TVA 64 (OS-9-65) (OP-WP-5-85)

UNITED STATES GOVERNMENT

Memorandum TENNESSEE VALLEY AUTHORITY

TO: Lawrence Martin, Project Manager, LP6N47A-C

FROM: K. W. Whitt, Director of Nuclear Safety Review Staff, E3A8 C-K

DATE: FEB 07 1986

SUBJECT: NUCLEAR SAFETY REVIEW STAFF INVESTIGATION REPORT TRANSMITTAL

Transmitted herein is Report No. IN-85-851-001.

Subject Welding Nonconformance: Unit 1

Concern No. IN-85-851-001

and associated recommendations for your action/disposition.

It is requested that you respond to this report and the attached recommendations by March 7, 1986. Should you have any questions, please contact B. F. Siefken at telephone 6230-K.

Recommend Reportability Determination: Yes ____ No X

Bruce F. Siefken
for Director, NSRS/Designee

BFS:JTH
Attachment
cc (Attachment):
H. L. Abercrombie, SQN
W. Bibb, BFN
J. W. Coan, W9D135 C-K
W. T. Cottle, WBN
James P. Darling, BLN
R. P. Denise, LP6N40A-C
D. R. Nichols, E10A14 C-K
QTC/ERT, Watts Bar Nuclear Plant
E. K. Sliger, LP6N48A-C

--Copy and Return--

To : K. W. Whitt, Director of Nuclear Safety Review Staff, E3A8 C-K

From: _____

Date: _____

I hereby acknowledge receipt of NSRS Report No. _____
Subject _____ for action/disposition.

_____ _____

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

Q-85-851-001-01: SLUGGED WELD

NSRS notes that this is another instance of QC not following drawing requirements on non-QA portions of the plant. The corrective action for this item should be determined in conjunction with the generic welding review being performed by EG&G at Watts Bar Nuclear Plant.

Principally prepared by Bruce F. Siefken.

QUALITY
TECHNOLOGY
COMPANY

P.O. BOX 600 Sweetwater, TN 37874 (615)365-4414

ERT INVESTIGATION REPORT

CONCERN NO: IN-85-851-001

CONCERN: Welding Nonconformance : Unit I

INVESTIGATION
PERFORMED BY: Ray Chappell

DETAILS

PERSONNEL CONTACTED: CONFIDENTIAL

DOCUMENTS REVIEWED:

47W2620- R/0
47W400-1 R/19
47B18 - R/8
Welding Procedure
SM-11-B-2 R/1
SM-11-B-5 R/1
GT-11-0-1A R/3
GT-88-0-1 R/3
SM-18-B-1 R/4

CODES:

ASME Section IX 1980
QW 351
QW 401
QW 402

DETAILS, continued

DOCUMENTS REVIEWED continued

PROCESS SPECS.:

G-29C3.C.5.2(a)
G-29C0.C.1.1 - 1985

SUMMARY OF FINDINGS:

This Concern is substantiated.

Investigation of this concern verified a slug did exist in the girth weld of the main steam line rupture restraint that protects the most westerly main steam line of Unit I. The slug consists of a 1/4 to 3/8 inch round/square bar in the root of the girth weld, and it runs from approximately 7:00 to 11:00 o'clock.

This concern should read as follows:

One of the girth welds in the main steam rupture restraints has a cold rolled steel slug embedded in the weld at approximately 7:00 to 11:00 o'clock.

FINDINGS:

The investigation began with review of TVA drawing 47W260-1 R/0, which identified the two (2) 27 degree main steam sleeves identified in the employee concern. A walkdown revealed that the sleeves were insulated in conjunction with the main steam piping. On September 24, 1985, Project Manager was requested by ERT to have the insulation removed to permit visual inspection of the pipe sleeves.

On September 26, 1985, Nuclear Safety Review Staff (NSRS) contacted the ERT investigator and discussed various methods of resolving this concern. NSRS suggested that, since the sleeves were not safety related, one possible solution would be for the Office of Engineering (OE) tc evaluate the effect of weld quality with the slug in the weld. NSRS contacted NucPwr and discussed the matter with them. On September 27, 1985, the ERT investigator received a call from Design Service Manager. He stated that a meeting would be held with OE to discuss the design and the purpose of the sleeves, and to determine the course of action required to resolve he concern.

DETAILS, continued .

FINDINGS, continued

On September 30, 1985, a meeting was held with the Office of Engineering (OE), Welding Engineering Unit (WEU), Site Mechanical Engineering Unit (MEU), Quality Technology Company (QTC), and the Design Service Manager. OE stated, "even if the slug constituted 50% of the weld seam, it would not affect the application of the sleeve. Howeve , I would be somewhat concerned if the slug was used in the longitudal seams". OE also stated, "should the girth weld seam burst, it would have little effect on the function of the sleeve, and a full penetration weld requirement was unnecessary, a square butt joint would have been acceptable".

The ERT investigator stated that the standard procedure used by TVA for closure of non-safety related nonconformances would be acceptable to ERT. However, engineering calculations would be required to support OE's position. The investigator further stated that removal of the insulation and physical verification of the slug's existence would be necessary because of the wrong doing concern expressed in case file HI-85-049.

On October 11, 1985, the engineering calculations were obtained from Design Service Manager. The calculations illustrated that the existence of a slug, one half the circumference of the sleeve, would not have an adverse effect on the strength of the sleeve weld.

On October 18, 1985, the insulation was removed to allow inspection of the sleeve. Visual inspection verified the following nonconformances:

A) Note No. 4 on drawing 47W2620-1 R/0 requires the sleeves to be sandblasted to a commercial grade sspc-sp-6 and painted with 3 mils. of carbo zinc 11 (dry film thickness) on all surfaces of the sleeves.

   Contrary to the requirement of Note No. 4, the sleeves were not sandblasted and/or painted.

B) A review of drawing 47W2620-1 R/0, indicated that longitudinal and girth welds were required to be full penetration welds.

   Contrary to the drawing requirements, visual inspection of the longitudinal, and girth welds verified the weld joints do not have full penetration welds.

DETAILS, continued

FINDINGS, continued

C) Notes 2 and 5 of drawing 47W2620-1 R/0 require the vendor to match mark all parts, tack weld the parts together for shipment, assure the separation of faying surfaces does not exceed 1/16", and assure weld bevels are type 2 per TVA drawing 47B18 R8. The weld land size requirement for a type 2 joint configuration is 1/16" $\pm$ 1/32".

Visual inspection of the longitudinal and girth welds identified the following deficiencies:

Either the vendor did not comply with drawing requirements and pre-fit, match mark, and tack weld the sleeves together prior to shipment, or the sleeve parts were interchanged during fit-up by the craft. This conclusion is based on visual examination of the completed weld joints. In addition, visual examination of the longitudinal and girth welds revealed:

* Lack of penetration in some areas.

* Root opening exceeding 1/16" resulting in a steel slug 1/4 to 3/8 of an inch in diameter being incorporated into the weld.

* Joint configuration that does not meet drawing 47B18 R/8 requirements in the following areas: The root of the weld reveals slag residues from oxyacetylene cutting; Irregular joint fit-up; Evidence of weld slag; and No significant amount of weld metal was visible in the root of the weld.

D) Note No.1 on drawing 47W2620-1 R/0 requires the sleeve material to be ASTM A515 GR70, or A516 GR70.

Note No.9 on drawing 47W260-1 R/0 requires certificates of compliance be supplied in accordance with ASTM specifications.

A review of the purchase contract computer printout was performed in an effort to verify the type of material purchased, and documentation requirements for the sleeves. The ERT investigator could not locate the purchase order.

E) Note No.3 on drawing 47W2620-1 R/0 requires all field welding to be in accordance with General Construction Specification G29C, latest edition.

DETAILS, continued

FINDINGS, continued

E. continued

Specification G29C, 0.C.1.1-1985 paragraph 5.3 requires welders to be qualified in accordance with ASME or AWS codes.

A review of the welder's qualification records revealed that the welder was qualified to ASME Section IX for welding pipe using the shielded metal arc process, with a backing ring. Deletion of the backing ring is an essential variable and requires requalification. (Ref. ASME QW-402.2). The welder was not qualified to weld an open root butt joint.

F) Note No.3 on drawing 47W2620-1 R/0 requires all welds to be visually examined in accordance with G29C, Process Spec. No. 3.C.5.2 (a).

As a result of not being able to locate inspection verification documentation, coupled with the welding nonconformances verified during the course of this investigation, it is evident that the inspection requirements of Process Spec. 3.C.5.2(a) and drawing 47W2620-1 R/0 were not met.

CONCLUSION:

This Concern is substantiated.

This conclusion is based on verification of the following deficiencies:

* Sleeves were not sandblasted and painted in accordance with drawing requirements.

* Welds are not full penetration and contain a slug embedded in the root of a girth weld from approximately 7:00 to 11:00 o'clock.

* Joint configuration and fit-up is not in accordance with drawing requirements.

* No evidence that sleeve material is the correct material, and meets the requirements of ASTM A515 GR70, or A516 GR70.

DETAILS, continued

CONCLUSION, continued

* Welder was not qualified to weld an open butt joint configuration.
* Welds were not inspected.

PREPARED BY: R. Chappell 1/28/86
DATE

REVIEWED BY: O. L. Thero 1/28/86
DATE

accepted by
Bruce L. Siefken
2-6-86

FINAL

REQUEST FOR REPORTABILITY EVALUATION

1. Request No. IN-85-851-001 _____
(ERT Concern No.) (ID No., if reported)

2. Identification of Item Involved: _____
(Nomenclature, system, manuf., SN, Model, etc.)

3. Description of Problem (Attach related documents, photos, sketches, etc.)

Welding nonconformance; Unit I.

4. Reason for Reportability: (Use supplemental sheets if necessary)

A. This design or construction deficiency, were it to have remained uncorrected, could have affected adversely the safety of operations of the nuclear power plant at any time throughout the expected lifetime of the plant.

No X Yes _____ If Yes, Explain: _____

AND

B. This deficiency represents a significant breakdown in any portion of the quality assurance program conducted in accordance with the requirements of Appendix B.

No X Yes _____ If Yes, Explain: _____

OR

C. This deficiency represents a significant deficiency in final design as approved and released for construction such that the design does not conform to the criteria bases stated in the safety analysis report or construction permit.

No X Yes _____ If Yes, Explain: _____

OR

REQUEST FOR REPORTABILITY EVALUATION

D. This deficiency represents a significant deficiency in construction of or significant damage to a structure, system or component which will require extensive evaluation, extensive redesign, or extensive repair to meet the criteria and bases stated in the safety analysis report or construction permit or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function.

No __X__ Yes _____ If Yes, Explain: ______________________________

____

____

<u>OR</u>

E. This deficiency represents a <u>significant</u> deviation from the performance specifications which will require <u>extensive</u> evaluation, <u>extensive</u> redesign, or <u>extensive</u> repair to establish the adequacy of the structure, system, or component to perform its intended safety function.

No __X__ Yes _____ If Yes, Explain: ______________________________

____

____

IF ITEM 4A, <u>AND</u> 4B <u>OR</u> 4C <u>OR</u> 4D <u>OR</u> 4E ARE MARKED "YES", <u>IMMEDIATELY HAND-CARRY</u> THIS REQUEST AND SUPPORTING DOCUMENTATION TO NSRS.

This Condition was Identified by: [signature] _______ 365-4414
ERT Group Manager — Phone Ext.

[signature] _______ 365-4414
ERT Project Manager — Phone Ext.

Acknowledgment of receipt by NSRS

[signature] ________________ Date 2-6-86 _______ Time 9:21__
Signed

ERT Form M

TVA 64 (OS-9-65) (OP-WP-5-85)

UNITED STATES GOVERNMENT

Memorandum TENNESSEE VALLEY AUTHORITY

TO: W. T. Cottle, Site Director, Watts Bar Nuclear Plant

FROM: K. W. Whitt, Director of Nuclear Safety Review Staff, E3A8 C-K

DATE: FEB 11 1986

SUBJECT: NUCLEAR SAFETY REVIEW STAFF INVESTIGATION REPORT TRANSMITTAL

Transmitted herein is NSRS Report No. IN-85-995-002

Subject PLANT/CONSTRUCTION PROCEDURES

Concern No. IN-85-995-002

and associated recommendations for your action/disposition.

It is requested that you respond to this report and the attached recommendations by March 10, 1986. Should you have any questions, please contact Bruce F. Siefken at telephone 6230.

Recommend Reportability Determination: Yes X No ____

for Director, NSRS/Designee

BFS:GDM
Attachment
cc (Attachment):
H. L. Abercrombie, SQN
W. Bibb, BFN
James P. Darling, BLN
R. P. Denise, LP6N40A-C
D. R. Nichols, E10A14 C-K
QTC/ERT, Watts Bar Nuclear Plant
E. K. Sliger, LP6N48A-C

--Copy and Return--

To : K. W. Whitt, Director of Nuclear Safety Review Staff, E3A8 C-K

From: _____

Date: _____

I hereby acknowledge receipt of NSRS Report No. IN-85-995-002
Subject PLANT/CONSTRUCTION PROCEDURES for action/disposition.

_____ _____
Signature Date

431U

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

NSRS RECOMMENDATIONS

EMPLOYEE CONCERN NUMBER: IN-85-995-002

Q-85-995-002-01: "Concrete Testing Inadequacies"

The QTC report outlines several areas in which the FSAR commitments were not followed in the sampling and testing of concrete. OC should initiate corrective action for these individual concerns and establish and correct the root causes of these concerns. Since FSAR commitments have not been followed, an NCR should be initiated and NRC should be notified if not previously done.

Principally prepared by Bruce F. Siefken.

QUALITY TECHNOLOGY COMPANY
P.O. BOX 600 Sweetwater, TN 37874 (615)365-4414

CONCERN NO: IN-85-995-002 (MILESTONE 1) - INTERIM REPORT

CONCERN: CI (Concerned Individual) is concerned that plant/construction procedures do not meet or address PSAR commitments [regarding concrete compressive strength and frequency of sampling].

INVESTIGATION
PERFORMED BY: J. T. Nation

DETAILS

I. SCOPE AND PURPOSE OF INTERIM REPORT:

This Interim Investigation Report addresses only the basic elements of the Concern, and does not contain all the findings, conclusions and observations essential for a complete reporting of the investigation. This Report is being published at this time, prior to completion of the full investigation and final report, to provide the responsible TVA organization(s) with advanced information regarding the present course of this investigation and the current validity of the basic elements of the Concern.

The investigation is still in progress and will be fully reported at a later date, under the same Concern identification number. The continued investigation involves both the compressive strength and the sampling frequency aspects of the Concern, and directly related aspects in the areas of design control, instructions/procedures, inspection, test control, nonconforming items, corrective action, quality assurance records and audits. Preliminary investigative findings indicate potential inadequacies in these areas, and indicate a direct relationship to the basic elements of the Concern. The findings and conclusions in this Report are not expected to change, but will be further developed in the forthcoming final report.

II. PERSONNEL CONTACTED: CONFIDENTIAL

DETAILS

III. REFERENCES:

A. WBNP Preliminary Safety Analysis Report (PSAR), Chapter 5, Section 5.1 and 5.2.

B. WBNP Final Safety Analysis Report (FSAR), Chapter 3, Section 3.8.

C. TVA General Construction Specification G-2, "Plain and Reinforced Concrete".

D. WBNP Quality Control Procedure WBN-QCP-2.02, "Concrete Placement and Documentation".

E. WBNP "Concrete Tracking System".

IV. SUMMARY OF INVESTIGATION:

The Concern is substantiated.

This investigation has been in progress, intermittently, since December 9, 1985, and included personnel contacts/interviews and document/documentation searches and reviews. The investigation results in this Report include only the basic elements of the Concern regarding compressive strength and sampling frequency for structural concrete used in Seismic Category I structures at WBNP.

For compressive strength, it was found that the percentage of strength test results below specified strength is significantly greater than allowed by the WBNP FSAR commitments and General Construction Specification G-2 requirements.

For sampling frequency, it was found that the quantity of concrete represented by most samples was generally within the Specification limits. However, more than fifty samples were found to be outside these limitations, and have not been identified and dispositioned as nonconforming conditions. Additionally, the WBNP FSAR, and the Specification G-2 and Procedure WBN-QCP-2.02, do not state the same limitations.

Conclusions for the findings are stated in Section VI of this Report.

DETAILS

IV. SUMMARY OF INVESTIGATION, continued

Observations of conditions not specifically identified in the Concern, but revealed during the investigation, will be included in a final report at a later date.

V. FINDINGS:

A. WBNP Preliminary Safety Analysis Report (PSAR):

The WBNP PSAR, Section 5.1 and 5.2, was found to contain the following commitments:

1. For compressive strength, the PSAR does not state specific acceptance criteria. The PSAR references General Construction Specification G-2.

2. For sampling frequency, the PSAR states that "At least one sample of concrete is tested for each 400 cubic yards of concrete placed or for each class of concrete placed during any 8 hour shift, but not less than one sample during the first hour and one sample during the last hour of each shift."

The Concern references the PSAR, however, the FSAR contains the current commitments for WBNP. Therefore, the FSAR was used for the investigation of the Concern.

B. WBNP Final Safety Analysis Report (FSAR):

The WBNP FSAR, Section 3.8, was found to contain the following commitments:

1. For compressive strength, the FSAR states that "TVA required that no more than 10 percent of the strength test results be below the specified strength for specified strengths equal to or greater than 3000 psi".

2. For sampling frequency, the FSAR states that "TVA varied the testing frequency requirements based on the specified strength of concrete with no one sample

DETAILS

V. FINDINGS, continued

B. 2, continued

representing more than...175 cubic yards with specified strength of 3000 psi, or more." Note: This frequency is not the same as specified in the current General Construction Specification G-2.

The FSAR contains additional information regarding the Concern, however, the above commitments provide the basic references for this Interim Report.

C. General Construction Specification G-2:

The Specification G-2 was found to contain the following requirements:

1. For compressive strength, the current Specification states that "the strength level of the concrete shall be such that ...no more than 10 percent of strength test results shall be below the specified strength for classes with a specified strength of 3000 psi or more".

2. For sample frequency, the current Specification states that "When concrete is produced in a central mixing plant, no one strength sample shall represent more than...200 cubic yards with specified strength of 3000 psi...150 cubic yards with specified strength more than 3000 psi." Note: This frequency is not the same as stated in the current WBNP FSAR.

The Specification G-2 contains, or contained other requirements regarding the Concern, however, the above basic references provide the basis for this Report.

D. Quality Control Procedure WBN-QCP-2.02:

The Procedure WBN-QCP-2.02 was found to contain the following provisions:

DETAILS

V. FINDINGS, continued

D. continued

1. For compressive strength, the current WBN-QCP-2.02 refers to General Construction Specification G-2 for acceptance criteria.

2. For sampling frequency, the current WBN-QCP-2.02 contains the same requirements as in General Construction Specification G-2.

The Procedure contains, or contained other provisions regarding the Concern, however, the above findings provide the basis for this Report.

E. Compressive Strength Test Results:

Based on a special sort and computation of data from the TVA Concrete Tracking System, the following is a summary of the actual percentage of compressive strength test results found to be below the specified strength (f´c) at the specified age for concrete classes/mixes used for Seismic Category I structures:

Class/Mix	QTY of Tests	Percentage of Tests Below f´c	
		Last 30 Tests	All Tests
301.5AFW	804	7%	8%
300.75 AFW	1,149	13%	6%
300.75 AFW	135	17%	8%
300.375 AFW	39	17%	13%
301.5 BFW	501	3%	12%
300.75 BFW	362	7%	3%
300.75 BFWP	84	17%	8%
401.5 AFW	116	13%	19%
400.75 AFW	186	50%	18%
400.75 AFW2	150	13%	5%
501.5 AFW	144	33%	26%
500.75 AFW	788	37%	21%
500.75 AFW2	229	10%	7%
500.375 AFW2	107	17%	7%

DETAILS, continued

V. FINDINGS, continued

E. continued

Class/Mix	QTY of Tests	Percentage of Tests Below f´c Last 30 Tests	All Tests
501.5 BFW	60	27%	13%
500.75 BFW	37	0%	0%
800.75 BFW	49	47%	55%
800.375 BFW	35	77%	74%

NOTE: The WBNP FSAR and General Construction Specification G-2 allow no more than 10 percent.

The Concrete Tracking System provided additional information regarding strength test results, such as grout strengths, average strengths and standard deviations, however, the above data provides the basic information for this Interim Report.

F. Sampling Frequency Results:

On 1/23/86 the ERT Investigator was advised that, after a number of unsuccessful attempts, the TVA Concrete Tracking System could not provide a sort of data that would readily identify the frequency of sampling by concrete class/mix. It was also found that Concrete Mixing Plant Reports (Attachment R of WBN-QCP-2.02), which could provide frequency data, were not classified and retained as permanent QA Records until January 1984; this condition is not further addressed in this Interim Report.

Based on a cursory review of a TVA Concrete Tracking System Master Report, which was not sorted to provide accurate correlation of sample numbers and quantities, the following was noted:

1. Generally, the quantities (cubic yards of concrete) representing most samples appeared to be within the General Construction Specification G-2 limitations of 150 cubic yards (over 3000 psi class/mix) and 200 cubic yards (3000 psi class/mix).

DETAILS, continued

V. FINDINGS, continued

F. continued

2. Specifically, the following samples where found to represent quantities (cubic yards of concrete) greater than permitted by the WBNP FSAR commitments and/or General Construction Specification G-2 requirements:

Class/Mix No.	Sample No.	Cubic Yards Sample Represents	Date(s) of Pours Sample Represents (See NOTE 3)
301.5AFW	420	528	3/29/74
"	422	528	"
"	424	528	"
"	426	528	"
"	1502	210	5/21/75
"	1517	310	5/23/75
"	1572	290	6/13/ to 6/16/75
"	1690	286	7/21/75
"	1730	268	7/31 to 8/1/75
301.5 BFW	45	304	10/1/73
"	57	343	10/4/73
"	192	256	12/14/73
"	236	400	1/14/74
"	276	244	1/31/74
"	325	243	2/20/74
"	340	440	2/28/74
"	360	244	3/8/74
"	366	372	3/12/74
"	369	372	3/12/74
"	371	232	3/13/74
"	389	272	3/21/74
"	390	270	"
"	393	270	"
"	394	270	"
"	395	270	"
"	397	365	3/22/74
"	398	365	"
"	439	250	4/5/74
"	444	250	"
"	1006	274	10/29/74
"	1010	255	10/31/74

DETAILS, continued

V. FINDINGS, continued

F. continued

Class/Mix No.	Sample No.	Cubic Yards Sample Represents	Date(s) of Pours Sample Represents (See NOTE 3)
300.75 BFW	180	256	12/4 to 12/14/73
"	559	232	5/23/74
(See NOTE 1)	1431	358	4/25/75
400.75 AFW	2110	178	12/23/75
400.75 AFW2	1435	446	7/2 to 12/29/75
501.5 AFW	2856	160	9/8/76
500.75 AFW	1477	264	5/9/to 5/21/75
"	1548	180	6/6/75
"	1578	184	6/16/75
"	1775	250	8/14 to 8/27/75
"	2504	160	5/3 to 5/4/76
"	2534	160	5/13 to 5/14/76
"	2797	212	8/17/76
(See NOTE 2)	2473	170	4/22 to 4/26/76
501.5 BFW	479	196	4/22/74
"	533	190	5/16/74
"	536	190	"
"	542	168	5/17/74
"	557	158	5/23/74
"	561	158	"
"	569	160	5/31/74
"	571	160	"
"	590	212	6/7/74
"	591	162	"
"	586	204	6/5/74
"	623	160	6/20/74
500.75 BFW	560	160	5/23/74
"	630	232	6/27/74

DETAILS, continued

V. FINDINGS, continued

F. continued

NOTES:

1. Sample No. 1431 is shown as Mix No. 300.75AFW2 and 400.75 AFW2. This sample is also shown to be used for a pour requiring a 5000 psi concrete mix. The TVA Concrete Cylinder Data Sheet, dated 4/24/75, shows a 3000 psi concrete mix was batched.

2. Sample No. 2473 is shown as Mix No. 300.75 AFW2 and 500.75 AFW. The TVA Concrete Cylinder Data Sheet, dated 4/22/76, shows mix 500.75 AFW was batched.

3. The use of a Sample to represent pours (concrete placements) on more than one day is not addressed in this Report.

The Concrete Tracking System provided additional information regarding the sampling of concrete, however, the above data provides the basic information for this Interim Report.

VI. CONCLUSIONS:

The Concern is substantiated.

For compressive strength, WBNP structural concrete used for Seismic Category I structures did not meet the WBNP FSAR commitment and General Construction Specification G-2 requirement for percentage of strength test results required to be equal to or greater than the specified strength at the specified age. This condition has not been identified, documented and dispositioned as a nonconforming condition.

DETAILS

VI. CONCLUSIONS, continued

For sampling frequency for strength tests, the quantities of concrete represented by each sample are generally within the WBNP FSAR commitments and Specification G-2 requirements. However, more than fifty samples reflect noncompliance, and this condition has not been identified, documented and dispositioned as a nonconforming condition.

Additionally, the current WBNP FSAR commitment regarding sampling frequency is incomplete (not stated for 2000 psi) and is inconsistent (not the same for 3000 psi and over) with respect to the limitations stated in the current Specification G-2 and Procedure WBN-QCP-2.02.

The above conditions are potentially significant conditions adverse to quality. These conditions, including evaluation of significance, determination of cause and affect, and remedial and preventative corrective action, have not been previously identified, documented, reported to appropriate levels of management, and addressed in a manner consistent with quality assurance program requirements for nuclear power plants. The satisfactory performance of the Seismic Category I (safety-related) concrete structures is dependent on attaining the strength of concrete, as designed and specified at the age specified. The frequency of sampling and testing must adequately assure the attainment of required strength. The conditions identified in this Report reflect nonconformance or deficiency in characteristic, documentation and/or procedure, which renders the quality of the affected Seismic Category I concrete structures unacceptable or indeterminate. This deficiency in design and/or construction if left uncorrected, could adversely affect the safety of operations of WBNP, and represents a significant breakdown in a portion of the quality assurance program under 10CFR50, Appendix B.

Accepted by
Bruce A. Young
2-6-86

PREPARED BY: J. T. Nation 1-31-86
DATE

REVIEWED BY: D. E. Sheen 1/31/86
DATE

TVA 64 (OS-9-65) (OP-WP-5-85)

UNITED STATES GOVERNMENT

Memorandum TENNESSEE VALLEY AUTHORITY

TO: W. T. Cottle, Site Director, Watts Bar Nuclear Plant

FROM: K. W. Whitt, Director of Nuclear Safety Review Staff, E3A8 C-K

DATE: FEB 07 1986

SUBJECT: NUCLEAR SAFETY REVIEW STAFF INVESTIGATION REPORT TRANSMITTAL

Transmitted herein is Report No. IN-86-022-002

Subject Unskilled Personnel

Concern Nos. IN-86-022-002; IN-86-022-X03

and associated recommendations for your action/disposition.

It is requested that you respond to this report and the attached recommendations by March 6, 1986. Should you have any questions, please contact B. F. Siefken at telephone 6230-K.

Recommend Reportability Determination: Yes X No ____

Bruce F. Siefken
for Director, NSRS/Designee

BFS:JTH
Attachment
cc (Attachment):
H. L. Abercrombie, SQN
W. Bibb, BFN
James P. Darling, BLN
R. P. Denise, LP6N40A-C
D. R. Nichols, E10A14 C-K
QTC/ERT, Watts Bar Nuclear Plant
E. K. Sliger, LP6N48A-C

--Copy and Return--

To : K. W. Whitt, Director of Nuclear Safety Review Staff, E3A8 C-K

From: _____

Date: _____

I hereby acknowledge receipt of NSRS Report No. _____
Subject _____ for action/disposition.

_____ _____
Signature Date

20

Buy U.S. Savings Bonds Regularly on the Payroll Savings Plan

EMPLOYEE CONCERN NUMBERS: IN-86-022-002; IN-86-022-X03

Q-86-022-002-01: INADEQUACIES IN CONTROL OF TEMPORARY ALTERATIONS

The attached QTC report identifies numerous instances of failure to comply with procedures, inadequate procedures, and different interpretations of procedures involved with the control of temporary alterations to permanent plant equipment. These findings should be addressed individually for corrective actions. Additionally, the number of problems found indicates that an overall assessment of the control adequacy in this area needs to be done. This assessment should indicate the root causes of the problems and the actions necessary to prevent reoccurrence.

Principally prepared by Bruce F. Siefken.

DETAILS, continued

PERSONNEL CONTACTED, continued CONFIDENTIAL

DOCUMENTS REVIEWED:

NSRS report, R-84-05-WBN, "Operational Readiness Review-Phase II", dated 6/4/84.

NRC Inspection Report, 50-390/84-42, dated 7/4/84
TVA Internal Correspondence with Reference to Quality Engineering Branch (QEB) Reviews of Completed Data, ARMS Document Number L.17 840329 817

TVA Watts Bar FSAR - NRC Question Number 040.10

Quality Notice, NQAM Part II Section 6.4, "Testing of Temporary Alterations" dated 8/27/85.

Procedure, N-OQAM Part II, Section 6.4, "Control of Temporary Alterations" Revision dated 11/5/84

Procedure, N-OQAM, Part III, Section 6.1, "Selection and Training of Personnel for Nuclear Power Plants", Revision dated 10/12/84.

CONCERN NO: IN-86-022-002, IN-86-022-X03

DETAILS, continued

DOCUMENTS REVIEWED, continued

Procedure, N-OQAM Part II, Section 2.1, "Plant Maintenance" Revision dated 4/28/85

WBNP Administrative Instruction, AI 2.15, "Temporary Alterations", Revision 13, dated 9/4/85.

WBN, WB2.1.13 Attachment "A", ID No: 1340, Plant Quality Assurance Group's Review of Changes, N-OQAM Part II Section 6.4, for Impact on WBNP Instruction AI-2.15, dated 11/15/85

WBNP Administrative Instruction, AI-2.19, Revision 4, dated 7/11/85, "Independent Verification".

WBNP Mechanical Maintenance Section Letter, MSL 2.14, Revision 1, dated 2/23/85, "Independent Verification."

WBNP Instrument Section Instruction Letter No. 3.8,. Revision 7, dated 6/20/85, "Configuration Control of Instrument Maintenance Activities."

WBNP, Plant Quality Assurance Section Letter, PQA-SIL-5.1, Revision 22, dated 12/11/85, "Survey Program".

WBNP Quality Surveillance Section 1985 Surveillance Plan, dated 12/11/85

WBNP-PQA Completed Survey Summary - (a) For the Period January thru October, 1985 and; (b) for the Year 1984.

WBNP Field Change Request: FS-458, 510, 567 and 594

WBNP Nonconforming Condition Reports:

NCR	Revision	Date
5612	0	5/1/84
	1	6/12/84
	2	10/12/84
5228	0	11/18/83

WBNP Drawings: 47W492 - 6 Revision 14
47W600 - 228 Revision 9

DETAILS, continued

SUMMARY OF INVESTIGATION

This concern is substantiated. This investigation was conducted from 12/4/85 to 12/21/85. The objective of this investigation was to determine if:

i) WBNP procedures specify qualifications and requirements for personnel performing the independent verification of temporary alterations on permanent plant equipment;

ii) Falsification of documents relative to temporary alteration of permanent plant equipment occurred due to this concern.

The following is an overview of the investigation results:

1. WBNP Administrative Instruction AI-2.15, "Temporary Alterations", Revision 13, dated 9/4/85, specifies that temporary alterations to permanent plant equipment be independently verified by qualified personnel. This instruction requires that independent verifiers of work activities be qualified in accordance with AI-2.19, "Independent Verification".

2. Administrative Instruction, AI-2.19, "Independent Verification", Revision 4, dated 7/11/85, specifies that each discipline supervisor is responsible for establishing the minimum levels of qualification for personnel designated to perform independent (Second Party) verification activities.

3. The concern originated as a result of management personnel utilizing unskilled personnel to perform temporary alteration activities. Applicable procedures require independent verifiers to be qualified in accordance with those procedures.

4. This investigation identified three instances wherein unauthorized personnel performed independent verification activities relative to temporary alterations to permanent plant equipment.

5. The PQA-Surveillance program does not include verification of personnel qualification requirements contained in AI 2.15 and AI 2.19.

6. AI 2.15, "Temporary Alterations", requirements for updating drawings and instructions have been misinterpreted by the NucPwr personnel.

DETAILS, continued

Overview, continued

7. Several deficiencies exist in complying with the instructions while filling out NucPwr TACF's. (See Attachments 1 and 2)

FINDINGS

Initial discussions with the concerned individual (CI) indicated that the concern originated as a result of craft foremen assigning subjourneymen (unskilled craftworker) to perform independent verifications of temporary alterations on permanent plant equipment. The CI questioned the adequacy of Quality Assurance resulting from an unskilled craft person performing the independent verification of the installation and/or removal of permanent plant item or equipment. The CI cited an instance where a Critical Structures, Systems and Components (CSSC) piece of equipment, located at Intake Pump Station, was temporarily altered.

The alteration required that a temporary valve bonnet, made from a material different from the original material, be installed and removed, via a Temporary Alteration Control Form (TACF). The installation activity was verified for adequacy by an unskilled (subjourneymen) craft person at WBNP. The CI did not remember the exact time frame and applicable TACF number, but did indicate that the subject TACF involved a System 26 Fire Protection Pump Valve located in the Intake Pump Station. The subjourneymen involved (CONFIDENTIAL) was not qualified as an independent verifier. The CI is concerned that temporary alterations made to permanent plant equipment which would be made permanent and verified by unskilled personnel, may render the quality of the work indeterminate.

Several discussions and interviews were conducted with cognizant personnel.The purpose of these discussions and interviews was to determine if:

* Cognizant management personnel were aware that subjourneymen (unskilled craft workers) were permitted to perform independent verification activities relative to TACF's;

* Cognizant management personnel were aware that these actions do not comply with procedural requirements contained in AI 2.15 and AI 2.19 relative to personnel qualifications of independent verifiers;

DETAILS, continued

FINDINGS, continued

* Exceptions to approved procedure requirements have been documented, reviewed and evaluated per site procedures;

* There is falsification involved, (i.e., an unskilled craft worker verified the work adequacy on a TACF and signed-off for that activity).

The discussions revealed that:

* Cognizant management personnel, did not knowingly permit the subjourneymen to perform the required independent verification;

* Cognizant management personnel were not aware of the procedural violation;

* The exceptions to applicable procedure requirements were not documented, reviewed and evaluated.

* There was no falsification of documents involved (i.e., an unskilled craft worker verified the work adequacy relative to a temporary alteration and signed-off for that activity).

Some of the personnel interviewed expressed that they might have misunderstood the procedure (AI 2.15, requirements for a second party verification). They thought that an independent (Second party) verifier means anybody other than the person who installed and/or removed a "TACF" item. These individuals did not realize that the independent (Second Party) verifier should be as equally qualified as the installer. From the above discussions, the investigator concluded that there is neither a willful wrongdoing nor a record falsification involved in those instances where subjourneymen had signed-off the "TACF's" as the independent verifiers. However, it must be noted that the quality aspects of the work performed, in those instances where unskilled craft workers performed the independent verification activities, is indeterminate.

Discussions with the Nuclear Power Quality Assurance Staff indicated that the site operations quality assurance surveillance activity does not include verification of personnel qualifications for those individuals performing the independent verifications. No reasons were

DETAILS, continued

FINDINGS, continued

given for not including an attribute in the surveillance checklists which would assure that the required independent verification activities are being accomplished by qualified personnel in accordance with the applicable site administrative instructions.

During the course of this investigation, several closed TACF's (with corresponding MR's, FCR's and WP's) and PQA-Survey Reports were reviewed. Several documentation deficiencies were noted in the initiation and closure of these TACF's. Some of the deficiencies noted were: incomplete instructions, incomplete justifications, incomplete tagging information, incomplete or incorrect references to drawings or instructions affected, incomplete identification of methods for TACF closure, incomplete information relative to "installed by" and "verified by" on TACF's, absence of "PORC" approval, and absence of necessary document update information. A review of PQA-Survey Reports indicated that most of the TACF documentation deficiencies noted in this investigation have been identified, reviewed, and evaluated and, with the exception of personnel qualification deficiencies of personnel performing independent verification activities, are being rectified via Corrective Action Report (CAR) and/or Discrepancy Report. (See Attachment 1 & 2)

The following is a list of findings noted during this investigation:

1. The minimum qualification requirements for personnel designated as independent verifiers in the Mechanical Maintenance, Electrical Maintenance and Instrumentation and Control Maintenance Sections were reviewed and discussed with cognizant personnel. Section Letters MSL 2.14 and ISL 3.8 specify qualification levels and designate personnel who are authorized to perform independent verification activities. However, a similar section letter or any other document appropriately reviewed and approved by the plant management is not available for use in the Electrical Maintenance Section. This is contrary to the requirements of AI-2.19,"Independent Verification".

DETAILS, continued

FINDINGS, continued

2. Plant Quality Assurance - Surveillance activities do not include a verification of personnel qualifications, to ensure compliance with AI 2.19, "Independent Verification" during the surveillance of temporary alteration activities.

3. The "as-constructed" controlled drawings located in the Shift Engineer's (SE) Office and the Control Room are inconsistently updated by the responsible TACF originating organizations. It was noted that:

   * AI 2.15 Step 2.0 "Scope", states in part, that the marking of the temporary alteration, on all controlled copies of the "as-constructed" drawings, are not required for CSSC temporary alterations prior to receipt of operating license for the unit involved.

   * AI 2.15 Step 5.d specifies that the originating organization marks up Shift Engineer's and affected unit control room's controlled copy "as-constructed" drawings to reflect the temporary alteration.

   * AI 2.15 Step 6.4 Paragraph 7, Item 3 specifies that prior to fuel loading all CSSC TACF's which were initiated prior to receipt of the operating license and which have not been removed shall be marked on the appropriate drawings in DCU by the responsible section.

   * AI 2.15 Step 6.4.1.2 "CSSC Operable Equipment - Instruction and Drawing Revision" specifies that: a). The SE's controlled copy of the "as-constructed" drawings and the affected unit control room's "as-constructed" drawings shall be marked before the system is declared operable; b).if a temporary alteration to system configuration is to remain on an operable system beyond 30 days, all controlled copies of the "as-constructed" drawings shall be marked.

DETAILS, continued

FINDINGS, continued

Noted Findings, 3, continued

* AI 2.15, Step 8.1 provides instructions for TACF initiation, approval, installation and return to normal. Instructions 18 and 24 specifies that: a). "As-constructed" drawings be marked-up and surveillance/operating instructions be up-dated, b). the section responsible for the temporary alteration shall sign/date indicating the drawings and instructions are updated; and c). an STA/SRO should verify the drawings and instructions have been properly revised.

All of the above activities to be accomplished both at the time of temporary alteration installation and removal. The intent of the above procedural instructions appears to be that the shift engineer, control room operators and shift technical advisors (STA) must always be aware of all of the plant equipment's operability and/or impairments regardless of the unit's license conditions (Fuel Loaded or not), and therefore the drawings and/or instructions affected by a temporary alteration of a permanent plant equipment should reflect accordingly in the SE, STA and/or affected unit's control room drawings and/or instructions. However, a revision to all "as-constructed" drawings, controlled and distributed by the drawing control unit, need not be accomplished by a responsible engineer, even when a temporary alteration remains open beyond thirty days. This requirement appeared to have been waived from implementation, prior to fuel-loading and/or plant licensing, per applicable sections of procedure AI 2.15.

The above AI 2.15 requirements relative to marking and posting a TACF on an affected drawing(s) have been misinterpreted by the organizations responsible for originating a TACF including the PQA Surveillance staff. Some of the interviewees stated that they would not mark the temporary alteration information in the SE and Control Room "as-constructed" controlled drawings because WBNP-Unit 1 did not receive an operating license. Some interviewees

DETAILS, continued

FINDINGS, continued

Noted Findings, 3 continued

indicated that they would mark the SE and Control Room "as-constructed" controlled drawings if the TACF remains open for more than 30 days. Some individuals indicated that they would markup the drawings affected by a TACF immediately after the temporary alteration is accomplished, however they might not indicate this on the TACF. Sometimes, the responsible engineer would not re-revise the drawing even though the temporary alteration of a CSSC equipment has been restored, because, a new drawing revision might be in effect at the time of equipment restoration, which might not contain the temporary alteration information that was previously posted on the superseded drawing.

A review of several "TACF's" which affected applicable drawings indicated that the appropriate sign-off areas which would indicate the accomplishment of updating the SE's and/or affected unit control room's controlled "as-constructed" drawings, has not been filled-out by the responsible "TACF" originating organization. Also, an STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected by TACF's.

A review of PQA Survey Reports and corresponding surveillance checklists prepared and approved for surveilling the temporary alteration control activities indicated that the SE's and Control Room "as-constructed" controlled drawing update to reflect the applicable "TACF", has not been verified and in most of the instances it was indicated that the requirement was not applicable until the unit is permitted for operation. It appears from the above discussions and reviews that the training of cognizant personnel, in the implementation of AI 2.15 requirements, relative to updating of documents affected by a TACF is inadequate.

DETAILS, continued

FINDINGS, continued

4. Several individuals expressed a concern relative to drawing revisions and the posting of open TACF's on the revised drawings. There is no procedural control to assure that the DCU personnel responsible for updating controlled drawing files at the Shift Engineer's Office and Control Room have posted or transferred all of the information relative to an open TACF onto a revised drawing.

5. TACF No.0-84-95-271 was initiated on 7/20/84 and was closed on 9/7/84. A closed copy of the TACF indicated that the temporary installation and removal activities were accomplished on a CSSC equipment in accordance with MR No.A-404683. A completed and signed copy of the MR is not available at the Nuclear Power QA Records Vault as of 12/10/85.

6. TACF No. 0-84-120-26, was reviewed to determine the adequacy of the temporary alteration and also to determine if the subjourneymen falsified the document by signing as a "craft inspector" (according to the CI the word "craft inspector" means "Independent Verifier"). This review revealed that the bonnet of valve, No. 0-SPV-26-561 (System 26) was fabricated at the site from ASTM A331 Grade 4140 material and was installed until such time that the actual replacement bonnet fabricated from SA 105 material could be obtained.

   The temporary installation of the valve bonnet was verified by a person who was not authorized to perform the verification of installation and/or removal activity. This verification activity does not meet the criteria for independent verification specified in AI 2.15 and AI 2.19. Discussions with the personnel responsible for this activity indicated that they were not fully aware of the independent verification requirements as specified in AI 2.15 and AI 2.19. They were under the impression that the "verified by" space of the TACF could be initialed/signed by any individual

DETAILS, continued

FINDINGS, continued

Noted Findings, 6 continued

witnessing the activity and they did not realize that the verification signature/initial signifies the acceptability of the work performed. The TACF installation verification activity stated by the CI did not comply with AI 2.15 and AI 2.19 procedure requirements. This investigation could not establish conclusively that there existed a false motive or an intent to violate the procedure relative to TACF installation verification. The subject TACF was closed-out when the temporary bonnet was replaced with a permanent valve bonnet, and verified by a qualified individual. This investigation noted some additional deficiencies in the completion of the subject TACF per the instructions provided in Step 8.1 of AI 2.15. (See Attachment 1 of 2)

7. TACF No. 0-84-100-30 was initiated on 8/16/84 to properly re-connect the differential pressure indicator sensing lines (System 30) in the Auxiliary Building Gas Treatment System trains A & B, which were found to have been installed backwards during the performance of Surveillance Instruction SI-7.9 & Pre-Operational Test TVA -9A tests. The TACF description of alteration also indicated that WBNP Drawing 47W920-40, Revision 7 was incorrect. The sensing lines were installed per the TACF and verified on 8/24/84. The temporary installation was requested to be made as a permanent change to the plant equipment via a Field Change Request No. FS-510, and the TACF was closed on 8/28/84. A review of this TACF did not reveal a document falsification. However, the review revealed the following inadequacies:

(a) The TACF installation activity was verified by a person who was not authorized or qualified to perform an independent verification per the procedures AI 2.15 and AI 2.19.

(b) An NCR was not generated to document, evaluate and provide necessary corrective actions, even though the installation at the time of the intended testing was found to have been incorrectly installed and accepted.

DETAILS, continued

FINDINGS, continued

Noted Findings, 7 continued

(c) FCR No. FS-510 was not approved by the cognizant "ENDES" Engineer, and the TACF was closed without providing a documented justification for implementing a permanent change to plant equipment.

8. TACF No. 0-85-75-29 was reviewed to determine the adequacy of the temporary alteration and also to determine if the subjourneymen falsified the document by signing as an independent verifier. This review indicated that the temporary alteration required the installation and subsequent removal of a check valve in System 29 cold water (potable) supply lines to the facemask washers which was noted to be non-CSSC equipment. The check valve installation was verified by a qualified individual. However, the removal activity via TACF 0-85-95-29, was verified by a subjourneyman, which was the process utilized to close TACF 0-85-75-29. This review revealed that there was neither a safety concern nor a falsification of documentation attributable to the activity accomplished per TACF 0-85-75-29.

CONTACT WITH CI: Several attempts were made to contact the concerned individual and discuss the investigation results. However, these attempts were not successful.

CONCLUSIONS

This investigation concluded that the portion of the concern relative to the utilization of unskilled personnel for performing independent verification activities is substantiated. However, the claim that the documentation was falsified by a craft persons, cannot be substantiated. The above conclusions are based on the following investigation results:

1. TACF's 0-84-120-26, 0-84-100-30 and 0-85-75-29 were signed-off by subjourneymen who were not authorized to perform independent verification activities prescribed in AI 2.15 and AI 2.19.

DETAILS, continued

CONCLUSIONS, continued

2. Objective evidence is not available to indicate that documentation is signed-off with an intent to falsify records. Also, no motives for willful procedure violations could be established.

3. Some of the cognizant individuals responsible for implementing the temporary alteration instructions did not realize the significance of independent verification requirements specified in AI 2.15 and AI 2.19.

4. The investigation revealed that AI 2.15 requirements for the initiation, approval, installation and return to normal of temporary alternation controls were misinterpreted by cognizant individuals which resulted in the origination of the subject concern.

OBSERVATIONS:

1. During the review of Procedure AI 2.15, Revision 11, it was noted that Step 6.4 Paragraph 4 indicated that a DCR or FCR must be submitted if an alteration was to remain in effect for more than 60 days, unless removed prior to operation of the affected system. Paragraph 5 specifies that the plant manager may waive the DCR/FCR requirement provided the temporary alteration is of recognized duration. However, this procedure fails to explain the definitions of the words such as "recognized duration" and "long-term testing". It also fails to address the documentation requirements necessary to obtain a waiver from the Plant Manager.

2. Procedure AI 2.15 specifies that affected drawings, operating instructions and/or surveillance instructions should be revised to reflect a temporary alteration of a permanent plant equipment. These activities were to be accomplished by the originating organization as well as operations group. However, the instructions in this procedure fail to identify how the cognizant individuals would fulfill their responsibility. No references to applicable activity procedures were included in the procedure.

3. WBNP Administrative Procedures AI 2.15 and AI 2.19 specifies requirements for performing independent verification of work performed on permanent plant items or equipment which are classified as CSSC or Non-CSSC. These verification activities are to be accomplished by an individual who is designated as an independent verifier by a cognizant section supervisor.

CONCERN NO: IN-86-022-002, IN-86-022-X03

DETAILS, continued

OBSERVATIONS, continued

3. continued

The purpose of any independent verification is to determine that the work performed on a permanent plant equipment is in accordance with appropriate written and approved work instructions, and to make sure that the work accomplished is in full compliance with the documented instructions. However, these procedures failed to address the following:

* Whether or not the independent verifier is required to document and process any nonconformance that is observed relative to the work being verified.

* Any other instructions for documenting and evaluating an observed unacceptable work.

4. The purpose of a temporary alteration (AI 2.15) to a permanent plant equipment is to accomplish activities relative to maintenance, operations surveillance and/or test objectives, in order to assure safe and continued operability of plant equipment. The temporary alteration control procedure discourages abuse of this privilege by the plant personnel. However, discussions with cognizant plant personnel indicated that they were utilizing the temporary alteration instructions to correct construction and/or potential design deficiencies. The reason for this practice was due to the tedious paperwork involved. For example: DCR, FCR, Drawing Revision, etc. However, the above practice, if continued, may not provide the management an opportunity to accurately assess and implement the required corrective actions, preventative measures by procedure revisions and/or personnel training.

Accepted by
Bruce L. Lighter
2-6-86

PREPARED BY: Krishna Mohan Vadlamani 2/3/86
DATE

REVIEWED BY: O. J. Thero 2/3/86
DATE

ERT FILE: IN-86-022-002 & IN-86-022-X03

REVIEW OF TEMPORARY ALTERATION CONTROL FORMS (COMPLETED)

ATTACHMENT 1 OF 2

TACF NUMBER	CSSC YES/NO	ORIGINATED BY	*DEFICIENT IN "TACF" FILL-OUT INSTRUCTION	REMARKS
0-84-100-300	YES	MM	17.) Unauthorized individual performed indepp-endent verification of installation. 18 & 24) STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected. 23) Temporary alteration removal method was disapproved by ENDES	Quality Indeterminate Procedure deviations not documented and justified.
0-84-120-26	YES	MM	17) Unauthorized individual performed independent verification of installion. 18 & 24) STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructons affected. 12. Originator's section supervisor's review not indicated.	Procedure deviations not documented and justified.
1-84-95-85	YES	MM	18 & 24) STA/SRO did not indicate verification of appropriate revisions to drawing and/or instructions affected	Procedure deviations not documented and justified

*Number in this column corresponds with AI2.15 Step 8.1, TACF fill-out instruction.

TACF NUMBER	CSSC YES/NO	ORIGINATED BY	DEFICIENT IN "TACF" FILL-OUT INSTRUCTION	REMARKS
0-84-96-31-R1	YES	MM	5) Description does not provide dimensions of the item to be installed. Desired increase in air flow is not listed/ 19 & 24) STA/SRO did not inidicate verification of appropriate revisions to drawings and/or instructions affected.	Procedure deviations not documented and justied.
1-84-115-3	YES	MM	4) & 23 Emergency temporary alteration installation and removal instruction numbers not included 18 & 24 STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	Quality Status indeterminate Procedure dedeviations not documented and justified.
0-84-117-67	YES	MM	18 & 24 STA/SRO did not indicate verification of appropriate revisions to drawings and/ or instruction affected.	MR.#A-482403 which installed the "TA" is not filed with NucPwr Records Group as of 1/8/86. Procedure deviations not documented and justified.

*Number in this column corresponds with AI2.15, Step 8.1, TACF fill-out instruction.

TACF NUMBER	CSSC YES/NO	ORIGINATED BY	*DEFICIENT IN "TACF" FILL-OUT INSTRUCTION	REMARKS
1-84-104-26	YES	MM	8. Drawings Affected by Alteration not listed 18 & 24. STA/SRO did not indicate verification of apropriate revisions to drawings and/or instructions affected.	*Alteration Installation MR 401175 does not address the process for installation, i.e., welded or screwed connection. *Installation MR indicated installation of a Non-QA nipple. Documented justification for this non-compliance from recurring was not provided. *Procedure deviations not documented and justified.
1-84-86-87	YES	MM	8. Drawings affected by alteration not listed. 23. Alteration removal method not indicated 18 & 24. STA/SRO did not indicate verification of appropriate revisions to drawing and/or instructions affected. 22. Loss of tag documented but impact not evaluated and documented.	Procedure deviations not documented and and justified.

*Number in this column corresponds with AI2.15, Step 8.1, TACF fill-out instruction.

TACF NUMBER	CSSC YES/NO	ORIGINATED BY	*DEFICIENT IN "TACF" FILL-OUT INSTRUCTION	REMARKS
0-85-75-29	YES	MM	22. Alteration removal verification by an unauthorized person. 18 & 24. STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Procedure deviations not documented and justified.
0-85-83-12	NO	MM	18 & 24. STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Procedure deviations not not documented and justified.
0-85-91-12	NO	MM	NONE	Satisfactory
0-85-93-12	NO	MM	NONE	Satisfactory
1-84-117-27	NO	MM	4. Installation Instruction or Document Number not listed. 18 & 24 STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Procedure deviations not documented and and justified.

*Number in this column corresponds with AI2.15,Step 8.1, TACF fill-out instruction.

ATTACHMENT 1 OF 2

TACF NUMBER	CSSC YES/NO	ORIGINATED BY	*DEFICIENT IN "TACF" FILL-OUT INSTRUCTION	REMARKS
0-84-95-271	YES	MM	18 & 24. STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*As of 1/8/86 "TA" installation and removal MR, 404683 was not filed with QA Records, NucPwr *Procedure deviations not documented and justified.
1-85-57-82	NO	DPSO	18 & 24. STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Procedure deviations not not documented and justified
1-85-62-57	NO	DPSO	NONE	Satisfactory
0-85-67-31	NO	EM	NONE	Satisfactory
0-85-52-65 0-85-51-65	YES	EM	18 & 24 STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Procedure deviation not documented and justified.

*Number in this column corresponds with AI2.15, Step 8.1, TACF fill-out instruction

TACF NUMBER	CSSC YES/NO	ORIGINATED BY	*DEFICIENT IN "TACF" FILL-OUT INSTRUCTION	REMARKS
1-85-60-55	NO	EM	24. Drawings marked up during installation were not indicated to have been brought back to normal.	*Incomplete verification of TACF closure.
1-85-51-250	NO	EM	NONE	Satisfactory
0-85-54-250	--	EM	1. Equipment safety classification not indicated. 18 & 24. STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Procedure deviations not not documented and justified.
1-85-63-234	YES	EM	NONE	Satisfactory
0-85-44-82	?	IM	NONE	*TACF identified the affected equipment to be Non-CSSC. MR 527558, which closed the TAC indicated the equipment affected to be CSSC. *MR-528659, which is filed at QA Records was found to be incomplete as of 1-8-86. Yet TACF is closed. No explanations provided on TACF or MR

*Number in this column corresponds with AI2.15, Step 8.01,TACF, fill-out instruction.

TACF NUMBER	CSSC YES/NO	ORIGINATED BY	DEFICIENT IN "TACF" FILL-OUT INSTRUCTION	REMARKS
0-85-68-257	NO	IM	NONE	Satisfactory
1-84-100-2	NO	IM	18 & 24 STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Procedure deviations not documented and justied.
1-84-110-68	YES	IM	4 & 23. "TA" installation and removal instruction performed in an uncontrolled manner.	*Procedure deviations not documented and justified.
0-84-110-31	YES	IM	5.e Equipment's original set point not indicated. 8. Drawings(s)affected not included. 18 & 24. STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Procedure deviations not documented and justified.
1-85-49-30	YES	IM	NONE	Satisfactory
1-85-56-68	NO	IM	18 & 24 STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Procedure deviations not documented and justified.

*Number in this column corresponds with AI2.15, Step 8.1 TACF fill-out instruction

TACF NUMBER	CSSC YES/NO	ORIGINATED BY	DEFICIENT IN "TACF" FILL-OUT INSTRUCTION	REMARKS
1-85-50-261	NO	IM	18 & 24. STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Procedure deviations not documented and justified.
1-85-105-3	YES	IM	18 & 24 STA/SRO did not indicate verification of appropriate revisions to drawings and/or instructions affected.	*Installation document number not indicated. It appears that installation of TA was accomplished well prior to the initiation of TACF. *Procedure deviations not documented and justified.

*Number in this column corresponds with AI2.15 TACF fill-out instruction

ERT FILE: IN-86-022-002 & IN-86-022-x03

REVIEW OF PQA-SURVEY REPORTS

ATTACHMENT 2 OF 2, SHEET 1 OF 1

PQA SURVEY NUMBER	REPORT DATE	REVIEW OF APPLICABLE CAR*	REVIEW OF APPLICABLE DR**	REMARKS
AS-84-67	3/12/84	NONE	NONE	SATISFACTORY
AS-84-77	3/20/84	NONE	NONE	SATISFACTORY
AS-84-84	4/2/84		WB-DR-84-129R	SATISFACTORY
26TA-84-1	5/23/84	WBN-CAR-84-24	NONE	SATISFACTORY
AS-84-115	6/28/84	NONE	WB-DR-84-166R -192R -193R -194R	SATISFACTORY
AS-84-131	8/14/84	NONE	NONE	SATISFACTORY
AS-85-18	2/14/85	NONE	NONE	SATISFACTORY
26TA(a)-85-1	2/27/85	NONE	NONE	SATISFACTORY
26TA(c)-85-1	3/29/85	WB-CAR-84-08	WB-DR-84-23R -24R	SATISFACTORY
AS-85-54	4/30/85	WB-CAR-85-18A -18B -19 -22	WB-DR-85-92R -85R	SATISFACTORY
AS-85-65	5/8/85	WB-CAR-85-18A -18B (ADDENDUM TO)	NONE	SATISFACTORY
AS-85-101	7/31/85	WB-CAR-85-39	WB-DR-85-135R	SATISFACTORY
AS-85-100	7/26/85	WB-CAR-85-36	NONE	SATISFACTORY
AS-85-99	7/26/85	NONE	WB-DR-85-163R	SATISFACTORY
26TA(a)-85-2	7/31/85	WB-CAR-85-39	WB-DR-85-135R	SATISFACTORY
AS-85-120	9/3/85	NONE	WB-DR-85-163R	SATISFACTORY

*CORRECTIVE ACTION REPORT
**DISCREPANCY REPORT

FINAL

REQUEST FOR REPORTABILITY EVALUATION

1. Request No. IN-86-022-002 _____
   (ERT Concern No.) (ID No., if reported)

2. Identification of Item Involved: Temporary Alterations
   (Nomenclature, system, manuf., SN, Model, etc.)

3. Description of Problem (Attach related documents, photos, sketches, etc.)

Unskilled people (sub-journeymen) working on maintenance equipment and other items. Sub-journeymen signed off as a craft inspector. CI has no more information.

4. Reason for Reportability: (Use supplemental sheets if necessary)

A. This design or construction deficiency, were it to have remained uncorrected, could have affected adversely the safety of operations of the nuclear power plant at any time throughout the expected lifetime of the plant.

No _____ Yes __X__ If Yes, Explain: If installation activities are verified by unqualified personnel for acceptance, then installation deficiencie may go [illegible]tected. This could affect safe operation of the plant.

AND

B. This deficiency represents a significant breakdown in any portion of the quality assurance program conducted in accordance with the requirements of Appendix B.

No _____ Yes __X__ If Yes, Explain: Installation activities accomplished in an uncontrolled manner would constitute violation of Criteria II, V, X of 10 CFR 50, Appendix B - Quality Assurance.

OR

C. This deficiency represents a significant deficiency in final design as approved and released for construction such that the design does not conform to the criteria bases stated in the safety analysis report or construction permit.

No __X__ Yes _____ If Yes, Explain: _____

OR

REQUEST FOR REPORTABILITY EVALUATION

D. This deficiency represents a significant deficiency in construction of or significant damage to a structure, system or component which will require extensive evaluation, extensive redesign, or extensive repair to meet the criteria and bases stated in the safety analysis report or construction permit or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function.
No __X__ Yes _____ If Yes, Explain: _____

OR

E. This deficiency represents a significant deviation from the performance specifications which will require extensive evaluation, extensive redesign, or extensive repair to establish the adequacy of the structure, system, or component to perform its intended safety function.
No _____ Yes __X__ If Yes, Explain: All of the temporary alterations accomplished utilizing unskilled personnel for verification purposes would require an extensive evaluation to determine and implement necessary corrective and preventative actions.

IF ITEM 4A, AND 4B OR 4C OR 4D OR 4E ARE MARKED "YES", IMMEDIATELY HAND-CARRY THIS REQUEST AND SUPPORTING DOCUMENTATION TO NSRS.

This Condition was Identified by: D. B. Shaw — 365-4464
ERT Group Manager — Phone Ext.

D. B. Shaw — 365-4464
ERT Project Manager — Phone Ext.

Acknowledgment of receipt by NSRS

Robert L. Sipher — Date 2-6-86 — Time 0754
Signed

ERT Form M

REQUEST FOR REPORTABILITY EVALUATION

1. Request No. IN-86-022-X03 (ERT Concern No.) _____ (ID No., if reported)

2. Identification of Item Involved: Temporary Alterations (Nomenclature, system, manuf., SN, Model, etc.)

3. Description of Problem (Attach related documents, photos, sketches, etc.)

Sub-journeyman (craft known) signed off as a craft inspector. Falsification of documents. *Construction Department concern. CI ha no more information.

4. Reason for Reportability: (Use supplemental sheets if necessary)

A. This design or construction deficiency, were it to have remained uncorrected, could have affected adversely the safety of operations of the nuclear power plant at any time throughout the expected lifetime of the plant.

No __X__ Yes _____ If Yes, Explain: _____

AND

B. This deficiency represents a significant breakdown in any portion of the quality assurance program conducted in accordance with the requirements of Appendix B.

No __X__ Yes _____ If Yes, Explain: _____

OR

C. This deficiency represents a significant deficiency in final design as approved and released for construction such that the design does not conform to the criteria bases stated in the safety analysis report or construction permit.

No __X__ Yes _____ If Yes, Explain: _____

OR

*ERT concern file review indicated that this concern originated from the Watts Bar Nuclear Power Group.

REQUEST FOR REPORTABILITY EVALUATION

D. This deficiency represents a significant deficiency in construction of or significant damage to a structure, system or component which will require extensive evaluation, extensive redesign, or extensive repair to meet the criteria and bases stated in the safety analysis report or construction permit or to otherwise establish the adequacy of the structure, system, or component to perform its intended safety function.

No __X__Yes _____ If Yes, Explain: ______________________________

OR

E. This deficiency represents a significant deviation from the performance specifications which will require extensive evaluation, extensive redesign, or extensive repair to establish the adequacy of the structure, system, or component to perform its intended safety function.

No ___X___Yes _____ If Yes, Explain: ______________________________

IF ITEM 4A, AND 4B OR 4C OR 4D OR 4E ARE MARKED "YES", IMMEDIATELY HAND-CARRY THIS REQUEST AND SUPPORTING DOCUMENTATION TO NSRS.

This Condition was Identified by: [signature] ERT Group Manager — 365-4464 Phone Ext.

[signature] ERT Project Manager — 365-4464 Phone Ext.

Acknowledgment of receipt by NSRS

[signature] Signed — Date 2-6-86 — Time 09:34

ERT Form M

TENNESSEE VALLEY AUTHORITY

NUCLEAR SAFETY REVIEW STAFF

NSRS INVESTIGATION REPORT NO. I-85-659-WBN

EMPLOYEE CONCERN IN-86-115-001

MILESTONE C

SUBJECT: SELF-DRILLING EXPANSION ANCHORS OVERTORQUED

DATES OF INVESTIGATION: November 18, 1986-January 10, 1986

INVESTIGATOR: J H Kincaid — J. H. Kincaid — 1/31/86 Date

REVIEWED BY: P R Wasmer — P. R. Wasmer — 1/31/86 Date

APPROVED BY: [signature] — M. A. Harrison — 2/1/86 Date

I. BACKGROUND

A Nuclear Safety Review Staff (NSRS) investigation was conducted to determine the validity of an expressed employee concern as received by the Quality Technology Company (QTC) Employee Response Team. The concern of record, as summarized on the Employee Concern Assignment Request Form from QTC and identified as IN-86-115-001, stated:

> Self Drilling Expansion Shell anchors are being over-torqued. This is done to correct excessive gap between baseplate and wall. Craft personnel are not trained to the requirements of Spec. G-32 paragraph 3.2. Construction dept concern - CI has no further information. Units 1 & 2.

II. SCOPE

A. The scope of the investigation was determined from the stated concern to be: (1) bolts in self-drilling expansion shell anchors (SSD anchors) were tightened more than the maximum one-quarter turn allowed by Paragraph 3.2.5 of Construction Specification G-32 in order to correct excessive gaps between baseplate and wall; and, (2) craft were not trained in implementing these specifications.

B. Construction Specification G-32 was reviewed to determine if overtightening was adequately addressed. Cognizant Office of Engineering (OE) engineers were contacted to determine the basis for instructions specified by Paragraph 3.2.5 of G-32 and the consequences of overtightening.

C. Craft persons were interviewed about training and implementation of specifications.

D. Quality Control Procedure WBNP-QCP-1.42-2 was reviewed, and QC inspectors were interviewed to determine if inspections detected SSD anchor failures as a consequence of bolt overtightening.

E. A field inspection was conducted with OE, Hanger Engineering, QC, and craft personnel.

III. SUMMARY OF FINDINGS

A. The bolt-tightening requirements for SSD anchors are governed by Construction Specification G-32, Paragraph 3.2.5. The sentences pertaining to tightening state:

> The installers are to be instructed to tighten the bolts between 1/8- and 1/4-turn after the bolthead comes into contact with the attachment or a helical spring lock washer may be used and the bolt tightened only enough to fully compress the washer. No additional tightening to close gaps between the attachment and the concrete surface shall be done.

It was demonstrated in the field that a bolt turned one-quarter turn after bolthead contact with the baseplate would not achieve firm baseplate restraint, and most installers would continue to turn until resistance was encountered indicating closure of mating surfaces. As a consequence, the specification was violated on a regular basis.

B. The apparent intent of the one-quarter-turn limit of the G-32 specification was to avoid applying excessive bolt torque, which implied that the SSD anchor was sensitive to final bolt torque. It was the opinion of experienced craft and QC inspectors that a healthy (proof tested) 1/2-inch and larger SSD anchor could not be damaged using a standard wrench size unless a cheater was employed. SSD anchors with bolt sizes below 1/2-inch could be damaged using unreasonable wrench force. In their opinion, an anchor which failed by bolt torquing would probably have failed a proof test.

C. QC inspections were not required nor were they normally performed which would verify anchor design integrity after baseplate final. The craft and QC inspectors indicated that they could determine when an anchor failed by "wrench feel." The general condition of an existing anchor could be determined by withdrawing the bolt and checking if a gap exists between plate and shell and subsequently retightening by wrench feel. This check was often conducted informally but was not required and was in violation of G-32 as written.

D. Persons interviewed in OE contended that SSD anchors greater than 1/2-inch would slip small increments under a direct tensile load without significantly degrading pull-out capacity but that smaller sizes would spall concrete before slipping. The craft interviewed stated that a bolt in an SSD anchor, which was torqued until perceptable slip, would seriously degrade the capacity of the expansion anchor. We were not sure these were opposing positions since test conditions using accurate measuring equipment would detect very small slip increments whereas wrench feel would indicate gross failure such as spalled concrete.

E. Installers did not receive formal training until recently. In the past, training was based on an apprentice program with on-the-job experience. The craft persons interviewed, who had been trained, did not use the turn-of-the-nut-method during installation. The reasons were covered in Paragraphs A and B above.

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The concern that bolts in SSD anchors have been tightened in violation of Paragraph 3.2.5 of Construction Specification G-32 and the concern that the craft had not been properly trained in implementing these specifications has been substantiated. There was no evidence that specifications were violated specifically to correct excessive gap between baseplate and wall.

Recommendations

I-85-659-WBN-01 - Conduct SSD Anchor Integrity Program

Develop and implement a program to determine if a statistically significant number of anchor failures have occurred due to bolt tightening practices. SSD anchors should be evaluated based on bolt size and anticipated mode of failure.

I-85-659-WBN-02 - Revise Construction Specification G-32

Based on the result of the 01 recommendation above and where shown to be applicable, revise Construction Specification G-32 to accomodate field installation tolerances.

I-85-659-WBN-03 - Develop QC Inspection Procedures

Develop QC inspection procedures which verify SSD anchors are not damaged by plate fitup or subsequent hanger rework such as welding stiffeners on installed baseplates.

I-85-659-WBN-04 - Craft Training

Based on results of recommendations above, engineers, craft, and inspectors shall be trained to implement Construction Specification G-32.