NUREG–0847
Supplement No. 13

Safety Evaluation Report

related to the operation of
Watts Bar Nuclear Plant,
Units 1 and 2

Docket Nos. 50–390 and 50–391

Tennessee Valley Authority

U.S. Nuclear Regulatory Commission

Office of Nuclear Reactor Regulation

April 1994

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ABSTRACT

This report supplements the Safety Evaluation Report (SER), NUREG-0847 (June 1982), Supplement No. 1 (September 1982), Supplement No. 2 (January 1984), Supplement No. 3 (January 1985), Supplement No. 4 (March 1985), Supplement No. 5 (November 1990), Supplement No. 6 (April 1991), Supplement No. 7 (September 1991), Supplement No. 8 (January 1992), Supplement No. 9 (June 1992), Supplement No. 10 (October 1992), Supplement No. 11 (April 1993), and Supplement No. 12 (October 1993), issued by the Office of Nuclear Reactor Regulation of the U.S. Nuclear Regulatory Commission with respect to the application filed by the Tennessee Valley Authority, as applicant and owner, for licenses to operate the Watts Bar Nuclear Plant, Units 1 and 2 (Docket Nos. 50-390 and 50-391). The facility is located in Rhea County, Tennessee, near the Watts Bar Dam on the Tennessee River. This supplement provides recent information regarding resolution of some of the outstanding and confirmatory items, and proposed license conditions identified in the SER.

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APPENDICES

ABBREVIATIONS

AECL	Atomic Energy of Canada Limited
AFD	axial flux difference
AFW	auxiliary feedwater
AMSAC	ATWS mitigation system actuation circuitry
ANSI	American National Standards Institute
ATWS	anticipated transient without scram
BISI	bypassed and inoperable status indication
BNL	Breakhaven National Laboratory
BOP	balance of plant
BTP	branch technical position
CAOC	constant axial offset control
CAP	corrective action program
CATD	Corrective Action Tracking Document
CECC	Central Emergency Command Center
CFR	Code of Federal Regulations
CMAA	Crane Manufacturers Association of America
CMS	Code Management System
CNPP	Corporate Nuclear Performance Plan
COC	Chattanooga Office Complex
COLR	Core Operating Limits Report
CRDM	control rod drive mechanism
CSB	Containment Systems Branch
CSST	common station service transformer
DNB	departure from nucleate boiling
DNBR	departure from nucleate boiling ratio
EAL	emergency action level
EBS	Emergency Broadcast System
ECCS	emergency core cooling system
ECSP	Employee Concern Special Program (TVA)
ECTG	Employee Concern Task Group (TVA)
EDG	emergency diesel generator
EMI	electromagnetic interference
EMT	emergency medical technician
EOF	emergency operations facility
EPA	Environmental Protection Agency
EPIP	emergency plan implementing procedure
EPZ	emergency planning zone
ERCW	essential raw cooling water
ERF	emergency response facility
ESD	electrostatic discharge
ESF	engineered safety feature
ESFAS	engineered safety features actuation system

FEMA	Federal Emergency Management Agency
FSAR	Final Safety Analysis Report
FWCS	feedwater control system
GDC	general design criterion
H&I	harassment and intimidation
IE	Office of Inspection and Enforcement
IEEE	Institute of Electrical and Electronics Engineers
IFBA	integral fuel burnable absorber
INPO	Institute of Nuclear Power Operations
IPE	individual plant examination
IR	inspection report
JIC	Joint Information Center
LCO	limiting conditions for operation
LOCA	loss-of-coolant accident
LOOP	loss of offsite power
LRC	local recovery center
MERT	Medical Emergency Response Team
MSS	median signal selector
NEMA	National Electrical Manufacturers Association
NIS	nuclear instrumentation system
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
NSRS	Nuclear Safety Review Staff (TVA)
NSSS	nuclear steam supply system
NUREG	report prepared by NRC staff
NUREG/CR	report prepared by NRC contractor
OBE	operating basis earthquake
ODS	operation duty specialist
OIA	Office of Inspector and Auditor
OSC	Operational Support Center
PACAQ	Program for Assurance of Completion and Assurance of Quality
PER	problem evaluation report
PLC	programmable logic controller
PORV	pilot-operated relief valve
PROM	programmable read-only memory
QA	quality assurance
QC	quality control
QPTR	quadrant power tilt ratio
QTC	Quality Technology Corporation

RAI	request for additional information
RAOC	relaxed axial offset control
RCCA	rod cluster control assembly
RCP	reactor coolant pump
RCS	reactor coolant system
REP	radiological emergency plan
RERP	radiological emergency response plan
RFI	radiofrequency interference
RG	regulatory guide
RMCC	Radiological Monitoring Control Center
RPS	reactor protection system
RTD	resistance temperature detector
RTP	rated thermal power
RWFS	RCCA bank withdrawal from subcritical
SED	site emergency director
SEOC	State Emergency Operations Center
SER	Safety Evaluation Report
SG	steam generator
SI	safety injection
SOS	shift operations supervisor
SP	special program
SRP	Standard Review Plan
SSER	supplemental Safety Evaluation Report
SSI	soil-structure interaction
TAC	technical assignment control
TEDE	total effective dose equivalent
TI	temporary instruction
TSs	Technical Specifications
TSC	Technical Support Center
TTD	trip time delay
TVA	Tennessee Valley Authority
V&V	verification and validation
WABA	wet annular burnable absorber
WARL	Western Area Radiological Laboratory
WBNPP	Watts Bar Nuclear Performance Plan
WCAP	report prepared by Westinghouse

INTRODUCTION AND DISCUSSION

1.1 Introduction

In June 1982, the Nuclear Regulatory Commission staff (NRC staff or staff) issued a Safety Evaluation Report, NUREG-0847, regarding the application by the Tennessee Valley Authority (TVA or the applicant) for licenses to operate the Watts Bar Nuclear Plant, Units 1 and 2. The Safety Evaluation Report (SER) was followed by SER Supplement No. 1 (SSER 1, September 1982), Supplement No. 2 (SSER 2, January 1984), Supplement No. 3 (SSER 3, January 1985) Supplement No. 4 (SSER 4, March 1985), Supplement No. 5 (SSER 5, November 1990) Supplement No. 6 (SSER 6, April 1991), Supplement No. 7 (SSER 7, September 1991), Supplement No. 8 (SSER 8, January 1992), Supplement No. 9 (SSER 9, June 1992), Supplement No. 10 (SSER 10, October 1992), Supplement No. 11 (SSER 11, April 1993) and Supplement No. 12 (October 1993). As of this date, the staff has completed review of the applicant's Final Safety Analysis Report (FSAR) up to Amendment 78.

The SER and SSERs were written in accordance with the format and scope outlined in the Standard Review Plan (SRP, NUREG-0800). Issues arising as a result of the SRP review that were not closed out at the time the SER was published were classified into outstanding issues, confirmatory issues, and proposed license conditions (see Sections 1.7, 1.8, and 1.9, respectively, which follow).

In addition to the guidance of the SRP, the staff would issue generic requirements or recommendations in the form of bulletins and generic letters. Each of these bulletins and generic letters carries its own applicability, work scope, and acceptance criteria; some are applicable to Watts Bar. The implementation status was addressed in Section 1.14 of SSER 6. The staff is reevaluating the status of implementation of all bulletins and generic letters.

Each of the following sections or appendices of this supplement is numbered the same as the section or appendix of the SER that is being updated, and the discussions are supplementary to, and not in lieu of, the discussion in the SER, unless otherwise noted. Accordingly, Appendix A is a continuation of the chronology of the safety review.[1] Appendix E is a list of principal contributors to this supplement. Appendices B-D and F-Z are not changed by this SSER. In Appendix AA, the staff reprints its supplemental safety evaluation concerning the TVA corrective action program on the Q-List. In Appendix BB, the technical evaluation report on feedwater check valve slam analysis is reproduced.

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[1]Availability of all material cited is described on the inside front cover of this report.

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1.7 Summary of Outstanding Issues

SER Section 1.7 identified 17 outstanding issues (open items) that had not been resolved at the time the SER was issued. Additional outstanding issues were added in SSERs that followed. This section updates the status of those items. The completion status of each of the issues is tabulated below with the relevant document in which the issue was last addressed shown in parentheses. Detailed, up-to-date status information for still-unresolved issues is conveyed in the staff's summaries of the monthly licensing status meetings.

Issue[2]	Status	Section
(1) Potential for liquefaction beneath ERCW pipelines and Class 1E electrical conduit	Resolved (SSER 3)	2.5.4.4
(2) Buckling loads on Class 2 and 3 supports	Resolved (SSER 4)	3.9.3.4
(3) Inservice pump and valve test program (TAC M74801)	Updated (SSER 5)	3.9.6
(4) Qualification of equipment		
(a) Seismic (TAC M71919)	Resolved (SSER 9)	3.10
(b) Environmental (TAC M63591)	Under review (SER)	3.11
(5) Preservice inspection program (TAC M63627)	Resolved for Unit 1 (SSER 10 and 12)	5.2.4, 6.6, App. Z
(6) Pressure-temperature limits for Unit 2	On hold	5.3.2, 5.3.3
(7) Model D-3 steam generator preheater tube degradation	Resolved (SSER 4)	5.4.2.2
(8) Branch Technical Position CSB 6-4	Resolved (SSER 3)	6.2.4
(9) H_2 analysis review	Resolved (SSER 4)	6.2.5
(10) Safety valve sizing analysis (WCAP-7769)	Resolved (SSER 2)	5.2.2

[2]The TAC (technical assignment control) number that appears in parentheses after the issue title is an internal NRC control number by which the issue is managed through the Workload Information and Scheduling Program (WISP) and by which relevant documents are filed. Documents associated with each TAC number can be located by the NRC document control system, NUDOCS/AD.

Issue	Status	Section
(11) Compliance of proposed design change to the offsite power system to GDC 17 and 18 (TAC M63649)	Resolved (SSER 13)	8.2
(12) Fire-protection program (TAC M63648)	Under review (SER)	9.5.1
(13) Quality classification of diesel generator auxiliary system piping and components (TAC M63638)	Resolved (SSER 5)	9.5.4.1
(14) Diesel generator auxiliary system design deficiencies (TAC M63638)	Resolved (SSER 5)	9.5.4, 9.5.5, 9.5.7
(15) Physical Security Plan (TAC M63657)	Under review (SER)	13.6
(16) Boron-dilution event	Resolved (SSER 4)	15.2.4.4
(17) QA Program (TAC M76972)	Resolved (SSER 13)	17
(18) Seismic classification of cable trays and conduit (TACs R00508, R00516)	Resolved (SSER 8)	3.2.1, 3.10
(19) Seismic design concerns (TAC M79717, M80346):		
(a) Number of OBE events	Resolved (SSER 8)	3.7.3
(b) 1.2 multi-mode factor	Resolved (SSER 9)	3.7.3
(c) Code usage	Resolved (SSER 8)	3.7.3
(d) Conduit damping values	Resolved (SSER 8)	3.7.3
(e) Worst case, critical case, bounding calculations	Resolved (SSER 12)	3.7.3
(f) Mass eccentricities	Resolved (SSER 8)	3.7.2.1.2
(g) Comparison of set A versus set B response	Resolved (SSER 11)	3.7.2.12
(h) Category 1(L) piping qualification	Resolved (SSER 8)	3.9.3
(i) Pressure relief devices	Resolved (SSER 7)	3.9.3.3
(j) Structural issues	Resolved (SSER 9)	3.8
(k) Update FSAR per 12/18/90 letter	Resolved (SSER 8)	3.7
(20) Mechanical systems and components (TACs M79718, M80345)		
(a) Feedwater check valve slam	Resolved (SSER 13)	3.9.1
(b) New support stiffness and deflection limits	Resolved (SSER 8)	3.9.3.4
(21) Removal of RTD bypass system (TAC M63599)	Resolved (SSER 8)	4.4.3
(22) Removal of upper head injection system (TAC M77195)	Resolved (SSER 7)	6.3.1

Issue	Status	Section
(23) Containment isolation using closed systems (TAC M63597)	Resolved (SSER 12)	6.2.4
(24) Main steamline break outside containment (TAC M63632)	Under review (SSER 7)	3.11
(25) Health Physics Program (TAC M63647)	Resolved (SSER 10)	12
(26) Regulatory Guide 1.97, Instruments To Follow Course of Accident (TACs M77550, M77551)	Resolved (SSER 9)	7.5.2
(27) Containment sump screen design anomalies (TAC M77845)	Resolved (SSER 9)	6.3.3
(28) Emergency procedure (TAC M77861)	Resolved (SSER 9)	13.5.2.1

1.8 Summary of Confirmatory Issues

SER Section 1.8 identified 42 confirmatory issues for which additional information and documentation were required to confirm preliminary conclusions. Issue 43 was added in SSER 6. This section updates the status of those items for which the confirmatory information has subsequently been provided by the applicant and for which review has been completed by the staff. The completion status of each of the issues is tabulated below, with the relevant document in which the issue was last addressed shown in parentheses. Detailed, up-to-date status information for still-unresolved issues is conveyed in the staff's summaries of the monthly licensing status meetings.

Issue	Status	Section
(1) Design-basis groundwater level for the ERCW pipeline	Resolved (SSER 3)	2.4.8
(2) Material and geometric damping effect in SSI analysis	Resolved (SSER 3)	2.5.4.2
(3) Analysis of sheetpile walls	Resolved (SSER 3)	2.5.4.2
(4) Design differential settlement of piping and electrical components between rock-supported structures	Resolved (SSER 3)	2.5.4.3
(5) Upgrading ERCW system to seismic Category I (TAC M63617)	Resolved (SSER 5)	3.2.1, 3.2.2
(6) Seismic classification of structures, systems, and components important to safety (TAC M63618)	Resolved (SSER 5)	3.2.1
(7) Tornado-missile protection of diesel generator exhaust	Resolved (SSER 2)	3.5.2, 9.5.4.1, 9.5.8

Issue	Status	Section
(8) Steel containment building buckling research program	Resolved (SSER 3)	3.8.1
(9) Pipe support baseplate flexibility and its effects on anchor bolt loads (IE Bulletin 79-02) (TAC M63625)	Resolved (SSER 8)	3.9.3.4
(10) Thermal performance analysis	Resolved (SSER 2)	4.2.2
(11) Cladding collapse	Resolved (SSER 2)	4.2.2
(12) Fuel rod bowing evaluation	Resolved (SSER 2)	4.2.3
(13) Loose-parts monitoring system	Resolved (SSER 3)	4.4.5
(14) Installation of residual heat removal flow alarm	Resolved (SSER 5)	5.4.3
(15) Natural circulation tests (TACs M63603, M79317, M79318)	Resolved (SSER 10)	5.4.3
(16) Atmospheric dump valve testing	Resolved (SSER 2)	5.4.3
(17) Protection against damage to containment from external pressure	Resolved (SSER 3)	6.2.1.1
(18) Designation of containment isolation valves for main and auxiliary feedwater lines and feedwater bypass lines (TAC M63623)	Resolved (SSER 5)	6.2.4
(19) Compliance with GDC 51	Resolved (SSER 4)	6.2.7, App. H
(20) Insulation survey (sump debris)	Resolved (SSER 2)	6.3.3
(21) Safety system setpoint methodology	Resolved (SSER 4)	7.1.3.1
(22) Steam generator water level reference leg	Resolved (SSER 2)	7.2.5.9
(23) Containment sump level measurement	Resolved (SSER 2)	7.3.2
(24) IE Bulletin 80-06	Resolved (SSER 3)	7.3.5
(25) Overpressure protection during low-temperature operation	Resolved (SSER 4)	7.6.5
(26) Availability of offsite circuits	Resolved (SSER 2)	8.2.2.1
(27) Non-safety loads powered from the Class 1E ac distribution system	Resolved (SSER 2)	8.3.1.1

Issue	Status	Section
(28) Low and/or degraded grid voltage condition (TAC M63649)	Resolved (SSER 13)	8.3.1.2
(29) Diesel generator reliability qualification testing (TAC M63649)	Resolved (SSER 7)	8.3.1.6
(30) Diesel generator battery system	Resolved (SSER 2)	8.3.2.4
(31) Thermal overload protective bypass	Resolved (SSER 2)	8.3.3.1.2
(32) Update FSAR on sharing of dc and ac distribution systems (TAC M63649)	Resolved (SSER 13)	8.3.3.2.2
(33) Sharing of raceway systems between units	Resolved (SSER 2)	8.3.3.2
(34) Testing Class 1E power systems	Resolved (SSER 2)	8.3.3.5.2
(35) Evaluation of penetration's capability to withstand failure of overcurrent protection device (TAC M63649)	Resolved (SSER 7)	8.3.3.6
(36) Missile protection for diesel generator vent line (TAC M63639)	Resolved (SSER 5)	9.5.4.2
(37) Component cooling booster pump relocation	Resolved (SSER 5)	9.2.2
(38) Electrical penetrations documentation (TAC M63648)	Under review (SER)	9.5.1.3
(39) Compliance with NUREG/CR-0660 (TAC M63639)	Resolved (SSER 5)	9.5.4.1
(40) No-load, low-load, and testing operations for diesel generator (TAC M63639)	Resolved (SSER 5)	9.5.4.1
(41) Initial test program	Resolved (SSER 3)	14
(42) Submergence of electrical equipment as result of a LOCA (TAC M63649)	Resolved (SSER 13)	8.3.3.1.1
(43) Safety parameter display system (TAC M73723)	Updated (SSER 6)	18.2, App. P

1.9 Summary of Proposed License Conditions

In Section 1.9 of the SER and in SSERs that followed, the staff identified 43 proposed license conditions. Since these documents were issued, the applicant has submitted additional information on some of these items, thereby removing the necessity to impose a condition. The completion status of the proposed license conditions is tabulated below, with the relevant document in which the

issue was last addressed shown in parentheses. Detailed, up-to-date status of still-unresolved issues is conveyed in the staff's summaries of the monthly licensing status meetings.

Proposed Condition	Status	Section
(1) Relief and safety valve testing (II.D.1)	Resolved (SSER 3)	3.9.3.3, 5.2.2
(2) Inservice testing of pumps and valves (TAC M74801)	Resolved (SSER 12)	3.9.6
(3) Detectors for inadequate core cooling (II.F.2) (TACs M77132, M77133)	Resolved (SSER 10)	4.4.8
(4) Inservice Inspection Program (TAC M76881)	Resolved (SSER 12)	5.2.4, 6.6
(5) Installation of reactor coolant vents (II.B.1)	Resolved (SSER 5)	5.4.5
(6) Accident monitoring instrumentation (II.F.1)		
(a) Noble gas monitor (TAC M63645)	Resolved (SSER 5)	11.7.1
(b) Iodine particulate sampling (TAC M63645)	Resolved (SSER 6)	11.7.1
(c) High-range in-containment radiation monitor (TAC M63645)	Resolved (SSER 5)	12.7.2
(d) Containment pressure	Resolved (SSER 5)	6.2.1
(e) Containment water level	Resolved (SSER 5)	6.2.1
(f) Containment hydrogen	Resolved (SSER 5)	6.2.5
(7) Modification to chemical feedlines (TAC M63622)	Resolved (SSER 5)	6.2.4
(8) Containment isolation dependability (II.E.4.2) (TAC M63633)	Resolved (SSER 5)	6.2.4
(9) Hydrogen control measures (NUREG-0694, II.B.7) (TAC M77208)	Resolved (SSER 8)	6.2.5, App. C
(10) Status monitoring system/BISI (TAC M77136, M77137)	Resolved (SSER 7)	7.7.2
(11) Installation of acoustic monitoring system (II.D.3)	Resolved (SSER 5)	7.8.1
(12) Diesel generator reliability qualification testing at normal operating temperature	Resolved (SSER 2)	8.3.1.6
(13) DC monitoring and annunciation (TAC M63643)	Resolved (SSER 13)	8.3.2.2

Proposed Condition	Status	Section
(14) Possible sharing of dc control power to ac switchgear	Resolved (SSER 3)	8.3.3.2.4
(15) Testing of associated circuits	Resolved (SSER 3)	8.3.3.3
(16) Testing of non-Class 1E cables	Resolved (SSER 3)	8.3.3.3
(17) Low-temperature overpressure protection/power supplies for pressurizer relief valves and level indicators (II.G.1) (TAC M63649)	Resolved (SSER 7)	8.3.3.4
(18) Testing of reactor coolant pump breakers	Resolved (SSER 2)	8.3.3.6
(19) Postaccident sampling system (TAC M77543)	Updated (SSER 5)	9.3.2
(20) Fire protection program (TAC M63648)	Under review (SER)	9.5.1.8
(21) Performance testing for communications systems (TAC M63637)	Resolved (SSER 5)	9.5.2
(22) Diesel generator reliability (NUREG/CR-0660) (TAC M63640)	Resolved (SSER 5)	9.5.4.1
(23) Secondary water chemistry monitoring and control program	Resolved (SSER 5)	10.3.4
(24) Primary coolant outside containment (III.D.1.1) (TACs M63646, M77553)	Resolved (SSER 10)	11.7.2
(25) Independent safety engineering group (I.B.1.2) (TAC M63592)	Resolved (SSER 8)	13.4
(26) Use of experienced personnel during startup (TAC M63592)	Resolved (SSER 8)	13.1.3
(27) Emergency preparedness (III.A.1.1, III.A.1.2, III.A.2) (TAC M63656)	Resolved (SSER 13)	13.3
(28) Review of power ascension test procedures and emergency operating procedures by NSSS vendor (I.C.7) (TAC M77861)	Resolved (SSER 10)	13.5.2
(29) Modifications to emergency operating instructions (I.C.8) (TAC M77861)	Resolved (SSER 10)	13.5.2
(30) Report on outage of emergency core cooling system (II.K.3.17)	Resolved (SSER 3)	13.5.3

Proposed Condition	Status	Section
(31) Initial test program (TAC M79872)	Resolved (SSER 7)	14.2
(32) Effect of high-pressure injection for small-break LOCA with no auxiliary feedwater (II.K.2.13)	Resolved (SSER 4)	15.5.1
(33) Voiding in the reactor coolant system (II.K.2.17)	Resolved (SSER 4)	15.5.2
(34) PORV isolation system (II.K.3.1, II.K.3.2) (TAC M63631)	Resolved (SSER 5)	15.5.3
(35) Automatic trip of the reactor coolant pumps during a small-break LOCA (II.K.3.5)	Resolved (SSER 4)	15.5.4
(36) Revised small-break LOCA analysis (II.K.3.30, II.K.3.31) (TAC M77298)	Resolved (SSER 5)	15.5.5
(37) Detailed control room design review (I.D.1) (TAC M63655)	Updated (SSER 6)	18.1
(38) Physical Security Plan (TAC M63657, M83973)	Resolved (SSER 10)	13.6.4
(39) Control of heavy loads (NUREG-0612) (TAC M77560)	Resolved (SSER 13)	9.1.4
(40) Anticipated transients without scram (Generic Letter 83-28, Item 4.3) (TAC M64347)	Resolved (SSER 5)	15.3.6
(41) Steam generator tube rupture (TAC M77569)	Updated (SSER 12)	15.4.3
(42) Loose-parts monitoring system (TAC M77177)	Resolved (SSER 5)	4.4.5
(43) Safety parameter display system (TAC M73723)	Opened (SSER 5)	18.2

1.12 Approved Technical Issues for Incorporation in the License as Exemptions

The applicant applied for exemptions from certain provisions of the regulations. These have been reviewed by the staff and approved in appropriate sections of the SER and SSERs. These technical issues are listed below and the actual exemptions will be incorporated in the operating license:

(1) Seal leakage test instead of full-pressure test (Section 6.2.6, SSER 4) (TAC M63615)

(2) Criticality monitor (Section 9.1, SSER 5) (TAC M63615)

(3) Fracture toughness requirements (Section 5.3.1.1, SER) (TAC M85712)

1.13 Implementation of Corrective Action Programs and Special Programs

On September 17, 1985, the NRC sent a letter to the applicant, pursuant to Title 10 of the Code of Federal Regulations, Section 50.54(f), requesting that the applicant submit information on its plans for correcting problems concerning the overall management of its nuclear program as well as on its plans for correcting plant-specific problems. In response to this letter, TVA prepared a Corporate Nuclear Performance Plan (CNPP) that identified and proposed corrections to problems concerning the overall management of its nuclear program, and a site-specific plan for Watts Bar entitled, "Watts Bar Nuclear Performance Plan" (WBNPP). The staff reviewed both plans and documented results in two safety evaluation reports, NUREG-1232, Vol. 1 (July 1987), and NUREG-1232, Vol. 4 (January 1990).

In a letter of September 6, 1991, the applicant submitted Revision 1 of the WBNPP. In SSER 9, the staff concluded that Revision 1 of the WBNPP does not necessitate any revision of the staff's safety evaluation report, NUREG-1232, Vol. 4.

In NUREG-1232, Vol. 4, the staff documented its general review of the corrective action programs (CAPs) and special programs (SPs) through which the applicant would effect corrective actions at Watts Bar. When the report was published, some of the CAPs and SPs were in their initial stages of implementation. The staff stated that it will report its review of the implementation of all CAPs and SPs and closeout of open issues in future supplements to the licensing SER, NUREG-0847; accordingly, the staff prepared Temporary Instructions (TIs) 2512/016-043 for the Inspection Manual and adhered to the TIs to perform inspections of the CAPs and SPs. This new section was introduced in SSER 5 and will be updated in subsequent SSERs. The current status of all CAPs and SPs follows. The status described here fully supersedes that described in previous SSERs.

1.13.1 Corrective Action Programs

(1) Cable Issues (TAC M71917; TI 2512/016)

Program review status:	Complete: NUREG-1232, Vol. 4; Letter, P. S. Tam (NRC) to D. A. Nauman (TVA), April 25, 1991 (the safety evaluation was reproduced in SSER 7 as Appendix P); supplemental safety evaluation dated April 24, 1992 (Appendix T of SSER 9); letter, P. S. Tam (NRC) to M. O. Medford (TVA), February 14, 1994.
Implementation status:	Full implementation expected by June 1994.
NRC inspections:	Inspection Reports 50-390, 391/90-09 (June 22, 1990); 50-390, 391/90-20 (September 25, 1990); 50-390, 391/90-22 (November 21, 1990); 50-390, 391/90-24 (December 17, 1990); 50-390, 391/90-27 (December 20, 1990); 50-390, 391/90-30 (February 25, 1991); 50-390, 391/91-07 (May 31, 1991); 50-390, 391/91-09 (July 15, 1991); 50-390, 391/91-12 (July 12,

92-01 (March 17, 1992); audit report of June 12, 1992 (Appendix Y of SSER 9); 50-390, 391/92-05 (April 17, 1992); 50-390, 391/92-13 (July 16, 1992); 50-390, 391/92-18 (August 14, 1992); 50-390, 391/92-22 (September 18, 1992); 50-390, 391/92-26 (October 16, 1992); 50-390, 391/92-30 (November 13, 1992); 50-390, 391/92-35 (December 15, 1992); 50-390, 391/92-40 (January 15, 1993); 50-390, 391/93-10 (March 19, 1993); 50-390, 391/93-11 (March 25, 1993); 50-390, 391/93-35 (June 10, 1993); 50-390, 391/93-40 (July 15, 1993); 50-390, 391/93-48 (August 13, 1993); 50-390, 391/93-56 (September 20, 1993); 50-390, 391/93-63 (October 18, 1993); 50-390, 391/93-70 (November 12, 1993); 50-390, 391/93-74 (December 20, 1993); 50-390, 391/93-85 (January 14, 1994); 50-390, 391/93-91 (February 17, 1994); 50-390, 391/94-11 (March 16, 1994); to come.

(2) Cable Tray and Tray Supports (TAC R00516; TI 2512/017)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), September 13, 1989; NUREG-1232, Vol. 4; SSER 6, Section 3.

Implementation status: Full implementation expected by July 1994.

NRC inspections: Inspection Reports 50-390, 391/89-14 (December 18, 1989); 50-390, 391/90-20 (September 25, 1990); 50-390, 391/90-22 (November 21, 1990); 50-390, 391/92-02 (March 17, 1992); audit report of May 14, 1992 (Appendix S of SSER 9); 50-390, 391/92-13 (July 16, 1992); 50-390, 391/92-201 (September 21, 1992); 50-390, 391/93-07 (February 19, 1993); to come.

(3) Design Baseline and Verification Program (TAC M63594; TI 2512/019)

Program review status: Complete: Inspection Report 50-390, 391/89-12 (November 20, 1989); NUREG-1232, Vol. 4.

Implementation status: Full implementation expected by May 1994.

NRC inspections: Inspection Reports 50-390, 391/89-12 (November 20, 1989); 50-390, 391/90-09 (June 22, 1990); 50-390, 391/90-20; (September 25, 1990); 50-390/91-201 (March 22, 1991); 50-390, 391/91-20 (October 8, 1991); 50-390, 391/91-25 (December 13, 1991); 50-390, 391/92-06 (April 3, 1992); 50-390, 391/92-201 (September 21, 1992); 50-390, 391/93-29 (May 14, 1993); 50-390, 391/93-66 (October 29, 1993); to come.

(4) Electrical Conduit and Conduit Support (TAC R00508; TI 2512/018)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), September 1, 1989; NUREG-1232, Vol. 4; SSER 6, Section 3.

Implementation status: Full implementation expected by July 1994.

NRC inspections: Inspection Reports 50-390, 391/89-05 (May 25, 1989); 50-390, 391/89-07; (July 11, 1989); 50-390, 391/89-14 (December 18, 1989); 50-390, 391/90-20 (September 25, 1990); 50-390, 391/91-31 (January 13, 1992); 50-390, 391/92-02 (March 17, 1992); audit report of May 14, 1992 (Appendix S of SSER 9); 50-390, 391/92-05 (April 17, 1992); 50-390, 391/92-09 (June 29, 1992); 50-390, 391/92-201 (September 21, 1992); 50-390, 391/92-26 (October 16, 1992); 50-390, 391/93-07 (February 19, 1993); 50-390, 391/93-35 (June 10, 1993); 50-390, 391/93-70 (November 12, 1993); 50-390, 391/93-74 (December 20, 1993); 50-390, 391/93-91 (February 17, 1994); 50-390, 391/94-11 (March 16, 1994); to come.

(5) Electrical Issues (TAC M74502; TI 2512/020)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), September 11, 1989; NUREG-1232, Vol. 4.

Implementation status. Full implementation expected by May 1994.

NRC inspections: Inspection Reports 50-390, 391/90-30 (February 25, 1991); 50-390, 391/92-22 (September 18, 1992); 50-390, 391/92-40 (January 15, 1993); 50-390, 391/93-35 (June 10, 1993); 50-390, 391/93-40 (July 15, 1993); 50-390, 391/93-63 (October 18, 1993); 50-390, 391/94-11 (March 16, 1994); to come.

(6) Equipment Seismic Qualification (TAC M71919; TI 2512/021)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), September 11, 1989; NUREG-1232, Vol. 4; SSER 6, Section 3.10.

Implementation status: Full implementation expected by July 1994.

NRC inspections: Inspection Reports 50-390, 391/90-05 (May 10, 1990); 50-390, 391/90-20 (September 25, 1990); 50-390, 391/90-28 (January 11, 1991); 50-390, 391/91-03 (April 15, 1991); audit report of May 14, 1992 (Appendix S of SSER 9); 50-390, 391/92-201 (September 21, 1992); 50-390, 391/93-07 (February 19, 1993); 50-390, 391/93-79 (March 4, 1994); to come.

(7) Fire Protection (TAC M63648; TI 2512/022)

Program review status: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), September 7, 1989; NUREG-1232, Vol. 4; review in progress, results to be published in Section 9.5.1 of a future SSER.

Implementation status: Full implementation expected by June 1994.

NRC inspections: To come.

(8) Hanger and Analysis Update Program (TAC R00512; TI 2512/023)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), October 6, 1989; NUREG-1232, Vol. 4; SSER 6, Section 3.

Implementation status: Full implementation expected by July 1994.

NRC inspections: Inspection Reports 50-390, 391/89-14 (December 18, 1989); 50-390, 391/90-14 (August 3, 1990); 50-390, 391/90-18 (September 20, 1990); 50-390, 391/90-20 (September 25, 1990); 50-390, 391/90-28 (January 11, 1991); 50-390, 391/91-03 (April 15, 1991); audit report of May 14, 1992 (Appendix S of SSER 9); 50-390, 391/92-201 (September 21, 1992); 50-390, 391/92-26 (October 16, 1992); 50-390, 391/92-35 (December 15, 1992); 50-390, 391/93-07 (February 19, 1993); 50-390, 391/93-35 (June 10, 1993); 50-390, 391/93-45 (July 20, 1993); 50-390, 391/93-56 (September 20, 1993); 50-390, 391/93-70 (November 12, 1993); 50-390, 391/93-74 (December 20, 1993); 50-390, 391/94-11 (March 16, 1994); to come.

(9) Heat Code Traceability (TAC M71920; TI 2512/024)

Program review status: Complete: Inspection Report 50-390, 391/89-09 (September 20, 1989); NUREG-1232, Vol. 4; letter, P. S. Tam (NRC) to D. A. Nauman (TVA), March 29, 1991.

Implementation status: 100% (certified by letter, E. Wallace (TVA) to NRC, July 31, 1990); staff concurrence in SSER 7, Section 3.2.2.

NRC inspections: Complete: Inspection Reports 50-390, 391/90-02 (March 15, 1990); 50-390, 391/89-09 (September 20, 1989).

(10) Heating, Ventilation, and Air-Conditioning Duct and Duct Supports (TAC R00510; TI 2512/025)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), October 24, 1989; NUREG-1232, Vol. 4; SSER 6, Section 3.

Implementation status: Full implementation expected by July 1994.

NRC inspections: Inspection Reports 50-390, 391/89-14 (December 18, 1989); 50-390, 391/90-05 (May 10, 1990); 50-390, 391/90-20 (September 25, 1990); 50-390, 391/91-01 (April 4, 1991); 50-390, 391/92-02 (March 17, 1992); audit report of May 14, 1992 (Appendix S of SSER 9); 50-390, 391/92-08 (May 15, 1992); 50-390, 391/92-13 (July 16, 1992); 50-390, 391/92-201 (September 21, 1992); 50-390, 391/93-07 (February 19, 1993); 50-390, 391/93-91 (February 17, 1994); 50-390, 391/94-08 (March 11, 1994); to come.

(11) Instrument Lines (TAC M71918; TI 2512/026)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), September 8, 1989; NUREG-1232, Vol. 4; letter, P. S. Tam (NRC) to O. D. Kingsley (TVA), October 26, 1990 (Appendix K of SSER 6).

Implementation status: Full implementation expected by July 1994.

NRC inspections: Inspection Reports 50-390, 391/90-14 (August 3, 1990); 50-390, 391/90-23 (November 19, 1990); 50-390, 391/91-02 (March 6, 1991); 50-390, 391/91-03 (April 15, 1991); 50-390, 391/91-26 (December 6, 1991); 50-390, 391/93-74 (December 20, 1993); 50-390, 391/94-11 (March 16, 1994); to come.

(12) Prestart Test Program (TAC M71924)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), October 17, 1989; NUREG-1232, Vol. 4; letter, P. S. Tam (NRC) to D. A. Nauman (TVA), March 27, 1991.

Implementation status: Withdrawn by letter (J. H. Garrity (TVA) to NRC, February 13, 1992). Applicant will re-perform preoperational test program per Regulatory Guide 1.68, Revision 2.

(13) Quality Assurance Records (TAC M71923; TI 2512/028)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), December 8, 1989; NUREG-1232, Vol. 4; letter, P. S. Tam (NRC) to M. O. Medford (TVA) June 9, 1992 (Appendix X of SSER 9); letter, P. S. Tam (NRC) to M. O. Medford (TVA), January 12, 1993; letter, F. J. Hebdon (NRC) to M. O. Medford (TVA), August 12, 1993; letter, P. S. Tam (NRC) to O. D. Kingsley (TVA), April 25, 1994.

Implementation status: Full implementation expected by April 1994.

NRC inspections: Inspection Reports 50-390, 391/90-06 (April 25, 1990); 50-390, 391/90-08 (September 13, 1990); 50-390, 391/91-08 (May 30, 1991); 50-390, 391/91-15 (September 5, 1991); 50-390, 391/91-29 (December 27, 1991); 50-390, 391/92-05 (April 17, 1992); 50-390, 391/92-10 (June 11, 1992); 50-390, 391/92-21 (September 18, 1992); 50-390, 391/93-11 (March 25, 1993); 50-390, 391/93-21 (April 9, 1993); 50-390, 391/93-29 (May 14, 1993); 50-390, 391/93-34 (July 5, 1993); 50-390, 391/93-35 (June 10, 1993); 50-390, 391/93-50 (September 3, 1993); 50-390, 391/93-59 (October 25, 1993); 50-390, 391/93-69 (November 12, 1993); 50-390, 391/93-70 (November 12, 1993); 50-390, 391/93-78 (December 16, 1993); 50-390, 391/93-86 (January 24, 1994); 50-390, 391/94-04 (February 23, 1994); 50-390, 391/94-09 (March 11, 1994); 50-390, 391/94-17 (April 1, 1994); to come.

(14) Q-List (TAC M63590; TI 2512/029)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), September 11, 1989; NUREG-1232, Vol. 4; letters, P. S. Tam (NRC) to O. D. Kingsley (TVA), January 23, 1991 and March 17, 1994 (enclosure of this letter reproduced as Appendix AA in SSER 13).

Implementation status: 100% (certified by letter, W. J. Museler to NRC, January 28, 1994); staff concurrence in Inspection Report 50-390, 391/94-27 (April 21, 1994).

NRC inspections: Complete: Inspection Reports 50-390, 391/90-08 (September 13, 1990); 50-390, 391/91-08 (May 30, 1991); 50-390, 391/91-29 (December 27, 1991); 50-390, 391/91-31 (January 13, 1992); 50-390, 391/93-20 (April 16, 1993); 50-390, 391/93-68 (November 12, 1993); 50-390, 391/94-27 (April 21, 1994).

(15) Replacement Items Program (TAC M71922; TI 2512/027)

Program review status: Complete: Letter, S. C. Black (NRC) to O. D. Kingsley (TVA), November 22, 1989; NUREG-1232, Vol. 4; letter, P. S. Tam (NRC) to O. D. Kingsley (TVA), February 11, 1991 (Appendix N of SSER 6); letter, P. S. Tam (NRC) to M. O. Medford (TVA), July 27, 1992, and April 5, 1994.

Implementation status: Full implementation expected by May 1994.

NRC inspections: Inspection Reports 50-390, 391/91-08 (May 30, 1991); 50-390, 391/91-29 (December 27, 1991); 50-390, 391/92-03 (March 16, 1992); 50-390, 391/92-11 (June 12, 1992); 50-390, 391/92-17 (July 22, 1992); 50-390, 391/92-21 (September 18, 1992); 50-390,

391/92-40 (January 15, 1993); 50-390, 391/93-22 (April 25, 1993); 50-390, 391/93-34 (July 9, 1993); 50-390, 391/93-38 (June 24, 1993); to come.

(16) Seismic Analysis (TAC R00514; TI 2512/030)

Program review status: Complete: Letters, S. C. Black (NRC) to O. D. Kingsley (TVA), September 7 and October 31, 1989; NUREG-1232, Vol. 4; SSER 6, Section 3.7.

Implementation status: 100% (certified by letter, J. H. Garrity (TVA) to NRC, December 2, 1991); staff concurrence in SSER 9, Section 3.7.1.

NRC inspections: Complete: Inspection Reports 50-390, 391/89-21 (May 10, 1990); 50-390, 391/90-20 (September 25, 1990); audit report by L. B. Marsh, October 10, 1990.

(16)(a) Civil Calculation Program (TAC R00514)

Program review status: No program review. A number of civil calculation categories are required by the Design Baseline and Verification Program CAP and constitute parts of the applicant's corrective actions. This program is regarded as complementary to but not part of the Seismic Analysis CAP. Staff efforts consist mainly of audits performed at the site and in the office.

Implementation status: Complete: Final calculations transmitted by letter, W. J. Museler (TVA) to NRC, July 27, 1992.

NRC audits: Complete: Memorandum (publicly available), T. M. Cheng (NRC) to P. S. Tam, January 23, 1992; letter, P. S. Tam (NRC) to D. A. Nauman (TVA), January 31, 1992; letters, P. S. Tam (NRC) to M. O. Medford (TVA), May 26 and December 18, 1992 and July 2, 1993; 50-390, 391/93-07 (February 19, 1993); letter, P. S. Tam (NRC) to M. O. Medford (TVA), November 26, 1993.

(17) Vendor Information Program (TAC M71921; TI 2512/031)

Program review status: Complete: Letter, P. S. Tam (NRC) to O. D. Kingsley (TVA), September 11, 1990 (Appendix I of SSER 5); Appendix I of SSER 11.

Implementation status: Full implementation expected by July 1994.

NRC inspections: Inspection Reports 50-390, 391/91-08 (May 30, 1991); 50-390, 391/91-29 (December 27, 1991); 50-390, 391/93-27 (May 14, 1993); to come.

(18) Welding (TAC M72106; TI 2512/032)

Program review status:	Complete: Inspection Reports 50-390, 391/89-04 (August 9, 1989); 50-390, 391/90-04 (May 17, 1990); NUREG-1232, Vol. 4; letter, P. S. Tam (NRC) to D. A. Nauman (TVA), March 5, 1991.
Implementation status:	100% (certified by letter, W. Museler (TVA) to NRC, January 9, 1993); staff concurrence to come.
NRC inspections:	Inspection Reports 50-390, 391/89-04 (August 9, 1989); 50-390, 391/90-04 (May 17, 1990); 50-390, 391/90-20 (September 25, 1990); 50-390, 391/91-05 (May 28, 1991); 50-390, 391/91-18 (October 8, 1991); 50-390, 391/91-23 (November 21, 1991); 50-390, 391/91-32 (February 10, 1992); 50-390, 391/92-20 (August 12, 1992); 50-390, 391/92-28 (October 9, 1992); 50-390, 391/93-02 (February 2, 1993); 50-390, 391/93-19 (March 15, 1993); 50-390, 391/93-38 (June 24, 1993); 50-390, 391/93-84 (December 21, 1993); 50-390, 391/94-05 (February 19, 1994); 50-390, 391/94-16 (March 15, 1994); to come.

1.13.2 Special Programs

(1) Concrete Quality (TAC M63596; TI 2512/033)

Program review status:	Complete: NUREG-1232, Vol. 4.
Implementation status:	100% (certified by letter, E. Wallace (TVA) to NRC, August 31, 1990); staff concurrence in SSER 7, Section 3.8.2.1.
NRC inspections:	Complete: NUREG-1232, Vol. 4; Inspection Reports 50-390, 391/89-200 (December 12, 1989); 50-390, 391/90-26 (January 8, 1991).

(2) Containment Cooling (TAC M77284; TI 2512/034)

Program review status:	Complete: NUREG-1232, Vol. 4; letter, P. S. Tam (NRC) to D. A. Nauman (TVA), May 21, 1991 (Section 6.2.2 of SSER 7).
Implementation status:	100% (certified by letter, W. J. Museler to NRC, December 30, 1993); staff concurrence to come.
NRC inspections:	Inspection Report 50-390, 391/93-56 (September 20, 1993); to come.

(3) Detailed Control Room Design Review (TAC M63655; TI 2512/035)

Program review status:	Complete: Appendix D of SER; NUREG-1232, Vol. 4; Section 18.1, and Appendix L of SSER 6.

Implementation status: Full implementation expected by June 1994.

NRC inspections: To come.

(4) Environmental Qualification Program (TAC M63591; TI 2512/036)

Program review status: NUREG-1232, Vol. 4; review in progress, results will be published in Section 3.11 of a future SSER.

Implementation status: Full implementation by June 1994.

NRC inspections: Inspection Reports 50-390, 391/93-63 (October 18, 1993; to come.

(5) Master Fuse List (TAC M76973; TI 2512/037)

Program review status: Complete: NUREG-1232, Vol. 4; letter, P. S. Tam (NRC) to O. D. Kingsley (TVA), February 6, 1991; letter, P. S. Tam (NRC) to TVA Senior Vice President, March 30, 1992 (Appendix U of SSER 9).

Implementation status: 100% (certified by letter, W. Museler (TVA) to NRC, April 2, 1993); staff concurrence in Inspection Report 50-390, 391/93-31 (May 6, 1993).

NRC inspections: Complete: Inspection Reports 50-390, 391/86-24 (February 12, 1987); 50-390, 391/92-05 (April 17, 1992); 50-390, 391/92-09 (June 29, 1992); 50-390, 391/92-27 (September 25, 1992); 50-390, 391/93-31 (May 6, 1993).

(6) Mechanical Equipment Qualification (TAC M76974; TI 2512/038)

Program review status: NUREG-1232, Vol. 4; review in progress, results to be published in Section 3.11 of a future SSER.

Implementation status: Full implementation expected by June 1994.

NRC inspections: To come.

(7) Microbiologically Induced Corrosion (TAC M63650; TI 2512/039)

Program review status: Complete: NUREG-1232, Vol. 4; Appendix Q of SSER 8; Appendix Q of SSER 10.

Implementation status: 100% (certified by letter, W. J. Museler (TVA) to NRC, August 31 1993); staff concurrence in Inspection Report 50-390, 391/93-67 (November 1, 1993).

NRC inspections: Complete: Inspection Reports 50-390, 391/90-09 (June 22, 1990); 50-390, 391/90-13 (August 2, 1990); 50-390, 391/93-01 (February 25, 1993); 50-390, 391/93-09 (March 26, 1993); 50-390, 391/93-67 (November 1, 1993).

(8) Moderate Energy Line Break Flooding (TAC M63595; TI 2512/040)

Program review status: Complete: NUREG-1232, Vol. 4; Section 3.6 of SSER 11.

Implementation status: Full implementation expected by May 1994.

NRC inspections: Inspection Reports 50-390, 391/93-85 (January 14, 1994); to come.

(9) Radiation Monitoring Program (TAC M76975; TI 2512/041)

Program review status: Complete: NUREG-1232, Vol. 4; this program covers areas addressed in Chapter 12 of the SER and SSERs.

Implementation status: Full implementation expected by July 1994.

NRC inspections: To come.

(10) Soil Liquefaction (TAC M77548; TI 2512/042)

Program review status: Complete: NUREG-1232, Vol. 4; letter, P. S. Tam (NRC) to TVA Senior Vice President, March 19, 1992; Section 2.5 of SSER 9.

Implementation status: 100% (certified by letter, W. J. Museler (TVA) to NRC, July 27, 1992); staff concurrence in SSER 11, Section 2.5.4.4.

NRC inspections: Complete: Inspection Reports 50-390, 391/89-21 (May 10, 1990); 50-390, 391/89-03 (May 11, 1989); audit report by L. B. Marsh (NRC) (October 10, 1990); audit report, P. S. Tam (NRC) to D. A. Nauman (TVA), January 31, 1992; audit report, P. S. Tam (NRC) to M. O. Medford (TVA), May 26 and December 18, 1992; 50-390, 391/92-45 (February 17, 1993).

(11) Use-as-Is CAQs (TAC M77549; TI 2512/043)

Program review status: Complete: NUREG-1232, Vol. 4.

Implementation status: 100% (certified by letter, W. J. Museler (TVA) to NRC, July 24, 1992); staff concurrence in Inspection Report 50-390, 391/93-10 (March 19, 1993).

NRC inspections: Complete: Inspection Reports 50-390, 391/90-19 (October 15, 1990); 50-390, 391/91-08 (May 30, 1991); 50-390, 391/93-10 (March 19, 1993).

1.16 Staff Actions on Quality Technology Company Matters

In May 1985, TVA awarded a contract to Quality Technology Company (QTC) to develop and implement a program for conducting confidential interviews with TVA employees working for the Watts Bar Nuclear Plant. The confidential interviews were conducted with emphasis on the identification of employee concerns dealing with nuclear safety at TVA facilities. After learning of a contract dispute between TVA and QTC, the NRC issued an order on January 30, 1986, which in part ordered TVA to retain QTC employee concern records and ensure NRC would have access to those records in order to photocopy them. To protect the identity of TVA employees, QTC kept the files from TVA, but agreed that NRC could retain a copy of the files on site with the condition that NRC would not reveal the identity of TVA employees who reported the concerns to QTC.

On April 18, 1986, the staff finished copying the files and sent a letter to TVA to rescind the part of Item V(A) of the January 30, 1986, order that prohibits removing the original files from TVA property, thus permitting the original unexpurgated records to be moved to a QTC location in Lebo, Kansas to be stored for 2 years in accordance with arrangements made between TVA and QTC. The part of Item V(A) which prohibited the destruction of the QTC files remains in effect. Item V(B), which required 5-working-day notification of NRC before QTC relinquishes control or custody of the unexpurgated original files, and Item V(C), which required TVA to permit inspection and copying of the unexpurgated original files remain in effect.

As a result of Item V(C) of the order, the staff made three copies of the original unexpurgated QTC files:

(1) Set A is kept in a locked room in the Watts Bar Resident Inspector's Office, and is being used by region-based and resident inspectors during routine and special inspections, as necessary. Set A is also used for the special inspections being conducted under Temporary Instruction (TI) 2512/15 for the Employee Concern Special Program.

(2) Set B was shipped to NRC headquarters for recordkeeping purposes and is being stored at the NRC Archival Facility as NRC Job Number 1077.

(3) Set C was shipped to NRC headquarters for use by the staff. After the staff reviewed Set C (see below), it was destroyed in late 1987.

The NRC Office of Inspector and Auditor (OIA) removed 21 files involving NRC employees from all three sets before any NRC staff reviewed the records. The OIA subsequently returned most of the QTC files or sent a sanitized version of the files to Set C to be reviewed by the staff. The returned files were then most likely destroyed with the Set C files in late 1987. The staff has verified that TVA has been sent any safety concerns that existed in the 21 files that OIA removed, as evidenced by TVA's possession of the sanitized version of these files. The files removed by OIA were never returned to Set A at the Watts Bar Resident Inspector's Office. The OIA documented its investigation findings in a report.

On April 28, 1986, the staff began reviewing (screening) Set C of the QTC files. Procedures had been developed to ensure a consistent review and training of those who reviewed the files. One objective of the review effort

was to protect individual confidentiality, and to identify any additional information on safety-related issues to the TVA Inspector General. In a memorandum dated April 1, 1986, Victor Stello, then Executive Director of Operations, stated to the Commission (publicly available) that

> Significant issues raised during the NRC screening effort would be selected for a more comprehensive staff evaluation. Also, specific issues which the NRC staff feels could compromise confidentiality if provided to TVA at any level, would be retained by the staff for NRC follow-up. The TVA resolution program and selected technical issues would be reviewed or inspected by the staff on a sampling basis.

This commitment was fulfilled when the staff issued a safety evaluation on October 6, 1987, as part of the Sequoyah restart effort. On July 25, 1986, the staff completed its screening of 2045 files containing 5237 TVA employee concerns. The staff completed its other followup activities in late August 1986.

The staff prepared a companion ("sanitized" or expurgated) file for each QTC file by deleting (1) any information that could identify individuals, (2) any technical information already in TVA's possession, and (3) information judged to be irrelevant to the particular technical concern. Copies of all companion files were sent to the TVA Inspector General's Office for a second confidentiality review before they were sent to the appropriate TVA organization for resolution. On October 2, 1987, as a result of a Freedom of Information Act request (FOIA-87-623), the staff placed a set of expurgated files in the public domain.

When the NRC staff reviewed Set C, it identified from the 5237 employee concerns 2437 safety-related issues requiring resolution. From the information provided by QTC, TVA already knew about most of these issues and was evaluating and resolving them. Of the 1130 issues classified as NRC items of interest, 126 were potential new issues, 481 were potentially significant issues, 391 were Sequoyah-related issues, and 132 issues were retained for staff review because of confidentiality or other considerations. The issues were separated into about a dozen broad categories, with electrical, welding, QA/QC, and harassment and intimidation (H&I) having the highest concentration of employee concerns.

TVA developed the Employee Concern Special Program (ECSP) in late 1985/early 1986 to address and resolve, among other things, employee concerns identified before February 1, 1986. The scope of the ECSP included the resolution of issues raised during interviews carried out by QTC, the old TVA employee concern program, and the TVA Nuclear Safety Review Staff (NSRS) issues. The ECSP separated the concerns into nine categories and issued a report on each category. The categories were divided into subcategories, and a report was prepared on each subcategory. The subcategories were divided into elements; element reports were written for Sequoyah only. The nine categories of concerns were (1) Construction, (2) Engineering, (3) Operations, (4) Material Control, (5) Welding, (6) Intimidation, Harassment and Wrongdoing, (7) Management and Personnel, (8) Quality Control/Quality Assurance, and (9) Industrial Safety. All of the categories were under the purview of the ECSP except the fifth, Welding, and the sixth, Intimidation, Harassment, and Wrongdoing. The welding concerns were assigned to the TVA Welding Task Group for followup, and the Intimidation, Harassment, and Wrongdoing category was assigned to the TVA

Office of Inspector General. These groups sent their conclusions to the ECSP. TVA transmitted an executive summary report and the nine category reports to the NRC on February 6, 1989.

As part of the ECSP, the TVA Employee Concern Task Group (ECTG) was assigned responsibility to resolve the concerns raised before February 1, 1986, including the QTC-identified concerns. The ECSP recorded issues from the employee concerns for which TVA had not taken corrective actions. The valid issues were identified in the Corrective Action Tracking Documents (CATDs) so the ECSP could track the corrective actions by line organization. The NRC reviewed the program, scope, organization, and methodology used by the ECSP to resolve the issues. The review effort was documented in Inspection Reports (IRs) (50-390, 391/85-49, 85-57, and 85-15, and 50-327, 328/86-08, 86-29, and 86-51). The staff also reviewed the ECSP manual (also known as the ECTG Program Manual). The Program Manual and its implementation were inspected. The inspectors concluded that ECTG members would find acceptable procedures and guidelines in the ECSP for evaluating and correcting the employee concerns that had been raised before February 1, 1986. The staff issued its safety evaluation on the review of the ECSP on October 6, 1986, as a part of the effort to restart Sequoyah Units 1 and 2. The safety evaluation stated that the staff would review the element reports for Sequoyah; and that for other plants, including Watts Bar, the staff would review the subcategory reports.

As a result of problems present in the TVA nuclear program and numerous employee concerns, the staff issued a letter, dated September 17, 1985, pursuant to 10 CFR 50.54(f) requesting that TVA submit information regarding the correction of management problems and site-specific problems. TVA responded with a set of plans: the Corporate Nuclear Performance Plan (Volume 1) issued prior to the restart of Sequoyah, and a Watts Bar Nuclear Performance Plan (Volume 4). The TVA submittals also described the Employee Concern Special Program and the Employee Concern Task Group. The staff reviewed the TVA submittals and issued two reports: NUREG-1232, Volume 1, dated July 1987, addressed corporate and programmatic problems, and NUREG-1232, Volume 4, dated January 1990, addressed problems specific to Watts Bar. NUREG-1232, Volume 1, restated the staff's position that because Sequoyah was the first TVA plant to restart, the staff would review the individual element reports. NUREG-1232, Volume 4, formalized the staff's intention to review the subcategory reports for Watts Bar. There are 107 subcategory reports that are related to Watts Bar. However, the staff withdrew that commitment in Watts Bar SSER 9 (NUREG-0847). The staff concluded that its commitment to review 15 of the subcategory reports had been obviated by its review of the 29 Corrective Action Programs and Special Programs (see details below).

In 1988 and 1989, TVA submitted Corrective Action Programs (CAPs, Section 1.13 of this report) to address 18 broad technical issues. In a meeting on January 18 and 19, 1989, the staff requested a comprehensive listing of the source documents that the 18 CAPs were designed to resolve. The source documents include CATDs, among other documents. TVA responded by a letter on July 13, 1989. In Inspection Reports 50-390, 391/89-14 and 90-05, the staff determined that the CAPs adequately addressed the technical issues identified in the source documents.

The NRC has continued to inspect the ECSP and the associated CATDs to ensure that the program has been implemented successfully. Temporary Instruction (TI) 2512/15, "Inspection of Watts Bar Nuclear Plant Employee Concerns," was

issued on November 11, 1985, to establish an inspection program for the QTC-received concerns. The TI committed the staff to perform at least two inspections, one when the TVA Nuclear Safety Review Staff (NSRS) received responses to about 40 percent of the concerns from the TVA line organization, and another when the NSRS received responses for a majority of the concerns. The staff would review approximately 20 percent of the safety-related concerns and approximately 5 percent of the non-safety-related concerns. One half of these concerns would be reviewed in depth. Approximately 20 percent of the reports completed by TVA would also be reviewed by the staff. Revision 1 (dated October 10, 1991) to the TI committed the staff to review about 20 percent of the safety-related ECSP CATDs. Approximately half of these CATDs would be reviewed in depth to verify that corrective actions have been implemented. The revised TI also required the staff to review the files that had information related to hardware removed to ensure employee confidentiality, and provide the information to Region II management.

The CATDs have been reviewed to assure that the employee concerns which the CATDs address have been corrected. In Inspection Report 50-390, 391/91-19, the staff concluded that the ECSP was being adequately implemented to support the restart of construction at Watts Bar. The inspection addressed the adequacy of the CATDs and the requirements for restart. The staff will continue to inspect TVA and Watts Bar in relation to the ECSP and CATDs. Other inspections carried out by the staff are documented in Inspection Reports 50-390, 391/90-24, 92-43, 93-06, 93-10, 93-16, 93-24, 93-58, 93-65, 93-72, 93-75, 93-83, 94-03, and 94-10. Although more than 20 percent of the CATDs have been reviewed to date, thus satisfying the commitment made in Revision 1 of TI 2512/015, the staff will continue its review. Because of problems discovered in CATD closure, the staff is performing a more rigorous review. On the basis of the adequacy of the CATD closeout, the extent of the review effort will be determined.

The staff reviewed QTC files in 1992. That review was specifically directed at ensuring that any hardware information previously withheld from TVA to protect employee confidentiality was identified and reevaluated by the staff to determine if the specific hardware deficiencies should be released to TVA (as stated in TI 2512/015, Revision 1). The staff's effort resulted in additional information being released on a number of concerns as identified in a letter to TVA dated April 24, 1992. TVA evaluated the additional information and sent the staff the results of those reviews in letters dated June 1, August 17, and November 23, 1992. The NRC staff will assess this material when it performs its "lookback review" (see below).

In a 1993 inspection (Inspection Report 50-390, 391/93-24 mentioned above), the staff discovered that a group of employee concerns did not have a formal program in place that tied the employee concern to the corrective action that resolved the concern. The group of concerns, known as "Class C" concerns, were described as "factual and identify a problem, but corrective action for the problem was initiated before the ECSP evaluation of the issue was undertaken." Because a corrective action had already been identified, the ECSP had taken no further action, even though the concern remained uncorrected. The staff concluded that this was a deficiency in the ECSP and identified it as a programmatic weakness. By letter dated August 20, 1993, TVA agreed to initiate a review of these employee concerns (the Employee Concern Special Program Lookback Review). The scope of the review was wider than just Class C concerns and included Class A, B, D, and E concerns as well. Class A concerns

are those that could not be verified as factual; Class B concerns are those considered valid but that did not require corrective actions; Class D concerns refer to problems that require corrective actions; Class E concerns refer to problems that were identified during the ECTG evaluation. Class D and E concerns are tracked by the CATDs. The TVA lookback review effort is scheduled to be complete in 1994. The staff continues to review this TVA effort through inspections. Inspections documented in IR 50-390, 391/93-75 approved the lookback plan and IR 50-390, 391/93-83 reviewed the initial implementation. The depth of the future review effort will be determined on the basis of the results of the lookback review. In a future SER supplement, the staff will update the results of its review effort.

The staff's effort in compiling this historical account was tracked by TAC M83202.

3 DESIGN CRITERIA--STRUCTURES, COMPONENTS, EQUIPMENT, AND SYSTEMS

3.9 Mechanical Systems and Components

3.9.1 Special Topics for Mechanical Components

In SSER 6, the staff stated that the applicant performed a nonlinear elastic-plastic analysis of the feedwater system inside the containment in order to evaluate the pressure boundary integrity of the feedwater piping for the water hammer that would occur if the check valve slammed shut following a postulated rupture at the main header in the turbine building. For this analysis, the applicant proposed to use the rules in Appendix F of the ASME Code to develop acceptance criteria for the piping. However, the applicant also assumed that certain supports would fail when the loads in the analysis exceeded the support calculated capacities. The staff considered the applicant's method of analysis an open issue requiring further staff review (Outstanding Issue 20(a)).

A piping analysis in which support failures are postulated is normally not performed. However, the applicant has maintained that it would be difficult to modify certain supports inside the containment because of space limitations. During a site visit in September 1991, the staff confirmed the applicant's contention that space limitations existed for some supports inside the containment. In an August 4, 1992, letter, the applicant stated that "[w]here possible, supports were upgraded in the analysis to maintain structural integrity during the postulated loading scenario." Because of the difficulty in making additional support modifications, and because the pipe break and resulting check valve slam event is a low probability event which creates a very large impulsive load on the piping and pipe supports, the staff accepts the applicant's use of the energy absorption capability of the piping in performing the nonlinear elastic-plastic analysis with the use of the ASME Code, Appendix F-based allowable limits as alternative to the faulted condition allowable limits for this specific load case.

Brookhaven National Laboratory (BNL), the staff's contractor, reviewed the applicant's feedwater check valve slam analysis. A copy of the BNL technical evaluation report is enclosed in this supplement as Appendix BB. BNL concluded that the applicant adequately demonstrated that the feedwater loops meet the selected ASME Code criteria when subjected to the dynamic loads resulting from a check valve slam. On the basis of the conclusions from the BNL review, the staff finds that reasonable assurance exists that the feedwater lines inside the containment will maintain structural integrity when subjected to loads resulting from a postulated rupture of the main header in the turbine building. Therefore, Outstanding Issue 20(a) is resolved.

4 REACTOR

By letters dated October 10, 1991, and August 24, 1992, the applicant proposed changes to the Final Safety Analysis Report (FSAR) to reflect the proposed use of a new fuel assembly design, VANTAGE 5H (V5H). By FSAR Amendments 73 (May 21, 1993) and 8C (January 20, 1994), the applicant formally documented this design change. The new fuel design uses Zircaloy-4 fuel rods and grid spacers, and the staff has approved it for reload applications in a number of nuclear plants. The staff documents its evaluation of V5H for Watts Bar application in Sections 4.2.3, 4.3, and 4.4 below, and in Section 15.2.1 of this report. The staff's evaluation supplements previous evaluations published in the SER and SSERs, unless specifically stated otherwise.

By letter dated April 20, 1993, the applicant responded to the staff's March 15, 1993, request for additional information (RAI) about the Unit 1 draft Technical Specifications (TSs). Three of the applicant's responses are evaluated in Sections 4.2.1, 4.4.4.1, and 4.4.4.2 below.

4.2 Fuel System Design

4.2.1 Description

Question 1 of the staff's March 15, 1993, RAI inquired if the prepressurization of fuel is a design characteristic that should be specified in Section 4.0, "Design Features," of the Watts Bar TSs.

The applicant responded to the question and justified that the initial backfill pressure is determined during the fuel rod design and is sized to, among other things, preclude flattening the cladding. The detailed fuel rod design establishes such characteristics as pellet size and density, clad-pellet diametral gap, gas plenum size, and helium pre-pressure. The design also considers such effects as fuel density changes, fission gas release, cladding creep, and other physical properties which vary with burnup. As reported in SSER 2, Section 4.2.2, the staff reviewed Westinghouse topical reports for information on internal fuel rod pressurization criteria, and found them acceptable.

The staff reviewed the applicant's response, and agrees that the requested information, already documented in SSER 2, is not key design information that needs to be included in the TSs. This effort was tracked by TAC M76742.

4.2.3 Mechanical Performance

The applicant has adopted the Standard Review Plan (SRP) approach in evaluating the V5H fuel design. This V5H fuel features standard fuel rods, debris filter bottom nozzle, reconstitutable top nozzle, and intermediate grid spacers with mixing vanes. NRC Information Notice 93-82, entitled "Recent Fuel and Core Performance Problems in Operating Reactors," pointed out the industry's experience involving V5H fuel damaged by vibrational fretting wear caused by a flow condition adjacent to the core baffle. The fuel vendor, Westinghouse, proposed short-term and long-term corrective actions. The Watts Bar reactor does not have a mixed-core situation. The applicant informed the

staff that Watts Bar fuel design and core loading have adopted the Westinghouse recommendation of short-term corrective action to address the vibrational fretting wear problem. The staff considers that the applicant's corrective action is acceptable for Watts Bar.

The applicant analyzed stress, strain, rod internal pressure, fatigue, and rod bowing based on approved methodologies for steady-state and transient conditions. The analyses showed that the V5H fuel will perform satisfactorily. The staff considers these analyses acceptable.

The applicant also analyzed the rod cluster control assemblies (RCCAs), control rod drive mechanisms (CRDMs), neutron source assemblies, burnable absorber assemblies, and thimble plug assemblies. The absorber materials used in the RCCAs are boron carbide pellets plus silver-indium-cadmium alloy. The burnable absorbers used are the Westinghouse-designed wet annular burnable absorbers (WABAs). All the RCCA and WABA designs have been approved previously by the staff. Therefore, the staff concludes that the RCCAs, WABAs, and CRDMs are acceptable for Watts Bar.

On the basis of approved mechanical methodologies, the staff concludes that the V5H fuel mechanical design for Watts Bar is acceptable. This effort was tracked by TAC M81887, M81888, M85774, M85775, M88644, and M88645.

In SSER 10, the staff documented its review of FSAR Amendment 65, and raised an issue about the methodology used to demonstrate seismic qualification of the CRDMs that did not appear to have been fully addressed during an earlier staff review of the FSAR. The staff based its concern on an apparent lack of documentation in the FSAR regarding CRDM qualification. Consequently, the staff asked the applicant to describe its basis for CRDM seismic qualification. The staff also asked the applicant to confirm that the revised design-basis seismic-response spectra for Watts Bar were included in the seismic qualification of CRDMs.

In a letter dated June 15, 1993, the applicant transmitted two letters from Westinghouse to TVA which address this issue. In these letters, Westinghouse stated that the CRDM design employed at Watts Bar is the same design that the staff accepted when it reviewed license applications from other Westinghouse plants. In addition, Westinghouse cited several CRDM generic testing programs that the staff accepted when it reviewed other Westinghouse plants, and specifically, when the staff performed a Seismic Qualification Review Team audit at Comanche Peak. Further, Westinghouse confirmed that it had evaluated the referenced tests to ensure plant-specific applicability for demonstrating CRDM seismic qualification at Watts Bar. On the basis of the information submitted in the applicant's June 15, 1993, submittal, the staff's concern regarding the adequacy of documentation is resolved.

With regard to Watts Bar's seismic response spectra, the applicant indicated during a conference call that Westinghouse proprietary report WCAP-13754, dated May 1993, "Qualification of the Reactor Internals, CRDMs, and CRDM Supports for Revised Seismic Spectra and the Addition of a Permanently Attached Head Shield Support Structure," documented an analysis which demonstrated that the design was adequate for Watts Bar's revised seismic response spectra. A portion of this report which summarized the results of the analysis, and which concluded that the CRDMs and supports were adequate to withstand the Watts Bar revised spectrum, was reviewed by the staff at the applicant's office.

Consequently, the staff's concern regarding consideration of the revised seismic spectra is resolved. It is noted that this report contained only a summary of the analysis results. The staff did not review analytical details and supporting engineering calculations which were referenced in the report.

On the basis of this discussion, the staff's specific concerns regarding CRDM seismic qualification at Watts Bar, which were reported in SSER 10, have been adequately resolved. The staff's efforts were tracked by TAC M84249 and M84250.

4.3 Nuclear Design

For the V5H fuel design, the applicant used such approved codes as ARK and PHOENIX-P/ANC to analyze shutdown margin. The analysis showed that the fuel design conforms to shutdown criteria. This is acceptable. The Watts Bar fuel pellet design has a thin layer of coated ZrB_2 on the pellet surface, a feature called "integral fuel burnable absorbers" (IFBAs), to control excessive reactivity during the beginning of the cycle. The IFBAs were approved earlier; hence this design feature is acceptable.

To gain more operating flexibility, the applicant analyzed axial power distribution on the basis of the procedures for constant axial offset control (CAOC) and relaxed axial offset control (RAOC). The hot channel factor, Fq, is maintained within acceptable limits. Additional operating flexibility is acquired by combining RAOC procedure with an Fq surveillance. Since the staff approved these methodologies previously, it concludes that the axial power distribution analysis is acceptable for Watts Bar.

The applicant calculated the fuel temperature coefficient by performing two group calculations using the TURTLE, PALADON, or the ANC code. Since the staff approved these codes earlier, it considers the fuel temperature coefficient analysis acceptable for Watts Bar.

The RCCAs are divided into two types: control groups and shutdown groups. Two criteria have been chosen to design the control groups: (1) the total reactivity worth must be adequate to meet shutdown margin requirements and (2) the total power peaking factor must be low enough to ensure that the power capability requirements are met. The applicant analyzed the control rod worth based on a conservative approach that the highest worth rod is stuck out of the core and the flux is skewed to the bottom of the core. The analysis showed that the two criteria were met, and the available reactivity for shutdown margin is adequate for Watts Bar.

Considering that the applicant used approved methodologies, the staff concludes that the nuclear design use of V5H fuel is acceptable for Watts Bar. This effort was tracked by TAC M81887, M81888, M85774, M85775, M88644, and M88645.

4.4 Thermal-Hydraulic Design

For the V5H fuel design, the applicant used the WRB-1 correlation for departure from nucleate boiling ratio (DNBR) calculations. In the SER, the staff stated that the applicant used the W-3 correlation; WRB-1 supersedes W-3. The

staff approved the WRB-1 correlation earlier; therefore, the applicant's calculated DNBR limit of 1.17 for V5H at Watts Bar is also acceptable.

A maximum rod bow penalty based on the approved methodology was incorporated in the DNBR analysis. See Section 4.4.4.1 for details.

The applicant analyzed the core thermal design using the approved THINC-IV code to determine the conditions in the hot channel and to ensure that the safety-related design bases are not violated. The analysis showed that the DNBR limits were met for steady-state and transient analyses. On the basis of the approved THINC-IV code and conservative results, the staff considers that the thermal design for Watts Bar is acceptable.

Considering that the applicant used approved thermal-hydraulic methodologies for its analysis, the staff concludes that the V5H thermal-hydraulic design is acceptable for Watts Bar. This effort was tracked by TAC M81887, M81888, M85774, M85775, M88644, and M88645.

4.4.4 Operating Abnormalities

4.4.4.1 Fuel Rod Bowing

Question 2 of the March 15, 1993, RAI asked the applicant to identify in the "Basis" section of the TS any plant-specific or generic margin used to offset the reduction in DNBR due to rod bowing, and to incorporate the residual rod bowing penalty into the TS.

By letter dated August 24, 1992 (submittal regarding use of V5H fuel design), the applicant addressed fuel rod bowing issues. The maximum rod bow penalties (<1.5% DNBR) accounted for in the design safety analysis are based on an assembly average burnup of 24,000 MWD/MTU. A 10.7-percent DNBR margin is maintained for the V5H fuel by comparing the DNBR limit of 1.31 to the WRB-1 correlation limit of 1.17. The applicant has incorporated the DNBR margin and residual rod bowing penalty into the "Bases for Safety Limits" section (Section 2.0) of the draft TSs. In the August 24, 1992, letter, the applicant stated that Table 4.1 ("Rod Bow Penalties") of the SER no longer applies; the staff concurs with the applicant in light of discussion in this paragraph.

The staff reviewed the applicant's response and finds it acceptable since an approved method (WCAP-8762-P-A, "New Westinghouse Correlation WRB-1 for Predicting Critical Heat Flux in Rod Bundles with Mixing Vane Grids," July 1984) was used, and the DNBR margin and all rod bow penalties have been incorporated into an appropriate section of the TSs. This effort was tracked by TAC M76742.

4.4.4.2 Crud Deposition

Question 3 of the March 15, 1993 RAI reiterates a proposed requirement in the SER and asks the applicant to incorporate appropriate surveillance requirements in the TSs to recognize any rapid crud buildup in the reactor core.

In its April 20, 1993, response, the applicant stated that Westinghouse submitted information detailing how Westinghouse accounts for possible buildup of crud in determining safety limits, and noted means of tracking core operating parameters that might indicate, among other things, a rapid crud buildup. The

applicant also noted that there have never been TS surveillance requirements for any Westinghouse-designed plant that would indicate specific conditions related to flow reductions, power reductions, or temperature excursions that would rule out all possible operating anomalies with the exception of crud buildup. For the current draft TSs, Surveillance Requirement 3.2.2.1 of Limiting Condition for Operation (LCO) 3.2.2, "Nuclear Enthalpy Rise Hot Channel Factor (F^N_H)," requires that (F^N_H) be a measure of the maximum total power produced in a fuel rod. The Core Operating Limits Report (COLR, approved by letter of September 20, 1993, to the applicant) gives limits that ensure that the design-basis value of departure from nucleate boiling (DNB) is met for normal operation, operational transients, and transient conditions arising from events of moderate frequency. During power operation, the global power distribution is monitored by LCO 3.2.3, "Axial Flux Difference (AFD)," and LCO 3.2.4, "Quadrant Power Tilt Ratio (QPTR)," which address directly and continuously measured process variables.

The staff reviewed the applicant's response and agrees that the staff's SER statement proposing a TS surveillance requirement to monitor the buildup of crud is addressed through the surveillance of core operating parameters in LCOs 3.2.2, 3.2.3, and 3.2.4. This effort was tracked by TAC M76742.