The inspector considered this outstanding item to be resolved.

H. Core Flooding Tanks (Accumulators)

Met Ed has rejected both of the B&W fabricated Core Flooding Tanks scheduled for installation in Unit No. 1 for failure to meet the NDTT requirement for unrestricted service at $\leq 40^{\circ}$ F and 60° F. These two tanks were fabricated from material meeting SA 515 requirements, which is not intended for low temperature service.

Two core flooding tanks originally scheduled for delivery for Unit No. 2 are to be fabricated from SA 516 material and will be installed in Unit No. 1 in late 1971. According to Mr. Shepard, these two tanks meet the requirements stated in Volume 3, Section 6 and Table 6-1 of the FSAR.

The inspector will followup on this outstanding item during future construction site inspections.

I. Procedures

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1. Site QA Program

The Met Ed site QA program contains no detailed assignment of the responsibility for preparation of procedures nor for conducting hydrostatic tests of piping systems.

*CO Report No. 289/71-1, paragraph H.2.a.

2. Insulation Studs on Primary System Components

No procedure has been prepared nor any quality control process or surveillance forms developed for use during installation (by welding) of the one half inch diameter by one inch long studs to be used to secure the thermal insulation on the exterior surfaces of the steam generators and the pressurizer. This change in insulation installation requirements is covered in Supplement No. 4, Gilbert Associates, Inc., Specification No. SP-5669. The steam generators and pressurizer are stenciled with the following warning: "Do not burn, chip, grind, or allow any form of arc strikes on this vessel".

J. High Head Safety Injection and Residual Heat Removal Systems

The inspection effort consisted of a detailed review of the QC system as required by Attachment G, "Other Class I Piping", PI 3800/2, items 4805.03 through 4805.04.b.3, 4805.04.c.1 through 4805.d.3, 4805.04.f.2 through 4805.04.g.5 and 5005.03 for the High Head Safety Injection and Residual Heat Removal Systems. All items inspected were found to be in accordance with approved specifications and procedures and FSAR commitments.

K. Containment Spray, Reactor Coolant, Safety Injection, Chemical and Volume Control, Residual Heat Removal and Reactor Coolant Vent and Drain Component Coolings Systems

The inspection effort consisted of a detailed review of the QC system as required by Attachment L, "Other Class I Components", PI 3800/2, items 4905.03 through 4905.04.b.8 for each of the above systems. All items inspected were found to be in accordance with approved specifications and procedures and FSAR commitments.

L. Fuel Handling System

The inspection effort consisted of a detailed review of the QC system as required by Attachment F, "Reactor Coolant Pressure Boundary Piping", PI 3800/2, items 4805.04.e.1 through e.6, 4805.05.a.1 through a.5, 4805.06.a.1 through a.5, 5005.04.f.3, f.5 and f.7, 5005.05.a.1, a.2 and a.3 and 5005.06.a.2 and a.3. All items inspected were found to be in accordance with approved specifications and procedures and FSAR commitments, except as follows:

1. The CONAM inspectors are not given guidance nor are the "visual" characteristics to be inspected identified for CONAM inspectors prior to their sign off on the "Weld History Record". 1419 167
2. The Metropolitan Edison site QA program does not contain a detailed assignment of the responsibility for preparation of procedures nor for actually conducting piping system hydrostatic tests.
3. Mottled areas of rust were observed over the weld and the heat affected zone on pipe spool No. SF-32 where the pipe was joined to a 45° elbow and to a 90° elbow. This condition had not been identified by either

the Bechtel vendor surveillance inspector on his Release Report, nor by the site receiving inspector. A "QC Release for Construction" tag is attached to this pipe spool.

Surface rust on a stainless steel pipe spool in the Spent Fuel Storage System is in violation of UE&C Specification QC-11, "Cleanliness Control"; Grinnell Specification FS-350-5; Supplement SS-980-E, "Cleaning of Stainless Steel Pipe"; and Gilbert Associates, Inc. (GAI) Specification, No. SP-5550, Section 5.4.4, "Cleaning, Etc. for Stainless Steel Piping".

M. Cables and Terminations

The inspection effort consisted of a detailed review of the QC System as required by Attachment H, "Instrumentation" and by Attachment I, "Electrical", PI 3800/2, items 5205.04.b.2, c.3, f.5, f.6 and f.9 and Receipt and Storage Procedures for Electrical components including the following:

1. Definition of responsibility for receipt inspection and storage components at the construction site.
2. Adequacy of information to guide the receipt inspection and handling operations.
3. Adequacy and appropriateness of storage space for components special handling.
4. Adequacy of provisions and instructions for periodic inspections of stored components and documentation of the inspection.

No deficiencies or items of nonconformance were found in the above areas, however, the resistance value specified for motor windings rates over 600 volts of $R = Kv + 1$ megohm appears very low and will be compared on a later inspection with the manufacturer's recommended value.

The quality control procedures for cables were inspected which included the following items:

1. Procurement
2. Materials Certification
3. Nondestructive Tests
4. Marking and Identification
5. Protection from Contamination
6. Packaging
7. Quarantine and Disposition of Nonconforming Material

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8. Segregation of Sizes
9. Identification and Control
10. Confirmation of Issue of Specified Material
11. Protection from Physical Damage
12. Protection from Contamination
13. Location and routing of wireways and conduits to provide for necessary separation
14. Proper bonding or grounding of wireways and conduit
15. Identification system integrating wireways and conduits with routing requirements for cable, assuring proper size and type of cable will be routed properly for identified circuits
16. Redundancy, separation of redundant circuits, separation of power cables from control or instrument cables, separation of control and safety circuits
17. Wireway or conduit fill specifying number, size, type, and arrangement of cables to limit heating effects
18. Cable pulling
19. Cable terminations
20. Nondestructive tests

The following deficiencies and nonconformances were found in the quality control program and procedures for cable:

1. Confirmation of Issue of Specified Material

Quality control procedures which detail this item as a point requiring verification have not been prepared.

2. Location and Routing of Wireways and Conduits to Provide for Necessary Separation

The stated commitments in the FSAR, Paragraph 8.2.2.12.c and d, which addresses physical separation, does not appear to be procedurally controlled since cable trays are being installed by the constructor, without benefit of procedures and without approval of the AE prior to the installation of the trays.

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3. Proper Bonding or Grounding of Wireways and Conduits

Procedures require that each equipment ground bond be checked between the ground grid and the equipment or structure to which the terminal lug is attached and that all field assemblies, bolted connections and welded connections be checked and/or tested for physical integrity and/or electrical continuity. Procedures to provide qualitative evidence have not been prepared.

4. Identification System Integrating Wireways and Conduits with Routing Requirements for Cable, Assuring the Proper Size and Type of Cable will be Routed Properly for Identified Circuits

The Gilbert Associates drawing S-211-002, states in part: "The computer will select the path between the beginning and end trays and will print the route on the computer circuit routing summary and the pull slips". Contrary to the above, the intermediate locations (path between the beginning and end trays) is not in all cases provided on the computer routing summary and the pull slips.

Procedures defining numbering techniques for field designed trays and correlating responsibilities between partial pull card data and circuit schedule provided by Gilbert Associates and completed on site by United Engineers and Constructors have not been prepared.

5. Redundancy, Separation of Redundant Circuits, Separation of Power Cables from Control or Instrument Cables, Separation of Control and Safety Circuits

The FSAR, paragraph 8.2.2.12 states in part, "Cabling for redundant components has been identified utilizing four different colors...." Paragraph 8.2.2.10.g.1 states in part, "...cables, conduits, trays.... are color coded to identify their function and/or channel association".

Procedures and/or techniques for color coding of cable has not yet been developed.

Procedures for color coding of cable trays has not been prepared.

Draft QC procedures and check list does not provide for verification that color coding has been performed.

Procedures have not been prepared describing the minimum frequency at which trays are to be numbered or frequency of recurrence of color coding.

6. Wireway or Conduit Fill Specifying Number, Size, Type and Arrangement of Cables to Limit Heating Effects

The UE&C draft check list does not provide for verification of physical fill precluding qualitative evidence at the field level that the design objective loading has not been exceeded.

The Metropolitan Edison construction electrical engineer stated that all terminations would be made in the cable spreading room rather than in the control console. Pigtails have been made up at the fabricator's shop, which will connect to a "states" type terminal block mounted on the cable tray seismic support. The incoming circuit will terminate on this terminal block.

The separations criteria as described in paragraph 8.2.2.10.c of the FSAR for the engineered safeguards 4160 volt switch gear and 480 volt power centers contains the same language as paragraph 8.2.2.10.d of the FSAR for the 480 volt motor control centers, which is as follows: "Separation of redundant power systems has been maintained throughout". Physical separation using a fireproof barrier was found in the case of the 4160 volt switchgear and 480 volt power centers; however, separation of two redundant 480 volt power centers was found to be approximately five feet with no separating barrier.