



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

September 21, 1988

Docket Nos. 50-327/328

LICENSEE: Tennessee Valley Authority
FACILITIES: Sequoyah Nuclear Plants, Unit 1 and 2
SUBJECT: MEETING SUMMARY REGARDING SHUTDOWN MARGIN AND READINESS
FOR UNIT 1 RESTART

On September 13, 1988 the NRC staff met with TVA at the Sequoyah site to discuss Sequoyah, Unit 2 shutdown margin and readiness for Unit 1 restart. Enclosure 1 is a list of attendees. Enclosure 2 is the TVA handout regarding shutdown margin. Enclosure 3 is the TVA handout regarding Unit 1 restart readiness. Enclosure 4 is a description of the Sequoyah NRC Bulletin 88-05 results to date. Enclosure 5 is a description of the electrical calculation program status.

TVA's presentation regarding shutdown margin was in response to Inspection Report 50-327, 8/88-35. During the meeting TVA committed to completing all of the proposed corrective actions listed on Enclosure 2 prior to Unit 1 restart except for the change from T_{AVG} to steam pressure control of the steam dumps. Additionally, with regard to the inappropriate Emergency Operating Procedure (EOP) deviation from Westinghouse guidelines delineated in NRC Inspection Report 50-327, 328/88-35, the licensee committed to review EOP step deviation documents for similar types of problems. TVA was informed that the staff will notify them if an enforcement conference is required.

The status of Unit 1 restart readiness was presented, including the restart schedule and a synopsis of work remaining for modes 4, 3, 2 and 1. In response to NRC's request, TVA also addressed NRC Bulletin 88-05 and the electrical calculation program status. The staff was assured that TVA is proceeding at a safe and deliberate pace. The NRC 24 hour coverage is scheduled to begin on September 21, several days before TVA anticipates entering Mode 4.

Suzanne Black

Suzanne Black, Assistant Director
for Projects
Office of Special Projects

Enclosures:

1. Attendee List
2. TVA Handout Regarding Shutdown Margin
3. TVA Handout Regarding Unit 1 Restart Readiness
4. NRC Bulletin 88-05 Results
5. Electrical Calculation Program Status

cc w/enclosures:
See next page

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Mr. S. A. White

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Sequoyah Nuclear Plant

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LIST OF ATTENDEES
 For September 13, 1988
 Meeting on Sequoyah 1 Restart/Shutdown Margin

<u>Name</u>	<u>Affiliation</u>
Suzanne Black	NRC/OSP/TVAP
Morris Branch	NRC/TVA
Ed Goodwin	NRC/OSP/TVAP
Bob Pierson	NRC/OSP/TVA/PSB
H. Rick Rogers	TVA-SQN Plant Reporting
R. W. Fatenberry	TVA-Sqn Tech Support
B. W. Gault	TVA-SQN Tech Support
Jerry Roberson	TVA-Eng-Nuc. Fuel
Bruce Schofield	TVA-SQN LIC.
Steve Smith	TVA-SQN Plant Manager
J. LaPointe	TVA-Acting Site Director
C. H. Fox	TVA
Paul Trudel	TVA DNE Project Engineer
Joe Bynum	TVA Nuclear Power Prod.
S. White	TVA Nuclear Power Group
N. C. Kazanas	TVA DNQA
K. N. Jenison	NRC Resident
D. M. Brown	TVA Nuclear Fuel
B. Charlson	ONP
J. Brady	TVA-GPA
D. Eisenhut	ONP-NUS
W. R. Lageigren	TVA-NGP
P. J. Polk	TVA-Licensing
G. G. Putt	TVA SQN Outage Supt.
T. A. Keys	TVA-Engr-Nuclear Fuel
Marcy Cooper	TVA-SQN Licensing
M. J. Ray	TVA-Site Licensing Mgr.
R. Gridley	TVA-Licensing
T. M. Nahay	TVA-SQN-Plant Assessment
F. McCoy	NRC/OSP
J. Partlow	NRC/OSP

REACTOR COOLANT SYSTEM POSTTRIP COOLDOWN
AND SHUTDOWN MARGIN

- I. INTRODUCTION TO ISSUE
 - A. VIOLATION 88-35-01
 - B. SHUTDOWN MARGIN WAS MAINTAINED

- II. CHRONOLOGY OF EVENTS
 - A. IDENTIFICATION OF ISSUE
 - B. REVIEWS BY TVA AND WESTINGHOUSE

- III. CORRECTIVE ACTIONS
 - A. ACTIONS COMPLETED
 - B. ACTIONS IN PROGRESS

- IV. CONCLUSIONS

CHRONOLOGY OF EVENTS

- 5/19/88 - SQN UNIT 2 TRIPPED FROM 70 PERCENT POWER. NOTED LESS EXCESS SHUTDOWN MARGIN THAN EXPECTED BASED ON PREVIOUS EXPERIENCE.
- 6/13/88 - AS THE RESULT OF REVIEWS OF SHUTDOWN MARGIN CALCULATIONS FOR SUBSEQUENT TRIPS, THE ISSUE CONCERNING POSTTRIP COOLDOANS AND SHUTDOWN MARGIN WAS IDENTIFIED. ON 6/14/88, A CAQR WAS INITIATED TO DOCUMENT THE ISSUE.
- 6/17/88 - W PROVIDED MINIMUM TEMPERATURE FOR THE MAINTENANCE OF SDM FOLLOWING REACTOR TRIP FROM 70 PERCENT REACTOR POWER. SEVENTY PERCENT POWER WAS CHOSEN BASED ON PLANS TO EXTEND CYCLE 3 OPERATION INTO JANUARY 1989.
- 6/18/88 - APPROVED REVISION 3 OF ES-0.1, EMERGENCY PROCEDURE FOR REACTOR TRIP RESPONSE, TO ENSURE COMPLIANCE WITH TECHNICAL SPECIFICATIONS. INSTRUCTION REVISED TO RECOMMEND THAT AUXILIARY FEEDWATER FLOW BE LIMITED TO MAINTAIN PCS TEMPERATURE ABOVE 520°F OR BEGIN A MANUAL BORATION OF THE RCS.
- 7/11/88 - NRC INSPECTION ON SDM ISSUE.
- 7/14/88 - TVA ISSUED LER ON SDM ISSUE.
- 7/16/88 - REVISION 4 TO ES-0.1 APPROVED WHICH PROVIDES GUIDANCE FOR FULL POWER OPERATION THROUGH END OF THE CYCLE. THIS REVISION MAINTAINED INSTRUCTIONS FOR MANUAL BORATION.
- 8/31/88 - SUBMITTAL TO NRC DESCRIBING THE POSTTRIP COOLDOWN/SHUTDOWN MARGIN ISSUE AND CORRECTIVE ACTIONS.

CORRECTIVE ACTIONS

- I. COMPLETED
 - A. PROCEDURES REVISED TO REQUIRE MANUAL BORATION OF RCS
 - B. REDUCTION IN BOP STEAM LEAKS

- II. IN PROGRESS
 - A. REVISE ES 0.1 TO BOUND U1C4
 - B. MODIFICATIONS TO THE STEAM DUMP CONTROL SYSTEM -
PRESSURE MODE
 - C. MANUAL CONTROL OF AFW AND OPERATOR TRAINING
 - D. ENHANCEMENT OF POSTTRIP REVIEW PROCEDURES

CONCLUSIONS

- I. OPERATED WITHIN TECHNICAL SPECIFICATIONS
- II. MANUAL BORATION IN RESPONSE TO POSTTRIP COOLDOwnS IS CONSISTENT WITH TECHNICAL SPECIFICATIONS
- III. POSTTRIP REVIEWS ENSURES EVALUATION OF PLANT RESPONSES

SEQUOYAH UNIT 1 RESTART

PREPARATIONS FOR MODE 4

- o Surveillance Instructions are critical path
- o Work Requests support testing and plant restoration
- o Modifications are essentially complete - lack PMTs
- o Document closeout follows testing
- o Systems are 94% under operational control
- o Mode 4 - week of 09/19/88

PREPARATIONS FOR MODE 3

- o Surveillance Instructions are critical path
- o Work Requests will not impact the schedule
- o Modifications are not a problem
- o Document closeout follows testing
- o Mode 3 - week of 09/26/88

PREPARATIONS FOR MODE 2

- o Heatup and Testing are critical path
- o Work Requests should not impact the schedule
- o Modifications are not a problem
- o Document Closeout follows testing
- o Mode 2 - week of 10/03/88

PREPARATIONS FOR MODE 1 AND POWER ESCALATION

- o Zero power physics testing, power ascension testing and chemistry hold points are critical path
- o Mode 1 - three days after mode 2
- o 100% power - 10 days after entering mode 1

IEB 88-05 SEQUOYAH (SQN) RESULTS TO DATE

- ° Five vendors provided WJM or PSI material to SQN. (Kellogg, National Valve, Capitol Pipe and Steel Products, Dubose Steel, and Hub). Awaiting responses to inquiries from 11 other vendors for material provided after construction.

- ° All WJM and PSI material records retrieved thus far are for flanges (orifice, blind, and weld neck). Sizes range from 1 to 14 inches with a majority being 2 inches or less.

- ° All fittings identified to date are carbon steel (approximately 580).

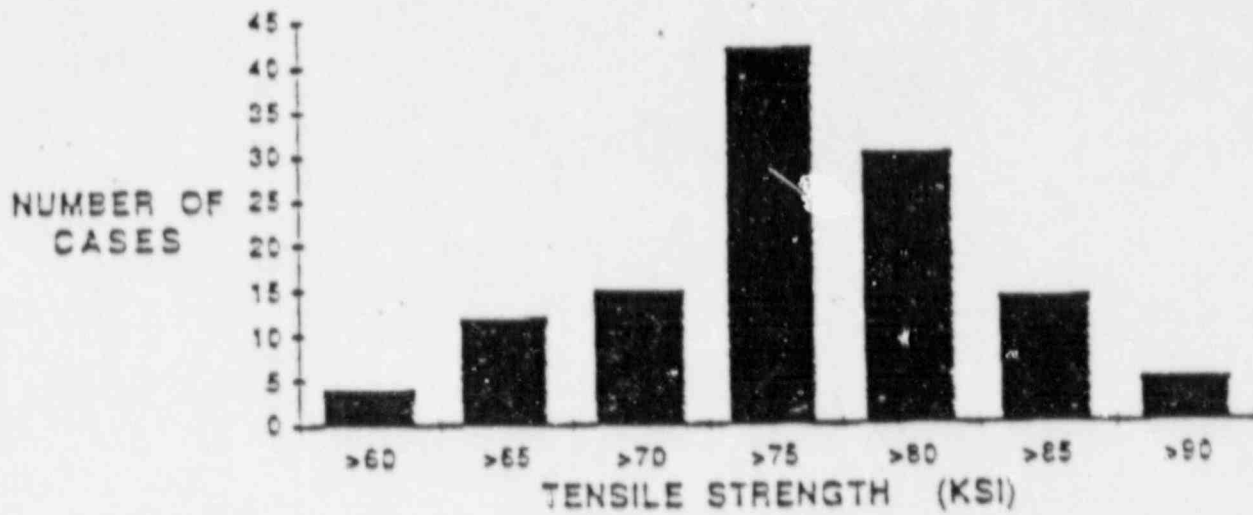
- ° Carbon steel fittings are prohibited from use in systems containing boric acid.

- ° TVA continuing to work with vendors to identify WJM or PSI material delivered to SQN.

TECHNICAL EVALUATION OF FLANGES

- ° Based on ANSI B16.5 criteria, flanges are normally designed to be thicker than adjoining piping, which results in low-stress factors.
- ° The WJM flanges have been shown to meet ANSI B16.5 dimensional requirements.
- ° The minimum tensile values to date for WJM material is 40,000 psi, which gives a safety factor of approximately 6.
- ° Most material has shown tensile strength greater than 70,000 psi (NUMARC test report), which gives a safety factor of at least 10.
- ° WJM material has been found acceptable for intended application.

LABORATORY TENSILE RESULTS



Data as of
7/22/88

FIG. 1 HISTOGRAM OF
LABORATORY TENSILE
RESULTS

NUMARC letter to NRC dated July 29, 1988 (included in
supplement 2 to Bulletin 88-05)

ESTIMATED TENSILE STRENGTH DISTRIBUTION

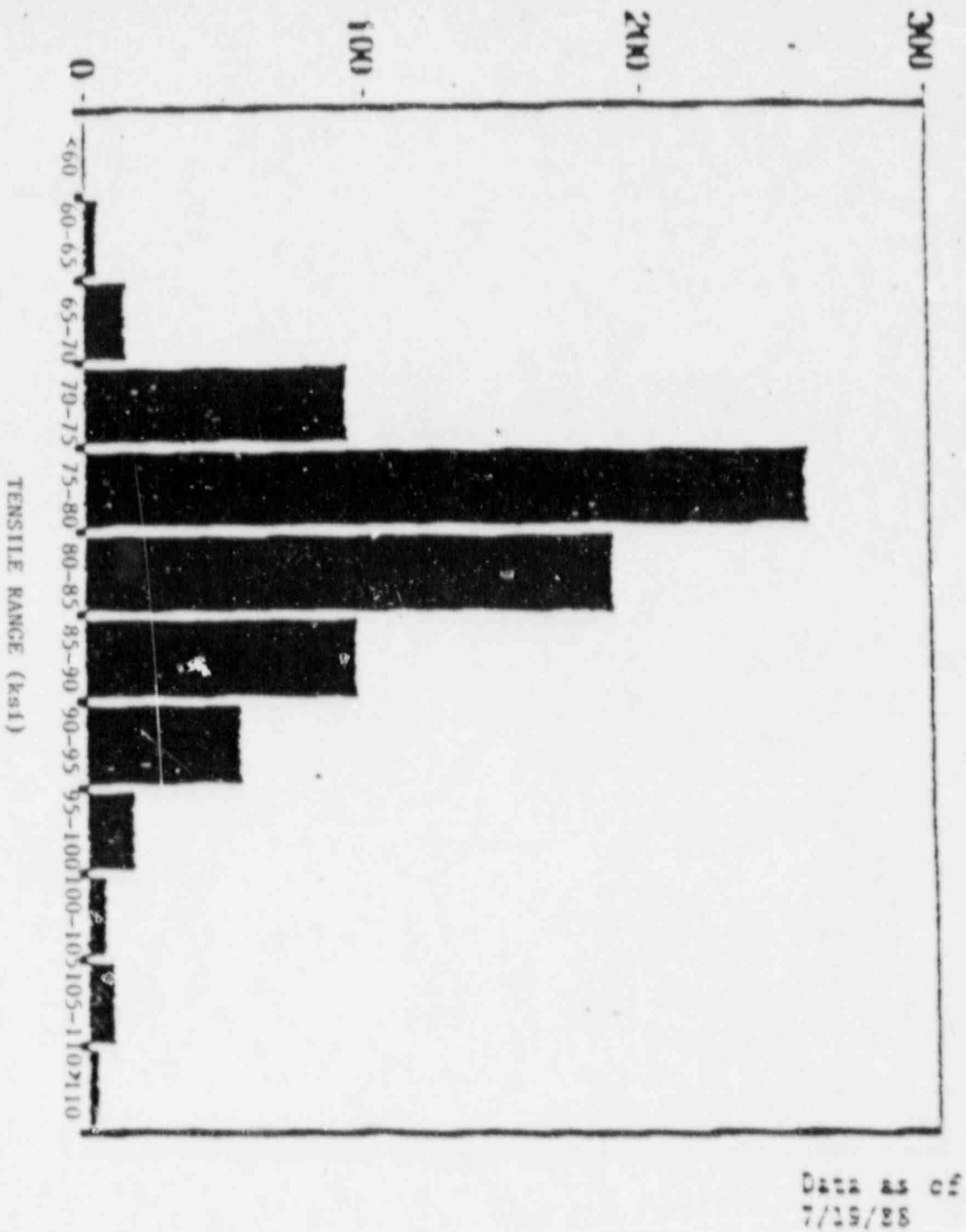


FIG. 6 BEST FIT DATA APPLIED TO
YIELD HARDNESS
STRENGTH ESTIMATE

NUMARC letter to NRC dated July 29, 1988 (Included in supplement 2 of Bulletin 88-05)

ANNEX D
METHODS FOR ESTABLISHING PRESSURE-TEMPERATURE RATINGS

(This Annex is an integral part of American National Standard B16.5 which is placed after the main text for convenience.)

D1. GENERAL

D1.1 Introduction. Pressure-temperature ratings in this standard have been determined by the procedures in this Annex. The method is general and can be used to establish ratings for a material not listed in Table 1A, provided that all dimensional and other requirements of this standard and the applicable Code are observed.

The primary consideration in establishing ratings is adequate wall thickness to sustain stresses due to pressure and other loadings. See D1.2. Other considerations affecting or limiting the ratings include: (1) stresses in flanges resulting from bolt-up necessary to maintain gasket seal, (2) distortion of flanges and flanged fittings due to loadings transmitted through the pipeline, and (3) limitations applying primarily to valves but imposed also on flanges in order to maintain compatible ratings.

D1.2 Wall Thickness. Wall thickness requirements for flanged fittings are set forth in 6.1, and minimum thicknesses, t_m , are listed in the tables designated in 6.1. These values are all greater than those determined by Equation 1

$$t = 1.5 P_c d / 2S = 1.2 P_c d \quad (1)$$

where

- t = calculated thickness, in. (mm)
- P_c = pressure rating class designation expressed in psi (e.g., $P_c = 150$ psi for Class 150)
- d = inside diameter of the fitting, in. (mm)
- S = stress factor of 7,000 psi

Equation 1 gives a thickness 50% greater than for a simple cylinder designed for a stress of 7,000 psi (48 MPa) when subjected to an internal pressure equal to the pressure rating class designation in psi. Actual values in the dimension tables listed in 6.1 are approximately 0.1 to 0.2 in. (2.5 to 5.0 mm) heavier than those given by the equation.

D2. RATINGS IN CUSTOMARY UNITS

D2.1 Rating Equation. Ratings given in Tables 2 in psig at temperatures expressed in degrees Fahrenheit, for all materials and pressure classes, are established by Equation 2

$$P_T = P_c S_T S_1 \quad (2)$$

where

- P_T = rated working pressure, psig, for the specified material at temperature T
- P_c = pressure rating class index expressed in psi (e.g., $P_c = 300$ psi for Class 300)
- S_T = selected stress, psi, for the specified material at temperature T . See D2.2, D2.3, and D2.4

D2.2 Rating for Group 1 Materials, Class 300 and Higher. The selected stress, S_T , for each material group¹ among Group 1 materials in Table 1A is determined as follows:

- (1) At temperatures below the creep range, S_T shall be lowest of the following values:
 - (1) 60% of specified minimum yield strength at 100°F
 - (2) 60% of the yield strength at temperature T .
 - (3) 1.25 times the allowable stress at temperature T taken from the ASME Code Section I, Table PG-23 or, if not listed therein, from Section VIII- Div. 1, Table UCS-23
 - (4) the selected stress, S_T , at temperature T which is the minimum value for any material listed in a given material group, Table 1A, as follows

¹The definition of P_c does not apply to Class 150. See D2.4.

²Material groups comprise materials of the same or closely related composition and allowable stress and yield strength values.

ELECTRICAL CALCULATION PROGRAM STATUS

- ° All essential electrical calculations required for unit 1 restart have been revised.

- ° Revisions to calculations made to address previously unverified assumptions, address nonconservative or unverified cable lengths, address DBVP deficiencies, and incorporate DBVP walkdown data.

- ° Alternating current auxiliary power system calculations redone for unit 1 restart with standardized vendor QA software
 - Loading analysis
 - Voltage analysis
 - Short circuit study (medium voltage system)
 - Branch technical position PSB-1 verification

- ° Submittal in final concurrence to address these items.

- ° Calculations support two-unit operation.

DISTRIBUTION FOR MEETING SUMMARY DATED: September 21, 1988

Facility: Sequoyah Nuclear Plant, Units 1 and 2*

Docket File

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