

VI. DOCUMENTS REVIEWED

A. Regulatory

1. USNRC IE Bulletin No. 80.14, "Degradation of BWR Scram Discharge Volume Capability," dated June 12, 1980
2. Letter to H. G. Parris from James P. O'Reilly, "Confirmation of Action," dated June 30, 1980
3. Letter to H. G. Parris from D. B. Vassallo, "Browns Ferry, NUREG-0737, Item III.D.3.4 - Control Room Habitability," dated February 12, 1982
4. Letter to H. G. Parris from D. B. Vassallo, "Browns Ferry, NUREG-0737, Item III.D.3.4 - Control Room Habitability," dated August 30, 1982
5. NUREG-0737, Item III.D.3.4, "Control Room Habitability Requirement," dated November 1980
6. NUREG-0578, "TMI-2 Lessons Learned Task Force Status Report and Short-Term Recommendations"

B. NSRS Correspondence

1. Memorandum to W. F. Willis from H. N. Culver, "Browns Ferry Nuclear Plant Unit 3 - Malfunction Control Rod Scram System," dated July 9, 1980 (GNS 800709 002)
2. Memorandum to NSRS Files from L. F. Blankner, "Browns Ferry Nuclear Plant - Investigation on Chlorine Accident - June 3, 1979," dated November 29, 1979
3. TVA 45D to E. A. Belvin from E. G. Beasley, "Browns Ferry Nuclear Plant - Investigation of Chlorine Accident - June 3, 1979," dated December 6, 1979
4. Memorandum to W. F. Willis from H. N. Culver, "Key Topics Report," dated March 21, 1980
5. Memorandum to E. A. Belvin from H. N. Culver, "Nuclear Safety Review Staff Major Management Review of the Office of Power and the Office of Health and Safety - Nuclear Safety Review Staff Report No. R-80-08-BFN," dated August 17, 1981 (GNS 81 0817 053)

C. POWER Correspondence

1. Memorandum to M. N. Sprouse from J. R. Calhoun, "Browns Ferry Nuclear Plant - Preliminary Identification of Design Changes - Scram Discharge Subsystem," dated August 3, 1980 (DES 800904 019)

2. Memorandum to H. N. Culver from H. G. Parris, "Browns Ferry Nuclear Plant - Nuclear Safety Review Staff (NSRS) Report No. R-82-11-BFN - Routine Review to Determine the Status of NSRS Open Items," dated August 18, 1982 (GNS 820820 102)
3. Memorandum to H. N. Culver from H. G. Parris, "Browns Ferry Nuclear Plant Units 1, 2, and 3 - Control Rod Drive (CRD) Hydraulic System Modifications," dated October 20, 1980 (GNS 801021 100)
4. Memorandum to H. N. Culver from H. G. Parris, "Browns Ferry Nuclear Plant (BFN) - Nuclear Safety Review Staff (NSRS) Report No. R-82-11-BFN - Routine Review to Determine Status of NSRS Open Items," dated November 9, 1982 (L16 821104 809)
5. Memorandum to J. A. Coffee from A. W. Sorrell, "Status Report for May 1983," dated June 13, 1983
6. Memorandum to H. N. Culver from H. G. Parris, "Browns Ferry Nuclear Plant - Nuclear Safety Review Staff Review of Contamination Control," dated September 11, 1980 (L01 800822 801)
7. Memorandum to H. N. Culver from H. G. Parris, "Browns Ferry Nuclear Plant - Nuclear Safety Review Staff Review of Contamination Control," dated December 18, 1980 (L03 801212 800)
8. Memorandum to R. H. Dunham from E. F. Thomas, "Browns Ferry Nuclear Plant - Compliance with Regulatory Guide 1.78, "Habitability of a Nuclear Plant Control Room During a Hazardous Chemical Release," dated October 10, 1975
9. Memorandum to R. H. Dunham from J. R. Calhoun, "Browns Ferry, Sequoyah, and Watts Bar Nuclear Plants - Auxiliary Boilers," dated November 16, 1979 (DES 791120 005)
10. Memorandum to H. N. Culver from H. G. Parris, "Browns Ferry Nuclear Plant - Investigation of Chlorine Accident - June 3, 1979" dated April 21, 1980 (L29 800411 910)
11. Memorandum to H. J. Green from J. G. Dewease, "Testing for Chlorides in Control Room and Other Areas which Received Air Contaminated with Chlorine Following the Chlorine Leak of June 3, 1979," dated July 23, 1979 (C85 790723 915)
12. Memorandum to M. N. Sprouse from J. R. Calhoun, "Browns Ferry Nuclear Plant - Additional TMI-2 Related NRC Requirements," dated June 12, 1980 (L33 800609 801)
13. Letter to H. R. Denton, USNRC, from L. M. Mills, "Response to D. G. Eisenhower's Letter dated October 31, 1980 and NUREG-0737 Post-TMI Requirements, Browns Ferry Nuclear Plant, III.D.3.4 -Control Room Habitability," dated March 17, 1981 (A27 810317 018)

14. Memorandum to C. R. Brimer from J. Hutton, "Browns Ferry Nuclear Plant - BF-DCR-P-2688 - Upgrade Control Room Ventilation System," dated March 21, 1983 (L33 830318 808)
15. Memorandum to H. N. Culver from H. G. Parris, "Browns Ferry Nuclear Plant - Plans for Implementation of Nuclear Safety Review Staff (NSRS) Recommendations," dated July 23, 1980 (L28 800616 836)
16. Memorandum to R. H. Dunham from J. R. Calhoun, "Browns Ferry Nuclear Plant - Design Change Request (DCR) No. P1802," dated January 21, 1980 (L36 800122 930)
17. Memorandum to R. H. Dunham from J. R. Calhoun, "Browns Ferry Nuclear Plant - Real-Time Evaluation, Analysis, and Monitoring System (REAMS) - DCR No. P1802 dated March 21, 1980
18. Memorandum to M. N. Sprouse from J. R. Calhoun, "Browns Ferry Nuclear Plant - BF DCR P1802," dated May 16, 1980
19. Memorandum to R. H. Dunham from J. R. Calhoun, "Browns Ferry Nuclear Plant - Real-Time Evaluation, Analysis, and Monitoring System (REAMS) - DCR No. P1802," dated March 21, 1980 (DES 800324 041)
20. Memorandum to M. N. Sprouse from J. R. Calhoun, "Browns Ferry Nuclear Plant - Computer Power Supplies - DCR P1802 and DCR P2027," dated May 27, 1980
21. Memorandum to H. N. Culver from H. G. Parris, "Browns Ferry Nuclear Plant - Plans for Implementation of Nuclear Safety Review Staff (NSRS) Recommendations," dated July 23, 1980 (L28 800616 836)
22. Memorandum to M. N. Sprouse from H. J. Green, "Browns Ferry Nuclear Plant - Design Change Request 1802 - Real-Time Evaluation, Analysis, and Monitoring System (REAMS) Implementation Schedule Change," dated January 6, 1981
23. Memorandum to H. H. Mull and M. N. Sprouse from H. J. Green, "Monthly Modification Coordination Meeting Between the Divisions of Nuclear Power (NUC PR) and Engineering Design (EN DES) - Browns Ferry Nuclear Plant," dated March 25, 1982
24. Memorandum to M. N. Sprouse from H. J. Green, "Browns Ferry Nuclear Plant - Design Change Request (DCR) No. 2491," dated November 17, 1982
25. Memorandum to H. N. Culver from H. G. Parris, "Nuclear Safety Review Staff Major Management Review of the Office of Power and the Office of Health and Safety - Nuclear Safety Review Staff Report No. R-81-08-BFN, dated October 31, 1981 (GNS 811015 100)

D. NUC PR Documents

1. DPM N81E4, "Recovery from a Spill of Radioactivity Contaminated Liquids," revised May 9, 1983
2. DPM N73E2, "Chemical Cleaning or Decontamination Procedure," revised April 27, 1981
3. DPM N79A15, "Shift Technical Advisor"

E. BFN Documents

1. BFN Technical Specifications, Units 1, 2, and 3, Section 4.3.F.1.a, "Scram Discharge Volume"
2. BFN Technical Instruction 20, "CRD System Testing, Units 1, 2, and 3," revised June 24, 1980
3. BFN Surveillance Instruction 4.3.F.1.b, "Scram Discharge Volume Valve Operability, Unit 1 or 3," revised February 2, 1983
4. Drawing BFN 47W820-4 R8, "Flow Diagram Control Rod Drive Hydraulic System," (As Constructed - Void after June 29, 1983)
5. BFN Standard Practice BF 5.12, "Major Equipment Decontamination Procedure," dated July 24, 1981
6. BFN Standard Practice BF 12.8, "Unit Trip and Reactor Transient Analysis," revised March 30, 1983
7. BFN Radiological Control Instruction RCI-9, "Special Work Permit, Special Inspection Permit," revised June 22, 1983
8. BFN DCR No. 2113, "Control Room Ventilation - 31," dated April 28, 1980
9. BF-SIL 24, "Nuclear Engineer/STA Training Program"
10. Mechanical Maintenance Instruction MMI-95, "Closure of Primary Containment Hatches"
11. Standard Practice BF-8.3, "Plant Modifications and Work Plans"
12. Standard Practice BF-12.12, "Duties and Responsibilities of STA."

F. OEDC Correspondence

1. Memorandum to J. R. Calhoun from M. N. Sprouse, "Browns Ferry Nuclear Plant - Preliminary Identification of Design Changes - Scram Discharge Subsystem," dated July 15, 1980 (NEB 800715 273)

2. Memorandum to D. B. Bowen from G. F. Dilworth, "Browns Ferry Nuclear Plant - Control Rod Drive System Modifications," dated September 19, 1980 (NEB 800919 279)
3. Memorandum to E. F. Thomas from R. H. Dunham, "Browns Ferry Nuclear Plant - Compliance with Regulatory Guide 1.78, Habitability of a Nuclear Plant Control Room during a Hazardous Chemical Release," dated September 16, 1975
4. Memorandum to J. R. Calhoun from M. N. Sprouse, "Browns Ferry Nuclear Plant - Additional TMI-2 Related NRC Requirements," dated June 27, 1980
5. Memorandum to Electrical Engineering Files from K. S. Oaks, "Browns Ferry Nuclear Plant - Computer Requirements," dated January 29, 1980
6. Memorandum to Thermal Plants Design Project Files from D. S. Freeze, "Browns Ferry Nuclear Plant - Plant Computers -DCRs P1802 and P1856," dated February 27, 1980
7. Memorandum to D. B. Bowen from G. F. Dilworth, "Browns Ferry Nuclear Plant - Preliminary Safety Review of DCR P1802," dated April 21, 1980
8. Memorandum to H. J. Green from M. N. Sprouse, "Browns Ferry Nuclear Plant - Design Change Request (DCR) 1802 - Real-Time Evaluation, Analysis, and Monitoring System," dated November 5, 1980
9. Memorandum to H. J. Green from M. N. Sprouse, "Browns Ferry Nuclear Plant - Design Change Request (DCR) 2491 - Process Computer Replacement," dated May 16, 1983

G. OEDC Documents

1. ECN L1582 - Browns Ferry Nuclear Plant, "Main Control Room Chlorine Alarm," dated January 13, 1976
2. ECN L1769 - Browns Ferry Nuclear Plant, "Hypochlorite Generation and Additional Systems," dated April 14, 1978
3. ECN L1970 - Browns Ferry Nuclear Plant - EECW System, "Remove all carbon steel piping, valves (except header isolation valves), and fittings 4 inches and smaller that are safety related and/or seismically qualified and replace with type 316 stainless steel"
4. ECN P0038 - Browns Ferry Nuclear Plant, "Residual Heat Removal (FHR) Pump Seal Heat Exchanger"

H. Office of Health and Safety Correspondence

1. Memorandum to W. F. Willis from E. A. Belvin, "Accident Investigation - Chlorine Accident - Browns Ferry Nuclear Plant (BFN) - June 3, 1979," dated November 5, 1979 (GNS 800507 105)
2. Memorandum to H. G. Parris from E. A. Belvin, "Browns Ferry Nuclear Plant - Investigation of Chlorine Accident - June 3, 1979," dated December 10, 1979
3. Memorandum to H. N. Culver from E. A. Belvin, "Nuclear Safety Review Staff Major Management Review of the Office of Power and the Office of Health and Safety - Nuclear Safety Review Staff Report No. R-81-08-BFN," dated June 22, 1981
4. Memorandum to H. N. Culver from E. A. Belvin, "Nuclear Safety Review Staff Major Management Review of Power and the Office of Health and Safety - Nuclear Safety Review Staff Report o. R-80-08-BFN," dated September 4, 1981
5. Memorandum to H. N. Culver from E. A. Belvin, "Followup Review of Implementation Activities of Occupational Health and Safety Related Recommendations Contained in NSRS Report No. R-81-08-BFN -Nuclear Safety Review Staff Report No. R-81-29-BFN," dated January 22, 1982
6. Memorandum to R. B. Maxwell from J. L. Lobdell, "Routine Review of Implementation Activities on Division of Occupational Health and Safety Related Recommendations Contained in NSRS Report No. R-81-08-BFN and Other Topics - NSRS Report No. R-82-06-NPS," dated May 28, 1982
7. Memorandum to H. N. Culver from E. A. Belvia, "Transfer of Nuclear Safety Review Staff Open Items to the Division of Nuclear Power," dated June 28, 1982 (GNS 820630 112)

APPENDIX A

BROWNS FERRY NUCLEAR PLANT NSRS REPORTS

1. No. R-79-10-01, "Operating Practices where Protective System Signals are Bypassed," dated October 23, 1979 and January 17, 1980 (Closed)
2. Report on Chlorine Accident dated December 10, 1979 (Closed)
3. No. R-80-01-03-BFN, "Hanger Restraints Missing on the RBCCW System Inside Containment on BFN-1," dated January 11, 1980 (Closed)
4. No. R-80-02-BFN, "Investigation of BFN-3 Containment Leakage Problem, December 6-9, 1979," dated January 9, 1980 (Closed)
5. No. R-80-03-NUC PR, "TVA Shift Technical Advisor Program," dated March 13, 1980 (Closed)
6. Unnumbered NSRS Report dated April 30, 1980, "Causes of Reactor Scrams on February 10, 12, and 15 and March 9, 1980" (Closed)
7. No. R-80-07-BFN, "NSRS Review of Contamination Control," dated July 25, 1980
 - Open Item
 - (a) R-80-07-BFN-01, Plant Decontamination Control
8. No. R-80-10-BFN, "Special Review of the Wire Lifts Performed on the Cooling Tower Lift Pumps," dated August 6, 1980 (Closed)
9. No. R-80-12-BFN, NSRS Review Report dated August 14, 1980
 - Open Item
 - (a) R-80-12-BFN-04, Install Protective Enclosures of Instrument Panels
10. No. R-80-13-BFN, "Control Rod Drive System Malfunctions at Units 1 and 3," dated August 20 1980
 - Open Item
 - (a) R-80-13-BFN-09, Modifications to Scram Discharge Instrument Volume
11. No. R-80-15-BFN, "Special Review of the Ultrasonic Monitoring Program for the Scram Discharge Volume 6-Inch Headers," dated October 24, 1980 (Closed)
12. No. R-81-18-BFN, Special Review dated December 3, 1980 (Closed)

13. No. R-81-02-BFN, "Technical Specification Error Concerning Acceptable EECW Pump Combinations," dated February 2, 1981

Open Item

- (a) R-81-02-BFN (c), Develop a TVA Policy Regarding Loss of Safety Function

14. No. R-81-08-BFN, NSRS Major Management Review of the Office of Power and the Office of Health and Safety, dated May 15, 1981

Open Items

- (a) R-81-08-BFN-45, Special Work Permit (SWP)

- (b) R-81-08-BFN-53, Radiological Hygiene Branch Formal Review of Purchase Contracts

15. No. R-81-10-BFN, "NSRS Routine Review," dated July 10, 1981 (Closed)
16. No. R-81-13-NPS, "Special Review of TVA's Nuclear Security System," dated September 8, 1981 (Closed)
17. No. R-81-17-BFN, Routine Review dated August 24, 1981 (Closed)
18. No. R-81-29-BFN - Followup Review on R-81-08-BFN, dated December 4, 1981 (Closed)
19. No. R-81-30-BFN, "Special Review of Security Training and Security Systems," dated December 22, 1981 (Closed)
20. No. R-81-31-NUC PR, "Operator Training, dated March 10, 1982 (Closed)
21. No. R-82-05-NPS, "Special Review of NUC PR Fire Protection Program," dated May 11, 1982 (Closed)
22. No. R-82-06-BFN, "Routine Review of Implementation Activities on Division of Occupational Health and Safety Related Recommendations Contained in NSRS Report R-81-08-BFN and Other Topics," dated May 10, 1982 (Closed)
23. No. R-82-08-NPS, "Review of Water Quality Program for Health and Safety and POWER," dated February 25, 1983 (All items from this report remain open.)
24. No. R-82-11-BFN, "Routine Review to Determine the Status of NSRS Open Items," dated July 22, 1982 (Closed)
25. No. I-82-25-BFN, "Investigation of Solid Radioactive Waste Shipments to the Washington Disposal Site," dated December 28, 1982 (Closed)

26. No. R-82-23-NPS, "Followup of NUC PR Fire Protection Program," dated January 18, 1983 (Closed)
27. No. I-83-02-BFN, "Welding and Safe Work Practices," dated February 7, 1983 (Closed)
28. No. I-82-14-BFN, "Control Rod Problems, Units 1 and 2," dated May 31, 1983

Open Items

- (a) I-83-14-BFN-1, Maintenance Program for Control Rod Drive System ASCO Solenoid Valves
 - (b) I-83-14-BFN-2, Implementation of Maintenance Program for the Control Rod Drive System
 - (c) I-83-14-BFN-3, Ineffective QA Program for the Control Rod Drive Maintenance Program
29. No. R-83-16-NPS, Followup Review (No new items were identified in this report.)

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

GNS '831219 050

TO : G. F. Dilworth, Assistant General Manager (Technical), E12D46 C-K

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

DATE : December 19, 1983

SUBJECT: EMPLOYEE CONCERN REGARDING VIOLATION OF QUALITY ASSURANCE PROCEDURES BY THE DIVISION OF CONSTRUCTION AT SEQUOYAH NUCLEAR PLANT - NUCLEAR SAFETY REVIEW STAFF REPORT NO. I-83-21-SQN

The Nuclear Safety Review Staff (NSRS) evaluated an employee concern in January 1983 alleging that deviation from QA procedures were widespread occurrences at CONST SQN. The employee's primary concern at that time involved the handling of nonconformance reports (NCRs) generated during inspections on the batteries for the fifth diesel generator. Several other examples of alleged QA procedure violations were brought to the attention of the NSRS evaluator during the review of the primary allegation. These concerns involved electrical cabling, receipt reports, lack of knowledge of inspection procedures by inspectors, and a general lack of knowledge of QA by CONST personnel.

The NSRS evaluation of the employee concerns at that time could not substantiate any of the allegations. The NSRS report, I-83-04-SQN, issued at that time directly to the employee, stated this determination, but it also informed the employee that if pressure were to be applied by supervision to accept deficient conditions when acceptance criteria was not met then this would be a violation of QA procedures. In July of 1983 the employee alleged to the NSRS that this pressure had in fact been applied. The NSRS reviewed this allegation and did a more indepth review of the original allegations leading up to the last allegation. The NSRS review in August of 1983 again could not substantiate either the original allegations or the last allegation.

Even though the employee's allegations could not be validated, the NSRS did find three items that it considers either in violation of QA procedures or in opposition to generally good practices. The following recommendations are being made to correct these perceived deficiencies:

- I-83-21-SQN-1 - The need for the wording "Quality Assurance" or "Non-Quality Assurance" on receiving inspection form 209 should be evaluated, and if determined necessary, the appropriate procedure should be revised to incorporate the purpose of this terminology.
- I-83-21-SQN-2 - A review of all inspector certifications should be made to determine if they have been recertified (not only updated) within the last three years as required by SNP CP P-33. All individuals lacking this recertification should be properly recertified.

NSRS FILE

2

G. F. Dilworth
December 19, 1983

EMPLOYEE CONCERN REGARDING VIOLATION OF QUALITY ASSURANCE PROCEDURES
BY THE DIVISION OF CONSTRUCTION AT SEQUOYAH NUCLEAR PLANT - NUCLEAR
SAFETY REVIEW STAFF REPORT NO. I-83-21-SQN

I-83-21-SQN-3 - SNP CP P-33 should be revised to clarify the mechanism called "updating" of individuals to revisions in Inspection Instructions to ensure that personnel understand that they cannot update themselves to QA procedures. Where this has occurred, they should be updated in accordance with the revised procedure.

H. N. Culver

 RWT:LML
Attachment

MEDS, W5B63 C-K

TENNESSEE VALLEY AUTHORITY

NUCLEAR SAFETY REVIEW STAFF

EMPLOYEE CONCERN

NSRS REPORT NO. I-83-21-SQN

SUBJECT: EMPLOYEE CONCERN - VIOLATION OF QUALITY ASSURANCE
PROCEDURES AT SEQUOYAH NUCLEAR PLANT - DIVISION OF
CONSTRUCTION

DATE OF
REVIEW: AUGUST 10-12, 1983

REVIEWERS: *Ronald W. Travis* 12/12/83
Ronald W. Travis Date

James C. Jones 12/19/83
James C. Jones Date

APPROVED BY: *Richard D. Smith* 12/18/83
Richard D. Smith Date

MEDS, W5B63 C-K

NSRS FILE

TABLE OF CONTENTS

	<u>Page</u>
I. Summary	1
II. Scope	1
III. Facts	1
Introduction	1
Employee's Concerns	2
Background	3
IV. Analysis	8
V. Conclusions	12
VI. Judgment of Needs	13
VII. Documents Reviewed	14
VIII. Personnel Contacted	15

I. SUMMARY

In January 1983, the Nuclear Safety Review Staff (NSRS) evaluated a Division of Construction (CONST) employee's concerns at Sequoyah Nuclear Plant (SQN). This evaluation was conducted completely offsite and was documented in NSRS memorandum No. I-83-04-SQN. Those concerns related to an employee's allegation that there was willful and widespread violations of QA procedures at SQN. The NSRS report indicated that the employee's concerns were not supported.

On July 25, 1983, the concerned individual sent a 45D to NSRS stating that he had been pressured into accepting a deficient condition when acceptance criteria had not been met and desired another investigation. NSRS then conducted an onsite investigation into the new allegation and also reexamined all six original concerns which directly related to the employee's allegations on July 25.

NSRS found no indication that the employee had been pressured into violating a QA procedure. Reexamination of previous allegations by the employee indicated no willful or widespread violations of QA procedures at SQN. There appeared to be an inability by supervision and engineering to establish communications with the individual involved and a lack of understanding of exactly what the acceptance criteria for the fifth diesel generator batteries were. During the investigation, it was discovered that there were violations of recertification requirements for QA inspectors which require corrective action.

II. SCOPE

An employee's concerns involving perceived violations of QA procedures in SQN CONST inspections were investigated using standard investigation techniques.

III. FACTS

Introduction

An alleged at CONST SQN, who wished to remain anonymous, was concerned that violations of QA procedures were occurring. These concerns initially came to the attention of NSRS in January 1983. The concerns were evaluated at that time, and it was determined that they were not supported by documented evidence. The concerned individual again contacted NSRS on July 25, 1983, asserting that he had been pressured into violating a QA procedure. After discussing the employee's second allegation, the investigator determined that the allegation was closely coupled to the initial employee allegation. Therefore, the concerns of the first contact were reinvestigated as a basis for determining the validity of the last allegation. There were six original concerns, and the first concern was divided into four parts for clarity.

Employee's Concerns

Concern No. 1

Concern No. 1 parts A through D pertain to the batteries for the fifth diesel generator and the alleged failure to follow SQN Inspection Instruction (II) 19 revision 9.

Part A - He alleged that he violated QA procedures when, as requested by management, he inspected the batteries of the fifth diesel generator after an NCR had been written against them but before corrective action had been completed.

Part B - He alleged that he was pressured into signing 34 Inspection Instruction data sheets verifying that proper corrective action had been taken when it had not. This specific concern was raised on July 15, 1983 and was not part of the January 1983 concerns.

Part C - He alleged that bank voltage acceptance criteria for an Inspection Instruction was not provided to him for comparison with his actual readings.

Part D - He alleged that the electrical engineer violated a QA procedure by not initiating an inspection request. Instead, a lead inspector was allegedly allowed to initiate the inspection.

Concern No. 2

He alleged that receiving report No. 82-0604 for contract No. 87K17-824979 contained an error and that this was only one example of many violations of QA procedures. He claimed that the words "Quality Assurance" were incorrectly written at the top of the page and that the words "Non-Quality Assurance" should have been written instead. This contract was for instrumentation in the component cooling water system and steam generator blowdown system.

Concern No. 3

He alleged that another inspector performing a humidity test did not know how to properly use a sling psychrometer, thus violating a QA procedure.

Concern No. 4

He alleged that a reel of cable was transferred from WBN and that it had the same identifying number (mark number) as a reel of cable that was already onsite at SQN. The SQN reel was QA cable and WBN reel was not. This violated a QA procedure he believed.

Concern No. 5

He alleged that cable had been rereeled but not properly meggered in violation of QA procedures. According to him, either the cable was

not meggered at all or the instrument for meggering had not been calibrated.

Concern No. 6

He alleged that there was a general lack of knowledge among CONST personnel in the area of QA.

Background

Concern No. 1

During the routine receipt inspection of the batteries that were received for the fifth diesel generator at SQN, it was determined that the batteries did not meet contract specifications. Consequently, the batteries had been nonconformed on April 23, 1981, as documented on NCR 2686. The vendor documentation received with the shipment of batteries indicated that the batteries actually received had a higher ampere-hour rating than called for in the contract. The manufacturer's representative was to change the electrolyte in the batteries in an attempt to bring the batteries' ampere-hour rating down to contract specifications. Subsequent vendor-supplied data showed the specific gravity was within the contract specifications. The nonconforming condition for NCR 2686 was considered corrected, and the receiving inspection NCR was dispositioned by the allegor on February 1, 1982.

On May 20, 1982, the allegor was requested to perform the biweekly inspection of the batteries in accordance with SQN II-19 "Battery Inspection," revision 9, but he refused to do so. His refusal to perform the biweekly inspection on the batteries was based on his belief that the manufacturer's modification did not correct the problem and that the batteries still did not meet contract specifications. The allegor provided no basis for his belief that the batteries did not meet contract specifications. He used the following statement from II-19 as a basis for his refusal:

Cells not meeting the acceptance criteria of this instruction shall be listed in the "Exceptions" space of Data Sheet 1. Data sheets indicating unacceptable cells shall be forwarded to the Electrical Engineering Unit so that corrective action can be specified. Upon completion of the required corrective action, the cells shall be reinspected in accordance with this instruction.

His contention was that since the "proper corrective action" had not taken place, that another inspection could not be performed. There were no outstanding NCRs against the batteries at this time and no indication that II-19 had been performed. The corrective action specified by the vendor was to replace the electrolyte. This was done and NCR 2686 was signed as completed on February 1, 1982. No record

of the receipt inspection was located. It was not known what exactly the allegor meant by "proper corrective action."

He refused to inspect the batteries on May 20, 1982, and again on May 21, 1982, and was then counseled by his supervisor. On June 1, 1982, the first documented performance of II-19, revision 9, was conducted. The batteries failed to meet inspection requirements, but no NCR was written. Again, on June 18, 1982, he was requested to inspect the batteries and refused. There was an inspection performed by the allegor on this date. Apparently he performed the inspection after his initial refusal.

From the inspection by the allegor on June 18, 1982, using SQN II-19, revision 9, it was determined that the specific gravity was higher than that given as acceptance criteria on the data sheet for that inspection. On July 20, 1982, NCR 2803 was written based upon the June 18 inspection. Between February 1, 1982, and July 20, 1982, there were no outstanding NCRs against the batteries. Also, there was no documented indication in the Quality Control and Records Unit that the batteries had been inspected using II-19 until June 1, 1982. A biweekly inspection of the batteries after they are put on charge is required by II-19, but it is not known when they were put on charge. It is not known why II-19 inspections were not performed earlier.

After the June 18, 1982 refusal to inspect the batteries, a meeting was held between the allegor and his management at which time he was allowed EA representation. On June 24, 1982, a warning letter for insubordination was placed in his file. The above dates and details came from that letter. Following the end of his performance evaluation period in June, his yearly evaluation was written and it was less than adequate. Up until that time his employee profiles (evaluations) had been adequate or better. His continued employment was conditional on performing his job adequately and obeying his supervisors for the next 90 days. After six months another review of his work was performed and it was judged adequate.

The second NCR written against the batteries, NCR 2803, was dispositioned as follows: "Field personnel will reduce the specific gravity of the battery electrolyte by using the approved Power System Procedure attached." This involved taking out electrolyte from the battery cells and adding water. The NCR showed the corrective action was taken on November 16, 1982, and on July 5, 1983, the allegor signed the disposition of NCR 2803 indicating that adequate corrective action had taken place and that the batteries were within requirements. A review of available II-19 data sheets showed high specific gravity readings on all cells from June 1, 1982, until November 16, 1982. Data sheets after November 16, 1982, did not exhibit the same problem of high specific gravity and showed only problems that would normally be expected.

On July 19, 1983, the allegor closed out inspection findings on 34 data sheets dating back to June 18, 1982, all of which related to the problems identified in NCR 2803. Failed inspections are closed by

(

an inspector signing the appropriate space on the data sheet for the failed inspection. However, it was the signing of the 34 data sheets which prompted the allegor to claim on July 25, 1983, that he was pressured into accepting corrective action which was not adequate. The employee's supervisor was not questioned about the allegation because the employee wanted to remain anonymous.

The allegor was also concerned that acceptance criteria for the Inspection Instruction was not provided to him for comparison with his actual readings. The specific criteria of concern to the allegor related to acceptance criteria for battery bank voltage.

The Inspection Instruction for inspection of the batteries requires the inspector to measure specific gravity of the batteries, battery bank voltage, and individual cell voltages; however, only specific gravity and deviations of the individual cell voltage from the calculated average cell voltage are acceptance criteria.

Because of his persistent voicing of the concern, he was able to obtain a value for the battery bank voltage for reference from the engineer in charge of the batteries. This value was not incorporated into the procedures (but it was typed in on the data sheets) and, consequently, was not a formalized acceptance criteria. Data sheets prior to December 22, 1982, did not contain the type-written battery bank voltage value but the ones after that date did. Finally, the allegor disagreed with the value provided.

From discussions with EN DES, NSRS was able to determine that the only acceptance criteria needed for the batteries were the specific gravity and the deviation of measured cell voltage from the calculated average cell voltage. These acceptance criteria had been provided in the inspection instructions. Although it was necessary to determine the battery bank voltage in order to calculate an average cell voltage, the actual battery bank voltage was not considered by EN DES as a key parameter requiring an acceptance criteria. One of the reasons stated by EN DES was that the battery bank voltage is directly related to specific gravity which is controlled and which has acceptance criteria.

The allegor was also concerned that the electrical engineer did not initiate any inspections, including filling in all blanks at the top of the standard data sheets II-19. Inspection Instruction 19 was written for inspections by the Electrical Engineering Unit after the batteries had been installed. Since the batteries were not installed but were only on charge in the warehouse, no inspection was officially required, and the Electrical Engineering Unit had no responsibility for inspection. It was determined, for some unknown reason, that II-19 would be performed by the Material Inspection Group. Inspection Instruction 19 does state that the Electrical Engineering Unit is responsible for initiating inspection, but it appeared to the allegor that his group leader was initiating the inspections. It could not be determined who was initiating the inspections.

Concern No. 2

The allegor believed that receiving report (form TVA 209) No. SNP 82-0604 for contract No. 97K17-824979 on Robertshaw Controls instrumentation contained an error and that this was only one example of many violations of QA procedures. He claimed that at the top of the form the handwritten words "Quality Assurance" should be "Non-Quality Assurance." Neither the allegor nor any documented procedure provided information specifying why or what meaning those words had on form 209.

Assuming the wording had some purpose, the documentation on the equipment received was reviewed. The original contract for the Robertshaw controls was for instrumentation in the component cooling water system. This is a system requiring QA. The materials on the receiving report reviewed here were instruments specifically ordered for the steam generator blowdown system. This system at SQN does not require QA. These items were bought on contract change No. 5 of the above contract. This contract change is referenced at the top of the receiving report and it states on the change that no quality assurance is needed for this equipment. The receiving report was signed with the statement that the equipment was acceptable. This acceptance included verification that Certification for Conformance for the level of QA for change sheet 5 was actually received. The equipment was issued to the Field Services Group specifically for use in the steam generator blowdown system, a non-QA system, the system for which it was bought.

Concern No. 3

The allegor believed that an individual performing a humidity test did not know how to properly use a sling psychrometer.

Since this alleged event occurred during 1981, it was not possible to ascertain the actions of the individual during that time period. It was also not possible to determine whether or not the humidity test the allegor referenced was adequately performed since it was not witnessed by anyone else. The individual performing the actions and the allegor were both certified to II-32, "SNP Storage and Housekeeping," which included the taking of relative humidity readings using the sling psychrometer. The individual whose qualifications were questioned was certified to II-32 in 1981. A review of inspection data sheets for inspections performed by the allegor and the individual whose qualifications he questioned for inspections requiring humidity readings uncovered no apparent data discrepancies between the two individuals.

Two other problems were discovered while investigating this area. One problem involved an individual "updating" himself for revisions 8 and 10 of II-32. The person had been designated by the unit supervisor to be responsible for "updating" everyone in the unit. "Updating" does not require that a test be administered but only that the procedure be read and understood. The section supervisor designated someone in the section to "update" the section personnel. This procedure was vague. There were no requirements except that the responsible person

sign the personnel certification record indicating the person had been updated. The second problem was the time between recertifications. SNP-CP P-33, "Certification of Inspectors," revision 6, states in part 6.F.2 that, "All inspection personnel shall be examined and recertified at periodic intervals not to exceed three years for each inspection level and/or method." Three inspectors were "updated" to the latest revision of II-32 but had not been examined and recertified in over five years.

Concern No. 4

The allegor believed that a reel of cable was transferred from WBN and that it had the same identifying number (mark number) as a reel of cable that was already onsite at SQN. Reportably, the SQN reel contained QA cable while the WBN reel did not. According to the allegor, the WBN cable was used in yard lighting which is not a QA system. The allegor could provide no other information to support this allegation other than which was remembered.

In reviewing documents and procedures at SQN and in interviewing personnel, there was no evidence identified to support this concern. All cable arriving onsite is assigned a unique SQN identifier in accordance with SNP-SOP 320, "Locating and Cataloging Permanent Material for Engineering Control." This is done no matter where the cable originated.

Concern No. 5

The allegor believed that cable had been rereeled but not properly meggered. Either the cable was not meggered at all or the instrument for meggering had not been calibrated. He contended that this was a widespread violation. The allegor could not cite specific cases.

Cable can be rereeled for several reasons. Cable comes to the site on large reels and may need to be divided into several small reels so that the electricians can more easily handle it. Also, older cable reels may begin to deteriorate, and the cable can be transferred to new reels and still be used. Inspection Instruction 32 has a data sheet for rereeling inspection documentation. Nothing is written in the body of II-32 about how to inspect the rereeled cable. The NSRS investigator reviewed 100 or more such data sheets and each one had the identifying number for the meggering instrument used and verification that the instrument was properly calibrated. SNP-CP P-4, "Control and Calibration of Measuring and Test Equipment," requires that meggers be "checked routinely before use daily." In all cases reviewed, the date the megger was used matched the date it was calibrated.

Concern No. 6

The allegor believed that there was a general lack of knowledge among CONST personnel in the area of QA and that he had not been trained in QA. CONST QA reported a similar observation in audit No. SN-G-81-07.

The overall controlling document for employee QA training is procedure SQP CP No. P-48, "Personnel Quality Assurance Training." That procedure requires periodic training and the maintenance of data sheets showing the topic, date of training, and list of attendees. As a result of the CONST QA audit finding SNP CP No. P-48 was reimplemented by each supervisor preparing a list, not previously required, of QA topics (procedures, instructions, etc.) to be scheduled for training. The auditors at the time felt that the QA knowledge had been raised to an acceptable level.

The NSRS investigator reviewed the list of QA topics that each unit supervisor had developed for instructing his section. Also reviewed were many data sheets from P-48 documenting that QA training had been given. The alлегer's own signature appeared on documents showing that he had been presented with QA training required for his position. Upon further questioning, he claimed he was not taught what he should have been. The alлегer made a general statement that for the six years he had been at SQN, no one else knew what QA was.

IV. ANALYSIS

Concern No. 1

Part A - Two issues are involved in Part A of the alлегer's allegations:

1. It is a violation of QA procedures to inspect a nonconforming item prior to completion of corrective action.
2. Was the alлегer told by management to inspect a nonconforming item prior to completion of corrective action?

With regard to the first issue, the basis for the alлегer claiming that there was a violation of QA procedures was that he was requested to inspect the batteries after an NCR had been written against them but before corrective action had been taken.

The record indicates that NCR 2686 was written on April 23, 1981, to identify a deviation from contract specifications. Actions identified in the NCR were completed and accepted by the alлегer on February 1, 1982. There was no data to support the position that the batteries did not conform to contract specifications following corrective action, nor was there any indication from the alлегer that he was pressured into accepting the corrective action identified in NCR 2686. Consequently, at the closeout of that NCR, the batteries were considered to meet all requirements.

Between February 1, 1982 (the closeout time of NCR 2686), and May 20, 1982, there is no documented information to indicate that (a) the alлегer was requested by management to inspect the batteries or (b) that any other personnel inspected the batteries. Thus, when management requested the inspector to inspect the batteries on May 10, 1982, the issue of inspecting a nonconforming item was not even an issue.

At that time there was no basis to assume or believe the batteries did not meet requirements. Regardless of the issue raised by the allegor, inasmuch as there was a requirement to perform a biweekly inspection of the batteries after they were placed on charge, the failure of management to implement that requirement would represent a violation of QA procedures. It was not determined when the batteries were placed on charge.

The record indicates that on June 1, 1982, the allegor did perform an inspection of the batteries and identified specific problems with the batteries.

An inspection on June 18 led to the preparation of NCR 2803 on July 20, 1982. This NCR was closed on July 5, 1983, when the allegor confirmed that adequate corrective action was taken. During the time period between June 18, 1982, when a nonconforming condition was identified, and July 5, 1983, when NCR 2803 was closed out, the allegor performed at least 34 inspections on the batteries as directed by management. Of these inspections, examination of the data sheets indicates that these inspections were generally to fulfill the requirement of the biweekly inspection of the batteries and were not directed toward the inspection of a nonconforming item prior to corrective action. Consequently, there is no basis to conclude that management had violated QA procedures by requesting that the inspections be performed.

With regard to the basic issue of inspection prior to corrective action, the allegor cited a statement from 11-19 that indicates that "upon completion of the required corrective action, the cells shall be reinspected in accordance with this instruction." The instruction is really requiring assurance that before an item is returned to service following corrective action that the success of the corrective action be verified by inspection. This in itself does not restrict other inspections. Prudence by management would, however, dictate that one not reinspect prior to corrective action unless one had concern regarding the adequacy of the inspection that dictated need for corrective action.

Part B - On July 5, 1983, the allegor signed the disposition of NCR 2803 indicating that adequate corrective action had taken place and that the batteries were within requirements. Reviewing the NCR corrective action was taken on or about November 16, 1982, and data sheets from that time until July 5, 1983, indicated that the problem had been solved. After the closure of NCR 2803, the allegor was requested to close out data sheets involving 34 inspections that related to the NCR. This series of events prompted the inspector to claim that he was pressured into accepting corrective action which was not adequate.

Both the record and discussion with the allegor clearly indicates that he signed off on the corrective action taken to remedy the deficiencies identified in NCR 2803, which indicates acceptance of the corrective action. Consequently, the allegations do not relate in any

manner to the corrective action that was taken regarding NCR 2803. From the discussions with the alleged it was determined that he considered it improper to close out the items identified on 34 data sheets that involved NCR 2803 when no action had been taken. He finally did close out the items because of alleged pressure placed upon him.

Review of the situation indicated that the closeout of the items appearing on the 34 data sheets was merely a formality to recognize that the closure of NCR 2803 took care of the deficiencies noted on the 34 data sheets. This should not have presented a problem to the alleged since corrective action was already acknowledged when he closed out NCR 2803. Although the closure of the NCR could in itself be used as a vehicle to close out the data sheets, there is no basis to allege undue pressure when an inspector is merely required to close out a data sheet if, in fact, that is the normal procedure. Since the alleged did not dispute the correctness of the action that was taken, there cannot be a basis for finding he was pressured into accepting corrective action that was not adequate. There could have been a basis for claiming he was pressured into following the normal practice of closure of data sheets. If pressure was applied to take that action, it may well have been justified. Since pressure to follow procedures is not at issue, that matter was not examined further.

Part C - This allegation involved the absence of part of the acceptance criteria for battery inspections. Two acceptance criteria were included in the data sheets for II-19. These acceptance criteria were for specific gravity and permissible deviation of measured voltage from calculated average cell voltage. Although battery bank voltage criterion was informally provided by the engineer to help the inspector, the criterion was neither needed nor was it ever formally made a part of the inspection process. The bank voltage requested by the inspector was not an acceptable criteria. The two important items for the acceptance criteria are the specific gravity and the cell voltage deviation and these values were always given.

Since adequate criteria were in place and since inspections were made using the criteria, there was no violation of QA procedures.

Part D - This concern involved the failure of the electrical engineer to initiate the inspections on the batteries. The inspection is required periodically (biweekly, monthly, and quarterly). II-19 states that the engineer is responsible for initiating each inspection. It does not state what this responsibility entails. An interpretation by an inspector as to what initiating an inspection means is not necessarily the right or wrong interpretation. If an inspector's group leader tells him to perform an inspection, it may appear that the ultimate responsibility for such initiation is being taken by the group leader. The engineer may have delegated this responsibility or he may have initiated it to the group leader.

As for not filling in all the information at the top of the data sheet, this was a communication problem between the alleged and engineering. No procedure or instruction states who must fill out this part of the form.

Concern No. 2

This concern involved the use of a receiving report labeled QA when the complainant believed it should have been labeled non-QA. No procedure could be found which specified the use of either phrase. If it is assumed that the phrase applies to the level of QA applied to the material received, the receiving report should probably not have said "Quality Assurance." Since the original contract called for QA, the standard QA format for the receiving report apparently was used but the contract change sheet, stating that no QA was required, was referenced.

The equipment that was purchased under change 5 of the contract was the same type as that bought under the QA part of the contract. It was specifically ordered for use in the steam generator blowdown system which was a non-QA system. The equipment was then issued to the Field Services Group specifically for use in the steam generator blowdown system. Thus, non-QA material was issued for use in a non-QA system. No safety problem was found and no QA procedures were violated since no definite instructions were given regarding which labled form to use.

Concern No. 3

This concern was an allegation that an inspector improperly used a sling psychrometer. The inspector who was accused of not knowing how to use the sling psychrometer was certified to the inspection instruction (II-32) at the time in question (1981) and upon questioning, he appeared to know how to perform the inspection. The completed inspection data sheets inspected by NSRS and performed by the alleged and the individual whose qualifications were questioned did not contain data obviously out of the expected range of relative humidity. Thus, there was no indication that the humidity readings were not obtained in an acceptable manner.

A problem was found, however, in the manner in which inspectors are recertified. Procedure SNP-CP P-33, "Certification of Inspectors," requires examination and recertification of inspectors every three years. Three inspectors were found that had not been examined and recertified in over five years. Another practice was found, "updating," which may have been considered as taking the place of recertification. This practice is covered by procedure SNP-CP P-33, but that procedure was vague on updating and had no requirements other than the person doing the updating sign the certification cards. In the process of updating, the person performing the updating also updates himself. The obvious intention of updating is to assure that inspectors review procedures between recertifications. The practice of allowing an individual to update himself removes independence from the updating process which is the foundation of all QA activities.

Concern Nos. 4 and 5

These concerns involved cable that was transferred from WBN to SQN with identical mark numbers and differing QA requirements and cable

that was improperly meggered. These concerns were based upon the allegor's memory and no specific examples of documented fact were provided. The allegor stated the cable transferred from WBN had the same unique identification as cable already at SQN. The WBN cable was allegedly used in yard lighting. The procedure for assigning unique identification to cable was reviewed and NSRS determined that it would preclude the assignment of a unique identification more than once. The fact that the alleged cable was used in yard lighting precludes the presence of a safety problem because yard lighting is a non-QA system.

With regard to improper or lack of meggering, over 100 inspection reports were reviewed. In every case the cable was meggered and the megger was calibrated on the day it was used.

Concern No. 6

This concern was a general allegation that there was a general lack of knowledge among CONST personnel in the area of QA. A QA audit in 1981 had identified a problem in the area of QA training and was satisfied with corrective action. NSRS was able to establish that the training procedures had been developed and documented and training provided. The allegor at first stated that he had not received training. When presented with documented evidence that he, in fact, had received training, he stated that the training was not adequate. The allegor had no specific situations which could be examined in detail to support or deny his allegation in this area.

V. CONCLUSIONS

- A. No violation of QA procedure occurred through the routine inspection of diesel generator batteries with an outstanding NCR. The inspection was not for the purpose of clearing the NCR before corrective action was taken.
- B. The signing of 34 inspection data sheets indicating that corrective action had been taken to correct the identified problem was routine practice and, in fact, performed after corrective action had been taken. If the allegor were pressured to follow established procedures, that pressure would be warranted.
- C. The acceptance criteria for the diesel generator batteries did not include bank voltage and it was never intended to, nor is it required.
- D. The procedure for initiating inspection 11-19 places the responsibility upon the Electrical Engineer Unit. The actual initiation can be accomplished as the Electrical Engineering Unit supervisor delegates. There was no violation of QA procedures.

- E. The existence of the handwritten words "Quality Assurance" or "Non Quality Assurance" on the receiving inspection form were not required by any procedure, and the equipment received, in the example provided by the allegor, was properly handled.
- F. Persons using a sling psychrometer were certified in the proper use of the instrument, including both the allegor and the individual whose qualifications were questioned.
- G. No reel of cable was found with the identified markings of another. Procedures to preclude duplicate marking from happening were adequate. No violation of QA procedures could be found.
- H. With regard to meggering rereeled cable, pertinent data sheets indicated that rereeled cable had been meggered with recently calibrated equipment. Meggering of rereeled cable was found adequate. This concern could not be substantiated.
- I. With regard to the level of QA knowledge, the QA training required by the inspection personnel was specified and documented constituting an acceptable mechanism to develop QA knowledge. This concern could not be substantiated.
- J. Recertification of inspectors is not in accordance with established procedure.
- K. Procedure SNP-CP P-23 is inadequate in that it does not prohibit a person designated to update inspection personnel from updating himself.
- L. The concerns appeared to stem from the inability of supervision and engineering to establish communications with the individual involved and a lack of understanding of exactly what the acceptance criteria for the diesel generator batteries were.

VI. JUDGMENT OF NEEDS

- A. The practice of having wording on the top of the receiving inspection form 209, Quality Assurance or Non-Quality Assurance, should be reviewed for relevancy and the associated procedures should be revised if applicable.
- B. The implementation of procedures regarding the recertification of quality control inspectors should be reviewed and corrective action instituted where appropriate.
- C. The practice of allowing an individual to "update" himself to a revised QC procedure should be reevaluated.

VII. DOCUMENTS REVIEWED

- A. Division Procedure Manual (DPM) N73M13, "Station Battery Maintenance," revised July 20, 1979
- B. Contract No. 79K17-824979, including changes
- C. SNP Inspection Instruction (II) No. 19, "Battery Inspections," revision 9
- D. SNP II-32, "Inspection of Materials in Storage," revision 9
- E. Nonconforming Condition Report No. 2686
- F. SNP Construction Procedure (CP) No. P-33, "Certification of Inspectors," revision 8
- G. SNP-CP P-4, "Control and Calibration of Measuring and Tese Equipment," revision 14
- H. SNP Standard Operating Procedure (SOP) No. 803, "Calibration Procedures for Meggers"
- I. SNP-SOP 302, "Locating and Cataloging Permanent Material for Engineering Control"
- J. SNP-SOP 601, "Receipt of Permanent Plant Materials"
- K. TVA, Division of Construction Certification Records
- L. Data Sheets for SNP II-19
- M. SNP II-30, "Receipt Inspection," revision 6
- N. C&D Installation and Operating Instruction for Stationary Batteries
- O. Data Sheets for SNP II-32
- P. SNP-CP P-12, "Storage of QA Materials"
- Q. SNP-CP P-6, "Preventive Maintenance for Permanent Materials"
- R. Nonconforming Condition Report No. 2803
- S. Quality Assurance Audit Report No. SN-G-81-14, "Equipment Storage and Preventive Maintenance"
- T. Quality Assurance Audit Report No. SN-G-81-02, "Receipt and Storage of Material"

- U. Quality Assurance Audit Report No. SN-G-81-07, "Orientation and Training"
- V. Quality Assurance Audit Report No. SN-G-81-09, "Material Storage and Preventive Maintenance"
- W. SNP-CP P-48, "Personnel Quality Assurance Training"
- X. Attachment A for SNP-CP P-48, "Report of QA Training or Instruction"
- Y. Receiving Report No. SNP 82-0604

VIII. PERSONNEL CONTACTED

Sam Given, Jr., Electrical Engineer, EEU
P. A. Thornton, CONST Engineering Associate, EEU
D. T. Kirk, CONST Engineering Associate, EII
S. M. Fuqua, CONST Engineering Associate, EEU
L. D. Delius, Materials Inspector, Materials Inspection Group
L. S. Cash, Materials Inspector, Materials Inspection Group
F. D. Henderson, Mechanical Engineer, Materials Unit
R. S. Green, EN DES, EEB
R. T. Hathcote, SQN Project Manager
C. E. Greek, SQN Construction Engineer

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY
GNS '83 1107 150

TO : G. H. Kimmons, Manager of Engineering Design and Construction, W12A9 C-K

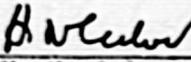
FROM : H. N. Culver, Director of Nuclear Safety Review Staff, 249A HBB-K

DATE : November 7, 1983

SUBJECT: BELLEFONTE NUCLEAR PLANT - FOLLOW-UP REVIEW - NUCLEAR SAFETY REVIEW STAFF
(NSRS) REPORT NO. R-83-25-BLN

Attached is the NSRS report for a follow-up review conducted at Bellefonte Nuclear Plant concerning responses to NSRS Report I-83-10-BLN. Four items were examined during the review, and two were determined to be satisfactorily resolved and closed. The remaining two items remain open pending implementation of corrective action.

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


H. N. Culver

CMK:BJN

Attachment

cc: MEDS, W5B63 C-K (Attachment submitted under Accno GNS 831107 151)

NSRS FILE



TENNESSEE VALLEY AUTHORITY
NUCLEAR SAFETY REVIEW STAFF
REVIEW
NSRS REPORT NO. R-83-25-BLN

SUBJECT: Follow-up Review of Bellefonte Nuclear Plant

DATE OF REVIEW: September 21-22 and October 4, 1983

REVIEWER:

for Richard D. Smith
C. M. KEY

11/7/83
DATE

APPROVED BY:

Richard D. Smith
R. D. SMITH

11/7/83
DATE

TABLE OF CONTENTS

	<u>Page</u>
I. SCOPE	1
II. CONCLUSIONS	1
III. STATUS OF PREVIOUSLY IDENTIFIED ITEMS	1
IV. DETAILS	1
V. PERSONNEL CONTACTED	2
VI. DOCUMENTS REVIEWED	2

I. SCOPE

This routine review examined the corrective action initiated by the Division of Engineering Design (EN DES), the Division of Construction (CONST), and Bellefonte Nuclear Plant (BLN), in response to the Nuclear Safety Review Staff (NSRS) investigation of an employee concern (NSRS report No. I-83-10-BLN).

II. CONCLUSIONS

A total of four items (recommendations) were examined during this review. Corrective action for two items appeared adequate and these items were closed during the review. The proposed corrective action for the remaining two items appeared adequate, but these items will remain open pending corrective action implementation.

III. STATUS OF PREVIOUSLY IDENTIFIED ITEMS

A. R-83-10-BLN-1, Inadequate Installation Guidance

General Specification G-40 has been revised to clarify the specification so that it is understood that condulets are a part of the conduit system. The standard drawings have also been revised to provide installation guidance. This item is closed. Refer to section IV.A for details.

B. R-83-10-BLN-2, Reinspection of Previous Installations

The site has generated an inspection procedure to provide for this reinspection. This item remains open since corrective action has not been implemented. Refer to section IV.B for details.

C. R-83-10-BLN-3, Prohibition of Condulet Usage

EN DES has provided instruction that they must be consulted when a condulet is located directly adjacent to the equipment. This item is closed. Refer to section IV.C for details.

D. R-83-10-BLN-4, Verification of Seismic Requirements

The site has generated an inspection procedure to provide for this verification. This item remains open pending implementation of corrective action. Refer to section IV.D for details.

IV. DETAILS

A. R-83-10-BLN-1, Inadequate Installation Guidance

This item concerned the inadequate installation guidance to ensure that condulets are properly installed. NSRS recommended that Construction Specification G-40 be improved and specific standard installation guidance be generated so that prior to

installation the method used will be one that is EN DES approved. General Specification G-40 has been revised to clarify the specification so that it is clearly understood that condulets are a part of the conduit system. Electrical standard drawings SD-E12.5.7-1 and SD-E12.5.7-2 have been revised to provide the site with adequate installation guidance. This item is closed.

B. R-83-10-BLN-2, Reinspection of Previous Installations

The item dealt with the necessity of reinspecting and reworking, if necessary, any previous installations that were not in accordance with the new criteria established by the revision of the standard electrical drawings required by recommendation R-83-10-BLN-1 above. BLN site generated an inspection procedure, BNP-QCP-3.32, that will provide for reinspection and rework, if necessary, for all permanent safety-related and seismically qualified conduit installations with the exception of plant lighting systems. Although corrective action appeared adequate, it has not yet been implemented. This item remains open.

C. R-83-10-BLN-3, Prohibition of Conduit Usage

The NSRS recommendation was that the installation of condulets on solenoid valves that have sheet metal covers be prohibited. In the revision to the electrical standard drawings (SD-E12.5.7.1 and -2, note 20 and 19, respectively) this arrangement was still authorized; however, the drawing revision required that the design project must be consulted for support requirements. This is acceptable. This item is closed.

D. R-83-10-BLN-4, Verification of Seismic Requirements

This item dealt with the concern that all safety-related conduit installations still met seismic requirements. BNP-QCP-3.32 provides for this verification. However, at the time of this review this procedure had not been implemented; therefore, this item remains open.

V. PERSONNEL CONTACTED

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

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

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

VI. DOCUMENTS REVIEWED

A. Specification Revision Notice SRN-G-40-4, "Installing Electrical Conduit Systems and Conduit Boxes," June 15, 1983

- B. Electric Standard Drawing SD-E12.5.7-1, "CA Termination at 600 V (or Less) Insulated CA to EQPT Furnished W/Pigtail," R2, April 1, 1983
- C. Electric Standard Drawing SD-E12.5.7-2, "CA Termination at 600 V (or Less) Insulated CA to EQPT Furnished W/Pigtail," R2, April 1, 1983
- D. BNP-QCP-3.32, "Final Raceway Verification," R0, October 28, 1983

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

GNS '840209 050

TO : H. G. Parris, Manager of Power, 500A CST2-C

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

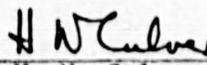
DATE : February 9, 1984

SUBJECT: FOLLOW-UP REVIEW OF THE NUCLEAR SAFETY REVIEW STAFF SPECIAL PROGRAM
REVIEW OF THE OFFICE OF POWER WATER QUALITY PROGRAM - NUCLEAR SAFETY
REVIEW STAFF REPORT NO. R-83-26-NPS

- References:
1. My memorandum to you dated January 10; 1984, "Browns Ferry Nuclear Plant - Technical Specifications Surveillance Requirements and Limiting Conditions for Operation for Dose Equivalent I-131 - NSRS Report No. R-82-08-NPS, Item R-82-08-NPS-10b" (GNS 840110 050)
 2. My memorandum to you and J. W. Anderson dated October 17, 1983, "Follow-up Review of the NSRS Special Program Management Review of the Office of Power Water Quality Program - NSRS Report No. R-82-26-NPS" (GNS 831017 050)

Attached is a copy of the subject report containing an evaluation of the actions taken to correct the observed weaknesses in the POWER Water Quality Program reported in NSRS Report No. R-82-08-NPS issued in February 1983. During this follow-up review there was an observed overall improvement in the program. However, actions to address the NSRS open items were just getting underway and increased attention should be applied as these open items contained recommendations of a programmatic nature or directly affected nuclear safety. Our increased concerns involving one of the open items have already been transmitted in reference 1. Please inform us of your plans and schedule for addressing the remaining open items by March 15, 1984.

The excellent cooperation extended by your staff in the central office and facilities visited is appreciated. If you have any questions concerning this report, please contact G. G. Brantley at extension 4815 in Knoxville.


H. N. Culver

GGB:LML

Attachment

cc (Attachment):

J. W. Anderson, M155G MIB-K
G. F. Dilworth, E12D46 C-K
MEDS, W5B63 C-K

NSRS FILE



TENNESSEE VALLEY AUTHORITY
NUCLEAR SAFETY REVIEW STAFF
REVIEW
NSRS REPORT NO. R-83-26-NPS

Subject: Followup Review of the NSRS Special Program Management
Review of the Office of Power Water Quality Program -
Nuclear Safety Review Staff Report No. R-82-08-NPS

Date of Review: November 7-December 1, 1983

Organizations Visited: NCO, NSS, OQAB, POTC, SQN, CLS, WBN, BFN

Reviewer: Gerald G. Brantley Date 2/9/84
Gerald G. Brantley

Approved by: Richard D. Smith Date 2/9/84
Richard D. Smith

TABLE OF CONTENTS

	<u>Page</u>
I. Scope	1
II. Conclusions/Recommendations	1
III. Status of Previously Identified Open Items	2
IV. Details	6
V. Persons Contacted	21
VI. Documents Reviewed (References)	24

I: SCOPE

This review was performed to evaluate actions taken by the Office of Power (POWER) to correct the Nuclear Safety Review Staff's (NSRS) perceived weaknesses in the nuclear water quality program. NSRS positions (recommendations) concerning actions to correct those programmatic weaknesses were presented in NSRS Report No. R-82-08-NPS issued February 25, 1983. This review consisted of personnel interviews and review of respective program documents, correspondence, and regulatory information.

II. CONCLUSIONS/RECOMMENDATIONS

NSRS determined that to date the actions taken by POWER to correct reported program weaknesses consisted primarily of planning and preliminary development of program definition documents. Increased Division of Nuclear Power (NUC PR) Central Office attention should be applied as the bulk of the NSRS positions are programmatic and affect the entire NUC PR water quality (chemistry) program.

All of NUC PR organizations visited and the Central Laboratory Services (CLS) addressed some of the recommendations made in the details of the NSRS report that directly related to their specific programs. Particularly notable are the efforts made by Watts Bar Nuclear Plant (WBN) management to address all of the specific recommendations for their facility.

Significant changes and actions had recently been made or taken at Browns Ferry Nuclear Plant (BFN) to provide for program improvement, but were too recent to effect significant program changes. Accomplishment of this needed improvement is an absolute necessity and depends upon the availability of technical resources to BFN. NUC PR management should fully support the BFN efforts in this endeavor.

Item No. R-82-08-NPS-10.b, "BFN Technical Specifications for Dose Equivalent I-131," involves nuclear safety, and the NSRS concerns regarding this item have increased and been expanded. NUC PR actions to evaluate the original NSRS concerns were only in the preliminary stages and prompt management attention is needed to resolve this issue without further delay. The increased and expanded NSRS concerns were referred to the Manager of Power for consideration in a memorandum from H. N. Culver to H. G. Parris dated January 10, 1984, "Browns Ferry Nuclear Plant - Technical Specifications Surveillance Requirements and Limiting Conditions for Operation for Dose Equivalent I-131 - NSRS Report No. R-82-08-NPS, Item R-82-08-NPS-10b," (GNS 840110 050).

There were no new areas assessed during this review, and no new conclusions or recommendations resulted for presentation in this report.

III. STATUS OF PREVIOUSLY IDENTIFIED OPEN ITEMS

A. Chemical and Radiochemical Program Controls

1. R-82-08-NPS-01, Requirements/Needs/Activities Matrix

The "requirements" portion of the matrix has been satisfied with the development of the area plan maintenance and engineering program matrix. However, the "needs/activities" portion remains open until the Chemical Control and Program Performance (CCPP) document has been developed and established as an official NUC PR document. (See section IV.A.1 for details.)

2. R-82-08-NPS-02, Quality Assurance Program for Chemistry Activities

The POWER Quality Assurance Program had been expanded to provide requirements for control of chemistry-related activities performed by Central Laboratory Services (CLS). However, a program for control of the activities was not in place. Generic controls had been established or were being established for safety/quality-related activities in NUC PR through the Operational Quality Assurance Manual (OQAM), area plan program manuals, and the CCPP. This item remains open until a quality assurance program for control of the CLS-related activities and the CCPP have been developed and implemented and until DPM N79E2 has been classified as a "QA Program Related Procedure." (See section IV.A.2 for details.)

B. Organization and Responsibilities

1. R-82-08-NPS-03, Chemistry Program Organization and Responsibility Review

The NUC PR Directives Manual and the Personnel Administration Program of the area plan assign responsibility and establish authority and accountability for area plan programs. However, the NUC PR chemical and radiochemical program had not been divided into basic elements and grouped together in one specific area plan program. The Chemical Engineering and Chemical Monitoring Sections (CES/CMS) interface with various organizations within TVA, including the nuclear plants and POTC. The CCPP is being developed to provide for specific program definition and Mechanical Branch interface agreements are being developed to provide for clear understanding of responsibilities between interfacing organizations. This item remains open until the CCPP and the respective interface documents have been prepared and issued. (See section IV.B.1 for details.)

C. Chemical and Radiochemical Program Administration

1. Division of Nuclear Power

a. NCO

- (1) R-82-08-NPS-04, Procedural Controls for Conducting Safety/Quality Affecting Activities within Chemical Engineering Group (CEG)

Generic controls for NUC PR activities affecting safety/quality exist in the OQAN and the area plan program manuals. The CCPP and an awareness program are being prepared to identify or provide more specific controls and to familiarize personnel in the (CES/CMS) with those controls that already exist. This item remains open until the CCPP and the awareness program have been developed, issued, and implemented. (See section IV.C.1.a(1) for details.)

- (2) R-82-08-NPS-05, Program Improvement

It was evident that the CES/CMS personnel had become more forward thinking in their activities and were more involved at the plants in support roles. These improvements can be attributed to better defined responsibilities and improved program management. However, the CES/CMS were not aggressively identifying nor resolving significant problem areas. This item remains open until a methodology has been developed and implemented that promotes a well informed CES/CMS taking aggressive actions to correct identified problem areas. (See section IV.C.1.a(2) for details.)

- (3) R-82-08-NPS-06, Internal Review and Feedback Process

The methodology to be used by the Maintenance and Engineering Program Manager in performing the evaluation function as required by the NUC PR Directives Manual had not been finalized; necessary routine feedback to the CES and CMS supervisors had not been identified and established; and an internal section review methodology had not been developed. This item remains open until these items have been accomplished. (See section IV.C.1.a(3) for details.)

(4) R-82-08-NPS-07, Verification of Onsite Radiochemical and Laboratory Analysts (RCLA) Training

Substantial improvements had been accomplished in the RCLA training programs. Periodic onsite assessments of the inplant phases of the training programs are planned. However, these assessments had not been formally addressed nor had any been performed. This item remains open until formal controls for the periodic onsite assessments have been established and until implementation of the inplant programs has been formally assessed by the Nuclear Training Branch (NTB). (See section IV.C.1.a(4) for details.)

b. Power Operations Training Center (POTC)

(1) R-82-08-NPS-08, Calibration and Radiochemical Laboratory Program Documentation

Formal controls for germanium detector calibrations and safety-related laboratory analyses had been established in documents that now receive upper-tier review and approval. This item is closed. (See section IV.C.1.b(1) for details.)

2. Central Laboratory Services (CLS)

a. R-82-02-08-NPS-09, Integrated Calibration and Chemical Program Development

A formal program to provide controls for chemistry and other quality/safety-related CLS activities is in the early stages of development. This item remains open until formal program controls have been established and until implementation of these controls for CLS chemical-related activities has been verified. (See section IV.C.2.a for details.)

D. Technical/Regulatory Issues

1. R-82-08-NPS-10, Items Requiring Management Attention for Resolution

a. BFN Regulatory Guide 4.15 Program and Laboratory Quality Program

Definite improvements have been made in the BFN laboratory quality assurance program since the last NSRS review. However, an acceptable quality assurance program has not yet been established. BFN has developed a formal water quality program improvement

plan that will significantly improve the quality of the program at BFN, but success of the improvement plan depends on BFN being supplied the technical level personnel that they need. NUC PR division management should support BFN in this endeavor. This item remains open until an acceptable radio-chemical laboratory quality assurance program has been developed and implemented at BFN. (See section IV.D.1.a for details.)

b. BFN Technical Specifications for Dose Equivalent I-131

During this review NSRS found that activities to address the NSRS concerns were only in the planning stages. Additional NSRS evaluation of the BFN Technical Specifications and other regulatory information regarding Dose Equivalent Iodine-131 (DEI-131) has increased and expanded NSRS concerns in this area. As this issue involves nuclear safety, the NSRS concerns should be addressed and resolved immediately. A memorandum to this affect was transmitted from H. N. Culver to H. G. Parris on January 10, 1984 (GNS 840110 050). Item R-82-08-NPS-10b from NSRS report No. R-82-08-NPS issued February 25, 1983, is officially changed to read "The standardized technical specification values for DEI-131 and a more meaningful surveillance sampling and analyses program should be adopted and implemented at BFN and the technical specifications should be upgraded to reflect the new programs." This item remains open until this has been accomplished. (See section IV.D.1.b for details.)

c. Issuing of Directives Contrary to TVA Commitments

NUC PR had established control for the preparation, review, and implementation of division directives, and TVA commitments had been tabulated in area plan program matrices. However, the CES and CMS were somewhat unaware of the established program commitments and controls. A formal awareness program is being developed along with the CCPP to provide better understanding of the program controls and commitments. This item remains open until the awareness and CCPP programs have been prepared, issued, and implemented. (See section IV.D.1.c for details.)

IV. DETAILS

A. Chemical and Radiochemical Program Controls

1. R-82-08-NPS-01, Requirements/Needs/Activities Matrix

Chemical Engineering and Chemical Monitoring Sections (CES/CMS) personnel were not aware of what requirements and commitments had been made on behalf of water quality control or how they had been incorporated into division directives. The NSRS position was that a requirements/needs/activities matrix should be developed to identify and tabulate all applicable requirements and TVA commitments; all necessary program needs such as qualifying analytical procedures, chemicals, personnel, etc.; and all activities that should be controlled.

An area plan program matrix had been developed tabulating requirements and TVA commitments for the Maintenance and Engineering Program through which the bulk of the water quality control procedures are issued as technical standards. This matrix identifies the requirement source documents, respective program procedures, status of those procedures, and responsible branch-level organizations. The matrix is continually updated as requirements and commitments change. The requirements portion of the requirements/needs/activities matrix is satisfied and closed with the development of the area plan program matrix.

As the NUC PR water quality (chemistry) program did not exist as an area plan program in itself and other program needs and respective activities were not well defined, the Chemical Metallurgy and Standards Group (CMSG) elected to develop a "Chemical Control and Performance Program (CCPP)" document that will provide better program definition and identify program needs and related activities. When completed, the document will identify or establish controls for program needs such as qualifying analytical procedures, chemicals, personnel, etc., and will identify related necessary program activities. This document is in the early stages of development and to date has no official NUC PR status. Along with the area plan program matrix, the CCPP is an acceptable method to satisfy the NSRS position. This item remains open until the CCPP document has been developed and established as an official NUC PR document.

2. R-82-08-NPS-02, Quality Assurance Program for Chemistry Activities

The POWER quality assurance program was devoid of controls required to be placed over safety-related chemistry activities. As a result, chemical and radiochemical

program controls were not established to the degree warranted. The NSRS position was that safety-related chemistry activities should be included in the POWER quality assurance program.

The Office of Power Quality Assurance Manual (OP-QAM) had only recently (August 30, 1983) defined requirements for the safety-related chemistry activities performed by the Maintenance Coordination Staff, which includes the CLS. The respective quality assurance program had not been developed as discussed in section IV.C.2 of this report.

The OP-QAM and the Operational Quality Assurance Manual (OQAM) establish controls for NUC PR's safety-related activities in a generic sense but do not address chemistry-related activities specifically. NUC PR's Management Services Program Procedure No. 1707.01.01 "Program Manual" requires that those area plan procedures containing QA program-related material which establish QA program requirements not specifically covered within the OQAM be classified as "Quality Assurance (QA) Program-Related Procedures." The Maintenance and Engineering Program that establishes controls over the bulk of NUC PR's safety-related chemistry activities (DPM N79E2, "Nuclear Plant Water Quality Manual") had not been classified as "QA Program-Related" as required by procedure 1707.01.01. NUC PR management agreed to evaluate DPM N79E2 for "QA Program-Related" applicability.

The CCPP, which will establish controls for the safety-related chemistry activities performed by the CES/CMS, was in the early stages of development as reported in section IV.A.1 of this report. This program will not be a specific QA program document but will define the chemistry program and will establish or identify existing controls for the safety-related functions performed by the CES/CMS.

Formal controls for safety-related chemical activities in the form of PORC-reviewed, plant superintendent-approved documents had been established or were in the later stages of development at the three nuclear plants reviewed. The POTC safety-related chemical activities were provided formal controls by a Radiochemical Laboratory Manual which received upper-tier review and approval.

This item remains open until the CLS Chemical Laboratory Section of the Maintenance Coordination Staff Quality Assurance Program and the CCPP have been developed and implemented and until DPM N79E2 has been classified as "Quality Assurance (QA) Program-Related Procedures."

B. Organization and Responsibilities

1. R-82-08-NPS-03, Chemistry Program Organization and Responsibility Review

Autonomy existed between project control staffs (plants, POTC, and the nuclear central office) for chemical and radiochemical activities within NUC PR. Confusion existed as to the responsibility relationship of the CES/CMS with the plants and the POTC. The NSRS position was that NUC PR should reexamine the assignment of responsibility and authority for chemical and radiochemical control to assure that responsibility, authority, and accountability are specifically defined and delegated.

NUC PR issued a Division of Nuclear Power Directives Manual on March 15, 1983. This manual contains a statement of policy on industrial and nuclear safety; develops a methodology for implementation of activities; establishes the area plan concept where all division activities are divided into basic elements, and elements having common or closely related functions and objectives are grouped into 19 division programs; establishes program managers for each program; provides charters for each of the 19 programs; defines program and implementing manager responsibilities; establishes accountability; and establishes methodologies for program and resource management.

Authority is not specifically addressed, but it is clear that ultimate authority for management of the division's programs rests with the division director. It is implied that the actual working authority for the program manager is dependent upon the manager's ability to establish necessary, reasonable, and cost effective program requirements and to work effectively with the implementing manager.

The lines of responsibility for the plant superintendents and support organizations (down to section levels) to the division director, organizational charters, and staffing levels are defined in the Personnel Administration Program of the area plan. Assignments of responsibilities below the section levels are through job descriptions and as delegated by the section supervisors using job assignment tracking programs.

The program manager for the area plan Maintenance and Engineering Program [Maintenance and Engineering Manager (MEM)] supervises the Reactor Engineering, Mechanical and Electrical, and Instrument and Control Branches. The CES and CMS report through the CMSG Head to the Mechanical Branch Chief who in turn reports to the MEM. The NUC PR chemical and radiochemical program elements had not been divided into basic elements and grouped together in a

division area plan program. Even though the bulk of the chemistry-related division directives are issued through the Maintenance and Engineering Program Manual, the CES and CMS have additional responsibilities to other program managers. To define working relationships and coordinate CES and CMS responsibilities with other program managers and organizations, interface agreements were being developed with the Mechanical Branch Radwaste Management Group, POTC, CLS, and the Emergency Planning and Preparedness Branch.

The area plan, along with the CCPP, and interface agreements affecting the CES and CMS, when developed should sufficiently define the NUC PR chemistry program and should delegate responsibility, accountability, and authority for its implementation.

This item remains open until the CCPP and the respective interface documents have been prepared and issued.

C. Chemical and Radiochemical Program Administration

1. Division of Nuclear Power

a. Nuclear Central Office

(1) R-82-08-NPS-04, Procedural Controls for Conducting Safety/Quality Affecting Activities within Chemical Engineering Group

NSRS found that no procedural controls had been formulated to accomplish the nuclear safety/quality affecting activities being performed by the CES/CMS [previously the Chemical Engineering Group (CEG)]. As a result, certain actions had been taken that circumvented normal administrative controls for these type activities. The NSRS position was that CEG should develop procedural controls to formalize its activities.

Controls for generic activities affecting nuclear safety/quality exist in NUC PR's OQAM and area plan program manuals. The NUC PR position was that rather than creating duplicate documents, the CCPP would be used to provide specific program controls where none existed and to identify applicable existing controls. In addition, an awareness program to familiarize personnel in the CES/CMS of the various existing industry, regulatory, corporate, POWER, and NUC PR documents that control their respective activities would be developed in the form of a Mechanical Branch Instruction.

This instruction will also provide a method for the CMSG head to keep the personnel in that group (including those in CES/CMS) informed of changes to those documents affecting their activities. This approach is acceptable to NSRS, and this item remains open until the CCPP and the awareness instruction have been developed, issued, and implemented.

(2) R-82-08-NPS-05, Program Improvement

The CES and CMS had become reactionary rather than forward-thinking sections. This had occurred to some degree as a result of the personnel within these groups confining themselves to the central office. This confinement was self-imposed and had resulted indirectly from artificial barriers constructed due to adversary relationships between the plants and the CES and CMS. The NSRS position was that CES and CMS personnel should be given strong management support which would allow those personnel to perform their prescribed functions.

It was evident that the CES and CMS had become somewhat less reactionary and more forward-thinking in their activities. This change is attributed to the following:

- ° Issuance of the Division of Nuclear Power Directives Manual which established the relationship between the program managers (primarily central office personnel) and the implementing managers (primarily plant personnel) that is acceptable to the division director.
- ° Defined responsibilities (Directives Manual and area plan program documents).
- ° Increased experience level of the CES and CMS personnel.
- ° More and better support provided to the plants by CES and CMS personnel (involvement in the BFN water quality improvement program including direct technical support to upgrade the nuclear counting room capabilities, decontamination efforts at the operating plants, flushing and chemical cleaning activities at the plants under construction, chlorination programs for asiatic clams and slime control at all the plants, etc.)

- ° CES and CMS personnel are spending more of their working time at the plants in support roles.
- ° Better planning practices by CES and CMS personnel (use of formal master plans to establish priorities, goals, plans of action, and schedules).
- ° NSRS observed better sense of cooperation between the plants and the CES and CMS personnel.

Even though there was significant improvement in this area, it was evident that the CES/CMS had not taken an aggressive lead in resolving concerns involving the BFN radiochemical laboratory quality assurance program and the technical specifications for DEI-131. In addition, it should be noted that actions taken to correct reported program weaknesses were only in the planning stages and the CES/CMS had not established an evaluation and feedback mechanism to allow them to be cognizant of the NUC PR chemical and radiochemical program. (See sections IV.C.1.a(3) and IV.D.1.a and b for details). This item remains open until a methodology has been developed and implemented that promotes a well informed CES/CMS taking aggressive actions to correct identified problem areas.

(3) R-82-08-NPS-06, Internal Review and Feedback Process

The CES and CMS had no internal review mechanism to appraise the sections' administrative and program weaknesses; to identify which of its activities need to be formally controlled; to verify through onsite reviews the implementation of its directives; to periodically advise management of overall chemistry program status and effectiveness; and to recommend corrective action when respective activities failed to comply with POWER/NUC PR approved procedures or regulatory requirements. The NSRS position was that responsibility should be established within CES and CMS to conduct internal reviews of its activities and assess the degree of implementation of NCO-issued division directives.

Section III of the Division of Nuclear Power Directives Manual states that the program manager is responsible for monitoring program

effectiveness and efficiency once implemented. In addition, it states that program manuals should state measurable program objectives and indicates that program evaluation reports are to be prepared and forwarded to the division director and other responsible managers and supervisors. Discussions with NUC PR management indicated that the methodology to be used by the program managers in performing those evaluations had not been finalized.

The CES and CMS section supervisors had not established a methodology for internal reviews to monitoring program effectiveness. They had not formally established what routine feedback (documents, reports, operational information, dialogue) they need to routinely review to maintain cognizance over their responsible activities.

This item remains open until the methodology to be used by the program manager in performing the evaluation function has been finalized, the necessary routine feedback to the CES and CMS supervisors has been identified and provided, and a methodology for internal section reviews of responsible activities has been developed.

(4) R-82-08-NPS-07, Verification of Onsite Radiochemical Laboratory Analysts (RCLA) Training

Radiochemical Laboratory Analysts (RCLA) trainees were assigned to one of the nuclear plants following their Power Operations Training Center (POTC) 14-week basic phase orientation in chemical and radiochemical principles, administrative and regulatory requirements, and program indoctrination. At the plants they were required to participate in an additional 21-month inplant phase training program. Though the Nuclear Training Branch (NTB) was charged with the responsibility for preparing, administering, and directing NUC PR training programs, no onsite involvement or program effectiveness appraisals (assessments) were being accomplished by NTB in the area of RCLA training. The nuclear plants train and certify RCLAs in accordance with their own locally approved programs with little input from the NTB. There were indications that the quality of the programs was breaking down at the plants (observed poor sampling and analytical techniques, lack of formal control of training records, and no established retraining programs

as required by facility technical specifications). The NSRS position was that the NTB should assess onsite RCLA training requirements and activities at periodic intervals.

NUC PR had developed an "area plan" program to define, organize, and coordinate management and administrative policies, procedures, and controls necessary to ensure that all activities associated with training in NUC PR are properly planned, controlled, and implemented. The Chief, NTB, is the program manager. Training plans had been finalized by NTB that define and control the training programs for the NUC PR laboratory analysts. The defined programs are for the entry-level chemical laboratory analysts (CLA) consisting primarily of on-the-job training at the nuclear plants, the RCLA formal basic phase conducted at POTC, and the scheduled periodic RCLA continuing (retraining) program conducted both at POTC and at each plant. These training plans provide for more NTB involvement in the inplant programs in that NTB is now responsible for recommending changes in the established plans to fulfill the objectives of the on-the-job (inplant) phases of the programs, participates in oral exams given by the plants, provides aid in the development of training programs and materials to be used during the inplant phases, and prepares quarterly seminars presented at the plants for the continuing (retraining) plan for RCLAs. To improve the quality of the inplant programs, the NTB is encouraging all instructors at the plantsites to complete the NTB Instructor/Associate Instructor Certification Program. In addition, a formal mechanism has been established to provide for feedback on program quality to NTB from trainees, journeymen analysts, and supervisors at the plants as well as at POTC. The laboratory analysts training programs were in the process of being evaluated for accreditation by INPO at the time of this review. These actions are recognized by NSRS as program improvements that have been accomplished since the original NSRS review.

POTC management informed NSRS that future improvements in the program would include periodic onsite assessments of the inplant phases of the training programs to aid in overall program evaluation. The onsite assessments will be performed by the NTB staff tentatively on an annual schedule. However, at the

time of this review, the onsite assessments had not been formally addressed in any NTB document nor had any been performed.

This item remains open until formal controls for the periodic onsite assessments of the inplant phases of the programs have been established and implementation of the programs have been formally assessed by the NTB staff.

b. Power Operations Training Center

(1) R-82-08-NPS-08, Calibration and Radiochemical Laboratory Program Documentation

The Chemistry, Health Physics, and Occupational Safety Training Section (CHPOSTS) of NTB performed germanium detector calibrations and safety-related laboratory analyses in support of TVA's nuclear program. Formal controls of these functions had not been prepared or were fragmented into instruction letters or a partially completed Radiochemical Laboratory Manual (RLM). These documents did not receive any upper-tier review and approval or plant concurrence for those activities.

The NSRS position was that all chemistry, radiochemistry, and calibration procedures, along with program descriptions, should be condensed into a QA program document with upper-tier review and approval to define the POTC QA responsibilities to the licensed plants.

During this review NSRS found that a section instruction letter had been established at POTC that outlined responsibilities and specified procedures for maintaining up-to-date calibrated germanium detectors for nuclear power plant use. It provided control measures for the procurement, receipt testing, calibration, use, and shipment of those detectors. The specific procedures for testing and calibrating these detectors had been placed in the RLM, which had been made a controlled document with upper-tier review and approval. The controlled RLM contained a basic description of the analytical laboratory quality assurance program, an expanded quality control program, approved procedures to be used for germanium detector calibrations and testing, and chemical and radiochemical laboratory analytical procedures to support TVA's nuclear program. This item is closed.

2. Central Laboratory Services

a. R-82-08-NPS-09, Integrated Calibration and Chemical Program Development

CLS had established some formal controls for its Measurement and Test Equipment (M&TE) calibration program. However, formal controls for the specific safety/quality chemical activities (chemical analyses of fuel and lubricating oils, unique samples, and materials composition determinations, etc.) had not been established. The NSRS position was that CLS should expand the formal program to provide controls for chemistry and other quality/safety-related CLS activities. This expanded program would provide assurance to NUC PR and other interfacing organizations that activities would be performed in accordance with formal controls thus enhancing the confidence of the results.

CLS organizationally reports to POWER's Maintenance Coordination Staff (MCS). The Office of Power Quality Assurance Manual procedure OP-QAP-1.4, "Maintenance Coordination Staff Quality Program," which contains respective program requirements was issued August 30, 1983. These requirements were being translated into an MCS program document (Maintenance Coordination Staff Quality Program) for implementation at CLS and the Power Service Shops. This program document was approximately 25 percent complete and addressed generic MCS quality-related activities. The specific controls for CLS chemical activities had not been developed. These controls when developed and issued will be contained in MCS procedure No. CLS-QAP-4.3, "Chemical Analysis Program." The complete MCS program, including controls for chemical, metallurgy, calibration, and shop and services activities, is tentatively scheduled for issue by February 1, 1984. This position remains open until MCS program controls have been established and until implementation of these controls for CLS chemical-related activities has been verified.

D. Technical/Regulatory Issues

1. R-82-08-NPS-10, Items Requiring Management Attention for Resolution

NSRS' review of the POWER chemical and radiochemical control program identified three significant conditions adverse to quality/safety which NSRS felt deserved management attention. These three conditions and subsequent actions taken by POWER management are discussed in the following.

a. BFN Regulatory Guide 4.15 Program and Laboratory Quality Program

Weaknesses in the BFN implementation program for Regulatory Guide (RG) 4.15, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment," were identified during the original NSRS review. Examples of these weaknesses were the lack of adequate written procedures required for nuclear counting room equipment calibration and use, no formal intralaboratory quality control program, and failure to take prompt corrective action to correct a condition adverse to quality (possible use of defective detectors). The NSRS position was that this program should receive management attention to assure compliance with TVA commitments.

After the NSRS review in the fall of 1982, BFN management initiated efforts to improve the laboratory quality assurance program. Efforts consisted of upgrading laboratory equipment, the radiochemical laboratory analysts training program, and the quality of the procedures being used in the radiochemical laboratory. However, progress was hampered because of the shortage of technical level personnel assigned to the BFN Chemical Unit due to the involvement of chemical engineers assigned to that unit in the Shift Technical Advisor (STA) training program. Early in 1983 nuclear counting equipment began failing at a more frequent rate. Technical support was requested and provided from the CMS, equipment was borrowed from other facilities, and purchase of new equipment was expedited. Installation, testing, calibration, and programming of this equipment required considerable CMS onsite effort because BFN did not have staff personnel available with the technical talents necessary to perform the tasks.

In April 1983 the NRC conducted an inspection at BFN which included reviews of the laboratory quality control program, chemistry and radiochemistry procedures, quality control records and logs, and a comparison of the results of split samples analyzed by BFN and the NRC Region II mobil laboratory. As a result of that inspection, the NRC issued a Severity Level IV violation to BFN for failure to establish and implement calibration procedures for nuclear counting room equipment. NRC concluded that the failure to establish procedures resulted in the use of improperly calibrated gamma spectroscopy systems for the measurement of radioactive effluents released to unrestricted areas. The NRC indicated

that failure to initiate corrective action contributed to the violation and that even though BFN was not implicitly required to meet the requirements of RG 4.15, development and implementation of an improved laboratory quality assurance program should be expedited.

Subsequently, during a recent review at BFN (August 1983), INPO identified similar concerns as expressed by NSRS and NRC.

BFN management decided in September 1983 that significant program changes were in order. A new Chemical Unit Supervisor was appointed, and a manager with primary responsibility in the area of water quality program improvement was assigned to work directly with the Engineering Section Supervisor. This program improvement manager is separate and in addition to the new Chemical Unit Supervisor and will be assigned to this task during the improvement period. This will allow daily business to proceed while focusing increased management attention to the area of program improvement.

A Water Quality Program Improvement Plan has been formulated by BFN and presented to upper NUC PR management. This plan represents significant changes in organization and philosophy of program management. The paramount element in the improvement plan is the addition to the permanent BFN staff of two experienced senior-level nuclear chemists/chemical engineers with strong technical backgrounds. This level of technical expertise is considered necessary to facilitate needed improvements in program development and implementation for increasingly complex program requirements, nuclear counting equipment, chemical process instrumentation, and laboratory analytical equipment. This level of technical expertise was not presently available at BFN and was being supplied on a part-time basis from the CMS. Equally important to the success of the program improvement plan is the continued involvement in these activities by the manager assigned to coordinate those efforts until the improved program is established and the new Chemical Unit Supervisor has developed sufficient experience and perception to properly manage the program. If the technical expertise is not made available to BFN and the management attention and commitment to an improved program is not maintained, the success of the water quality program improvement plan formulated by BFN will be limited.

During October 1983 a change to the BFN technical specifications was submitted to NRC to modify the requirement to meet audit requirements of RG 4.15. This change was initially disapproved by the Browns Ferry Nuclear Safety Review Board (BF-NSRB) and later approved on the basis of commitments made by NUC PR management. NSRS agrees in principle with the concerns raised by the BF-NSRB in this matter. In view of the serious deficiencies that have existed within the TVA programs, it is considered essential that the change in the technical specifications not be interpreted by the personnel at BFN as permission to decrease requirements in this area.

The release of radioactive nuclides to the plant and offsite environments is a continual process at BFN and directly affects the health and safety of the plant personnel and the general public. An acceptable radiochemical laboratory quality assurance program is badly needed to assure the validity of the technical data used in evaluating all radioactive effluents released to and from the plant along with other critical plant parameters. NUC PR should provide the necessary resources to BFN without delay as this program was identified as being deficient as far back as late 1981 and failure to take corrective action has contributed to a recent NRC violation.

This item remains open until an acceptable radiochemical laboratory quality assurance program has been developed and properly implemented at BFN.

b. BFN Technical Specifications for Dose Equivalent I-131

The NSRS position was that the BFN Technical Specifications for determining reactor coolant dose equivalent I-131 (DEI-131) activity were deficient in that they did not require special surveillance sampling following transients when the equilibrium value, as determined once per month, was less than 0.032 microcuries/gm. NSRS felt that the Technical Specifications as written did not provide the assurance indicated in the "Bases" and the "Bases" did not provide a technical bases for assuring that following one or more transients the activity level will not exceed 3.2 microcuries/gm. NSRS felt that the Technical Specifications should be rewritten, or proper justifications for the existing Technical Specifications should be provided.

The CMS has been requested by BFN to evaluate an alternative method for determining DEI-131, correct discrepancies between the Technical Specifications and surveillance requirements, and determine if the Technical Specifications are inadequate. These items are included in the BFN water quality program improvement plan and CMS has solicited the services of a consultant to assist in the evaluation of the adequacy of the Technical Specifications. The evaluation is just now getting underway.

The NSRS considers that this item had not received prompt management attention within NUC PR. The Technical Specification surveillance requirements, limiting conditions for operation, and bases should have been assessed to determine if indeed they meet the true intent of the regulatory requirements.

DEI-131 is the reactor coolant parameter that is monitored and limited by Technical Specifications to assure that the thyroid doses at the exclusion distance are not exceeded during the two-hour period following a main steam line break occurring outside primary containment. NRC identified limiting conditions for operation for this parameter in NUREG-0123, "Standard Technical Specifications for General Electric Boiling Water Reactors (BWRs)," dated December 1980, to limit the thyroid dose to small fractions of the 10CFR100 dose guideline following a main steam break. These identified values in NUREG-0123 were calculated for a typical site. The BFN unit 3 Technical Specifications values are significantly higher than in the Standard Technical Specifications; thus, at the time of a postulated accident, the dose to the public would be higher than identified in NUREG-0123.

In August 1981 the NRC forwarded NUREG-0803, "Generic Safety Evaluation Report Regarding Integrity of BWR Scram System Piping," to all GE BWR licensees. This NUREG reported results of a study of safety concerns associated with postulated pipe breaks in the boiling water reactor scram system that were identified during NRC's investigation of the BFN unit 3 control rod partial insertion failure on June 28, 1980.

The NRC study compared the whole body dose rates that would result in the event a scram system pipe break occurred while operating at DEI equilibrium limits allowed by the present BFN unit 3 Technical Specifications versus the DEI-131 equilibrium limits in the STS (3.2 microcuries/gm versus 0.2 microcuries/gm).

The study indicated that operator actions to terminate leakage from a scram discharge volume (SDV) rupture would require personnel access to the reactor building and that radiation levels from the iodine present in the reactor coolant would directly affect reactor building accessibility and mitigation of the accident. The whole body dose rates that would be encountered in the reactor building following the postulated pipe break, slow reactor coolant system depressurization, and a well-mixed reactor building atmosphere after operating at equilibrium concentrations of 3.2 microcuries/gm and 0.2 microcuries/gm is graphically illustrated in figure 1 of this report (assumes an iodine spike of 500 times the equilibrium value).

The figure illustrates that whole body dose rates in the general reactor building environment would be approximately 25 rem/hr versus 3.5 rem/hr for the STS. Additionally, the whole body dose rates in the immediate vicinity of the pipe break have been calculated to be approximately 100 rem/hr versus 13 rem/hr respectively. Mitigation of the accident with the higher dose rates would result in a higher radiation dose to the operator and could affect the ability of the operators to mitigate the accident in the reactor building. General Electric and TVA have argued that normal iodine concentrations in the reactor coolant systems are roughly 10 times lower than the STS limit of 0.2 microcuries/gm. NRC's position as stated in NUREG-0803 is that this fact supports the reasoning behind adopting the STS limits.

NSRS believes that there is no potential benefit to TVA in maintaining the present BFN Technical Specification limit at the current values, and operating at those levels would only serve to increase the plant radiation levels, increase radiation doses to plant personnel and the general public at the time of an accident, and make it more difficult for operating personnel to mitigate accidents involving loss of reactor coolant with subsequent contamination of the reactor building atmosphere.

This item remains open until the STS limiting conditions for operation for DEI-131 and a more meaningful surveillance sampling and analysis program for DEI-131 have been adopted and implemented and the BFN Technical Specifications have been upgraded to reflect the new program. These changes would be consistent with TVA's policies for nuclear safety and radiation protection.

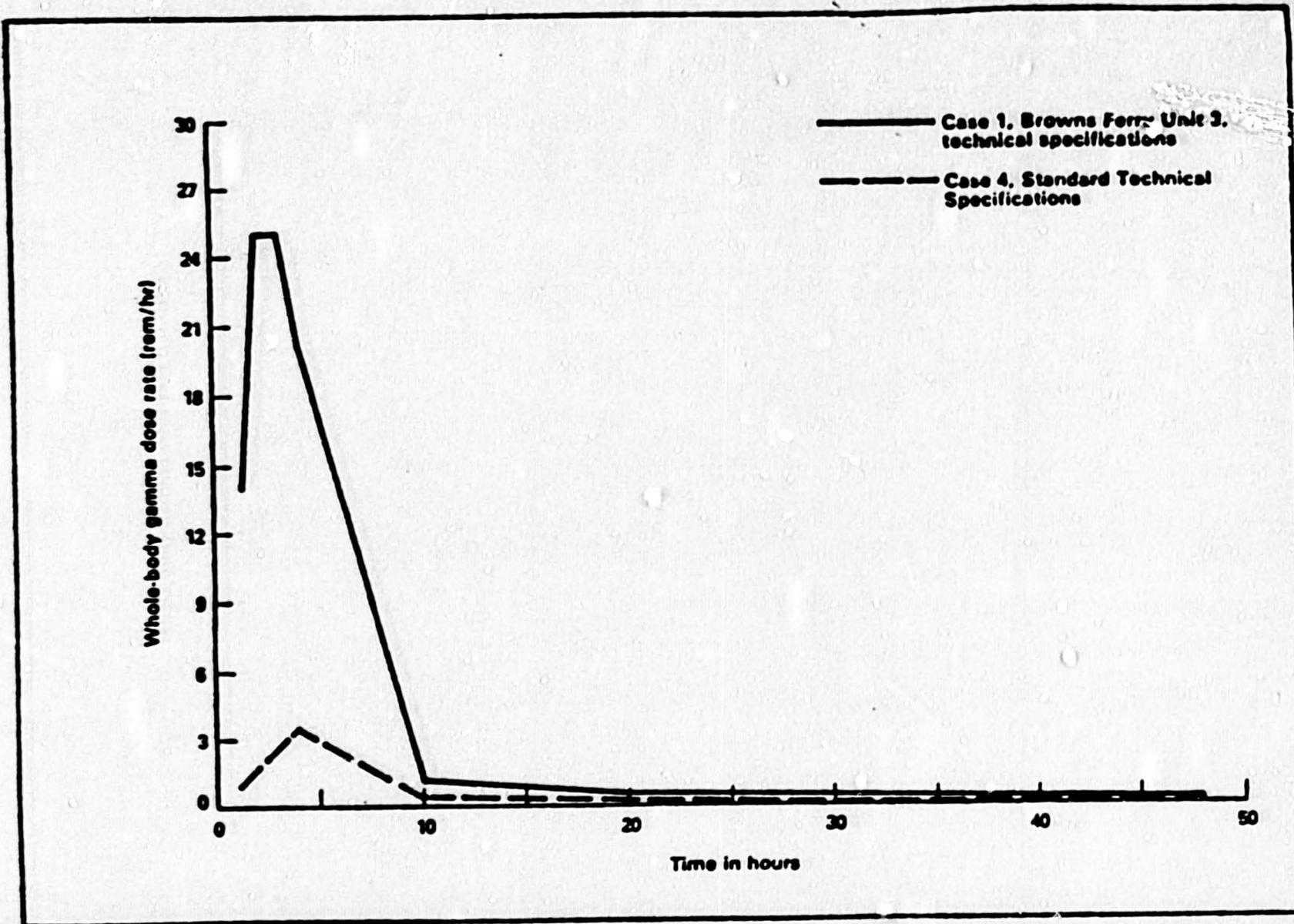


Figure 4.1 Scram discharge volume dose rates in reactor building for slow depressurization cases

c. Issuing of Directives Contrary to TVA Commitments

Due to a lack of internal control procedures and awareness of existing controls, CES and CMS had issued directives which resulted in chemical parameters being exceeded and regulatory administrative requirements being violated. The NSRS position was that this program weakness should be corrected to assure compliance with TVA commitments.

NUC PR had established controls in the form of area plan technical standards and OQAM procedures for the preparation, review, and implementation of division directives. In addition, area plan program matrices had been prepared to identify TVA commitments. A formal awareness program that will define the regulatory, industry, corporate, POWER, and NUC PR documents that provide controls for CES and CMS activities is being prepared. In addition the CCPP is being prepared to provide better control of specific CES and CMS activities where existing controls do not exist.

This item remains open until the awareness and CCPP programs have been prepared, issued, and implemented.

LIST OF PERSONNEL CONTACTED

A. Division of Nuclear Power Central Office

<u>Name/Title</u>	<u>Attended Entrance Meeting</u>	<u>Contacted During Review</u>	<u>Attended Exit Meeting</u>
Bacon, W. R., Compliance Management Supervisor		X	
Bollinger, R. A., Nuclear Engineer		X	
Cole, J. B., Chemist		X	
Harwell, E. F., Chemical Metallurgy and Standards Group Head	X	X	X
Hixson, D. S., Chemical Engineer		X	
Nix, D. W., Chemist		X	
Paul, D. L., Assistant to Mechanical Branch Chief	X	X	
Pleva, J. M., Chemical Engineering Section Supervisor	X	X	
Reardon, L. D., Chemist		X	
Rollins, M. L., Chemical Monitoring Section Supervisor	X	X	
Stevens, S. W., Chemist		X	
Traynor, J. C., Chemical Engineer		X	

Whaley, E. L., Chemical Engineer		X
Whitt, P. L., Chemical Engineer		X
Wilson, D. P., Chemical Engineer		X
Ziegler, T. F., Mechanical Branch Chief	X	X

B. Office of Power Nuclear Safety Staff

<u>Name/Title</u>	<u>Attended Entrance Meeting</u>	<u>Contacted During Review</u>	<u>Attended Exit Meeting</u>
Chmielewski, C. E., Nuclear Engineer		X	
Galbreth, T. M., Nuclear Engineer		X	
Roberts, B. F., Nuclear Engineer		X	
Szczepanski, F. A., Chief, Nuclear Safety Staff		X	

C. Office of Power Nuclear Licensing Staff

Rogers, R. E.; Nuclear Engineer		X	
---------------------------------	--	---	--

D. Operations Quality Assurance Branch

Frizzell, T. O. Quality Assurance Evaluator	X		
Lumpkin, R. L., Chief, Operations Quality Assurance Branch	X		
Moore, R. L., Head, Support Services Program Group	X	X	

E. Power Operations Training Center

<u>Name/Title</u>	<u>Attended Entrance Meeting</u>	<u>Contacted During Review</u>	<u>Attended Exit Meeting</u>
Johnson, R. J., Chief, Nuclear Training Branch	X		
Reid, W. T., Supervisor, Chemistry and Health Physics Laboratory Unit		X	X
Scott, N. E., Supervisor, Chemistry, Health Physics, and Occupational Safety Training Section	X	X	

F. Sequoyah Nuclear Plant

Amos, D., Chemist		X	
Anderson, J., QC Assistant Supervisor	X		
Bosley, C. E., Chemist		X	
Craigge, E. A., Field and Safety Staff Supervisor		X	

	<u>Attended Entrance Meeting</u>	<u>Contacted During Review</u>	<u>Attended Exit Meeting</u>
Fortenberry, R. W., Engineering Section Supervisor	X		
Hamilton, J. L., Field Quality Engineering Unit Supervisor		X	
Harding, M. R., Compliance Section Supervisor	X		
Law, J. E., Field Quality Engineering Unit Assistant Supervisor		X	
Lones, W. A., Radiochemical Laboratory Analyst		X	
McDonald, C. L., Chemical Engineer		X	
Mullenix, J. B., Chemist		X	
Pierce, J. P., Radiochemical Laboratory Supervisor		X	
Proffitt, J. W., Chemical Engineer		X	
Taylor, J. L., Chemical Unit Supervisor		X	X
G. <u>Central Laboratory Services</u>			
Erickson, G. A., QA/QC Supervisor	X	X	X
Ragsdale, J. B., QC Inspector	X	X	X
Rose, J. L., Chemical Laboratory Supervisor	X	X	
Taff, H. A., Chief, Central Laboratory Services	X		
H. <u>Watts Bar Nuclear Plant</u>			
Byrd, W. L., Compliance Section Supervisor		X	
Jones, M. K., Engineering Section Supervisor		X	
King, M. E., Chemical Engineer		X	
Matthews, D. R., Chemical Engineer		X	
Nall, W. H., Radiochemical Laboratory Supervisor		X	
I. <u>Browns Ferry Nuclear Plant</u>			
Clement, A. L., Chemical Unit Supervisor	X	X	X
Jones, G. T., Plant Superintendent		X	X
Mims, D. C., Assistant Engineering Section Supervisor	X	X	X
Morkin, K. M., Compliance Section Engineer	X		

	<u>Attended Entrance Meeting</u>	<u>Contacted During Review</u>	<u>Attended Exit Meeting</u>
Pittman, J. R., Assistant Plant Superintendent	X		
Tays, W. G., Radiochemical Laboratory Supervisor		X	
Thomison, W. C., Engineering Section, Supervisor	X	X	

J. Regulatory and Industry

Helmholz, H. R., Consultant, NWT		X	
Jackson, M., INPO		X	

VI. DOCUMENTS REVIEWED (REFERENCES)

A. Codes, Standards, and Regulations

1. Regulatory Guide 4.15 dated December 1977, "Quality Assurance for Radiological Monitoring Programs (Normal Operations) - Effluent Streams and the Environment"
2. Regulatory Guide 1.21 dated June 1974, "Measuring, Evaluating, and Reporting Radiation in Solid Wastes and Releases of Radioactive Materials in Liquid and Gaseous Effluents from Light-Water-Cooled Nuclear Power Plants"
3. Regulatory Guide 4.1 dated April 1975, "Programs for Monitoring Radioactivity in the Environs of Nuclear Power Plants"
4. U.S. NRC OI&E Report Nos. 50-259/81-30, 50-260/81-30, and 50-296/81-30 dated October 16, 1981
5. U.S. NRC OI&E Report Nos. 50-259/83-11, 50-260/81-30, and 50-296/81-30 dated May 24, 1983
6. Letter from Williard L. Bowers, Chairman AIF Subcommittee on RETS to Radiological Effluent Technical Specification Subcommittee dated August 9, 1983
7. U.S. NRC Safety Guide 5 dated March 10, 1971, "Assumptions Used for Evaluating the Potential Radiological Consequences of a Steam Line Break Accident for Boiling Water Reactors"
8. 10CFR20 - Standards for Protection Against Radiation
9. 10CFR100 - Reactor Site Criteria