WELDING PROJECT

EMPLOYEE CONCERN

EVALUATION REPORT

ADEQUACY OF STRUCTURAL SUPPORT WELDS
AT BROWNS FERRY NUCLEAR PLANT

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Revision 0
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WELDING PROJECT

EMPLOYEE CONCERN

SUMMARY SHEET

ADEQUACY OF STRUCTURAL SUPPORT WELDS AT BROWNS FERRY NUCLEAR PLANT

I. SCOPE OF EVALUATION

This report addresses one employee concern dealing with the adequacy of structural support welds in safety related systems at Browns Ferry Nuclear Plant (BFN). One issue evolved from the concern.

The adequacy of many welds and hangers is questionable. The process followed today with regard to welding and weld inspection is more detailed. Original welds would not pass current requirements.

Text of the concern is provided in the technical report (WP-32-BFN) under Attachment 1.

II ANALYSIS OF ISSUE ADDRESSED BY CONCERN

The concern is factual, in that prior to the issue of Browns Ferry Standard Practice 6.2 on June 29, 1983, some structural support welds were not included in a documented quality inspection program. Reinspection of structural supports at BFN revealed a number of deficiencies. While most of these deficiencies relate to size, length and location of welds, many of the supports also have one or more welds with rejectable discontinuities.

Analysis of the reinspection results indicates that most of the support groups are suitable for service. It is possible that a statement of suitability for service of instrument piping supports will not be supportable without some rework.

Complete details of the evaluation of this issue may be found in WP-32-BFN, Paragraph III.

III. COLLECTIVE SIGNIFICANCE

In that further evaluation of the support welds is necessary, the collective significance of this issue has not been determined.

IV. ROOT CAUSE(S)

The reason for the question relating to the adequacy of the support welds at Browns Ferry is that some of the welds do not meet the acceptance criteria of AWS D1.0. These welds had not been previously identified due to the TVA decision to exclude them from the Quality Inspection Program.

V. CORRECTIVE ACTION

It is recognized that analysis of the reinspection data generally supports a conclusion of suitability for service of support welds. The selection of items for inspection was based on engineering bias rather than recognized statistical methods. The reinspection yielded a number of rejectable weld discontinuities. Also, prior to mid 1983, some support welds were not included in a documented quality inspection program. The results of this evaluation do not fully support a conclusion that the subject welds are adequate. In order to draw such a conclusion, additional weld evaluation data is needed.

Action to prevent recurrence is not required, in that Standard Practice 6.2, and later Site Director Standard Practice 13.1 place all safety related welding at BFN under an inspection program. This program has been in effect since mid 1983.

VI. REINSPECTION REQUIRED

Yes.

VII. ISSUE CLOSURE

(illegible)

VIII. ATTACHMENTS

1 Evaluation Report WP-32-BFN, Revision 0.

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ADEQUACY OF STRUCTURAL SUPPORT WELDS
AT BROWNS FERRY NUCLEAR PLANT

I. SCOPE OF EVALUATION

This report addresses one employee concern. Text of the concern is provided under Attachment 1.

The implementing procedure history for Browns Ferry Nuclear Plant (BFN) was reviewed. The BFN Phase I and draft Phase II Reports and the Weld Project draft reports addressing welder qualification, inspector qualification, and inspection practices were reviewed. Additionally, a selection of the Phase II reinspection packages for structural supports was reviewed. The findings presented herein are based on the above noted documents and discussions with cognizant TVA Engineering, Maintenance, and Quality Assurance personnel.

II. ISSUE ADDRESSED BY CONCERN

The subject concern questions the adequacy of the support welds at BFN, and states that the original welds would not meet today's standards. Also stated is that the process followed today with regard to welding and weld inspection is more detailed.

III. ANALYSIS OF ISSUE ADDRESSED BY CONCERNS

The concern is factual, in that some of the support welds do not meet the visual acceptance criteria required by the original installation specification. Whether or not this is a problem requires engineering evaluation. Also, relative to supports, the process (program) is now clearly defined, where prior to mid-1983 some support welds were not subject to the controls of the Quality Inspection Program.

Field construction on BFN units 1 and 2 began in September 1966. It should be noted that construction of BFN was largely completed prior to the TVA commitment to 10 CFR 50, Appendix B, in July 1972.

A review of the procedure history of BFN indicates that prior to mid-1983, quality inspection of some structural support welding was not mandated by the Quality Assurance Program. This was substantiated by discussion with several cognizant TVA personnel.

For initial construction, an engineering decision was made that, for other than integral attachment welds to pressure boundaries, structural support welding would not be included under the Quality Inspection Program. Rather, these supports were to be fabricated and erected in accordance with recognized national codes and standards, using design drawings and/or prudent engineering judgment

Support construction was monitored on a surveillance basis by the field engineering force. These surveillances principally considered design and location. They did not specifically address quality of welding. They were not required to be documented.

This method of direct application of nationally recognized codes, i.e., AWS D1.0-1966, combined with engineering surveillance to monitor and assess the adequacy of the installation process was an extension of the proven methods used in the fossil construction program. These methods formed the base from which the nuclear construction program evolved, and were considered adequate at the beginning of the nuclear era.

There were some attempts at proceduralizing and programmatically addressing the issue of support welds. They were, however, limited in scope.

In January 1970, Construction Procedure BF-30, Welding Cable Tray Hangers to Structural Steel, was issued. This procedure required the engineer to inspect "all welds." The procedure, however pertained only to the attachment of the support to the structural steel. No instruction for performing the inspections was outlined, and no acceptance criteria was given.

In November 1972, Construction Procedure BF-68 replaced BF-30. This new procedure was limited to the attachment of cable tray supports to structural steel. The acceptance criteria did not address size, length, or location of the welds.

Construction Procedure BF-47, Quality Assurance Program for Principal Piping Systems and Documentation, Revision 4, was issued in September 1973. This procedure included Standard Test No. 2, Hanger and Restraint Inspection for Piping Systems. Standard Test No. 2 applied to the principal piping systems "that require hangers and restraints to a specific design as given by drawings and specifications." This test required inspection for weld size only, and only for the weld which attached the support to the building steel. In July 1974, Standard Test No. 2 was revised to include weld contour, reinforcement, and defects.

Discussion with cognizant TVA personnel and research of design criteria indicated that many small bore piping, tubing, HVAC, and electrical supports were fabricated and erected with no detail design drawings. Many of these systems were field-routed. Installation requirements for hanger features were conveyed to Construction through Detailed Design Criteria for various field-routed small bore piping and tubing. These Detailed Design Criteria documents provided the applicable design details for each feature. This information was used by Field Engineering to perform the detailed design of the supports and determine the support spacing.

A review of 60 Weld Project Phase II reinspection packages revealed that in 23 cases, a detail design drawing for the support could not be located. This observation supports the premise that the initial designs were done by Field Engineering personnel. Additionally, there were twelve instances where the assembly detail was shown, but insufficient or no welding details were shown.

These practices continued through construction and operation until mid-1983. In June 1983, Standard Practice 6.2, Quality Control of Welding Activities, was issued. This procedure at 2.0 states in part, "This standard practice shall apply to all welding activities at BFN." Discussion with cognizant Maintenance and Quality Assurance personnel revealed that SP 6.2 encompassed all safety-related welding, including structural supports. SP 6.2 was superseded by Site Director Standard Practice (SDSP) 13.1, Quality Control of Welding, for all work instructions approved on or after November 17, 1986. The scope of SDSP 13.1 is identical to that of SP 6.2.

In that each of these standard practices at 6.1.5 make the quality control inspections and verifications contained therein mandatory "for all CSSC and safety related permanent plant structures and components," it can be concluded that with the issue of Standard Practice 6.2, structural support welding for all safety-related support populations came under the Quality Assurance Program.

Discussion with cognizant DNE (Weld Project) personnel revealed that the Welding Project Phase II reinspection of structural supports was an engineering-biased sample representative of welding performed over the life of the plant. These inspections included groups of large bore, small bore, instrument pipe and tubing supports, conduit and cable tray supports, HVAC duct supports and electrical equipment, and instrument supports.

Preliminary results of the weld reinspection indicate that the discrepancies identified were largely configurational, i.e., weld size, length, and location. It was noted, however, that some of the supports also had rejectable discontinuities in one or more welds. Engineering analysis of these results has thus far shown that, with the exception of instrument piping supports, the identified discrepancies are not design significant, i.e., the support welds are suitable for service.

The suitability for service of the instrument piping supports is being evaluated, and has not been established to date.

The Phase II reinspection treated structural welding, including supports, as one group. As a result, only a small number of each type of support was reinspected. In that rejectable discontinuities were identified on several supports, the selection of items for inspection was not statistically based, and that prior to 1983 some support welds were not inspected under the auspices of a defined Quality Assurance program by QC Inspectors, the overall adequacy of the support welds has not been established.

In discussion with Division of Nuclear Engineering personnel, it was observed that a number of walkdown evaluations are in various stages of planning and implementation at BFN. All of these walkdowns will, to some degree, address structural supports. Collectively, they will address each of the support groups. These programs were reviewed to determine the extent to which they might address the quality of support welds, thus providing additional assurance that all of the welds are adequate.

Review of five of the programs and discussion with cognizant engineers revealed that these programs are intended for design reconciliation and seismic qualification of various systems. Of approximately twenty-one walkdowns, none is planned to address welding other than weld size, length and location. It was determined that these programs, as currently planned, do not provide the desired additional assurance that the issue raised by the employee concern is fully satisfied. They could meet this objective with some modification. Alternatively, other methods could be developed to provide this additional assurance.

IV. COLLECTIVE SIGNIFICANCE

In that further evaluation of the support welds is necessary, the collective significance of this issue has not been determined.

V. ROOT CAUSE(S)

The reason for the question relating to the adequacy of the support welds at Browns Ferry is that some of the welds do not meet the acceptance criteria of AWS D1.0. These welds had not been previously identified due to the TVA decision to exclude them from the Quality Inspection Program.

VI. CORRECTIVE ACTION

It is recognized that analysis of the reinspection data generally supports a conclusion of suitability for service of support welds. The selection of items for inspection was based on engineering-bias rather than recognized statistical methods.

The reinspection yielded a number of rejectable weld discontinuities. Also, prior to mid-1983, some support welds were not included in a documented quality inspection program. The results of this evaluation do not fully support a conclusion that the subject welds are adequate. In order to draw such a conclusion, additional weld evaluation data is needed.

Action to prevent recurrence is not required, in that Standard Practice 6.2, and later Site Director Standard Practice 13.1 place all safety-related welding at BFN under an inspection program. This program has been in effect since mid-1983.

VII. ATTACHMENTS

1. Text of concern.

2. Corrective Action Tracking Document WP-32-BFN-01.

WELDING PROJECT

EMPLOYEE CONCERN EVALUATION REPORT
ATTACHMENT 1

TEXT OF EMPLOYEE CONCERNS

Evaluation Report WP-32-BFN addresses one employee concern. The text of the concern is shown on the following page.

BFN-85-019-001.

REFERENC. - ECPS132J-ECPS132C
FREQUENCY - REQUEST
ONP - ISSS - RWM

TENNESS. ALLEY AUTHORITY
OFFICE Ur NUCLEAR POWER
EMPLOYEE CONCERN PROGRAM SYSTEM (ECPS)
EMPLOYEE CONCERN INFORMATION BY CATEGORY/SUBCATEGORY
WP - 32 WELDS DO NOT SATISFY ACCEPTANCE CRITERIA

R... TIME - 11:56
RUN DATE - 03/16/

CATEGORY: WE NON QA/QC WELDING

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 REPORT APPL 2 SAF RELATED BF	BL	SQ	WB	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REF. SECTI CAT - W SUBCAT - 3
BFN-85-019-00101	WE	50632	N	BFN	1 Y 2 SS	N NA	N NA	N NA		NSRS	DURING AN EXIT INTERVIEW THE CI EXPRESSED HIS CONCERN THAT MANY WELDS AND HANGERS ARE QUESTIONABLE WITH RESPECT TO THEIR ADEQUACY. THE PROCESS FOLLOWED TODAY WITH REGARD TO WELDING AND WELD INSPECTION IS MORE DETAILED AND THAT ORIGINAL WELDS IN QUESTION WOULD NOT PASS CURRENT REQUIREMENTS.	

1 CONCERNS FOR CATEGORY WE WP - 32

CONCERNS ARE GROUPED BY LAST 2 DIGITS OF SUBCATEGORY NUMBER.

ECSP CORRECTIVE
ACTION TRACKING DOCUMENT
(CATD)

INITIATION

1. Immediate Corrective Action Required: |___| Yes |_X_| No
2. Stop Work Recommended: |___| Yes |_X_| No
3. CATD No. 50132-01 4. INITIATION DATE 7/17/87
5. RESPONSIBLE ORGANIZATION: Browns Ferry
6. PROBLEM DESCRIPTION: |_X_| QR |___| NQR Additional engineering valuation of support welds at BFN is needed. See attachment.

/ 1 /ATTACHMENTS

7. PROPOSED BY: NAME: Ed Shevlin Ed Shevlin DATE: 7-17-87
8. CONCURRENCE: CEG-H: _____ DATE: _____
9. APPROVAL: ECTG PROGRAM MGR: _____ DATE: _____

CORRECTIVE ACTION

10. PROPOSED CORRECTIVE ACTION PLAN: _____

/ /ATTACHMENTS

11. PROPOSED BY: DIRECTOR/MGR: _____ DATE: _____
12. CONCURRENCE: CEG-H: _____ DATE: _____
SRP: _____ DATE: _____
ECTG PROGRAM MGR: _____ DATE: _____

VERIFICATION AND CLOSEOUT

13. Approved corrective actions have been verified as satisfactorily implemented.

SIGNATURE	TITLE	DATE

CATD 50132-01
ATTACHMENT 1
PROBLEM DESCRIPTION

It is recognized that analysis of the reinspection data generally supports a conclusion of suitability for service of support welds. The selection of items for inspection was based on engineering bias rather than recognized statistical methods. The reinspection yielded a number of rejectable weld discontinuities. Also, prior to mid 1983, some support welds were not included in a documented quality inspection program. The results of this evaluation do not fully support a conclusion that the subject welds are adequate. In order to draw such a conclusion, additional weld evaluation data is needed.

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