

1. CHARACTERIZATION OF ISSUES:

Concern:

Issue:

ECTG-3

"Valve wiring circuits allow red and green lights to operate at reduced voltage and light dimly, if at all, upon a malfunction of the P-auto contact of the Westinghouse W-2 control switch on the unit control board."

- a. Control switch malfunction causes red and green indicating lights to be dark or partially illuminated.

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

- o Identified by Black and Veatch

Date October 27, 1982

Black and Veatch Findings Report, - "Finding 112"

- o Identified by TVA Task Force for Review of Black and Veatch Findings

Date April 20, 1983

TVA Task Force Evaluation Sheet, "Task Force Category 37 for Sequoyah Nuclear Plant - Units 1 and 2"

- o Identified by TVA Quality Management Staff

Date January 18, 1985

TVA Quality Management Staff, "Surveillance Report for the Assessment of the Effectiveness of Corrective Actions Identified in the Task Force Report on the Black and Veatch Findings"

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

Concern applies to all control circuits containing Westinghouse type W-2 spring return to neutral control switches for safety-related motor operated valves. The concern applies also to control circuits of other safety-related equipment where W-2 switch malfunction, through the sneak circuit path, could cause misleading indication of equipment condition.

4. INTERVIEW FILES REVIEWED:

Employee Concern Task Group (ECTG) files were reviewed and no additional unreviewed information for Sequoyah was identified for the concern addressed in this report.

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 Nuclear Regulatory Commission (NRC) investigative interviews for additional information regarding this concern.
- b. Reviewed existing reports, findings, and responses to findings to assess their adequacy and the extent to which they satisfy the concern. Identified other documents needed to perform the review.
- c. Reviewed existing TVA construction, QA/QC, Operation, and Material Control reports for the Employee Concerns Special Program for applicability to the concern discussed in this report.

9. DISCUSSION, FINDINGS, AND CONCLUSIONS:

Chronology:

- 07/31/80: NRC IE Bulletin 80-20 identified a malfunction of Westinghouse W-2 switches; continuity testing of W-2 switches required until circuits have been modified to monitor W-2 switch contact
- 08/18/80: SQ-DCR 837 responds to NRC IE Bulletin 80-20
- 09/16/80: TVA advises NRC that continuity testing had been performed and long-term corrective action was being pursued with Westinghouse
- 08/05/81: Westinghouse advises TVA that W-2 switches do not have a common mode failure mechanism but TVA may monitor the switch contact or purchase new switches
- 11/09/81: TVA submits final response to NRC IE Bulletin 80-20
- 01/22/82: NRC IE Information Notice 82-01 cautions against introducing sneak circuit in the course of implementing IE Bulletin 80-20 (sneak circuit is defined in Discussion below).
- 01/27/82: Westinghouse advises TVA that its 08/05/81 position had been reversed by the NRC
- 04/05/82: TVA Nuclear Engineering Branch (NEB) submits proposed revised final response for NRC IE Bulletin 80-20 and acknowledges the NRC caution against sneak circuit in IE Information Notice 82-01
- 06/07/82: Engineering Change Notice (ECN) L5591 RO implements DCR 837
- 10/27/82: Sneak circuit problem identified in Black and Veatch Findings Report for Watts Bar
- 01/20/83: TVA advises NRC that long-term corrective action of changing out W-2 switches will be completed after Unit 1 cycle 2 refueling outage
- 04/20/83: TVA SQN Task Force identifies sneak circuit problem as generic for Sequoyah in preliminary evaluation of Black and Veatch finding
- 02/21/84: TVA SQN Task Force initiates corrective action to eliminate sneak circuit

02/23/84: ECN L5591 Data Sheet 4 R0 issued to correct sneak circuit

06/08/84 Drawings issued as required by ECN L5591, Data Sheet 4 R1

11/86: K-form submitted to TVA

Discussion:

The concern, that W-2 switch malfunction would cause misleading indication of valve position through a sneak circuit in the position indicating light wiring, was raised on Watts Bar. It is considered to be a generic problem for Sequoyah since Westinghouse W-2 control switches are used in both plants.

The problem was first identified for TVA plants in the Black and Veatch Findings Report for Watts Bar (App. A, 5.a; 10/27/82) and subsequently evaluated for Sequoyah by the TVA Task Force for Review of Black and Veatch Findings (App. A, 5.e; 04/20/83).

The NRC transmitted IE Bulletin 80-20 July 31, 1980 to alert TVA to the malfunction of W-2 switches, and in response, TVA committed to the following actions:

- o Perform continuity tests on all W-2 switches, spring return to neutral, used in safety-related applications. Repeat the tests every 31 days as well as following each operation of the switches (preliminary responses, App. A, 5.cc and 5.ee; 12/12/80 and 09/16/80).
- o Rewire existing indicating lights in series with the W-2 switch contact. Where indicating lights do not exist, replace the W-2 switches with new W-2 switches manufactured under a new process (final response, App. A, 5.x; 11/09/81). The option of replacing the W-2 switches with new W-2 switches was based on a Westinghouse recommendation (App. A, 5.z; 08/05/81).

The TVA commitment included testing and modifications of control circuits for valve control circuits and for all other safety-related equipment utilizing W-2 spring return to neutral switches.

To comply with NRC IE Bulletin 80-20, Design Change Request DCR-837 initiated wiring changes so that indicating lights will monitor the W-2 switch contact continuity in the neutral position. Subsequently, the wiring change was defined in ECN L5591 and design work was completed on August 23, 1982.

TVA's final response to the NRC on Bulletin IE 80-20, as noted above, included an option, based on a Westinghouse recommendation, to replace W-2 switches with new W-2 switches manufactured under a new process. After discussions with the NRC, Westinghouse reversed its position and eliminated the W-2 switch replacement option (App. A, 5.u; 02/02/82). The reversal made necessary a revised final response by TVA as discussed in a TVA memo from Raulston to Mills, April 5, 1982 (App. A, 5.g). However, no record could be found by the evaluation team that a revised final response had been submitted to NRC.

Although the option for replacement of the original W-2 switches with new W-2 switches had been rejected, TVA did replace, according to a discussion with TVA (App. A, 7.a), certain W-2 switches with new switches manufactured by Electroswitch. Neither drawings nor other documentation could be found for the switch replacement nor could evidence be found that a revised final response had informed the NRC of the switch replacement.

As a result of the wiring change, the sneak circuit was introduced inadvertently. A sneak circuit can be defined as a path for electrical current, not intended by the circuit designer, and which causes unexpected and, usually, unacceptable circuit functioning. In this case, the sneak circuit could only exist if the W-2 switch contact, normally closed in neutral position, would fail open, causing the valve position indicating lights to dim. The sneak circuit was later identified by Black and Veatch on October 27, 1982 and was corrected by revision of ECN L5591. Design drawing revisions to eliminate the sneak circuit were completed June 8, 1984.

TVA Electrical Engineering Branch (EEB) prepared the final evaluation for the TVA Task Force for the Review of Black and Veatch Findings and concluded that the sneak circuit problem was caused by inadequate design checking. EEB concluded further that current procedures were sufficient to provide reasonable assurance that deficiencies of this type would not recur in the future. Although the evaluation team could not find documentation of Task Force concurrence with the EEB conclusions, this absence of concurrence is not considered significant and no corrective action is required. In the TVA Task Force final evaluation, EEB stated that there was a need to design circuits that do not rely on the operator judgment of lamp brightness to determine equipment condition. The evaluation team agrees with the EEB position.

The Quality Management Staff (QMS) Surveillance Report (App. A, 5.c; 01/28/85) concluded that the problem had been corrected by implementation of ECN L5591 but could have been prevented by recognition of NRC IE Information Notice 82-01, issued 01/22/82 (App. A, 5.o). QMS noted that NRC IE Information Notice 82-01, cautioning against the sneak circuit, had been received prior to issue of ECN L5591. Also, QMS recommended that TVA management become more effective in internal communications relative to the assessment and disposition of NRC information notices, circulars, and bulletins.

The evaluation team review supports the conclusion of the TVA Task Force evaluation and the QMS report stated above. The QMS report noted that ECN L5591 had not been closed indicating the possibility of additional design and construction work. The applicable engineering procedure (EP) in force while this ECN was in process (1982-1984) was Office of Engineering's Engineering Procedure EN DES-EP 4.52 "Engineering Change Notices (ECNs) After Licensing - Handling." This EP required closure of ECNs upon completion of design or construction work. The EP in effect at present is NEP 6.1, "Change Control," which also requires closure of an ECN when design has been completed and the design has been physically implemented by construction. The evaluation team could find no evidence of completion of construction work or of closure of the ECN.

During the time the NRC IE Notice and Bulletin were being addressed and while ECN L5591 was in process, engineering procedure EN DES-EP 1.26 "Nonconformances - Reporting and Handling by EN DES" was in effect. This EP required that all conditions adverse to quality (CAQs) be documented by nonconformance reports (NCRs). This EP is no longer applicable; however, its replacement Nuclear Engineering Procedure NEP-9.1 "Corrective Action," requires that all significant CAQs must be documented by significant condition reports (SCRs). A CAQ is significant, according to EN DES-EP-1.26, when it requires extensive redesign, repair, or rework or when it has generic implications at other TVA nuclear plants. The evaluation team believes that both the wiring change to monitor W-2 switch continuity identified in 1980 and the subsequent sneak circuits identified in 1982 were significant CAQs by definitions cited above and should have been documented by NCRs. No NCR or SCR could be found by the evaluation team.

The significance of this deficiency stems from the fact that the operator depends on two lights, one red and one green, for indication of valve position. The red light illuminated indicates valve fully open; the green light illuminated indicates valve fully closed. When the valve is in an intermediate position, between fully open and fully closed, both red and green lights are

illuminated. The sneak circuit described above would cause both indicating lights to be dark or at best partially illuminated if the W-2 switch contact failed open. This abnormal condition could mislead the operator, observing both lights partially illuminated, to believe that the valve was in an intermediate position even though it might actually be fully open or closed.

Furthermore, the evaluation team found a discrepancy in the count of W-2 switches. ECN L5591 RO issued June 7, 1982 lists 60 switches to be rewired. However, the TVA memo from Raulston to Chandler, May 14, 1982 (App. A, 5.h) added eight switches to an "original list of 57" for a total of 65 switches to be corrected. The "original list of 57," March 5, 1982 (App. A, 5.tt), in a discussion with TVA (App. A, 7.a) was characterized as the informal basis for ECN L5591. The evaluation team could not establish that switch listings, including revisions and additions, have been consistent or traceable starting from initial review conducted in response to IE Bulletin 80-20 and continuing throughout the design process.

Finally, no evidence could be found of a program to prevent recurrence of the problem. The various switch listings and the ECN include only the W-2 switches with suspect contacts then currently functioning in the circuit and required by IE Bulletin 80-20 to be monitored for continuity. However, the balance of the installed W-2 switches, which were not listed, contain unused (spare) contacts which are suspect also. Although the possibility exists that future circuit modifications could require use of the suspect spare contacts, no cautions were noted on drawings or other documents to ensure that the contacts would be properly monitored as required by IE Bulletin 80-20 or that sneak circuits would be avoided as advised by IE Information Notice 82-01. This lack of documentation could cause a similar problem also in the future use of spare W-2 switches now in stock.

Findings:

Control switch malfunction, through the sneak circuit path inadvertently introduced by implementation of IE Bulletin 80-20, caused the valve position indicating lights to be dark or partially illuminated.

In addition, during the investigation the evaluation team identified the following findings. Although a proposed revised response was attached to a TVA internal memo eliminating the option for replacement of the original W-2 switches with new W-2 switches, no evidence could be found that a revised final response to NRC IE

Bulletin 80-20 had been submitted to the NRC. Also absent from the record are documentation of an option that was exercised, the replacement of certain of the original W-2 switches with new switches manufactured by Electroswitch, and a final revised response to the NRC describing this replacement.

Concurrence by the TVA Sequoyah Task Force for Review of Black and Veatch Findings with the final evaluation by TVA EEB could not be found. The absence of concurrence is not considered significant and requires no corrective action.

The TVA QMS report (App. A, 5.c) in 1985 noted that ECN L5591 had not been closed indicating the possibility of additional design and construction work. The evaluation team could find no documentation confirming completion of construction work or of closure of the ECN.

The wiring change to the indicating lights and the later correction of the sneak circuits were significant CAQs which should have required NCRs. No NCRs could be found by the evaluation team.

There is a discrepancy in the count of W-2 switches found by comparison of several listings and a TVA memo. There is no evidence that W-2 switch listings used in the IE Bulletin 80-20 reviews and as a basis for design have been consistent or traceable or that all W-2 switches requiring changes have been identified and their circuits corrected. In addition, no program was found which would prevent recurrence of the problem in the event that future circuit modifications required use of installed W-2 switch spare contacts or spare W-2 switches now in stock.

Conclusion:

The concern is valid since control switch malfunction, through the sneak circuit path, caused the valve position indicating lights to be dark or partially illuminated. This abnormal indication could mislead the operator concerning valve position. Furthermore, no evidence could be found that:

- o The revised final response for the related IE Bulletin has been submitted to the NRC.
- o The design and construction work, to respond to the IE Bulletin and subsequently to eliminate the sneak circuits, has been completed.
- o Replacement of certain W-2 switches by Electroswitch switches had been documented.

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- o Necessary NCRs or SCRs had been initiated to address significant CAQs.
 - o W-2 switch listings had been consistent or traceable throughout the review and design process.
 - o A program exists to prevent recurrence of the problem.

10. CORRECTIVE ACTION

A corrective action plan (CAP) has been produced by TVA and transmitted by TVA letter TCAB-077, February 17, 1987 (App. A, 5.yy).

The CAP responds to corrective action tracking documents (CATDs) 235.11(B) SQN 01, 02, 03, 04, and 05 and commits to the following actions:

- a. CATD 235.11(B) SQN 01 contained the following problem description: No final revised response to the NRC could be found for IE Bulletin 80-20. The revised response is needed to address:
 - o Reversal by Westinghouse of its position on corrective action as discussed in TVA memo from Raulston to Mills (NEB 820405 266) (04/05/82)
 - o Replacement of W-2 switches with switches manufactured by Electroswitch.

TVA will evaluate the above condition and, if required, will submit appropriate response to the NRC.

- b. CATD 235.11(B) SQN 02 contained the following problem description: Closure of ECN L5591 could not be established to document that design and construction work has been completed including replacement of certain W-2 switches with switches manufactured by Electroswitch.

TVA will:

- o Establish as-designed and as-constructed status of applicable switch circuits
- o Revise ECN L5591 to ensure inclusion of all applicable safety-related switches

- o Close ECN L5591 following design completion and construction implementation according to applicable engineering procedures.
- c. CATD 235.11(B) SQN 03 contained the following problem description: No NCR or SCR could be found to address the following CAQs:
 - o Malfunction of Westinghouse W-2 switches, identified by IE Bulletin 80-20
 - o Sneak circuits in indication wiring identified by Black and Veatch Finding 112.

TVA will issue SCR SQNEEB8792 to address the subject CAQs. The SCR also reports the problems identified in CATDs 235.11(B) SQN 01, 02, 04, and 05.

- d. CATD 235.11(B) SQN 04 contained in the following problem description: Traceability of the W-2 switch listings could not be established; the listings reviewed were inconsistent and did not provide an adequate basis for design changes in response to IE Bulletin 80-20 and subsequent correction of sneak circuits.

TVA will:

- o Create a definitive list, to be used as a design input, of all applicable switch circuits
 - o Review the design basis of the circuit change before implementation
 - o Verify that there are no applicable switch circuits with a sneak circuit path.
- e. CATD 235.11(B) SQN 05 contained the following problem description: A program could not be found to prevent recurrence of the problem if spare W-2 switches in stock or spare contacts of W-2 switches now installed were required to be used in the future. No cautions on drawings or other documents were found to ensure that these contacts would be monitored as required by IE Bulletin 80-20 or that sneak circuits would be avoided as advised by IE information notice 82-01.

TVA will add a cautionary note to the switch contact development drawing to prevent problems in future applications or replacement of W-2 switches or in the introduction of sneak circuit paths.

The TVA corrective actions listed above directly address each aspect of the problems and should provide acceptable solutions.

TVA indicates that the corrective actions are required to be completed after restart of Sequoyah except for CATD 235.11(B) SQN 05 which is a restart item. This is documented in TVA letter TCAB-081 dated March 31, 1987 (App. A, 5.zz) which provides Revision 1 to the CAP. The revised CAP also provides for the following TVA corrective actions to be completed before restart:

- o Identify all W-2 switches used in safety-related circuits
- o Review each type W-2 switch application to ensure that all failures which could result from spring return to neutral or sneak circuits will be detectable by the operators
- o All plant operators must be notified of the possible failure mode of the W-2 switches and the effect on control board status light indication.

The evaluation team concurs with the revised CAP because TVA will complete a review of all safety-related W-2 switches and make the operators aware of the possible failure modes. This will ensure that operators are not misled if such failure modes occurs (e.g., incorrect indication). As mentioned above, TVA will also complete the corrective action for CATD 235.11(B) SQN 05 before restart. This action is considered appropriate to preclude recurrence of the problem, should circuit design changes be considered.

APPENDIX A

5. DOCUMENTS REVIEWED RELATED TO THE ELEMENT:

- a. Black and Veatch Findings Report, Finding 112, (10/27/82)
- b. TVA WBN Task Force Report Evaluation of Black and Veatch Findings, (03/19/84)
- c. TVA memo from J. W. von Weisenstein to Quality Management staff files, (QMS 850128 200), "Assessment of Adequacy of Corrective Action for Black and Veatch Task Force Category 37 - SQN Units 1 and 2," (01/28/85)
- d. TVA EN DES Calculations, "Black and Veatch Task Force Category 37 Safety Evaluation of Indicating Light Sneak Circuits," Watts Bar Units 1 and 2 (NEB 840207 221)
- e. TVA Task Force for Review of Black and Veatch Findings, Task Force Category 37 for Sequoyah Nuclear Plant, Units 1 and 2 Evaluation Sheet, RO, (04/20/83)
- f. TVA memo from H. J. Green to M. N. Sprouse, (DES 820224 010), "SQN DCR 837," (02/22/82)
- g. TVA memo from J. A. Raulston to L. M. Mills, (NEB 840405 266), "Sequoyah and Watts Bar Nuclear Plants - Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches - IE Bulletin 80-20," (04/05/82)
- h. TVA memo from J. A. Raulston to F. W. Chandler, (NEB 820514 254), "Sequoyah Nuclear Plant - IE Bulletin 8-20 Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches," (05/14/82)
- i. TVA memo from R. W. Cantrell to J. A. Raulston, (SQP 820202 040), "Sequoyah and Watts Bar Nuclear Plants - IE Bulletin 80-20 Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches," (01/27/82)
- j. TVA memo from M. N. Sprouse to H. J. Green, (SWP 820308 071), "SQ DCR-837," (03/08/82)
- k. TVA memo from M. N. Sprouse to H. J. Green, (SQP 820610 004), "Sequoyah Nuclear Plant - NRC Commitment Schedule for the Unit 1 Refueling Outage - ECN L5591 W-2 Switches," (06/10/82)

APPENDIX A (cont'd)

- l. TVA memo from F. W. Chandler to H. L. Jones, (EEB 840227 917), "Sequoyah Nuclear Plant Units 1 and 2 - Evaluation of Black and Veatch Finding for Category 37," (02/24/84)
- m. Westinghouse letter to J. A. Raulston, TVA, (WAT D-4813), "Sequoyah and Watts Bar Nuclear Plants - TVA Questions on OT-2 and W-2 Switches," (02/23/82)
- n. NRC IE Bulletin 80-20, "Failures of Westinghouse W-2 Spring Return to Neutral Control Switches," (07/31/80)
- o. NRC IE Information Notice 82-01, "Auxiliary Feedwater Pump Lockout Resulting from Westinghouse W-2 Switch Circuit Modification," (01/22/82)
- p. SQ-DCR-837 (08/18/80)
- q. ECN L5591 RO (06/07/82)
- r. TVA EN DES Design Calculations, "Black and Veatch Task Force Category 37 Safety Evaluation of Indicating Light Sneak Circuits, Watts Bar Units 1 and 2," (NEB 840207 221), (02/07/84)
- s. TVA letter from L. M. Mills to J. P. O'Reilly (NRC), (A27 830120 016), "IE Bulletin 80-20 - Sequoyah Nuclear Plant - Revised Response," (01/20/83)
- t. TVA memo from F. W. Chandler to G. F. Dilworth, (EEB 801001 906), "IE Bulletin 80-20 Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches," (09/30/80)
- u. Westinghouse letter to J. A. Raulston, TVA, (WAT-D-4784), "Sequoyah 2 and Watts Bar 1 and 2 - Type W Switch Safety-Related Applications," (02/02/82)
- v. TVA memo from J. A. Raulston to L. M. Mills, (NEB 811210 257), "Sequoyah and Watts Bar Nuclear Plants - IE Bulletin 80-20 - Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches," (12/10/81)
- w. TVA memo from J. A. Raulston to L. M. Mills, (NEB 810821 259), "IE Bulletin 80-20 - Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches," (08/21/81)

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- x. Letter from L. M. Mills, TVA, to J. P. O'Reilly, NRC, (A27 811109 030), "IE Bulletin 80-20 - Sequoyah, Watts Bar, Bellefonte, and Yellow Creek Nuclear Plants - Response to Bulletin," (11/09/81)
- y. Letter from L. M. Mills, TVA, to J. P. O'Reilly, NRC, (A27 810813 019), "IE Bulletin 80-20 - Sequoyah, Watts Bar, Bellefonte, and Yellow Creek Nuclear Plants - Response to Bulletin," (08/13/81)
- z. Westinghouse letter to J. A. Raulston, TVA, (WAT-D-4525), "Sequoyah and Watts Bar Nuclear Plants Unit 1 and 2 - W-2 Switch," (08/05/81)
- aa. Letter from L. M. Mills, TVA, to J. P. O'Reilly, NRC, (A27 810402 016), "IE Bulletin 80-20 - Sequoyah, Watts Bar, Bellefonte, and Yellow Creek Nuclear Plants - Response to Bulletin," (04/02/81)
- bb. TVA memo from J. A. Raulston to L. M. Mills, (NEB 801219 251), "IE Bulletin 80-20 - Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches," (12/19/80)
- cc. Letter from L. M. Mills, TVA, to J. P. O'Reilly, NRC, (A27 801212 010), "IE Bulletin 80-20 - Sequoyah, Watts Bar, Bellefonte, and Yellow Creek Nuclear Plants - Response to Bulletin," (12/12/80)
- dd. TVA memo from L. M. Mills to J. A. Raulston, (NEB 801023 283), "IE Bulletin 80-20 - Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches," (10/23/80)
- ee. Letter from L. M. Mills, TVA, to J. P. O'Reilly, NRC, (A27 800916 013), "IE Bulletin 80-20 - Sequoyah, Watts Bar, Bellefonte, and Yellow Creek Nuclear Plants - Response to Bulletin," (09/16/80)
- ff. TVA memo from J. R. Calhoun to L. M. Mills (DES 800919 022), "IE Bulletin 80-20, Dated July 31, 1980, J. P. O'Reilly to H. G. Parris," (09/18/80)
- gg. TVA memo from J. R. Calhoun to M. N. Sprouse, (DES 800821 039), "Sequoyah Nuclear Plant - Design Change Request No. SQ-DCR-837," (08/20/80)

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- hh. Sequoyah FSAR Chapter 7
- ii. TVA Division of Nuclear Engineering Procedure NEP-6.1, "Change Control," RO (07/01/86)
- jj. TVA Division of Nuclear Engineering Procedure NEP-9.1, "Corrective Action," RO (07/01/86)
- kk. TVA memo from M. N. Sprouse to J. R. Calhoun, (NEB 800818 265), "Sequoyah and Browns Ferry Nuclear Plants - NRC IE Bulletin 80-20 - Failures of Westinghouse Type W-2 Spring Return to Neutral Control Switches," (08/26/80)
- ll. TVA memo from L. Wallace to P. Nesbitt, (no RIMS number), "Westinghouse W-2 Spring Return to Neutral Handswitches," (09/20/82)
- mm. Westinghouse Technical Bulletin NSD-TB-80-9, R1, "W-2 Switches (with Spring Return to Neutral), (02/16/81)
- nn. Letter from J. A. Raulston, TVA, to Westinghouse (NEB 801204 105), "W-2 Switches (with Spring Return to Neutral)," (12/04/80)
- oo. TVA memo from F. W. Chandler to R. W. Cantrell, (EEB 811008 910), "Sequoyah Nuclear Plant - IE Bulletin 80-20 - Failure of Westinghouse Type W-2 Spring Return to Neutral Control Switches - Design Change Request SQ-DCR-837," (10/08/81)
- pp. TVA memo from R. W. Cantrell to F. W. Chandler and Raulston, (SWP 810904 006), "Sequoyah Nuclear Plant - IE Bulletin 80-20 - Failure of Westinghouse Type W-2 Spring Return to Neutral Control Switches - Design Change Request SQ-DCR-837," (09/03/81)
- qq. Letter from J. A. Raulston, TVA, to Westinghouse, (NEB 8203023 102), "Westinghouse W-2 Switches (Spring Return to Neutral), (03/23/82)
- rr. TVA memo from F. W. Chandler to R. W. Cantrell, (EEB 810924 936), "Sequoyah Nuclear Plant - IE Bulletin 80-20 - Failure of Westinghouse Type W-2 Spring Return to Neutral Control Switches - Design Change Request SQ-DCR-837," (09/25/81)

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- ss. TVA memo from J. A. Raulston to R. W. Cantrell, (NEB 810924 252), "Sequoyah Nuclear Plant - IE Bulletin 80-20 - Failure of Westinghouse Type W-2 Spring Return to Neutral Control Switches Design Change Request SQ-DCR-837," (09/24/81)
- tt. TVA List by T. E. Kidd, (no RIMS number), "Sequoyah and Watts Bar - W-2 Switches - IE Bulletin 80-20," (03/05/82)
- uu. Letter from B. J. Youngblood, NRC, to S. A. White, TVA, with the attached transcript of the investigative interview conducted by the NRC on 02/21/86 at the First Tennessee Bank Building in Knoxville, TN, (06/23/86) (B45 860714 832)
- vv. TVA Engineering Procedure, EN DES-EP 4.52, R1, "Engineering Change Notices (ECNs) after Licensing - Handling," (04/24/84)
- ww. Letter from J. P. O'Reilly, NRC, to H. G. Parris, TVA, (NEB 800807 254) with the attached IE Bulletin 80-20, (07/31/80)
- xx. TVA Engineering Procedure, EN DES-EP 1.26, R9, "Nonconformance - Reporting and Handling by EN DES," (03/15/85)
- yy. Letter from G. R. McNutt, TVA, to G. L. Parkinson, Bechtel, TCAB-077, "Corrective Action Plan," (02/17/87)
- zz. Letter from G. R. McNutt, TVA, to G. L. Parkinson, Bechtel TCAB-081, "Corrective Action Plan," (03/31/87)

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

- a. NRC IE Bulletin 80-20, "Failures of Westinghouse W-2 Spring Return to Neutral Switches"
- b. TVA Engineering Procedure, EN DES-EP 1.26, "Nonconformance - Reporting and Handling by EN DES"
- c. TVA Engineering Procedure, EN DES-EP 4.52, "Engineering Change Notices (ECNs) after Licensing - Handling"

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

- a. Telephone call from Nesbitt and Kidd, TVA, to Mehegan, Bechtel, IOM 533, (01/08/87)

CATD LIST

The following CATDs identify and provide corrective action for the findings included as part of this report:

235 11 SQN 01 (02/13/87; CAP revised 03/27/87)
235 11 SQN 02 (02/13/87; CAP revised 03/27/87)
235 11 SQN 03 (02/13/87; CAP revised 03/27/87)
235 11 SQN 04 (02/13/87; CAP revised 03/27/87)
235 11 SQN 05 (02/13/87; CAP revised 03/27/87)

REFERENCE - ECPS120J-ECPS121C
 FREQUENCY - REQUEST
 ONP - ISSS - RHM

TENNESSEE VALLEY AUTHORITY
 OFFICE OF NUCLEAR POWER
 EMPLOYEE CONCERN PROGRAM SYSTEM (ECPS)
 EMPLOYEE CONCERN INFORMATION BY CATEGORY/SUBCATEGORY
 SUBCATEGORY: 23511 MALFUNCTION OF WESTINGHOUSE W-2 SWITCH

PAGE - 84
 RUN TIME - 13:58:39
 RUN DATE - 03/19/87

CATEGORY: EN DES PROCESS & OUTPUT

| CONCERN NUMBER | CAT | SUB CAT | S H R D | PLT LOC | 1 REPORT APPL 2 SAF RELATED BF BL SQ WB | HISTORICAL REPORT | CONCERN ORIGIN | CONCERN DESCRIPTION |
|----------------|-----|----------|------------------|------------|---|----------------------|-------------------|---|
| ECTG-3 | 01 | EN 23511 | N | NPS | 1 N H Y Y 2 NA NA SR SR | | NRC | VALVE WIRING CIRCUITS ALLOW RED AND GREEN LIGHTS TO OPERATE AT REDUCED VOLTAGE AND LIGHT DIMLEY, IF AT ALL, UPON A MALFUNCTION OF THE P-AUTO CONTACT OF THE WESTINGHOUSE W-2 CONTROL SWITCH ON THE UNIT CONTROL BOARD. (REF: BLACK AND VEATCH CATEGORY 37 FINDING F112) |

1 CONCERNS FOR CATEGORY EN SUBCATEGORY 23511