

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

GNS '850111 050

TO : Charles Bonine, Jr., Manager of Construction 12-108 SB-K

FROM : K. W. Whitt, Director of Nuclear Safety Review Staff, 249A HBB-K

DATE : January 11, 1985

SUBJECT: BELLEFONTE NUCLEAR PLANT - FOLLOW-UP REVIEW - NUCLEAR SAFETY REVIEW STAFF
(NSRS) REPORT NO. R-84-03-BLN

Attached is the NSRS report for a follow-up review conducted at Bellefonte Nuclear Plant concerning responses to NSRS reports I-83-06-BLN, I-83-10-BLN, I-83-15-BLN, and R-84-09-BLN. Ten items were examined during the review, and five were determined to be satisfactorily resolved and closed. The remaining five items remain open pending implementation of corrective action and subsequent review by NSRS.

If you have any questions concerning this report, please contact C. M. Key at extension 4815.

James J. Murdock acting
K. W. Whitt

mk.

CMK:BJN

Attachment

cc (Attachment

W. R. Brown, 102 ESTA-K

L. S. Cox, Bellefonte (CONST)

MEDS, W5B63 C-K Reference GNS 850111 051

C. W. Crawford, 670 CST2-C

NSRS FILE



TENNESSEE VALLEY AUTHORITY
NUCLEAR SAFETY REVIEW STAFF
REVIEW
NSRS REPORT R-84-03-BLN

SUBJECT: FOLLOW-UP REVIEW OF BELLEFONTE NUCLEAR PLANT
OPEN ITEMS

DATES OF REVIEW: DECEMBER 18 - DECEMBER 20, 1984

REVIEWER:

C. M. Key
C. M. KEY

1/11/85
DATE

APPROVED BY:

M. S. Kidd
M. S. KIDD

1-11-85
DATE

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I. SCOPE

This routine review examined the corrective action initiated by the Office of Engineering (OE), Office of Construction (OC), and Bellefonte Nuclear Plant (BLN) in response to Nuclear Safety Review Staff investigations I-83-06-BLN, I-83-10-BLN, and I-83-15-BLN and review R-84-09-BLN.

II. CONCLUSIONS

A total of ten items were examined during this review. Corrective action for five actions appeared adequate and these items were closed during the review. The proposed corrective action for the remaining five items appeared adequate, however these items will remain open pending completion of corrective action.

III. STATUS OF PREVIOUSLY IDENTIFIED ITEMS

A. I-83-06-BLN, Employee Concern Relating to Undue Pressure on Quality Control Inspectors

1. I-83-06-BLN-01, Concrete Pour Card

This item dealt with the interpretation of the craft superintendent's signature on a concrete pour card. BNP-QCP-5.3 has been revised to clarify the meaning of the superintendent's signature. This item is closed. Refer to section IV.A.1 for details.

2. I-83-06-BLN-02, Use of Quality Control Investigation Report (QCIR)

This item identified that QCIRs were not being used in a consistent manner. The procedure has been deleted from the site quality assurance (QA) program and replaced by the inspection rejection notice (IRN) procedure. This item is closed. Refer to section IV.A.2 for details.

3. I-84-06-BLN-03, Inspector Notification

This item dealt with the inconsistent manner by which inspectors were notified that work was complete and ready for inspection. The corrective action to assure each inspection procedure indicated the organization which informs the quality control (QC) unit that a feature is ready for inspection appears adequate. However, three procedures still require revision. This item will remain open. Refer to section IV.A.3 for details.

B. I-83-10-BLN, Employee Concern Regarding Cable Terminations on Solenoid Valves

1. R-83-10-BLN-02, Reinspection of Previous Installations

This item dealt with the reinspection of previous cable terminations in accordance with revised OE specific standard installation guidance. The site has issued and implemented an inspection procedure to provide for this reinspection. This item is closed. Refer to section IV.B.1 for details.

2. R-83-10-BLN-04, Verification of Seismic Requirements

This item was concerned with the verification that safety class installations still meet seismic requirements. The site has generated and implemented an inspection procedure to provide for this verification. This item is closed. Refer to section IV.B.2 for details.

C. I-83-15-BLN, Employee Concern Relating to Seismic Supports on Instrument Sensing Lines

NSRS committed to perform informal follow-up to ensure that procedures delineating the process for field routing and supporting of instrument sensing lines were revised and issued. The appropriate actions have been taken. Refer to section IV.C for details.

D. R-84-09-BLN, Nuclear Safety Review Staff Review of INPO Finding QP-5.1

1. R-84-09-BLN-01, Inspectors Encouraged Not to Write NCRs

This item concerned some administrative and/or procedural problems with the NCR process utilized by BLN that may have caused some inspectors to perceive a problem. The corrective action accomplished by the site included: (1) issuance of a Standard Operating Procedure (SOP) to provide guidelines for using a "reply" memorandum and (2) revision of the the nonconformance procedure. However, project training had not been completed. This item is open pending completion of corrective action. Refer to section IV.D.1 for details.

2. R-84-09-BLN-02, Nonconforming Conditions Dispositioned by Invalidating or Voiding the NCR

This item dealt with the concern that nonconformance reports had been invalidated or voided improperly. The site has reviewed invalidated NCRs to determine if any additional action is necessary to correct these nonconformances; however, the justification given on NCRs 765, 2732, 2733, 2807, 2839, and 2845 appeared inadequate. The site had revised the NCR procedure to clarify the invalidation process and to require an independent review of invalidated

NCRs; however, project training had not been completed. This item will remain open pending completion of committed corrective action. Refer to section IV.D.2 for details.

3. R-84-09-BLN-03, NCRs Closed Before Corrective Action Completed

This item concerned nonconformance reports that were closed before corrective action to rectify the nonconforming condition had been completed. The site had issued a nonconformance report to address this item, but the site procedure had not been revised to prevent recurrence. This item will remain open. Refer to section IV.D.3 for details.

4. R-84-09-BLN-04, Evaluation of Offsite-Generated NCRs

This item concerned the "evaluation" of offsite-generated NCRs allowed by BNP-QCP-10.4 and QAP 15.1. The "evaluation" allowed appeared to violate upper-tier requirements. QAP 15.1 has been revised and appeared adequate. BNP-QCP-10.4 was in the revision process. The site is also performing a review to determine if any items with offsite-generated NCRs have been received without BLN initiating an NCR to track the items. This item will remain open pending completion of corrective action. Refer to section IV.D.4 for details.

IV. DETAILS

A. I-83-06-BLN, Employee Concern Relating to Undue Pressure on Quality Control Inspectors

1. I-83-06-BLN-01, Concrete Pour Card

This item concerned the interpretation of the meaning of the craft superintendent's signature on the concrete pour card. Some inspection personnel understood the signature to indicate that the work was complete and ready for inspection. Other inspection personnel indicated that the signature meant that the work would probably be completed sometime during the day the concrete pour card was signed. NSRS recommended that the significance of the craft superintendent's signature be clearly defined in a quality procedure. BNP-QCP-5.3 was revised and paragraph 6.5.1 states, "The Assistant Construction Superintendent signature indicates that work is complete and ready for inspection." This corrective action appears adequate. This item is closed.

2. I-83-06-BLN-02, Use of Quality Control Investigation Report (QCIR)

This item identified that QCIRs were not being used in a consistent manner. The QCIR was to be written to identify a questionable condition; however, some inspectors were lenient and allowed the crafts another opportunity to

correct or complete the work before a QCIR was written. NSRS recommended that the proper use of the QCIRs by QC inspectors should be clearly defined and consistently implemented by QC personnel. On November 20, 1983 the usage of QCIRs was discontinued and BNP-QCP-10.4 was revised to delete the portion of the procedure that described the QCIR process. The QCIR was replaced by the Inspection Rejection Notice (IRN), which is controlled by BNP-QCP-10.43. Revision 0 of BNP-QCP-10.43 was issued on November 1, 1983. Interviews of inspectors during NSRS review R-84-09-BLN indicated that inspectors had a good understanding of the IRN process. This corrective action appears adequate. This item is closed.

3. I-83-06-BLN-03, Inspector Notification

This item dealt with the inconsistent manner by which inspectors were being notified that work was complete and ready for inspection. This finding primarily concerned the method by which QC inspectors were being informed that a concrete pour was ready to be inspected. NSRS recommended that the method of informing QC inspectors that work is ready for inspection should be standardized and documented. The site's proposed corrective action was to assure each inspection procedure indicated what organization informs the QC unit that a feature is ready for inspection. This proposed corrective action appears adequate. However, review of site quality control procedures indicated that three procedures still required revision. The three procedures (BNP-QCP-23, BNP-QCP-3.9, and BNP-QCP-6.14) did not address the engineering and quality control units as separate organizations and assigned inspection responsibilities to the engineering units. Interview of the site Procedures and Training Unit (PTU) supervisor revealed: (1) that BNP-QCP-3.9 had been in the review and revision cycle since February 14, 1984 but had not been revised to date, (2) that BNP-QCP-6.14 had never been utilized, and (3) that BNP-QCP-2.3 was only used once per year. This item will remain open until the proposed corrective action is completed.

B. I-84-10-BLN, Employee Concern Regarding Cable Terminations on Solenoid Valves

1. R-83-10-BLN-02, Reinspection of Previous Installations

This item dealt with the necessity of reinspecting and reworking, if necessary, any previous installations that were not in accordance with the new criteria established by the revision of the standard electrical drawings. BLN site has generated and implemented an inspection procedure, BNP-QCP-3.32, that will provide for reinspection and rework, if necessary, for all permanent safety-related and seismically qualified conduit installations with the exception of

plant lighting systems. The reinspection had been identified as a required test (test code 12A) for all conduit in the "Conduit Status Master Report." Some reinspections had been accomplished in accordance with the procedure, and this activity will continue until all reinspections have been completed. The corrective action appears adequate. This item is closed.

2. R-83-10-BLN-04, Verification of Seismic Requirements

This item was concerned with the verification that all safety class conduit installations still met seismic requirements. BNP-QCP-3.32 was revised to provide for this verification. Review of documents in the records vault indicated that this inspection had been implemented. This corrective action appears adequate. This item is closed.

C. I-83-15-BLN, Employee Concern Relating to Seismic Supports on Instrument Sensing Lines

Although NSRS made no formal recommendations in this report, it stated that an informal follow-up would be performed to ensure that commitments made by OE and BLN site would be implemented in a timely fashion. OE made a commitment to issue a procedure to delineate the process for ensuring OE requirements were met for field routing and supporting of instrument sensing lines. Also BLN committed to revise the site procedure to reflect the site method being used for routing and supporting of instrument sensing lines. The procedures, BLP-EP-44.64 and BNP-QCP-4.3 have been implemented by OE and BLN and have been reviewed by NSRS. The procedures appear to be adequate to ensure that the requirements are met, therefore there are no further questions in this area.

D. R-84-09-BLN, Nuclear Safety Staff Review of INPO Finding QP-5.1

1. R-84-09-BLN-01, Inspectors Encouraged Not to Write NCRs

This item concerned some administrative and/or procedural problems with the NCR process being used at BLN. These problems may have caused some inspectors to perceive that they were being encouraged not to write NCRs. The NSRS recommended that: (1) definitive guidelines be issued to provide instructions for the usage of "reply" memorandums, (2) appropriate action be taken to emphasize to all employees the importance of proper identification and handling of nonconformances, and (3) the nonconformance procedure be revised to require the NCR be numbered prior to the review and approval cycle.

The BLN site has issued SOP-11, "Reply memorandums," to provide instructions to all employees for the proper usage of reply memorandums. Training to emphasize the importance of proper identification and handling of nonconformances has

not been completed. Although NSRS recommended that the nonconformance procedure be revised to require the NCR be numbered prior to the review and approval cycle by the appropriate supervisor, the BLN site nonconformance procedure was not revised to reflect this recommendation. However, the site procedure was revised by Addendum 2 to Revision 11 to state "if an agreement cannot be reached between the initiator and the supervisor regarding the validity of the condition as nonconforming, the initiator may obtain an NCR identifier prior to submitting the NCR to the responsible supervisor." The corrective actions appear adequate. This item will remain open pending completion of training.

2. R-84-09-BLN-02, Nonconforming Condition Dispositioned by Invalidating or Voiding the NCR

This item dealt with the concern that nonconformance reports had been invalidated or voided improperly. NSRS recommended that all invalidated NCRs be reviewed to determine if any action was necessary to correct nonconformances that had been improperly invalidated or voided. The site had reviewed invalidated NCRs and determined that no corrective actions were necessary. However NSRS examination of the site review revealed six NCRs that appeared to be inadequately addressed. The following describes these six NCRs:

- a. NCR 765 - The nonconformance report still does not reference the QCIR number.
- b. NCR 2732 - Information given on NCR is a blanket statement and does not provide justification for invalidating the NCR.
- c. NCR 2733 - Same as NCR 2732.
- d. NCR 2807 - No identification of acceptance criteria is provided.
- e. NCR 2839 - Same as 2732.
- f. NCR 2845 - No valid justification given for voiding NCR.

The NSRS also recommended for action to prevent recurrence that the site nonconformance procedure BNP-QCP-10.4 be revised to provide an explanation of the invalidation process and to require an independent review of all invalidated NCRs. This recommendation was incorporated into paragraph 6.8 of revision 11 to the NCR procedure. Lastly, NSRS recommended that appropriate action (training) should be taken to ensure that all personnel have a thorough understanding of what constitutes a valid NCR. This training will be provided in conjunction with the training recom-

mended for Finding 1. The corrective actions appear adequate; however, this item will remain open pending the completion of the site reexamination of the six NCRs discussed above.

3. R-84-09-BLN-03, NCRs Closed Before Corrective Action Completed

This item concerned nonconformance reports that were closed before corrective action to rectify the nonconforming condition had been completed. NSRS recommended that this condition adverse to quality be documented on a nonconformance report and that appropriate corrective action be taken. The site issued NCR 3432 to address this problem. A sampling program was accomplished and only one NCR was identified to have been closed improperly, but the NCR was corrected prior to the sampling program beginning. Interview of the Nuclear Licensing Unit (NLU) supervisor revealed that all the NCRs referenced by NSRS had been reviewed and adequately addressed, except for NCR 2564. The support modification request (SMR) referred to this NCR had still not been closed.

NSRS also recommended that the site nonconformance procedure be revised to ensure that NCRs are not closed prior to completion of corrective action to rectify the nonconforming condition. The site response was that this recommendation would be followed and the procedure revised. However, review of the NCR procedure indicated that paragraph 6.5.1.1 still allowed the site to close an NCR upon verification that a revision to a drawing or specification had been initiated. This appears to be the site position on this issue and the interview of the NLU supervisor revealed that a major revision to OC quality assurance procedure (QAP) 15.1 was to provide adequate justification for the position taken by the site. This item will remain open until QAP-15.1 is issued and reviewed for adequacy by NSRS.

4. R-84-00-BLN-04, Evaluation of "Offsite-Generated" NCRs

This item concerned the "evaluation" of offsite-generated NCRs allowed by BNP-QCP-10.4 and QAP-15.1. The "evaluation" allowed by these procedures appeared to violate upper-tier requirements by not requiring that site NCRs be issued to track items received onsite with offsite-generated NCRs. NSRS recommended that the site perform a review to determine if any items with offsite-generated NCRs had been received and that nonconformance reports be initiated for items not covered by site NCRs. This review is ongoing and will be evaluated by NSRS upon completion. NSRS also recommended that QAP-15.1 and BNP-QCP-10.4 be revised to require the site to initiate NCRs to track offsite-generated NCRs. QAP-15.1 had been revised by Addendum 2 dated December 3, 1984, to require the site to generate NCRs for this condition. BNP-QCP-10.4 is in the review process for approval

and has been revised to reflect this recommendation. The corrective action appears adequate. This item will remain open pending verification of completion of corrective action.

V. PERSONNEL CONTACTED

P. C. Mann, Supervisor, Nuclear Licensing Unit, BLN (CONST)

G. M. Parsons, Electrical Engineer, Electrical Engineering Unit, BLN (CONST)

E. D. Rose, Supervisor, Procedure and Training Unit, BLN (CONST)

VI. DOCUMENTS REVIEWED

QAP 15.1, "Reporting and Correcting Nonconformances," R11 (Addendum 1), October 1, 1984

Standard Operating Procedure, SOP-11, "Reply Memorandums," R0, November 26, 1984

Numerous test cards for test 12A, "Final Recovery Verification"

Construction Test Procedures:

BNP-CTP-3.10, "Circuit Breakers 15KV and Below," R1, September 12, 1984

BNP-CTP-3.11, "Switch Adjustment (Limit and Torque Types)," R3, August 17, 1984

BNP-CTP-3.12, "Motor Rotation and Performance," R2, November 28, 1984

BNP-CTP-3.17, "Electrical Functional," R3

BNP-CTP-3.21, "DPSG Testing," R1, January 20, 1984

BNP-CTP-4.2, "Pneumatic Functional and Limit Switch Adjustment," R2, February 1, 1984

BNP-CTP-4.4, "Flushing and Pressure Testing of Instrument Tubing," R1, November 13, 1983

BNP-CTP-4.6, "Ionization Smoke Detectors," R2, March 2, 1984

BNP-CTP-6.1, "Cleaning and Flushing of Systems," R4, August 1, 1984

BNP-CTP-6.4, "HVAC Duct Test," R2, November 15, 1984

BNP-CTP-6.5, "HVAC Duct Balancing," R2, August 1, 1984

- BNP-CTP-6.6, "Cleaning and Flushing HVAC Duct," R0, May 23, 1984
- BNP-CTP-7.6, "Hydrostatic Testing," R3, August 22, 1984
- BNP-CTP-7.7, "Pneumatic Testing," R3, August 13, 1984

Quality Control Procedures:

- BNP-QCP-1.1, "Receiving Inspection," R13, September 27, 1984
- BNP-QCP-1.2, "Storage," R15, December 21, 1984
- BNP-QCP-1.3, "Maintenance," R6, June 25, 1984
- BNP-QCP-1.4, "Handling of Nuclear Components," R2, January 6, 1984
- BNP-QCP-2.1, "Rebar, Embedments, and Concrete Formwork," R12, August 7, 1984
- BNP-QCP-2.2, "Structural Steel Fabrication," R17, December 21, 1984
- BNP-QCP-2.3, "Surveillance of Site Contractor-Brewer Engineering Laboratories - Contract TV42364A - Structural Acceptance Test for Primary Containment," R0, June 1, 1977
- BNP-QCP-2.4, "Protective Coatings for Concrete and Carbon Steel Surfaces," R8, April 6, 1984
- BNP-QCP-2.6, "Cadmium Inspection," R7, April 17, 1984
- BNP-QCP-2.8, "Bolt Anchors Set in Hardened Concrete," R14, July 13, 1984
- BNP-QCP-2.12, "Fire Protection of Structural Steel," R3, October 26, 1984
- BNP-QCP-2.13, "Safety-Related Doors," R3, June 18, 1984
- BNP-QCP-2.14, "Fire-Rated Barriers," R2, June 18, 1984
- BNP-QCP-2.15, "Structural Steel Installation," R2, December 21, 1984
- BNP-QCP-3.1, "Embedded Conduit," R6, November 1, 1983
- BNP-QCP-3.2, "Conduit Systems," R6, July 31, 1984
- BNP-QCP-3.3, "Cable Tray," R10, December 20, 1984
- BNP-QCP-3.4, "Electrical Cables and Jumpers Installation (Pulling) and Preparation (Terminating)," R9, December 5, 1984

BNP-QCP-3.7, "Electrical Hangers," R9, December 27, 1984

BNP-QCP-3.9, "Electrical and Instrumentation Panels, Boards, and Equipment (Includes Internal Wiring and Component Verification)," R5, September 21, 1982

BNP-QCP-3.13, "Equipment Installation," R9, July 26, 1984

BNP-QCP-3.18, "Insulation Resistance," R6, May 24, 1984

BNP-QCP-3.19, "Lighting," R3, June 3, 1984

BNP-QCP-3.22, "Permanent Identification of Electrical and Instrumentation Devices," R6, December 21, 1984

BNP-QCP-3.26, "Electrical Local Control/Test Panels and Arc Suppressor Network Junction Boxes," R6, August 28, 1984

BNP-QCP-3.27, "Indefinite Status Control During Troubleshooting, Inspection, and Test Activities," R4, October 2, 1984

BNP-QCP-3.28, "Computer Data Control," R3, April 6, 1984

BNP-QCP-3.29 "Electrical Heat Trace," R4, December 27, 1984

BNP-QCP-3.30, "Inspection of Communication Devices," R2, April 12, 1984

BNP-QCP-3.31, "Inspection Control During Equipment Modifications," R4, November 7, 1984

BNP-QCP-3.32, "Raceway Verification," R1, June 12, 1984

BNP-QCP-3.33, "Medium Voltage Cable Preparation (Termination)," R0, December 5, 1984

BNP-QCP-3.34, "Electrical Cable Installation (Pulling)," R0, December 5, 1984

BNP-QCP-4.1, "Instrumentation Calibration and Loop Testing," R3, May 1, 1984

BNP-QCP-4.3, "Instrument Tubing Installation," R9, September 18, 1984

BNP-QCP-4.5, "Bellefonte Equipment List (BLEL) NUREG 0588," R1, February 14, 1984

BNP-QCP-5.1, "Backfill Materials Placement," R6, October 17, 1984

BNP-QCP-5.2, "Batch Plant Inspection," R7, July 11, 1984

BNP-QCP-5.3, "Concrete Placement," R7, July 5, 1984

BNP-QCP-5.4, "Concrete Curing and Repair," R8, September 11, 1984

BNP-QCP-5.5, "Grouting and Drypack," R11, November 7, 1984

BNP-QCP-5.6, "Concrete Materials Testing by Singleton Materials Laboratory," R4, July 13, 1984

BNP-QCP-5.8, "Mixer Performance Test," R3, August 27, 1984

BNP-QCP-5.9, "Testing Fines, Specific Gravity, and Absorption of Concrete Aggregate," R3, September 17, 1984

BNP-QCP-5.10, "Free Moisture and Gradation of Fine and Coarse Aggregate," R6, November 14, 1984

BNP-QCP-5.11, "Sampling, Consolidating, and Testing Concrete Compressive Strength Test Specimens," R4, October 15, 1984

BNP-QCP-5.12, "Concrete Slump and Air Content Testing," R5, October 23, 1984

BNP-QCP-5.14, "Storage of Concrete Material," R4, October 15, 1984

BNP-QCP-5.15, "Fineness of Fly Ash by 325 Wash Test," R2, October 15, 1984

BNP-QCP-5.17, "Neutron Shielding Blocks," R1, September 11, 1984

BNP-QCP-5.18, "Firestops, Moisture, and Pressure Seals," R8, December 21, 1984

BNP-QCP-5.19, "Masonry," R1, November 7, 1984

BNP-QCP-6.1, "Embedded Piping," R4, May 3, 1983

BNP-QCP-6.2, "Pipe for Underground Service," R4, October 15, 1984

BNP-QCP-6.3, "Mechanical Equipment," R5, November 30, 1984

BNP-QCP-6.4, "HVAC Ductwork," R5, August 7, 1984

BNP-QCP-6.7, "Inspection of HVAC Duct and Mechanical Equipment Supports," R13, November 14, 1984

BNP-QCP-6.8, "Pipe Bending," R4, July 5, 1984

BNP-QCP-6.9, "Valves," R5, October 15, 1984

BNP-QCP-6.10, "Exposed Piping," R7, July 5, 1984

BNP-QCP-6.11, "Clean Operations," R2, November 18, 1983

BNP-QCP-6.14, "Pipe Rupture and Whip Restraints," R0 (Addendum 1), April 23, 1980

BNP-QCP-6.15, "Threaded Connections," R5, December 27, 1984

BNP-QCP-6.16, "Cleanliness Control During Piping System Installation," R2, May 1, 1984

BNP-QCP-6.17, "Seismic Support Installation and Inspection," R10, November 29, 1984

BNP-QCP-6.18, "Metallic and Nonmetallic Thermal Insulation," R3, October 23, 1984

BNP-QCP-6.19, "Bolted Flange Connections," R2, July 27, 1983

BNP-QCP-6.20, "Flexible Metal Hose Assemblies," R4, December 12, 1984

BNP-QCP-6.22, "Mechanical Fire Protection," R2, October 22, 1984

BNP-QCP-6.23, "Detection and Control of Asiatic Clams," R0, December 28, 1983

BNP-QCP-6.24, "Installation Testing and Inspection of Mechanical Shock Suppressors," R0, November 29, 1984

BNP-QCP-7.1, "Radiography Examination," R3, November 28, 1983

BNP-QCP-7.2, "Ultrasonic Examination," R4, June 25, 1984

BNP-QCP-7.3, "Magnetic Particle Examination," R6, February 24, 1984

BNP-QCP-7.4, "Liquid Penetrant Examination," R5, February 24, 1984

BNP-QCP-7.5, "Visual Examination of Weld Joints," R11, May 31, 1984

BNP-QCP-7.8, "Vacuum Box Leak Testing," R4, January 6, 1984

BNP-QCP-7.9, "Fitup and Cleanliness," R15, August 27, 1984

BNP-QCP-7.10, "Thickness Measurement by Ultrasonic Means," R5, November 1, 1984

BNP-QCP-8.2, "Post Weld Heat Treatment," R7, June 25, 1984

BNP-QCP-8.3, "Stud Welding," R4, December 23, 1983

BNP-QCP-10.6, "Work Release," R16 (Addenda 1, 2, 3), August 16, 1984

BNP-QCP-10.14, "Anchor Bolt Freeze Protection," R4, September 29, 1983

BAP-QCP-10.16, "Bending of Partially Embedded Reinforcing Steel," R5, December 23, 1983

BNP-QCP-10.18, "Weld and Base Material Repairs," R10, March 2, 1984

BNP-QCP-10.39, "Surveillance of Site Contractor," R0, March 8, 1983

BNP-QCP-10.47, "Automated Process Control (APC)," R1 (Addendum 1),
May 1, 1984

BNP-QCP-10.48, "Coordination of Information Obtained from NRC-OIE
Inspections, R0, February 24, 1984

BNP-QCP-10.50, "QA Training Program for Engineering Personnel, R0,
October 2, 1984

UNITED STATES GOVERNMENT

Memorandum

GNS '840614 050
TENNESSEE VALLEY AUTHORITY

TO : H. G. Parris, Manager of Power, 500A CST2-C
R. L. Craig, M.D., Medical Director, 320 EB-C

FROM : H. N. Culver, Director of Nuclear Safety Review Staff, 249A HBB-K

DATE : June 13, 1984

SUBJECT: NUCLEAR SAFETY REVIEW STAFF (NSRS) INVESTIGATION OF EMPLOYEE CONCERN
REGARDING COLORBLINDNESS - NSRS REPORT NO. I-84-10-NPS

In response to an anonymous employee concern, NSRS conducted an investigation of TVA's color vision requirements for licensed nuclear plant operators and designated career development positions leading to licensed operators. The methods used to determine and record compliance with those requirements were included in the investigation as was the use of x-chrom lenses to compensate for identified color deficiencies. Attached is the report of the investigation with the identity of employees coded whose medical information is discussed in the report. By separate Administrative Confidential memorandum, the employee's identity will be given for your use. The candor and professionalism exhibited by members of the Office of Nuclear Power (NUC PR) and especially the Division of Medical Services (MED SV) personnel throughout this investigation is highly commendable.

The findings of this investigation have been informally and frequently conveyed to MED SV and NUC PR management along with the NSRS recommendations for corrective action. It is our understanding that corrective action in the form of implementing most, if not all of the below listed recommendations, has already begun. In absence of any official action communicated to NSRS, however, the following recommendations are made:

- I-84-10-NPS-01 - A practical color vision test needs to be developed as soon as possible along with requirements regarding when, how often, and to whom it should be given.
- I-84-10-NPS-02 - The medical requirements, rigor to which they will be followed, testing to ensure medical approval, and documentation to support medical approval for color vision should be reviewed by MED SV in light of the problems found in this investigation and appropriate changes made to procedures, guides, and codes and communicated through training or other suitable mechanism to physicians and nurses responsible for testing and medically approving NUC PR licensed operators and associated career development positions.
- I-84-10-NPS-03 - Once a practical color test has been developed, all licensed personnel within NUC PR and those identified with possible color deficiencies by MED SV should be given a baseline color examination using both the Orthorator and AO-HRR plates, given out of sequence,

NSRS FILE



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H. G. Parris
R. L. Craig, M.D.
June 13, 1984

**NUCLEAR SAFETY REVIEW STAFF (NSRS) INVESTIGATION OF EMPLOYEE CONCERN
REGARDING COLORBLINDNESS - NSRS REPORT NO. I-84-10-NPS**

and where necessary the practical color test. This test should be conducted as soon as possible after the practical test has been developed.

- I-84-10-NPS-04 - All nonlicensed NUC PR personnel in designated career development paths to positions requiring licensing should be given the baseline color examination, described in I-84-10-NPS-03 above, as part of regularly scheduled physical examinations.
- I-84-10-NPS-05 - Regarding the NRC Forms 396 that were sent to NRC and apparently disagreed with the documented medical test results, a determination should be made by NUC PR as to whether or not the forms in questions should be corrected and resubmitted to NRC.
- I-84-10-NPS-06 - MED SV should make a policy decision regarding the use of x-chrom lenses and document and communicate that decision.

Your plans and schedules to implement the above recommendations or justification for why they should not be implemented should be submitted to this office by July 23, 1984. Any questions regarding the conduct of this investigation or content of the report may be directed to me or R. D. Smith (extension 4813-K). I want to thank you for the cooperation extended in the conduct of this investigation.

Original Signed By

H. N. Culver

H. N. Culver

BM
RDS:LML

Attachment

bc (Attachment):

H. S. Sanger, Jr., E11B33 C-K

W. F. Willis, E12B16 C-K

MEDS, W5B63 C-K

~~GNS 840614 051~~

TENNESSEE VALLEY AUTHORITY
NUCLEAR SAFETY REVIEW STAFF
EMPLOYEE CONCERN INVESTIGATION
NSRS REPORT NO. I-84-10-NPS

SUBJECT: ALLEGATION OF COLORBLINDNESS OF NUCLEAR PLANT EMPLOYEES

DATES OF
INVESTIGATION: APRIL 10 - MAY 11, 1984

TEAM LEADER:

Richard D. Smith
R. D. SMITH

6/13/84
DATE

APPROVED BY:

M. A. Harrison
M. A. HARRISON

6/13/84
DATE

MEDS, W5863 C-K

NSRS FILE

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I. SCOPE

An anonymous employee concern was received by the Nuclear Safety Review Staff (NSRS) alleging the possibility of some colorblind personnel operating TVA's nuclear power plants. One person was assigned to the investigation and instructed to determine the validity and possible extent of the allegation and to prepare a report of the findings.

II. SUMMARY

NSRS received an anonymous employee concern on April 10, 1984. The allegor stated that some personnel with color deficiencies were being allowed to wear a red (x-chrom) lens in order to pass the TVA medical color examination for entrance into the Student Generating Plant Operation Program (SGPO), and there were people in the nuclear power program who were colorblind. The allegor further stated that an optometrist in Chattanooga was supplying the red lens to TVA employees. Early in the investigation it was learned that an EEO complaint had been filed on the same subject.

Throughout the NSRS investigation the Division of Medical Services (MED SV) and Office of Nuclear Power (NUC PR) were very helpful in providing information. The Nuclear Regulatory Commission (NRC) has specific medical requirements, including color vision, for licensed reactor operators. TVA had developed a standard and testing procedure for the color vision requirements and applied the standard and testing procedure also to nonlicensed positions which were considered in the career development path for a licensed reactor operator. MED SV personnel stated that x-chrom lenses had been allowed in the past and approximately 3 to 12 candidates for SGPO training had used them. An x-chrom lens, a red contact lens, worn in only one eye, changes the intensity of red and green colored light seen by the lens-covered eye as compared to the unaided eye. The brain learns to interpret the intensity difference as a color. In 1982 MED SV prohibited the use of any contact lenses for people who have occasion to wear a full-face respirator. That action was consistent with regulatory and standard setting bodies requirements on the same subject. Therefore, x-chrom lenses were prohibited. MED SV, however, never officially approved or disapproved the x-chrom lens based upon its merits and their procedures and guides contained no reference to x-chrom lenses. Their approved use was apparently a decision based upon professional judgment by the examining physicians.

MED SV reviewed over 650 medical records of NUC PR personnel in the affected job classifications and found 3 individuals that had been or were wearing an x-chrom lens. Those individuals had been approved in 1981 before contact lens were disapproved, and two of the three no longer required the use of the x-chrom lens. Standard MED SV procedures used to notify supervisors of an individual's medical constraints, form TVA 1444 (lifting restrictions, prescription glasses, etc.), was used only twice. Form TVA 1444 for the individual still wearing an x-chrom lens did not identify that medical constraint. It was also determined that the three had not obtained their x-chrom lenses from the same source.

Further review of the 650 plus medical records by MED SV showed that no one had a strong color deficiency and 8 employees were identified, in addition to the 3 x-chrom lens users, with color vision test results suggesting further examination was justified. An NSRS review of those records and further discussions with MED SV personnel at the nuclear plantsites revealed a deficiency in procedures and lack of rigor in handling indicated color deficiencies (wrong test given, incorrect follow-up test, incorrect test listed for the job, questionable information reported to NRC).

The color tests given by TVA (Orthorator and AO-HRR), which have been long accepted by the medical profession, were reviewed by NSRS. It was concluded that the screening test, the Orthorator, while very good at detecting color deficiencies, can be circumvented if the examinee can remember four of six numbers. The AO-HRR consisting of 20 different pseudoisochromatic colorplates would be extremely difficult to circumvent. In addition to the requirements for formal tests, the NRC regulations allow the use of a practical color examination, but TVA did not have one prescribed.

Based upon this investigation and MED SV's own review of their records, both MED SV and NUC PR have informally agreed to recommend to NUC PR upper management that a practical color test be developed. All NRC-licensed personnel would then be given a special color test. There was no evidence to indicate that TVA has any colorblind licensed operators, but this special test was considered necessary to remove any doubt about the licensed operators having adequate color vision. They were to further recommend that career development nonlicensed positions be given the same test but during their regularly scheduled periodic physical examination. NSRS concurs with these actions. In addition, MED SV needs to evaluate their program regarding color testing and the review of results, make necessary changes, and communicate those changes to personnel involved in the testing/ review process.

III. FACTS

A. Allegation

On April 10, 1984, an anonymous telephone call was received by NSRS regarding color vision deficiencies among nuclear plant operators and assistant unit operators. The alleger stated that some personnel having color deficiencies were being allowed to wear a red contact lens in order to pass the TVA medical examination and that there were people in the nuclear power program who were colorblind. The alleger further stated that an optometrist in Chattanooga was supplying the red lens to TVA employees.

Discussions with NUC PR and Office of the General Counsel (OGC) personnel revealed that an Equal Opportunity Compliance (EOC) complaint had been filed on the same subject on November 11, 1983. The person that filed the EEO complaint is not the same individual that raised the employee concern. Only the subject matter is the same. Personnel within EOC provided information

and documentation regarding the complaint which alleged that two "guys" (names unknown) were in Chattanooga, at the same time as the EEO complainant to take the medical examination for admittance to the SGPO program (reference 1). The allegation continued that the two "guys" were from Bellefonte, one had a red contact lens flown in from Nashville and "both of them used the red contact lens." The EEO complainant in an affidavit, supplied the names of two assistant unit operators (AUO) with red-green color deficiencies, one of which allegedly had a red contact lens obtained from an optometrist in Chattanooga. Regarding licensed operators with color deficiencies, the EEO complainant did not know of any.

In an interview with the EEO complainant he stated that he could not wear a red lens because he did not have fusion between both eyes and his optometrist said it would not be beneficial. The EEO complainant further stated he believed his color vision was adequate and wanted admittance to the SGPO program on that basis.

B. Background

1. Color Vision Test and Criteria Development

The NRC requires in 10CFR55.11 that the physical condition, including vision, of an applicant for a reactor operator license shall be such that it will not contribute to operational errors. This requirement is further clarified in Regulatory Guide (RG) 1.134, "Medical Evaluation of Nuclear Power Plant Personnel Requiring Operator Licenses," which states that NRC would be satisfied with methods used to implement ANSI N546-1976, "Medical Certification and Monitoring of Personnel Requiring Operator Licenses for Nuclear Power Plants." With no exceptions, TVA adopted ANSI N546-1976 and its revision ANSI/ANS-3.4-1983. The ANSI standard requires, in part, "color vision adequate to distinguish among red, green, and orange-yellow signal lamps, and any other coding required for safe operation of the particular facility as defined by the facility operator." The standard further specifies that nuclear reactor operators shall be examined biennially by a licensed medical practitioner conversant with the standard and with a general understanding of activities required of the operator. Should an examinee fail to meet any of the minimum requirements but can demonstrate complete capacity to perform operational duties to the satisfaction of the facility operator (authorized representative of the production license holder), the facility operator may recommend the medical examiner waive that requirement.

Ultimate approval of an applicant for an operator's license resides with the NRC and is based, in part, on medical information supplied on NRC Form 396, "Certificate of Medical History."

2. Medical Services Criteria

Within TVA, responsibility for determining the medical adequacy of operations personnel in meeting the requirements is assigned to MED SV. MED SV has two documents which describe the medical requirement and administrative procedures used for TVA employees. One is the Medical Services Examiner's Guide which defines the administrative procedures regarding the examination approval and/or disapproval, for medical reasons, of an individual's ability to perform the functions of his/her job. It includes, by reference and in total, ANSI/ANS 3.4-1983, and describes the process for sending, to NRC on NRC Form 396 the results of the medical evaluation of applicants for a facility operator's or senior operator's license. The Examiner's Guide specifies that "The TVA physician's determination of the applicant's medical qualifications and medical disposition, including any medical constraints, are entered on the (TVA form) 1444." That form, and the original copy of the NRC Form 396 in a sealed envelope labeled "Administratively Confidential," are sent to the plant superintendent. The NRC Form 396, along with other licensing documentation, is sent by the plant to NRC.

The other MED SV document describing medical requirements and procedures is the "Job Title Code Guide." That guide lists the official TVA job titles and their associated special medical examination codes to comply with legislative, regulatory, or other requirements. It also includes vision profile requirements and potential exposures, i.e., chemical, dust, radiation, associated with the job. A detailed description of vision requirements and associated medical procedures is contained within that document which had been maintained current over the years. In total, there are 12 different vision profiles (requirements) for TVA employment positions one of which, Profile 5A, applied to nuclear plant operators and positions allowing a career development path to nuclear plant operator.

3. Vision Profile

The vision profile of nuclear operators has evolved over the years as needs and requirements changed. For a complete understanding of the current 5A profile, as it pertains to color vision, an historical description of its development is provided below.

The earliest obtainable copy of the job title code book was dated July 1971. At that point in time a vision profile 5 was required for auxiliary operators (AOs) selected for training, SGPOs, assistant unit operators (AUOs) and unit operators and was applied to personnel in nuclear, hydro, and fossil plants. Complete vision profiles have been given since 1947 on a machine called an Orthorator. Color vision

was evaluated by an examinee's ability to distinguish a colored number written on a multi-colored background of slightly different hues of the same color as the number. This test contained six different numbers, which have not changed since 1947. For a vision profile 5 a passing score would be the ability to distinguish at least four of those six numbers.

On April 12, 1976, the American National Standards Institute, Inc., approved the medical standard for nuclear plant licensed operators ANSI N546-1976 which was subsequently adopted by TVA. In a memorandum dated February 24, 1977 from J. R. Calhoun, Chief, Nuclear Generation Branch, to R. L. Craig, Director of MED SV, the color vision requirements were identified for NRC operator licensees and potential NRC operator licensees. Those requirements resulted in the development of a new vision profile 5A, the requirements of which were transmitted by memorandum dated March 14, 1977, from R. L. Craig to TVA Medical Examiners. Both the vision profile 5 and 5A required a score on the Orthorator of four or more to pass. If an examinee scored less than four, additional testing would be performed. For the vision profile 5, that additional testing consisted of being able to distinguish between red, yellow, and green lights using the Orthorator. The profile 5A required further testing, not on the Orthorator, but using AO-HRR pseudoisochromatic plates. The AO-HRR test is similar to the Orthorator test, but instead of identifying numbers, the examinee identifies various colored shapes on a background of multicolored spots of different hues of the color shape being identified. There are 20 different plates, and depending upon the ones identified, a rating of mild, medium, or strong color deficiency can be identified. A mild red-green color deficiency has been acceptable to TVA and the NRC.

Also contained in the March 14, 1977 memorandum was the requirement that all nuclear operators, operator transferees to nuclear plants, and all applicants for SGPO program training meet the 5A profile. It should be noted that there are no NRC color vision requirements other than for the licensed operators (SRO and RO) and licensed shift engineers (SE and ASE), and the 5A profile requirement for other operator positions at the nuclear plant is TVA's requirement. Recognizing the possibility that some personnel already licensed or in the SGPO program may not pass the more stringent requirements, a provision was made for a special color ability assessment.

In June 1981, the job title code book was revised to show, among other things, the vision profile change adopted in 1977. The vision profile 5A was assigned to NRC licensed positions and SGPOs. However, the AUO (to which a successful graduate of SGPO training progresses) remained a profile 5. The job title code book, again revised in October 1983,

contained the same less stringent vision profile 5 requirement for AUOs but changed the vision profile for the AO from a 5 to the more stringent 5A. The normal career development path is from AO to SGPO to AUO and then to licensed operator.

4. X-Chrom Lens

In about 1971, the x-chrom lens was invented to improve color discrimination. The x-chrom lens was named after the female chromosome on which the recessive gene for color-blindness is carried. The x-chrom lens is a hard contact lens having a cranberry red color. Only one lens is worn over the nondominant eye to improve color discrimination. The x-chrom lens does not correct a color deficiency, rather, it enhances the contrast or light intensity between red and green. The unaided eye seeing the colors confused yields to the x-chrom aided eye and the brain learns to identify a color with different intensities of light.

Reviewing some published literature on the subject revealed differences in the long-term (greater than a day) benefits from an x-chrom lens (references 2 and 3). In an interview with Dr. [REDACTED] Optometrist, who has experience with these lens and was named by the EEO complainant, he indicated that the prolonged benefit of these lenses depended upon the degree of color deficiency. Color deficiencies that are relatively mild will have a longer lasting benefit from the lens than those that are more severe. Dr. [REDACTED] stated he had not supplied TVA people with x-chrom lenses.

At some unknown point in time, TVA was faced with the question of whether or not color deficiencies compensated for with an x-chrom lens would be acceptable. No official position was developed by MED SV on the x-chrom lens with respect to its color compensation ability, and MED SV examining physicians allowed and recommended their use. Ultimately the use of x-chrom lenses was prohibited, not specifically by name, but because they were contact lenses. Contact lenses were prohibited in a July 30, 1982 revision to the Medical Services Examiner's Guide for personnel requiring medical approval to wear full-face respiratory protection. The use of contact lenses by persons who must wear a respirator equipped with a full-face piece, helmet, hood, or suit had been prohibited by regulatory and standard-setting organizations for years. As TVA medical requirements for nuclear plant operators also include medical approval to wear a full-face respirator, contact lenses had been prohibited.

In an October 21, 1983 memorandum from R. L. Craig, Medical Director, to M. S. Jimerson, EOC counselor, the first documented position on x-chrom lenses was presented "...a red contact lens for one eye is not considered an acceptable

corrective device for SGPO applicants." That memorandum was prepared in response to questions raised by EOC that resulted from a pre-complaint conference on October 10, 1983 with the EEO complainant.

C. Review of Medical Services Practices Regarding Color Vision

Based upon the issues raised by the employee concern and the EEO complaint, NSRS conducted interviews with NUC PR and MED SV personnel to determine the validity of the issues. As a result of the EEO complaint filed on November 10, 1983, and a subsequent memorandum dated March 9, 1984 from the Director of Equal Opportunity Compliance to the Manager of Power, both NUC PR and MED SV were evaluating the issues.

NUC PR provided NSRS a list of BLN SGPO candidates for class 310 that had physical examinations at the same time as the EEO complainant. A review of the form YVA 1444 for each identified SGPO candidate did not show any medical restrictions regarding color deficiencies or references to x-chrom lens.

A discussion with the EEO complainant produced information somewhat different than in his EEO complaint. The EEO complainant stated he did not know of anyone who wore an x-chrom lens or any colorblind licensed operators but held fast to the two "guys" from BLN who had used x-chrom lenses in their medical test. He could not recall their names, but he stated they were approved for the SGPO program. He stated they were approved because someone (caller unknown) from BLN called him at WBN and told him everyone tested from BLN had been approved for the SGPO program. NSRS could not find from an examination of medical records anyone in SGPO class 310 who wore an x-chrom lens when taking their color examination.

Discussions with MED SV personnel revealed they had reviewed the medical records of two AUOs specifically named in the EEO complainant's allegation as having color deficiencies, one with an x-chrom lens. The records were shown to NSRS and both were described as having a mild color deficiency. Neither record had any reference to x-chrom lenses.

The AUO identified by name in the EEO complaint as having an x-chrom lens was contacted by NSRS. He stated he did not now nor had he ever worn an x-chrom lens. He said he was aware of their existence through his association with Dr. X [REDACTED] and said he had passed that information to the EEO complainant.

As a result of the EEO complaint and NSRS interest in color vision requirements MED SV was in the process of developing a list of personnel within NUC PR who had job descriptions requiring the vision profile 5A. Once the list was developed, a review of each medical record was planned along with the completion of a

form with pertinent color test information on each individual. The anomaly of the less stringent vision profile 5 for AUOs was presented by NSRS, and MED SV indicated that anomaly and another for the job title assistant shift engineer-M (ASE), also requiring profile 5, had been identified by MED SV and both jobs were included in their planned survey. During the course of the NSRS investigation, MEDS SV reviewed approximately 650 records in their survey and identified 11 individuals with information suggesting further color deficiency evaluation was warranted. In an April 30, 1984 memorandum from the Director of MED SV to the MED SV Files, with copies to NUC PR and NSRS, the following categories and associated individuals were identified for follow-up testing:

1. Three licensed ASEs with medium red and green defects, but with demonstrated adequate color vision through on-the-job evaluation.
2. Three nonlicensed AUO and SGPO personnel identified as having used x-chrom lens.
3. Five nonlicensed AUO and SGPO personnel either having color defects greater than TVA's standard or insufficient testing results to confirm adequate color vision.

The survey did not identify anyone with a strong color deficiency. NSRS reviewed 10 of the medical records of the MED SV-identified individuals, and the findings of that review and discussions with MED SV personnel are contained in the next 3 sections.

1. Licensed ASEs

All three entered the SGPO program prior to the change, in 1977, to the more stringent vision profile 5A.

In 1977, Employee A (currently an ASE at BFN), according to the TVA-administered AO-HRR test, indicated a strong color deficiency. Further testing by a consulted ophthalmologist concluded he had a mild color deficiency and he performed well on the TVA "yarn test" for colorblindness. The "yarn test" was a medically accepted colorblindness test. The NRC Form 396 sent to the NRC in 1977 stated that Employee A had a mild R-G color defect.

In 1979, Employee A was retested by TVA using the AO-HRR and again showed a strong color defect. However, with no further color testing, the NRC Form 396 was submitted to NRC indicating a mild defect. In subsequent color testing in 1980, 1981, and 1982, using both the Orthorator and AO-HRR tests, TVA documented a medium color deficiency and so reported it on the NRC Form 396.

In 1977, Employee B (currently an ASE at BFN) was rated by TVA as having a medium color deficiency. Additional testing by a consultant ophthalmologist and the "yarn test" indicated a mild defect and was reported as such to the NRC on NRC Form 396. Subsequent evaluations using the Orthorator and AO-HRR tests in 1979, 1981, and 1983 continue to show a medium defect and the NRC Forms 396 have identified the medium deficiency and notes Employee B's demonstrated ability to perform duties which reflected the 1977 testing results.

In 1978, Employee C (currently an ASE at WBN), was rated as having a medium color deficiency. The NRC Form 396 showed a mild defect with the note "demonstrated adequate vision on the job." Employee C's medical records showed no documentation to support that note, and Employee C stated he had never been given a practical color vision test (yarn or control room walk-through). He further stated he had no problem identifying colors on the job. Employee C has been evaluated twice for color vision--once in 1981 as an ASE using the vision profile 5 instead of 5A and once in 1983 using vision profile 5A. In both the 1981 and 1983 exams, the Orthorator score for color indicated further evaluation was required, but the incorrect follow-up test for his job was given (the red-yellow-green lights versus the AO-HRR). The associated NRC Forms 396 were sent to the NRC specifying normal or adequate color vision.

2. X-Chrom Lens Users

The use of the x-chrom lens within TVA's nuclear power program presented some interesting observations. No one within MED SV could remember when or how the x-chrom lens came on the scene at TVA, but they remembered that some people had been approved for the SGPO program using them. Estimates on the number of users ranged from 3 to 12 with the best guess at about 5. None of the physicians or nurses could recall ever seeing one of these lenses. At the time x-chrom lens use was allowed, there were no restrictions on their use either as a contact lens or for compensating a color deficiency. In the three cases of x-chrom lens users found, one purchased his in the Huntsville area, another in the Chattanooga area, and it is unknown where the third purchased his. Each purchased them at their own expense, and based upon a Chattanooga MED SV examining physician's recommendation that they consider getting an x-chrom lens. The MED SV recommendation did not include where to get the lens. MED SV at the time of this investigation had not made an official decision on the lens based upon its own merits, but had disapproved them because they were a contact lens and contact lens were disapproved. Professional published literature on the subject had been obtained by MEDS SV and their general judgment was they were inappropriate for the jobs requiring color vision within NUC PR, but since they had

been excluded through association with contact lens in general, no decision specific to x-chrom lenses was made. According to MEDS SV, the x-chrom lens must be a contact lens; a standard pair of glasses with one red lens will not work. Not having an official position on the x-chrom lens, and therefore, not included in MEDS SV procedures, discussions with MEDS SV physicians revealed two different approaches when approving someone with an x-chrom lens. All agreed a notation would be made on the form TVA 9080, Medical Examination Record, but some said they would place a medical constraint on the individual and one said a medical constraint would not be assigned. A medical constraint on form TVA 1444 is the official mechanism whereby a person's supervisor is notified of any medical problems the supervisor should be aware of.

Employee D (currently in the SGPO at BLN) was approved for the SGPO program in 1981 using an x-chrom lens. His forms TVA 9080 and 1444 showed the lens requirement and his supervisor was aware of the requirement. Discussions with Employee D indicated he always wore his lens when it was required, but he had had eye surgery (radial keratotomy) which apparently eliminated his need for an x-chrom lens. According to Employee D his vision was formerly such that he could not see the muted numbers well enough, but since his surgery he could. A 1983 examination showed an acceptable color vision without an x-chrom lens and his medical constraint was lifted by MED SV.

Employee E (currently SGPO at POTC) passed the 5A profile for AO in 1981 after obtaining an x-chrom lens. As in the case of Employee D all of Employee E's medical records reflected x-chrom lens use and his supervisor at BLN was aware of his medical constraint. Employee E also had a radial keratotomy and was able to pass the TVA AO-HRR exam showing only a mild R-G deficiency in 1983 and approved for SGPO training in class 310. This is the same class that the EEO complainant tried to enter. Employee E's medical record shows his medical constraints had been removed.

Employee F (currently AUO at SQN) was approved for SGPO training in 1981 using an x-chrom lens. His medical records showed the use of the lens, but his form TVA 1444 did not. In subsequent examinations in 1982 and 1983, his medical records showed he passed the Orthorator examination for color and no notation regarding x-chrom lens use was documented. In a discussion with Employee F he stated when he entered SGPO training he was told at the POTC he did not have to wear his lens during the training and he did not. During the two color examinations in 1982 and 1983, he stated he had not worn his lens and could not see the numbers without his lens but could see the red, yellow, and green lights. He said the passing scores recorded for him could not be his. The medical record for Employee F did not

have a score or indicate he took the red-yellow-green test as he said he had. The nurse practitioner at SQN where the test was given could offer no explanation for the apparent discrepancy.

3. Insufficient Testing or Color Deficiency Greater Than Allowed

Medical records for four of the five individuals in this category were reviewed by NSRS.

Employee G (currently an AUO at SQN) passed his vision profile 5A for admittance to the SGPO program in 1981. On two subsequent examinations in 1981 and 1983 at SQN he scored less than four on the Orthorator requiring the AO-HRR test. However, he was given the red-yellow-green light test instead. SQN did not have the AO-HRR plates and would have had to send Employee G to Chattanooga for the test.

Employee H (currently an AUO at SQN) was admitted to the SGPO program in 1978. He scored a one on the Orthorator and was given the required AO-HRR test but his record did not have a rating (mild, medium, severe) for his color deficiency. He was examined again in 1980, as an AUO, for a vision profile 5A and with an Orthorator score of one was only given the red-yellow-green light test. In a 1982 test, again as an AUO, he was tested under vision profile 5, no Orthorator score was recorded and he was given the red-yellow-green light test.

Employee I (currently SGPO training) was tested and accepted in the SGPO training program in 1981. Since that time, he was examined in 1982, 1983, and 1984 and his exams were incomplete with regard to color.

Employee J (currently an AUO at BFN), was admitted to the SGPO program in 1975 and had an acceptable Orthorator score of 4, was given an AO-HRR test (though it was not required) but it was not rated. He was subsequently examined in 1978 and 1983, each time as an SGPO 4th period (in 1983 he was actually an AUO) and the incorrect vision profile 5 (for an SGPO) was used. In both subsequent examinations, his Orthorator scores showed progressively fewer numbers seen. His 1983 exam included the AO-HRR test which was rated a medium deficiency (greater than allowed). His 1978 examination was performed by the mobile health lab showing an Orthorator score of two and an inability to detect all nine lights in the red-yellow-green light test. His form TVA 9080 showed unacceptable color and an indication that a letter was sent (receiver unknown, no copy in medical record). There was no form TVA 1444 prepared which should have alerted his supervisor of the problem. The medical records did not contain, for any test, any indications of a suspected problem or a need for corrective action.

D. Nuclear Plant Medical Offices

In discussing the test results described in section III.C.1, .2, and .3 above with the associated plant medical office personnel, inconsistencies were revealed with regard to the intent of medical approval for NUC PR positions. In all cases the test results were described as being reviewed clinically (the medical significance to the individual) rather than from a requirements standpoint (do the individuals meet the regulatory and TVA medical requirements for the job). If an individual were asked (e.g., about a color deficiency) if it affected his job performance and the answer was no, the deficiency would not be pursued further.

There was confusion expressed by some nurse practitioners about the 5/5A vision profile scoring plate. As described in section III.B.3 above, additional testing is required if an examinee scores less than four on the Orthorator pseudoisochromatic plates. MED SV has clear plastic scoring templates for all 12 vision profiles, that are placed over the visual performance profile portion of form TVA 9082, "Clinical Laboratory Examination Record." For any given vision profile, the scoring template is clear in the region of acceptable scores, dotted in a discretionary area of scores, and unacceptable in a lined area of scores. The vision profiles 5 and 5A use the same scoring template and has no discretionary area. The scores are either acceptable or unacceptable. On the 5/5A scoring template is the following instruction for additional testing:

or { RGY 5
AO-HRR 5A

The interpretation of the scoring template means, for color, the examinees Orthorator score must lie within the clear region (scores 4, 5, or 6) or the examinee must pass the Orthorator red-yellow-green light test for profile 5 (RGY 5) or the AO-HRR for the profile 5A (AO-HRR 5A). The confusion expressed over this scoring plate was that the word "or" before the braces indicated that either the red-yellow-green light test or the AO-HRR were acceptable for either vision profile. Additionally, with the exception of BFN, which first identified this confusion, none of the plant medical offices had AO-HRR plates or the training to administer them.

Several nurse practitioners indicated that until the current concern regarding color vision, they did not know what an x-chrom lens was.

E. MEDS SV and NUC PR Recommended Corrective Actions

Throughout this investigation information developed by NSRS, MED SV, and NUC PR was freely and frequently exchanged. Based upon this information and NSRS's verbal recommendations, NUC PR personnel working on this problem reported informally to NSRS the actions to be recommended to NUC PR management. These intended actions are summarized as follows:

- (1) MED SV will officially prohibit x-chrom lens use.
- (2) A practical color vision test will be developed within a month to six weeks by MED SV and NUC PR for those personnel currently licensed and in career development programs leading to licensed positions.
- (3) Rigid color vision tests for incoming SGPO students will remain unchanged and not include a practical test.
- (4) Color vision tests for personnel within positions designated as career development for licensed operators and licensed operators will consist of the current tests and, if necessary, a practical test.
- (5) All licensed personnel and others with identified testing or color vision anomalies will have their color vision retested as soon as the practical test is developed.
- (6) All personnel in career development positions will be retested during their regularly scheduled physical examination.
- (7) MEDS SV will reemphasize their examination of color vision with regard to the established requirements.

IV. ANALYSIS

A. X-Chrom Lens

The x-chrom lens was invented in 1971 to improve color discrimination. There is no record of an x-chrom lens being used to correct a color deficiency of an operator in the nuclear program until 1981. During 1981 medical records show that three non-licensed employees used x-chrom lens to correct color deficiencies which enabled them to pass the TVA color vision tests. At the time these three employees were allowed the use of an x-chrom lens to correct a color deficiency there was no policy or guidance established within TVA regarding use of the x-chrom lens to correct a color deficiency. Prior to acceptance of the lens as a valid corrective device there is no indication in the records to indicate that there was a formal evaluation made by MED SV of the acceptability of the lens for meeting medical requirements. It appears the decision to allow the use of an x-chrom lens was a professional judgment decision made at the examining physician level. Since there were no specific instructions regarding use of the lens or procedures regarding the examination of employees and the transfer of information to supervisors in NUC PR, supervisors of only two employees wearing x-chrom lenses were notified of this medical constraint. In the case of the three employees that are known to have used x-chrom lenses, the employees individually purchased the lenses at their own expense. These purchases were made after each employee failed the color vision test for profile 5A and the MED SV examining physician in Chattanooga

recommended the x-chrom lens as a possible compensatory device. As all three purchased their lenses at TVA's recommendation, it appears that either MED SV initiated the use of the lens or someone other than the three identified used the lens at an earlier time and thus introduced the lens to TVA. The review of medical records by MED SV identified only three individuals with x-chrom lenses which implies that if someone other than the three existed, then that person either no longer works for TVA or his/her medical record does not show the use of the lens. Interviews with the two examining physicians that recommended the use of x-chrom lenses indicated that their acceptability to TVA occurred before they made their recommendation, but they did not know where or by whom the decision to allow x-chrom lenses was made.

On the basis of information available in the literature, it appears that there was no basis for accepting the x-chrom lens as a corrective device for operations personnel. In the absence of a valid basis for accepting the x-chrom lens, it was poor judgment on the part of MED SV to either recommend use of the lens or to accept the use of the lens as a corrective device. In the absence of an official policy or guidance on the use of the x-chrom lens, administrative problems either existed or could have existed in the examining program. Since the use of the lens was not addressed, it is not obvious that examiners were aware of the use of the lens by employees in taking exams. In interviews it was revealed that none of the medical personnel had ever seen an x-chrom lens. It is possible therefore that employees could have used the lens to pass the physical exam. There was no evidence to support this had occurred, however, the lack of a procedural step to assure this was not happening presents the possibility that it could have happened.

With the restriction imposed in 1982, that disallows use of contact lens, the use of the x-chrom lens is also disallowed. This action in effect establishes the policy that the x-chrom lens cannot be used to correct a color deficiency problem. With the initiation of the EEO complaint MED SV for the first time documented, on October 21, 1983, its position on the unacceptability of the x-chrom lens to compensate for a color deficiency.

B. Adherence to MED SV Procedures and Medical Requirements

Anomalies described in sections III.C.1, .2, and .3 appear to be related to procedural and requirement adherence. With regard to the licensed operators, two were examined in 1977 and found to have color deficiencies that were unacceptable (strong or medium). Both were tested by a consultant ophthalmologist and given the TVA "yarn test." Both were determined to be acceptable on the basis of those tests. In subsequent years, although the two ASEs continued to have color deficiencies, according to TVA's Orthorator and AO-HRR tests, that were unacceptable (strong or medium), with no further testing the two were evaluated as acceptable.

Understanding that the medical community generally accepts the premise that color deficiencies do not get worse with age unless the eye contracts some disease, then it could be postulated that the 1977 practical tests were still valid and continued Orthorator and AO-HRR testing would confirm no changes. MED SV procedures do not address practical tests other than as included in ANSI/ANS-3.4-1983 which required biennial medical evaluation which NSRS interprets to include any practical test to demonstrate compliance with the standard requirements. NSRS believes that if it is necessary to perform periodic exams to determine acceptability, then if these exams indicate an unacceptable condition, the practical test must be repeated to demonstrate acceptability.

In reviewing the records discussed in sections III.C.1, .2, and .3, it appeared that there were situations where once a person was medically qualified for a position, he/she continued to be qualified regardless of the test results and their relationship to the TVA requirements. This was seen in the case of Employee C who was an AVO the first time he was tested with the AO-HRR. He did not pass it, was approved with unsubstantiated on-the-job demonstrated ability, and was not tested again on AO-HRR even though other test data required it. This was also seen in the case of Employee G whose Orthorator scores had been deteriorating and had never been given an AO-HRR test even though it was required. MED SV procedures described in detail what to do if a person failed to meet the medical requirements, and both cases above could have been handled using those procedures.

Most other anomalies seen in the records included using the wrong profile, not giving the appropriate test, incorrect profile listed in job code book, or poor data. The most probable contributing factor was the expressed position that examinees were looked at clinically rather than from a regulatory basis. In all cases these abnormalities were associated with testing at the plant and did not involve a physician. Implicit is a need for good procedural guidance and an appreciation for what the requirements are meant to accomplish.

While only 11 of over 650 records reviewed by MED SV revealed problems, the kinds of problems identified especially with the accuracy and uniformity of the records, may indicate that other related cases remain unidentified. Record accuracy is particularly important among TVA's licensed operators and medical approval should be based upon acceptable standard medical data and judgment. In the case of the ASE's the MED SV review indicated they had demonstrated adequate color vision ability during on-the-job evaluation. Further review by NSRS revealed those evaluations were seven-years old or unsubstantiated.

Considering the importance of medical approval for a licensed operator from both the TVA and the operator standpoints, discussion of the color tests used is in order. The Orthorator is a machine that has been used by the medical profession for years.

TVA has been using it since about 1947. Contained in that device is a pseudoisochromatic plate consisting of six numbers. Satisfactorily reading four of the six numbers precludes the need for any further color testing. The six numbers on that plate are the same ones present in 1947, and NSRS understood there are no replacements with different numbers. While there is no information to presume the following, one could, if his job depended upon it, easily memorize those six numbers. On the other hand, the AO-HRR test consists of 20 individual pseudoisochromatic plates. They, unlike the Orthorator plate, can be shown out of sequence which renders memorization almost impossible. Additionally, they lend themselves to tracing the number with, for example, an artist's brush which could further confirm seeing the correct shape.

Both of these tests are rigorous and, in the case of two individuals with an x-chrom lens, their poor visual acuity versus a color deficiency hampered their ability to see the numbers. A practical test based upon the needs of the job not involving pseudoisochromatic plates should prove worthwhile. However, even in this case, the practical test should be clearly defined and results documented. The test should assure some minimum requirements. Individuals should not be unnecessarily disqualified from a job if they can no longer pass a rigorous physical test, but have satisfactorily demonstrated job performance through a practical test.

With regard to the "two guys" supposedly using x-chrom lenses while taking the SGPO medical examination for class 310 in 1983, they were never identified and thus could not be interviewed. A possible explanation for the allegation is that the EEO complainant talked with Employee E, who come from BLN and who was also taking the entrance examination for SGPO class 310. The EEO complainant may have misunderstood that Employee E was wearing an x-chrom lense rather than he used to wear an x-chrom lens. The other "guy" from BLN could well have been Employee D, who was known by Employee E. Employee E could have discussed Employee D's color condition and that Employee D had been allowed, in 1981, to enter the SGPO program using an x-chrom lens.

V. CONCLUSIONS

- A. Adherence to MED SV procedures and job code color vision requirements were less than adequate for the NSRS-reviewed medical records.
- B. The construction of the 5/5A vision profile scoring template probably contributed to medical approval, documented in of some of the reviewed records, when the appropriate test was not given.
- C. Documentation regarding the rationale for medical approval of personnel with color deficiencies was not always adequate.

- D. The lack of a standardized practical color vision test and established requirements regarding when it will be given could result, if the color vision requirements are enforced, in the disqualification of personnel who cannot pass the more rigorous Orthorator and AO-HRR color tests.
- E. The color vision test of the Orthorator is more easily circumvented than the AO-HRR test.
- F. The NUC PR/MED SV-identified corrective actions should improve the reliability of the medical records and eliminate most of the problems identified in this review.
- G. There was no evidence to indicate that TVA has any colorblind licensed operators. There were however three ASEs where there was insufficient information to justify their acceptance.
- H. Although x-chrom lenses could have been used prior to the time period when the three identified x-chrom lens users took their exam for SGPO training, there is no evidence to support that x-chrom lenses were used to pass the color examination for SGPO training other than the June to December 1981 time period.
- I. There was no evidence to support the allegation that the identified optometrist in Chattanooga was supplying x-chrom lenses to TVA employees.

VI. JUDGMENT OF NEEDS

- A. A practical color vision test needs to be developed as soon as possible along with requirements regarding when, how often, and to whom it should be given.
- B. The medical requirements, rigor to which they will be followed, testing to ensure medical approval, and documentation to support medical approval for color vision should be reviewed by MED SV in light of the problems found in this investigation and appropriate changes made to procedures, guides, and codes and communicated through training or other suitable mechanism to physicians and nurses responsible for testing and medically approving NUC PR licensed operators and associated career development positions.
- C. Once a practical color test has been developed, all licensed personnel within NUC PR and those identified with possible color deficiencies by MED SV should be given a baseline color examination using both the Orthorator and AO-HRR plates, given out of sequence, and where necessary the practical color test. This test should be conducted as soon as possible after the practical test has been developed.
- D. All nonlicensed NUC PR personnel in designated career development paths to positions requiring licensing should be given the baseline color examination, described in C above, as part of regularly scheduled physical examinations.

- E. A determination should be made by NUC PR regarding the NRC Forms 396 that were sent to NRC which apparently disagreed with the documented medical test results, as to whether or not the forms should be corrected and resubmitted to NRC.
- F. MED SV should make a policy decision regarding the use of x-chrom lenses and document and communicate that decision.

VII. REFERENCES

- A. Affidavit of the EEO complainant subscribed to Michael B. Fox, EEOC, January 19, 1984.
- B. The x-chrom lens by P. Ed LaBissoniere presented at the International Contact Lens Clinic, Winter 1974.
- C. "Effects of X-Chrom Lens Wear on Chromatic Discrimination and Steneopsis in Color Deficient Observers," by Ellen R. Matsumoto, et al. - American Journal of Optometry and Physiological Optics, Vol. 60, No. 4, 1983

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

GNS '840816 056

TO : Charles Bonine, Jr., Manager of Construction, E7B24 C-K

FROM : H. N. Culver, Director of Nuclear Safety Review Staff, 249A HBB-K

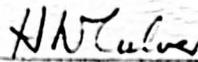
DATE : August 15, 1984

SUBJECT: FOLLOW-UP TO EMPLOYEE CONCERN REGARDING VIOLATION OF QUALITY ASSURANCE PROCEDURES BY THE DIVISION OF CONSTRUCTION AT SEQUOYAH NUCLEAR PLANT - NUCLEAR SAFETY REVIEW STAFF REPORT NO. R-84-21-SQN

The Nuclear Safety Review Staff (NSRS) evaluated an employee concern in December 1983 and documented that evaluation in NSRS Report No. I-83-21-SQN (GNS 831219 052). Even though the employee's primary allegation was not validated, the NSRS did find three items that it considered in violation of QA procedures or in opposition to generally good practices.

We received your March 13, 1984 response (DOC 840313 001) to the three items and conducted an onsite follow-up review on July 25 and 26. The NSRS finds that CONST response and the implementation of corrective actions defined in that response to be adequate. The three items, the CONST response, and the NSRS evaluation of the response are included in the attached report. The NSRS considers all three items closed.

If there are any questions concerning this report, please contact R. W. Travis at 4814-K.


H. N. Culver

RWT:BJN
Attachment
cc (Attachment):
MEDS, W5B63 C-K
H. G. Parris, 500A CST2-C

NSRS FILE



TENNESSEE VALLEY AUTHORITY
NUCLEAR SAFETY REVIEW STAFF
FOLLOW-UP REVIEW
NSRS REPORT NO. R-84-21-SQN

SUBJECT: FOLLOW-UP TO EMPLOYEE CONCERN (NSRS REPORT NO. I-83-21-SQN) REGARDING VIOLATION OF QUALITY ASSURANCE PROCEDURES BY THE DIVISION OF CONSTRUCTION AT SEQUOYAH NUCLEAR PLANT

DATES OF REVIEW: JULY 25-26, 1984

REVIEWER: *R. Travis* 8-16-84
RONALD W. TRAVIS DATE

APPROVED BY: *M. Kidd* 8-16-84
MICHAEL S. KIDD DATE

I. BACKGROUND

This review was a follow-up to NSRS investigation I-83-21-SQN, "Employee Concern Regarding Violation of Quality Assurance Procedures by the Division of Construction at Sequoyah Nuclear Plant." At that time the employee's primary allegation could not be substantiated by the NSRS but the investigation did produce three recommendations. The Division of Construction (CONST) responded with proposed corrective actions which the NSRS found acceptable. This review evaluated the implementation of that response.

II. SCOPE

This review was limited to evaluating the response and implementation of that response by CONST to the three recommendations made by NSRS in Report I-83-21-SQN.

III. CONCLUSIONS AND RECOMMENDATIONS

A. I-83-21-SQN-1, The Use of Wording "Quality Assurance" on Form TVA 229, "Receipt Inspection"

The NSRS recommended evaluating the inclusion of instructions in an appropriate procedure describing the method of filling out a form TVA 209, including the use of the wording "Quality Assurance." CONST evaluated this and replied that this inclusion was not required or needed in that the words "Quality Assurance" were not needed on the 209. The NSRS evaluated the response and agreed that SNP II-30, "Receipt Inspection" contained adequate controls to prevent use of non-QA materials in QA systems. This item is closed. (See Section IV.A for details.)

B. I-83-21-SQN-2, Failure to Recertify Inspectors on a Three-Year Basis

The NSRS recommended implementing the requirement of SNP CP P-33, R5, "Certification of Inspectors," that stipulated the inspectors be recertified by testing every three years. CONST responded that the revision to SNP CP P-33 which included this requirement was not issued until September 27, 1982. Therefore, CONST believed that recertification was not needed until September 27, 1985. CONST did, however, agree to recertify inspectors by February 24, 1984 to comply with the NSRS recommendation.

The NSRS reviewed the certification records of inspectors at SQN and found the CONST response and its implementation of the response acceptable. This item is closed. (See Section IV.B for details.)

C. I-83-21-SQN-3, Inspectors Updating Themselves on Revisions to Inspection Instructions

The NSRS recommended that procedures be clarified to preclude individuals from updating themselves on revisions to Inspection Instructions. CONST revised SNP CP P-33, "Certification of

Inspectors," to require that individuals designated to update inspectors to instruction revisions be updated themselves by their responsible unit supervisor.

The NSRS reviewed the revision and updating since the procedure revision and found the CONST response and its implementation acceptable. This item is closed. (See Section IV.C for details.)

IV. DETAILS

A. I-83-21-SNP-1, The Use of the Wording, "Quality Assurance" on Form TVA 209, "Receipt Inspection"

The NSRS recommended that: "The need for the wording 'Quality Assurance' or 'Nonquality Assurance' on receiving inspections, form TVA 209 should be evaluated, and if determined necessary, the appropriate procedure should be revised to incorporate the purpose of this terminology."

CONST responded that: "We have evaluated placing the wording 'Quality Assurance' and 'Non-Quality Assurance' on receiving inspection form TVA 209 and find that it is not required since the documentation of the receipt inspection is covered by SNP CONST Inspection Instruction No. 30, 'Receipt Inspection.' This instruction describes the manner in which all permanent plant QA material shall be inspected when received on site and prescribes the documentation that must be accomplished upon receipt."

The NSRS agrees that the words "Quality Assurance" are not required by any QA document but by an internal document titled "General Rules for Writing a 209" which was used in the warehouse for training employees who filled out the 209 form, and this document instructed the employees to write "Quality Assurance" on a 209 when the contract indicated that QA was required.

The NSRS could not find the reason for the words "Quality Assurance" and CONST management could not determine the reason for the words but warehouse personnel indicated it came from an accounting procedure issued in Knoxville. Personnel on the Planning and Procedures Staff, Knoxville, who wrote the accounting procedures, knew of no reason for the wording. Accounting Procedure 1, "Receipt of Materials," was reviewed and it described how to fill out a 209, but it does not require the words "Quality Assurance" to appear on the document.

The NSRS concludes that the words "Quality Assurance" on the 209 may have filled a need in the warehouse at one time, but the reason for it is no longer known and it is not needed. The NSRS does not believe it is a QA or nuclear safety problem and accepts the CONST response.

B. I-83-21-SQN-2, Failure to Recertify Inspectors on a Three-Year Basis

The NSRS recommended that: "A review of all inspector certifications should be made to determine if they have been recertified (not only updated) within the last three years as required by SNP CP P-33. All individuals lacking this recertification should be properly recertified."

SNP CP P-33, "Certification of Inspectors," Revision 7 was the document reviewed by the NSRS during the I-83-21-SQN investigation.

CONST replied that: "The requirement for recertification of inspectors on a periodic basis not to exceed three years was not required by SNP CP P-33 until revision 5 was implemented on September 27, 1982. Since a three year period will not be up until September 27, 1985, we have not violated our project procedure. We have implemented a review of all inspector certification and have implemented a program to recertify all inspectors whose inspector certification on any specific Inspection Instruction is three years old or older. The program was completed February 17, 1984 except for some retests which could not be accomplished due to work conflicts and absences. All retests will be completed by February 24, 1984."

The SNP CONST program conforms partially to Regulatory Guide 1.58, R1, which endorses ANSI N45.2.6-1978. This conformance is described in the TVA Topical Report on Quality Assurance (TVA-TR75-1A), Table 17D-2 and QASM N45.2.6, "Qualification of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants;" N45.2.6-1978 requires a reevaluation of inspector job performance at least every three years. This reevaluation can be made in one of several ways, one of which is test results. Thus, TVA at SQN CONST is committed to N45.2.6-1978 and has chosen the retest method to reevaluate or recertify its inspectors.

The NSRS reviewed the schedule issued by CONST in January 1984 for recertifying inspectors. This schedule was then compared with recertification records and tests taken for recertification. Fourteen inspectors' records were reviewed for recertification on 78 Inspection Instructions (II). A total of 223 entries on the schedule were checked against the records. Of that total 215 entries agreed with the schedule and the other 8 were cases where the individual inspector was not needed for inspection on a particular II.

Quality Assurance Procedure, QAP 17.1, "Quality Assurance Records," Section 17.4, "Records Review Checklist," requires that a review be made of QA records using a checklist. A part of this review checklist is to verify the certification of inspectors performing the inspection or test. This checklist is used at SQN CONST to review 209s. This review would preclude uncertified inspectors from signing a receipt inspection.

The NSRS believes CONST has recertified required inspectors in a timely manner and finds the CONST response and its implementation acceptable.

C. I-83-21-SQN-3, Inspectors Updating Themselves on Revisions to Inspection Instructions

The NSRS recommended that: "SNP CP P-33 should be revised to clarify the mechanism called 'updating' of individuals to revisions in Inspection Instructions to ensure that personnel understand that they cannot update themselves to QA procedures. Where this has occurred, they should be updated in accordance with the revised procedure."

CONST replied: "SNP CP P-33 has been revised to exclude any individual from updating himself to a new revision on Inspection Instructions. The new revision was effective February 14, 1984."

The NSRS reviewed the change to SNP CP P-33 in revision 7 and its implementation. The NSRS reviewed the only incident of updating personnel since the revision was issued and the procedure was followed in that the designated updater was himself updated by his unit supervisor. The NSRS finds the change to the procedure and its implementation adequate.

V. DOCUMENTS REVIEWED

- A. General Rules for Writing a 209
- B. Accounting Procedure 1, "Receipt Inspection," June 30, 1977
- C. SNP Inspection Instruction II-30, "Receipt Inspection," R6
- D. SNP Inspection Instruction II-32, "Inspection of Materials in Storage," R10
- E. SNP Construction Procedure CP P-33, "Certification of Inspectors," R7
- F. Inspector Certification Records
- G. Quality Assurance Procedure, QAP 17.1, "Quality Assurance Records," R9
- H. QASM N45.2.6, "Qualifications of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants," R5
- I. ANSI/ASME N45.2.6-1978, "Qualifications of Inspection, Examination and Testing Personnel for Nuclear Power Plants."

VI. PERSONNEL CONTACTED

R. E. Alsup *
S. B. Miller *
R. W. Olson *
J. L. Hamilton *
L. M. Nobles *
C. E. Greek III
M. C. Shivers
J. L. Smith, Jr.
R. L. Potts

Compliance Supervisor
QCRU Engineering Aide
Modifications Manager
FQE Section Supervisor
Plant Superintendent (O&E)
SQN Construction Engineer
QCRU Engineering Aide
Materials Officer
Chief, Planning and Procedures Staff

* Attended Exit Meeting

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

GNS '840906 101

TO : R. M. Pierce, OEDC Project Manager (Watts Bar), 106 EST-A-K
 FROM : H. N. Culver, Director of Nuclear Safety Review Staff, 249A HSB-K
 DATE : September 5, 1984
 SUBJECT: WATTS BAR NUCLEAR PLANT - NSRS ROUTINE REVIEW OF THE RESPONSE TO NSRS REPORT R-84-19-WBN, ASSESSMENT OF THE RESULTS OF THE 25V INDEPENDENT DESIGN REVIEW OF THE WBN AUXILIARY FEEDWATER SYSTEM - NSRS REPORT NO. R-84-26-WBN

Attached is the NSRS report for the routine review of the response to NSRS report R-84-19-WBN. The purpose of this review was to examine the response provided in a memorandum from H. G. Parris to me dated July 31, 1984 (EDC 840801 601).

Of the seven recommendations, NSRS considers four of the items satisfied. It is noted that while the action taken to resolve item R-84-19-WBN-01 was considered appropriate for WBN, the item addressed all TVA plants. This was not understood by your organization and the response only addressed WBN. It is understood that all of the TVA plants are reviewing the item for generic implications and responses are expected.

NSRS does not concur with the response provided for recommendations R-84-19-WBN-06 and -07. As a result, the NSRS has recommended that action is considered to be necessary to satisfy the initial recommendation. This should be sufficient for the staffs to reach agreement on a specific course of action.

Within 30 days of receipt of this report, please provide us with the proposed corrective action including the expected implementation date for the three open items.

H. N. Culver
 H. N. Culver

DRW

VSO:BJN

Attachment

cc (Attachment):

- C. Bonine, W7B24 C-K
- R. W. Cantrell, W11A9 C-K
- J. P. Darling, 1750 CST2-C
- MEDS, W5B63 C-K
- H. G. Parris, 500A CST2-C

NSRS FILE



TENNESSEE VALLEY AUTHORITY
NUCLEAR SAFETY REVIEW STAFF
REVIEW
NSRS REPORT NO. R-84-26-WBN

SUBJECT: NSRS ROUTINE REVIEW OF THE RESPONSE TO NSRS
RECOMMENDATIONS IDENTIFIED IN NSRS REPORT
NO. R-84-19-WBN

DATES OF
REVIEW: AUGUST 15-27, 1984

REVIEWERS: John W. Mashburn 9-5-84
J. W. MASHBURN DATE

J. D. Smith 9-5-84
J. D. SMITH DATE

P. R. Washer 9-5-84
P. R. WASHER DATE

V. S. O'Block 9-5-84
V. S. O'BLOCK DATE

APPROVED BY: P. R. Washer 9-5-84
FOR J. F. MURDOCK DATE

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I. PURPOSE AND SCOPE

The NSRS performed an assessment of the results of the Black and Veatch (B&V) Independent Design Review of the Watts Bar Nuclear Plant Auxiliary Feedwater System and documented the results of the review in NSRS Report R-84-19-WBN dated July 5, 1984. The report provided five recommendations and requested that NUC PR provide NSRS with a plan of action to respond to the recommendations. The memorandum from H. G. Parris to H. N. Culver dated July 31, 1984 (EDC 840801 601) provided the response to the recommendations and stated that all findings could be closed. This report provides the results of the NSRS evaluation of the response and provides the status of the recommendations.

II. SUMMARY AND CONCLUSIONS

As a result of the review, the NSRS has determined that adequate corrective action has been completed to satisfy four of the seven recommendations. NSRS has also determined that the response to three recommendations provided insufficient corrective action to warrant closeout.

III. STATUS OF PREVIOUSLY IDENTIFIED ITEMS

All of the responses to the seven recommendations made in the memorandum mentioned above (EDC 840801 601) were examined. Based upon the review, four of the recommendations are satisfied and three remain open. The details of the NSRS action follow:

A. R-84-19-WBN-01 (Category 3)

This recommendation was not fully complied with since it referred to all TVA plants and the response only addressed WBN. As part of this follow-up review, NSRS has examined a number of drawings which were changed under ECNs 4666 and 4667. The changes appeared to clarify and correct the drawings listed. A large number of logic and control drawings were changed. Therefore, NSRS considers this issue satisfied for WBN due to the corrective actions taken and verified. The extent of the problem identified by B&V and identified by this item in the NSRS report is endemic to EN DES drawings for all plants. Therefore it will remain open until EN DES completes a similar review and makes corrections as needed for SQN, BLN, and BFN logic and control drawings versus electrical drawings and termination lists. It is understood that this review for other plants is being performed as a result of the generic review of the B&V findings. NSRS shall be made cognizant of the results of this generic review and upon evaluation will determine if sufficient action has been taken for satisfying this item. A related item is R-84-19-WBN-05 (see below).

B. R-84-19-WBN-02 (Category 9)

This item is satisfied since NSRS concurs with the action specified in the memorandum mentioned above (EDC 840801 601).

C. R-84-19-WBN-03 (Category 9)

This item is satisfied since NSRS concurs with the action specified in the memorandum mentioned above (EDC 840801 601).

D. R-84-19-WBN-04 (Category 20)

This item is satisfied. The NSRS recommendation that a review of time-delay relay settings procedures should be determined for all plants has been satisfied in large measure by work done under SEP-83-11 and work reflected in the memorandum from F. W. Chandler to H. L. Jones (EEB 831125 436). These documents provide satisfactory evidence for WBN and BLN time-delay settings. NSRS has reviewed the BLN design approach in which critical control functions are handled by solid-state logic (SSCS) with predetermined settings in all instances by the designers, and conclude that the program problems discovered by B&V on WBN do not apply to BLN.

E. R-84-19-WBN-05 (Category 34)

This item is satisfied. This category contained 11 findings where "out of function" features of drawings were in error (i.e. these drawings were not used to construct the feature, and drawings which were used differed because of changes or updating). Given the increased emphasis on training and the guidance by checklists and greater detail given in the EPs (EP 3.10 and EP 4.01 for example) now, there is no reason to believe that "out-of-function" features will be in error in the future to the degree that B&V found. In light of this information, NSRS does not believe there is a problem with "out-of-function" elements with the possible exception of old drawings which have not been through a change cycle recently. As noted by EN DES following their review of B&V findings, there were no significant user problems due to the errors found so far, so a special program to review all drawings for this type of error is probably not justified. No corrective action is necessary.

F. R-84-19-WBN-06 (Category 35)

This item is considered to remain open since the response presented in the memorandum from H. G. Parris to H. N. Culver dated July 31, 1984 (EDC 840801 601) and memorandum from J. C. Standifer to R. A. Coster dated July 18, 1984 (WBP 840718 076) is considered to be insufficient. The basic NSRS concern is that the 480-volt motor branch protection is not being performed in accordance with the National Electric Code (NEC). The response verifies this and is unacceptable for the following reasons.

1. The memorandum from J. C. Standifer (WBP 840718 076) states in part:

Subsequent to the evaluation of the Task Force Category 35 finding, Design Standard DSE9.2.1 was replaced by DGE-2.3.5. This occurred on November 10, 1983, and negates the requirement to comply with the National Electrical Code. Design Guide DGE-2.3.5 references the National Electrical Code but the final decision in complying with the National Electrical Code is left up to the discretion of the designer per the definition of design guides.

NSRS considers it to be inappropriate to change a design standard to a design guide to resolve the conflict and leave the compliance to the discretion of the designer. The NEC, as with all nationally recognized codes and standards, represents the collective body of knowledge, experience and accepted design practice of the industry. Considering the safety significance of the application it is not considered to be appropriate to let designer discretion be the final authority.

2. The design guide does not appropriately implement the NEC requirements for instantaneous trip circuit breaker settings. Table 430-152 of the NEC states that the maximum rating or setting for instantaneous trip breakers for motors (other than dc constant voltage) shall be 700 percent of full-load current. An exception being that:

Where the setting specified in Table 430-152 is not sufficient for the starting current of the motor, the setting of an instantaneous trip circuit breaker shall be permitted to be increased but shall in no case exceed 1300 percent of the motor full-load current.

As stated, the 1300 percent setting can be used only if the setting is not sufficient for the starting current of the motor. The TVA Design Guide DG-E2.3.5, Table 1 recommends 7 to 13 times motor full-load current and to follow manufacturer's recommendations. The guide is not in compliance with the NEC since no mention is made on designing to the 700 percent and by exception permit settings up to 1300 percent of full-load current.

3. The TVA design guide DG-E2.3.5 states in part:

Table 1 (end of text) does not include overload protection, which must be selected in accordance with NEC Article 430, Part C (see section 1.2). Table 1 is based on the requirements of NEC table 430-152 (see section 1.3) and motor data included

in NEC table 430-150 for three-phase induction motors, full voltage starting, and motors with NEMA code letters F through V, or without code letter. The table shows maximum values, but does not include allowances for exception of NEC section 430-52 which, when required, should be used with discretion. The fuse ratings in the table are based on fuse manufacturers' recommendations corresponding to the foregoing code requirements.

Contrary to the statement of not including allowances for exceptions, the table permits the use of the NEC 1300 percent of full load currents as standard design guidance.

Based upon the above discussion, NSRS does not agree that this recommendation is satisfied until the following is completed:

- ° Design Guide DG-E2.3.5 is made a mandatory Design Standard.
- ° The Design Standard invokes the instantaneous trip circuit breaker setting requirements of the NEC from Table 430-152 and properly implements the exception clause.

G. R-84-19-WBN-07 (Category 36)

The item is considered to remain open since the response presented in the memorandum from H. G. Parris to H. N. Culver dated July 31, 1984 (EDC 840801 601) is considered to be insufficient.

Our root concern as raised in R-84-19-WBN, section IV.B.23, and as summarized in the recommendation section, III.G, was that there did not appear to exist criteria that could be used by the field personnel to evaluate the adequacy of the work that was being performed or that could be used by the QC inspection units to determine that the final installation was acceptable. This concern, which is stated in R-84-19-WBN, relates to the fact that TVA in its FSAR committed that:

. . . low voltage power cable tray fill shall be limited to a maximum of 30 percent of the cross-sectional area of the tray, except when a single layer of cable is used. Cable tray fill for control and instrumentation cables shall be limited to a maximum fill of 60 percent of the cross-sectional area of the tray.

It was recognized by NSRS that TVA uses a computerized system to route cables and to limit the fill in the cable trays. Although this system is used to assist and to document what was actually accomplished in the field, the computer system cannot be used as a final acceptance vehicle without some verification of what exists in the field.

The response to R-84-19-WBN-07 presented by the line organization relates to a concern that is not even identified by NSRS in its report. The recommendation made by NSRS relates to establishing design criteria and providing the field with the acceptance criteria both for installation and QC inspection.

As has been stated previously, the concern raised regarding the cable routing system was raised when NSRS observed that cabling in many areas exceeds the height of the side rails of the cable trays, even though the tray proper seems (in most cases) to have sufficient area to lay cable below the side rails. This physical condition at the plant also negates the natural protection the cable receives from the side rails, thereby unnecessarily exposing them to damage. NSRS recognized that the NEC did not specify tray fill criteria until 1975. However, our discussions with peers in the industry (Bechtel, Stone and Webster, Sargent and Lundy) revealed that tray fill was generally limited to 80 percent and in no case were cables allowed to protrude above the side rail, the exception being where a "side board" could be added to accommodate a tray cover. Since we are not using "side boards" and covers for the Watts Bar trays, it would appear that our cabling in many areas is unnecessarily exposed to damage and is not consistent with standard industry practice.

TVA has recognized this inconsistency and has revised the TVA General Construction Specification G-38, section 3.2.1.3, paragraph b, which states in part:

Beginning with Bellefonte Nuclear Power Plant, cable trays must not be filled above the side rails except at intersections and where cables enter or exit the tray.

To satisfy the recommendation NSRS considers the following should be performed:

- a. Develop criteria for field use to control actual tray fill levels and to provide a basis for QC inspection.
- b. Either QC or the appropriate QA organization should through an inspection and/or audit process determine if the existing installation meets the established criteria.
- c. Where deviation from the FSAR commitment are made, TVA should perform a safety analysis to justify the deviations. Such deviations should be examined for reportability to NRC.

IV. PERSONNEL CONTACTED

Jim Thompson - Watts Bar Project Manager's Office
Ara Djirikian - Electrical Engineering Branch

V. DOCUMENTS REVIEWED

EN DES EP 3.10

EN DES SEP 83-11

EN DES EP 4.01

ECN 4666

ECN 4667

EN DES FP 1.44

Drawings changed by ECN 4666 and ECN 4667

Memorandum from F. W. Chandler to H. L. Jones dated November 25, 1983
(EEB 831125 936)

Memorandum from H. G. Parris to H. N. Culver dated July 31, 1984
(EDC 840801 601)

Memorandum from J. C. Standifer to R. A. Costner dated July 18, 1984
(WBP 840718 076)

INPO Good Practices (Searched--none apply to "out-of-function"
drawing)

EN DES DG-E2.3.5

National Electric Code, 1984