

TVA EMPLOYEE CONCERNS
SPECIAL PROGRAM

REPORT NUMBER: 235.1(B)

REPORT TYPE: SEQUOYAH ELEMENT

REVISION NUMBER: 1

TITLE: ELECTRICAL SAFETY

480V Power Receptacles Unsafe

PAGE 1 OF 8

REASON FOR REVISION:

1. Revised to incorporate TVA comments, revised CATD 235.01(B)-SQN-02.

PREPARATION

PREPARED BY:

Y. Vachon for J. Wheeler
SIGNATURE

2/20/87
DATE

REVIEWS

PEER: REVIEW COMMITTEE

[Signature]

SIGNATURE

[Signature]

2/20/87
DATE

TAS:

SIGNATURE

DATE

CONCURRENCES

8710290302 871023
PDR ADOCK 05000327
PDR

Carl C. Lyke for PRR 2/24/87

CEG-H: George R. McNutt 2-24-87

SRP:

SIGNATURE

DATE

SIGNATURE*

DATE

APPROVED BY:

ECSP MANAGER

DATE

MANAGER OF NUCLEAR POWER
CONCURRENCE (FINAL REPORT ONLY)

DATE

* SRP Secretary's signature denotes SRP concurrences are in files.

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1. CHARACTERIZATION OF ISSUES:

Concerns:

WBM-5-002-003

"There are no means of disconnect provided immediately above 480 V receptacles to prevent flash burns caused by insertion, or removing."

Issue:

- a. No means of disconnect provided at 480 V receptacles. Connect or disconnect of plugs from 480 V receptacles could cause flash burns and other injuries.

EX-85-154-007

"Personnel safety is seriously endangered by lack of disconnect switches at 480 volt welding outlets. Many personnel who connect and disconnect welding conductors to these outlets might not know if circuits are energized. Removing or inserting the plug while energized could cause an explosion and could embed small metallic particles in the arms, face and torso of the person."

2. HAVE ISSUES BEEN IDENTIFIED IN ANOTHER SYSTEMATIC ANALYSIS? YES NO X

Identified by Not Applicable

Date Not Applicable

Documentation Identifiers:

Not Applicable

3. DOCUMENT NOS., TAG NOS., LOCATIONS OR OTHER SPECIFIC DESCRIPTIVE IDENTIFICATIONS STATED IN ELEMENT:

No further information available. Employee concerns address problems with the 480 V receptacles not having a disconnect switch located near receptacle to prevent flash burns should the plug be inserted or removed under load.

4. INTERVIEW FILES REVIEWED:

The interview files for EX-85-154-007 and WBM-5-002-003 were reviewed by the evaluation team. The files contained no additional unreviewed information.

5. DOCUMENTS REVIEWED RELATED TO THE ELEMENT:

See Appendix A.

6. WHAT REGULATIONS, LICENSING COMMITMENTS, DESIGN REQUIREMENTS OR OTHER APPLY OR CONTROL IN THIS AREA?

See Appendix A.

7. LIST REQUESTS FOR INFORMATION, MEETINGS, TELEPHONE CALLS, AND OTHER DISCUSSIONS RELATED TO ELEMENT.

See Appendix A.

8. EVALUATION PROCESS:

- a. Reviewed available transcripts of NRC investigative interviews for additional information on the concerns.
- b. Performed field walkdown to check and verify types of receptacles and plugs used at SQN.
- c. Reviewed adequacy of specifications and requirements regarding application of 480 power receptacles.
- d. Assessed overall adequacy of 480 V receptacles used at SQN.

9. DISCUSSION, FINDINGS, AND CONCLUSIONS:

Chronology:

11/25/85: Concern EX-85-154-007 received by TVA for WBN.

01/16/86: Concern WBM-5-002-003 received by TVA for WBN.

Discussion:

The applicable Sequoyah drawing (App. A, 5.b) and Master Bill of Materials (App. A, 5.a) specify Crouse-Hinds (C-H) type AEQ1648, 600 V, 3 wire, 4 pole, 60 A rated receptacles. Similarly, Electrical Design Standard DS-E12.5.2 (App. A, 5.g) specifies these receptacles to be "similar to Crouse-Hinds type AEQ, or equivalent." These receptacles are Underwriters Laboratory tested and approved for connect and disconnect under full load (circuit breaking) when used with mating C-H plug part number APJ6485.

The SQN Master Bill of Materials and the Electrical Design Standard, however, do not reference the type of plug to be used with the specified C-H receptacle. During the field walkdowns (App. A, 7.f and g, 08/23/86 and 10/09/86), the evaluator noted that Appleton ACP6034BC plugs were used in the C-H receptacles. A review of the Appleton catalog found a listing that cross referenced Appleton part number ACP6034BC as interchangeable with C-H part number APJ6485.

A review of C-H catalogs and a telephone conversation with C-H personnel (App. A, 7.b, 04/29/86) indicated that C-H opposes the practice of interchanging other manufacturer's plugs or receptacles, even though their charts cross-reference catalog numbers to C-H parts. C-H opposes this for the following reasons: 1) C-H has proprietary information not available to other manufacturers, 2) there is no national standard for mandating minimum performance requirements, and 3) "UL" does not test these parts as interchangeable, only as mated halves and lists them as such.

Appleton states (App. A, 7.c, 05/05/86) that its plug is totally compatible with the Crouse-Hinds receptacle. Appleton's list of plugs interchangeable with C-H plugs has been industrially used and accepted for more than 15 years without any noted problems.

Since C-H and Appleton disagree about the acceptability of the 480 V receptacle and plug interchangeability, the Occupational Safety and Health Administration (OSHA) and Tennessee OSHA

(Tenn-OSHA) were contacted (App. A, 5.d and e; 05/09/86). Both OSHA and Tenn-OSHA would require a review of the plug or receptacle configuration on their own merits should the question be raised. If it is necessary to review the acceptability of this assembly, full load insertion and withdrawal testing of the plug would be performed to ensure that no personnel safety hazard exists. However, both OSHA agencies indicated that no records exist of any concerns regarding this interchangeability.

Underwriter's Laboratory (UL) was also contacted on this subject. UL would not discuss the acceptability of the interchangeability of the plugs unless the request was submitted in writing. However, UL did acknowledge that they were aware of this common practice of using interchangeable 480 V plugs with the C-H receptacles.

The assessment of the evaluation team after review of the assembly and based on the fact that similar assemblies have been used by the industry for over 15 years, is that the assembly is acceptable and will not result in personnel hazard. However, since the field walkdown covered only a limited number of assemblies, in view of the lack of specifications for the plugs, no certainty exists that acceptable assemblies have been installed throughout the plant.

Findings:

Electrical Design Standard DS-E12.5.2 and the Master Bill of Materials do not specify the type of mating plug to be used with the specified receptacles. A field walkdown by the evaluation team identified the use of C-H receptacles with Appleton plugs. Discussions with UL, Tenn-OSHA, and OSHA indicate that this type of product interchangeability is a general practice and no safety concerns or problems have been identified. Based on the construction of the assembly, the fact that the plug manufacturer (Appleton) lists it as an interchangeable part with the C-H plug, and considering that the interchangeability has been widely accepted by the industry for more than 15 years, the present installation of 480 V receptacles and mating plugs is acceptable and will not present any hazard to personnel safety. However, without specified mating plugs required by the Electrical Design Standard and the Master Bill of Material, there is no assurance that only acceptable "circuit breaking" plugs have been purchased and used.

Conclusion:

The employee concern is not valid. The present C-H receptacles installed at SQN, if used with the correct mating plug, do not require the use of any disconnect switch because of their "circuit-breaking" feature which is designed to be disconnected and connected under full load without causing a personnel safety hazard. However, since Engineering Design Standards and the Master Bill of Materials do not specify the type of mating plug to be used with the specified receptacles, there is no assurance that in all cases the proper mating plugs have been or will be used or specified to ensure "circuit breaking" assembly.

APPENDIX A

5. DOCUMENTS REVIEWED RELATED TO THE ELEMENT:

- a. SQN Master Bill of Materials, (no date)
- b. TVA drawing E45N842-1, R41, "Conduit and Grounding," (04/30/86)
- c. 1984 National Electrical Code
- d. 1983 Crouse-Hinds Electrical Construction Materials Catalog 4700 and 1984 Product Data Sheet
- e. 1980 Appleton Electric Co. catalog, and 1984 Condensed Catalog
- f. 1982 Crouse-Hinds Guide to Selection, Installation, Use and Maintenance of Plugs, Receptacles and Cord Connectors
- g. TVA Electrical Design Standard DS-E12.5.2, "Cable, 480 V Power Receptacles," R1 (11/23/82)
- h. TVA Office of Nuclear Power Employee Safety Handbook.

6. WHAT REGULATIONS, LICENSING COMMITMENTS, DESIGN REQUIREMENTS OR OTHER APPLY OR CONTROL IN THIS AREA?

None

7. LIST REQUESTS FOR INFORMATION, MEETINGS, TELEPHONE CALLS, AND OTHER DISCUSSIONS RELATED TO ELEMENT.

- a. Telecon from Wheeler, Bechtel, to Brickey, TVA, (04/29/86), IOM # 066
- b. Telecon from Wheeler, Bechtel, to Ewing, Crouse-Hinds, (04/29/86), IOM # 068
- c. Telecon from Wheeler, Bechtel, to Kennedy, Appleton, (05/05/86), IOM # 079
- d. Telecon from Wheeler, Bechtel, to Walker, OSHA, (05/09/86), IOM # 096
- e. Telecon from Wheeler, Bechtel, to Bradley, TENN-OSHA, (05/09/86), IOM # 095
- f. Field walkdown at Sequoyah site conducted by Jack Wheeler, Bechtel, and N. Black, TVA, (08/23/86), BLT-080
- g. Field walkdown at Sequoyah site conducted by Jack Wheeler, Bechtel, and G. Bill, TVA, (10/09/86)

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CATD LIST

The following CATD forms are included as part of this report:

235.01(B) SQN 01

235.01(B) SQN 02 (Revised 02/19/87)

DATE _____

1. Immediate Corrective Action Required: ☐ Yes ☒ No
2. Stop Work Recommended: ☐ Yes ☒ No
3. CATD No. 235.01(B)-SQN-02 4. INITIATION DATE - 02/19/87
5. RESPONSIBLE ORGANIZATION: DNE SQN
6. PROBLEM DESCRIPTION: ☐ QR ☒ NQR THERE IS NO ASSURANCE
THAT "CIRCUIT BREAKING" PLUGS HAVE BEEN
SPECIFIED OR USED WITH THE SPECIFIED CROUSE-
HINDS RECEPTACLES IN ALL CASES.

7. PREPARED BY: NAME JACK B. WHEELER *[Signature]* DATE: 02/19/87
8. CONCURRENCE: CEG-H George R. Minnick DATE: 2-24-87
9. APPROVAL: ECTG PROGRAM MGR. DW. [Signature] DATE: 2-25-87

☐ ATTACHMENTS

[illegible]

13. Approved corrective actions have been verified as satisfactorily implemented.

DATE _____

Bechtel Western Power Corporation

Engineers - Constructors

Fifty Beale Street

San Francisco, California

Mail Address: PO Box 3985 San Francisco, CA 94119



July 28, 1987

BLT-359

Mr. George R. McNutt
Engineering CEG-H
Tennessee Valley Authority
Knoxville, Tennessee 37902

Subject: Watts Bar Nuclear Plant
Employee Concerns Evaluation Program
Tennessee Valley Authority
Job No. 76985-026
SEQUOYAH NUCLEAR PLANT CORRECTIVE ACTION PLAN 235 01 SQN 01 and -02

Dear Mr. McNutt:

The subject CAP, as transmitted by TCAB-096 dated 06/25/87, responds to Corrective Action Tracking Document 235 01 SQN 01 and -02.

The implementation of the corrective action indicated in the supplement TVA memo, J. B. Hosmer to R. C. Denny [B25 870717 009], to the CAP for CATD 235 01 SQN 01 and -02 is acceptable to the evaluation team and will be incorporated into the subcategory report.

Very truly yours,

G. L. Parkinson
Project Manager

GLP/JW/88/3242D

UNITED STATES GOVERNMENT

Memorandum

T 25 870804 864

TENNESSEE VALLEY AUTHORITY

TO : H. L. Abercrombie, Site Director, Sequoyah Nuclear Plant ONP

FROM : W. R. Brown, Jr., Program Manager, Employee Concerns Task Group,
Watts Bar Nuclear Plant ONP

DATE : AUG 04 1987

SUBJECT: SEQUOYAH NUCLEAR PLANT (SQN) - EMPLOYEE CONCERNS TASK GROUP (ECTG)
ELEMENT REPORTS - ENGINEERING CATEGORY - CONCURRENCE WITH CORRECTIVE
ACTION PLAN (CAP)

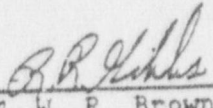
The category evaluation group leader, Engineering, concurs with the CAPs for the following CATDs.

23501-SQN-01

23501-SQN-02

This concurrence is based upon the CAP and the supplemental information in the Hosmer to Denney memorandum (B25 870717 009.)

Please inform me when your corective action is complete and you are ready for me to close out the CATDs.


for W. R. Brown, Jr.

GRM:GB

Attachments

cc (Attachments):

RIMS, MR 4N 72A-C

R. C. Denney, DSC-P, Sequoyah

Jack Howard, ECTG Bldg, ONP, Watts Bar

Guy Huff, ECTG Bldg., ONP, Watts Bar

J. L. McAnally, ONP, Watts Bar

G. R. McNutt, ECTG Bldg, ONP, Watts Bar

UNITED STATES GOVERNMENT

Memorandum

QA Record

TENNESSEE VALLEY AUTHORITY

B25 '87 0717 009

TO : R. C. Denney, Employee Concerns Special Project Manager, DSC-P, Sequoyah Nuclear Plant

FROM : J. B. Hosmer, Project Engineer, Sequoyah Engineering Project, DSC-E, Sequoyah Nuclear Plant

DATE : JUL 17 1987

SUBJECT: SEQUOYAH NUCLEAR PLANT (SQN) - EMPLOYEE CONCERN TASK GROUP (ECTG) ELEMENT REPORT NO. 235.01 SQN R1 - REVIEW AND CORRECTIVE ACTION PLAN (CAP) - SUPPLEMENTAL REVIEW

Reference: My memorandum dated June 12, 1987 (B25 870612 010)

This is in supplement to the response provided in the referenced memorandum for the subject ECTG element evaluation report.

Further review of Sequoyah Nuclear Plant electrical bill of material indicated mark number "SRT" as a mating plug for use with 480-V plug receptacle with mark numbers "SRA" and "SRB". However, the words "or equal" have been inadvertently omitted for mark number "SRT" which will allow the project to procure equivalent plugs for use with the 480-V plug receptacles.

We have revised the master bill of material for mark number "SRT" to include the equivalent material.

Considering the above, no further corrective action is required on this ECET element.

J. B. Hosmer
J. B. Hosmer

RCW:AJ:BE
Attachment
RCW cc (Attachment):

RIMS, SL 26 C-K
H. L. Abercrombie, D&PS-4, Sequoyah
G. P. Cooper, 5-215 SB-K
G. T. Hall, DSC-P, Sequoyah
T. C. Price, 5-233 SB-K
R. D. Rudder, DSC-E, Sequoyah
~~P. C. Williams, DSC-P, Sequoyah~~
A. Kaju, DSC-P, Sequoyah



UNITED STATES GOVERNMENT

S03 870617 851

Memorandum

TENNESSEE VALLEY AUTHORITY

TO : J. L. McAnally, Corrective Action Program Manager, A108 IOB, ONP,
Watts Bar Nuclear Plant

FROM : H. L. Abercrombie, Site Director, O&PS-4, Sequoyah Nuclear Plant

DATE : June 20, 1987

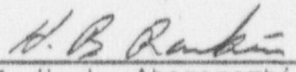
SUBJECT: SEQUOYAH NUCLEAR PLANT (SQN) - EMPLOYEE CONCERNS TASK GROUP (ECTG) ELEMENT
REPORT 235.01 SQN - ENGINEERING CATEGORY - CORRECTIVE ACTION PLAN (CAP)

Reference: Your memorandum to R. C. Denney dated May 19, 1987, "Watts Bar
Nuclear Plant (WBN) - Transmittal of Employee Concerns Special
Program (ECSP) Fact Sheets and Corrective Action Tracking
Documents (CATDs) - WBN"

I acknowledge receipt of your element report and in accordance with your
request (see reference) Element Report 235.01 SQN has been reviewed for
applicable corrective action.

By way of this memorandum, I am endorsing the site line organization CAP,
returning your CATD Nos. 235.01-SQN-01 and 235.01(B)-SQN-02, and attaching the
CAP for your review/concurrence. This CAP is not a restart requirement.

If ECTG agrees with the proposed CAP, please have them sign the ECTG
concurrence space below item 9 on the CAP checklist and return the CAP
tracking checklist.


for H. L. Abercrombie

RCM:RCD:JB:CNA

Attachments

cc (Attachments):

RIMS, MR 4N 72A-C (B25 870612 010) (w/reference)
T. C. Price, 5-212 SB-K (w/reference)

0360D



ECSP CORRECTIVE
Action Tracking Document
(CATD)

INITIATION

1. Immediate Corrective Action Required: ☐ Yes ☒ No
2. Stop Work Recommended: ☐ Yes ☒ No
3. CATD No. 235.01-SOJ-01
4. INITIATION DATE 16 DEC 86
5. RESPONSIBLE ORGANIZATION: DNE SOJ
6. PROBLEM DESCRIPTION: ☐ QR ☒ NQR ELECTRICAL DESIGN STANDARD DS-E-12.5.2 AND THE MASTER BILL OF MATERIALS DO NOT SPECIFY THE ACCEPTABLE MATING PLUGS TO BE USED WITH THE SPECIFIED 480V RECEPTACLES.
7. PREPARED BY: NAME JACK B. WHEELER ☐ ATTACHMENTS NO DATE: 16 Dec 86
8. CONCURRENCE: CEG-H: George R. McHatt DATE: 2-24-87
9. APPROVAL: ECTG PROGRAM MGR. DW Stewart for DATE: 2-25-87

CORRECTIVE ACTION

10. PROPOSED CORRECTIVE ACTION PLAN: SEE THE CAP TRANSMITTED BY MEMORANDUM B75 870612 010
- * See Supplemental info in memo

11. PROPOSED BY: DIRECTOR/MGR: H B Hunter ☐ ATTACHMENTS NO DATE: 6-19-87
12. *CONCURRENCE: CEG-H: George R. McHatt DATE: 7-30-87
SRP: N/A DATE:
ECTG PROGRAM MGR: RRH for DATE: 8/4/87

VERIFICATION AND CLOSEOUT

13. Approved corrective actions have been verified as satisfactorily implemented.

SIGNATURE

TITLE

DATE

ECSP CORRECTIVE
Action Tracking Document
(CATD)

INITIATION

1. Immediate Corrective Action Required: ☐ Yes ☒ No
2. Stop Work Recommended: ☐ Yes ☒ No
3. CATD No. 235.01(B)-SON-02 4. INITIATION DATE 02/19/87
5. RESPONSIBLE ORGANIZATION: DNE SON
6. PROBLEM DESCRIPTION: ☐ OR ☒ NQR THERE IS NO ASSURANCE
THAT "CIRCUIT BREAKING" PLUGS HAVE BEEN
SPECIFIED OR USED WITH THE SPECIFIED CROUSE-
HINDS RECEPTACLES IN ALL CASES.
7. PREPARED BY: NAME JACK B. WHEELER ☐ ATTACHMENTS DATE: 02/19/87
8. CONCURRENCE: CEG-H George R. McNamee DATE: 2-24-87
9. APPROVAL: ECTG PROGRAM MGR: D. D. D. D. DATE: 2-25-87

CORRECTIVE ACTION

10. PROPOSED CORRECTIVE ACTION PLAN: SEE THE CAP TRANSMITTED
BY MEMORANDUM B25 87 0612 010

* See Supplemental info in Memo
11. PROPOSED BY: DIRECTOR/MGR: H. B. Rankin ☐ ATTACHMENTS DATE: 6-19-87
12. *CONCURRENCE: CEG-H: George R. McNamee DATE: 7-20-87
SRP: N/A DATE:
ECTG PROGRAM MGR: all right DATE: 8/4/87

VERIFICATION AND CLOSEOUT

13. Approved corrective actions have been verified as satisfactorily implemented.

SIGNATURE

TITLE

DATE

Attachment A

Page 1 of 2

Corrective Action Plan of Employee Concern Investigation
Tracking Checklist

ECTG Report/CATD Number 235-01 SQNR1/235-01 (R)-SQN-02
Lead Organization Responsible for Corrective Action Plan DNE
Initiation Date 6-11-87

CORRECTIVE ACTION PLAN (CAP)

1. Does this report require corrective action? Yes _____ No ☒
(If yes, describe corrective action to be taken, if no, provide justification)
1. 480V POWER RECEPTACLES AND MATING PLUGS
ARE MANUFACTURED IN ACCORDANCE WITH THE
REQUIREMENTS OF UL-498.514 AND NATIONAL
ELECTRICAL CODE.
2. RECEPTACLES HAVE FULL RATING CIRCUIT
BREAKING CAPABILITY AND WILL NOT
ACCEPT MATING PLUGS WITH A DIFFERENT
2. Identify any similar item/instances and corrective action taken. (CONT'D ON V)
N/A
3. Will corrective action preclude recurrence of findings? Yes N/A No N/A
4. Does this report contain findings that are conditions adverse to quality (CAQ)
as defined by AI-12 or NEP 9.1? YES _____ No ☒
5. IF a CAQ condition exists, what CAQ document was initiated?
N/A
6. Which site section/organization is responsible for corrective action?
N/A
7. Is corrective action required for restart? Yes N/A No N/A
(This determination is to be made using Attachment C of SQA166.)
8. P2 zone number for restart corrective action? Zone N/A
9. Estimate completion date for correction action. N/A

Completed By John J. [Signature]Approved By N/A

ECTG Concurrence _____

Date 6-12-87Date 6-12-87

Date _____

ATTACHMENT A

Page 2 of 2

CAP CLOSURE

10. Was your corrective action initiated and completed in accordance with step 1? Yes N/A No N/A

11. If step 10 is no, describe the corrective action taken.

N/A

12. Is the corrective action implementation complete? Yes N/A No N/A
 13. Is the corrective action documentation closed? Yes N/A No N/A
 14. What documents were used to implement the corrective action? N/A

Completed By: _____ Date: _____
 Verified By: _____ Date: _____
 ECTG Closure: _____ Date: _____

(Step No.)

Description

(CONT'D FROM SH-1) VOLTAGE OR CURRENT RATING. ALSO THE ARC FORMED BY PULLING THE PLUGS IS INSTANTLY SNUFFED IN THE DEEP, CONFINED INSULATED ARCING CHAMBER WHILE THE PLUG CONTACT IS STILL A CONSIDERABLE DISTANCE INSIDE. THE ARC CAN NOT TRAVEL TO THE OTHER SIDE OF THE CIRCUIT OR TO THE HOUSING.

3. REQUIREMENTS FOR POWER INPUT CORD AND ATTACHMENT PLUG ARE NORMALLY CALLED OUT IN THE UTILIZATION EQUIPMENT PROCUREMENT SPECIFICATION.

4. PER SON STANDARD PRACTICE SQA-149 AND MAINTENANCE INSTRUCTION MI-14-1, ALL WELDING MACHINES/POWER TOOLS ARE REQUIRED TO BE TESTED ANNUALLY AND ACTION TAKEN TO REPAIR/REPLACE DEFECTIVE EQUIPMENT. (INCLUDING CORDS & PLUGS)

CONSIDERING THE ABOVE, NO CORRECTIVE ACTION IS REQUIRED FOR THIS ECTG ELEMENT REPORT.