

C. Division of Construction

<u>Name</u>	<u>Organization/Title</u>	<u>Attended Entrance Meeting</u>	<u>Contacted During Review</u>	<u>Attended Exit Meeting</u>
B. Ahmadi	EEU/Electrical Engr		X	
R. A. Aikens	QCRU/Clerk		X	
D. R. Allen	MEU/Mechanical Engr		X	
R. D. Anderson	EEU/Asst Supervisor		X	
E. J. Austin	EEU/Asst Supervisor		X	
W. H. Besson	CEU/Asst Supervisor		X	
H. C. Blair	CONST/Mech Superintendent		X	
S. J. Boney	WEU/Supervisor		X	X <sup>2</sup>
J. M. Boyd	EEU/Engng Associate		X	
T. R. Brown	HEU/Supervisor		X	
W. R. Brown	CONST/Asst Manager	X <sup>4</sup>		
E. L. Burke	WBN/Asst Const Engr			X <sup>1,3</sup>
C. Christopher	WBN/Asst Const Engr		X	
L. D. Clift	STCU/Supervisor		X	
K. T. Cole	QCRU/Clerk		X	
W. M. Copeland	WBN QA/QA Engineer		X	
S. F. Cranfield	QCRU/Clerk		X	
H. Dake	MEU "B"/Mech Engr		X	
J. D. Dawkins, Jr.	MEU "A"/Mech Engr		X	
R. W. Dibeler	CONST QA/Manager			
H. F. Fletcher	MEU "A"/Mech Engr		X	
R. W. Forsten	IEU/Asst Supervisor		X	
K. G. Galloway	WEU/Asst Supervisor		X	X <sup>2</sup>
W. B. Hays	WSU/Supervisor			X <sup>2</sup>
M. A. Harper	TO/Training Officer		X	
W. C. Hatmaker	Procedures & Training/Welding Engineer		X	
T. W. Hayes	IEU/Supervisor	X <sup>5</sup>	X	X <sup>2,3</sup>
G. L. Hill	EEU/Engineering Aide		X	
C. H. Jetton	WBN/General Const Superintendent		X	X <sup>2</sup>
D. J. Jividen	MSB/Project Controls Staff Chief		X	X <sup>1</sup>
L. J. Johnson	MEU "B"/Supervisor		X	X <sup>2</sup>
S. Johnson, Jr.	WBN/Asst Const Engineer	X <sup>5</sup>	X	X <sup>2,3</sup>
D. W. Kelley	QCRU/Supervisor		X	X <sup>2</sup>
M. A. Koltovich	WBN QA/QA Engineer		X	
H. W. Loftis	MEU "A"/Asst Supervisor		X	
C. M. Lowe	IEU/Asst Supervisor		X	
G. B. Lubinski	EEU/Supervisor		X	
D. W. Mack	QAB/Supervisor Quality Engng		X	
J. C. Morton	MEU "B"/Asst Supervisor		X	
B. J. McCreary	WEU/Engineering Assoc		X	
C. L. Nobles	QCRU/Clerk		X	

<u>Name</u>	<u>Organization/Title</u>	<u>Attended Entrance Meeting</u>	<u>Contacted During Review</u>	<u>Attended Exit Meeting</u>
L. C. Northard	WBN/Asst Cont Engineer		X	
C. E. Oakes	EEU/Engineering Aide		X	
H. S. Odum	WSU/Asst Supervisor		X	
R. W. Olson	WBN/Const Engineer	X <sup>5</sup>		
P. E. Orstadt	QAB/Supervisor Quality Compliance	X <sup>4</sup>	X	X <sup>1,3</sup>
V. F. Powell	MEU "A"/Supervisor		X	
J. E. Powers	WBN/Asst Mech Superintendent		X	
A. M. Ray	WBN/Instrument Superintendent		X	
A. W. Rogers	WBN/QA Supervisor		X	X <sup>2</sup>
L. D. Sandlin	IEU/Engineering Aide		X	
J. W. Self	MSB/Supervisor ADP Devlpmt		X	
F. Smith, Jr.	CEU/Supervisor		X	X <sup>2</sup>
D. R. Spangler	WBN QA/QA Engineer		X	
E. P. Spicer	MSB/Projects Control Engineer		X	
S. P. Stagnolia	CONST/Supv Welding Eng Staff			X <sup>3</sup>
M. R. Terry	MEU "A"/Engng Assoc		X	
V. Thomas	IEU/Supervisor		X	
J. A. Thompson	WBN/Procedures & Training Supervisor		X	
T. R. Trail	WBN/NRC Coordinator		X	X <sup>2</sup>
J. R. Vineyard	EEU/Electrical Engineer		X	
J. C. Vowell	MEU/Engineering Assoc		X	
J. L. Webb	QCRU/Engineering Aide		X	
J. Weinbraum	QCRU/Asst Supervisor		X	
J. E. Wilkins	WBN/Project Manager	X <sup>5</sup>		X <sup>2,3</sup>
B. K. Wilson	MSU/Supervisor	X <sup>4</sup>	X	

## Notes:

1. Exit meeting held in Knoxville on February 24, 1982.
2. Exit meeting held at Watts Bar site on March 19, 1982.
3. Exit meeting held in Knoxville on April 9, 1982.
4. Entrance meeting held in Knoxville on February 16, 1982.
5. Entrance meeting held at Watts Bar site on March 1, 1982.

## VII. DOCUMENTS REVIEWED

- A. Title 10, Code of Federal Regulations
  - 1. Part 50.2, "Definitions"
  - 2. Part 50, Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants"
- B. Watts Bar Nuclear Plant Final Safety Analysis Report
  - 1. Section 9.2.1, "Essential Raw Cooling Water"
  - 2. Section 9.2.2, "Component Cooling System"
  - 3. Section 9.5.3, "Lighting Systems"
  - 4. Section 9.5.4, "Diesel Generator Fuel Oil Storage and Transfer System"
  - 5. Section 10.4.9, "Auxiliary Feedwater System"
  - 6. Section 17.1A, "Quality Assurance - Office of Engineering Design and Construction"
- C. TVA Topical Report, TVA-TR75-1, "Quality Assurance Program Description for the Design, Construction, and Operation of TVA Nuclear Power Plants."
  - 1. Section 17.1A, "Quality Assurance - Office of Engineering Design and Construction"
    - a. Revision 4, August 1978
    - b. Section 17.1A, "Quality Assurance - Office of Engineering Design and Construction, Revision 5 - DRAFT"
- D. Quality Assurance Program Requirements Manual for Design, Procurement, and Construction, February 3, 1982
- E. United States Nuclear Regulatory Commission Regulatory Guides
  - 1. 1.28, "Quality Assurance Program Requirements, R2, 1979"
  - 2. 1.30, "Quality Assurance Requirements for the Installation, Inspection, and Testing of Instrumentation and Electrical Equipment, R0, 1972"
  - 3. 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants," R0, 1973"

4. 1.38, "Quality Assurance Requirements for Packing, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants," R2, 1977
5. 1.39, "Housekeeping Requirements for Water-Cooled Nuclear Power Plants," R2, 1977
6. 1.54, "Quality Assurance Requirements for Protective Coatings Applied to Water-Cooled Power Plants," R0, 1973
7. 1.55, "Concrete Placement in Category I Structures," R0 1973
8. 1.58, "Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel," R1, 1980
9. 1.64, "Quality Assurance Requirements for the Design of Nuclear Power Plants," R2, 1976
10. 1.74, "Quality Assurance Terms and Definitions," R0, 1974
11. 1.88, "Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records," R2, 1970
12. 1.94, "Quality Assurance Requirements for Installation, Inspection, and Testing of Structure Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants," R1, 1976
13. 1.116, "Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems," R0, 1976
14. 1.123, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants," R1, 1977
15. 1.144, "Auditing of Quality Assurance Programs for Nuclear Power Plants, R1, 1980
16. 1.146, "Qualification of QA Program Audit Personnel for Nuclear Power Plants," R0, 1980

F. American National Standards Institute

1. N5.9-1967, "Protective Coatings (Paint) for the Nuclear Industry"
2. N45.2-1977, "Quality Assurance Program Program Requirements for Nuclear Power Plants"

3. N45.2.1-1973, "Cleaning of Fluid Systems and Associated Components During the Construction Phase of Nuclear Power Plants"
4. N45.2.2-1978, "Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants"
5. N45.2.3-1978, "Housekeeping During the Construction Phase of Nuclear Power Plants"
6. N45.2.4-1977, "Installation, Inspection, and Testing Requirements for Instrumentation and Electrical Equipment During the Construction of Nuclear Power Generating Stations"
7. N45.2.5-1978, "Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soils, and Foundations During the Construction Phase of Nuclear Power Plants"
8. N45.2.6-1978, "Qualification of Inspection, Examination, and Testing Personnel for Nuclear Power Plants"
9. N45.2.8-1975, "Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants"
10. N45.2.9-1979, "Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants"
11. N45.2.10-1973, "Quality Assurance Terms and Definitions"
12. N45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants"
13. N45.2.12-1977, "Requirements for Auditing QA Programs for Nuclear Power Plants"
14. N45.2.13-1976, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants"
15. N45.2.23-1978, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Power Plants"
16. N101.2-1972, "Protective Coatings (Paint) for Light Water Nuclear Reactor Containment Facilities"
17. N101.4-1972, "Quality Assurance for Protective Coatings Applied to Nuclear Facilities"

- G. American Society of Mechanical Engineers Boiler and Pressure Vessel Code - 1971 Edition
- H. American Welding Society D1.1-1972, "Structural Welding Code"
- I. American Society for Nondestructive Testing SNT-TC-1A, "Personnel Qualification and Certification in Nondestructive Testing," 1975 Edition
- J. OEDC Quality Assurance Manual for ASME Section III Nuclear Power Plant Components (NCM)
- K. Interdivisional Quality Assurance Procedures
  - 1. ID-QAP 1.3, "Work Control," R0
  - 2. ID-QAP 2.2, "EN DES-NUC PR-CONST Interfaces and Responsibilities During and Following Transition from Design and Construction to Operation," R3
  - 3. ID-QAP 3.1, "Processing of Construction Change Notices," R0
  - 4. ID-QAP 4.1, "Responsibilities and Functions of the Division of Purchasing," R3
  - 5. ID-QAP 4.2, "Procurement Document Control by the Division of Purchasing," R3
  - 6. ID-QAP 4.3, "Transfer of Items," R0
  - 7. ID-QAP 4.4, "Vendor Quality Assurance Evaluation Information Center," R1
  - 8. ID-QAP 4.5, "Procurement of Nuclear Fuel Assemblies and Fuel-Related Components," R0
  - 9. ID-QAP 6.1, "Configuration Control," R2
  - 10. ID-QAP 11.2, "Construction Test Control," R0
  - 11. ID-QAP 12.1, "Initial Calibration and Testing of Permanent Plant Instrumentation," R0
  - 12. ID-QAP 12.2, "Procurement, Calibration, and Management of Measuring and Test Equipment," R0
  - 13. ID-QAP 16.2, "Control and Tracking of Licensing Commitments by OEDC," R0
  - 14. ID-QAP 17.1, "Transfer of QA Records," R1
  - 15. ID-QAP 17.2, "QA Records for Design and Auditing," R0

- 16. ID-QAP 18.1, "Qualification, Certification, and Recertification of QA Audit Personnel," R1
- 17. ID-QAP 18.2, "Joint QA Audit," R2
- L. QA Procedures Manual For Manager's Office
  - 1. MO-QAP 3.1, "Manager's Office QA Audit Program," R5
  - 2. MO-QAP 3.2, "Review of Division Nonconformance Records and Audit Deficiencies," R5
- M. NRC Construction Permits CPPR-91 and CPPR-92
- N. Draft Safety Evaluation Report Related to the Operation of the Watts Bar Nuclear Power Plant Units 1 and 2 Docket No. 50-390 and 50-391, 11-24-81
- O. TVA Code, Chapter VI Records, Record Administration, 7-6-81
- P. Office Service Branch Administrative Procedure Records Staging Center
- Q. Management and Engineering Data System Procedure Manual
- R. Management and Engineering Data Systems Handbook, R0
- S. 1982 Action Plan for Quality Improvement
  - 1. TVA OEDC QA Staff, 12-31-81
  - 2. TVA Division of Engineering Design, 12-31-81
  - 3. TVA Division of Construction, 12-4-81
- T. EN DES Engineering Procedures
  - 1. 1.14, "Engineering Records - Retention and Storage," R8
  - 2. 1.16, "QA Training Program," R2 and R3
  - 3. 1.26, "Nonconformances - Reporting and Handling by EN DES," R3
  - 4. 1.28, "Control of Documents Affecting Quality," R3
  - 5. 1.29, "Internal EN DES QA Audit Program," R3
  - 6. 1.30, "Qualification Requirements for Personnel Assigned to QA Activities," R2
  - 7. 1.31, "Nondestructive Examination (NDE) Personnel Qualification and Certification," R3

8. 2.02, "Handling of Conditions Potentially Reportable Under Title 10 of the Code of Federal Regulations, Parts 21 and 50.55(e)," R5
  9. 2.07, "Licensing Commitments - Control and Tracking," R4
  10. 2.08, "NRC Regulatory Guides - Review, Comment, and Documentation of TVA Conformance," R3
  11. 2.10, "NRC-OIE Bulletins and Circulars - Distribution and Preparation of Responses," R4
  12. 2.11, "NRC-OIE Inspection Reports - Handling and Preparation of Responses, R2
  13. 3.01, "Design Criteria Documents - Preparation, Review, and Approval," R3 and R4
  14. 3.02, "Seismic Design, Review, and Control," R2
  15. 3.03, "Design Calculations," R5
  16. 3.10, "Design Verification Methods and Performance of Design Verifications," R4
  17. 3.23, "EN DES Computer Programs Requiring Quality Assurance - Verifying, Documenting, and Revising," R1
  18. 4.02, "Engineering Change Notices - Handling," R11
  19. 4.03, "Field Change Requests," R7
  20. 4.04, "Squad Check Process," R7
  21. 5.01, "Purchase/Transfer Requisitions - Evaluation of Bids and Recommendation/Rejection of Contract Award - Revisions to Contracts
  22. 5.06, "Instrumentation and Controls - Preparation and Review of Specifications," R1
  23. 5.12, "Manufacturer's Drawings and Data - Contract Administration and Enforcement," R1
  24. 5.15, "NSSS Contract - Communications, Information Exchange, and Contract Administration and Interface Control," R4
  25. 5.33, "Procurement Quality Assurance," R4
  26. 6.05, "Documentation of System Status Configuration for Preoperational Testing," R3
- U. Sequoyah and Watts Bar Project Engineering Procedures

1. 43.01, "Handling and Distributing Manufacturers Drawings and Manuals in SWP," R4
  2. 43.03, "Project Internal Squad Checks - Handling of," R3
  3. 43.16, "Drawing Control for Configuration Status Drawings," R0
  4. 43.19, "Electrical Conduit Schedule Handling Procedure," R0
- V. Quality Assurance Branch Engineering Procedure 26.11, "Identification and Investigation of Potential Generic Conditions Adverse to Quality," R0
- W. EN DES Administrative Instructions
1. 104.04, "Delegation of Authority - Review of Protective Coatings Requirements," R1
  2. 104.05, "Management and Engineering Data Systems Staff," R3
  3. 125, "EN DES QA Policy," R0
  4. 206, "Outgoing Correspondence," R15
  5. 901, "Correspondence," R0
- X. MEDS Branch Engineering Procedure 62.01, "Preparing, Processing, and Revising MEDS Procedures and Instructions," R0
- Y. EN DES General Construction Specifications
1. G-29C, "Process Specifications for Welding, Heat Treatment, Nondestructive Examination, and Allied Field Fabrication Operations"
  2. G-29M, "Process Specifications for Welding, Heat Treatment, Nondestructive Examinations, and Allied Field Fabrication Operations"
  3. G-32, "Bolt Anchors Set in Hardened Concrete," R1
  4. G-43, "Support and Installation of Piping Systems in Category I Structures," R6
  5. G-50, "Torque and Limit Switch Settings for Motor-Operator Valves," R1
  6. G-55, "Surface Preparation, Application, and Inspection of Special Protective Coatings for Nuclear Plants," R0

- Z. Watts Bar Project Construction Specification N3G-881, "Identification of Structures, Systems, and Components Covered by the Watts Bar Nuclear Plant Quality Assurance Program," R2

AA. Memoranda and Letters

1. Letter from L. M. Mills to J. P. O'Rielly, "WBNP Faulty Fillet Welds - QC Breakdown," NCR 2111R, Interim Reports 1 through 10
2. Informal memorandum from E. J. Austin to All EEU Inspectors, "WBN Units 1 and 2 Cable Tray Supports Fillet Welds," dated March 26, 1982 and April 5, 1982
3. Memorandum from R. W. Cantrell to J. E. Wilkins, "Cable Tray Supports Fillet Welds Sampling Program," dated September 16, 1981 (SWP 810917 044)
4. Memorandum from J. A. Raulston to R. W. Cantrell, "Fillet Weld Sampling Program," dated September 9, 1981 (NEB 810909 260)
5. Memorandum from R. W. Cantrell to J. A. Raulston, "Fillet Weld Sampling Program," dated August 24, 1981 (SWP 810824 015)
6. Memorandum from E. G. Beasley to J. A. Raulston, "NCRs on Weld Inspection," dated March 9, 1981 (QAM 810309 003)
7. Memorandum from R. W. Cantrell to J. E. Wilkins, "Fillet Weld Visual Inspection Requirements," dated February 2, 1981 (NEB 810206 265)
8. Memorandum from R. O. Barnett to R. W. Cantrell, "American Welding Society (AWS) D1.1 Welding Requirements," dated February 5, 1981 (CEB 810205 001)
9. Memorandums from R. W. Cantrell to J. E. Wilkins, "Welding Criteria," dated December 9, 1980; December 3, 1980; and October 15, 1980 (SWP 801210 056, SWP 801203 074, and SWP 801017 012)
10. Memorandum from J. E. Wilkins to R. W. Cantrell, "Welding Criteria," dated August 22, 1980 (WBN 800822 006)
11. Memorandum from R. W. Cantrell to J. E. Wilkins, "Nonconformance Report 2375R," dated July 8, 1980 (SWP 800708 028)
12. Memorandum from J. E. Wilkins to R. W. Cantrell, "Nonconformance Report 2375R," dated June 20, 1980 (WBN 800623 006)

13. Memorandum from R. M. Pierce to G. F. Dilworth, "Nonconformance Report (NCR) No. 2111R," dated February 26, 1980 (SWP 800226 C26)
14. Memorandum from R. W. Cantrell to J. E. Wilkins, "Visual Inspection of Welds in Accordance with G-29C - Coated with Carbozinc," dated November 2, 1981 and January 14, 1982 (SWP 811102 056 and NEB 820114 253)
15. Memorandum from M. N. Sprouse and H. H. Mull to Those listed, "Construction Welding Program," dated May 28, 1980 (QAM 800528 002)
16. Memorandum from R. O. Branett to R. W. Cantrell, "Nonconforming Fillet Weld Designs (Acute Angle Welds) - NCRs SQNSWP8025, WBNSWP8008, and WBN 2807R - Request for Information and Recommendations," dated April 3, 1981 (CEB 810403 021)
17. Memorandum from G. L. Buchanan to R. W. Cantrell, "WBN Nonconforming Fillet Weld Designs (Acute Angle Welds) NCR WBNSWP8008," dated April 22, 1981 (CDB 810422 011)
18. Memorandums from O. P. Thornton to R. O. Barnett, "Nonconforming Fillet Weld Design (Acute Angle Welds)," dated April 29, 1981 and May 8, 1981 (MDB 810430004 and MDB 810511 016)
19. Memorandum from R. O. Barnett to R. W. Cantrell, "Design Input Memo for Design Criteria for Category I Cable Tray Supports, WB-DC-20-21.1," dated August 26, 1981 (CEB 810826 004)
20. Memorandum from R. W. Cantrell to R. O. Barnett, "WBN Evaluation of Skewed Weld Joints (Fillet Welds Less Than 60° and Greater Than 130°)," dated September 23, 1981 (SWP 810924 004)
21. Memorandum from R. W. Cantrell to R. O. Barnett, "WBN Nonconforming Fillet Weld Designs (Acute Angle Welds) NCR WBNSWP8008," dated January 4, 1982 (SWP 820106 009)
22. Memorandum from M. N. Sprouse to Those listed, "Commitments Resulting from EN DES Welding Task Force Meeting of June 1, 1981," dated June 29, 1981 (BLP 810618 034)
23. Memorandum from R. O. Barnett to J. A. Raulston, "Watts Bar, Bellefonte, Hartsville, Phipps Bend, and Yellow Creek Nuclear Plants - Safety Analysis Report (SAR) Commitments of the American Welding Society (AWS) Structural Welding Code," dated August 9, 1981 (CEB 810909 007)

24. Memorandum from M. N. Sprouse to G. H. Kimmons, "Trend Analysis - Semiannual Report," dated July 30, 1980 (QAS 800630 001)
25. Memorandum from W. R. Brown to W. R. Dahnke and J. E. Wilkins, "OEDC Audit M81-11 Pre-ASME Survey," dated March 1, 1981 (DOC 820301 007)
26. Memorandum from L. M. Mills to H. J. Green and J. A. Raulston, "NRC Questions on QA Program Description Report TVA-TR-75-1A," dated December 11, 1981 (A27 811211 030)
27. Letter from TVA to NRC, "Revision to FSAR Table 17-2-2 (Critical Systems/Components List)," dated January 28, 1982 (A27 820128 014)
28. Memorandum from M. Guity to E. G. Beasley, "Handling of Nonconformances that Effect More Than One Division," dated May 21, 1981 (QAM 810521 003)
29. Memorandum from E. G. Beasley to R. A. Costner, "Update of the Last EPs for OEDC QA Concurrence," dated July 28, 1981 (QAM 810729 001)
30. Memorandum from J. E. Wilkins to E. G. Beasley, "Watts Bar Nuclear Plant - TVA Topical Report TR-75-1A, Revision 5," dated October 15, 1981 (WBN 811015 005)
31. Memorandum from R. A. Costner to E. G. Beasley, "Inter-divisional Procedural Changes to Improve the Effectiveness of the EN DES/CONST Interface Control Program," dated September 1, 1981 (QAS 810901 011)
32. Letter from TVA to NRC, "Reportable Deficiency - Inconsistent Establishment of Inspection Program," dated February 26, 1982 (A27 820226 031)
33. Memorandum from R. A. Costner to J. L. Parris, "EN DES Internal Audit RO-82-01 - Audit Notification," dated February 11, 1982
34. Memorandum from M. N. Sprouse to J. L. Williams, "QA Authority in EN DES Contracts," dated November 3, 1981
35. Memorandum from A. W. Rodgers to J. E. Wilkins, "Quality Trend Analysis Report - July-December 1981 WB-TA-81-02," dated March 8, 1982
36. Memorandum from R. H. Dunham to R. M. Pierce, "Watts Bar Nuclear Plant - Updating or Inactivation of Design Criteria and Associated DIMs - Listing of Current Design Documents," dated February 27, 1979 (MEB 790227 039)

- BB. Watts Bar Design Criteria
1. WB-DC-10-3, "Control Room Ceiling Panels," R0
  2. WB-DC-20-2, "Reactor Building Concrete Structures," R3
  3. WB-DC-20-5, "Personnel Access Doors on Crane Wall of Reactor Building," R0
  4. WB-DC-20-7, "Escape Hatches in Reactor Building at Floor El 856.63"
  5. WB-DC-20-12, "Shield Building Equipment Hatch Doors and Sleeves," R1
  6. WB-DC-40-1, "Roof Drains," R0
  7. WB-DC-40-7, "Feedwater System Piping Through Isolation Valves," R0
  8. WB-DC-40-8, "Safety Injection Piping," R0
  9. WB-DC-40-9, "Residual Heat Removal System Piping," R0
  10. WB-DC-40-13, "Chemical and Volume Control System Piping (Letdown and Charging)," R0
  11. WB-DC-40-14, "Chemical and Volume Control System Piping (Boron Recycle)," R0
  12. WB-DC-40-28.1, "Additional Diesel Generator System Class 1E," R0
  13. WB-DC-40-28.2, "Additional Diesel Generator Building Environmental Control System, R0
- CC. Architectural Design Guide - DG-A9.8.1, "Requirements for the Selection and Application of Coatings for Coating Service Level I Areas of Nuclear Power Plants," R0
- DD. Division of Construction Quality Assurance Program Manual
1. CONST-QAPP 1, "Organization," R3
  2. CONST-QAP 1.1, "Division of Construction Organization," R2
  3. CONST-QAPP 2, "Quality Assurance Program," R3
  4. CONST-QAPP 3, "Design Control," R1
  5. CONST-QAP 3.1, "Field Change Request," R6
  6. CONST-QAP 3.2, "Design Information Request," R2

7. CONST-QAPP 4, "Procurement Document Control," R1
  8. CONST-QAPP 4.1, "Procurement Document Control," R7
  9. CONST-QAPP 6, "Document Control," R2
  10. CONST-QAPP 7, "Control of Purchased Material, Equipment, and Services," R2
  11. CONST-QAP 7.1, "Transfer of Items for Construction Use," R0
  12. CONST-QAP 7.2, "Surveillance of Site Contractors," R1
  13. CONST-QAP 7.3, "Evaluation and Selection of Suppliers," R4
  14. CONST-QAPP 12, "Control of Measuring and Test Equipment," R0
  15. CONST-QAPP 13, "Handling, Storage, and Shipping," R0
  16. CONST-QAPP 15, "Nonconforming Material, Parts or Components," R1
  17. CONST-QAP 15.1, "Control of Nonconformances," R6
  18. CONST-QAPP 16, "Corrective Action," R1
  19. CONST-QAPP 17, "QA R cords," R0
  20. CONST-QAP 17.1, "QA Records," R4
  21. CONST-QAPP 18, "Audits," R1
  22. CONST-QAP 18.1, "Audits," R3
  23. CONST-QAPP 20, "Housekeeping," R0
- EE. Construction QA Branch Manual QASP 6.2, "Qualification and Certification of Audit Personne," R2
- FF. Watts Bar Quality Control Instructions
1. 1.1, "Print Room Procedure," R2
  2. 1.2, "Control of Nonconforming Items, R2, Addenda 4, 5, and 6
  3. 1.2-1, "Inspection Rejection Notice," R0
  4. 1.8, "QA Records," R2, Addendum 1
  5. 1.9, "Disposition of Engineering Change Notices," R1

6. 1.10, "Preparation and Control of QC Instructions, Procedures, and Tests, R4 and R5
7. 1.11, "Quality Assurance Training Program," R1
8. 1.13, "Preparation and Documentation of Field Change Request," R3
9. 1.14, "Installation of Bolt Anchors Set in Hardened Concrete," R0
10. 1.17, "Transfer of Material Parts and Components," R1
11. 1.18, "Lifting and Transporting of Major Components," R0
12. 1.19, "Handling and Disposition of Field Change Notices and Field Deficiency Reports," R0
13. 1.20, "Site Control of Procurement," R1
14. 1.22, "Transfer of Permanent Features to the Division of Nuclear Power," R3
15. 1.24, "Initial Calibration and Testing of Permanent Plant Instrumentation," R1
16. 1.25, "Control of As-Constructed Drawings," R3
17. 1.27, "Design Information Request Preparation and Documentation," R1, Addendum 1
18. 1.28, "Preparation and Documentation of Seismic Support Variances," R2
19. 1.36, "Housekeeping," R2
20. 1.40, "Inspection and Test Documentation Accountability," R1
21. 1.41, "Qualification, Training, and Certification of Visual Weld Inspectors," R0
22. 2.13, "Qualification of Protective Coatings Applicators," R0
23. 4.1, "Procurement, Storage, Issue, and Control of Welding Materials," R1
24. 4.4, "Qualification, Training, and Certification of Nondestructive Examination Personnel," R0
25. Handling, Storage, and Installation of Spiral Wound Gaskets and SEPCO Crinkle Tape," R1
26. 4.34, "Preparation of Segment and Test Boundary Maps," R5

- GG. Watts Bar Quality Control Procedures
1. 1.6, "Receipt of Inspection of Safety-Related Items," R9
  2. 1.14, "Inspection and Testing of Bolt Anchors Set in Hardened Concrete and Control of Attachments to Embedded Features," R9
  3. 1.16, "Equipment Monitoring Program," R5
  4. 2.4, "Fabrication, Erection, and Inspection of Structural and Miscellaneous Steel," R8, Addenda 1 and 2
  5. 2.12, "Protective Coatings - Inspection and Documentation," R7, Addendum 1
  6. 3.1, "Handling, Storage, and Maintenance of Permanent Electrical and Instrumentation Material," R13
  7. 3.6, "Electrical and Instrumentation Equipment Installation, Standard Tests, Inspection, and Documentation," R12, Addenda 1 and 2
  8. 4.5, "Handling, Storage, and Maintenance of Permanent Mechanical Equipment," R9
  9. 4.7, "Mechanical Equipment Installation; Standard Inspections and Documentation," R6
  10. 4.10, "Standard Inspection and Test Instructions for Mechanical Piping System," R2
  11. 4.14, "Lubrication Control for Permanent Mechanical Equipment," R4
  12. 4.21, "Storage, Installation, Inspection, and Documentation of Mechanical Sleeve Seals," R5
  13. 4.13, "Standard Inspection and Documentation Requirements for Seismic Supports," R2
  14. 4.47, "Equipment Installation," R0
  15. 4.48, "Coupling Alignment," R1
- HH. Watts Bar Quality Control Test Procedure 3.6, "Electrical Equipment - Standard Tests and Documentation," R0, Addendum 2
- II. Construction Requirements Manual
- JJ. OEDC Audits
1. M78-5, "QA Indoctrination and Training

2. M80-6
3. M80-11
4. M81-9
5. M81-11
6. M81-15
7. J8100-7
8. OEDC Audit Schedule 1981, December 31, 1980
9. OEDC Audit Schedule 1982, December 21, 1981
10. OEDC and POWER QA Program Plan and Schedule, R1, August 21, 1981
11. OEDC and POWER QA Program Plan and Schedule, R0, December 9, 1981

**KK. EN DES Audits**

1. EN DES Internal Audit Schedule 1982, R0
2. EN DES QA Internal Audit Index
3. P-81-2
4. P-81-7
5. P-81-11
6. SS-81-1
7. SS-81-6

**LL. Watts Bar Site QA Audits**

1. M-79-10
2. E-80-04
3. G-81-16
4. C-82-02
5. G-82-02
6. G-82-04
7. G-82-05
8. G-82-06

- 9. M-80-07
- 10. CONST QA Audit Schedule - Watts Bar 1981 and 1982
- MM. Nonconformance Reports
  - 1. Watts Bar NCRs numbered 2111, 2375, 2559R, 2587R, 2692R, 2929R, 3086R, 3116R, 3314R, 3579R, 3741R, 3761R, 3775R, 3842R, 3866R, 3898R, 3907R
  - 2. Sequoyah/Watts Bar Project NCRs numbered SWP-80-W-1, SWP-80-W-2, W-5-P, WBNSWP8003, WBNSWP8005, WBNSWP8006, WBNSWP8007, WBNSWP8008, WBNSWP8009, WBNSWP8010, WBNSWP8012, WBNSWP8013, WBNSWP8014, WBNSWP8015, WBNSWP8101, WBNSWP8103, WBNSWP8106, WBNSWP8120, WBNSWP8121, WBNSWP8127, WBNSWP8128, WBNSWP8148, WBNSWP8157, WBNSWP8211
  - 3. NEB NCRS numbered WBNNEB8106, WBNNEB8112, WBNNEB8121
  - 4. MEB NCR WBNMEB8104
  - 5. QAB NCRs numbered WBNQAB8201, GENQAB8201
  - 6. TVA Monthly Status Report of Nonconformances 12/20/80 through 1/20/82
- NN. User's Guide, Watts Bar ECM&D Program
- OO. User's Guide, Watts Bar Construction Mechanical Program
- PP. QA Evaluation Report #QAE-2, "Review and Evaluation of OEDC Welding and NDE Program June 16 to July 31, 1980"
- QQ. Watts Bar Nuclear Plant Quality Control and Records Unit Vault 1 Index 12-21-81 and Vault 2 Index 12-1-81
- RR. Watts Bar Nuclear Plant Universal System Description file
- SS. NRC Inspection Report 50-390, 391/81-16
- TT. Watts Bar Engineering Change Notices numbered 2730, 2756, and 2786
- UU. Watts Bar Contracts numbered 71C62-54114-1, 81KL3-623947, 80K70-87919
- VV. Watts Bar Purchase Request RD685400
- WW. Watts Bar Steamfitter Sketches numbered SK-447-24 Sheet 1 R1, SK-447-25 Sheet 5 R2, SK-406-03 sheet 17, R3, SK-406 sheet 14 R0

## APPENDIX A

### MANAGEMENT EVALUATION TREE

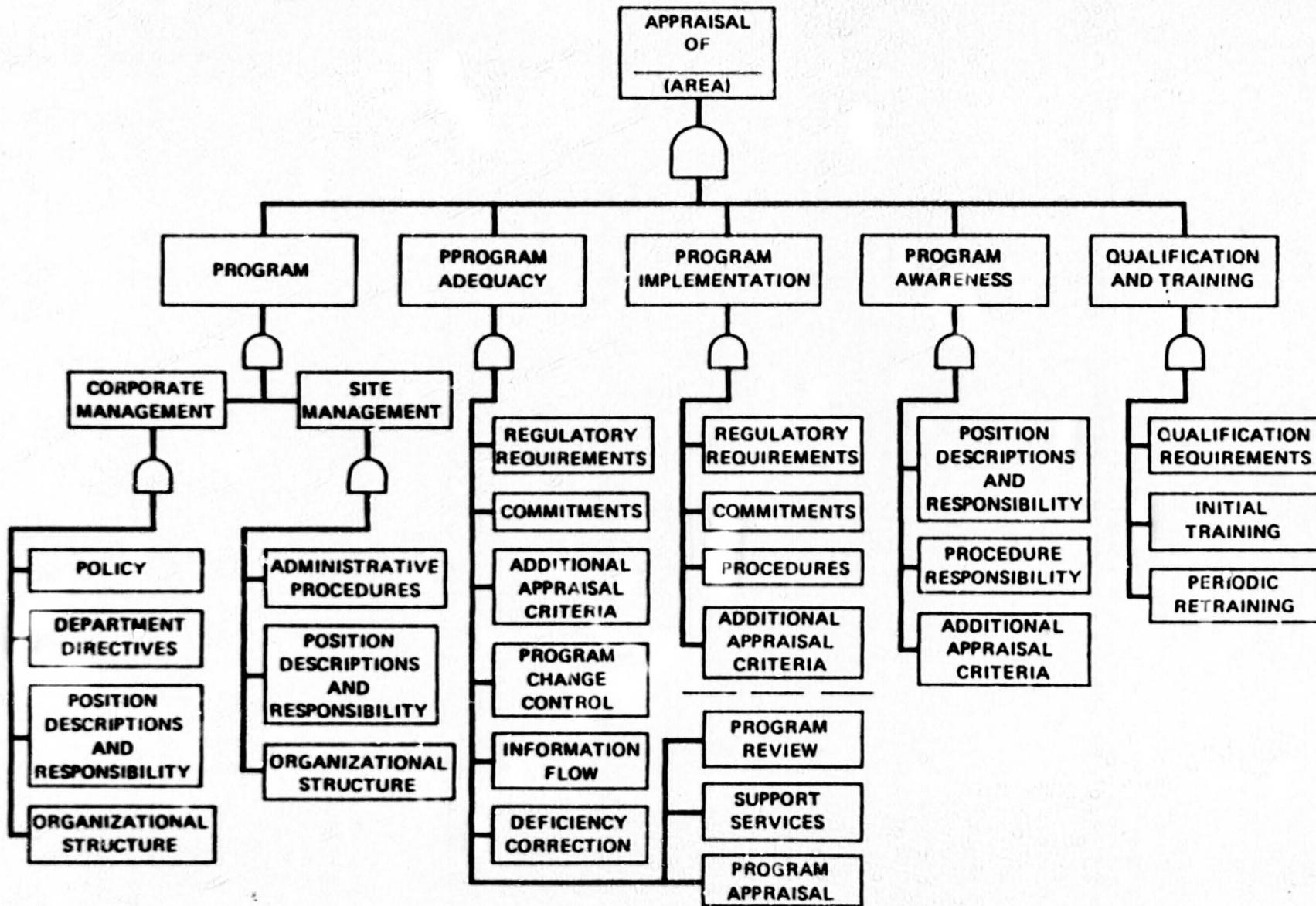
One of the primary goals of this management review was to assess the management controls system within OEDC QA, EN DES, and CONST. To aid in the accomplishment of this objective, a fault tree was developed which NSRS believed would assist the reviewers in a systematic and uniform evaluation of the management system in each functional area. The fault tree which is attached to this appendix is entitled "Management Evaluation Tree" and is commonly referred to as the MET chart.

The MET chart provided the reviewers with a structured approach to the assessment of the management systems that had been established for each functional area. By addressing each of the key elements of the MET chart, the reviewer should have been able to gain a good understanding of how business was being conducted in the area being reviewed. This management evaluation approach should have assured the following basic determinations.

1. If documented policy has been established to provide guidance in the management of the subject areas.
2. If a program had been developed and documented to successfully carry out the established policy in compliance with regulatory requirements, commitments, latest standards, and additional evaluation criteria.
3. If the program was being implemented and implementing activities were being appropriately documented.
4. If responsible personnel were being adequately trained and qualified.
5. If those individuals having gained responsibilities in the area being reviewed understood their roles in the accomplishment of activities within the area.

The various elements indicated by the MET chart were considered in some depth for each area reviewed. Additional detailed checklists appropriate for each specific area were also developed for use during the review.

MANAGEMENT EVALUATION TREE



## APPENDIX C

### ABBREVIATIONS AND ACRONYMS

ADB	Architectural Design Branch - EN DES
AI	Administrative Instruction - EN DES
ANI	Authorized Nuclear Inspector
ANSI	American National Standard Institute
ASME	American Society of Mechanical Engineers
AWS	American Welding Society
BLN	Bellefonte Nuclear Plant
CQA	Condition Adverse to Quality
CCN	Construction Change Notice
CEO	Construction Engineering Organization
CONST	Division of Construction
CONST QA	Quality Assurance Branch - CONST
CRM	Construction Requirements Manual
CSM	Codes, Standards, and Materials Section - NEB
CS	Construction Specification
CVCS	Chemical Volume Control System
DC	Design Criteria
EDM&D	Engineering Construction Monitoring and Documentation
ECN	Engineering Change Notice
EN DES	Division of Engineering Design
EP	EN DES Engineering Procedure
FCR	Field Change Request
FSAR	Final Safety Analysis Report
ID-QAM	TVA Interdivisional Quality Assurance Manual

ID-QAP	TVA Interdivisional Quality Assurance Procedure
IRN	Inspection Rejection Notice
LP	Liquid Penetrant
LOCA	Loss of Coolant Accident
MEDS	Management and Engineering Data System
MEU	Mechanical Engineering Unit
MT	Magnetic Particle Testing
NCH	OEDC Quality Assurance Manual for ASME Section III Nuclear Power Plant Components
NCR	Nonconformance Report
NEB	Nuclear Engineering Branch - EN DES
NDE	Nondestructive Examination
NLS	Nuclear Licensing Section - NEB
NRC	U.S. Nuclear Regulatory Commission
NSRS	Nuclear Safety Review Staff
NUC PR	Division of Nuclear Power
OEDC	Office of Engineering Design and Construction
OEDC QA	Office of Engineering Design and Construction Quality Assurance Staff
OIE	Office of Inspection and Enforcement (NRC)
OWIL	Outstanding Work Items List
PCR	Personnel Certification Record
POWER	Office of Power
PRM	OEDC QA Program Requirements Manual
PURCH	Division of Purchasing
QA	Quality Assurance
QAB	Quality Assurance Branch
QAI	Quality Assurance Instruction

QAP	Quality Assurance Procedure - CONST
QAPP	Quality Assurance Program Policy - CONST
QAU	CONST Quality Assurance Unit - Watts Bar
QC	Quality Control
QCI	Quality Control Instruction
QCP	Quality Control Procedure
QCT	Quality Control Test
QCRU	Quality Control and Records Unit
QES	Quality Engineering Section
QPM	OEDC Quality Policy Memorandum
RG	Regulatory Guide
RS	Regulatory Staff
SNT-TC-1A	Society for Nondestructive Testing, Test Code IA
SWP	Sequoyah and Watts Bar Design Projects - EN DES
RT	Radiographic Testing
TIC	Technical Information Center
TVA	Tennessee Valley Authority
USNRC	United States Nuclear Regulatory Commission
UT	Ultrasonic Testing
WBN	Watts Bar Nuclear Plant
WBFI	Watts Bar Field Instruction
WEU	Welding Engineering Unit
WSU	Warehouse Service Unit
10CFR50	Title 10, Code of Federal Regulations, Part 50

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

GNS '82 0226 050

TO : H. J. Green, Director of Nuclear Power, 1750 CST2-C

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

DATE : February 23, 1982

SUBJECT: WATTS BAR NUCLEAR PLANT UNIT 1 - NUCLEAR SAFETY REVIEW STAFF REPORT  
NO. R-82-03-WBN

Attached is the NSRS report of a routine review conducted during the period January 25-29, 1982 in the area of preoperational testing. This review was described in my memorandum to you dated January 15, 1982 (GNS 820115 056).

Three previous recommendations were closed, and no new items were identified.

Cooperation at the plant was excellent. This consideration is appreciated. If you have any questions regarding this report, please contact H. Randall Fair at extension 4814 in Knoxville.

*H. N. Culver*  
H. N. Culver

HRF:LML

Attachment

cc (Attachment):

- W. T. Cottle, Watts Bar Nuclear NUC PR
- A. W. Crevasse, 401 UBB-C
- G. F. Dilworth, E12D45 C-K
- MEDS, 100 UB-K
- F. A. Szczepanski, 417 UBB-C

**NSRS FILE**



TENNESSEE VALLEY AUTHORITY  
NUCLEAR SAFETY REVIEW STAFF  
REVIEW  
NSRS REPORT NO. R-82-03-WBN

SUBJECT: TENNESSEE VALLEY AUTHORITY  
WATTS BAR NUCLEAR PLANT UNIT 1  
ROUTINE REVIEW

DATES OF  
ONSITE REVIEW: JANURY 25-29, 1982

REVIEWERS:

H. Randall Fair  
H. RANDALL FAIR

2/23/82  
DATE

Richard D. Smith  
RICHARD D. SMITH

2/22/82  
DATE

APPROVED BY:

Kermit W. Whitt for  
KERMIT W. WHITT

2/23/82  
DATE

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## I. SCOPE

This was a routine review of site activities in the area of pre-operational testing including procedure review and system walkdown. In addition, followup reviews of previously identified NSRS items were performed for closeout or update.

## II. CONCLUSIONS AND RECOMMENDATIONS

Nine preoperational test instructions were reviewed for compliance with plant standard practices and scoping documents. Comments on these instructions were given to preoperational test section supervision and are attached to this report as an appendix. No formal recommendations are offered at this time. However, resolution of comments given will be monitored by NSRS and dispositioned accordingly.

## III. STATUS OF SELECTED PREVIOUSLY IDENTIFIED ITEMS

The following is a summary of the status of selected items of concern which were identified in previous NSRS reports. The items presented do not represent a comprehensive list of recommendations but only those reviewed during this review period.

### A. R-81-16-WBN-01, Conduct of Preoperational Tests

Test personnel have been reinstructed in the area of change sheet control as recommended. This item is closed. (Reference section IV.A.1 for details.)

### B. R-81-06-WBN-01, Preoperational Test Data Packages and Partially Completed Tests

Item 1: SIL No. 13 has been revised to incorporate this recommendation. This item is closed. (Reference section IV.A.2 for details.)

Items 2 and 3: Dry runs of tests and initial system operations (ISOs) are being utilized to preclude piecemeal testing and to reduce formal testing reruns. Items 2 and 3 of this recommendation are closed. (Reference section IV.A.2 for details.)

### C. R-81-06-WBN-02, Preoperational Test Section Instruction Letters

The preoperational section instruction letters have been revised to update attachments. This item is closed. (Reference section IV.A.3 for details.)

### D. R-81-06-WBN-03, Employee Training in Administrative Controls

Recommended training is in progress. This item remains open until all training is complete. (Reference section IV.A.4 for details.)

#### IV. DETAILS

##### A. Previously Identified Open Items

###### 1. R-82-16-WBN-01, Conduct of Preoperational Tests

The preoperational test section supervisor issued a memorandum dated October 2, 1981 to all section employees stressing the importance of continuity between test procedure and procedure change sheets in establishing adequate prerequisites for test conduct. This item is closed.

###### 2. R-81-06-WBN-01, Preoperational Test Data Package and Partially Completed Tests

Progress is being demonstrated toward incorporation of this recommendation into practice by the preoperational test section. During recent site visits by our staff, it was observed that informal dry runs of tests are being performed prior to formal testing. This practice, according to the test directors, is helping to work out equipment and procedure problems before the record run of tests. Also, in order to comply with 10CFR50, Appendix B, Item V, which states, "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances. . .," dry runs of preop tests are controlled by the initiation of trouble report and attaching applicable portions of the preop test instruction. Thus, dry runs are documented and are reviewed by plant QA. Also, during this site visit, it was noted that the scheduling program (PC-3) includes initial system operations (ISOs) as an integral part of preop testing.

In addition to the above actions, SIL No. 13 was revised to require a weekly review of test status by group leaders which is to provide closer control of testing activities. All three items of this recommendation are closed.

###### 3. R-81-06-WBN-02, Preoperational Test Section Instruction Letters

The preoperational test section instruction letters were reviewed and found to be updated. Revisions to the SILs within the last four months have deleted outdated attachments. This item is closed.

###### 4. R-81-06-WBN-03, Employee Training in Administrative Controls

The training of section personnel was found to be well underway but still incomplete. It is anticipated that the recommended training will be completed by March 1, 1982. NSRS will continue to monitor progress in this area, thus the item remains open.

## B. Procedure Review and System Walkdown

A general review of selected Preoperational Test Instructions was performed prior to and during the site visit. These are listed below:

- TVA 3, "Airlock Leakage and Operational Test"
- TVA 4, "Upper Containment Ventilation System"
- TVA 5, "Lower Containment Ventilation System"
- TVA 7, "CRDM Cooling System"
- TVA 9B, "Reactor Building Purge System"
- TVA 31A, "Process Radiation Monitoring System (Offline Gamma Scintillation Monitors)"
- TVA 31B, "Process Radiation Monitoring Systems (Offline Particulate, Total Gas, and Iodine Monitors)"
- W 2.1, "Chemical and Volume Control System - Charging and Letdown"

A detailed technical review was performed prior to the site visit on test instruction TVA-22, "Auxiliary Feedwater System."

Comments on the above test instructions which should be considered in future revisions to the instructions were given to the preop test section supervisor at the exit meeting and are included as an appendix to this report. Disposition of these comments will be monitored by NSRS.

The scope of the general review included such things as comparison of system scoping document to the requirements of Regulatory Guide 1.68; adequacy of review of the procedure by NUC PR, CONST, and EN DES; comparison with test instruction objectives, acceptance criteria, prerequisites, and precautions to the corresponding requirements of the scoping document; and adequacy of appendices, data sheets, initial conditions, etc. The general review does not dwell on the step-by-step logic and correctness of the test instruction.

The scope of our technical review of test instructions includes all of the above and a step-by-step review of the technical aspects of the instruction as the nature of comments in the appendix will indicate. Also associated with the detailed technical review of a selected test instruction is a system walkdown. During the site visit a system walkdown of the auxiliary feedwater system was performed. This walkdown was a hand-over-hand inspection of major components, piping, valve placement, hanger installation, and instrumentation. The system was found to be incomplete and since system tentative transfer has slipped for more than three months, comments given at this time would be premature. An abbreviated walkdown will be performed after tentative transfer and discrepancies found compared with those listed on the system punchlist developed by NUC PR and CONST.

V. PERSONNEL CONTACTED

<u>Name</u>	<u>Operation/Title</u>	<u>Attended Entrance Meeting</u>	<u>Contacted During Review</u>	<u>Attended Exit Meeting</u>
M. K. Jones	Preop Test Section Supervisor	X	X	X
R. H. Smith	Preop Test Section Asst Supervisor		X	
J. A. Holmes	Preop Test Section Test Director		X	
R. E. Grimes	Preop Test Section Test Director		X	

VI. DOCUMENTS REVIEWED

1. Preoperational Test Instruction

- TVA 3, "Airlock Leakage and Operational Test"
- TVA 4, "Upper Containment Ventilation System"
- TVA 5, "Lower Containment Ventilation System"
- TVA 7, "CRDM Cooling System"
- TVA 9B, "Reactor Building Purge System"
- TVA 31A, "Process Radiation Monitoring System (Offline Gamma Scintillation Monitors)"
- TVA 31B, "Process Radiation Monitoring System (Offline Particulate, Total Gas, and Iodine Monitors)"
- W 2.1, "CVCS - Charging and Letdown"
- TVA 22, "Auxiliary Feedwater System"

2. Scoping documents for all preop test instructions listed in 1 above.

3. Correspondence files in the preop test section relating to the instructions listed in 1 above.

4. Preop test section instruction letters 1 through 13.

5. Memorandum from preop test section supervisor to section personnel dated October 2, 1981.

6. Various drawings associated with the auxiliary feedwater system.

7. WBNP Standard Practice WB 3.3.1.

## APPENDIX

### TVA 3, Revision 1, Draft 1

1. There is no objective, acceptance criteria, or procedure step to verify that (1) the latching mechanism opening force is 40 lbs (scoping document 3.2) or (2) limit switches for remote indication and annunciation are operable.
2. The test procedure does not include a prerequisite to have a vendor overpressure and operational test per scoping document 3.2.
3. Precaution in scoping document not included in procedure.

### TVA 4, Revision 0

1. Test objectives do not include a verification that each fan delivers within  $\pm 10$  percent of values shown on drawing 47W866-1 per scoping document section 4.1. Acceptance criteria omits this also.
2. Scoping document states an objective to be "confirm coolers capability to maintain containment upper compartment at a temperature no greater than 110°F." Practically, this cannot be done.
3. Scoping document section 5.4 lists the prerequisite that "proper lubrication of fans and motors shall be assured." This prerequisite is not in the test procedure.

### TVA 5, Revision 0

1. Test objective does not include a verification that each fan delivers within  $\pm 10$  percent of values shown on drawing 47W866-1 per scoping document section 4.1.
2. Scoping document states, "confirm cooler's capability to maintain containment lower compartment at a temperature no greater than 120°F." This is not done in the test nor can it practically be done.

### TVA 7, Revision 0

1. Section 4.2 of the scoping document gives the acceptance criteria for demonstrating cooling air flow through each of four nozzles and support openings, through each of four other nozzles and through dampers in relief panel above the reactor as 3500, 1200, and 33,700 cfm, respectively. The test procedure lists these air flow values as 1500, 1500, and 40,500 cfm, respectively.
2. Section 4.6 of the scoping document states as an objective, "Test shall confirm air delivery of each fan to be within  $\pm 10$  percent of the values shown on drawing 47W866-1. This objective is not mentioned in the objectives or acceptance criteria of the procedure.

TVA 9B, Revision 0

Section 4.10 of the scoping document lists the following as a test objective/ acceptance criteria: "Airflow rates shall be within  $\pm 10$  percent of those indicated on airflow diagram drawing 47W866-1." This is not listed in the objectives or acceptance criteria of the procedure but is a prerequisite.

W 2.1, Revision 0

Test description and signature sheet was not included in procedure.

TVA 31A, Process Radiation Monitoring System

1. The scoping document objectives and acceptance criteria No. 4.2.2 require the electronic calibration of indicators and recorders on O-M-12 and the setting of the trip points. This is considered inappropriate for a preoperational test and should be included as a prerequisite for the test. Calibration and the setting of set points during a preoperational test introduces a potential conflict of interest. TVA 31A, dated June 12, 1979 and Approved for Use, does not accomplish requirement 4.2.2 as specified in the scoping document requirements dated November 6, 1978.
2. The scoping document objective and acceptance criteria No. 4.2.1 and TVA 31A test objective require the verification of detector calibration. The test procedure does not verify detector calibration.
3. The scoping document objective and acceptance criteria No. 4.2.6.2 specifies the monitors will actuate within  $\pm 0.3$  volt of the stated high radiation set point. The test procedure TVA 31A, section 5.4, tests whether or not the alarm will actuate and any associated interlock provision will function. It does not determine whether or not the alarm is actuated within acceptable limits of the set point or specify what the set points are. What was being measured at TP3 was unknown to preop at the time of the review (the person familiar with this system recently left) but they indicated this would be evaluated.

The test as presently written will test on a go/no go basis that an alarm and interlock functions will work but does not appear to be able to quantify the test results with regard to acceptance criteria.

4. TVA 31A, section 5.4, requires a simulated radiation level. In an electronic test, which this section appears to be written for, this is generally accomplished with a calibrated electronic signal generator. The test does not specify how this simulated radiation level will be produced and, therefore, should be modified to do so. If an electronic signal generator is to be used it should be included in the list of special test equipment.
5. Acceptance criteria does not include testing downscale indicator trips as required by scoping document 4.2.6.1.

TVA 31B

1. Test instructions step 5.1 requires verification that the ratemeter and recorder respond correctly. The procedure should specify what is meant by "correctly."
2. In order to satisfy objective 1.4, data sheet 5.4 should be modified to include radiation alarm setpoints.

COMMENTS ON TVA-22

- 3.2 Reference should be WBNP TI-27, Table 27.2.1
- 5.1.1.1 In Appendix C, page 4 of 9, valves 3-803 and 3-804 are locked open. Why not valves 3-800, 3-809, and the first valve out of CST? All of these valves are locked open for pump protection as well as to ensure a supply of water is available.
- 5.1.1.2 "Off" and "racked out" are used in this procedure. "Racked out" seems more appropriate.
- 5.1.1.7 "Close" and "rack in" are synonymous. "Rack in" seems more appropriate.
- 5.1.1.29 These steps should also be done with the trip and throttle  
5.1.1.44 valve closed to verify that ERCW valves won't open on a low pressure signal.
- 5.1.1.51, 72 It should be made clear that if the valve opens and the  
110 pressure is regained (short removed) that the valve remains open.
- 5.1.1.112, FCV-3-179B does not auto close.  
113, 114, 117
- 5.1.1.150 FCV-3-179B does not auto close (45W760 3-5, 47W611-3-3)  
151, 152, 155
- 5.1.1.184 The TDAFP trip and throttle valve has nothing to do with  
277, 269, 312 auto opening of ERCW valves to MDAFPs.
- 5.1.1.187 4SW760-3-3,4 says 30 seconds instead of 20 seconds.  
189, 191, etc.  
for FCV3-116A,  
166B, 166A
- 5.1.1.200 Should reference step 5.1.1.187.
- 5.1.1.283 Not 40 (see comment on step 5.1.1.187).
- 5.1.1.291 3-808 instead of 3-803.
- 5.1.2.149 HS-1-51A should be HS-46-56A.
- 5.1.2.150 Acceptance criteria should be given here. 45W600-57-26  
says 60 sec. TDPU.
- 5.1.2.150-151 These steps should also test the feature of FCV-1-51 which  
requires FCV 1-51 to be fully closed before FCV 1-16 begins  
opening.

- 5.1.2.158 Step 152 leaves FCV 1-51 open. PS-138 is showing low pressure because there is no steam. FCV 1-16 is closed by this step (158). All of the above will cause FCV 1-16 to open and R-4 to energize after the time delay.
- 5.1.3.28 RAS is in JB 1933 not 2744 (45W600-57-26).
- 5.1.3.33 RAS not RA5.
- 5.1.3.127 It appears (reference 47W611-3-4) that placing X5-45-57 in "auxiliary" will place controller in manual, not automatic.
- 5.1.3.135 45W600-46-6 gives setpoint of FS-46-57 as being  $> 880$  gpm, not 940.
- 5.1.5.3 With the main feed pumps tripped R/A, RA1, RA2, RAS, TDBR1, and TDBR2 (train A) will be energized. With lo-lo level in one steam generator RA1 and RAS will be energized. With two steam generators below the lo-lo level, RA2, RAS, TDBR2, and TDBR4 will be energized.
- 5.1.5.24 From 45W600-57-16 it appears that these relays do not seal in.
- 5.1.5.62, 67, 72, 77 What should the time be? Should time be specified here?
- 5.1.5.86, 87 Ambiguous. Is this saying to measure the time to relay pickup and then verify that valve immediately closes. Need somewhere to document time. Need acceptance criteria.
- 5.2.3.7, 9 Include acceptance criteria.

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY  
 GNS '82 05 11 05 0

TO : H. G. Parris, Manager of Power, 500A CST2-C  
 FROM : H. N. Culver, Director of Nuclear Safety Review Staff, 249A HBB-K  
 DATE : May 11, 1982  
 SUBJECT: NUCLEAR SAFETY REVIEW STAFF (NSRS) REVIEW OF THE DIVISION OF NUCLEAR POWER (NUC PR) FIRE PROTECTION PROGRAM - NSRS REPORT NO. R-82-05-NPS

Attached is the report of a special review of the NUC PR Fire Protection Program. Included in this review is an evaluation of the programs and their implementation at the Browns Ferry, Sequoyah, and Watts Bar Nuclear Plants and the NUC PR Central Office.

This review compared established programs to regulatory requirements and commitments and good fire safety practices. Recommendations which involve deficiencies by regulatory standards are annotated by [R]. Those which involve deficiencies based on the NSRS reviewers' judgment are annotated by [E].

This review report indicates that the fire protection programs that have been established by NUC PR are generally adequate. The report does, however, identify specific parts of programs that we believe are inadequate that require action.

You are requested to provide NSRS your response to all recommendations with your plan and schedule for corrective action within 30 days of the date of this memorandum. It is expected that appropriate action will be taken to correct those deficiencies based on regulatory requirements in a timely manner. The enhancements should be resolved in accordance with your prioritizing system.

If you have any questions concerning this report, please contact Ronald W. Travis at extension 4814 in Knoxville.

*H N Culver*

H. N. Culver

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**READING FILE**



TENNESSEE VALLEY AUTHORITY  
NUCLEAR SAFETY REVIEW STAFF  
REVIEW

NSRS REPORT NO. R-82-05-NPS

SUBJECT: SPECIAL REVIEW OF THE DIVISION OF NUCLEAR POWER  
FIRE PROTECTION PROGRAM

DATES OF  
REVIEW:

BFN - March 22-26, 1982  
SQN - March 29 - April 2, 1982  
WBN - April 5-9, 1982  
NCO - April 14, 1982

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## I. SCOPE

This review was an evaluation of the administrative controls and implementation of the fire protection and prevention programs at the Browns Ferry Nuclear Plant (BFN), Sequoyah Nuclear Plant (SQN), Watts Bar Nuclear Plant (WBN), and the Division of Nuclear Power (NUC PR) Central Office (NCO). The following aspects of fire protection and prevention were reviewed:

- °Organization and responsibilities for fire protection
- °Fire brigade organization and staffing
- °Qualification and training of the fire brigade
- °Surveillance testing of fire protection systems
- °Control of ignition sources
- °Control of combustibles
- °Fire fighting procedures

Not included in this review were modification and design commitments and quality assurance.

## II. BACKGROUND

10CFR50.48 requires that each operating nuclear power plant have a fire protection plan describing the overall fire protection program for the facility, identifying the various positions within the organization that are responsible for the program and stating the authorities that are delegated to each of the positions to implement those responsibilities. The plan is required to also describe specific features necessary to implement the program described above, such as administrative controls and personnel requirements for fire prevention and manual fire suppression activities; automatic and manually operated fire detection and suppression systems; and the means to limit fire damage to structures, systems, or components important to safety so that the capability to safely shut down the plant is ensured.

The above regulation, as well as other specific requirements for programmatic controls as discussed in section IV.A of this report, forms the rationale for review of the fire protection and prevention program.

## III. CONCLUSIONS AND RECOMMENDATIONS

This review indicated that the Division of Nuclear Power (NUC PR) fire protection program was generally adequate. Of the seven areas that were examined, the program and program implementation was either adequate in all parts or was adequate with only deficiencies noted in some parts of the program. Specific conclusions and recommendations in individual parts of the review are presented below.

A. General - Nuclear Central Office (NCO)

1. Organization and Responsibilities for Fire Protection

The NCO Fire Protection Engineering Staff (FPES) had performed audits of plants' fire protection programs under the cognizance of the Nuclear Safety Review Board (NSRB) as required by technical specifications and DPM N78S2. However, there were no requirements for response to audit findings by the plants, resolution of audit findings, or followup by the NCO FPES.

Recommendation R-82-05-NCO-01

NUC PR should include in corporate policy the requirement to followup and resolve audit findings identified by NCO FPES audits. (See section IV.A.1 for details.) [R]

2. Fire Brigade Organization and Staffing

Corporate policy for staffing the plant fire brigade complies with NRC guidelines and 10CFR50, Appendix R. (See section IV.A.2 for details.)

3. Qualification and Training of the Fire Brigade

Corporate policy for training fire brigade members and leaders was considered adequate for assuring that fire emergencies can be effectively met by the plant's fire brigade. (See section IV.A.3 for details.)

4. Surveillance Testing of Fire Protection Systems

DPM N78S2 was considered adequate in prescribing testing requirements for nonsafety-related fire protection systems. (See section IV.A.4 for details.)

5. Control of Ignition Sources

DPM N78S2 was considered inadequate in complying with NRC guidelines with regard to issuance of the Torch Cutting, Welding, Open Flame, Grinding, and Spark Producing Work Permit in that restrictions on grinding and spark producing work was not as restrictive as the NRC guidelines.

DPM N78S2 was considered inadequate in complying with 10CFR50, Appendix R, requirements in that work activities proposed by maintenance requests (trouble requests for BFN) are not reviewed for fire protection considerations.

Recommendation R-82-05-NCO-02

NUC PR should initiate revisions to corporate procedures to require that all torch cutting, welding, open flame,

grinding, and spark producing work be authorized by issuance of a permit (form TVA 6561). (See section IV.A.5 for details.) [R]

Recommendation R-82-05-NC0-03

NUC PR should initiate revisions to corporate procedures to require designation of onsite personnel to review work activities proposed by maintenance requests for fire protection considerations. (See section IV.A.5 for details.) [R]

6. Control of Combustibles

DPM N78S2 does not include control of contamination zone clothing as a combustible stored item.

Recommendation R-82-05-NC0-04

NUC PR should initiate revisions to corporate procedures to restrict storage of contamination zone clothing to specified storage locations adequately protected by fire suppression systems. (See section IV.A.6 for details.) [E]

B. Browns Ferry Nuclear Plant

1. Organization and Responsibilities for Fire Protection

The plant program establishing the responsibilities of onsite personnel for fire protection and prevention was considered adequate. The safety staff was charged with formulation and implementation of the major aspects of the fire protection program and was considered well qualified and motivated for the task.

The standard practices establishing the fire protection and prevention program were not being reviewed by PORC, contrary to the requirements of the BFN technical specifications.

Recommendation R-82-05-BFN-01

Initiate action to have all procedures establishing the fire protection and prevention program reviewed by PORC. (See section IV.B.1 for details.) [R]

2. Fire Brigade Organization and Staffing

Fire brigade organization, staffing, and equipment were determined to be adequate in meeting the applicable requirements. (See section IV.B.2 for details.)

3. Qualification and Training of the Fire Brigade

The training program established for fire brigade members was adequate and was being implemented per the applicable requirements. (See section IV.B.3 for details.)

4. Surveillance Testing of Fire Protection Systems

Surveillance instructions effectively reflected the surveillance requirements of the technical specifications. Implementation of surveillance instructions was adequate. (See section IV.B.4 for details.)

5. Control of Ignition Sources

The plant procedure for controlling ignition sources was not consistent with NRC guidelines in that actual control of grinding and spark producing work was not as restrictive as NRC guidelines.

The technical specification precaution to prohibit the use of open flame in the cable spreading room, except when the plant is in the cold shutdown condition, was not included in the plant procedure controlling open flame work.

Recommendation R-82-05-BFN-02

Revise plant procedures controlling work involving torch cutting, welding, open flame, grinding, and spark production to require that all such work in or near safety-related areas be authorized by a permit (form TVA 6561). (See section IV.B.5 for details.) [E]

Recommendation R-82-05-BFN-03

The plant should initiate a procedure change to include the technical specification precaution prohibiting the use of open flame in cable spreading rooms unless the plant is in the cold shutdown condition. (See section IV.B.5 for details.) [R]

6. Control of Combustibles

Plant procedures did not adequately restrict the storage of certain combustibles in safety-related areas.

Temporary structures installed in safety-related areas had remained installed for months thus introducing an additional fire load which could have been avoided.

The procedure for controlling transient fire loads in safety-related areas was adequate and was being implemented and well monitored.

Recommendation R-82-05-RFN-04

The plant should revise BF 14.14, "Storage of Material in Safety-Related Areas," to include a limitation of quantities of combustibles which may be stored and to specify storage locations. This revision should be preceded by an evaluation to determine the effects of fires due to the stored material on safety-related structures and equipment. (See section IV.B.6 for details. [R])

Recommendation R-82-05-BFN-05

The plant should initiate action to either limit the time that a temporary structure constructed of combustible material may remain erected or replace the temporary structures with noncombustible material. (See section V.B.6 for details.) [E]

7. Fire Fighting Procedures

Fire fighting procedures had been developed and were considered adequate in establishing prefire instructions for combating fires in safety-related areas. (See section IV.B.7 for details.)

C. Sequoyah Nuclear Plant

1. Organization and Responsibilities for Fire Protection

The plant program establishing the responsibilities of onsite personnel for fire protection was considered adequate. The filling of the Fire Protection Engineer position by a person other than the section supervisor should strengthen the implementation of the program. (See section IV.C.2 for details.)

2. Fire Brigade Organization and Staffing

The fire brigade at SQN as implemented by PHYSI-13 and verified by the review of training records met the requirements of DPM N78S2. (See section IV.C.2 for details.)

3. Qualification and Training of the Fire Brigade

The training program established for fire brigade members met the requirements of DPM N78S2. The implementation was adequate. The methodology of establishing and implementing the weekly crew meetings was considered exceptional for instruction in fire protection principles. (See section IV.C.3 for details.)

#### 4. Surveillance Testing of Fire Protection Systems

Surveillance instructions for testing fire protection systems in fulfillment of technical specification requirements were adequate. Scheduling and performance of surveillance instructions were also adequate. (See section IV.C.4 for details.)

#### 5. Control of Ignition Sources

The operation of many fire doors did not meet the requirement of the technical specifications, the corresponding surveillance instruction, DPM N7852, NRC guidelines, nor 10CFR50, Appendix R.

The NRC guidelines and 10CFR50, Appendix R, requirements for a permit for general work were met at SQM through the amplification of AI-15 (2) HMI #6. It was more stringent than DPM N7852 in this respect and therefore acceptable.

Requirements by DPM N7852 and PHYSI-13 for no smoking signs in specific areas was not properly implemented since the signs were not in place.

##### Recommendation R-82-05-SQM-01

The operation of the fire doors should be corrected to ensure proper closure of normally closed doors. (See section IV.C.5 for details.) [R]

##### Recommendation R-82-05-SQM-02

The requirement for no smoking in certain areas of the plant should be implemented by the proper posting of "No Smoking" signs. (See section IV.C.5 for details.) [R]

#### 6. Control of Combustibles

Control of combustibles met the minimum requirements as defined by DPM N7852 and implemented by PHYSI-13. (See section IV.C.6 for details.)

#### 7. Fire Fighting Procedures

The procedures for fire fighting addressed and met all pertinent requirements except for a PHYSI-13 requirement that instructions be posted at various CO<sub>2</sub> control stations.

##### Recommendation R-82-05-SQM-03

The plaque containing detailed operating instructions for CO<sub>2</sub> control stations should be posted at all CO<sub>2</sub> control stations. It would be a program enhancement to rewrite the paragraph of PHYSI-13 that requires this at the next revision to clarify the requirement. (See section IV.C.7 for details.) [E]

D. Watts Bar Nuclear Plant

1. Organization and Responsibilities for Fire Protection

The organization and staffing for implementing the plant fire protection program at WbN was determined to be adequate. The safety staff was responsible for establishing and monitoring activities relating to fire protection and prevention and was considered highly qualified. (See section IV.D.1 for details.)

2. Fire Brigade Organization and Staffing

The fire brigade organization and staffing were found in compliance with all requirements referenced in section IV.A of this report. Fire fighting and personnel protective equipment inventory met the requirements of DPM N78S2. (See section IV.D.2 for details.)

3. Qualification and Training of the Fire Brigade

The training being administered to fire brigade members and leaders met the requirements of DPM N78S2. However, some aspects of the training being conducted had not been formally established in the PORC-reviewed, superintendent-approved fire protection and prevention program (PHYSI-2). Drill scenarios and critiques written by the fire protection trainer were excellent. (See section IV.D.3 for details.)

Recommendation R-82-05-WBN-01

The plant should resolve the deficiencies in PHYSI-2 listed in section V.D. of this report. (See section IV.D.3 for details.) [R]

4. Surveillance Testing of Fire Protection Systems

A review of surveillance instructions, DPM N78S2 requirements, and PHYSI-2 requirements revealed discrepancies in how certain technical specification surveillance requirements were being met. Scheduling and implementation of the surveillance program for fire protection were considered adequate.

Recommendation R-82-05-WBN-02

The plant should resolve the discrepancies listed in section IV.D.4 of this report. (See section IV.D.4 for details.) [R]

5. Control of Ignition Sources

The plant procedure for controlling ignition sources did not fully meet the requirements of NRC guidelines in that

actual control of grinding and spark producing work was not as restrictive as the NRC guidelines.

Extension of Torch Cutting, Welding, Open Flame, Grinding, and Spark Producing Work Permits, form TVA 6561, past one shift validity required approval by the responsible foreman and the shift engineer, per PHYSI-2. This requirement was not being met in that shift engineer signatures were not found on any extended permits which were reviewed.

Recommendation R-82-05-WBN-03

Plant procedures controlling work involving torch cutting, welding, open flame, grinding, and spark production should be revised to require that all such work in or near safety-related areas be authorized by a permit (form TVA 6561). (See section IV.D.4 for details.) [R]

Recommendation 82-05-WBN-04

Plant management should further instruct applicable personnel as to the requirements of PHYSI-2 for shift engineer's approval of extensions of Torch Cutting, Welding, Open Flame, Grinding, and Spark Producing Work Permits (form TVA 6561). (See section IV.D.5 for details.) [R]

6. Control of Combustibles

Plant procedures did not restrict the storage of combustibles in safety-related areas. The plant procedures establishing the requirement of completion of a transient fire load calculation for introducing combustible materials into or through safety-related areas met all applicable requirements.

Recommendation R-82-05-WBN-05

The plant should establish plant procedures to require the storage of combustible material in areas designated combustible material storage areas with adequate fire protection. Storage of combustible material should be prohibited in areas containing safety-related equipment. (See section IV.D.6 for details.) [R]

7. Fire Fighting Procedures

Fire fighting procedures were being developed at WBN. Those completed appeared to meet 10CFR50, Appendix R, requirements. (See section IV.D.7 for details.)

IV. DETAILS

Introduction

Review of the fire protection and prevention programs was divided into seven major areas as follows:

- °Organization and responsibilities for fire protection
- °Fire brigade organization and staffing
- °Qualification and training of the fire brigade
- °Surveillance testing of fire protection systems
- °Control of ignition sources
- °Control of combustibles
- °Fire fighting procedures

Each of these areas was reviewed for program adequacy and implementation. The standards for review were as follows:

- °10CFR50, Appendix R
- °Nuclear Plant Fire Protection Functional Responsibilities Administrative Controls and Quality Assurance (NRC guidance issued 6/14/77)
- °Applicable plant technical specifications
- °DPM N78S2

Division Procedures Manual Procedure N78S2, section VII, establishes corporate policy for fire protection at the nuclear plants. Paragraph A below addresses the DPM and concerns identified at the plants which are generic in nature. This paragraph also describes major aspects of the plants' fire protection program which are common to all plants. Paragraphs B, C, and D address specific plants.

A. General

1. Organization and Responsibilities for Fire Protection

The NCO Fire Protection Engineering Section (FPES) was responsible for establishing corporate policy with regard to fire protection and prevention and for the performance of periodic audits of the fire protection and loss prevention program of each nuclear plant. This staff was not responsible for the nuclear plant's program but acted as a consultant in matters of fire protection. The plant superintendent was responsible for the formulation and implementation of the fire protection program at the plant level.

Section 6.8 of the BFN Technical Specifications and section 6.5.2.8 of the SQN and WBN Technical Specifications require that "audits of unit activities shall be performed under the cognizance of the NSRB to encompass the facility fire protection program and implementing procedures at least once per 24 months and an independent fire protection and loss prevention program inspection and audit annually utilizing either qualified offsite license personnel or an outside fire protection firm." DPM N78S2 designates the NCO FPES as being responsible for performing these audits. Recent audits performed were reviewed and appear to be comprehensive. However, there was no requirement that the plants respond to audit findings nor was there a requirement that

deficiencies identified by the audits be resolved or followed up on by the NCO FPES. NCO FPES supervision stated that the intention in future audits was to coordinate these audit efforts with the Office of Power Quality Assurance and Audit (OPQA&A) staff so that deficiencies could be tracked as an OPQA&A finding thus assuring response and followup. The plants had been responding to NCO FPES audit findings but in some cases the responses were lacking in detail to the point of being inadequate. Since these audits were required by technical specifications, a policy for resolution and followup of audit findings should be instituted.

2. Fire Brigade Organization and Staffing

DPM N78S2 sets forth the structure and staffing requirements for plant fire brigades trained to level I and level II requirements. Level I brigade members are the primary fire fighters and level II brigade members provide support and backup functions. The organization and staffing requirements contained in the DPM were consistent with NRC guidelines and 10CFR50, Appendix R, and were therefore acceptable.

3. Qualification and Training of the Fire Brigade

DPM N78S2 established training requirements which should provide fire brigade members the knowledge and practical skills to combat fires in the plant. Each level I fire brigade member is required to complete the Fire Brigade Member Course prior to being assigned to fire brigade duties.

The Fire Brigade Member Course consists of 32 hours of classroom training and practical exercises in fighting fire. This training is administered at the Nickajack Fire Training Center and repeated every four years for all brigade members. To provide hands-on practice in fire fighting and familiarization with plant fire hazards and fire protection equipment, drills are conducted quarterly for each work group (shift). Each brigade member is required to participate in at least two drills per year. The drills are arranged, planned, and scheduled by the plant's safety staff. At least one drill per year per group is unannounced and at least one drill per year per group is on a backshift. The drills are directed and critiqued by the plant's safety staff. These periodic drills utilize prefire plans to familiarize brigade members with all aspects of fighting fires in specific plant areas (emergency lighting, ventilation, special hazards, location of fire protection, equipment, etc.). Retraining of level I members consists of quarterly meetings emphasizing plant specific training with a program to cover all required items every two years. Practice exercises and protective equipment exercises are conducted annually.

In addition to the above training, each fire brigade leader is required to complete the Fire Incident Command Course prior to being assigned and every four years thereafter. This training is a 32-hour course emphasizing leadership in fire emergencies.

10CFR50, Appendix R, requires that a physical examination be administered to fire brigade members annually. ASEs and AUOs are required to have a physical examination every two years by virtue of the fact that they are licensed and prospective license candidates, respectively. On alternate years these fire brigade members receive a medical evaluation consisting of a pulse and blood pressure check and a questionnaire for determining any change in the subjects' physical condition which could prevent his performing strenuous activities.

The training program outlined above is considered adequate for assuring that fire emergencies can be effectively met by the plant's fire brigade.

4. Surveillance Testing of Fire Protection Systems

DPM N78S2 provides testing and inspection requirements for plant fire protection systems. These requirements parallel technical specification surveillance requirements and provide a testing schedule for items not covered by the technical specifications. No discrepancies were noted in this area.

5. Control of Ignition Sources

DPM N78S2 establishes the control of ignition sources by requiring the issue of a Torch Cutting, Welding, Open Flame, Grinding, and Spark Producing Work Permit, form TVA 6561. The established instruction does not meet the requirements of the NRC guidelines. The DPM requires that torch cutting, welding, and open flame work be authorized by issue of the permit but does not require the permit for grinding and spark producing work unless in specified areas. The NRC guidelines require the same controls on all of the above processes, and does not distinguish between open flame and spark producing work.

10CFR50, Appendix R, requires that an onsite staff member be designated for the inplant fire protection review of proposed work activities to identify potential transient fire hazards and prescribe additional fire protection in the work activity procedure. This requirement is being met for modification work plans. Maintenance Requests (trouble reports in the case of BFN) are not being reviewed per this requirement. Such a review is not called for in either the DPM or plant procedures.

## 6. Control of Combustibles

One area of concern which was noted at the plants was the storage of contamination zone (C-zone) clothing. Neither the DPM nor plant procedures provide any guidance or restrictions on storage of C-zone clothing. In touring BFN and SQN, it was observed that C-zone clothing was being stored in large open racks with no automatic fire suppression system protecting these areas. At SQN one rack observed was directly under safety-related cable trays. Specific areas of the plant should be designated for such storage with adequate automatic suppression available per 10CFR50, Appendix R, requirements for stored material.

### B. Browns Ferry Nuclear Plant

#### 1. Organization and Responsibilities for Fire Protection

The safety engineer was responsible to plant management for formulating, implementing, and periodically assessing the effectiveness of fire protection and prevention programs. His staff consisted of a fire protection engineer and fire protection engineering aides. Duties of the safety staff included periodic inspections to minimize combustibles in safety-related areas, verification of transient fire load calculations, monitoring housekeeping practices, assuring the availability of fire protection systems, training fire brigade members and fire watches, and evaluating work plans for identification of transient fire hazards. The safety engineer and staff were found to be well qualified by educational background and practical experience to effectively implement the fire protection and prevention program. A review of documentation of past performance and observation of day-to-day activities indicated that a conscientious effort was being put forth by the safety staff.

The program establishing plant management's policy for fire protection and prevention was provided in Standard Practice Section 14. Standard practices at BFN were being approved by the plant superintendent but received no review by the Plant Operations Review Committee (PORC). Section 6.3 of the BFN Technical Specifications require that written procedures covering fire protection and prevention be prepared, approved, and adhered to and that written procedures pertaining to fire protection and prevention shall be reviewed by PORC and approved by the plant superintendent prior to implementation. Actual work procedures involving fire protection (surveillance instructions, mechanical maintenance instructions, etc.) were being PORC reviewed. The program establishing the organization, control and responsibilities in the area of fire protection and prevention was not reviewed by PORC. This inconsistency was in apparent conflict with the requirements of the technical specifications.

## 2. Fire Brigade Organization and Staffing

The plant fire brigade consisted of a fire brigade leader and at least four brigade members. The unit 2 assistant shift engineer was designated as the brigade leader and all assistant unit operators (AUOs) were designated as level I fire brigade members. DPM N78S2 requires that at least five level I members be designated by name and that a compliment of level II members be designated by position. (Level II members are those whose training in fire protection is not as extensive as level I members.) BFN management opted to designate all AUOs as level I members and not to designate level II members. In the event of a fire, all AUOs respond to the fire location. The brigade leader then dispatches extra members to perform support functions (manning fire equipment cages, replenishing air cylinders, etc.) as needed. The practice was considered equivalent to or better than the DPM requirements. All brigade members are required to successfully complete the Fire Brigade Member Training Course prior to being assigned. All brigade leaders were required to complete the Fire Incident Command Course prior to being assigned. Training of brigade leaders and AUOs were found to be up to date.

Fire fighting equipment and personnel protective equipment was being provided in two fire equipment cages in the turbine building. Included in these cages were 15 fullface, positive pressure, NIOSH-approved face masks and 30 air cylinders for brigade use per the technical specifications. Contents of the fire equipment cages were found to comply with the requirements of DPM N78S2.

## 3. Qualification and Training of the Fire Brigade

In order to ensure that a trained fire brigade and leader were available on every shift and to minimize scheduling problems, all ASEs were required to receive the Fire Incident Command Course and all AUOs to receive the Fire Brigade Member Course. The only exception to this requirement was medical problems which could restrict an individual's performance on the fire brigade. The training received by the fire brigade members and leaders is described in section IV.A of this report. Personnel files and training schedules were reviewed and no discrepancies noted. The drill scenarios reviewed were realistic and the drill critiques were considered exemplary.

## 4. Surveillance Testing of Fire Protection Systems

Surveillance instructions for testing fire protection systems in fulfillment of technical specification requirements were reviewed for adequacy and found acceptable. Scheduling and performance documentation were also reviewed and no discrepancies were identified.

Conduct of a surveillance instructions for verification of fire door positions was observed by the reviewers. No discrepancies were noted.

#### 5. Control of Ignition Sources

Standard Practice BF 14.1, "Safety and Hazard Control Policy," endorsed (by reference) DPM N78S2, section VII, F22, for control of work involving welding, cutting, open flame, grinding, and production of sparks. There was no plant procedure that specifically covered control of these processes and in effect, the DPM was the plant policy for such work. This method of establishing plant policy by reference to a DPM is acceptable; however, the DPM did not appear to be adequate in establishing positive control of ignition sources and therefore the plant policy was not adequate. The inadequacies of the DPM are discussed in section IV.A.5 of this report. Implementation of the program for controlling these processes was reviewed and found to surpass DPM requirements.

An extensive plant walkthrough was performed by the reviewers to verify that fire doors were being kept closed and that fire stop (wall penetrations) integrity was being maintained. No inadequacies were found.

In several areas of the plant which were posted with "no smoking" signs, the reviewers observed indications that violations of the no smoking restrictions continue to be a problem. This problem was documented in the triennial audit of the fire protection program performed by Professional Loss Control, Inc., in late 1980 to which BFN management responded by strengthening disciplinary action for violators. No further recommendation will be made at this time, however, continued management attention in this area is suggested.

The BFN Technical Specifications forbid the use of open flame in cable spreading rooms unless the unit(s) is in the cold shutdown condition. This precaution could not be found in any plant procedure. While it is recognized that the shift engineer's review of open flame permits should guard against such occurrences, it would seem prudent to place this precaution in the controlling document for work involving torch cutting, welding, open flame, grinding, and production of sparks.

#### 6. Control of Combustibles

Standard Practice BF 14.4, "Storage of Material in Safety-Related Areas," provides the plant's policy for storage of combustibles. This procedure lists material which may be stored in safety-related areas (reactor building, control

bay, diesel generator room, and intake structure). The control of combustibles set forth in this procedure was considered too loose in that no limit was set on the quantity of the listed material nor was there any restriction on the location where these combustibles could be stored. Any quantity of a listed material could be stored anywhere in the plant by this procedure. Specific areas in the plant should be designated as storage areas with limits placed on the quantity of material which may be stored. An evaluation of each designated storage area should be performed to determine the threat to nearby equipment and the adequacy of installed automatic fire suppression equipment.

In touring the reactor buildings, the reviewers observed several "temporary" structures constructed of fire retardant wood and Herculite. Authorization for these structures was documented by issue of a temporary structure permit, form BF103, as required by Standard Practice BF 8.5. It is recognized that such structures are necessary, especially during outages. The concern rises from the question of whether these structures are temporary. Plant personnel stated that some of the structures had been in place for several months. Since these structures are constructed of combustible material, it is recommended that they either be treated as temporary structures (i.e., removed expeditiously upon completion of work) or that they be replaced by noncombustible material.

Transient combustibles are controlled by Standard Practice BF 14.19, "Temporary Fire Loads." Prior to transporting a transient combustible into or through an area of the plant a transient fire load determination is made to assess the adequacy of installed suppression systems and dictate additional protection. This procedure ensures that exposure fires involving transient combustibles will not jeopardize plant equipment and structures. Safety staff personnel duties included a daily plant walkthrough to verify that the conditions of the permit were being met. Field services safety staff personnel were also making daily walkthroughs in areas where outage work was being performed. No deviations were noted with regard to this practice.

## 7. Fire Fighting Procedures

Fire fighting procedures had been established for BFN. These procedures covered items such as identification of hazards, points for access and egress, identification of radiological hazards, ventilation system operation, and fire suppression system operation. These procedures were individualized for specific plant areas. The procedures were considered adequate. It may be of benefit in actual fire emergencies to have a one page summary list of the above points and posting such in the immediate vicinity of each hazard for ready reference by the brigade leader.

## C. Sequoyah Nuclear Plant

### 1. Organization and Responsibilities for Fire Protection

The supervision of the Fire and Safety Engineering Section was responsible to plant management for formulating, implementing, and periodically assessing the effectiveness of fire protection and prevention programs. The staff of this section included a Fire Protection Engineer and engineering aides. At the time of the review, the Fire Protection Engineer's position was being filled by the supervisor of the section but an engineer had been selected for this position. Duties of the fire protection engineer and aides include daily inspections, excluding weekends, of selected areas, especially in known high fire load areas, to minimize combustibles in safety-related areas, to verify transient fire load calculations, to monitor housekeeping practices, and to assure the availability of fire protection systems. Duties also included refresher training of fire brigade members and evaluating work plans for identification of transient fire loads.

The program for the policy of plant management in the area of fire protection was established in Physical Security Instruction, PHYSI-13, by PORC and approved by the plant superintendent.

### 2. Fire Brigade Organization and Staffing

The plant fire brigade consisted of a fire brigade leader and at least four other fire brigade members. DPM N78S2 requires that at least five level I members be designated by name and that a compliment of level II members be designed by position. SQN met this requirement in the manner prescribed. All fire brigade leaders were required to complete the Fire Incident Command Course prior to being assigned as leaders. Fire brigade members were required to complete the Fire Brigade Member Course prior to assignment to a fire brigade.

The required compliment of fire fighting and personnel protective equipment was provided in two fire equipment storage areas in the service building, on the operations crew truck and in the shift engineer's office.

### 3. Qualification and Training of the Fire Brigade

The requirements and program for SQN were similar to those at BFN. SQN was doing exceptionally well with their weekly crew meetings. The meetings were scheduled by plant services similar to scheduling of surveillance instructions. The original schedule including the dates the subject will be taught and the material to be included was generated by

the Fire and Safety Engineering Section. The package of information to be taught was supplied to the crew to be instructed in advance of the lesson date by safety and then the instructor assignment was made by safety.

4. Surveillance Testing of Fire Protection Systems

Surveillance instructions in the area of fire protection were reviewed for content and compared with the technical specification. The SIs were adequate in the fulfillment of requirements. Scheduling was reviewed in the Plant Services Section and their schedule and dates of past performance of SIs was in agreement with technical specification requirements. Several completed SI data sheets were reviewed for proper implementation of the program and for documentation of results. This area was adequate in meeting all requirements.

5. Control of Ignition Sources

PHYSI-13 and AI-15 adequately implements DPM N78S2. There is the generic question about the adequacy of the DPM. HCI-M8 and HCI-M6 define the requirements of AI-15. HCI-M6 requires that a permit be obtained for grinding anywhere in the plant. AI-15 lists certain areas where a permit is required for grinding but also states that other areas may be designated by the plant superintendent. The plant superintendent had used HCI-M6 to designate the remainder of the plant as requiring a permit. There is no conflict in procedures. The plant procedures surpassed the DPM requirements and met the requirements of the NRC guidelines and 10CFR50, Appendix R.

In a walkthrough of the plant, it was noted that many fire doors in the auxiliary building would not close automatically upon release. Doors A143 and A168 had signs on them directing personnel to close them by hand. The NSRS noted several personnel using these doors and not closing them. Other doors, especially those entering into the 480-V shutdown board rooms, would not completely close upon release. These doors included, but were not limited to, the following: A113, A145, A146, A147, A148, A150, A161, A163, A164, A165, and A160. A check of SI-261, "Visual Inspection of Fire Doors," showed an instruction in section 6.J which read "Open self-closing fire doors fully and release. The door should not catch in the open position and should latch upon closing." The above listed doors would not latch upon closing. A check of the completed data sheets for SI-261 for August 14, 1981 (the last available full SI-261), showed that all the doors had operated acceptably. The fire doors to the shutdown board rooms appeared to be held open by pressure from the ventilation system. This condition is not in agreement with DPM N78S2, 10CFR50, Appendix R, the technical specifications, or the National Fire Codes. We were told by plant personnel that they had been released from the DPM requirement by the central office.

Also in a walkthrough of the plant, it was noted that several no smoking areas as specified by PHYSI-13 were not marked as such by "No Smoking" signs. These included the cable tunnels, the communication room, the area outside the permanent record storage room, and the yard storage area between the diesel generator building and the power plant. PHYSI-13 listed oil storage areas, and the yard storage area had barrels stored which were marked lube oil. The number of signs missing made this a concern to the NSRS. The plant staff personnel prepared maintenance requests to correct these deficiencies before the NSRS left the plant site.

6. Control of Combustibles

Control of combustibles was established by PHYSI-13, attachment E, for transient fire loads. A concern was expressed in the general portion of this report about the storage of C-zone clothing in safety-related areas or near safety-related equipment and cables. Otherwise this area of the fire protection and prevention program and its implementation was adequate.

7. Fire Fighting Procedures

Several specific fire plans had been written for SQN and more are to be written. These were written for specific areas and had adequate detail to aid in fighting fire.

PHYSI-13 had a requirement that operating instructions (SOI-26.1, SOI-39.1, and EOI-10) require the posting of instructions for use of the various portions of these systems near the control station(s) for that portion of the system. A member of the plant staff stated that this applied only to CO<sub>2</sub> control stations and actually consisted of a plaque with about five instructions posted at the control station. This practice appeared to be adequate but didn't agree with PHYSI-13. Also, several locations did not have the plaques.

D. Watts Bar Nuclear Plant

1. Organization and Responsibilities for Fire Protection

The plant safety staff was designated to assist and direct plant fire protection and prevention activities. Routine responsibilities of the safety staff included assisting in and monitoring of fire fighting training programs; selection of fire protection equipment; reviewing maintenance, testing, and inspection activities; documentation for fire protection systems; conduct and evaluation of fire drills; evaluation and identification of transient fire loads; surveillance of open flame and grinding work controls; and review of work plans for potential fire hazards. The safety staff consisted of a supervisor, fire protection engineer, and engineering

aides. The credentials of safety staff personnel were impressive. Since WBN was still a construction site, review of the implementation of the established fire protection program was limited.

The program establishing the fire protection and prevention policies was provided in PHYSI-2. This document was reviewed by the PORC and approved by the plant superintendent as required by the proposed technical specifications.

## 2. Fire Brigade Organization and Staffing

The plant fire brigade consisted of at least five members including a fire brigade leader. The assignments to the brigade were as follows:

Fire brigade leader - Duty ASE - unit 1  
Asst. Fire brigade leader - Duty ASE - unit 2  
Member - Duty unit operator (not assigned to control room)  
Member - Duty assistant unit operator  
Member - Duty shift chemist

Individuals were assigned by name at the beginning of each shift and posted by the brigade leader. The assignments were made using a listing of qualified members. It was the responsibility of each brigade member to check the posted shift fire brigade assignments to determine if they were on fire brigade duty for the shift. All of the above positions were level I brigade members that had been trained to level I requirements. (Level I training applies to primary fire brigade members.) In addition to member training, the brigade leaders had received the Fire Incident Command Course prior to assignment.

In addition to the primary fire brigade discussed above, a complement of support personnel were available during fire emergencies. The fire brigade support group consisted of maintenance foremen, instrument maintenance foremen, safety engineering aides, and health physics personnel. The support group was trained to level II requirements.

Staffing requirements and implementation were found to be adequate.

Fire fighting equipment and personnel protection equipment were stored in fire equipment cages. Contents appeared to meet the DPM requirements.

## 3. Qualification and Training of the Fire Brigade

All ASEs, UOs, and AUOs, and designated chemical technicians received the Fire Brigade Member Training Course prior to being assigned. In addition to the member training, all

ASEs received the Fire Incident Command Course prior to assuming the duties of fire brigade leader. This training and additional training and retraining is described in section V.A of this report except for the following:

- a. The contents of the 32-hour Fire Bridage Member Course and the 32-hour Fire Incident Command Course for brigade leaders was not described in the plant program (PHYSI-2). Since this training is conducted offsite referencing the description of training contained in DPM N78S2, section VII, F3, would suffice.
- b. PHYSI-2 did not specify that annual practice exercises include fighting Class A, Class B, and simulated Class C fires under strenueous conditions. (A proposed revision to PHYSI-2 does require this.)
- c. PHYSI-2 did not require annual protective equipment excercises per the requirements of 10CFR50, Appendix R.
- d. PHYSI-2 did not require that each brigade memeber participate in at least two drills per year.
- e. PHYSI-2 did not require that at three year intervals a randomly selected unannounced drill be critiqued by an outside consultant.
- f. PHYSI-2 did not require that unannounced drills be scheduled at four week or greater intervals.

With the exception of (e) above, which is not applicable prior to the operating license, all of the above training requirements were being met in actual practice but the requirements were not included in the program. No other discrepancies were found in the program or in its implementation. It became apparent from a review of drill scenarios and critiques that the safety staff, in particular the fire protection engineer, was taking fire drills quite seriously.

#### 4. Surveillance Testing of Fire Protection Systems

PHYSI-2 listed all surveillance requirements established by technical specifications and DPM N78S2 and the plant surveillance instruction(s) which satisfied these requirements. The surveillance instructions were compared with the PHYSI-2 listing and DPM and the following discrepancies were identified:

- o Technical specification surveillance requirement 4.7.12.a pertaining to fire barrier inspections was not listed in PHYSI-2.

- Surveillance instruction 4.7.11.2.b.2 did not require the removal of at least four spray nozzles in each system for inspection per the requirements of D.M N78S2.
- PHYSI-2 referenced several cancelled surveillance instructions as satisfying technical specification surveillance requirements. (Surveillance Instructions 4.3.3.8.b.1-a, -aa; 4.3.3.8.d.1-a, -f; 4.3.3.8.b.2, 4.3.3.8.b.3.-d, -e)
- Surveillance instructions 4.3.3.8.c.1-b, -c, -d, and -e referenced technical specification surveillance requirements 4.3.3.8.c.1 but were not listed in PHYSI-2 as such.

#### 5. Control of Ignition Sources

The policy for controlling ignition sources is described in section V.A of this report. PHYSI-2 complied with the requirements of DPM N78S2. However, as pointed out in section V.A, the DPM and therefore PHYSI-2 appeared to be inadequate in controlling grinding and spark producing work. Several Torch Cutting, Welding, Open Flame, Grinding, and Spark Producing Work Permits (form TVA 6561) were reviewed. A comparison of assigned fire watches was made with a listing of qualified fire watches and no discrepancies noted. Several permits were extended past one shift. DPM N78S2 and PHYSI-2 allowed for this flexibility provided that the responsible foreman and the shift engineer approve the extension. None of the extended permits had been approved by the shift engineer. This is a deficiency in that the established procedure was not being followed.

#### 6. Control of Combustibles

Guidelines for storing combustible material was provided in PHYSI-2. The only restrictions established for introducing combustible material into safety-related areas were that the material be stacked neatly and not within 35 inches of a fire door opening. 10CFR50, Appendix R, states that administrative controls shall be established to minimize fire hazards in areas containing safety-related equipment. These controls shall establish procedures to govern the handling and limit the use of ordinary combustible materials, combustible and flammable gasses and liquids, high efficiency particulate and charcoal filters, dry ion exchange resins, or combustible supplies in safety-related areas. These controls shall prohibit the storage of combustibles in safety-related areas or establish designated storage areas with appropriate fire protection. None of these controls existed at WBN. It is recognized that in order to introduce combustible material into or through

a safety-related area, a transient fire load determination is required. By definition given in PHYSI-2, a transient fire load is combustible material not permanently installed. However, transient fire load controls do not restrict the accumulation of the combustible materials once they have been brought into the plant. Transient fire load controls are, as the name implies, established for controlling combustibles which are transient, i.e., not stored. There seemed to be some confusion at WBM as to the distinction between transient combustibles and stored combustibles. Borrowing from the definition given in the SQN fire protection program (PHYSI-13), stored combustibles are those which are not being used for an immediate job. It is therefore recommended that a policy be established for control of combustibles satisfying the requirements of 10CFR50, Appendix R.

#### 7. Fire Fighting Procedures

Prefire plans were being developed for safety-related areas of the plant. The completed prefire plans were reviewed and found to cover the areas listed in 10CFR50, Appendix R. These prefire plans were being used during fire drills as a means of familiarizing fire brigade members with their contents and proving the adequacy of the plans. No discrepancies were found in this area.

V. LIST OF PERSONNEL CONTACTED

A. Division of Nuclear Power

<u>Name</u>	<u>Organization/Job Title</u>	<u>Attended Entrance Meeting</u>	<u>Contacted During Review</u>	<u>Attended Exit Meeting</u>
R. E. Thompson	NCO FPES Supervisor		X	

B. Browns Ferry Nuclear Plant

R. C. Boyer	Information Officer			X
J. R. Bynum	Asst Plant Superintendent			X
Sandra Childers	Plant Services		X	
T. L. Chinn	Compliance Supervisor		X	X
Ray Cole	OPQA Coordinator			X
Pat Crabb	Work Plant Coordinator		X	
J. D. Glover	Asst Operations Supervisor		X	X
Ray Hunkepillar	Operations Supervisor		X	X
G. H. Jones	Safety Engineering Aide		X	X
G. T. Jones	Plant Superintendent			X
T. J. Keckeisen	Fire Protection Engineer		X	X
Roger Lowry	Safety Engng Aide FSG		X	X
Ray Phifer	Safety Supervisor		X	
Bill Roberts	Compliance Engineer	X		
E. G. Thornton	Training Shift Engineer		X	

C. Sequoyah Nuclear Plant

E. A. Craigge	Safety Supervisor	X	X	X
J. M. McGriff	Asst Plant Superintendent	X		X
B. H. Norman	Plant Services		X	
G. D. Poe	Safety Engng Aide FGG		X	
Larry Smith	Training Officer		X	
V. M. Taylor	Safety Engineer FSG		X	

D. Watts Bar Nuclear Plant

W. L. Byrd	Compliance Supervisor			X
W. T. Cottle	Plant Superintendent			X
E. R. Znnis	Asst Plant Superintendent			X
W. F. Hawkins	Fire Protection Engineer		X	X
J. T. Kirkpatrick	Asst Field Services Supervisor		X	
J. J. Lould	Safety Supervisor	X	X	X
R. C. Manley	Plant Services		X	

## VII. DOCUMENTS REVIEWED

### A. Division of Nuclear Power

1. 1981 NCO FPES audit reports.
2. Division Procedure Manual Procedure N78S2

### B. Browns Ferry Nuclear Plant

1. Standard Practice Section 14
2. Technical Specifications
3. Hazard Control Instructions
4. Surveillance instructions
5. Surveillance schedules
6. Surveillance instructions data packages
7. Work plans
8. Maintenance reports
9. Completed transient fire load calculations
10. Completed torch cutting, welding, open flame, grinding, and spark producing work permits, form TVA 6561
11. Training records

### C. Sequoyah Nuclear Plant

1. Administrative Instruction 15, "Torch Cutting, Welding, Open Flame, Grinding, Spark Producing Work Permit"
2. PHYSI-13, "Fire"
3. Technical Specifications
4. Hazard Control Instructions
5. Surveillance instructions
6. Surveillance schedules
7. Surveillance instructions data packages
8. Work plans
9. Completed transient fire load calculations