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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

July 18, 1985


MEMORANDUM FOR: Charles E. Norelius, Director
Division of Reactor Projects
Region III

FROM: Brian K. Grimes, Director
Division of Quality Assurance, Vendor
and Technical Training Center Programs
Office of Inspection and Enforcement

SUBJECT: ZION STATION UNIT 2 INSPECTION REPORT NO. 50-304/85-06

Enclosed is the report (and attendant 766) of the special team inspection at Zion Station Unit 2 to review the implementation of a program to meet the requirements of 10 CFR 50.49. This inspection was conducted on January 14-18, 1985, at the offices of Commonwealth Edison Company and Sargent & Lundy Company in Chicago, Illinois, and at Zion Station Unit 2, Zion, Illinois. The inspection report contains four Potential Enforcement/Unresolved Items. We would characterize these items at Severity Level IV relative to implementation of a 10 CFR 50.49 program. The recommended severity level for these items has been concurred in by the IE Enforcement Staff. Enclosed are Potential Enforcement/Unresolved Items 304/85-06-01, 05, 06, and 09. In addition, five Open Items (304/85-06-02, 03, 04, 07, and 08) were identified that are being referred to you for appropriate followup and resolution. If you do not expect to issue a Notice of Violation on the above items within the next month, please let me know.

If you have any questions concerning this inspection, please call U. Potapovs (FTS 492-8030) or G. Zech (FTS 492-9663).


Brian K. Grimes, Director
Division of Quality Assurance, Vendor
and Technical Training Center Programs
Office of Inspection and Enforcement

Enclosures:
See next page

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Serialized by Sherry Meador

July 18, 1985

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Item 304/85-06-09

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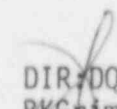
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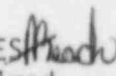
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for 7/1/85


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JAxelrad
for 7/15/85

Potential Enforcement/Unresolved Item 304/85-06-01

Facility: Zion Station Unit 2
Area: 10 CFR 50.49 Implementation
Team Leader: G. T. Hubbard

Docket No.: 50-304
Date: January 18, 1985

As a result of the inspection at the Zion Station Unit 2 Nuclear Plant on January 14-18, 1985, the following violation of an NRC requirement was identified:

Paragraph (g) of 10 CFR 50.49 requires that each holder of an operating license issued prior to February 22, 1983, shall by May 20, 1983, identify the electric equipment important to safety within the scope of this section already qualified and submit a schedule for either the qualification to the provisions of this section or for the replacement of the remaining electric equipment important to safety within the scope of this section. This schedule must establish a goal of final environmental qualification of the electric equipment within the scope of this section by the end of the second refueling outage after March 31, 1982 or by March 31, 1985, whichever is earlier.

Paragraph (b)(3) of 10 CFR 50.49 requires that certain post-accident monitoring equipment be included as electric equipment important to safety covered by 10 CFR 50.49.

Findings:

Contrary to the above, the licensee failed to establish qualification of certain post-accident monitoring (Regulatory Guide 1.97) equipment, included on his May 1983 submittal of electric equipment important to safety within the scope of 10 CFR 50.49, prior to Zion 2's second refueling outage after March 31, 1982. Examples of equipment included in the licensee's submittal that had not had qualification established were Barton Model 763 and 764 pressure transmitters.

Recommended Severity Level: IV

Potential Enforcement/Unresolved Item 304/85-06-05

Facility: Zion Station 2
Area: 10 CFR 50.49 Implementation
Team Leader: G. T. Hubbard

Docket No.: 50-304
Date: January 18, 1985

As a result of the inspection at the Zion Station Unit 2 Nuclear Plant on January 14-18, 1985, the following violation of an NRC requirement was identified:

Paragraph (g) of 10 CFR 50.49 requires that each holder of an operating license issued prior to February 22, 1983, shall by May 20, 1983, identify the electric equipment important to safety within the scope of this section already qualified and submit a schedule for either the qualification to the provisions of this section or for the replacement of the remaining electric equipment important to safety within the scope of this section. This schedule must establish a goal of final environmental qualification of the electric equipment within the scope of this section by the end of the second refueling outage after March 31, 1982, or by March 31, 1985, whichever is earlier.

Findings:

Contrary to the above, the licensee had not adequately demonstrated and/or documented qualification of Marathon terminal blocks/top-entry junction boxes used in electrical control circuits inside containment prior to the end of Zion 2's second refueling outage after March 31, 1982.

Recommended Severity Level: IV

Potential Enforcement/Unresolved Item 304/85-06-06

Facility: Zion Station Unit 2
Area: 10 CFR 50.49 Implementation
Team Leader: G. T. Hubbard

Docket No.: 50-304
Date: January 18, 1985

As a result of the inspection at the Zion Station Unit 2 Nuclear Plant on January 14-18, 1985, the following violation of an NRC requirement was identified:

Paragraph (f) of 10 CFR 50.49 requires that each item of electric equipment important to safety must be qualified by one of the following methods:

- (1) Testing an identical item of equipment under identical conditions or under similar conditions with a supporting analysis to show that the equipment to be qualified is acceptable.
- (2) Testing a similar item of equipment with a supporting analysis to show that the equipment to be qualified is acceptable.

Findings:

Contrary to the above, the licensee had installed qualified Limitorque valve operators in Zion 2 in a configuration different from the configuration which was qualified by testing and/or analysis. The licensee had installed the valve operators without removing the plastic protective shipping caps from the valve operator gear case grease relief valves, therefore, providing an operator configuration different from the qualified configuration.

Recommended Severity Level: IV

ENCLOSURE 6

Potential Enforcement/Unresolved Item 304/85-06-09

Facility: Zion Station Unit 2
Area: 10 CFR 50.49 Implementation
Team Leader: G. T. Hubbard

Docket No.: 50-304
Date: January 18, 1985

As a result of the inspection at the Zion Station Unit 2 Nuclear Plant on January 14-18, 1985, the following violation of an NRC requirement was identified:

Paragraph (e) of 10 CFR 50.49 requires that the electric equipment qualification program must include and be based on the following:

- (1) Temperature and Pressure. The time-dependent temperature and pressure at the location of the electric equipment important to safety must be established for the most severe design basis accident during or following which this equipment is required to remain functional.

Paragraph (1) of 10 CFR 50.49 requires that replacement equipment must be qualified in accordance with the provisions of this section unless there are sound reasons to the contrary.

Findings:

Contrary to the above, the licensee did not consider the most severe environment accident profile (specifically Main Steam Line Break) when establishing the qualification of replacement equipment (Conax seals, Namco limit switches, and Raychem splices) installed inside containment in Zion 2.

Recommended Severity Level: IV



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

ENCLOSURE 1

APR 15 1985

Docket No. 50-304

Commonwealth Edison Company
ATTN: Mr. Cordell Reed
Vice President
Post Office Box 767
Chicago, Illinois 60690

Gentlemen:

SUBJECT: INSPECTION NO. 50-304/85-06

Enclosed is the report of the special team inspection conducted by Mr. G. T. Hubbard and other NRC representatives on January 14-18, 1985, at the offices of Commonwealth Edison Company and Sargent & Lundy Company in Chicago, Illinois, and at Zion Station Unit 2, Zion, Illinois, of activities authorized by NRC License DPR-48. The team's findings were discussed with you and members of your staff at the conclusion of the inspection. The inspection reviewed your implementation of a program as required by 10 CFR 50.49 for establishing and maintaining the qualification of electric equipment within the scope of 10 CFR 50.49. The inspection also included evaluations of the implementation of equipment qualification corrective action commitments made as a result of the December 14, 1982, Safety Evaluation Report (SER) and the June 18, 1982, Franklin Research Center Technical Evaluation Report (TER). Within this area, the inspection consisted of selected examinations of procedures and representative records, interviews with personnel, and observations by the inspectors.

The inspection determined that you have implemented a program to meet the requirements of 10 CFR 50.49 and your corrective action commitments relative to SER/TER deficiencies; however, some deficiencies in your implementation of this program were identified. Four deficiencies are classified as Potential Enforcement/Unresolved Items and will be referred to the NRC Region III office for further action. Five other identified deficiencies are classified as Open Items and your corrective actions regarding them will be reviewed during a future NRC inspection. Details of the above deficiencies are discussed in the enclosed inspection report.

We will gladly discuss any question you have concerning this inspection.

Sincerely,


Gary G. Zech, Chief
Vendor Program Branch

Division of Quality Assurance, Vendor,
and Technical Training Programs
Office of Inspection and Enforcement

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Enclosure:

1. Appendix A
2. Inspection Report No. 50-304/85-06

APPENDIX A

Potential Enforcement/Unresolved Items

As a result of the special equipment qualification inspection of January 14-18, 1985, the following items have been referred to NRC Region III as Potential Enforcement/Unresolved Items (paragraph references are to the detailed portion of the inspection report).

1. Contrary to paragraph (f) of 10 CFR 50.49, Commonwealth Edison Company (CECo) had installed qualified Limitorque valve operators in Zion 2 in a configuration different from the configuration which was qualified by testing and/or analysis (Paragraph 4.C.(2)).
2. Contrary to paragraph (g) of 10 CFR 50.49 CECo had not adequately demonstrated and/or documented qualification of Marathon Terminal blocks/junction boxes used in electrical control circuits inside containment prior to the end of Zion 2's second refueling outage after March 31, 1982, (Paragraph 4.C.(1)).
3. Contrary to paragraphs (e) and (l) of 10 CFR 50.49, CECo did not consider the most severe environment accident profile (specifically Main Steam Line Break) when establishing the qualification of replacement equipment (Conax seals, Namco limit switches, and Raychem splices) installed inside containment in Zion 2 (Paragraph 4.D.(3)).
4. Contrary to paragraphs (b) and (g) of 10 CFR 50.49, CECo failed to establish qualification of certain post-accident monitoring equipment, identified on their May 1983 submitted list of electric equipment important to safety, prior to the end of Zion 2's second refueling outage date after March 31, 1982 (Paragraph 4.A.(1)).

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

Report No.: 50-304/85-06
Docket No.: 50-304
License No.: DPR-48
Licensee: Commonwealth Edison Company
Post Office Box 767
Chicago, Illinois 60690
Facility Name: Zion Station, Unit 2
Inspection At: Chicago and Zion, Illinois
Inspection Conducted: January 14-18, 1985

Inspector: G. T. Hubbard 4/15/85
G. T. Hubbard, Equipment Qualification and
Test Engineer Date

Also participating in the inspection and contributing to the report were:

U. Potapovs, Chief, Equipment Qualification Inspection Section, I&E
R. C. Wilson, Engineer, I&E
H. C. Garg, Engineer, NRR
R. O. Karsch, Reactor Engineer, NRR
R. A. Borgen, Consultant Engineer, Idaho National Engineering Laboratory
A. S. Gautam, Reactor Inspector, RIII
R. J. Smeenge, Reactor Inspector, RIII

Approved by:

Gary G. Zech
Gary G. Zech, Chief, Vendor Program Branch, I&E

4-15-85
Date

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INSPECTION SUMMARY:

Inspection on January 14-18, 1985 (Inspection Report No. 50-304/85-06)

Areas Inspected: Special, announced inspection to review the licensee's implementation of a program per the requirements of 10 CFR 50.49 for establishing and maintaining the qualification of electric equipment within the scope of 10 CFR 50.49. The inspection also included evaluations of the implementation of equipment qualification (EQ) corrective action commitments made as a result of deficiencies identified in the December 14, 1982, Safety Evaluation Report (SER) and the June 18, 1982, Franklin Research Center (FRC) Technical Evaluation Report (TER). The inspection involved 255 inspector hours onsite.

Results: The inspection determined that the licensee has implemented a program to meet the requirements of 10 CFR 50.49, except for certain deficiencies listed below. No deficiencies were found in the licensee's implementation of corrective action commitments made as a result of SER/TER identified deficiencies.

Four Potential Enforcement/Unresolved Items were identified.

- (1) Installation of Limitorque valve operators in a configuration different from the equipment configuration for which qualification was established - paragraph 4.C.(2).
- (2) Failure to adequately demonstrate and/or document qualification relative to leakage currents for the installed configuration of Marathon control circuit terminal blocks/junction boxes - paragraph 4.C.(1).
- (3) Lack of specific quantitative evaluation of main steam line break (MSLB) environmental profile inside containment for replacement equipment - paragraph 4.D.(3).
- (4) Failure to establish qualification of post-accident monitoring [Regulatory Guide (R.G.) 1.97 - 10 CFR 50.49(b)(3)] equipment included on licensee's May 1983 submitted list of electric equipment important to safety within the scope of 10 CFR 50.49 - paragraph 4.A.(1).

Five open items were identified:

- (1) Station procurement procedure for replacement equipment - paragraph 4.A.(2)(a)
- (2) Verification of training program implementation - paragraph 4.A.(2)(b)
- (3) Incomplete maintenance procedures - paragraph 4.A.(4)(a)
- (4) Incomplete documentation packages - paragraph 4.D.(1)
- (5) Deficiencies in documentation - paragraph 4.D.(2)

Details

1. PERSONS CONTACTED

1.1 Commonwealth Edison Company (CECo)

- *C. Reed, Vice President, Engineering
- *R. Cascarano, Zion Licensing Administrator
- *F. Lentine, Zion Project Engineering, Station Nuclear Engineering Department (SNED)
- *G. Pliml, Assistant Superintendent, Zion
- *J. Abel, Manager, SNED
- *D. Lamken, SNED Electrical and Qualification Group
- *G. Wagner, Power Operations Manager
- *R. Rybak, Nuclear Licensing
- *M. Bailey, Tech Staff Engr/EQ Coordinator, Zion
- *G. Alexander, Nuclear Licensing Administrator
- *S. Zunjic, SNED, Zion, Engineer
- L. DelGeorge, Assistant Vice President, Engineering
- D. Farrar, Director, Nuclear Licensing
- K. Graesser, Station Superintendent, Zion
- G. Dix, Electrical Maintenance, Zion
- W. Kurth, Instrument Maintenance, Zion
- L. Thorsen, Operations, Zion
- C. Lawreys, Technical Staff, Zion
- *J. Bieronski, SNED, LaSalle
- M. Lesnet, Technical Staff, Zion
- W. Stone, Technical Staff, Zion

1.2 CECo Contractors

- *R. Hameetman, Project Manager, Sargent & Lundy (S&L)
- *R. Mazza, Project Director, S&L
- *M. Rauckhorst, Mechanical Engineer, S&L
- *R. Raheja, Supervisor, Mechanical Engineer, S&L
- B. Gogineni, Engineer, S&L
- C. Schwartz, Engineer, S&L
- D. Drankham, Engineer, S&L
- A. Behera, Engineer, S&L
- C. Crane, EQ Consultant; WESTEC Services, Inc.
- J. Bassett, Engineer, Westinghouse Electric Corporation
- B. Tumblin, Engineer, Westinghouse Electric Corporation
- *R. Ho, Consultant, EPM, representing Nuclear Utility Group on Equipment Qualification (Observer)

1.3 Nuclear Regulatory Commission

- *G. Zech, Chief, Vendor Program Branch, I&E
- *J. Norris, Project Manager, NRR

*Denotes those present at the exit interview in Chicago on January 18, 1985

2. PURPOSE

The purpose of this inspection was to review the licensee's implementation of the requirements of 10 CFR 50.49 and the implementation of committed corrective actions for SER/TER identified deficiencies.

3. BACKGROUND

On January 25 and 26, 1984, the NRC held a meeting with CECO officials to discuss CECO's proposed methods to resolve the EQ deficiencies identified in the December 14, 1982 SER and June 18, 1982, FRC TER. Discussions also included CECO's general methodology for compliance with 10 CFR 50.49 and justification for continued operation for those equipment items for which environmental qualification was not completed. The minutes of the meeting and proposed method of resolution for each of the EQ deficiencies were documented in April 10 and June 20, 1984, submittals from the licensee. The TER and the April 10 and June 20 submittals were reviewed by the inspection team members and were used to establish a status baseline for the inspection.

4. FINDINGS

A. EQ Program Compliance with 10 CFR 50.49

The NRC inspectors examined the licensee's program for establishing the qualification of electric equipment within the scope of 10 CFR 50.49. The program was evaluated by examination of the licensee's qualification documentation files, examination of procedures which control the licensee's EQ efforts, verifying the adequacy and accuracy of the licensee's 10 CFR 50.49 equipment list, and examination of the licensee's program for maintaining the qualified status of the covered electrical equipment. Based on the inspection findings, which are discussed in more detail below, the inspection team determined that the licensee has implemented a program to meet the requirements of 10 CFR 50.49, although some deficiencies were identified. The identified deficiencies relate to the implementation of specific aspects of the program.

(1) Qualification Files, General

The licensee's qualification files were arranged in the format of a single binder titled, "Zion Environmental Qualification Report" (EQR), Revision 4, dated January 10, 1985. The EQR was supplemented by individual equipment binders identified as "EQ Documentation Packages." The inspection team reviewed the EQR and determined that it contained the master list of qualified equipment; references to the EQ documentation packages; summaries of plant environmental zone descriptions; lists of action items such as deferred Three Mile Island (TMI) related items; and similar information serving to define and coordinate all of the plant environmental qualification documentation.

The NRC inspectors reviewed and evaluated EQ documentation packages for 13 types of equipment, three of which were identified by CECo as being TMI related items. Since CECo's TMI items have a deferred implementation schedule, these three packages were incomplete and not finalized at the time of the inspection.

Each EQ documentation package included such information as a checklist comparing service and qualification conditions; detailed identification of plant equipment and type test specimens; pertinent type test reports; references to or copies of purchase orders and other relevant supporting documents; copies of applicable IE Information Notices (INs)/ Bulletins with definition of their impact on the equipment and resolution of any concerns; and detailed definition of maintenance and surveillance criteria necessary to maintain qualification of the installed equipment.

Additional documentation such as plant modification packages for installing qualified replacement equipment, supporting seismic calculations, station maintenance/surveillance procedures, and station instrument calibration procedures were also referred to in support of the documentation file reviews.

The inspection team's review and evaluation of the EQR and 13 documentation packages identified several minor deficiencies in the files which are discussed in more detail later in this report and one item classified as a Potential Enforcement/Unresolved Item. During the team's review of the licensee's EQ documentation it became apparent that for some post-accident monitoring [R.G. 1.97 - 10 CFR 50.49(b)(3)] equipment, establishment of qualification would not be completed until the licensee has completed his R.G. 1.97 review. In the case of Zion Station, CECo is scheduled to submit its final 1.97 review report to the NRC in early 1987. CECo has not requested an extension of the qualification deadline for this equipment.

10 CFR 50.49 requires that each holder of an operating license issued prior to February 22, 1983, identify by May 20, 1983, the equipment important to safety within the scope of the rule and, for such equipment not already qualified, submit a schedule of qualification or replacement. Final qualification of all equipment is required to be established by the end of the second refueling outage after March 31, 1982, or by March 31, 1985, whichever is earlier unless an extension of the deadline has been granted by the Director, NRR.

In their May 19, 1983 submittal to NRC, CECo identified certain equipment items used for post-accident monitoring as falling within the scope of 10 CFR 50.49, for example, Barton Model 763 and 764 pressure transmitters. These, as well as other post-

accident monitoring items listed in the May 19, 1983 submittal have subsequently been deleted from the CECo environmental qualification review pending the completion of their final R.G. 1.97 review.

The failure to establish qualification of this equipment is identified as a Potential Enforcement/Unresolved Item since any extension of qualification schedules for items identified in the May 19, 1983 submittal beyond the 10 CFR 50.49 deadlines must be processed in accordance with the provisions described in the rule. (304/85-06-01)

It is recognized, however, that the qualification schedule of additional items identified as a result of R.G. 1.97 review will depend on the R.G. review schedule and may extend beyond the dates established in 10 CFR 50.49.

(2) EQ Program Procedures

The NRC inspectors reviewed the licensee's EQ program as described in the EQR, which was prepared and is maintained current by S&L for CECo. Additional program procedures reviewed for evaluating the licensee's 10 CFR 50.49 program implementation included:

S&L Instruction PI-ZI-25, Rev. 0, dated January 7, 1985, "Procedure for the Documentation of Updates to the Zion EQR."

S&L Instruction PI-ZI-14, Rev. 2, dated January 7, 1985, "Review of Modifications for Potential Environmental Qualification Interface."

S&L Instruction PI-ZI-23, Rev. 1, dated January 7, 1985, "Procedure for Preparation, Review, Control, Issuance, and Maintenance of Environmental Qualification Documentation Packages."

SNED Procedure Q.6, Rev. 9, dated January 14, 1985, "Modifications Originated by Station Technical Staff."

Station Quality Procedure (SQP) QP-4-51, dated December 12, 1984, "Procurement Document Control for Operations - Processing Purchase Documents."

SQP QP-3-51, dated December 12, 1984, "Design Control for Operations Modification."

SQP QP-3-52, dated November 21, 1984, "Design Control for Operation Plant Maintenance."

The licensee's program was reviewed to verify that adequate procedures and controls had been established by the licensee to implement requirements of 10 CFR 50.49. Areas of the program reviewed included methods and their effectiveness for:

- (a) Requiring all equipment that is located in harsh environments and is within the scope of 10 CFR 50.49 to be included on the list of equipment requiring qualification.
- (b) Controlling the generation, maintenance, and distribution of the list of equipment requiring qualification.
- (c) Defining and differentiating between mild and harsh environments.
- (d) Establishing harsh environmental conditions at the location of equipment through engineering analysis and evaluation.
- (e) Establishing and maintaining a file of plant conditions.
- (f) Establishing, evaluating, and maintaining EQ documentation.
- (g) Training personnel in the environmental qualification of equipment.
- (h) Controlling plant modifications such as installation of new and replacement equipment, and providing for updating replacement equipment to 10 CFR 50.49 criteria.

As a part of the program review, the licensee's Quality Assurance (QA) program was reviewed as it pertains to equipment qualification. Interviews were conducted with the station supervisors of quality assurance and electrical and mechanical maintenance. These interviews revealed that in-place procedures are providing direction for maintaining environmental qualification of the equipment identified in the EQR. The Work Request cover pages identify when equipment with environmental qualification are involved in maintenance activities. The jackets of Work Request packages were also noted to be stamped with 1½" letters "EQ." For these Work Requests identified as "EQ," QC is required to observe and signoff on the Work Request verifying that all work is completed and that the activities have been accomplished in accordance with approved procedures. Quality Assurance performs audits and surveillances for site work activities affecting environmentally qualified equipment and uses "HOLD POINTs" to assure witnessing of key activities. See paragraph 4.A(4) for further discussion of activities to preserve the qualified status of installed equipment for the life of the plant.

Purchase orders reviewed were observed to be appropriately identified with EQ requirements. Receipt inspection for EQ equipment and qualification data packages is performed by the site QA/Quality Control (QC) organization. Accepted equipment is stored in a controlled area reserved for safety-related equipment.

The inspector determined that CECo QA audits the activities performed by S&L and vendors, including equipment qualification laboratories. The 1985 audit schedule planned two audits for S&L and four audits for equipment qualification laboratories.

During the 10 CFR 50.49 programmatic review the inspection team noted that CECo's program is actually established, controlled, and implemented through S&L procedures such as PI-ZI-14, 23, and 25, which are not referenced in CECo's SNED QC procedure or the EQR. Discussions were held with CECo personnel concerning the possibility that CECo's 10 CFR 50.49 program could be deficient without the S&L procedures; therefore, some means of correlating the SNED and S&L procedures might be appropriate to avoid possible future program problem areas/deficiencies. The inspection team did determine that the S&L procedures are being followed and no programmatic deficiencies were identified.

Certain documentation discrepancies, typographical errors, and the like were identified during the programmatic review. These deficiencies are discussed in paragraph 4.D(2) below.

Two Open Items resulted from the EQ program review, as follows:

- (a) CECo procurement procedures require involvement of the headquarters SNED, which ensures that EQ procedures are followed, unless a simple like-for-like component procurement is involved, in which case the station can procure directly. Paragraph (1) of 10 CFR 50.49 requires that a DOR Guidelines plant such as Zion 2 must upgrade replacement equipment to full rule conformance. Station personnel are aware of this requirement and indicated that they follow it; no evidence to the contrary was observed. Since station procurement procedures do not require upgrading of environmentally qualified replacement equipment, the NRC inspector recommended that the licensee incorporate the requirement into the procedure. Verification of action on this concern is considered to be an open item, pending further review during a subsequent inspection. (304/85-06-02)
- (b) During review of the licensee's EQ training activities, it was observed that a 16 hour qualification maintenance training program had been prepared for CECo engineering and station personnel. At the time of this inspection, this training had only been provided to 28 management personnel. Only four site personnel were identified as being trained. Personnel from QA/QC, engineering, purchasing, licensing and Quality and Maintenance at CECo Headquarters and site personnel from engineering, QA/QC, and stores were scheduled to receive this training. NRC interviews with licensee and contractor personnel established a consistent awareness on the part of

personnel that special requirements apply to environmentally qualified equipment within the scope of 10 CFR 50.49. Verification of implementation of the training program is considered to be an open item, pending further review during a subsequent inspection. (304/85-06-03)

(3) 10 CFR 50.49 List

The licensee is required to maintain a list of the equipment necessary to bring the plant to hot shutdown in case of an accident. The first master list of equipment required for compliance with 10 CFR 50.49 was developed by the licensee in response to IE Bulletin 79-01B. Between 1980 and 1982 the licensee evolved a methodology (as described in the CECO submittal to NRC dated April 10, 1984) by which an initial master list was derived. At this time CECO maintains executive control of the master list and its contractor, S&L, maintains physical control of the list with the aid of a computerized system. No formal procedures have been written to document the development of a master list; however, CECO and S&L procedures are in place for keeping the list current with regard to configuration changes in the plant. These include CECO procedure Q.42, Rev. 2, dated January 14, 1985, "E.Q. Documentation Control and Acceptance," and several of the procedures listed in paragraph 4.A.(2). The reviewed procedures appear to be adequate for maintaining the master list.

Seventeen items were used as the audit sample to verify the completeness of the master list. This sample included two items from Appendix I, "Justification for Removal of Items from the Master List," of the EQR as a test of the rationale for deleting an item from the list. The remaining fifteen items were selected to verify that items required to be on the list are in fact on the list, and that items not required to be on the list are in fact not on the list. Additionally, a check was made to determine that items which may be required in the future as part of the TMI improvement program are not on the list now, but are earmarked for future consideration.

These sample items were selected from examination of piping and instrumentation drawings, a review of the EQR, and from file inspection items. The audit verified that the master list was accurate and complete for every item sampled, except for post-accident monitoring equipment discussed in paragraph 4.A.(1).

(4) EQ Maintenance Program

The NRC inspectors reviewed the licensee's program for preserving the qualified status of equipment through maintenance and surveillance activities. Each completed EQ documentation package contains

a maintenance and surveillance section detailing criteria for maintaining qualification. Schedules, inspection checksheets, and other information pertinent to the specific equipment type are included. Based on these criteria, the station prepares Plant Maintenance/Surveillance Procedures specifying the activities to be performed in the plant. A typical procedure, IMEQ-1 for Rosemount 1153D transmitters, was reviewed by the inspector. A typical plant modification package, M22-2-81-51 for installation of qualified transmitters, and the calibration procedure for the transmitters were also reviewed, and procedural implications were considered during the plant physical inspection.

The NRC inspectors found no deficiencies in the completed maintenance and surveillance procedures. Where EQ procedures were not yet in effect, the inspectors found that the normal plant maintenance procedures currently being used did not compromise the environmental qualification of equipment reviewed. Since some of the EQ procedures are not yet completed, the following open items were identified:

- (a) Plant EQ Maintenance/Surveillance procedures have not been completed for all environmentally qualified equipment, such as 4 kv Westinghouse motors, Rosemount 176 KF temperature elements, Conax temperature elements, and D.G. O'Brien electrical penetration assemblies. Procedures are being updated for activities between outages such as lubrication and bearing inspection. Procedures are also not in place to initiate annual review of EQ inspection result trends and resultant scheduling of changes, modifications, and checks. The licensee informed the NRC inspectors that all procedures currently in draft or under revision are expected to be in place by March 31, 1985. Verification of full implementation of the EQ Maintenance procedures at the station is considered to be an open item pending further review during a subsequent inspection. (304/85-06-04)
- (b) During the plant physical inspection, the solenoid coil housings on several non-EQ ASCO solenoid valves were found to be loose to the touch. Master List valve 2A0V-BD0001 was inspected, and the coil housing was not loose to the touch. Modification package M22-2-82-36, which covers installation of environmentally qualified ASCO solenoid valves, includes and properly invokes ASCO installation bulletins specifying torque requirements for the solenoid base subassembly. Tightness is essential to qualification, since it compresses two gaskets that prevent postulated accident atmospheres from entering the coil housing. Although no discrepancy was observed for the Master List valve, the loose housings found on several unqualified

valves indicate that Plant Maintenance/Surveillance Procedure E-024-01 should be reviewed by the licensee for adequacy with respect to assuring housing tightness.

B. SER/TER Commitments

The NRC inspectors evaluated the implementation of EQ corrective action commitments made as a result of the SER/TER identified deficiencies as stated in licensee submittals dated April 10 and June 20, 1984. These submittals stated that all equipment on the EQ master list is qualified except (a) three component types for which exemption requests were submitted and (b) certain post-accident monitoring equipment for which a separate, later schedule was negotiated with the NRC.

Based on review of files whose selection specifically included components for which the licensee had committed to replace unqualified equipment, and on review of the EQ master list, the NRC inspectors identified no deficiencies in the licensee's implementation of SER/TER commitments to date.

C. Plant Physical Inspection

The NRC inspectors, with plant accessibility input from licensee personnel, established a list of components for physical inspection that were (1) of the same types for which file reviews were performed and (2) accessible at the time of the inspection, during plant operation. Ten components were selected for examination of such characteristics as mounting configuration, orientation, interfaces, model number, ambient environment, and physical condition. Two concerns were identified during the physical inspection and both are classified as Potential Enforcement/Unresolved Items. Details are as follows.

- (1) One concern was identified during the inspection of Marathon series 6000 and 1600 terminal blocks. The NRC inspectors observed that outside containment terminal blocks for control circuits were located in junction boxes which had top conduit entries as opposed to the qualification tested configuration of side or bottom conduit entries. The inspectors determined from discussions with licensee personnel that the licensee was planning to replace all top-entry junction boxes with boxes using side or bottom entries. However, this action had not been completed, raising the question of whether or not the top conduit entry boxes/terminal block configurations are qualified, especially for use on inside containment control circuits. The specific concern with the top conduit entry boxes is whether

the cumulative effect of control circuits with terminal block leakage currents will trip the associated power circuit breaker itself and thus render all circuits from that breaker ineffective. Since the licensee was unable to present any data during the inspection that would demonstrate that this concern regarding the qualification of top entry junction boxes did not exist, this is identified as a Potential Enforcement/Unresolved Item. (304/85-06-05)

- (2) Inspection of an outside containment Limitorque valve operator revealed the presence of a plastic protective shipping cap on the valve operator gear case grease relief valve. Although this is probably acceptable for outside containment uses, the question was asked whether shipping caps also were installed on operators inside containment. As a result of this question, CECO sent personnel inside Unit 2 containment on the morning of Friday, January 18, 1985. These personnel found and removed the covers from two operators, plant ID numbers 2-MOV-RC-8000A and B. This action was reported to the NRC during the exit meeting. The presence of shipping caps on valve operator gear case grease relief valves created a situation where the installed equipment configuration was different from the equipment configuration for which qualification had been established. Since the above described difference in equipment configuration raises questions regarding the qualification of the installed equipment prior to the removal of the shipping caps, this deficiency is identified as a Potential Enforcement/Unresolved Item. (304/85-06-06)

D. Detailed Review of Qualification Files

The NRC inspectors examined selected Zion EQ documentation packages and supporting documents to verify the qualified status of equipment within the scope of 10 CFR 50.49. In addition to comparing plant service conditions with qualification test conditions and verifying the bases for these conditions, the inspectors reviewed such things as required post-accident operating time compared to the duration of time the equipment has been demonstrated to be qualified, similarity of tested equipment to that installed in the plant (e.g., insulation class, materials of components of the equipment, tested configuration compared to installed configuration, and documentation of both), evaluation of adequacy of test conditions, aging calculations for qualified life and replacement interval determination, effects of decreases in insulation resistance on equipment performance, adequacy of demonstrated accuracy, evaluation of test anomalies, and applicability of EQ problems reported in IE INs/Bulletins and their resolution.

The Zion EQ packages reviewed by the NRC inspectors were generally in conformance to 10 CFR 50.49 except for the following deficiencies.

- (1) Incomplete documentation packages - Some of the EQ documentation packages were not complete and issued to the station at the time of inspection. The following concerns were noted:
 - (a) Package EQ-ZN039 for Rosemount resistance temperature detectors (RTDs) was not fully assembled. Test report WCAP-9157, references identifying plant equipment, maintenance and surveillance requirements, and the like were missing.
 - (b) "Open Items Lists" at the front of some packages identified missing information. For example, in EQ-ZN035 for Rosemount transmitters, documentation of installed plant equipment and a study demonstrating the acceptability of a reduced operating time were not yet included.
 - (c) Package EQ-ZN011 was being expanded to include information on Marathon 1600 series terminal blocks, as well as 6000 series, but the expansion was not completed.

Although no technical deficiencies were observed because of this incompleteness, the issuance of the remaining Zion EQ Packages is considered to be an open item pending verification during a subsequent inspection. (304/85-06-07)

- (2) Deficiencies in documentation - Several minor errors in the form of discrepancies, omissions, typographical errors, and the like were noted by the NRC inspectors, including the following:
 - (a) SNED procedure Q6, Rev. 9, Exhibit I, section 4.0(e) defines harsh environment as radiation exceeding 5×10^4 rads, with no mention of other parameters. The EQR, section 4.2 pp 26-7, defines harsh environment as exceeding 1×10^4 rads, atmospheric pressure and 90% humidity.
 - (b) Definition of "long, mid, and short term" operating times was not provided in Rev. 4 of the EQR. The licensee indicated that Rev. 3 had contained definitions inadvertently omitted from Rev. 4.
 - (c) For charging pump motors the zone description specified 3 psig environment, while the EQ package stated "unknown" plant pressure and 0 psig qualified pressure. The licensee indicated that the discrepancy is simply a documentation error.
 - (d) The type test documentation for the charging pump motors is not clear in identifying whether the same stator was subjected to all type tests. In response to questions the licensee indicated that the same stator was used throughout testing, and initiated action to obtain documentation from Westinghouse to clarify the files.

(e) In lists and tabulations in the EQR the following deficiencies were identified.

- [1] Limit switch AOV-DT 9170 was listed on the qualified status list in Appendix L when in fact it should have been deleted per the list of Appendix I.
- [2] Typographical errors in the main steam isolation valve listings of Appendix K were identified.
- [3] Remote shutdown panels were identified in Appendix I for Unit 2 when in fact they should have been deleted as were the panels for Unit 1.

(f) The review checklist form in package EQ-ZN011 omitted reference to terminal block orientation, which is necessary to establish qualification.

Verification of correction of these deficiencies in documentation is considered an open item, pending further review during a subsequent inspection. (304/85-06-08)

- (3) Lack of specific quantitative treatment of MSLB environmental profile inside containment for replacement equipment - The NRC inspector's review of the EQ documentation packages revealed that replacement equipment was being procured to the same severe accident environmental criteria used for evaluation of original plant equipment. The CECO evaluation considered only the LOCA profile for in-containment equipment and not the in-containment MSLB profile, which could be more severe. However, for replacement equipment paragraphs (e) and (1) of 10 CFR 50.49 require qualification to be established for the most severe design basis accident during or following which the equipment is required to remain functional.

CECO identified that the following types of replacement equipment have been ordered since the effective date of 10 CFR 50.49, installed in the plant, and considered qualified without addressing a specific in-containment MSLB profile: Conax seals, Namco limit switches, and Raychem splices. CECO stated that, although a specific MSLB profile was not considered in the qualification review of this equipment, actual qualification test conditions would probably exceed the plant conditions. CECO stated that it had not considered MSLB environmental profiles when establishing qualification for replacement parts due to past correspondence with the NRC regarding qualification environmental profiles and its interpretation of the upgrading requirements of 10 CFR 50.49.

CECo was advised that the upgrading requirements of 10 CFR 50.49 do require reevaluation or recalculation of environmental parameters for replacement equipment within the scope of 10 CFR 50.49; therefore, this deficiency is identified as a Potential Enforcement/Unresolved Item. (304/85-06-09)

- E. The NRC inspectors reviewed and evaluated CECo's activities relative to the review of EQ related IE INs/Bulletins. The inspectors' review included examination of CECo's procedures and EQ documentation packages relative to 12 INs and one Bulletin. The review determined that CECo does have a system for distributing, reviewing, and evaluating INs/Bulletins relative to qualified safety-related equipment within the scope of 10 CFR 50.49. During the review of individual EQ documentation packages, which include copies of applicable INs/Bulletins with definition of each's impact on equipment and resolution of any concerns, the NRC inspectors evaluated the actions taken by CECo relative to the applicable INs/Bulletins for that package. No concerns were identified during this review of CECo's activities.