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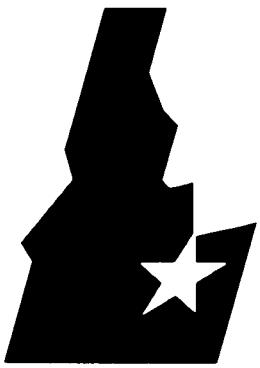
Weld Evaluation Project Aggregate Results of Weld Assessments

Department of Energy Weld Evaluation Project TVA Watts Bar Nuclear Plant Unit 1

Lloyd C. Brown
R. J. (Nick) Wade



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WELD EVALUATION PROJECT
AGGREGATE RESULTS OF WELD ASSESSMENTS

DEPARTMENT OF ENERGY
WELD EVALUATION PROJECT
TVA WATTS BAR NUCLEAR PLANT UNIT 1

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ABSTRACT

The United States Department of Energy/Weld Evaluation Project (DOE/WEP) was formed in December 1985 as the result of an interagency agreement between the DOE and the Tennessee Valley Authority (TVA). The project was assigned by the DOE to EG&G Idaho, Inc., for implementation. The DOE/WEP was tasked to perform an independent evaluation of the documented TVA welding program and the as-constructed weld quality with respect to the TVA-performed safety-related welds at the Watts Bar Nuclear Plant Unit 1 (WBNP-1). This is one of ten reports describing the plan, processes, implementation, and results of the DOE/WEP. This report sorts the reinspection data collected during the implementation of the project in several different ways. The results are sorted in nine category reviews (CRV) determined by the nature of the welding related employee concerns and quality indicators. The results have also been sorted in terms of weld deviation rates by construction code criteria, engineering discipline, plant geographic area, designated primary and secondary safety systems, and relevant plant construction time frames.

ACKNOWLEDGMENTS

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CONTENTS

(NOTE: Appendixes B and D are on microfiche attached to the inside back cover.)

TABLES

WELD EVALUATION PROJECT AGGREGATE RESULTS OF WELD ASSESSMENTS

1. INTRODUCTION

The United States Department of Energy/Weld Evaluation Project (DOE/WEP) was formed in December 1985 as the result of an interagency agreement between the DOE and the Tennessee Valley Authority (TVA) to provide the TVA with an independent assessment of the quality of safety-related welding performed by the TVA during construction of the Watts Bar Nuclear Plant Unit 1 (WBNP-1). The DOE/WEP was conducted by EG&G Idaho, Inc., as contractor to the DOE.

The specific objectives of the Weld Evaluation Project, as jointly agreed to in the approved Project Management Plan, were to:

1. Assess compliance of the TVA's documented weld program to the requirements in the WBNP Final Safety Analysis Report (FSAR)[1] and amendments through February 1, 1986.
2. Assess the applicable TVA employee concerns (ECs) and quality documents to determine if they identify quality problems with the TVA-performed, safety-related welds.
3. Evaluate the TVA's as-constructed plant weld status by conducting an examination of the plant welds, evaluating the results, and when deviations[a] were determined to be unacceptable, analyzing and concurring with the TVA's corrective action proposals for these deviations.
4. Provide the TVA with a statement of the compliance of the plant welds with applicable construction welding codes.

This is one of ten reports describing the plan, processes, implementation, and results of the DOE/WEP at the WBNP-1. Objective 1 was accomplished with the completion of the report, "Weld Program Review."[2] The other eight reports are listed as References 3 through 10. These reports delineate: the program organization and work scope, the formation of homogeneous groupings of welds, the formation of the weld/component data base, the formation of data bases for weld reinspection results and status reports, the processes of component inspection and examination, suitability for service evaluation engineering, and generic problem analysis of deviations found during the examinations. The remaining report presents a final summary of the Weld Evaluation Project.

In order to accommodate the evaluation of the welds and/or related documents, the issues that were identified as potential weld quality problems in the employee concerns and quality indicators[a] were consolidated into groups of welded components[b] associated with these issues (see Reference 4). In addition, in order to assess the overall TVA weld program implementation, the DOE/WEP divided the total population of the TVA-performed, safety-related, Unit 1 welded components into logical groups for evaluation.

The issues were further classified for evaluation based on the amount of information available. The designations used for the groups formed from employee concerns and quality indicators were *specific* and *special* (see below).

> *Specific* Group—A group formed to address a specified problem that could be isolated to a specific component or group of components.
> *Special* Group—A group formed to address a specified problem that could not be isolated to specific components, but could be isolated to a certain type of component, configuration area, system, etc., where the weld quality could be assessed statistically.

When the evaluation of an employee concern or quality indicator found that it could not be

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a. *Deviation* or *deviant weld* denotes a condition that does not meet the applicable code inspection acceptance criteria for the weldment specified by the engineer. These terms are used before an evaluation has been performed in accordance with other applicable code provisions to determine the acceptability of the condition.

a. Quality indicators (QIs), those issues resulting from the DOE/WEP review of a selected list of quality documents related to the TVA welding.

b. Component—for structures, a logical assembly of parts that have a common function; for piping, a welded joint.

addressed by a specific or special group, it was assigned to be addressed by a general group.

- *General* group—A group formed to investigate the general plant weld quality and to determine if any safety-related issues existed that may not have been otherwise identified.

In this report, the results of sorting weld reinspection data from the plant are presented. The data collected during the implementation of the project are sorted in several different ways in order to view the results from the aspects of (a) applicable welding code, (b) employee concerns, (c) quality indicators, (d) area in the plant, (e) plant system involved, and (f) applicable safety classification. Section 2 sorts the results of the weld reinspection data in nine categories determined by the nature of the welding employee concerns and quality indicators. Section 3 sorts the results of the weld inspection data in terms of weld deviation rates by construction code criteria and by classification of components. Appendix A contains 35 figures depicting deviation rates for welds and weld attributes. Appendix B contains the inspection results summarized from the inspection data base before engineering analysis. The TVA corrective action plans are summarized in Appendix C. Appendix D contains the DOE/WEP final group closure reports.

2. RESULTS OF WELD REINSPECTION BY QUALITY CATEGORY

The DOE/WEP results of evaluation of all groups were provided in group closure reports. Using the appropriate group closure results, the DOE/WEP further evaluated the employee concerns and quality indicators by sorting the results in nine categories. The findings and conclusions for each category are presented in this section.

The nine categories, CRV-01 through CRV-09 (indicating category review number), were divided into subcategories (as shown in Table 1), all of which were logically derived from the employee concerns and quality indicators. The DOE/WEP determined that some of the concerns transmitted for evaluation were outside the work scope of the DOE/WEP and these concerns were returned to the TVA for their action. These concerns are listed in tables after each category with the reasons the DOE/WEP did not perform an evaluation.

The examination results for the various groups were utilized, as appropriate, to reach conclusions

Table 1. The WBNP-1 weld quality category review designations

Category Review	Category Designation Descriptions
CRV 01	WELDER CERTIFICATIONS
	A. Improper welder recertification
	1. Backdating of welder certification
	2. Nonrigorous verification of requirements for recertification
	3. Requalification test not per code requirements
	4. Welder not qualified for process used
	B. Questionable welder training and experience
	C. Administrative problems associated with recertification
	D. Welder recertification, not applicable to the DOE/WEP.
CRV 02	INSPECTOR CERTIFICATION/QUALIFICATION
	A. Visual inspection qualifications do not meet code
	B. Questionable visual inspector experience and training
	C. Inspector qualification, not applicable to the DOE/WEP.
CRV 03	WELD FILLER MATERIAL CONTROL
	A. Procedures for coated electrode not followed
	B. Poor quality flux
	C. Inadequate weld filler traceability
CRV 04	PARENT METAL PROBLEMS
	A. Unrepaired arc strikes
	B. Excessive excavation
CRV 05	INADEQUATE DOCUMENTATION AND ALLEGATIONS OF FALSIFICATION
	A. Improper alterations
	1. Unauthorized access to computerized weld information system (WIMS)
	2. Alterations using correction fluid
	B. Incorrect or inaccurate documentation
	1. Undocumented temporary welds
	2. Documentation buyoff without inspection
	3. Unspecified documentation inaccuracies

Table 1. (continued)

Category Review	Category Designation Descriptions
CRV 05	(continued) C. Inadequate document control 1. Lost or missing documentation 2. Documentation does not comply with manual 3. Welds not identified/stenciled D. Documentation, not applicable to the DOE/WEP
CRV 06	WORKMANSHIP AND SPECIFIC WELD PROBLEMS A. Incomplete welds B. Welds do not satisfy acceptance criteria C. Possible subsurface defects D. Unsatisfactory weld appearance E. Welding dissimilar metals F. Workmanship, not applicable to the DOE/WEP
CRV 07	NDE PROCESSES AND PROCEDURES A. Inadequate process control 1. HVAC ductwork systems not visually inspected 2. Inspection criteria problems 3. Inspection through paint 4. Weld inspection not performed B. Questionable inspection practice 1. Surface conditioning for NDE 2. Fitup performed by craft 3. Inspection tools not provided C. NDE Process and procedures, not applicable to the DOE/WEP
CRV 08	WELD PROCESS AND PROCEDURES A. Weld procedures not properly followed B. Weld procedures not adequate C. Welding equipment unsuitable D. Other weld process control problems E. Improper weld repair F. Weld process control, not applicable to the DOE/WEP
CRV 09	OTHER WELD QUALITY PROBLEMS A. Questionable design practice 1. Questionable box hanger weld joint design 2. Use of straight butt joint configuration B. Questionable management practice 1. Inadequate corrective action follow-up 2. Creation of busy work 3. Disposition by engineering analysis 4. Rework to avoid disciplinary action C. Questionable construction practices 1. Use of weld bosses 2. Sandblasting while welding 3. Post weld surface conditions D. Other quality problems, not applicable to the DOE/WEP

for more than one subcategory issue. Therefore, the total number of welds for each individual subcategory cannot be combined for a "program total." The number of welds for expansion groups[a] are included in the total welds that were examined where the original group is identified in the table. The expansion groups are considered as part of the original group population from which they were derived.

2.1 CRV-01 Welder Certification

The CRV-01 was created by the DOE/WEP to classify employee concerns (ECs) and quality indicators (QIs) related to "Welder Certification."

a. Expansion Group—Those groups of components selected to further evaluate potential problem areas identified through evaluation of the initially selected components.

2.1.1 Characterization of Issues. This category is divided into the following subcategories:

1A Improper welder recertification

1. Backdating of welder certification
2. Nonrigorous verification of requirements for recertification
3. Requalification test not per code requirements
4. Welders not qualified for process used

1B Questionable welder training and experience

1C Administrative problems associated with recertification

1D Welder recertification, not applicable to the DOE/WEP

Of the 113 ECs assigned to CRV-01, it was determined that 12 were not applicable to the DOE/WEP scope and, therefore, did not require further action by the DOE/WEP (see Table 2 for clarification of these

Table 2. Employee concerns in CRV-01 (Subcategory 1D) not within the DOE/WEP scope and requiring further processing by the TVA

Employee Concerns	Determination of the DOE/WEP Applicability
IN-85-503-001	Not weld related; addressed in the TVA report WP-19-SQN and with employee concern IN-85-352-001 in the TVA report WP-03-WBN
IN-85-150-001	Not safety related; addressed in the TVA report WP-03-WBN
IN-85-738-004	Not weld related; addressed in the TVA report WP-03-WBN
IN-85-672-003	Not safety related; addressed in the TVA report WP-01-WBN
IN-85-128-001	Not safety related; employee concern is not specifically addressed, the category of the employee concern is addressed in the TVA report WP-07-WBN
IN-85-445-001	Not safety related; addressed in the TVA report WP-06-WBN
IN-85-424-014	Not safety related; addressed in the TVA subcategory report 70205
IN-85-852-003	Not weld related; addressed in the TVA report WP-03-WBN
IN-85-740-008	Not safety related; addressed in the TVA subcategory report 71809
PH-85-002-029	Not applicable to WBNP-1; addressed in the TVA subcategory report 71701
EX-85-096-002	Not weld related; addressed in the TVA subcategory report 70605
XX-85-069-X13	Not applicable to WBNP-1; addressed in the TVA subcategory report 50300

ECs). The evaluation of the remaining 101 ECs established that 19 could be addressed by selected populations and the other 82 were best addressed as part of the general groupings.

A review by the DOE/WEP of WBNP-1 quality related documents established that three QIs would also be assigned to CRV-01.

Table 3 lists the subcategories of CRV-01 and establishes the relationship between Subcategories, ECs, QIs, applicable DOE/WEP weld evaluation groups, and shows the methods of assessment.

2.1.2 Evaluation and Findings. Within the Subcategory 1A, improper recertification, for the issue

Table 3. Employee concerns/quality indicators from CRV-01 welder certification

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 1A.1—Backdating of Welder Certification		
Total welds examined were 9873.		
IN-85-627-036	233	IE
IN-85-627-037	233	IE
IN-85-770-002	210	IE
IN-85-770-003	210	IE
IN-85-770-X07	210	IE
IN-85-965-001	210	IE
IN-85-965-002	210	IE
IN-85-021-003	A - L	IE
IN-85-021-X05	A - L	IE
IN-85-335-002	A - L	IE
IN-85-424-X13	A - L	IE
IN-85-612-X07	A - L	IE
IN-85-740-009	A - L	IE
IN-85-778-X07	A - L	IE
IN-86-143-002	A - L	IE
IN-86-167-005	A - L	IE
IN-86-167-X06	A - L	IE
PH-85-052-002	A - L	IE
PH-85-052-X03	A - L	IE
SQM-6-005-X02	A - L	IE
WBP-6-022-016	A - L	IE
WBP-6-022-X28	A - L	IE
WI-85-003-001	A - L	IE
WI-85-003-X02	A - L	IE
XX-85-049-001	A - L	IE
XX-85-049-X03	A - L	IE
XX-85-088-X05	A - L	IE

Table 3. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 1A.2—Nonrigorous Verification of Requirements for Recertification		
Total welds examined were 9813.		
EX-85-021-002	216	IE
EX-85-042-004	A - L	IE
EX-85-042-005	A - L	IE
IN-85-113-003	A - L	IE
IN-85-310-006	A - L	IE
IN-85-346-003	A - L	IE
IN-85-352-001	A - L	IE
IN-85-424-011	A - L	IE
IN-85-426-002	A - L	IE
IN-85-453-007	A - L	IE
IN-85-480-004	A - L	IE
IN-85-493-004	A - L	IE
IN-85-532-005	A - L	IE
IN-85-533-009	A - L	IE
IN-85-533-X11	A - L	IE
IN-85-540-001	A - L	IE
IN-85-543-002	A - L	IE
IN-85-600-006	A - L	IE
IN-85-612-006	A - L	IE
IN-85-778-001	A - L	IE
IN-85-815-001	A - L	IE
IN-85-835-002	A - L	IE
IN-86-205-007	A - L	IE
WBP-6-022-026	A - L	IE
Subcategory 1A.3—Requalification Test Not Per Code Requirements		
Total welds examined were 9813.		
IN-86-301-002	A - L	IE
WI-85-055-001	A - L	IE
WI-85-056-001	A - L	IE
Subcategory 1A.4—Welders Not Qualified For Process Used		
Total welds examined were 10,236.		
EX-85-037-002	232	IE
EX-85-048-004	233	IE
IN-85-055-003	202	IE
IN-85-089-003	210	IE
IN-85-556-001	233	IE

Table 3. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 1A.4—Welders Not Qualified For Process Used (cont'd)		
IN-85-923-002	233	IE
WI-85-035-007	233	IE
EX-85-008-001	A - L	IE
IN-85-297-004	F	IE
IN-85-316-007	F	IE
IN-85-589-002	A - L	IE
IN-85-686-001	D & E	IE
IN-85-940-X02	A - L	IE
IN-86-122-X02	A - L	IE
XX-85-101-006	A - L	IE
CAR WB-CAR 85-31[b]	25	DR
NCR 5304 Rev. 0[b]	30	DR
NCR 5330 Rev. 0[b]	30	DR
Subcategory 1B—Questionable Welder Training and Experience		
Total welds examined were 9813.		
IN-85-225-001	235	IE
IN-85-707-003	232	IE
IN-85-947-X08	233	IE
IN-86-190-002	211	DR
HI-85-080-001	A - L	IE
IN-85-113-001	A - L	IE
IN-85-178-003	A - L	IE
IN-85-568-001	A - L	IE
IN-85-706-001	A - L	IE
IN-86-158-006	A - L	IE
IN-86-303-003	A - L	IE
IN-86-305-003	A - L	IE
PH-85-002-030	A - L	IE
PH-85-003-020	A - L	IE
XX-85-045-001	I - J	IE
XX-85-069-001	A - L	IE
Subcategory 1C—Administrative Problems Associated with Recertification		
Total welds examined were 9813.		
EX-85-042-002	A - L	IE
EX-85-042-003	A - L	IE
EX-85-107-001	A - L	IE
IN-85-052-005	A - L	IE
IN-85-283-003	A - L	IE

Table 3. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 1C—Administrative Problems Associated with Recertification		
IN-85-300-X04	A - L	IE
IN-85-424-005	A - L	IE
IN-85-532-004	A - L	IE
IN-85-725-X14	A - L	IE
IN-85-725-X15	A - L	IE
IN-85-725-X16	A - L	IE
IN-85-738-008	A - L	IE
IN-85-940-X04	A - L	IE
IN-86-167-004	A - L	IE
IN-86-303-004	A - L	IE
SQM-6-005-001	A - L	IE

a. DR = document review
IE = inspection/examination.

b. Identifies a quality indicator.

1A.1, backdating of welder certification, there were 27 ECs for which 9873 welds were examined to evaluate weld quality. For the issue 1A.2, nonrigorous verification of requirements for recertification, there were 24 ECs (related to inadequate certification update, updating certification without verifying the process used, and maintaining certification without welding) for which 9813 welds were examined to evaluate weld quality. For the issue 1A.3, requalification test not per code requirements, there were three ECs for which 9813 welds were examined to evaluate weld quality. For the issue 1A.4, welders not qualified for the process used, there were 15 ECs and 3 QIs. The latter were resolved as a result of document review. In addition to the document review, 10,236 welds were examined to evaluate weld quality.

For the Subcategory 1B, questionable welder training and experience, there were 16 ECs. One was resolved by document review, and 15 were addressed by 9813 welds that were examined to evaluate weld quality.

For the Subcategory 1C, administrative problems associated with recertification, there were 16 ECs related to alleged management instructions contrary to procedures, supervisors not keeping qualification records updated, and weld cards not checked during withdrawal of weld rod for which 9813 welds were examined to evaluate weld quality.

The issue of welder certification and associated subcategories was programmatic/administrative in nature and has been addressed separately by the TVA.[a] The DOE/WEP addressed the potential safety significance of the issue by evaluating the weld quality of the applicable installed hardware. The evaluation of the sample welds showed that the welds either had no deviations or were analyzed for acceptance in accordance with the applicable construction code. Components analyzed as unsuitable for service are being corrected by the TVA as indicated by the TVA corrective plans related to the DOE/WEP general groups. These address the pipe lug issue, the radiograph (RT) review, the 741 floor elevation, and attachments classified as ASME MC. A descriptive summary of the corrective action plans is given in Appendix C.

2.1.3 Conclusions. The DOE/WEP addressed the potential safety significance of welder certification by

a. Guenter Wadewitz letter to M. L. Rayfield, "Final Response to NRC-OIE Confirmation of Action Letter (COAL)-Welder Recertification Program," the TVA Memorandum C 24 860508 012, May 8, 1986.

evaluating weld quality and found that either the welds had no deviations or that any deviations were acceptable in accordance with the applicable construction code, or will be upon completion of the TVA committed corrective action plans as described in Appendix C. The DOE/WEP evaluated the sampled populations and determined that the unsampled portions have no generic problems.

2.2 CRV-02 Inspector Certification/Qualification

The CRV-02 was created by the DOE/WEP to classify ECs and QIs related to "Inspector Certification/Qualification."

2.2.1 Characterization of Issues. This category has been divided into the following subcategories.

2A Visual inspection qualifications do not meet code requirements
2B Questionable visual inspector experience and training
2C Inspector qualification, not applicable to the DOE/WEP.

Of the 48 ECs assigned to CRV-02, it was determined that 2 were not applicable to the DOE/WEP scope and therefore did not require further action by the DOE/WEP (see Table 4 for clarification of these concerns). The evaluation of the remaining 46 ECs established that two could be addressed by selected populations and the other 44 were best addressed as part of the DOE/WEP general groupings.

A review by the DOE/WEP of Watts Bar Unit 1 quality related documents has established that one QI would also be assigned to Category CRV-02.

Table 5 lists the subcategories of CRV-02 and establishes the relationship between Subcategories,

Table 4. Employee concerns in CRV-02 (Subcategory 2C) not within the DOE/WEP scope and requiring further processing by the TVA

Employee Concern	Determination of the DOE/WEP Applicability
XX-85-069-001-R1	Not welding related; Sequoyah TVA Report 1-85373.NPS
XX-85-069-003	Not applicable to WBNP-1; Sequoyah TVA Report 1-85373.NPS

Table 5. Employee concerns/quality indicators from CRV-02 inspector certification/qualification

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 2A—Visual Inspection Qualifications Do Not Meet Code Requirements		
Total welds examined were 9813.		
WI-85-013-001	247	IE
IN-85-445-010	A - L	IE
IN-85-458-002	A - L	IE
IN-85-510-001	A - L	IE
IN-85-563-007	A - L	IE
WI-85-046-003	A - L	IE

Table 5. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 2A—Visual Inspection Qualifications Do Not Meet Code Requirements (cont'd)		
WI-85-046-X18	A - L	IE
XX-85-069-X05	A - L	IE
NCR-4374 Rev. 0[b]	223	DR
Subcategory 2B—Questionable Visual Inspector Experience and Training		
Total welds examined were 9813.		
IN-85-706-002	235	IE
EX-85-007-002	A - L	IE
EX-85-037-004	A - L	IE
EX-85-082-001	A - L	IE
EX-85-093-001	A - L	IE
EX-85-169-002	A - L	IE
IN-85-001-004	A - L	IE
IN-85-001-008	A - L	IE
IN-85-007-002	A - L	IE
IN-85-041-001	A - L	IE
IN-85-079-001	A - L	IE
IN-85-089-001	A - L	IE
IN-85-209-002	A - L	IE
IN-85-365-003	A - L	IE
IN-85-414-001	A - L	IE
IN-85-442-003	A - L	IE
IN-85-442-004	A - L	IE
IN-85-454-001	A - L	IE
IN-85-476-004	A - L	IE
IN-85-513-001	A - L	IE
IN-85-529-005	A - L	IE
IN-85-682-008	A - L	IE
IN-85-788-002	A - L	IE
IN-85-981-001	A - L	IE
IN-86-088-001	A - L	IE
IN-86-142-001	A - L	IE
IN-86-168-002	A - L	IE
IN-86-304-001	A - L	IE
PH-85-016-001	A - L	IE

Table 5. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 2B—Questionable Visual Inspector Experience and Training (cont'd)		
WBP-6-004-X01	A - L	IE
WI-85-030-002	A - L	IE
WI-85-041-002	A - L	IE
WI-85-046-002	A - L	IE
WI-85-046-014	A - L	IE
WI-85-081-007	A - L	IE
WI-85-081-010	A - L	IE
XX-85-069-003-R1	A - L	IE
XX-85-107-001	A - L	IE

a. DR = document review
IE = inspection/examination.

b. Identifies a quality indicator.

ECs, QIs, applicable DOE/WEP weld evaluation groups, and shows the methods of assessment.

2.2.2 Evaluations and Findings. For the Subcategory 2A, visual inspection qualification not meeting code requirements, there were eight ECs and one QI. The QI was resolved by document review. There were 9813 welds examined to evaluate weld quality.

For Subcategory 2B, questionable visual inspector experience and training, there were 38 ECs. There were 9813 welds examined to evaluate weld quality.

Inspector certification/qualification and associated subcategories, was programmatic/administrative in nature and has been addressed separately by the TVA.[a]

The DOE/WEP addressed the potential safety significance of the issue by evaluating the weld quality of the applicable installed hardware. The evaluation of the sample welds showed that the welds either had no deviations or were analyzed for acceptance in accordance with the applicable construction code. Components analyzed as unsuitable for service are being corrected by the TVA as indicated by the TVA corrective plans related to the DOE/WEP general groups. These include the pipe lug issue, the RT review, the 741 floor elevation, and attachments classified as ASME MC. A descriptive summary of the corrective action plans is given in Appendix C.

2.2.3 Conclusions. The DOE/WEP addressed the potential safety significance of inspector certification/qualification by evaluating weld quality and found that either the welds had no deviations or that any deviations were acceptable in accordance with the applicable construction code or will be upon completion of the TVA committed corrective action plans. The DOE/WEP evaluated the sampled populations and determined that the unsampled portions have no generic problems.

2.3 CRV-03 Weld Filler Metal Control

The CRV-03 was created by the DOE/WEP to classify ECs and QIs related to "Weld Filler Metal Control."

2.3.1 Characterization of Issues. This category was divided into the following subcategories:

a. The TVA report WP-06-WBN, "Inspection Qualification and Training at Watts Bar Nuclear Plant."

3A Procedures for coated electrode not followed
3B Poor quality flux
3C Inadequate weld filler material traceability.

Of the 50 ECs that were assigned to CRV-03, it was determined that 25 concerns would be addressed by selected populations and the other 25 were best addressed as part of the DOE/WEP general groupings.

In addition to the ECs, one QI was assigned to CRV-03.

Table 6 lists the Subcategories of CRV-03 and establishes the relationship between subcategories, ECs, QIs, applicable DOE/WEP weld evaluation groups, and shows the methods of assessment.

2.3.2 Evaluation and Findings. For the Subcategory 3A, procedures for coated electrodes not

Table 6. Employee concerns/quality indicators from CRV-03 weld filler material control

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 3A—Procedure for Coated Electrode Not Followed		
Total welds examined were 9813.		
EX-85-021-001	201	DR, EE
EX-85-039-001	201	DR, EE
EX-85-061-003	201	DR, EE
IN-85-001-002	201	DR, EE
IN-85-052-008	201	DR, EE
IN-85-234-001	201	DR, EE
IN-85-310-005	201	DR, EE
IN-85-337-002	201	DR, EE
IN-85-352-002	201	DR, EE
IN-85-424-001	201	DR, EE
IN-85-424-007	201	DR, EE
IN-85-426-001	201	DR, EE
IN-85-441-003	201	DR, EE
IN-85-453-009	201	DR, EE
IN-85-454-004	201	DR, EE
IN-85-501-001	201	DR, EE
IN-85-725-011	201	DR, EE
IN-85-768-X06	201	DR, EE
IN-85-947-005	201	DR, EE
IN-85-039-001	201	DR, EE
IN-86-047-001	201	DR, EE
IN-86-305-004	201	DR, EE
WI-85-002-001	201	DR, EE
WI-85-041-009	201	DR, EE
WI-85-053-004	201	DR, EE
XX-85-068-003	A - L	IE
XX-85-068-006	A - L	IE

Table 6. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 3B—Poor Quality Flux		
Total welds examined were 9813.		
IN-85-247-001	A - L	IE
IN-85-284-001	A - L	IE
IN-85-299-002	A - L	IE
IN-85-317-001	A - L	IE
IN-85-411-002	A - L	IE
IN-85-450-001	A - L	IE
IN-85-455-001	A - L	IE
IN-85-520-002	A - L	IE
IN-85-524-001	A - L	IE
IN-85-540-002	A - L	IE
IN-85-600-001	A - L	IE
IN-85-636-001	A - L	IE
IN-85-167-003	A - L	IE
PH-85-013-001	A - L	IE
XX-85-124-001	A - L	IE
Subcategory 3C—Inadequate Weld Filler Traceability		
Total welds examined were 9813.		
IN-85-424-004	A - L	IE
IN-85-424-006	A - L	IE
IN-86-150-001	A - L	IE
IN-86-167-001	A - L	IE
WI-85-026-005	A - L	IE
WI-85-041-001	A - L	IE
WI-85-041-012	A - L	IE
XX-85-013-001	A - L	IE
NCR-4390 Rev. 0, 1, and 2[b]	19	DR

a. DR = document review
EE = engineering evaluation
IE = inspection/examination.

b. Identifies a quality indicator.

being followed, there were 27 ECs. There were 9813 welds examined to evaluate weld quality.

For the Subcategory 3B, poor quality flux, there were 15 ECs. There were 9813 welds examined to evaluate weld quality.

For the Subcategory 3C, inadequate weld filler traceability, there were eight ECs and one QI. The QI was resolved by document review. There were 9813 welds examined to evaluate weld quality.

The issue of weld filler metal control and associated subcategories was either programmatic/administrative or manufacturing/handling practices in nature and has been separately addressed by the TVA.[a] The DOE/WEP addressed the potential safety significance of the issue by evaluating the weld quality of the applicable installed hardware.

2.3.3 Conclusions. The DOE/WEP addressed the potential safety significance of weld filler metal control by evaluating weld quality and found either that the welds had no deviations or that any deviations were acceptable in accordance with the applicable construction code. The DOE/WEP evaluated the sampled populations and determined that the unsampled portions have no generic problems.

a. The TVA report WP-01-WBN, "Control of Welding Filler Material at Watts Bar."

2.4 CRV-04 Parent Metal Problems

The CRV-04 was created by the DOE/WEP to classify ECs related to Parent Metal Problems.

2.4.1 Characterization of Issues. This category was divided into the following subcategories:

4A Unrepaired arc strikes
4B Excessive excavation.

Of the eight ECs assigned to CRV-04, it was established that seven concerns could be addressed by selected populations and one as part of the general groupings.

Table 7 lists the subcategories of CRV-04 and establishes the relationship between Subcategorie, ECs, applicable DOE/WEP weld evaluation groups, and shows the methods of assessment.

Table 7. Employee concerns from CRV-04 parent metal problems

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 4A—Unrepaired Arc Strikes		
Total welds examined were 9819.		
IN-85-080-001	7	DR
IN-85-460-X04	8	IE
IN-85-203-003	A - L	IE
IN-85-460-X04	233	IE
Subcategory 4B—Excessive Excavation		
Total welds examined were 2.		
IN-85-246-002	9	DR, IE
IN-85-270-001	9	DR, IE
IN-85-460-X05	9	DR, IE
IN-86-133-001	9	DR, IE

a. DR = document review
IE = inspection/examination.

2.4.2 Evaluations and Findings. For the Subcategory 4A, unrepaired arc strikes, there were four ECs. The ECs were resolved by examination. There were 9819 welds examined to evaluate quality. The DOE/WEP conducted document reviews and inspection/examinations for two selected populations and the general plant grouping in order to properly assess this issue. The document review and field walkdowns for one of the selected populations were unable to confirm the employee concern as no arc strikes were detected and therefore required no further action. In the other population, over 60 ft of piping was visually examined and documented for the presence of arc strikes. All of the noted arc strikes had no measurable depth and no evidence of cracking. The employee concerns were confirmed (i.e., the presence of arc strikes), however, the piping was determined to be acceptable in accordance with the applicable construction code. In addition to these assessments, the DOE/WEP also analyzed the results of the examinations performed for the general plant groupings. There were no cases of safety impact on hardware related to arc strikes. The DOE/WEP concluded that as long as there is no evidence of cracking and no encroachment on minimum pipe wall thickness requirements, arc strikes do not represent a safety significant deviation.

For the Subcategory 4B, excessive excavation, there were four ECs. The ECs were resolved by examination. The DOE/WEP conducted visual and ultrasonic examinations and document review for the selected population. The DOE/WEP examined two welds that were specific to the employee concern. Both of the welds exhibited arc strikes with one having been previously documented by the TVA and the other not. The previously examined one did not exhibit any cracking or reduction in pipe wall thickness and is in compliance with the ASME Code.[11] The other weld did not exhibit any cracking, but ultrasonic examination did reveal that pipe wall thickness was below material minimum wall requirements. The TVA performed engineering analysis demonstrated that the remaining wall thickness satisfied the TVA minimum design requirements and the piping is acceptable. The DOE/WEP concurred with the analysis.

2.4.3 Conclusion. The DOE/WEP addressed the potential safety significance of parent metal problems and found either that the welds and parent metal had no deviations or that any deviations were acceptable in accordance with the applicable construction code. Five of the eight employee concerns were confirmed (i.e., there were conditions that, on inspection, were deviant). These conditions were, however, shown to be suitable for service. The DOE/WEP concludes that the welds evaluated in this assessment are in compliance with FSAR construction codes. The DOE/WEP evaluated the sampled populations and determined that the unsampled portions have no generic problems.

2.5 CRV-05 Inadequate Documentation and Allegations of Falsification

The CRV-05 was created by the DOE/WEP to classify ECs and QIs related to Inadequate Documentation and Allegations of Falsification.

2.5.1 Characterization of Issues. This category was divided into the following subcategories:

5A Improper alterations

1. Unauthorized access to computerized weld information system (WIMS)
2. Alterations using correction fluid.

5B Incorrect or inaccurate documentation

1. Undocumented temporary welds
2. Documentation buyoff without inspection
3. Unspecified documentation inaccuracies.

5C Inadequate document control

1. Lost or missing documentation
2. Documentation does not comply with manual
3. Welds not identified/stenciled.

5D Documentation, not applicable to the DOE/WEP.

Of the 56 ECs assigned to CRV-05, it was determined that eight were not applicable to the DOE/WEP scope and, therefore, did not require any further action by the DOE/WEP (see Table 8 for clarification of these concerns). The evaluation of the remaining 48 ECs established that 24 could be addressed by selected populations and the other 24 were addressed as part of the general groupings.

Table 8. Employee concerns in CRV-05 (Subcategory 5D) not within the DOE/WEP scope and requiring further processing by the TVA

Employee Concern	Determination of the DOE/WEP Applicability
IN-85-260-003	Concern withdrawn; not substantiated. Addressed in the TVA subcategory report 80500
IN-86-155-004	Vendor weld documentation; addressed in TVA report WP-26-WBN
IN-85-298-001	Not welding related; addressed in TVA report 70200
IN-85-339-X06	Not welding related; addressed in TVA report 80500
WBM-6-004-X08	Not welding related; addressed in TVA report 60000
IN-85-260-004	Not welding related; addressed in TVA report 80500
XX-85-082-001	Specific to Phipps Bend Nuclear Plant
XX-85-082-002	Specific to Phipps Bend Nuclear Plant

In addition to the ECs, 40 QIs were assigned to CRV-05.

Table 9 lists the subcategories of CRV-05 and establishes the relationship between Subcategories, ECs, QIs, applicable DOE/WEP weld evaluation groups, and shows the methods of assessment.

2.5.2 Evaluation and Findings. For the Subcategory 5A, improper alterations, there were 15 ECs. The ECs were resolved by examination. There were 9813 welds examined to evaluate weld quality. This subcategory centers around two issues. One issue, 5A.1, unauthorized access to computerized weld information system (WIMS), is a programmatic/administrative concern. The DOE/WEP determined that the best assessment method to determine any possible hardware implications would be the document review and analysis of examination results of the general piping populations. This computer accessing would only be a significant incident if it resulted in welds of such quality that a significant safety situation had not been detected. The DOE/WEP examined 331 welds in these groups. Welds with discrepancies were evaluated as to their acceptance in accordance with the applicable codes and were found to be acceptable. The other issue, 5A.2, alterations using correction fluid, was again considered by the DOE/WEP to be of a programmatic nature that would be assessed for any effects on installed hardware. The DOE/WEP concluded that this assessment would require an evaluation of all general plant groupings. Welds with discrepancies were evaluated and found to be acceptable. Based on the above, the DOE/WEP concludes that the sample components for this subcategory demonstrate that the hardware is in compliance with FSAR construction codes. No relationship was established between the software issues and hardware discrepancies.

For the Subcategory 5B, incorrect or inaccurate documentation, there were 21 ECs and 6 QIs. Twenty ECs were resolved by examination and one by document review. Three QIs were resolved by examination and three by document review. There were 10,941 welds examined to evaluate weld quality. This subcategory encompasses three related but separate issues. The first issue 5B.1, concerned undocumented temporary welds. The DOE/WEP conducted a visual walkdown for verification of removal of temporary attachments (thermocouples for postweld heat treatment) and a document review for the verification of attachment and removal in accordance with the TVA specification requirements. The walkdown of the sampled welds indicated that, in all cases, the temporary attachments had been removed. The TVA could not retrieve the documentation for the attachment and removal of these thermocouples. This issue will be resolved by the TVA-committed corrective action for Group 209 as described in Appendix C. The issue 5B.2, documentation buyoff without inspection, was assessed by document review and inspection/examination. Four selected populations and the results of the general plant

Table 9. Employee concern/quality indicator from CRV-05 inadequate documentation and allegations of falsification

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 5A.1—Unauthorized Access to Computerized Weld Information System (WIMS)		
Total welds examined were 331.		
EX-85-003-003	233	IE
EX-85-003-X04	233	IE
EX-85-006-X06	233	IE
HI-85-040-001	233	IE
IN-85-406-001	233	IE
IN-85-445-002	233	IE
IN-85-445-X16	233	IE
IN-85-446-001	233	IE
IN-85-458-007	233	IE
IN-85-576-001	233	IE
IN-85-890-001	233	IE
WI-85-025-001	233	IE
WI-85-064-006	233	IE
Subcategory 5A.2—Alterations Using Correction Fluid		
Total welds examined were 9813.		
XX-85-088-001	A - L	IE
XX-85-088-003	A - L	IE
Subcategory 5B.1—Undocumented Temporary Welds		
WI-85-053-003	209	DR
Subcategory 5B.2—Documentation Buyoff Without Inspection		
Total welds examined were 10,941.		
IN-85-260-001	233	IE
IN-85-260-002	233	IE
IN-85-260-X05	233	IE
WI-85-035-002	233	IE
NSRS Report 1-83-01-WBN[b]	239	IE
NCR-4576[b]	16	DR
NCR-4941[b]	16	DR
NCR-3450[b]	26	IE
PH-85-027-X08	A - L	IE
WI-85-076-002	A - L	IE

Table 9. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 5B.3—Unspecified Documentation Inaccuracies		
Total welds examined were 9813.		
NCR-4582[b]	17	DR, IE
NCR-1047[b]	31	EE
BEP-5-001-003	A - L	IE
IN-85-682-X07	A - L	IE
IN-85-768-X07	A - L	IE
IN-86-168-001	A - L	IE
PH-85-008-001	A - L	IE
WI-85-064-X04	A - L	IE
WI-85-076-001	A - L	IE
WI-85-081-002	F - L	IE
WI-85-081-X06	A - L	IE
XX-85-068-005	A - L	IE
XX-85-034-X02	A - L	IE
WI-85-097-002	A - L	IE
WI-85-097-001	A - L	IE
WI-85-064-001	233	IE
Subcategory 5C.1—Lost or Missing Documentation		
Total welds examined were 9814.		
IN-85-887-001	246	IE
IN-85-887-003	226	DR
WI-85-041-003	246	IE
WI-85-041-004	209	DR
NCR-2013[b]	244	IE
NCR-2134[b]	244	IE
NCR-2191[b]	244	IE
NCR-2196[b]	244	IE
NCR-2344[b]	244	IE
NCR-2999R1[b]	244	IE
NCR-3101[b]	244	IE
NCR-3104[b]	244	IE
NCR-3133[b]	244	IE
NCR-3134[b]	244	IE
NCR-3139[b]	244	IE

Table 9. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 5C.1—Lost or Missing Documentation (cont'd)		
NCR-3179[b]	244	IE
NCR-3244[b]	244	IE
NCR-3377[b]	244	IE
NCR-3385[b]	244	IE
NCR-3456[b]	244	IE
NCR-3468[b]	244	IE
NCR-3548[b]	244	IE
NCR-3593[b]	244	IE
NCR-3613[b]	244	IE
NCR-3621[b]	244	IE
NCR-3645[b]	244	IE
NCR-3654[b]	244	IE
NCR-3654[b]	244	IE
NCR-3722R1[b]	244	IE
NCR 5384R2[b]	244	IE
NCR-5452[b]	244	IE
NCR-5459[b]	244	IE
NCR-5580[b]	244	IE
NCR-5613[b]	244	IE
NCR-5788[b]	244	IE
NCR-5808[b]	244	IE
IN-85-155-003	5	DR
NCR-5807[b]	20	DR, IE
IN-85-981-002	A - L	IE
IN-86-037-001	D - L	IE
WI-85-091-007	A - L	IE
Subcategory 5C.2—Documentation Does Not Comply with Manual		
Total welds examined were 9813.		
USNRC Enforcement Item 390/79-25-01[b]	226	DR
WI-85-053-002	A - L	IE

Table 9. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 5C.3—Welds Not Identified/Stenciled		
Total welds examined were 9813.		
IN-86-167-002	A - L	IE
IN-86-168-003	A - L	IE
IN-86-211-001	A - L	IE

a. DR = document review
EE = engineering evaluation
IE = inspection/examination.

b. Identifies a quality indicator.

examinations were used. The DOE/WEP determined that this issue was programmatic but that the implications could result in hardware discrepancies. Welds with discrepancies were evaluated and found to be acceptable. The DOE/WEP concluded by analysis of the hardware versus documentation, that there was no significant correlation between them. The third issue, 5B.3, unspecified documentation inaccuracies, was assessed by document review, examination, and engineering evaluation. Three selected populations and the results of the general plant examinations were utilized for this issue. One population was evaluated solely by document review and the DOE/WEP concluded that the TVA's program for identification of inspection personnel and level of certification required for final weld acceptance was in compliance with their committed codes. A second population combined document review and examination of full penetration welds. The documentation was acceptable and the welds will be acceptable on completion of committed corrective action (the RT review as described in Appendix C). The third population was addressed by the results of the general plant groupings. The DOE/WEP examined 9813 welds and reviewed the associated documentation. There was no significant relationship between hardware and software discrepancies. Based on the above, the DOE/WEP concludes that the sample components utilized for Subcategory 5B demonstrate that the hardware is in compliance with the FSAR construction codes (or will be upon the TVA-committed corrective action) and there is no significant correlation between the software issues and hardware discrepancies.

For the Subcategory 5C, inadequate document control, there were 12 ECs and 34 QIs. Nine ECs were resolved by examination and three by document review. Thirty-three QIs were resolved by examination and one by document review. There were 9814 welds examined to evaluate weld quality. This subcategory encompasses three issues: 5C.1, lost or missing documentation, 5C.2, documentation does not comply with manual, and 5C.3, welds not identified/stenciled. The DOE/WEP determined that the best assessment method to determine any possible hardware implications would be the document review, examination, and engineering analysis of six selected populations and the general plant groups. In order to evaluate this, the DOE/WEP conducted document review and examination for a total of 9814 welds and concluded that no significant correlation existed between hardware and the noted documentation discrepancies. The documentation discrepancies with regard to the ASME Code will be addressed by the TVA-committed corrective action for documentation of temporary attachments. The hardware associated with this evaluation was determined to be acceptable or will be upon completion of the TVA-committed corrective action.

The issue of inadequate documentation and allegations of falsification and associated subcategories was programmatic/administrative in nature and has been addressed separately by the TVA.[a]

a. The TVA report WP-26-WBN, "Inaccurate/Inadequate Documentation at Watts Bar Nuclear Plant."

2.5.3 Conclusions. The DOE/WEP has concluded that the TVA had a program in place for the generation, authentication, and maintenance of the quality records required to provide evidence that the inspection activities had been performed in accordance with the specified requirements. The DOE/WEP has also determined that the evaluation of programmatic documentation discrepancies that were noted did not indicate any significant relationship between the discrepancies and the weld quality of the installed hardware. The assessments determined that with few exceptions (e.g., temporary attachments) the records required were retrievable, legible, and traceable to the activity performed.

The specific accusations of falsification of QA records is outside of the DOE/WEP scope, and specific incidents of this nature will be evaluated by the TVA.[a]

The DOE/WEP addressed the potential safety significance of inadequate documentation and allegations of falsification and found either that the welds had no deviations or that any deviations were acceptable in accordance with the applicable construction code, or will be upon completion of the TVA-committed corrective action plans for RT and documentation for temporary attachments as described in Appendix C. The DOE/WEP evaluated the sampled populations and determined that the unsampled portions have no generic problems.

2.6 CRV-06 Workmanship and Specific Weld Problems

The CRV-06 was created by the DOE/WEP to classify ECs and QIs related to Workmanship and Specific Weld Problems.

2.6.1 Characterization of Issues. This category was divided into the following subcategories:

- 6A Incomplete welds
- 6B Welds do not satisfy acceptance criteria
- 6C Possible subsurface defects
- 6D Unsatisfactory weld appearance
- 6E Welding dissimilar metals
- 6F Workmanship, not applicable to the DOE/WEP

Of the 73 ECs assigned to CRV-06, it was determined that 14 were not applicable to the DOE/WEP scope and, therefore, did not require further action by the DOE/WEP (see Table 10 for clarification of these concerns). The evaluation of the remaining 59 ECs established that 31 could be addressed by selected populations and the other 28 were addressed as part of the general groupings.

In addition to the ECs, a review by the DOE/WEP of WBNP-1 quality related documents has established that 32 QIs would also be assigned to Category CRV-06.

Table 11 lists the subcategories of CRV-06 and establishes the relationship between Subcategories, ECs, QIs, applicable DOE/WEP weld evaluation groups, and shows the methods of assessment.

2.6.2 Evaluation and Findings. For the Subcategory 6A, incomplete welds, there were nine ECs and two QIs. The ECs were resolved by plant examination. The QIs were resolved by plant examination and document review. The DOE/WEP examined a total of 10,256 welds in the populations used for this assessment including the general plant populations. The DOE/WEP specifically assessed this issue for a misinterpretation by the TVA of Bergen-Patterson structural drawings. The DOE/WEP concluded that the TVA adequately addressed the generic implications of this and further determined that the sample welds in this portion of the population meet the FSAR construction code. The DOE/WEP examined and evaluated 430 welds on seismic pipe sleeve hanger supports. This evaluation led to examination of additional components and allowed the DOE/WEP to conclude that the welds met the applicable FSAR construction codes and the unsampled population has no generic problems. In addition, the DOE/WEP analyzed the examination results for the general plant groups and concluded that any welds that have discrepancies associated with this issue are acceptable or will be upon completion of the TVA committed corrective action for elevation 741 (as summarized in Appendix C).

For the Subcategory 6B, welds not satisfying acceptance criteria, there were 28 ECs and 30 QIs. Twenty-five ECs were resolved by examination and three by document review. Twenty-seven QIs were resolved by examination and three by document review. This effort utilized the results from the populations specifically addressing this issue and all general plant groupings. The DOE/WEP examined a total of 13,162 welds in the populations used for this assessment. The DOE/WEP has determined that the noted discrepancies indicate that the installed hardware does exhibit attributes that do not meet the acceptance criteria; however the

a. The TVA report WP-26-WBN, "Inaccurate/Inadequate Documentation at Watts Bar Nuclear Plant."

Table 10. Employee concerns in CRV-06 (Subcategory 6F) not within the DOE/WEP scope and requiring further processing by the TVA

Employee Concern	Determination of the DOE/WEP Applicability
XX-85-068-007	Specific to Sequoyah Nuclear Plant; addressed in the TVA report 50399
IN-85-846-001	Vendor welding; addressed in the TVA report WP-32-WBN
IN-85-960-001	Vendor welding; addressed in the TVA report 80500
IN-85-657-001	Vendor welding; addressed in the TVA report 80500
IN-85-246-005	Vendor welding; addressed in the TVA report 80500
IN-85-852-001	Vendor welding; addressed in the TVA report 80500
IN-85-127-001	Vendor welding; addressed in the TVA report 80500
IN-85-007-003	Vendor welding; addressed in the TVA report 80500
IN-85-001-005	Vendor welding; addressed in the TVA report 80500
IN-85-559-002	Voided; transferred to concern HI-85-113-001
IN-86-131-001	Voided; transferred to concern IN-86-131-004 and addressed in the TVA report WP-32-WBN
IN-85-246-001	Not welding related; addressed in the TVA Report 22100
IN-86-246-005	Not welding related; addressed in the TVA Report 90100
IN-86-131-002	Voided; transferred to concern IN-86-131-005 and addressed in the TVA report WP-32-WBN

Table 11. Employee concerns/quality indicators from CRV-06 workmanship and specific weld problems

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 6A—Incomplete Welds		
Total welds examined were 10,256.		
IN-85-349-005	233	IE
IN-85-579-001	233	IE
NCR-4477[b]	230	IE
EX-85-154-001	I & J	IE
IN-85-349-001	F - L	IE
IN-85-413-002	A - L	IE
IN-85-524-002	F - L	IE
IN-85-541-001	F - L	IE
IN-86-131-004	A - C	IE
IN-86-131-005	A - C	IE
NCR-4484R1[b]	15	DR, IE

Table 11. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 6B—Welds Do Not Satisfy Acceptance Criteria		
Total welds examined were 13,162.		
EX-85-020-001	228	IE
X-85-076-001	246	IE
NCR-3523[b]	206/217	DR
NCR-3001R3[b]	206/217	DR
NCR-3325R1[b]	206/217	DR
NCR-2819[b]	219	IE
NCR-2379[b]	222	IE
NCR-4625[b]	224/245	IE
NCR-4759[b]	224/245	IE
NCR-4574[b]	224/245	IE
NCR-5962[b]	224/245	IE
NCR-5492[b]	224/245	IE
NCR-3745[b]	224/245	IE
NCR-5559[b]	224/245	IE
NCR-5177R1[b]	224/245	IE
NCR-4985[b]	224/245	IE
NCR-4483[b]	224/245	IE
NCR-4507[b]	224/245	IE
NCR-5435[b]	224/245	IE
NCR-5946[b]	224/245	IE
NCR-2064[b]	224/245	IE
NCR-2065[b]	224/245	IE
NCR-3776R1[b]	224/245	IE
NCR-5308[b]	224/245	IE
NCR-3632[b]	224/245	IE
NCR-2451[b]	224/245	IE
NCR-2882[b]	224/245	IE
NCR-3257[b]	224/245	IE
NCR-3632[b]	224/245	IE
NCR-4301[b]	224/245	IE
WI-85-064-005	203	IE
WI-85-081-004	213	DR
WI-85-018-005	233	IE
NCR-2629[b]	225	IE
NCR-4477[b]	230	IE

Table 11. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 6B—Welds Do Not Satisfy Acceptance Criteria (cont'd)		
EX-85-076-002	I & J	IE
IN-85-089-004	A & C	IE
IN-85-134-001	A - L	IE
IN-85-156-001	D & E	IE
IN-85-380-003	D & E	IE
IN-85-530-001	D & E	IE
IN-85-593-001	A - L	IE
IN-85-670-001	F - L	IE
IN-85-793-003	A - C	IE
IN-85-828-001	I & J	IE
IN-86-155-002	F - L	IE
SQM-6-008-001	A - C	IE
XX-85-098-001	A - C	IE
IN-85-996-002	A - C	IE
IN-86-017-001	A - L	IE
PH-85-035-002	34	IE
IN-85-085-001	33	IE
IN-85-085-002	33	IE
IN-85-641-002	14	DR, IE
IN-85-851-001	10	DR
IN-86-093-001	02	IE
PH-85-027-001	12	IE
PH-85-027-006	12	IE
Subcategory 6C—Possible Subsurface Defects		
Total welds examined were 10,153.		
IN-85-632-001	233	IE
IN-86-032-002	214	IE
IN-86-184-001	229	IE
IN-85-202-001	D & E	IE
IN-86-158-008	A - L	IE
HI-85-049-001	10	IE
IN-86-032-001	03	IE
IN-86-297-001	01	DR
PH-85-027-004	12	IE
WI-85-050-001	13	IE
WI-85-035-004	04	IE

Table 11. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 6D—Unsatisfactory Weld Appearance		
Total welds examined were 9813.		
EX-85-037-003	233	IE
IN-85-155-001	233	IE
IN-85-868-002	247	IE
IN-86-019-003	246	IE
IN-86-301-001	206/217	DR
PH-85-032-001	247	IE
IN-85-515-002	F - L	IE
IN-85-707-001	F - L	IE
IN-86-047-002	A - C	IE
PH-85-003-011	A - L	IE
Subcategory 6E—Welding Dissimilar Metals		
Total welds examined were 331.		
IN-85-845-004	233	IE

a. DR = document review
EE = engineering evaluation
IE = inspection/examination.

b. Identifies a quality indicator.

welds are suitable for service and thus meet the committed codes. For those items that require corrective action (the piping lug issue as described in Appendix C), the DOE/WEP has reviewed and concurred with the proposed corrective action and concludes that those items will be in compliance upon completion of the TVA-committed corrective action. The DOE/WEP has also concluded that the unsampled populations have no generic problems.

For the Subcategory 6C, possible subsurface defects, there were 11 ECs. Ten ECS were resolved by plant examination and one by document review. There were 10,153 welds examined to evaluate weld quality. The populations that were formed to address this issue covered various aspects, such as cracks, slugged welds and lack of penetration. The DOE/WEP performed the required examinations and in some cases utilized ultrasonic examinations not required by code. The DOE/WEP examined 312 welds for this portion and detected one weld with an indication that confirmed the employee concern. The DOE/WEP also utilized the results of the general plant groupings when the assessment had utilized an appropriate NDE for detecting indications of subsurface discrepancies. The DOE/WEP concluded that for this issue the sampled welds were in compliance with the FSAR construction codes. The DOE/WEP also concludes that no generic problem exists with the exception of those areas to be addressed by TVA.[a]

a. Craig Lundin letter to Frank Fogarty, "Watts Bar Nuclear Plant Unit 1—North and South Valve Room Structural Steel," CDL87101470, October 14, 1987.

For the Subcategory 6D, unsatisfactory weld appearance, there were 10 ECs. Nine ECs were resolved by plant examination and one by document review. There were 9813 welds examined to evaluate weld quality. The ECs supporting this category are not specific to certain types of attributes or welds that one would anticipate as being evidence of confirmation. The DOE/WEP concluded that for one EC, the review of documentation to support the required rework was adequate and examination or engineering analysis was not appropriate. The other ECs were most appropriately evaluated by using the results of examinations for the general plant groupings. These populations have been determined to be representative and the welds evaluated in these are or will be acceptable, upon completion of the TVA corrective action, and that the results indicate no generic problems exist for the unsampled portions.

For the Subcategory 6E, welding dissimilar metals, there was one EC, which was resolved by plant examination. There were 331 welds examined to evaluate weld quality. The DOE/WEP determined that this evaluation would utilize the results of the general plant piping populations. This evaluation of 331 welds indicated that these welds had no deviations or that any deviant conditions were analyzed as acceptable in accordance with the applicable construction code. The employee concern was not confirmed and the sample welds evaluated are in compliance with the FSAR committed codes.

2.6.3 Conclusion. The DOE/WEP addressed the potential safety significance of workmanship and specific weld problems and found either that the welds had no deviations or that any deviations were acceptable in accordance with the applicable construction code, or will be upon completion of the TVA-committed corrective action plans, as described in Appendix C. The DOE/WEP evaluated the sampled populations and determined that the unsampled portions have no generic problems, with the exception of those areas identified in Subcategory 6C.

2.7 CRV-07 NDE Processes and Procedures

The CRV-07 was created by the DOE/WEP to classify ECs and QIs related to NDE processes and procedures.

2.7.1 Characterization of Issues. This category has been divided into the following subcategories:

7A Inadequate process control

1. Heating, ventilating, and air conditioning (HVAC) ductwork systems not visually inspected
2. Inspection criteria problems
3. Inspection through paint
4. Weld inspection not performed

7B Questionable inspection practice

1. Surface conditioning for NDE
2. Fit-up verification performed by craft
3. Inspection tools not provided

7C NDE Process and procedures not applicable to the DOE/WEP

Of the 87 ECs assigned to CRV-07, it was determined that 20 were not applicable to the DOE/WEP scope and therefore, did not require further action by the DOE/WEP (see Table 12, for clarification). The evaluation of the remaining 67 ECs established that 35 could be addressed by selected populations and the other 32 were best addressed as part of the general groupings.

In addition to the ECs, a review by the DOE/WEP of WBNP-1 quality related documents has established that 24 QIs would also be assigned to category CRV-7.

Table 13 shows the relationship between Subcategories, ECs, QIs, applicable DOE/WEP weld evaluation groups and shows the methods of assessment.

2.7.2 Evaluation and Findings. For the Subcategory 7A.1, HVAC ductwork systems not visually inspected, two ECs were resolved by engineering evaluation. The DOE/WEP concludes that the ECs were confirmed. The DOE/WEP determined that the basis for the TVA's acceptance of the HVAC duct welds was inadequate. Acceptance of welds using a pneumatic test as allowed by Sheet Metal and Air Conditioning Contractors National

Table 12. Employee concerns in CRV-07 (Subcategory 7C) not within the DOE/WEP scope and requiring further processing by the TVA

Employee Concern	Determination of the DOE/WEP Applicability
EX-85-007-004/07B27	Administrative; addressed in the TVA report WP-26-WBN
IN-85-584-002/07A32	Not applicable to WBNP Unit 1; addressed in the TVA report WP-34-WBN
IN-85-532-001/07B52	Code requirements for socket weld gap introduces crud trap; addressed in the TVA report 23207
IN-85-671-004/07A01	Not substantiated by NSRS investigation; addressed in the TVA report WP-34-WBN
XX-85-065-001/07A08	Specific to Sequoyah nuclear plant; not applicable to WBN
IN-85-706-003/07B67	Delay in inspection does not imply weld quality problem—identified not safety related; addressed in the TVA report WP-32-WBN
IN-85-358-001/07B65	Vendor welding; addressed in the TVA report WP-33-WBN
IN-85-212-001/07A26	Not applicable to WBNP Unit 1; addressed in the TVA report WP-16-WBN
IN-85-730-001/07B36	Not applicable to WBNP Unit 1; refer to IN-85-730-002 and -003
SQM-5-001-002/07A16	Not applicable to WBNP Unit 1; addressed in the TVA report WP-16-SQN
BFM-5-001-001/07B60	Not applicable to WBNP Unit 1; as related to the TVA report WP-16-WBN
BFM-5-001-002/07B60A	Not applicable to WBNP Unit 1; as related to the TVA report WP-16-WBN
SQM-5-001-001/07A15	Not applicable to WBNP Unit 1; as related to the TVA report WP-16-SQN
BEM-5-001-001/07B62	Not applicable to WBNP Unit 1; as related to the TVA report WP-16-WBN
BEM-5-001-002/07B62A	Not applicable to WBNP Unit 1; as related to the TVA report WP-16-WBN
IN-85-946-001/07B71	Not applicable to WBNP Unit 1; as related to the TVA report WP-16-WBN
IN-85-730-003/07B69A	Not applicable to WBNP Unit 1; as related to the TVA report WP-32-WBN
WBM-5-001-002/07B75	Not applicable to WBNP Unit 1; as related to the TVA report WP-16-WBN
IN-85-730-002/07B69	Not applicable to WBNP Unit 1; as related to the TVA report WP-16-WBN
WI-85-035-001/07B23	Vendor welds; addressed in the TVA report WP-32-WBN

Table 13. Employee concerns/quality indicators from CRV-07 NDE processes and procedures

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 7A.1—HVAC Ductwork Systems Not Visually Inspected		
PH-85-012-001	35	EE
PH-85-012-X03	35	EE
Subcategory 7A.2—Inspection Criteria Problems		
Total welds examined were 10,042.		
IN-85-310-004	233	IE
IN-85-532-006	232	IE
IN-85-682-002	232	IE
IN-86-184-003	229	IE
NCR-2528[b]	242	IE
NCR-2529[b]	242	IE
NCR-2807[b]	237	IE
NCR-3216[b]	242	IE
NCR-3443[b]	242	IE
NCR-4201[b]	242	IE
NCR-4667[b]	242	IE
NCR-4909[b]	242	IE
NCR-5143[b]	242	IE
NCR-5246[b]	242	IE
NCR-5305[b]	242	IE
NCR-5635[b]	242	IE
NCR-6274[b]	242	IE
NCR-3302R[b]	227	IE
NCR-4753R1[b]	241	IE
NCR-5561R1[b]	241	IE
NRC Enfor. Item 50-390/79-25-0[b]	238	IE
IN-85-001-001	A - L	IE
IN-85-109-003	D - L	IE
IN-85-156-002	D & E	IE
IN-85-272-003	A - C	IE
IN-85-349-002	D - L	IE
IN-85-406-002	A - L	IE
IN-85-545-005	A - L	IE
IN-85-545-X09	A - L	IE
IN-85-670-005	A - L	IE
IN-85-682-003	A - L	IE

Table 13. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 7A.2—Inspection Criteria Problems (cont'd)		
IN-85-852-002	A - C	IE
IN-86-205-009	A - C	IE
NS-85-001-X03	A - L	IE
PH-85-051-001	A - C	IE
WI-85-030-003	A - L	IE
XX-85-083-001	A - L	IE
XX-85-102-006	A - L	IE
IN-85-137-001	35	EE
Subcategory 7A.3—Inspection Through Paint		
Total welds examined were 1457.		
IN-85-458-001	205	IE
IN-85-767-003	205	IE
IN-86-019-001	205	IE
NS-85-001-001	205	IE
PH-85-040-001	205	IE
WI-85-013-003	205	IE
WI-85-030-007	205	IE
WI-85-030-008	205	IE
WI-85-030-009	205	IE
WI-85-041-006	205	IE
WI-85-041-007	205	IE
WI-85-041-008	205	IE
WI-85-041-010	205	IE
Subcategory 7A.4—Weld Inspection Not Performed		
Total welds examined were 10,155.		
IN-85-476-003	205	IE
WI-85-029-002	248	IE
NCR-4737[b]	242	IE
NCR-5604[b]	242	IE
NRC Enfor. Item 50-390/80-19-01[b]	238	IE
BEP-5-001-001	A - L	IE
IN-85-022-001	F	IE
IN-85-062-002	I & J	IE
IN-85-260-006	A - L	IE

Table 13. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 7A.4—Weld Inspection Not Performed (cont'd)		
IN-85-682-001	F - L	IE
XX-85-034-001	A - L	IE
XX-85-054-001	A - L	IE
XX-85-108-001	A - L	IE
XX-85-108-002	A - L	IE
PH-85-027-005	12	IE, EE
NCR-6575[b]	18	DR, IE
NCR-3454[b]	21	IE
NCR-4522[b]	22	IE
NCR-1315[b]	23	DR
Subcategory 7B.1—Surface Conditioning for NDE		
Total welds examined were 9865.		
IN-85-282-002	233	IE
IN-85-579-005	212	IE
IN-85-271-001	A - L	IE
IN-85-441-002	A - L	IE
IN-85-643-002	D - L	IE
Subcategory 7B.2—Fit-Up Verification by Craft		
IN-85-001-006	236	DR
IN-85-026-001	234	DR
IN-85-052-006	236	DR
IN-85-052-007	236	DR
IN-85-488-001	236	DR
IN-85-584-001	236	DR
IN-85-671-001	236	DR
WBM-5-001-001	234	DR
WI-85-013-002	236	DR
WI-85-041-013	236	DR
Subcategory 7B.3—Inspection Tools Not Provided		
Total welds examined were 9813.		
IN-85-007-001	A - L	IE
IN-85-134-002	A - L	IE
IN-85-406-003	A - L	IE

a. DR = document review
EE = engineering evaluation
IE = inspection/examination.

b. Identifies a quality indicator.

Association (SMACNA)[12] standard does not establish the structural adequacy of the HVAC welds. The DOE/WEP has concurred with the TVA-committed corrective action plan that will bring the welds into compliance with the applicable TVA construction specifications. The corrective action plan summary for resolution of safety-related HVAC ductwork weld quality is given in Appendix C.

For the Subcategory 7A.2, inspection criteria problems, there were 22 ECs and 17 QIs. There were 21 ECs resolved by inspection/examination and 1 EC by engineering evaluation. The 17 QIs were resolved by inspection/examination. This subcategory includes issues regarding inspection of pipe support welds, inspection to drawing requirements, questionable inspection, possible liquid penetrant inspection deficiencies, radiographic film review, acceptance of skewed fillet welds and generic implications of quality indicators. The DOE/WEP evaluated inspection results of 10,042 welds and reviewed 3072 radiographic film review examination packages pertinent to this subcategory. The ECs and QIs that relate to radiographs, specific pipe support welds, surge line truss welds, and ductwork welds have been confirmed; the remainder were not confirmed. The DOE/WEP has evaluated the randomly selected welds for generic implications, has performed document review as appropriate, and has reviewed and concurred with all the TVA suitability for service analyses in this subcategory. The components evaluated in this subcategory will be acceptable upon completion of the TVA-committed corrective action plan as described for RT review in Appendix C.

For the Subcategory 7A.3, inspection through paint, there were 13 ECs that were resolved by inspection/examination. The ECs question visual inspection and/or reinspection through paint or carbo-zinc primer during the period from December 1, 1981, to January 23, 1984. Weld reinspection through primer is not a violation of the American Welding Society Code.[13] The DOE/WEP has evaluated inspection data for 1457 randomly selected welds in relation to this subcategory. Deviation rates were compared for the welds inspected by the TVA before, during, and following the time period of concern. Each relevant attribute was analyzed to determine if any significant differences existed for the deviation rates in each time period. The analysis indicates that no significant differences exist. The issues identified in the ECs could not be confirmed. All components evaluated in this category have been determined suitable for service.

For the Subcategory 7A.4, weld inspection not performed, there were 12 ECs and 7 QIs. The ECs and QIs were resolved by inspection examination of 10,155 welds, document review, and engineering evaluation. The ECs and QIs relate to: lack of inspection of specific components or types of components, lack of minimum wall verification, and generic implications of NCRs. The EC regarding lack of inspection on instrument supports and the specifically identified EC item (structural beams, South Valve Room) were confirmed. The issues produced by QIs were not confirmed. The welds evaluated in this subcategory are acceptable or will be upon completion of the TVA-committed corrective actions as described in Appendix C.

For the Subcategory 7B.1, surface conditioning for NDE, there were five ECs that were resolved by inspection/examination and engineering evaluation. The first issue in this subcategory is possible minimum wall encroachment on penetration sleeves at the containment shield wall. The DOE/WEP performed examinations on 52 welds for this subcategory. The EC that identified this condition has been confirmed, but the TVA evaluation has determined these components are acceptable. The DOE/WEP concurs with this evaluation and has also determined that there are no generic problems with the unsampled population. The remaining four concerns in this subcategory are nonspecific in nature and, therefore, were addressed through the utilization of examination results from the 9813 welds in the general groups. There are no generic problems related to this subcategory.

For the Subcategory 7B.2, fit-up verification by craft, there were 10 ECs. These were resolved by document review and engineering evaluation. This subcategory addresses the issues of (a) the acceptability of fit-up verification performed by welding foremen, (b) the acceptability of quality control using a surveillance program to verify fit-up compliance, and (c) surveillance program implementation compliance. The DOE/WEP has determined that the TVA has satisfied the applicable requirements of the FSAR construction code with regard to fit-up criteria. The issues identified in the ECs were not confirmed.

For the Subcategory 7B.3, inspection tools not provided, there were three ECs. The ECs were resolved by evaluation of 9813 welds.

A weld group was not formed to specifically address this issue because the impact on weld quality could be best evaluated by results of the DOE/WEP general group plant examinations. The sample welds were evaluated as being in compliance with the applicable codes.

2.7.3 Conclusion. The DOE/WEP addressed the potential safety significance of nondestructive processes and procedures and found either (a) that the welds had no deviations, or (b) that any deviations were acceptable in accordance with the applicable construction code, or will be upon completion of the TVA committed corrective action plans as described in Appendix C. The DOE/WEP evaluated the sampled populations and determined that the unsampled portions have no generic problems.

2.8 CRV-08 Weld Process and Procedures

The CRV-08 was created by the DOE/WEP to classify ECs and QIs related to "Weld Process and Procedures."

2.8.1 Characterization of Issues. This category has been divided into the following subcategories:

- 8A Weld procedures not properly followed
- 8B Weld procedures not adequate
- 8C Welding equipment unsuitable
- 8D Other weld process control problems
- 8E Improper weld repair
- 8F Weld process control, not applicable to the DOE/WEP.

Of the 56 ECs assigned to CRV-08, it was determined that 6 were not applicable to the DOE/WEP scope and, therefore, did not require any further action by the DOE/WEP (see Table 14 for clarification of these concerns). The evaluation of the remaining 50 concerns established that 22 concerns could be addressed by selected populations and the other 28 were addressed as part of the general plant groupings.

In addition to the ECs, a review by DOE/WEP of Watts Bar Unit 1 quality related documents has established that 11 QIs would also be assigned to CRV-08.

Table 15 lists the Subcategories of CRV-08 and establishes the relationship between Subcategories, ECs, QIs, applicable DOE/WEP weld evaluation groups and shows the methods of assessment.

2.8.2 Evaluation and Findings. For the Subcategory 8A, weld procedures not properly followed, there were 11 ECs and 10 QIs, which were resolved by examination, evaluation, and document review. The DOE/WEP examined 10,087 welds for the populations utilized and concluded that they were suitable for service or will be upon completion of the TVA-committed corrective action. The document reviews conducted for this issue indicated that the correct electrodes were being used, interpass temperature requirements were being met, and required purging was being performed and verified. The DOE/WEP performed three engineering evaluations on specific issues for this subcategory. The first was an evaluation on the detrimental effects of not satisfying preheat requirements. This evaluation determined that the most probable resulting defect would be underbead cracking. The evaluation also determined that this would not be expected to occur at WBNP-1 because of the type and thickness of material. A second evaluation was to determine the detrimental effect of welding over cracks. It was determined that two types of cracks (stress or crater) could occur in the welding at WBNP-1. The DOE/WEP concluded that stress cracks would remain detectable by NDE if welded over and crater cracks, though not as detectable when welded over, would not propagate. The third evaluation was performed to determine the detrimental effects caused by exceeding a required interpass temperature of 350°F. The evaluation indicated that welding at interpass temperatures as high as 1200°F would not have a detrimental effect and that exceeding that temperature was very unlikely. It was also noted that intergrannular stress corrosion cracking would not be a problem in a pressurized water reactor such as WBNP-1, even if the stainless steel had been sensitized because of overheating.

For the Subcategory 8B, weld procedures not adequate, there were six ECs and one QI. The ECs were resolved by examination and engineering evaluation. The QI was resolved by document review. The DOE/WEP conducted document review, examinations, and engineering evaluation for five selected populations to evaluate this issue. The examinations encompassed 387 welds and indicated that these welds either (a) had no defects, or (b) any deviant conditions were analyzed as being suitable for service in accordance with the applicable codes. The document review was performed to determine if the TVA had a welding procedure approved for HVAC duct with 7018 electrodes. This review indicates that the TVA did have an approved procedure in place. A second document review was performed to ensure that the TVA incorporated and complied with code requirements pertaining to weld procedure and welder performance qualifications. The review indicated that the TVA had a program that was in compliance for both

Table 14. Employee concerns in CRV-08 (Subcategory 8F) not within the DOE/WEP scope and requiring further processing by the TVA

Employee Concern	Determination of the DOE/WEP Applicability
IN-85-001-003	Vendor welding; addressed in the TVA report WP-32-WBN
IN-85-050-0031	Not construction; addressed in the TVA report 90000
IN-85-079-003	Not safety related; addressed in the TVA report WP-32-WBN
IN-85-681-002	Not safety related; addressed in the TVA report 90000
IN-86-086-002	Not welding related; addressed in the TVA report WP-42-WBN
IN-86-112-002	Not welding related; addressed in the TVA report WP-42-WBN

Table 15. Employee concerns/quality indicators from CRV-08 weld process and procedures

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 8A—Weld Procedures Not Properly Followed		
Total welds examined were 10,087.		
IN-85-185-001	215	EE
	218	EE
IN-85-641-005	207	IE
IN-85-671-003	214	IE
IN-85-834-002	215	EE
	218	EE
PH-85-035-003	204	DR
WI-85-064-002	207	IE
WI-85-081-003	207	IE
NRC Report	215	EE
50-390/78-31-02[b]	218	EE
NRC Report	240	DR
50-390/78-3[b]		
NRC Report	240	DR
50-390/79-41[b]		
NRC Report W-309-P[b]	215	EE
	218	EE
NRC Report 5093[b]	220	IE

Table 15. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 8A—Weld Procedures Not Properly Followed (cont'd)		
NRC Report 5164[b]	220	IE
NRC Report 5211[b]	220	DR
NRC Report 5385[b]	220	IE
NRC Report 5389 R1[b]	220	IE
NRC Report 5493[b]	220	IE
IN-85-544-001	A - L	IE
IN-85-544-002	A - L	IE
XX-85-041-001	A - L	IE
PH-85-027-007	12	IE
Subcategory 8B—Weld Procedures Not Adequate		
Total welds examined were 387.		
IN-85-143-001	208	IE
IN-85-143-002	208	IE
IN-85-469-003	233	IE
IN-85-634-002	231	EE
IN-86-046-003	233	IE
IN-85-658-002	35	EE
CAR-82-10[b]	28	DR
Subcategory 8C—Welding Equipment Unsuitable		
Total welds examined were 9813.		
IN-85-247-002	233	IE
IN-85-280-001	233	IE
IN-85-298-002	233	IE
IN-85-303-001	233	IE
EX-85-061-004	A - L	IE
EX-85-127-003	A - L	IE
IN-85-004-001	A - L	IE
IN-85-050-001	D - L	IE
IN-85-050-002	D - L	IE
IN-85-299-001	A - L	IE
IN-85-317-002	A - L	IE
IN-85-435-001	A - L	IE
IN-85-435-005	A - L	IE
IN-85-453-006	A - L	IE
IN-85-486-001	A - L	IE

Table 15. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 8C—Welding Equipment Unsuitable (cont'd)		
IN-85-600-002	A - L	IE
IN-85-612-002	A - L	IE
IN-85-880-001	A - L	IE
OW-85-003-002	A - L	IE
Subcategory 8D—Other Weld Process Control Problems		
Total welds examined were 9813.		
IN-86-184-004	233	IE
IN-86-249-X02	233	IE
IN-85-982-003	233	IE
EX-85-030-001	A - L	IE
IN-85-317-004	A - L	IE
IN-85-038-001	A - L	IE
IN-85-894-003	A - L	IE
WI-85-030-005	A - L	IE
WI-85-084-001	A - L	IE
Subcategory 8E—Improper Weld Repair		
Total weld examined were 9815.		
PH-85-027-002	12	IE
Subcategory 8E—Improper Weld Repair		
IN-85-216-001	D & E	IE
IN-85-404-001	A - L	IE
IN-86-086-001	D & E	IE
XX-85-100-001	A - L	IE

a. DR = document review
EE = engineering evaluation
IE = inspection/examination.

b. Identifies a quality indicator.

issues. The DOE/WEP also performed an engineering evaluation to determine any detrimental effects to weldments if excessive heat was applied by welding. The evaluation indicated that no detrimental effect would result.

For the Subcategory 8C, welding equipment being unsuitable, there were 19 ECs, which were resolved by inspection/examination. There were 9813 welds examined to evaluate weld quality and it was determined that all welds were acceptable. The DOE/WEP utilized the results of examinations for the general plant groupings in order to assess the installed hardware. The DOE/WEP cannot substantiate any relationship between the quality of the reinspected welds and the condition or adequacy of the welding equipment.

For the Subcategory 8D, other weld process control problems, there were nine ECs. The ECs were resolved by inspection/examination. There were 9813 welds examined to evaluate weld quality and it was determined that all welds were acceptable. The DOE/WEP utilized the examination results of the general plant groupings to determine if any process control problems other than those addressed in this report had been overlooked by the DOE/WEP. The DOE/WEP concluded that, based on the examination results, no other process control problems were evident.

For the Subcategory 8E, improper weld repair, there were five ECs, which were resolved by inspection/examination. There were 9815 welds examined to evaluate weld quality. The DOE/WEP conducted inspection/examinations for one selected population and the general plant groupings. The selected population required the examination of two welds. One weld was acceptable and the other exhibited lack of fusion detected by UT. This weld was determined to be suitable for service in accordance with applicable codes by the TVA with the DOE/WEP concurrence. One employee concern was confirmed and one was not confirmed. In addition, the DOE/WEP also utilized the examination results of the general plant groupings to demonstrate the overall quality of installed hardware, which includes items that have been repaired.

2.8.3 Conclusions. The DOE/WEP addressed the potential safety significance of weld process and procedure issues and found that either the welds had no deviations or that any deviations were acceptable in accordance with the applicable construction code, or will be upon completion of the TVA committed corrective action plans as described in Appendix C. The DOE/WEP evaluated the sampled populations and determined that the unsampled portions have no generic problems.

2.9 CRV-09 Other Weld Quality Problems

The CRV-09 was created by the DOE/WEP to classify ECs and QIs regarding weld quality problems that could not be appropriately addressed in the preceding eight categories.

2.9.1 Characterization of Issues. This category has been divided into the following subcategories:

9A Questionable design practice

1. Questionable box hanger weld joint design
2. Use of straight butt joint configuration

9B Questionable management practice

1. Inadequate corrective action follow-up
2. Creation of busy work
3. Disposition by engineering analysis
4. Rework to avoid disciplinary action

9C Questionable construction practices

1. Use of weld bosses
2. Sandblasting while welding
3. Post weld surface conditions

9D Other quality problems, not applicable to the DOE/WEP.

Of the 114 ECs assigned to this category, it was determined that 71 were not applicable to the DOE/WEP scope and therefore, did not require any further action by the DOE/WEP (see Table 16 for clarification). The evaluation of the remaining 43 ECs established that 14 could be addressed by selected populations and the other 29 were best addressed as part of the general groupings.

In addition to the ECs a review by the DOE/WEP of WBNP-1 quality related documents has established that 10 QIs would also be assigned to category CRV-9.

Table 17 shows the relationship between Subcategories, ECs, QIs, applicable DOE/WEP weld evaluation groups, and shows the methods of assessment.

Table 16. Employee concerns in CRV-09 (Subcategory 9D) not within the DOE/WEP scope and requiring further processing by the TVA

Employee Concern	Determination of the DOE/WEP Applicability
XX-85-010-001	Not welding related; the TVA report 11300
IN-85-641-003	Not welding related; the TVA report 10200
IN-85-845-001	Not welding related; the TVA report 11300
IN-86-140-002	Not welding related; the TVA report 11300
IN-86-158-007	Not welding related; the TVA report 15100
IN-85-396-001	Not welding related; the TVA report 15100
PH-85-009-001	Not welding related; the TVA report 70500
IN-85-198-001	Not welding related; the TVA report 15100
HI-85-046-001	Employee harassment; the TVA report 60000
WI-85-053-012	Vendor welding; the TVA report 17100
PH-85-001-005	Not welding related; the TVA report WP-32-WBN
IN-86-294-002	Not applicable to WBNP Unit 1; the TVA report 11300
HI-85-042-001	Employee harassment; the TVA report 60000
XX-85-102-011	Not applicable to WBNP Unit 1; the TVA report WP-26-WBN
IN-85-297-006	Vendor welding; the TVA report 80500
IN-85-868-001	Vendor welding; the TVA report 80500
IN-85-052-002	Disciplinary action; the TVA report 80500
IN-85-475-001	Not safety related; the TVA report WP-32-WBN
IN-85-295-002	Administrative; the TVA report WP-14-WBN
IN-85-866-002	Not welding related; the TVA report 10700
IN-86-003-001	Not welding related; the TVA report 22211
IN-85-454-002	Not safety related; the TVA report 40602
IN-86-282-004	Not welding related; the TVA report 17100
IN-85-598-001	Not welding related; the TVA report 70500
IN-85-585-001	Not welding related; the TVA report 70500
EX-85-008-002	Supervisor drinking, not welding related; the TVA report 60000
IN-85-167-001	Employee harassment, not welding related; the TVA report 70500
IN-85-538-001	Employee privileges, not welding related; the TVA report 70500
XX-85-101-005	Not applicable to WBNP Unit 1
EX-85-010-002	Not welding related; the TVA report 70500
PH-85-005-001	Union problem, not welding related; the TVA report 70500
EX-85-009-001	Union problem, not welding related; the TVA report 70500
IN-85-705-001	Union problem, not welding related; the TVA report 70500
EX-85-012-001	Union problem, not welding related; the TVA report 30806
IN-85-130-001	Union problem, not welding related; the TVA report 30806
HI-85-006-001	Employee harassment; the TVA report 60000
HI-85-064-001	Employee harassment; the TVA report 60000
IN-85-029-001	Design issue, not welding related; the TVA report 70500
IN-85-480-007	Unfair discipline; the TVA report 11200
PH-85-002-019	Employee harassment; the TVA report 70500

Table 16. (continued)

Employee Concern	Determination of the DOE/WEP Applicability
WI-85-042-001	Administrative, Not welding related; the TVA report 80500
WI-85-085-003	Not welding related; the TVA report 70500
XX-85-065-002	Not applicable to WBNP Unit 1; the TVA report 60000, 70500, and 80500
IN-85-295-001	Not weld quality related; the TVA report 70500
IN-85-372-001	Vendor welding; the TVA report 80500
IN-85-706-005	Not weld quality related; the TVA report 70500
IN-85-940-X03	Administrative; the TVA report 70500
IN-85-362-002	Cost effectiveness issue, not weld problem; the TVA report 11200
EX-85-107-002	Administrative; the TVA report 71804
HI-85-019-001	Employee harassment; the TVA report 60000
HI-85-114-001	Employee harassment; the TVA report 60000
IN-85-004-002	Discipline problem; the TVA report 70500
IN-85-297-003	Administrative; the TVA report 21509
IN-85-377-001	Administrative; the TVA report 11200
IN-85-579-004	Administrative; the TVA report 70500
IN-85-731-001	Administrative; the TVA report 80500
IN-85-301-001	Administrative; the TVA report 80500
IN-85-617-001	Not welding related; the TVA report 30501
IN-86-219-001	Not welding related; the TVA report 70500
IN-85-195-001	Not weld quality related; the TVA report 70500
EX-85-061-005	Not weld quality related; the TVA report 11100
IN-85-025-001	Not welding related; the TVA report 30700
IN-85-868-003	Not welding related; the TVA report 17100
IN-85-947-003	Not welding related; the TVA report 11200
IN-85-441-001	Not weld quality related; the TVA report 40505
WI-85-053-001	Administrative; the TVA report 60000
XX-85-086-002	Not applicable to WBNP Unit 1; the TVA report 22201
XX-85-086-003	Not applicable to WBNP Unit 1; the TVA report 22201
XX-85-086-004	Not applicable to WBNP Unit 1; the TVA report 22201
IN-85-289-004	Not welding related; the TVA report 22402
IN-85-325-004	Not welding related; the TVA report 22402

Table 17. Employee concerns/quality indicators from CRV-09 other weld quality problems

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 9.A.1—Questionable Box Hanger Weld Joint Design		
EX-85-039-003	231	EE
IN-85-316-005	231	EE
IN-85-405-001	231	EE
IN-85-613-001	231	EE
IN-85-634-001	231	EE

Table 17. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 9.A.1—Questionable Box Hanger Weld Joint Design (cont'd)		
IN-85-672-001	231	EE
OW-5-003-001	231	EE
WBP-6-007-001	231	EE
Subcategory 9.A.2—Use of Straight Butt Joint Configuration		
Concerns IN-85-289-004 and IN-85-325-004 have been moved to Subcategory 9D (see Table 16)		
Subcategory 9.B.1—Inadequate Corrective Action Follow-up		
Total welds examined were 10,551.		
WI-85-030-006	233	IE
IN-85-424-009	A - L	IE
IN-85-424-010	A - L	IE
IN-85-435-002	A - L	IE
IN-86-281-001	A - L	IE
WI-85-030-001	A - L	IE
WI-85-030-010	A - L	IE
XX-85-068-008	A - L	IE
XX-85-110-001	A - L	IE
NCR 2375R[b]	D - L 252, 254	IE
NCR 3001R1[b]	D - L 252, 254	IE
NCR 3523R[b]	D - L 252, 254	IE
NRC Enfor. Item WBRD-90/81-75[b]	D - L 252, 254	IE
Subcategory 9.B.2—Creation of Busy Work		
Total welds examined were 3384.		
IN-85-629-001	I, J, K, L, 202, & 225	IE

Table 17. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 9.B.3—Disposition by Engineering Analysis		
Total welds examined were 9829.		
WI-85-030-004	246	IE
IN-85-321-001	A - L	IE
IN-85-339-005	A - L	IE
IN-85-424-002	A - L	IE
IN-85-937-001	A - L	IE
IN-86-230-003	A - L	IE
IN-85-134-005	A - L	IE
IN-86-315-006	A - L	IE
XX-85-102-004	A - L	IE
IN-85-109-002	A - L	IE
IN-85-442-008	11	DR
NCR 4139 R0[b]	24	DR, EE
NCR 3782[b]	27	DR
NCR 5495[b]	29	IE
NCR 4477[b]	32	IE
NCR 717R/717R-R1[b]	36	DR
NCR 2375 R0[b]	221	DR
Subcategory 9.B.4—Rework to Avoid Disciplinary Action		
Total welds examined were 331.		
IN-85-435-003	233	IE
Subcategory 9.C.1—Use of Weld Bosses		
Total welds examined were 331.		
IN-86-085-003	233	IE
Subcategory 9.C.2—Sandblasting While Welding		
Total welds examined were 9813.		
IN-85-600-004	A - L	IE, EE
Subcategory 9.C.3—Post Weld Surface Conditions		
Total welds examined were 9815.		
IN-85-299-003	6	IE
EX-85-059-001	A - L	IE
IN-85-149-002	A - L	IE
IN-85-192-002	A - L	IE
IN-85-273-001	A - L	IE

Table 17. (continued)

Employee Concern or Quality Indicator	Weld Group	Assessment Method[a]
Subcategory 9.C.3—Post Weld Surface Conditions (cont'd)		
IN-85-451-001	A - L	IE
IN-85-511-002	A - L	IE
IN-85-561-X05	A - L	IE
IN-86-300-004	A - L	IE
WBM-6-002-001	A - L	IE
WI-85-064-003	A - L	IE

a. DR = document review
EE = engineering evaluation
IE = inspection/examination.

b. Identifies a quality indicator.

2.9.2 Evaluation and Findings. For the Subcategory 9A.1, questionable box hanger weld joint design, there were eight ECs. The DOE/WEP has resolved the issues through an engineering evaluation, which included destructively testing six mockup joints in a worst case scenario, and through a literature search. The ECs express concern that the large circumferential weld that attached a box anchor to a pipe may have caused excessive heat input to the pipe that could result in degradation of the mechanical properties of the piping. One of the ECs also stated that in some cases, a plate (on the unattached end of the hanger) has been inadvertently welded to the pipe and could damage the pipe should the weld fail. The issue regarding the inadvertently welded plates was confirmed. However, related piping systems will not be adversely affected. The issues regarding degradation of the mechanical properties of the pipe were not confirmed.

For the Subcategory 9A.2, use of straight butt joint configuration, there were two ECs, which were resolved by engineering evaluation. The two ECs suggest that more rigorous design requirements need to be established for WBNP-1 conduit supports than those required by codes. The DOE/WEP design engineering has reviewed the TVA WBNP General Design Criteria No. WB-DC-40-31.1 OR3, "Seismically Qualifying Conduit Supports," and verified that the various conduit supports are analyzed for acceptability within the proper local envelopes of the seismic criteria. A follow-up review of the analysis was not performed by DOE/WEP because this is a design issue and is outside the DOE/WEP workscope, which is limited to an assessment of welds and the weld quality program at WBNP-1. The ECs have been returned to the TVA's employee concern group for disposition as indicated in Tables 16 and 17.

For the Subcategory 9B.1, inadequate corrective action follow-up, there were nine ECs and four QIs, which were resolved by evaluation of 10,551 welds. Because of the nonspecific nature of the issues, the DOE/WEP has determined that the generic implications of these issues are most appropriately evaluated through inspection results for the total plant populations. The DOE/WEP has determined that there are no weld quality problems related to this subcategory.

For the Subcategory 9B.2, creation of busy work, there was one EC. The EC was resolved by evaluation of 3384 hanger welds for generic implications on weld quality, which determined that there were no generic problems within the population. The EC in this subcategory refers to creation of busy work by having workers cut down and reweld hangers. The DOE/WEP has determined that any impact on weld quality would be detected by an evaluation of inspection results for all hanger welds. The DOE/WEP has reviewed and concurred with the TVA analysis that all components evaluated in this subcategory are suitable for service.

For the Subcategory 9B.3, disposition by engineering analysis, 11 ECs and 6 QIs were resolved

by engineering analysis, weld evaluation, and document review. There were 9829 welds examined to evaluate weld quality. The ECs and QIs addressed issues regarding the TVA disposition by engineering analysis of the following: acceptance of embedded bulkhead welds; acceptance of pipe supports; formation of alternate weld acceptance criteria; potential hydrostatic test inadequacy; use of Schedule 80 pipe in place of Schedule 40, arc strike repair; and the adequacy of the TVA's weld sample program.

The DOE/WEP has reviewed and concurred with the TVA analysis that all components evaluated in this subcategory are acceptable. The DOE/WEP has performed a document review and engineering analysis as appropriate, and has determined that the ECs and QIs were either not confirmed or could not be confirmed. There are no weld quality problems related to this subcategory. The DOE/WEP has determined that in all cases, the TVA's engineering analyses were in compliance with FSAR commitments.

For the Subcategory 9B.4, rework to avoid disciplinary action, there was one EC that was resolved by engineering evaluation and radiograph review. The DOE/WEP has evaluated inspection results of 331 welds for generic problems, and has reviewed 3072 radiographic film review examination packages pertinent to this subcategory. The EC in this subcategory refers to cutting out root passes and refitting to avoid disciplinary action. The DOE/WEP has determined that the concern could not be confirmed and that weld quality is not affected by cutting out the root and refitting.

For the Subcategory 9C.1, use of weld bosses, there was one EC, which was resolved by weld examination and radiograph review. The DOE/WEP has evaluated 331 welds and has reviewed 3072 radiographic film review examination packages pertinent to this subcategory. The EC deals with holes being drilled in pipe subsequent to welding of branch connections. The DOE/WEP investigation indicates the practice described in this concern is acceptable per design of bosses. The EC could not be confirmed.

For the Subcategory 9C.2, sandblasting while welding, there was one EC, which was resolved by engineering evaluation and welding code review. The EC in this subcategory relates to sandblasting while welding. The DOE/WEP review of all applicable codes indicates that there are no limitations specified that restrict welding adjacent to sandblasting. The small amount of sand and dirt from sandblasting in the area would not be expected to cause weld quality problems. It is expected that dust and dirt entering the weld zone would be trapped by flux or floated out of the weld. The EC was not confirmed.

For the Subcategory 9C.3, postweld surface conditioning, there were 11 ECs, which were resolved by weld examination. There were 9815 welds examined to evaluate weld quality. One EC in this subcategory relates to a specific weld joint. The other 10 ECs deal with improper postweld conditioning and rusting of welds. The DOE/WEP performed inspection/examinations of the two welds indicated in the first employee concern and found them to be within code allowables. The other 10 concerns were nonspecific in nature and were addressed through the evaluation of 9813 welds in the general plant groups.

2.9.3 Conclusions. The DOE/WEP addressed the potential safety significance of other weld quality problems and found either that the welds had no deviations or that any deviations were acceptable in accordance with the applicable construction code, or will be upon completion of the TVA committed corrective action plans as described in Appendix C. The DOE/WEP evaluated the sampled populations and determined that the unsampled portions have no generic problems.

3. RESULTS OF WELD REINSPECTION BY SUBJECT

The weld reinspection results have been sorted by pertinent subjects initially evaluated by the DOE/WEP as special areas of interest or subjects identified during the course of the DOE/WEP evaluations. The data from the specific, special, and general groups have been sorted by code criteria and unique subcategories, plant geographic areas, safety system designations, NDE methods, construction timeframes, and miscellaneous subjects. Sections 3.1 through 3.4 provide data on those subjects or areas of interest initially evaluated by the DOE/WEP. Subsections 3.5 through 3.10 provide data on those areas of interest further evaluated by the DOE/WEP.

3.1 AWS Weld Data

Approximately 15,000 AWS welds were inspected/evaluated with 80% found in compliance with the inspection acceptance criteria. All the deviant welds (20% of the total) were evaluated for acceptance in accordance with the TVA-committed code requirement.

Deviations that had no safety significance with regard to the acceptance of the weld were: arc strikes, slag, weld spatter, porosity, overlap, and undercut. These attributes relate to workmanship criteria rather than structurally significant conditions. Undercut is the only deviation within this class that relates to component structural safety. The DOE/WEP evaluated all reported undercut deviations and found none degraded the safety function of the related components. In addition, undercut had a low frequency of occurrence (1.04%). Removal of these insignificant deviations reduces the weld deviation rate to approximately 18%. Figure A-1 presents the attribute deviation rates (2.82% of the total) for the aggregate AWS welds. Deviations that affect the weld size directly i.e., weld size, length, location, and profile represent the majority of AWS DOE/WEP reported deviations. Of the inspected welds, approximately 15% have one or more of these size related deviations. The average calculated stress for those components with deviant welds in the general plant populations was conservatively determined to be 37.6% of allowable stress. The same study showed that 87% of the deviant welds have calculated as-constructed stresses of less than 80% of that allowed by the applicable design requirements. This evidence clearly demonstrates that the plant, except for a few instances as noted below, has a sufficient margin of safety designed into it to accommodate the weld size deviations.

The frequency of occurrence of deviations that can be significant (i.e., cracks, missing welds, and incomplete fusion) was quite low at less than 1%. Incomplete fusion generally was located at the ends of weld segments or was reported because of an overlap condition where fusion could not be verified. All components reported as having cracks or incomplete fusion were evaluated and deemed suitable for service. With the exception of one component as noted below, those components with missing welds were evaluated and deemed suitable for service.

With the exception of 11 components, all the components with deviant welds were determined to be suitable for service. Of the 11 AWS, 10 unsuitable for service components were associated with the Control Building 741 ft elevation bounded area. The other unsuitable for service component was a monorail support structure with a missing diagonal brace (not a weld defect).

For the unsuitable for service components with weld related deviations, the TVA provided a corrective action plan (summarized in Appendix C, No. 4) which the DOE/WEP reviewed and concurred with as being the necessary actions required to bring the bounded problem areas into compliance with the applicable committed construction code.

3.1.1 AWS Civil/Structural Weld Data. Figure A-2 presents the attribute deviation rates (2.63% of the total) for AWS civil/structural components sampled and examined in the general plant population. Figure A-3 presents the attribute deviation rates (3.60% of the total) for potential problem areas identified in the initial DOE/WEP review of employee concerns and quality indicators (Reference 4) or identified during the analysis of found weld deviations (Appendix B). Figure A-4 (a) represents the overall attribute deviation rates for civil/structural welding. Figure A-4 (b) represents the percent deviation rate, by attribute, of all attributes found deviant (3.17% of the total) in the AWS civil/structural weld population.

3.1.2 AWS Pipe Supports Weld Data. Figure A-5 presents the attribute deviation rates (0.69% of the total) for the AWS pipe supports

sampled and examined in the general plant population. Figure A-6 presents the attribute deviation rates (1.19% of the total) for potential problem areas identified in the initial DOE/WEP review of employee concerns and quality indicators (Reference 4) or identified during the analysis of found weld deviations (Appendix B). Figure A-7 (a) represents the overall attribute deviation rates for pipe support welding. Figure A-7 (b) presents the percent deviation rate, by attribute, of all attributes found deviant (1.01% of the total) in the AWS pipe support weld population.

3.1.3 AWS Instrumentation and Control Supports Weld Data. Figure A-8 presents the attribute deviation rates (1.97% of the total) for the AWS instrumentation and control (I&C) supports sampled and examined in the general plant population. Figure A-9 presents the attribute deviation rates (8.65% of the total) for potential problem areas identified in the initial DOE/WEP review of employee concerns and quality indicators (Reference 4) or identified during the analysis of found weld deviations (Appendix B). Figure A-10 (a) represents the overall attribute deviation rates for instrumentation and control support welding. Figure A-10 (b) presents the percent deviation rate, by attribute, of all attributes found deviant (2.39% of the total) in the AWS I&C weld population.

3.1.4 AWS Electrical Supports Weld Data. Figure A-11 presents the attribute deviation rates (4.01% of the total) for the AWS electrical supports sampled and examined in the general plant population. Figure A-12 presents the attribute deviation rates (5.14% of the total) for potential problem areas identified in the initial DOE/WEP review of employee concerns and quality indicators (Reference 4) or identified during the analysis of found weld deviations (Appendix B). Figure A-13 (a) presents the overall attribute deviation rates for electrical support welding. Figure A-13 (b) presents the percent deviation rate, by attribute, of all attributes found deviant (4.45% of the total) in the AWS electrical support weld population.

3.1.5 AWS HVAC Supports Weld Data. Figure A-14 presents the attribute deviation rates (0.94% of the total) for the AWS HVAC supports sampled and examined in the general plant population. Figure A-15 presents the attribute deviation rates (1.72% of the total) for potential problem areas identified in the initial DOE/WEP review of employee concerns and quality indicators (Reference 4) or identified during the analysis of found weld deviations (Appendix B). Figure A-16 (a) presents the overall attribute deviation rates for HVAC support welding. Figure A-16 (b) presents the percent deviation rate, by attribute, of all attributes found deviant (1.18% of the total) in the AWS HVAC weld population.

3.1.6 AWS Mechanical Equipment Supports Weld Data. Figure A-17 presents the attribute deviation rates (7.92% of the total) for the AWS mechanical equipment supports sampled and examined in the general plant population.

3.2 ASME Section III Weld Data

There were 401 weld examinations by visual, magnetic particle, or liquid penetrant methods. Of the welds examined, 81%[a] were found to be in compliance with the examination acceptance criteria. The majority of the reported deviations (71 of 79) were minor local deviations from the ASME provisions of NX-4420. Each of these deviations was found to be acceptable, based on demonstrated compliance with the ASME design criteria of Article NX-3000 accounting for the reported condition. Based on worst case load combinations, the ASME components evaluated by a stress analysis had an average calculated stress of 34.6% of code allowable. Of these components, 89% have calculated stress values of less than 65% of the code allowable.

As evident from these results, the plant ASME components generally have considerably more margin of safety designed into them than required to accommodate the found types of deviant conditions. The other eight reported surface conditions were apparent deviations from the ASME code acceptance criteria, article NX-5000. All of these conditions were evaluated using the DOE/WEP characterization procedure to determine relevancy; that is, in accordance with the ASME, Paragraphs NX-5341 and NX-5351. The reported conditions were determined to be nonrelevant.

ASME pipe lugs and ASME Class MC components have not been included in the inspection data presentations. Lug welds and ASME Class MC components are to be evaluated in accordance with the applicable TVA corrective plans that have been concurred with by the DOE/WEP (summarized in Appendix C, numbers 1 and 7).

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a. After the elimination of arc strike, porosity, surface slag, or weld spatter attributes.

3.2.1 Small Bore Pipe Weld Data. The visual examination attribute deviation rates for the ASME small bore pipe are shown on Figure A-18. Figure A-18 (a) shows the percent deviant for each attribute inspected. Figure A-18 (b) represents percent of acceptable and deviant attributes (2.55% of the total) and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

Nondestructive examination results for small bore pipe evaluated are shown in Table 18.

Engineering evaluations were performed on welds with deviant attributes. All welds evaluated were determined to be in compliance with the code.

3.2.2 Large Bore Pipe Weld Data. The visual examination attribute deviation rates for the ASME large bore pipe are shown in Figure A-19. Figure A-19 (a) shows the percent deviant for each attribute inspected. Figure A-19 (b) represents percent of acceptable and deviant attributes (6.22% of the total) and tabulation of the percent of each deviant attribute relative to the total deviant attributes. Nondestructive examination results for large bore pipe evaluated are shown in Table 19.

Welds with radiographic NDE deficiencies are included in the TVA corrective action plan (summarized in Appendix C, No. 3), and engineering evaluations were performed on all other welds with deviant attributes. Those welds evaluated were determined to be in compliance with the Code.

3.2.3 Other ASME Weld Data. There were 29 ASME mechanical equipment support welds examined. In the 29 that were examined, no deviations were found. Because these welds are not piping welds, they are not considered with other ASME welds when discussing the ASME aggregate data in Subsection 3.2.4.

3.2.4 Combined Weld Data. Figure A-20 shows the combined ASME Section III visual examination attribute deviation rates. Figure A-20 (a) represents the percent deviant for each attribute inspected. Figure A-20 (b) represents percent of acceptable and deviant attributes (4.34% of the total) and tabulation of the percent of each deviant attribute relative to the total deviant attributes. Nondestructive examination results for all ASME components evaluated are shown in Table 20.

3.3 ASME Section VIII Weld Data

The ASME Section VIII[14] welds examined by WEP consisted of 64 welds made on the stainless steel fuel pit liner plates. Figure A-21 (a) shows the percent deviant for each visually examined attribute. Figure A-21 (b) represents percent of acceptable and deviant attributes (3.09% of the total) and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

Engineering evaluations were performed on welds with deviant attributes. All welds evaluated were determined to be in compliance with the applicable code.

Table 18. ASME Section III small bore pipe NDE results

Type of NDE	Number Deviant	Total Number of Welds Examined
Dye Penetrant	6	124
Magnetic Particle	0	0
Ultrasonic	0	0
Radiographic	1	1

Table 19. ASME Section III large bore pipe NDE results

Type of NDE	Number Deviant	Total Number of Welds Examined
Dye Penetrant	2	45
Magnetic Particle	3	15
Ultrasonic	0	1
Radiographic	8	28

Table 20. Combined ASME Section III NDE results

Type of NDE	Number Deviant	Total Number of Welds Examined
Dye Penetrant	8	169
Magnetic Particle	3	15
Ultrasonic	0	1
Radiographic	9	29

3.4 ANSI B31.1 and B31.5 Weld Data

As a result of the visual examinations of the 174 welds, 20 were reported as having deviations.[a] An evaluation of each of the reported deviant welds was performed and, in all cases, the reported condition was found to be acceptable. Based on worst case load combinations, the ANSI piping welds evaluated by a stress analysis had an average calculated stress of 23.4% of Code allowable. One component had a calculated stress of 87% of Code allowable; the remainder of components had calculated stress values, accounting for the reported conditions, of less than 60% of Code allowable. The ANSI piping components had a sufficient margin of safety designed into them to accommodate the minor local deviations reported by the DOE/WEP examinations.

The ANSI B31.1 and B31.5[15] code piping welds represented the general plant weld population and previously identified potential problem areas. Figure A-22 (a) shows the percent deviant for each attribute inspected. Figure A-22 (b) represents percent of acceptable and deviant attributes (8.90% of the total) and tabulation of each deviant attribute relative to the total deviant attributes.

3.5 Geographic Area Weld Data

Approximately 15,000 welds representing the plant population of AWS welds were separated into the 10 distinct geographic areas listed below.

1. Control Building
2. Auxiliary Building
3. Intake Pump Station
4. Diesel Generator Buildings (2 buildings)
5. Yard Area
6. Reactor Building
7. North and South Valve Rooms
8. Unit 1 Annulus—area between the containment liner and building wall
9. Additional Equipment Building
10. Condensate Demineralizer Waste Evaporation Building.

Figure A-23 shows the percentage of deviant welds in each of the 10 areas; as well as the percentage, by area, of the total welds inspected.

The number of acceptable and deviant welds for each area was compared to the combined number of acceptable and deviant welds for the other nine areas. The results of these comparisons revealed no significant differences except in two areas (Diesel Generator Buildings and North/South Valve Rooms). The DOE/WEP determined that 92% of the deviant welds in the Diesel Generator buildings were present on civil/structural or instrumentation and control components fabricated before February 1981. This data parallels the findings in Subsection 3.7 where higher deviation rates were noted in welds fabricated before February 1981.

In the North and South Valve Room Area, two factors combine to produce or indicate the higher deviation rates: (a) components were welded before February 1981; (b) components were reinspected by the DOE/WEP to a more stringent code than NCIG-01.[16] The components are in an area where the TVA has committed to conduct further evaluations.[a]

3.6 Designated Safety System Weld Data

Figure A-24 (a) represents primary safety system welds showing the percent deviant of each attribute visually inspected. Figure A-24 (b) represents percent of acceptable and deviant attributes (5.83% of the total) and tabulation of each deviant attribute relative to the total deviant attributes. The NDE results for ASME piping components evaluated in the primary system are shown in Table 21.

Figure A-25 (a) represents secondary safety system welds showing the percent deviant of each attribute visually inspected. Figure A-25 (b) represents percent of acceptable and deviant attributes (5.76% of the total) and tabulation of each deviant attribute relative to the total deviant attributes. NDE results for ASME piping components evaluated in the secondary system are shown in Table 22.

The DOE/WEP has concluded that a comparison of the visual reinspection results for welds in the primary and secondary safety systems shows no significant difference in the weld deviation rates.

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a. Deviations do not include arc strike, porosity, surface slag, and weld splatter attributes.

a. Craig Lundin letter to Frank Fogarty, "Watts Bar Nuclear Plant Unit 1—North and South Valve Room Structural Steel," CDL87101470, October 14, 1987.

Table 21. Primary safety system NDE results

Type of NDE	Number Deviant	Total Number of Welds Examined
Dye Penetrant	6	146
Magnetic Particle	3	14
Ultrasonic	0	0
Radiographic	8	25

Table 22. Secondary safety system NDE results

Type of NDE	Number Deviant	Total Number of Welds Examined
Dye Penetrant	2	23
Magnetic Particle	0	1
Ultrasonic	0	1
Radiographic	1	4

3.7 ASME Section III Class 1, 2, and 3 Weld Data

The ASME Code Section III weld data piping was subdivided by Classes 1, 2, and 3 components.

No visual discrepancies were found for Class 1 piping. Figures A-26 and A-27 show the attribute deviation rates for the Class 2 and the Class 3 piping, respectively. For Class 2 piping Figure A-26 (a) shows the percent deviant of each attribute visually inspected. Figure A-26 (b) represents percent of acceptable and deviant attributes (2.74% of the total) and tabulation of the percent of each deviant attribute relative to the total deviant attributes. For Class 3 piping Figure A-27 (a) shows the deviation rates for each attribute visually inspected. Figure A-27 (b) represents percent of acceptable and deviant attributes (6.05% of the total) and tabulation of the percent of each deviant attribute relative to the total deviant attributes. The NDE results for Classes 1, 2, and 3 components examined are shown in Table 23.

The Class 1 and Class 2 welds with radiographic NDE deficiencies are included in the TVA corrective action plan (summarized in Appendix C, No. 3). The DOE/WEP has concluded there is no marked difference in the Class 2 and Class 3 deviation rates.

3.8 Time Period Related Data

Deviation rates are presented by time period for AWS welding showing before and after February 1981 reinspection results in Figures A-28 through A-35. Figures A-28, A-29, A-30, and A-31 shows by time period, the deviation rate for each attribute inspected. Figures A-32, A-33, A-34, and A-35 shows by time period the percent of deviant attributes relative to the total number of deviant attributes found. The DOE/WEP concludes that there is marked improvement in the weld quality of civil/structural, instrumentation and control, and electrical supports fabricated after February 1981. No marked difference was noted in the deviant weld attribute rates for AWS HVAC supports; however, the deviation rates for HVAC supports were relatively low. Pipe supports were 100% reinspected after the programmatic changes were effected; consequently time period data is not applicable. The improvements in weld quality were caused in part by several major programmatic changes that culminated in early 1981. The major areas of change included a separation of the quality assurance/quality control organization as an independent department from construction; welder requalifications; and upgraded inspector training and certification.

3.9 Radiographic NDE Data

The DOE/WEP reviewed 100% of the radiographic film for the 2689 welds requiring radiography. Of these 2689, there were 287 rejected for one or more of the attributes listed in Table 24.

Of the 287 welds, 69 of these were rejected for film artifacts and/or problems with radiographic technique. There were instances where film densities and geometric unsharpness did not meet ASME Code requirements. These cases were determined to be insignificant and did not affect film interpretation.[a]

The DOE/WEP has concluded that the deviant welds evaluated will meet the applicable Final Safety Analysis Report (FSAR) construction code upon completion of the TVA-committed corrective action (summarized in Appendix C, No. 3).

a. William S. Burkle letter to K. G. Therp, "Final Report, Radiographic Film Review, Groups A, B. and 1000," August 20, 1986.

Table 23. ASME Section III Class 1, 2, and 3 NDE results

	Class 1		Class 2		Class 3	
	Number Deviant	Total Number of Welds Examined	Number Deviant	Total Number of Welds Examined	Number Deviant	Total Number of Welds Examined
Dye penetrant	0	16	6	111	2	42
Magnetic particle	0	0	0	1	3	14
Ultrasonic	0	0	0	1	0	0
Radiographic	4	4	5	25	0	0

3.10 Miscellaneous Weld Data

3.10.1 Missing Weld Data. All missing welds identified from plant reinspection records were classified into one of the following major categories:

- Civil/Structural Supports
- Electrical Supports
- Instrumentation and Control Supports
- Pipe Supports
- HVAC Supports
- Mechanical Equipment Supports.

Table 24. Radiographic NDE results by attribute

Attribute	Number Deviant
Porosity	20
Incomplete penetration	27
Slag	19
Cracks	22
Lack of fusion	135
Surface defect	5
Convexity	7
Concavity	9
Radiographic technique	48
Missing film	13
Film artifact	8
Burn through	1

For the major classification categories, as shown in Table 25, each weld was assigned to a subcategory identifying the cause for the weld to be missing.

The text below describes the subcategories to which missing welds were assigned and explains in general how these deviations occurred.

Subcategory Description

1. *Unspecified Welds*
   A weld that is required by the design drawing but not installed in the location identified by the drawing. Unspecified welds were not normally examined or evaluated by WEP but were taken into consideration on a case by case basis for the purpose of engineering evaluation.
2. *Missing Welds Caused by Drawing Errors*
   Missing welds caused by drawing errors were identified when the drawing inaccurately specified weld symbols, details, and/or general notes. An example of this is welds identified as missing as the result of detailing a weld in two places when in actuality the design allows for its application in only one place.
3. *Missing Welds Caused by Interpretation Errors*
   Missing welds were also identified when the field condition did not accurately reflect the requirements of the design drawings. This was caused in part by misinterpretation or ambiguity because of inexplicit weld symbology and/or drawing notes. An example of this is the use of the weld symbology associated with typical

Table 25. Missing weld data

Missing	Major Categories and Number of Missing Welds					
	Civil/ Structural Supports	Electrical Supports	Instrumentation and Control Supports	Pipe Supports	HVAC Supports	Mechanical Equipment Supports
Unspecified	4	9	0	0	4	0
Drawing Error	7	0	0	0	2	0
Interpretation	9	0	0	14	3	0
Missing Member	16	4	0	0	0	0
Configuration	83	16	6	5	4	4
No Identified Cause	47	1	1	4	2	0
Total	166	30	7	23	15	4
Number of Welds missing in Samples (%)	2.1	1.4	1.0	2.4	0.49	1.2

welds. This weld symbol designates a typical weld by placing the word *typical* in the tail of the symbol. This could be interpreted as either any similar joint configuration on the total assembly or as only the specific view depicted on the drawing.

4. *Welds Missing Caused by Missing Members*
   Missing welds were also identified when the as-constructed geometry of an assembly differed from the configuration specified on the design drawing because of the omission of a member or subassembly. An example is where the configuration of the component differed from the detail on the drawing. Therefore, welds were noted as missing because of the fact the assemblies/ members were not installed.
5. *Missing Welds Caused by Configuration*
   Missing welds were further identified when the configuration or field geometry does not allow the weld to be installed because of accessibility. An example is a configuration change being required in order to maintain a required clearance between components (as required by a general note); however, the as-constructed configuration is changed from the as-designed configuration so that the required welds are omitted.
6. *Missing Welds No Identified Cause*
   The WEP investigated all cases of missing welds. Welds not assigned to one of the above subcategories were classified as *missing no identified cause* because WEP could not determine the cause for the weld to be missing.

   Reinspection results for missing welds are shown in Table 25. The components with missing welds were subjected to detailed engineering evaluations to determine whether the condition would adversely affect the capability of the component to perform its intended function. It was determined that with one exception the affected connections have sufficient load-carrying capacity to be in compliance with the applicable codes. The exception has been addressed by a TVA-committed corrective action plan (summarized in Appendix C, No. 4).

3.10.2 Cracked Weld Data. This section presents the results of evaluating cracked welds identified by the DOE/WEP through plant examination. The DOE/WEP evaluated 38 special and specific groups and 12 general plant groups for visual detection of cracks. The combined special and specific groups were visually examined for cracks on 6660 different occasions and nine deviant welds

were detected, for a reject rate of 0.14%. The combined general groups were visually examined for cracks on 6823 different occasions and 16 deviant welds were detected, for a reject rate of 0.23%. The combination of all 13,483 welds were visually examined for cracks, and the total of 21 deviant welds (4 deviant welds are duplicates between a special and a general group) represents an overall reject rate of 0.16%. The DOE/WEP considers this to be an insignificant number of deviations in that the cracks were minor in nature. In addition, characterization was performed on 12 of these welds to determine the extent of these deviations. During characterization, all the deviations were removed by light surface grinding and did not require any repair or rework. The remaining nine AWS welds did not require characterization and were deemed suitable for service without further evaluation in accordance with the applicable code.[a]

The DOE/WEP also utilized NDE (MT, PT) for reinspection evaluations where required by the applicable code. Of the 611 welds examined by MT or PT, 4 (0.65%) were determined to be cracked. Two of these were also detected visually and were discussed and dispositioned previously. The remaining two were characterized to determine the extent of the indications and were removed by light grinding and did not require any repair or rework. These welds were subsequently determined to be acceptable in accordance with the applicable code. After the above dispositioning, there are no remaining cracks on ASME welds as found by visual, MT, and PT inspections and all remaining AWS indications are Code acceptable.

The DOE/WEP also reviewed 100% of the TVA radiographs as part of the reinspection effort. This effort covered the review of radiographic film for 2689 welds. Of these 2689, there were 22 (0.82%) that were rejected for cracks. All these deviations are covered by the TVA radiography corrective action plan (summarized in Appendix C, No. 3). The DOE/WEP has concurred with this corrective action plan and has concluded that the populations of ASME Code piping associated with radiographic examinations will be in compliance with the FSAR committed codes upon completion of this corrective action.

a. In welds governed by AWS criteria, cracks may be acceptable if assessed by engineering evaluation using a rational approach with regard to the true influence of the crack size, orientation, location, and potential for growth.

3.10.3 Weld Type Data. This section presents the results of evaluating welds of a type different from that specified by the design drawing. All weld type deviations identified from the DOE/WEP reinspection records were classified into one of the following categories:

- Civil/Structural Supports
- Electrical Supports
- Instrumentation and Control Supports
- Pipe Supports
- HVAC Supports.

For the major classification categories, as shown in Table 26, each weld was assigned to a subcategory identifying the cause for the weld specified by the drawing to differ from the weld type installed.

The text below describes the subcategories to which weld type deviations were assigned and explains in general how these deviations occurred.

Subcategory Description

1. *Configuration*
   Weld type deviations were caused when the as-installed configuration of the component differed from the configuration as specified by the design drawing. The weld as correctly specified on the design drawing was replaced with a different type of weld as required by the altered configuration.
2. *Drawing Errors*
   Weld type deviations were also noted when the weld on the design drawing was incorrectly specified. A weld type compatible with the design drawing configuration was used in lieu of the incorrectly specified design weld.
3. *Interpretation Errors*
   Weld type deviations associated with interpretation error occurred because of misinterpretation or multiple interpretations of drawing notes or weld symbols.

Reinspection results for weld type deviations found during examination are shown in Table 26. The components with weld type deviations were subjected to detailed engineering evaluations and were determined to be in compliance with the applicable codes.

Table 26. Weld type data

	Major Categories and Number of Weld Type Deviations				
	Civil/ Structural Supports	Electrical Supports	Instrumentation and Control Supports	Pipe Supports	HVAC Supports
Configuration	124	62	2	8	24
Drawing Error	0	0	22	0	0
Interpretation Error	12	35	4	0	16
Total	136	97	28	8	40
Number of Weld Type Deviations in Samples (%)	1.7	4.4	4.2	0.85	1.3

4. REFERENCES

1. *Tennessee Valley Authority Watts Bar Nuclear Plant Final Safety Analysis Report* and amendments through February 1, 1986, Tennessee Valley Authority, Chattanooga, TN.

2. W. H. Borter, *Weld Program Review*, DOE/ID-10152, December 1986.

3. S. M. Bradford, *WEP Organization and Work Scope*, DOE/ID-10175-1, November 1987.

4. S. M. Bradford, *WEP Formation of Homogeneous Groupings of Welds*, DOE/ID-10175-2, November 1987.

5. J. M. Savage, *WEP Weld/Component Data Base*, DOE/ID-10175-7, November 1987.

6. D. A. Armour, *WEP Component Inspection and Examination Process*, DOE/ID-10175-4, November 1987.

7. De Lon "H" Gardner, *WEP Data Bases for Weld Reinspection Results and Status Reports*, DOE/ID-10175-3, November 1987.

8. R. K. Blandford, *WEP Suitability for Service Evaluation Engineering Process*, DOE/ID-10175-5, November 1987.

9. L. C. Brown, *WEP Generic Problem Analysis Process*, DOE/ID-10175-6, November 1987.

10. F. C. Fogarty, *Weld Evaluation Project Final Report*, DOE/ID-10175-9, November 1987.

11. The American Society of Mechanical Engineers, "Rules for Construction of Nuclear Power Plant Components," *ASME Boiler and Pressure Vessel Code*, Section III-Division 1, 1971 Edition with Summer 1973 Addenda (1974 Addition for Heat Treatment).

12. Sheet Metal and Air Conditioning Contractors National Association Incorporated, "Low Velocity Duct Construction Standards," 1969, and "High Velocity Duct Construction Standards," 1969.

13. American Welding Society Inc., *Structural Welding Code*, AWS D1.1-72, with Revision 2, 1974.

14. The American Society of Mechanical Engineers, "Pressure Vessels," *ASME Boiler and Pressure Vessel Code*, Section VIII-Divisions 1 and 2, 1971 Edition with Summer 1976 Addenda.

15. The American Society of Mechanical Engineers, "Power Piping," ANSI B31.1, June 15, 1973, with Summer 1973 Addenda, and "Refrigeration Piping," ANSI B31.5, 1966 (USASI B31.5-1966).

16. Nuclear Construction Issues Group "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," Rev. 2, NCIG-01, May 1985.

APPENDIX A

WELD DATA (FIGURES A-1 THROUGH A-35)

APPENDIX A

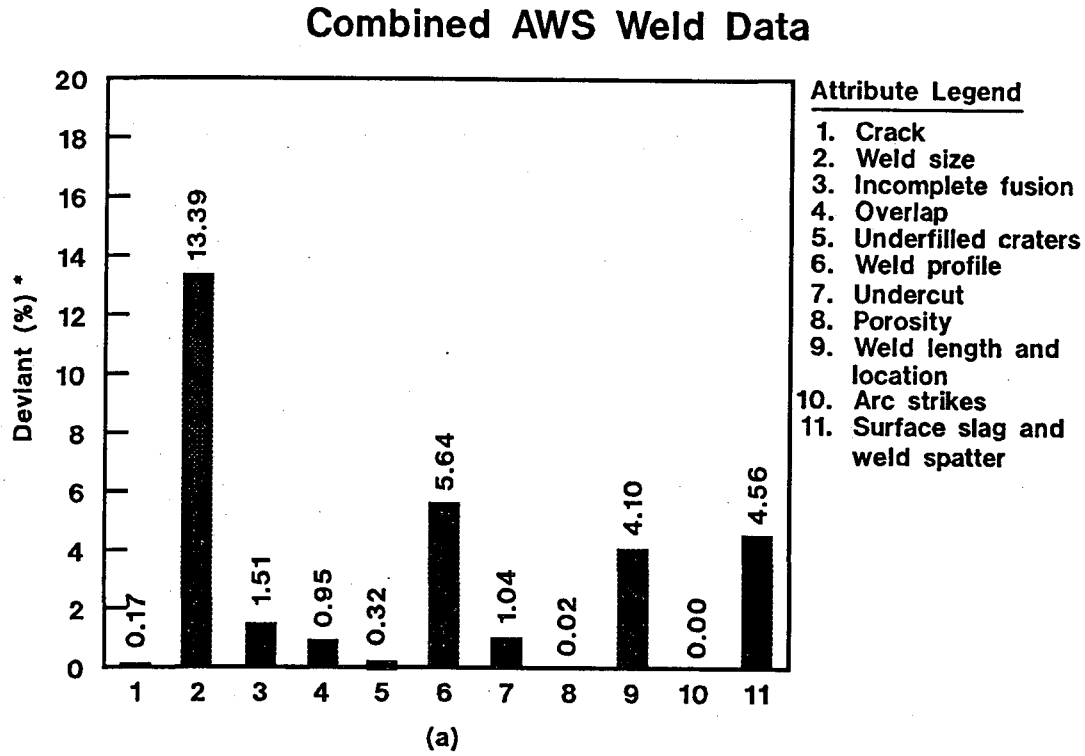
WELD DATA (FIGURES A-1 THROUGH A-35)

The figures shown here represent the results of visual weld examinations performed by the DOE/WEP at WBNP Unit 1. Figures A-1 through A-22 represent visual examination weld data for welds fabricated to the AWS code and reinspected to the NCIG-01 criteria, ASME welds, and ANSI welds. Figure A-23 represents visual examination weld data by plant geographic area. Figures A-24 and A-25 represent visual examination weld data for the primary and secondary safety system welds. Figures A-26 and A-27 represent visual examination weld data for ASME Code Section III, Class 2 and Class 3 piping welds. Figures A-28 through A-35 represent the visual examination weld data for welds fabricated to the AWS code and reinspected to the NCIG-01 criteria. The data for these welds have been sorted according to the date of fabrication; pre/post-February 1981.

NOTES:

1. Welds reinspected to the NCIG-01 criteria were not denoted as deviant for arc strikes if cracks were not present in the affected area.

2. Welds were reinspected for those attributes applicable to the weld types (e.g., fillet, full penetration). Therefore, all welds were not inspected for all the attributes listed on the applicable figure.



$$* \text{ Deviant (\%)} = \frac{\text{Number of times attribute deviant}}{\text{Number of times attribute examined}} \times 100$$

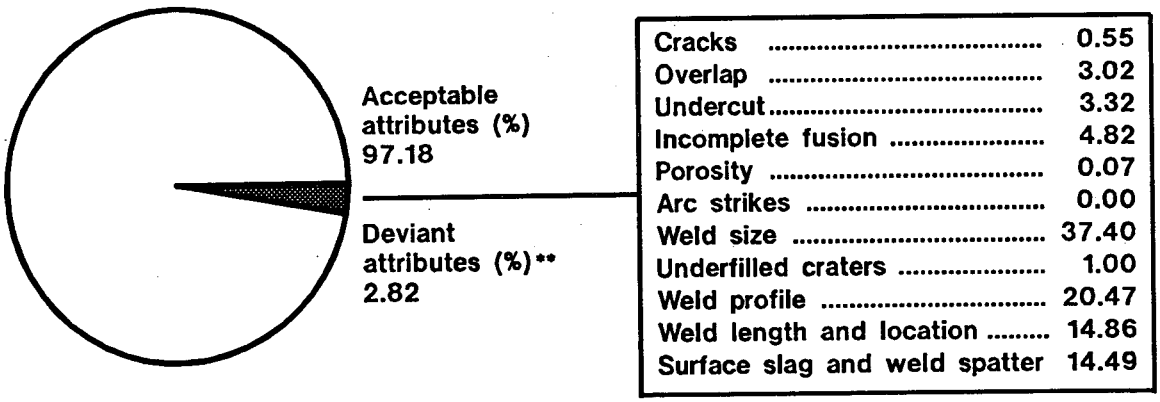
Notes:

1. Data represented is for visual examinations
2. Percent of welds deviant is 18.00%, excluding welds deviant for surface slag and weld spatter only
3. Total number of welds inspected, 15,053

C7 4773

Figure A-1. Visual examination weld data for the six AWS component classifications show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

Combined AWS Weld Data
(cont'd)



(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4808

Figure A-1. (continued).

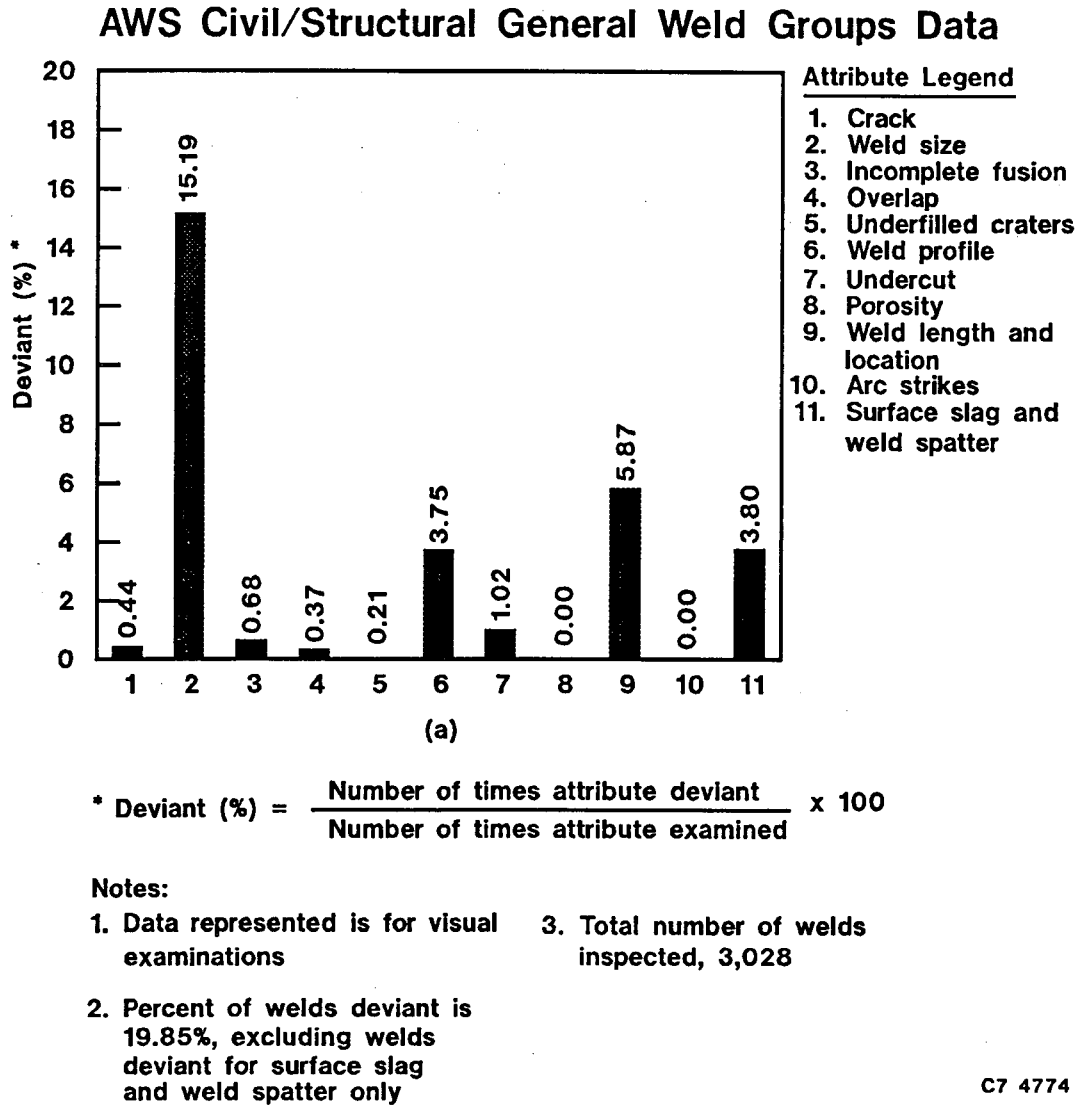
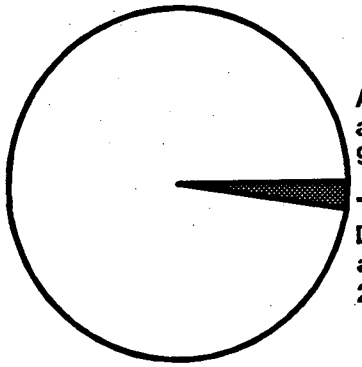


Figure A-2. Visual examination weld data for AWS civil/structural general weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Civil/Structural General Weld Groups Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	1.56
Overlap	1.32
Undercut	3.59
Incomplete fusion	2.40
Porosity	0.00
Arc strikes	0.00
Weld size	43.35
Underfilled craters	0.72
Weld profile	13.05
Weld length and location	20.60
Surface slag and weld spatter	13.41

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4809

Figure A-2. (continued).

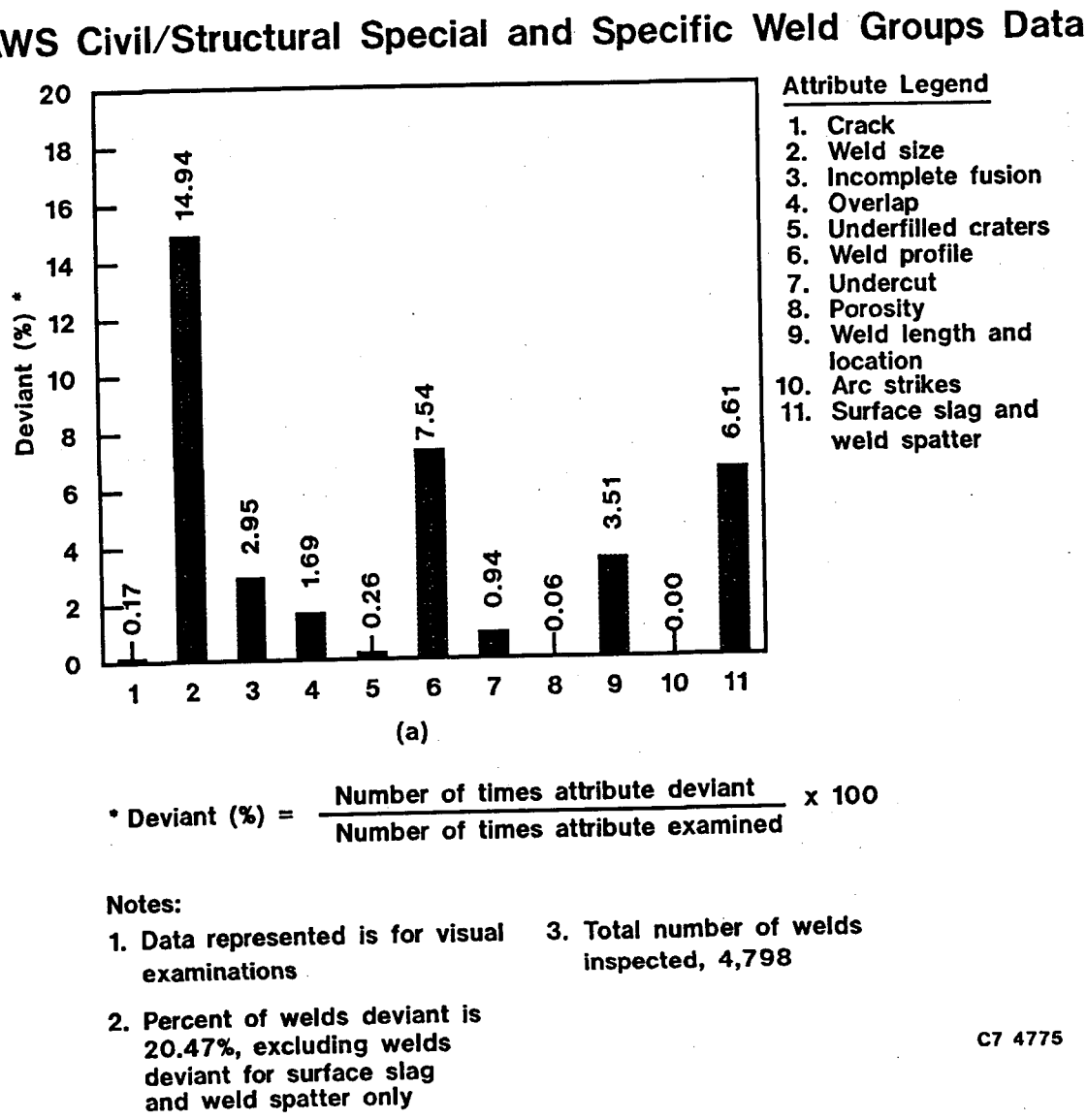
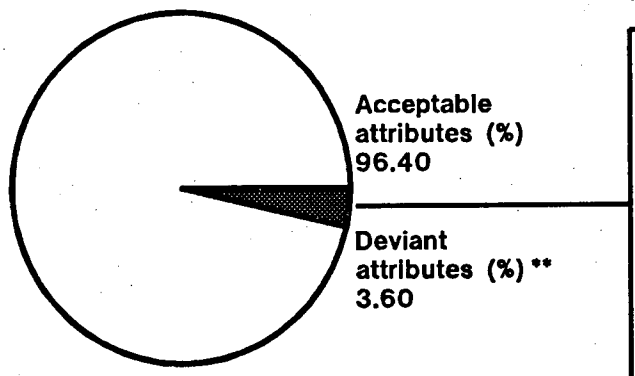


Figure A-3. Visual examination weld data for AWS civil/structural special and specific weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Civil/Structural Special and Specific Weld Groups Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.41
Overlap	4.05
Undercut	2.26
Incomplete fusion	7.07
Porosity	0.14
Arc strikes	0.00
Weld size	34.93
Underfilled craters	0.62
Weld profile	23.61
Weld length and location	11.05
Surface slag and weld spatter	15.86

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4810

Figure A-3. (continued).

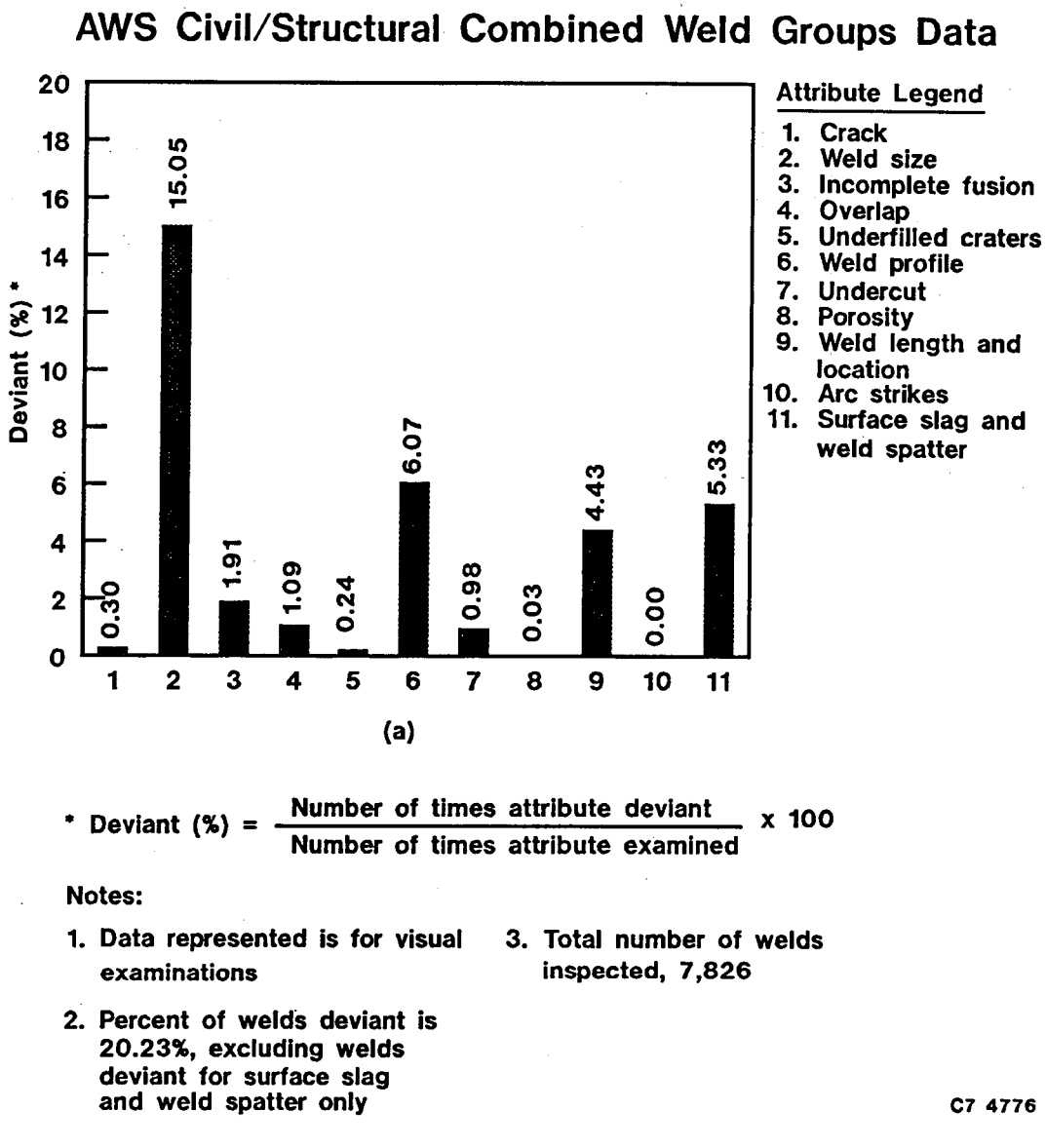
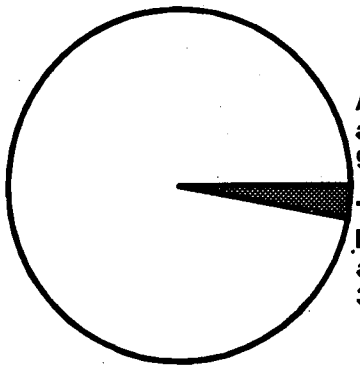


Figure A-4. Visual examination weld data for all AWS civil/structural weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Civil/Structural Combined Weld Groups Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.83
Overlap	3.05
Undercut	2.75
Incomplete fusion	5.37
Porosity	0.09
Arc strikes	0.00
Weld size	38.00
Underfilled craters	0.65
Weld profile	19.76
Weld length and location	14.53
Surface slag and weld spatter	14.97

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4811

Figure A-4. (continued).

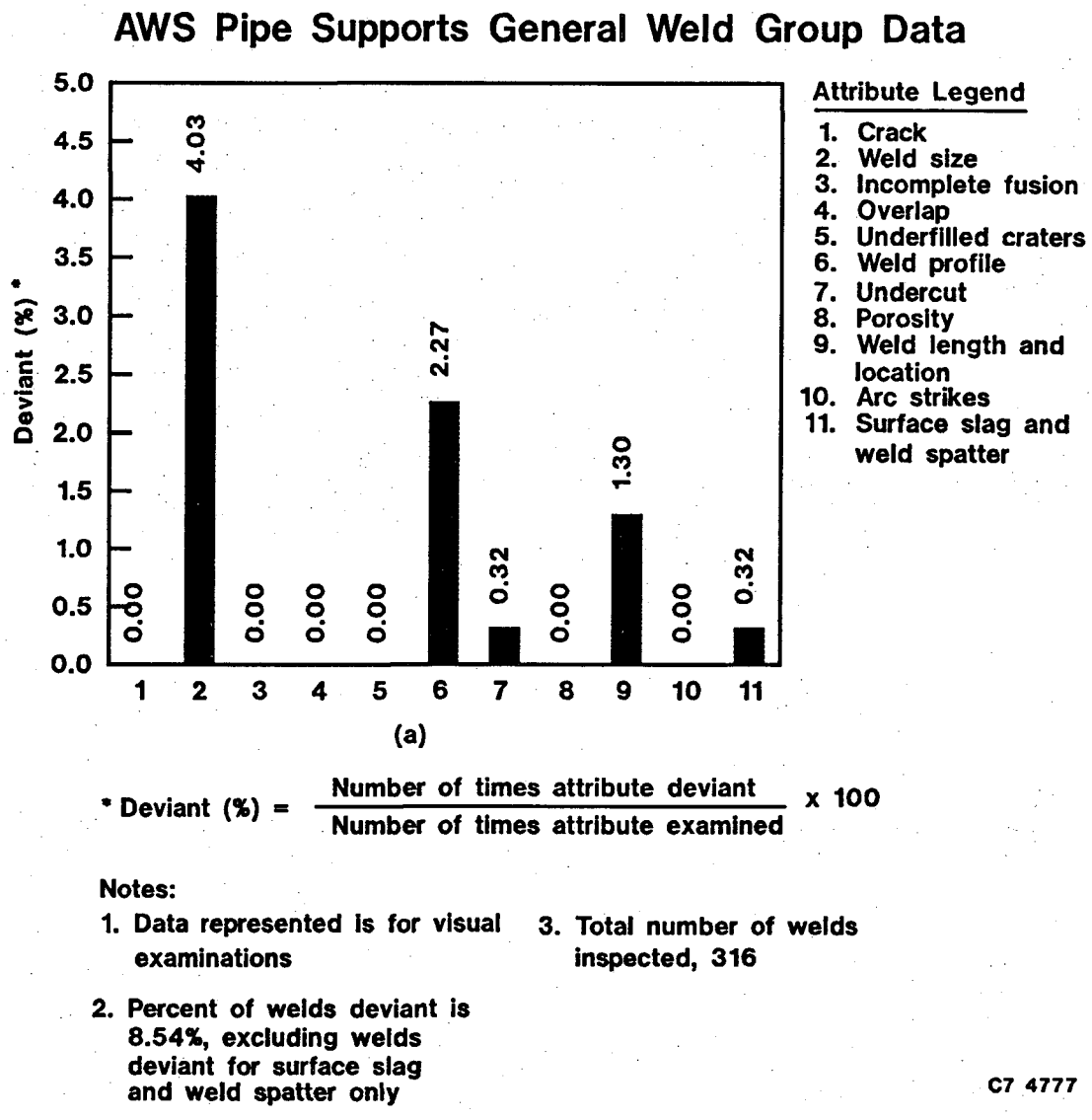
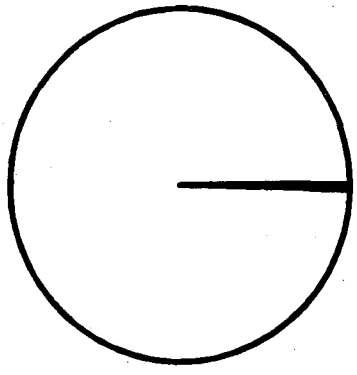


Figure A-5. Visual examination weld data for AWS pipe supports general weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Pipe Supports General Weld Group Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.00
Overlap	0.00
Undercut	4.35
Incomplete fusion	0.00
Porosity	0.00
Arc strikes	0.00
Weld size	43.48
Underfilled craters	0.00
Weld profile	30.43
Weld length and location	17.39
Surface slag and weld spatter	4.35

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4812

Figure A-5. (continued).

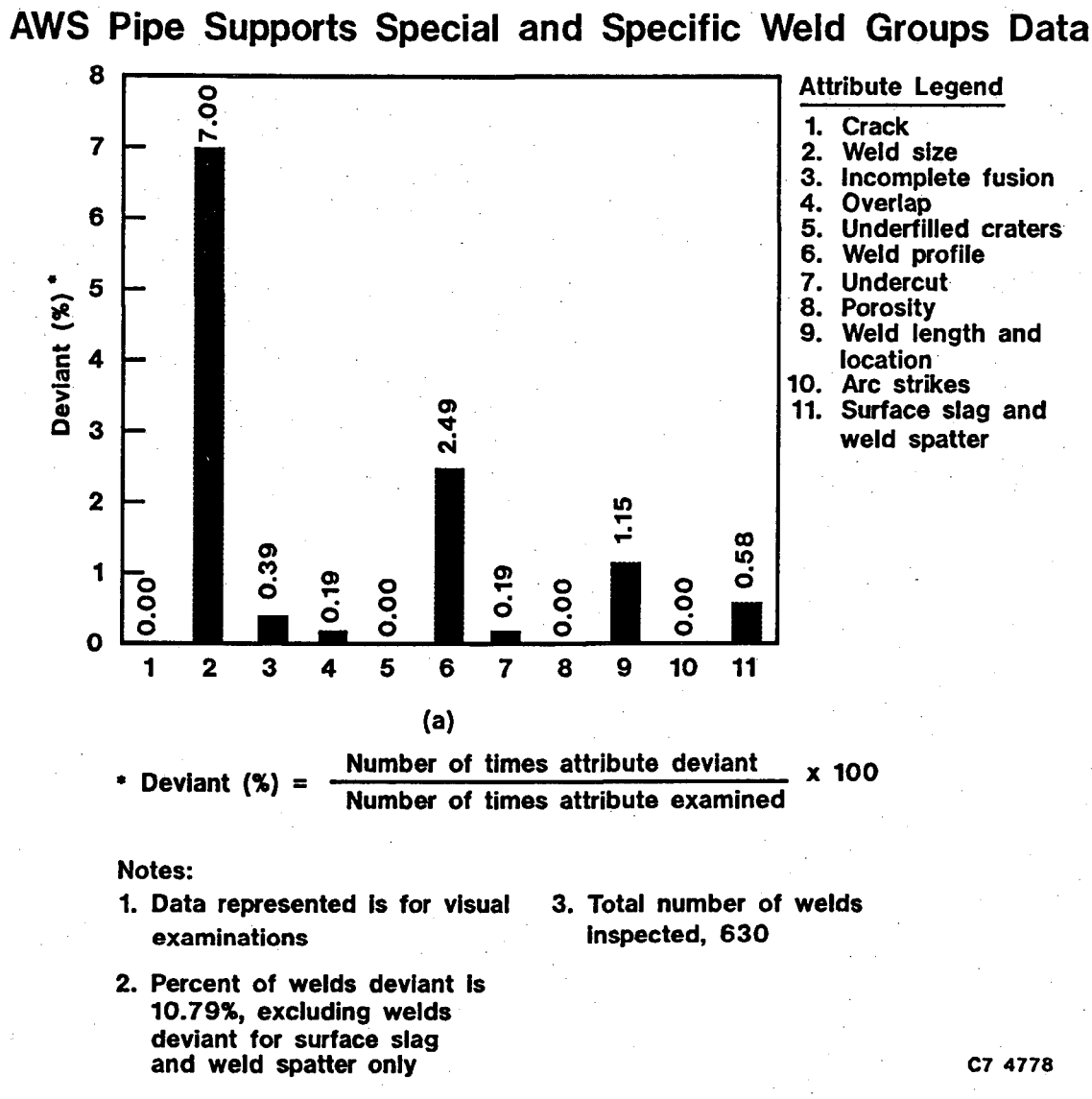
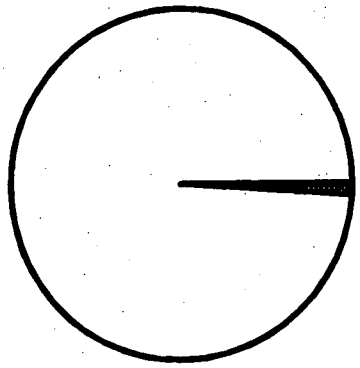


Figure A-6. Visual examination weld data for AWS pipe supports special and specific weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Pipe Supports Special and Specific Weld Groups Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.00
Overlap	1.43
Undercut	1.43
Incomplete fusion	2.86
Porosity	0.00
Arc strikes	0.00
Weld size	58.57
Underfilled craters	0.00
Weld profile	21.43
Weld length and location	10.00
Surface slag and weld spatter	4.28

(b)

** Deviant attributes (%) = $\frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4813

Figure A-6. (continued).

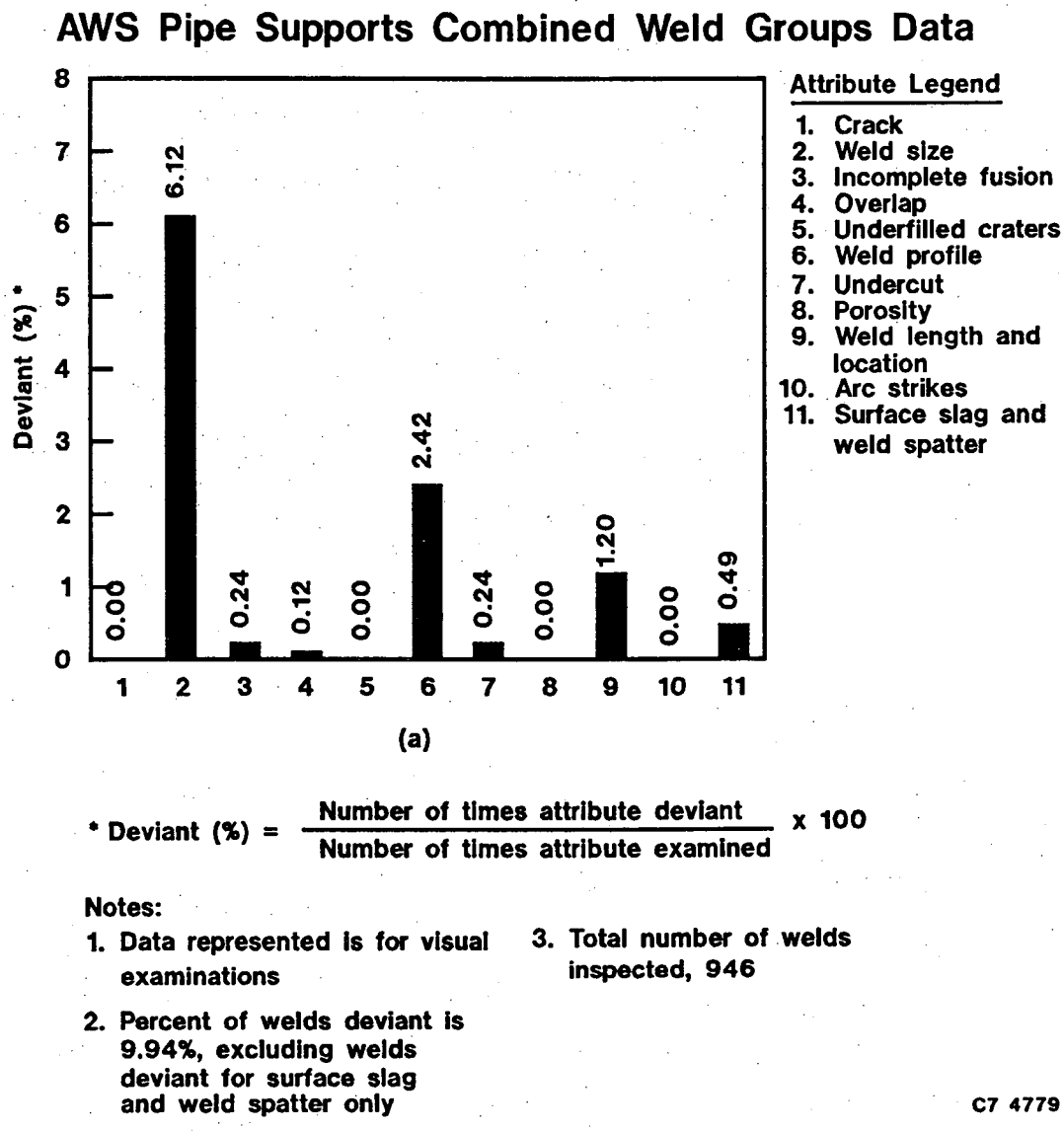
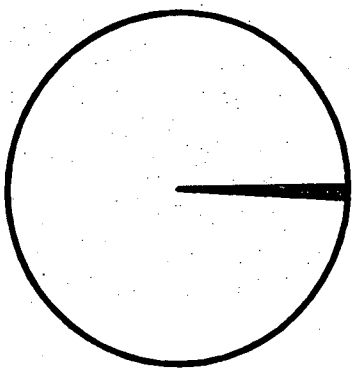


Figure A-7. Visual examination weld data for all AWS pipe supports weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Pipe Supports Combined Weld Groups Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.00
Overlap	1.08
Undercut	2.15
Incomplete fusion	2.15
Porosity	0.00
Arc strikes	0.00
Weld size	54.83
Underfilled craters	0.00
Weld profile	23.66
Weld length and location	11.83
Surface slag and weld spatter	4.30

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4814

Figure A-7. (continued).

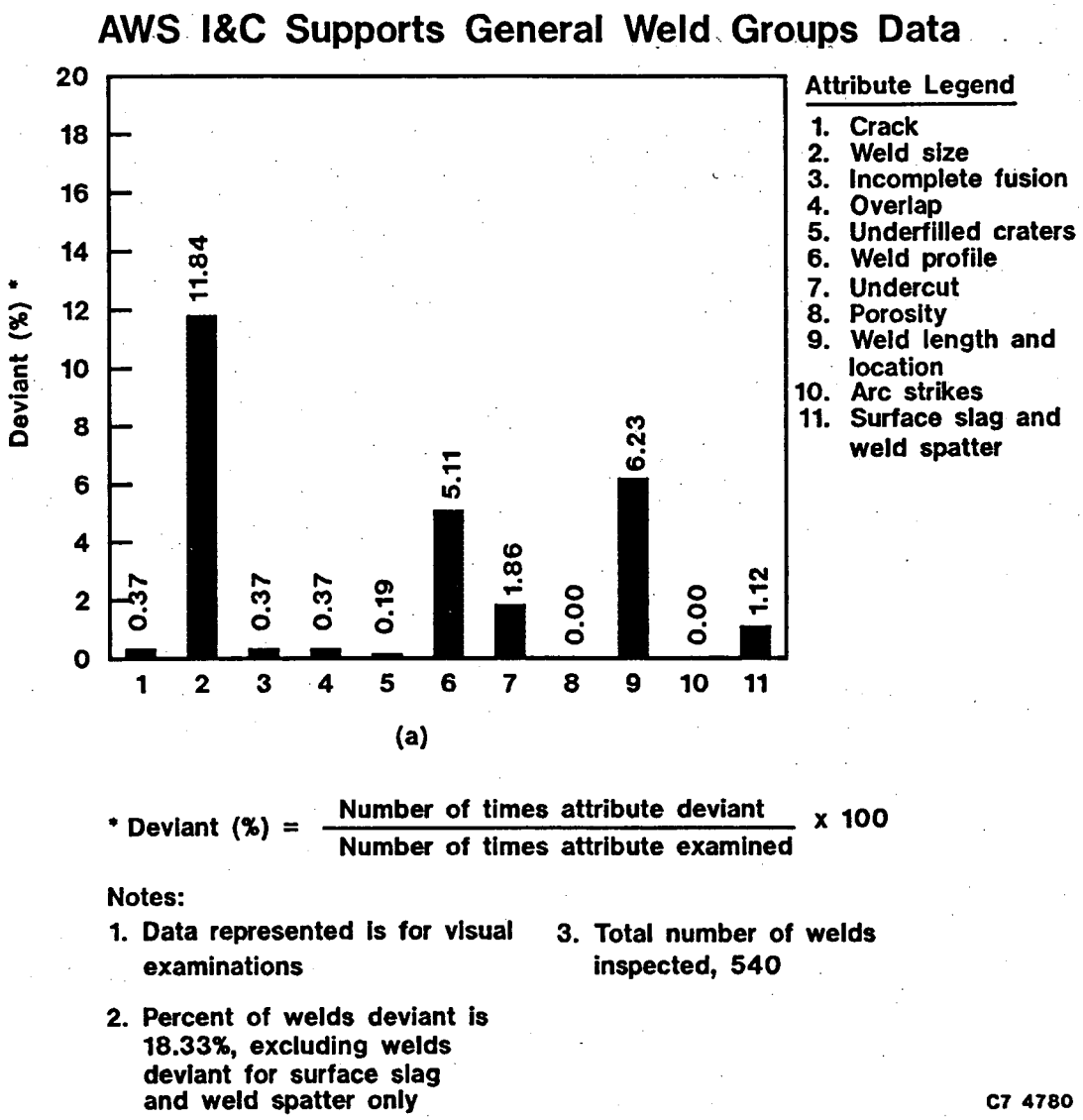
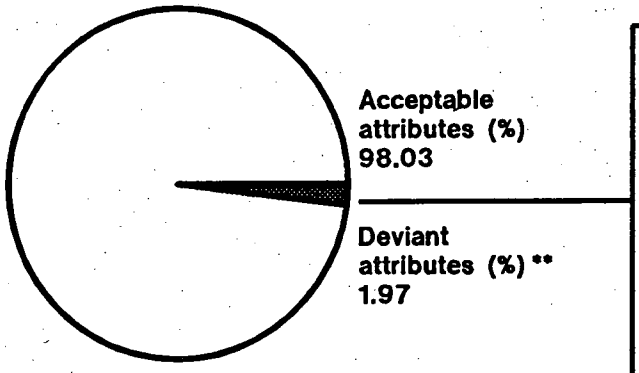


Figure A-8. Visual examination weld data for AWS I&C supports general weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS I&C Supports General Weld Groups Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	1.82
Overlap	1.82
Undercut	9.09
Incomplete fusion	1.82
Porosity	0.00
Arc strikes	0.00
Weld size	24.54
Underfilled craters	0.91
Weld profile	24.55
Weld length and location	30.00
Surface slag and weld spatter	5.45

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4815

Figure A-8. (continued).

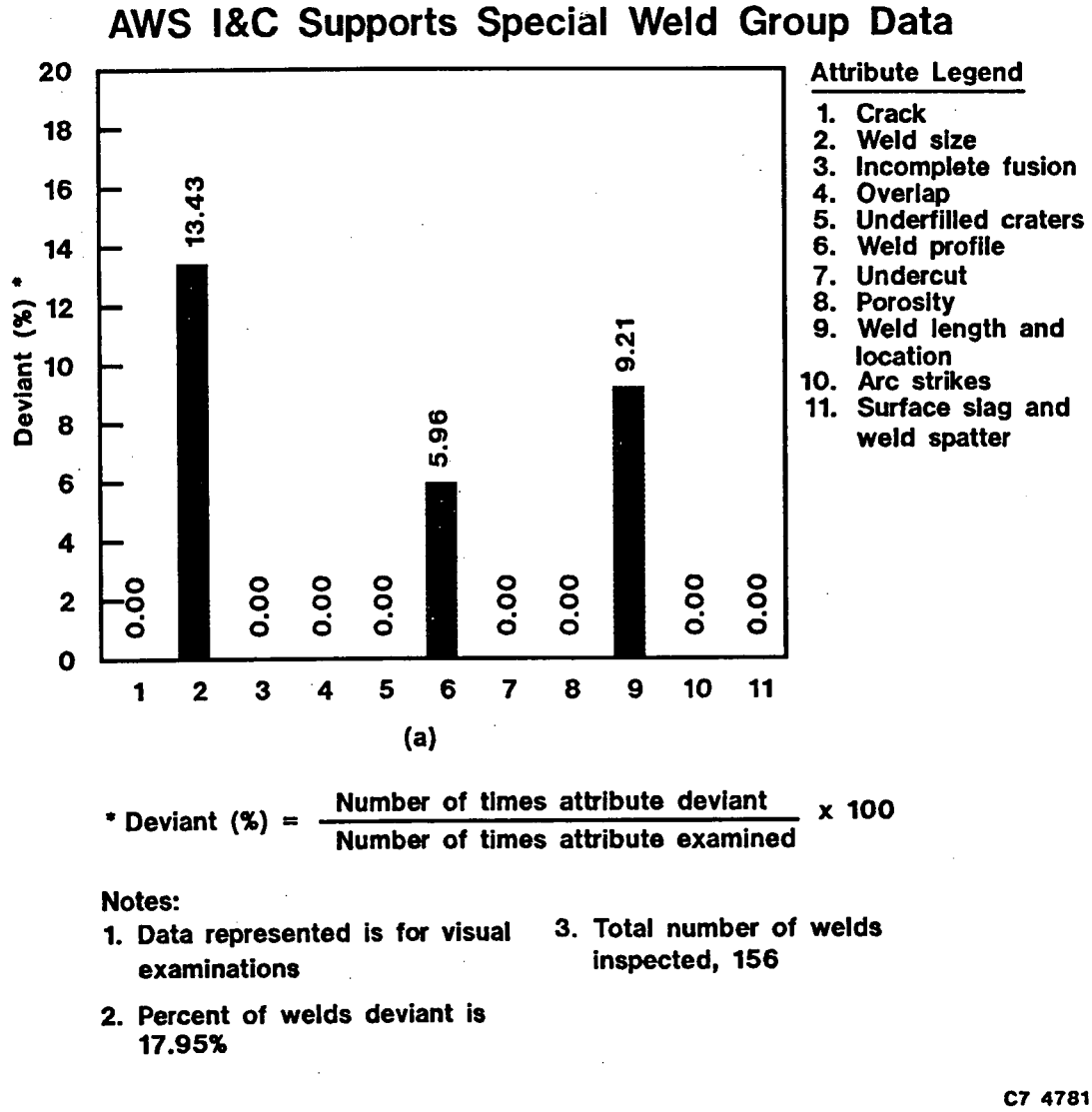
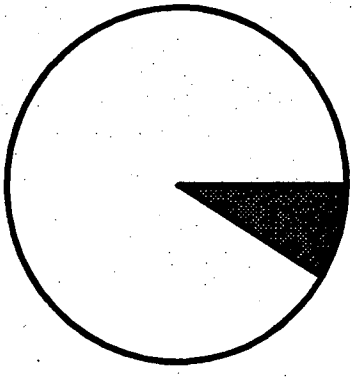


Figure A-9. Visual examination weld data for AWS I&C supports special weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS I&C Supports Special Weld Group Data
(cont'd)



Acceptable attributes (%) 91.35

Deviant attributes (%) ** 8.65

Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.00
Overlap	0.00
Undercut	0.00
Incomplete fusion	0.00
Porosity	0.00
Arc strikes	0.00
Weld size	28.12
Underfilled craters	0.00
Weld profile	28.12
Weld length and location	43.76
Surface slag and weld spatter	0.00

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4816

Figure A-9. (continued).

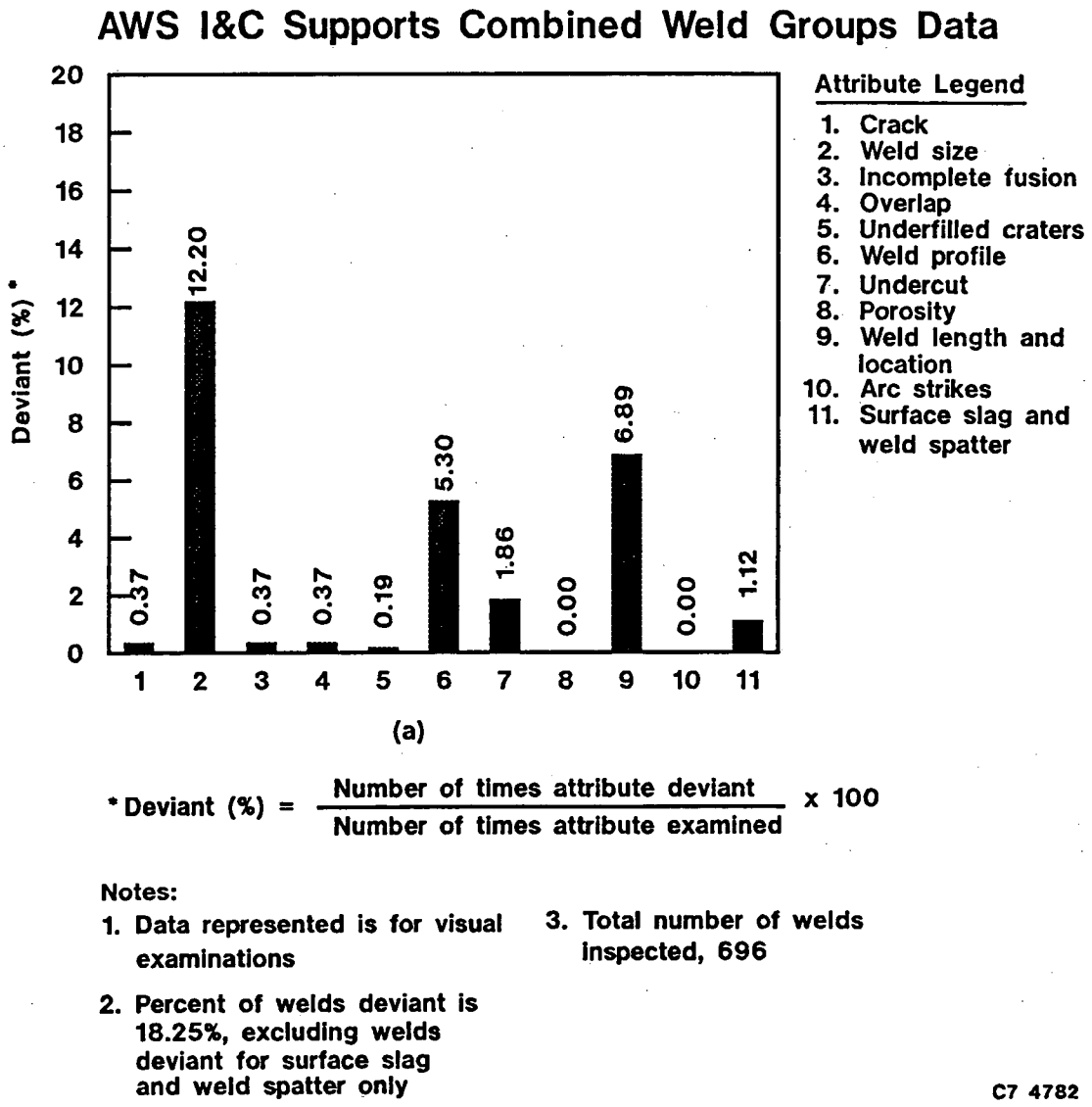
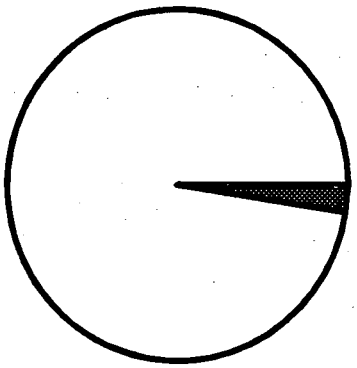


Figure A-10. Visual examination weld data for all AWS I&C supports weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS I&C Supports Combined Weld Groups Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	1.41
Overlap	1.41
Undercut	7.04
Incomplete fusion	1.41
Porosity	0.00
Arc strikes	0.00
Weld size	25.35
Underfilled craters	0.70
Weld profile	25.35
Weld length and location	33.10
Surface slag and weld spatter	4.23

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4817

Figure A-10. (continued).

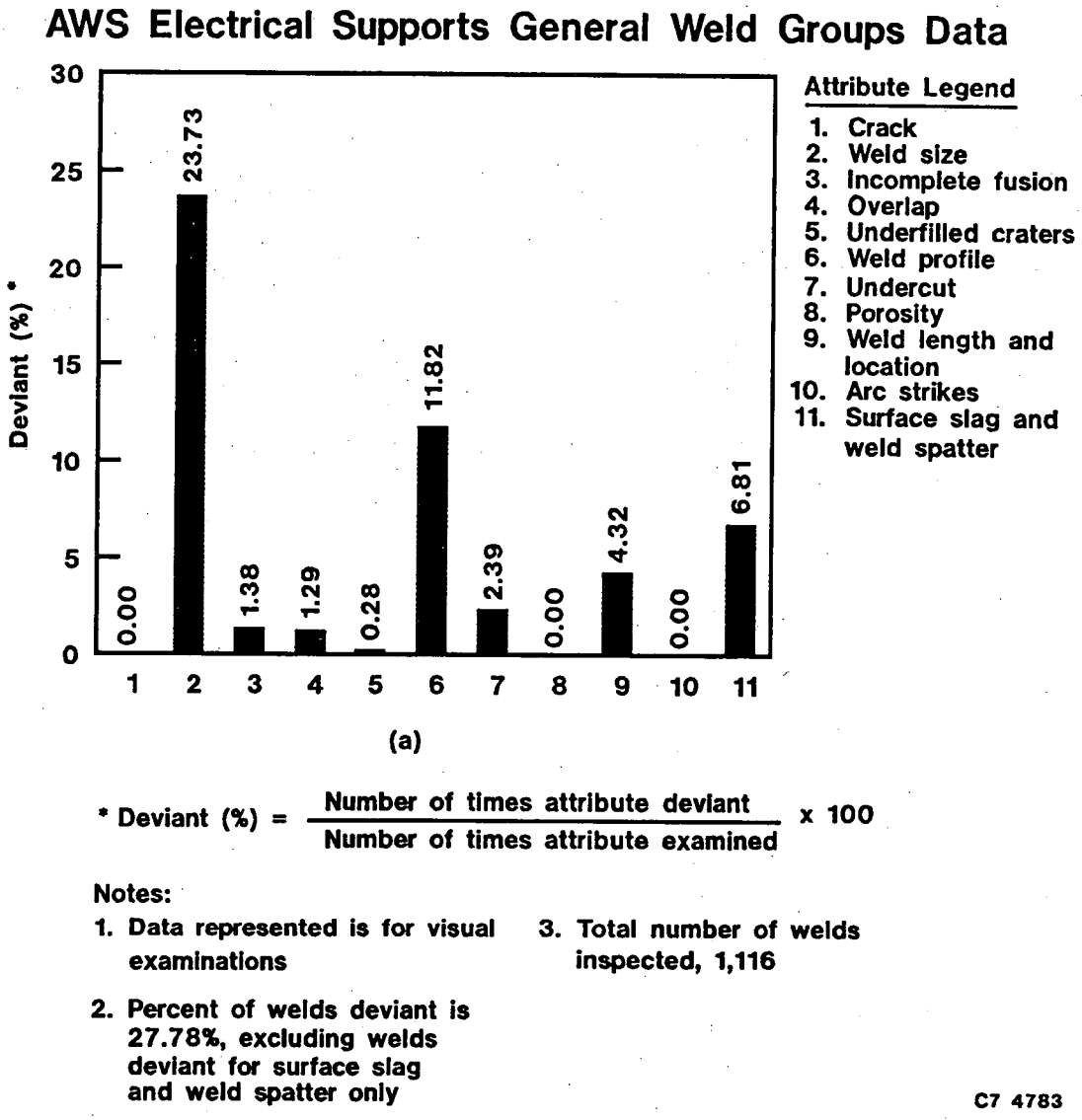
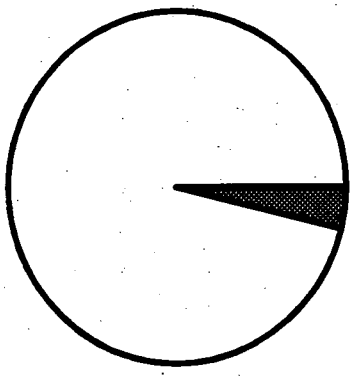


Figure A-11. Visual examination weld data for AWS electrical supports general weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Electrical Supports General Weld Groups Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.00
Overlap	3.04
Undercut	5.64
Incomplete fusion	3.25
Porosity	0.00
Arc strikes	0.00
Weld size	33.41
Underfilled craters	0.65
Weld profile	27.77
Weld length and location	10.20
Surface slag and weld spatter	16.04

(b)

** Deviant attributes (%) = $\frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4818

Figure A-11. (continued).

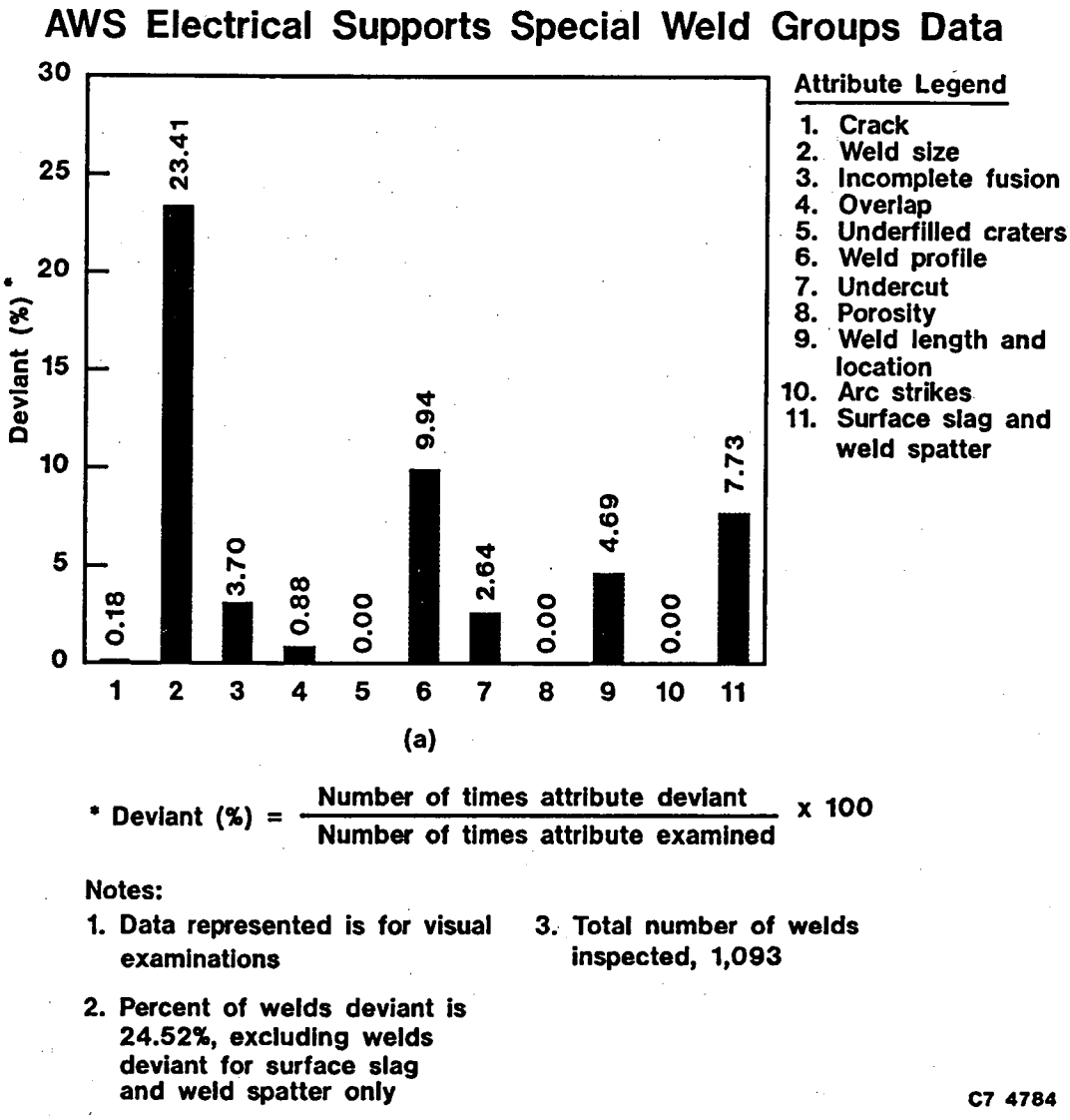
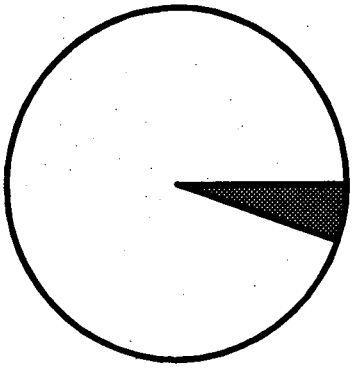


Figure A-12. Visual examination weld data for AWS electrical supports special weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Electrical Supports Special Weld Groups Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.27
Overlap	1.34
Undercut	4.01
Incomplete fusion	5.61
Porosity	0.00
Arc strikes	0.00
Weld size	34.49
Underfilled craters	0.00
Weld profile	28.88
Weld length and location	13.64
Surface slag and weld spatter	11.76

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4819

Figure A-12. (continued).

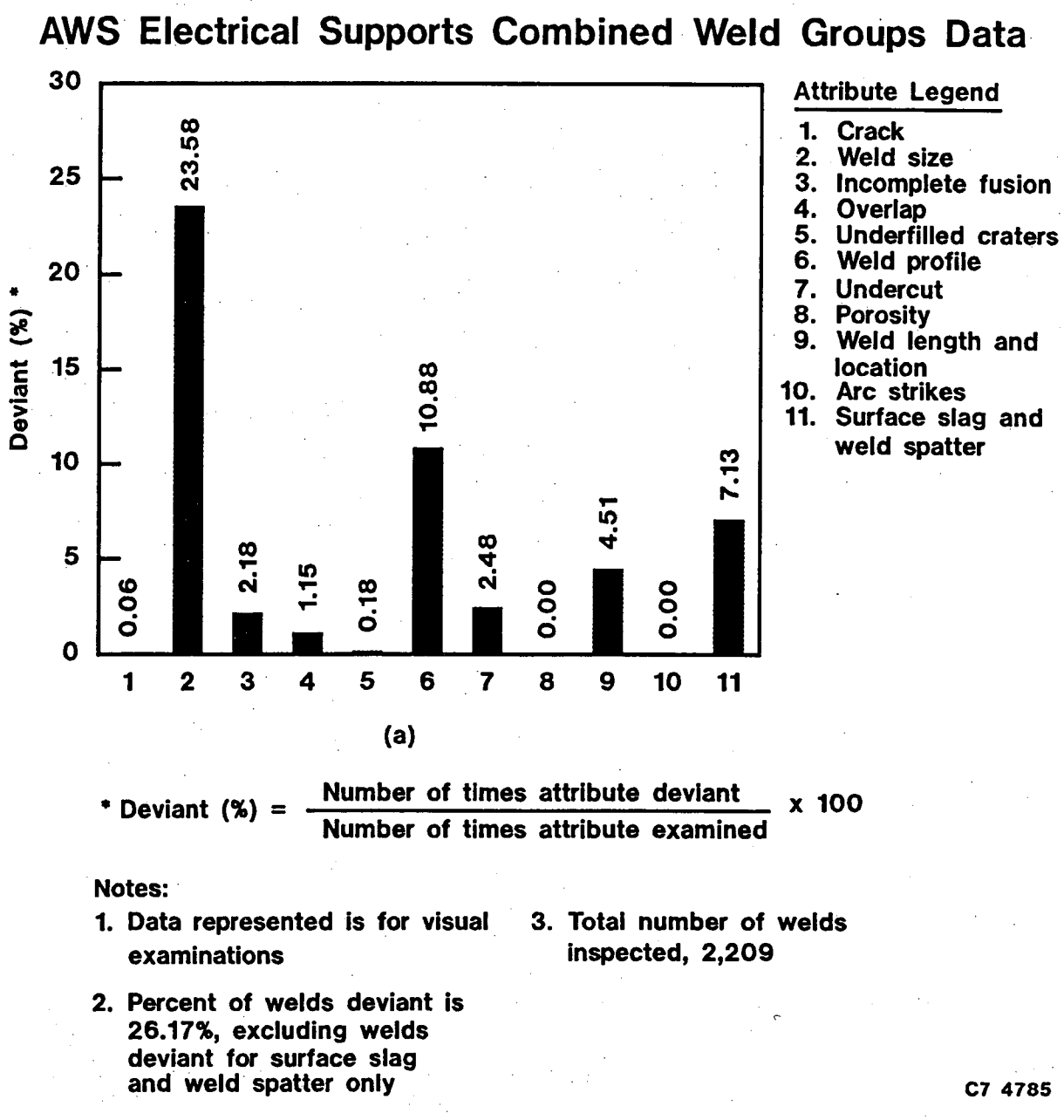
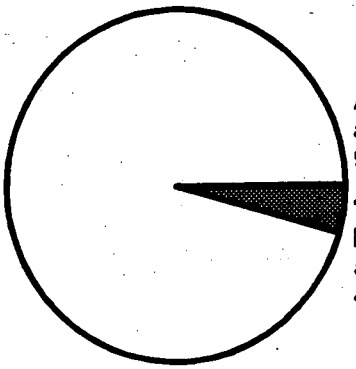


Figure A-13. Visual examination weld data for all AWS electrical supports weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Electrical Supports Combined Weld Groups Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.12
Overlap	2.28
Undercut	4.91
Incomplete fusion	4.31
Porosity	0.00
Arc strikes	0.00
Weld size	33.89
Underfilled craters	0.36
Weld profile	28.26
Weld length and location	11.74
Surface slag and weld spatter	14.13

(b)

** Deviant attributes (%) = $\frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4820

Figure A-13. (continued).

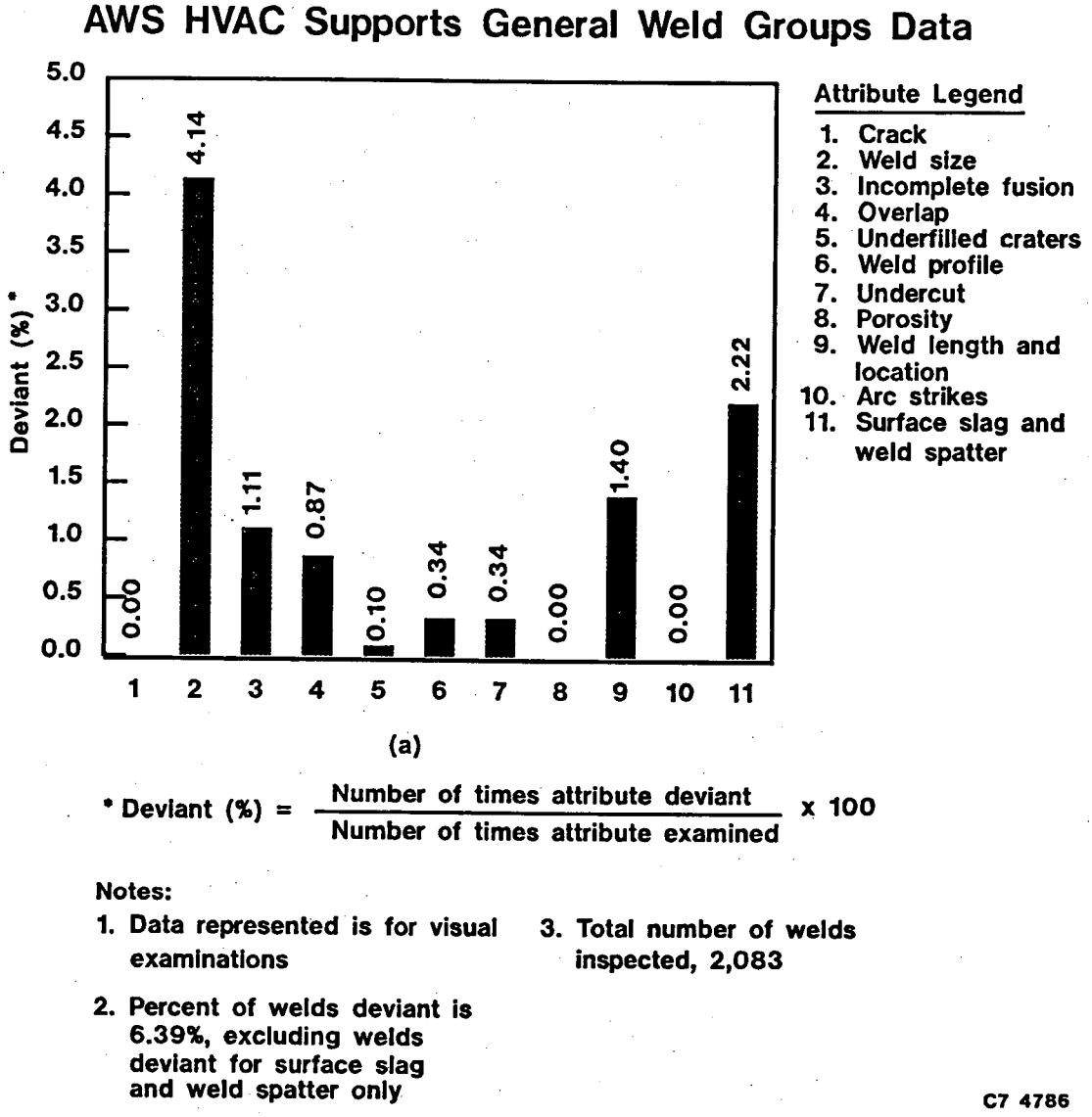
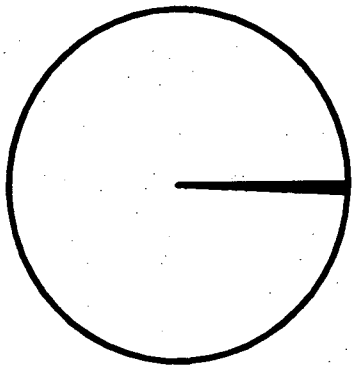


Figure A-14. Visual examination weld data for AWS HVAC supports general weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total number of deviant attributes identified.

AWS HVAC Supports General Weld Groups Data
(cont'd)



Acceptable attributes (%) 99.06

Deviant attributes (%) ** 0.94

Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.00
Overlap	8.45
Undercut	3.29
Incomplete fusion	10.80
Porosity	0.00
Arc strikes	0.00
Weld size	38.02
Underfilled craters	0.94
Weld profile	3.29
Weld length and location	13.61
Surface slag and weld spatter	21.60

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4821

Figure A-14. (continued).

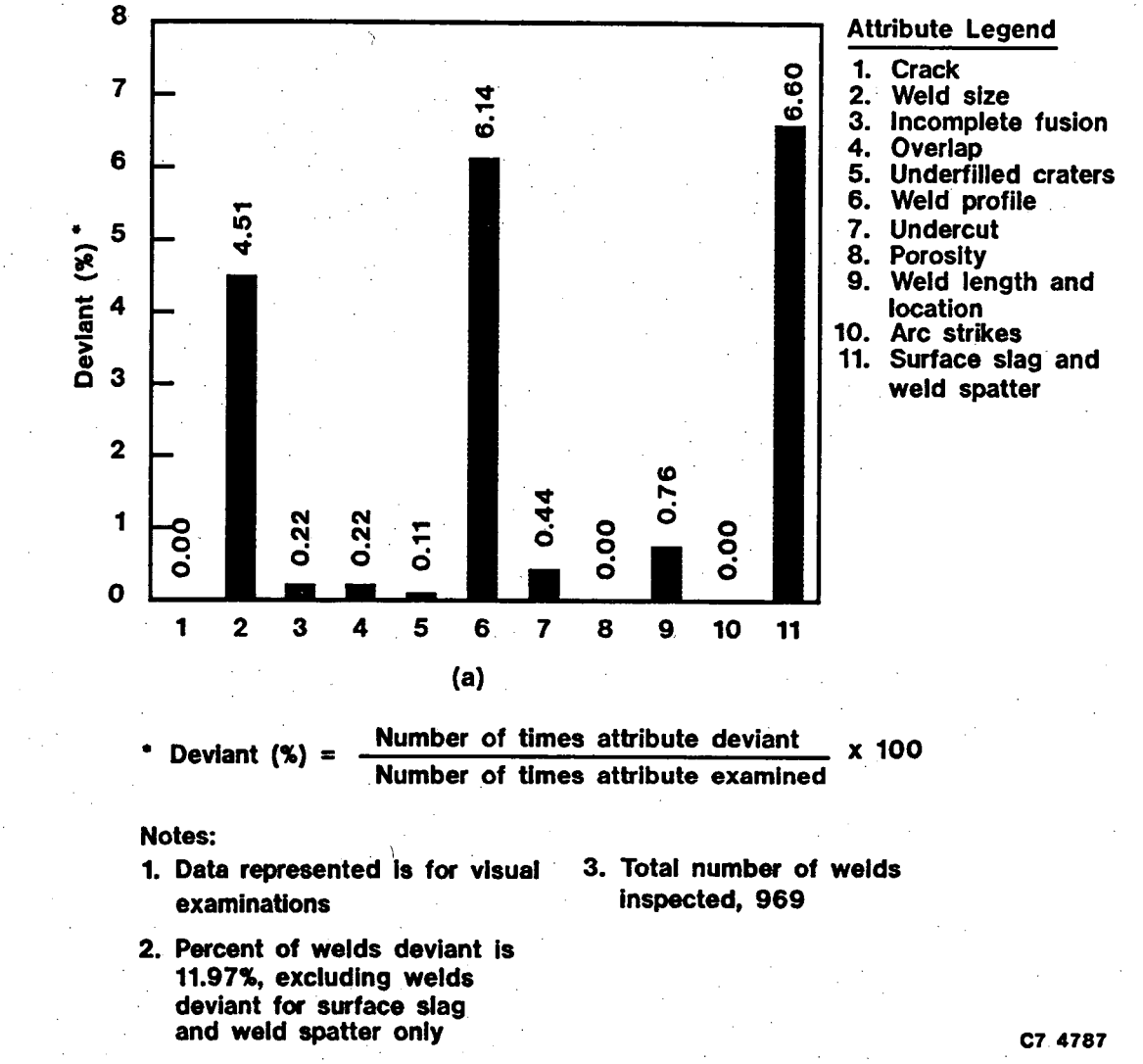
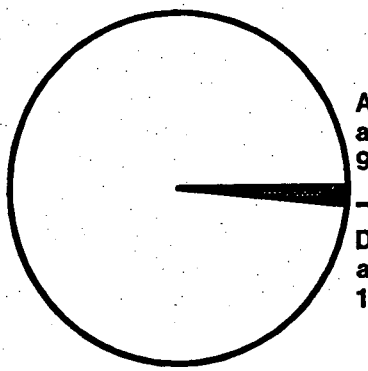


Figure A-15. Visual examination weld data for AWS HVAC supports special and specific weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS HVAC Supports Special and Specific Weld Groups Data
(cont'd)



Acceptable attributes (%) 98.28

Deviant attributes (%) ** 1.72

Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.00
Overlap	1.16
Undercut	2.31
Incomplete fusion	1.16
Porosity	0.00
Arc strikes	0.00
Weld size	20.80
Underfilled craters	0.58
Weld profile	33.53
Weld length and location	4.05
Surface slag and weld spatter	36.41

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4822

Figure A-15. (continued).

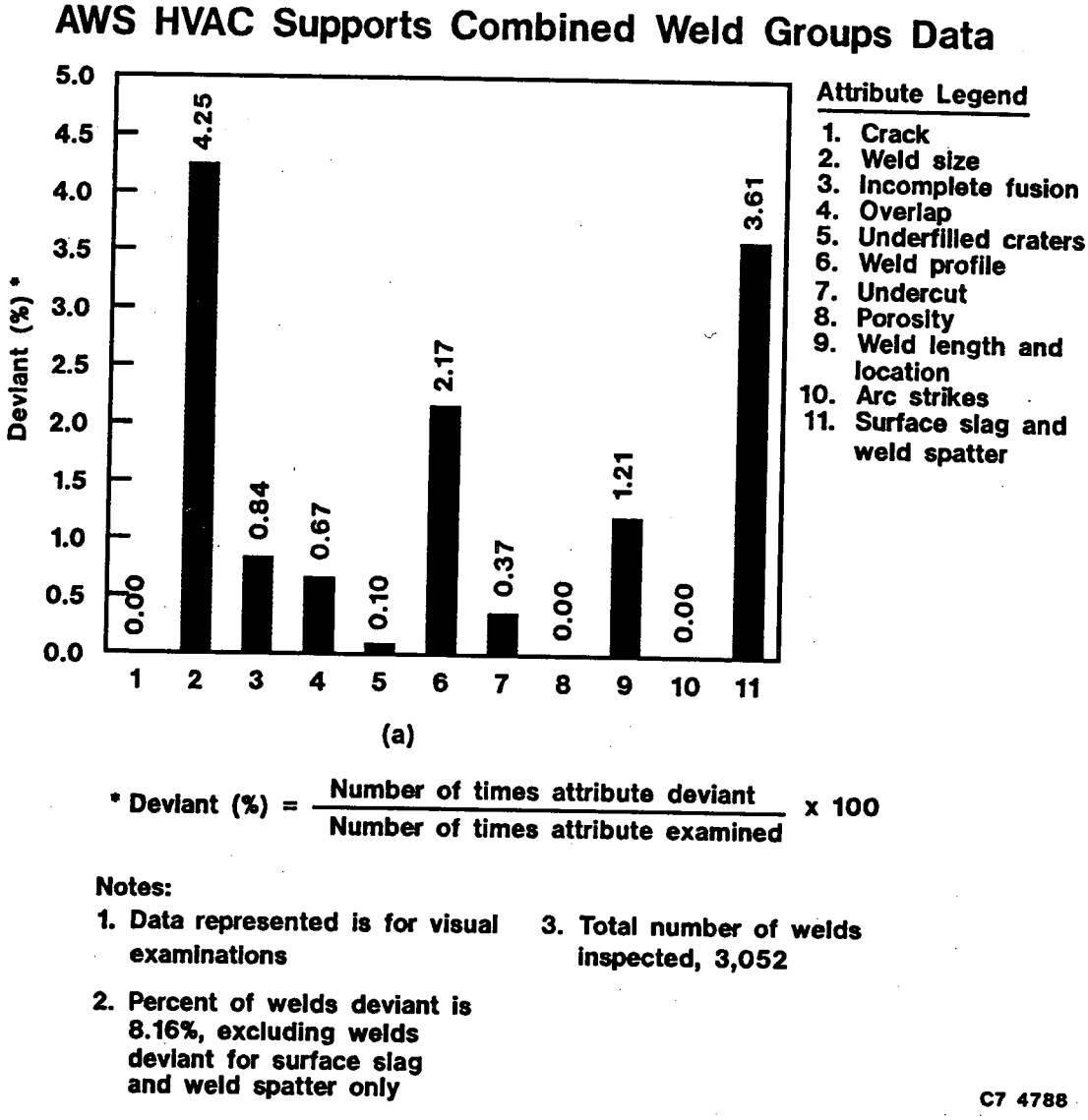
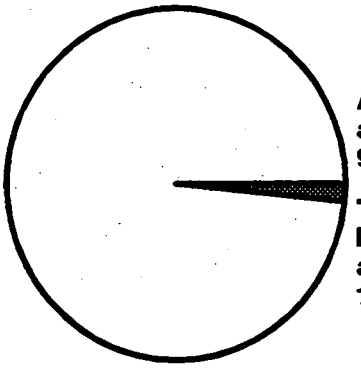


Figure A-16. Visual examination weld data for all AWS HVAC supports weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS HVAC Supports Combined Weld Groups Data
(cont'd)



Acceptable attributes (%) 98.82

Deviant attributes (%) ** 1.18

Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.00
Overlap	5.18
Undercut	2.85
Incomplete fusion	6.48
Porosity	0.00
Arc strikes	0.00
Weld size	30.31
Underfilled craters	0.78
Weld profile	16.84
Weld length and location	9.33
Surface slag and weld spatter	28.23

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4823

Figure A-16. (continued).

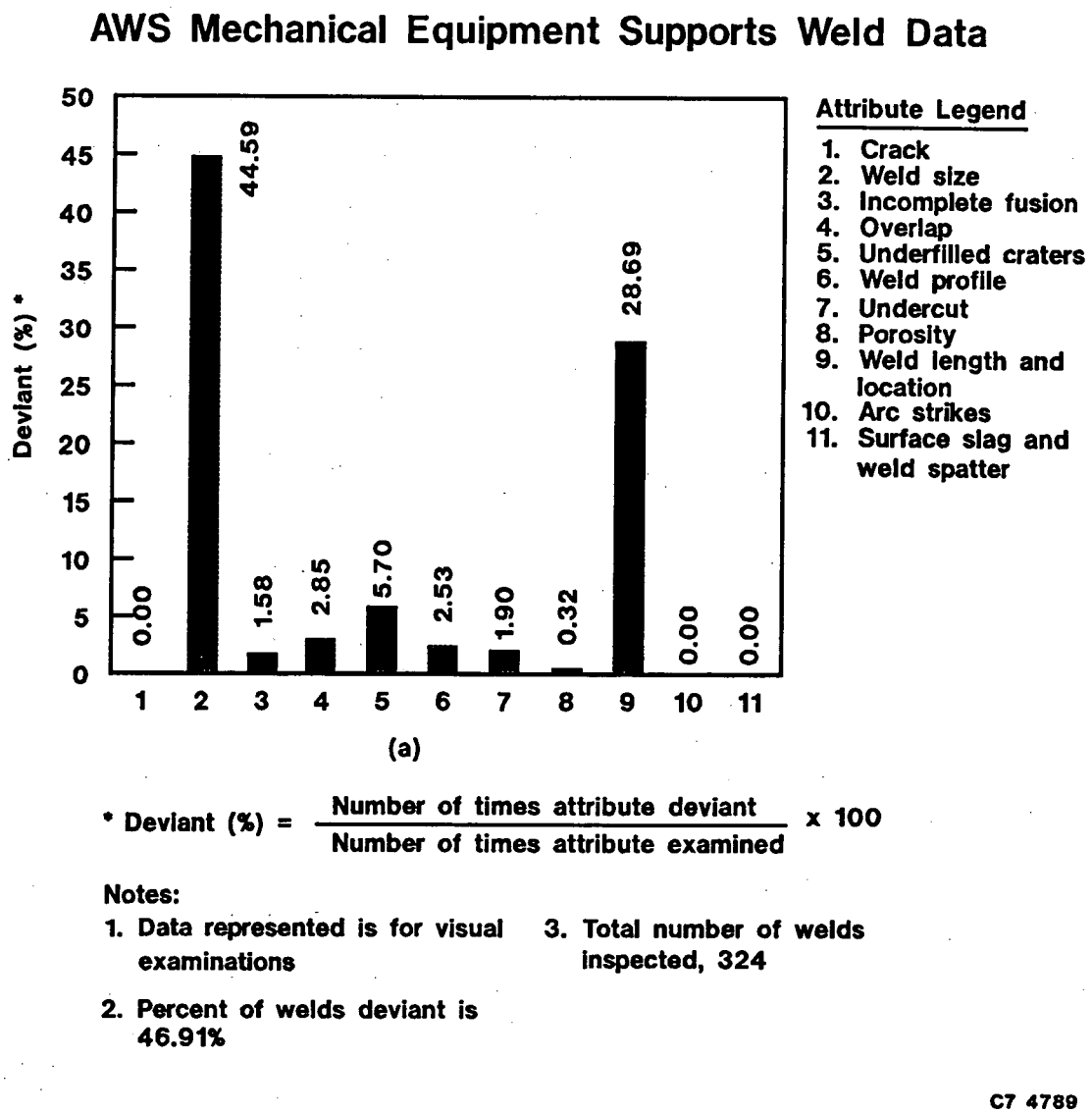
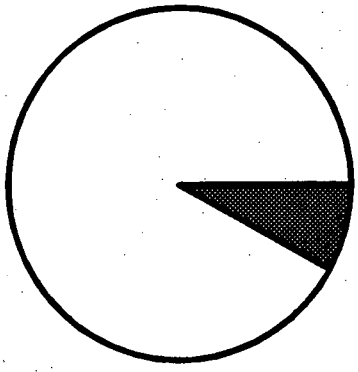


Figure A-17. Visual examination weld data for AWS mechanical equipment supports weld group components show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Mechanical Equipment Supports Weld Data
(cont'd)



Percent of each deviant attribute relative to total of deviant attributes ***

Cracks	0.00
Overlap	3.50
Undercut	2.33
Incomplete fusion	1.95
Porosity	0.39
Arc strikes	0.00
Weld size	54.48
Underfilled craters	7.00
Weld profile	3.11
Weld length and location	27.24
Surface slag and weld spatter	0.00

(b)

** Deviant attributes (%) = $\frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4824

Figure A-17. (continued).

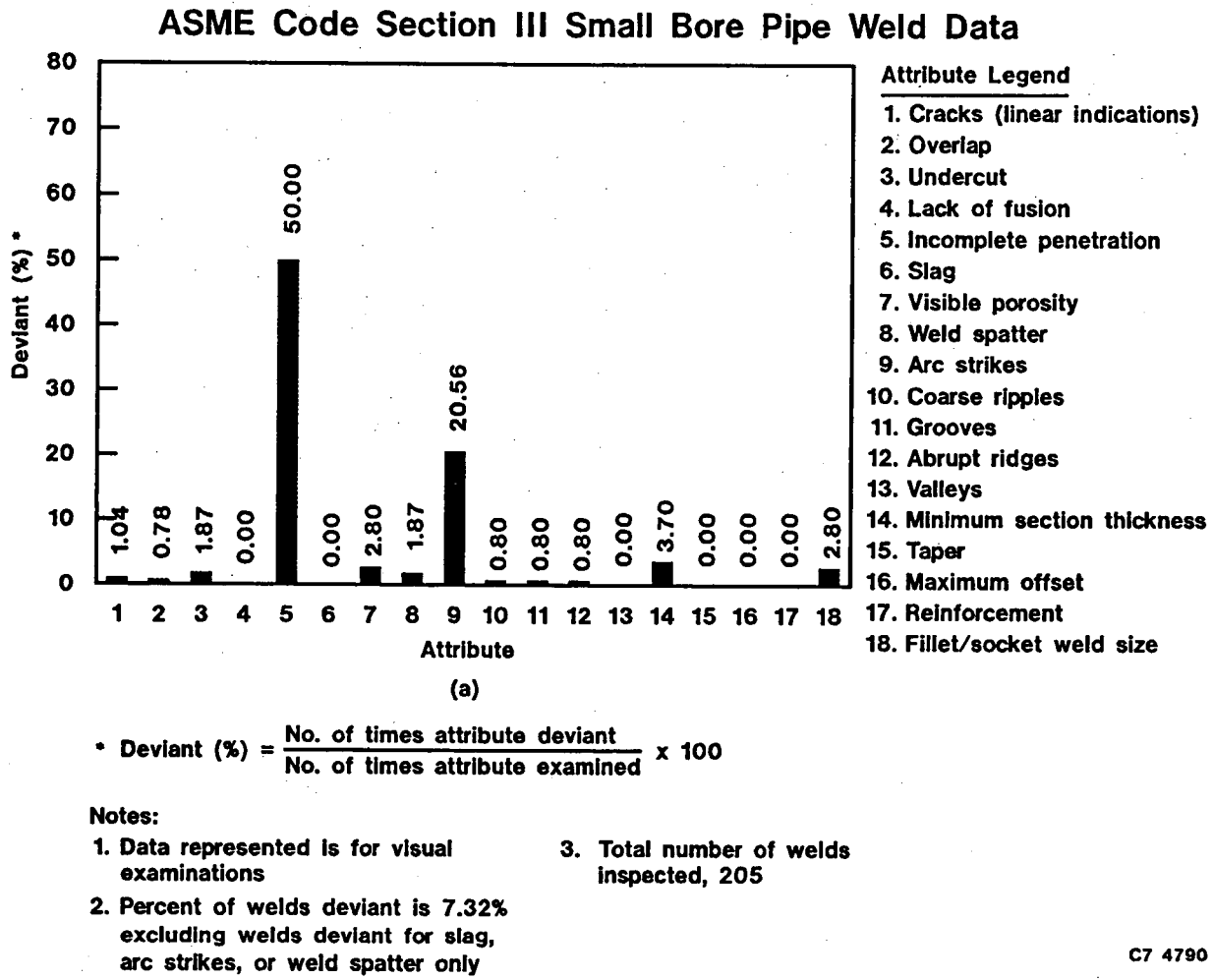
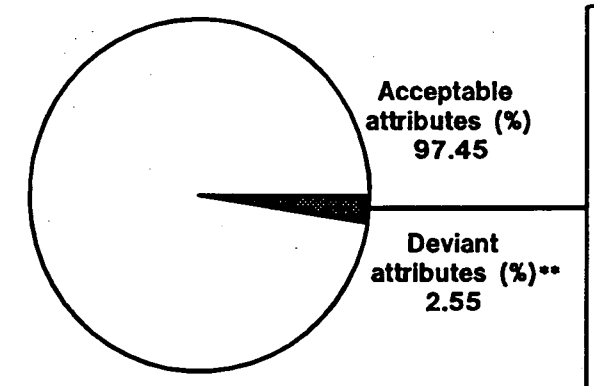


Figure A-18. Visual examination weld data for ASME Code Section III small bore pipe welds show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

ASME Code Section III Small Bore Pipe Weld Data
(cont'd)



Acceptable vs deviant attributes

Percent of deviant attributes relative to total deviant attributes ***

Cracks	4.65
Overlap	2.33
Undercut	4.65
Incomplete Penetration	2.33
Porosity	6.98
Weld spatter	4.65
Arc strikes	51.15
Coarse ripples	2.33
Grooves	2.33
Abrupt ridges	2.33
Minimum section thickness	9.30
Fillet/socket weld size	6.97

(b)

** Deviant attributes (%) $= \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4825

Figure A-18. (continued).

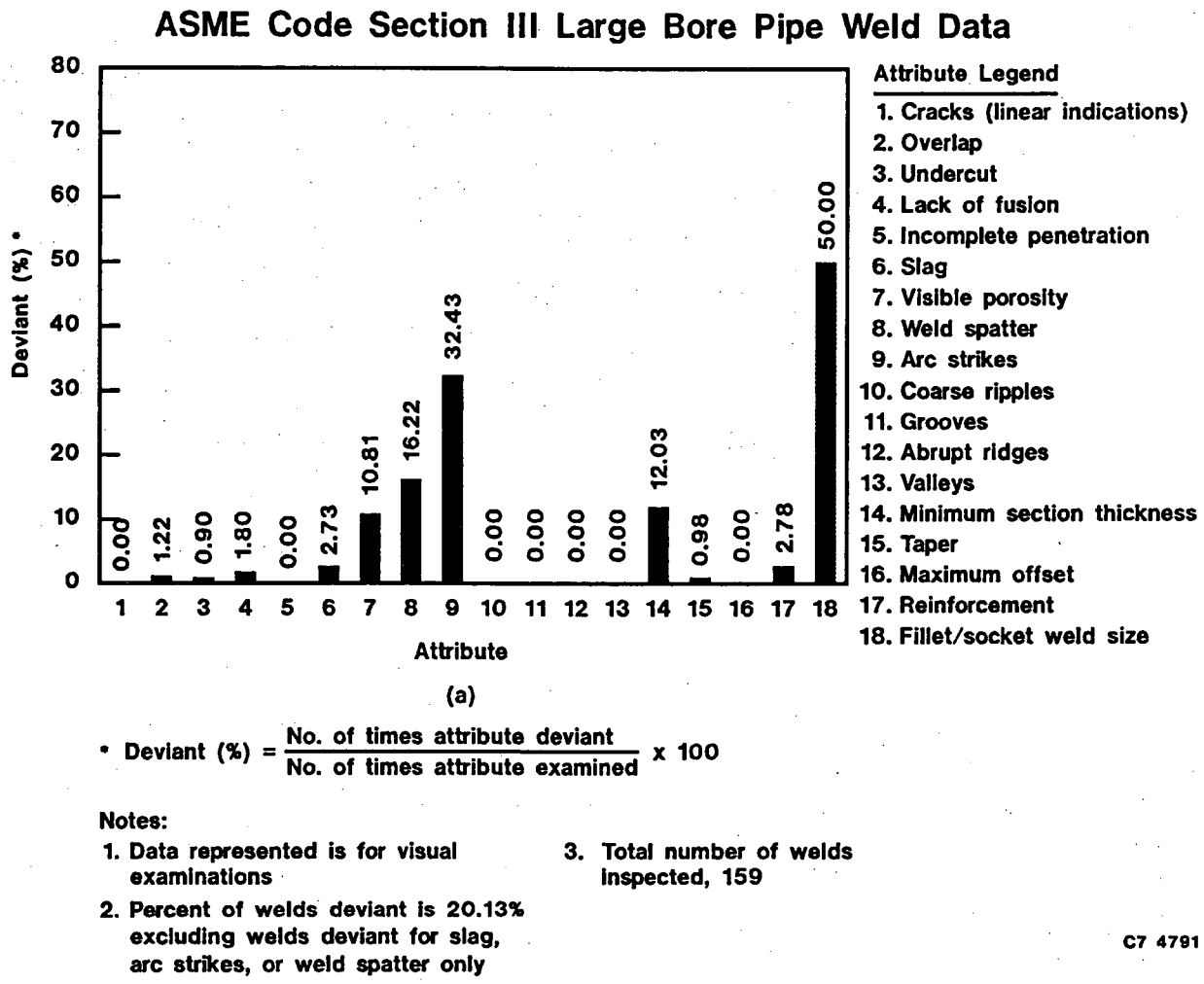
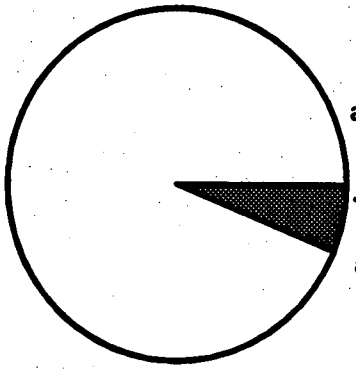


Figure A-19. Visual examination weld data for ASME Code Section III large bore pipe welds show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

ASME Code Section III Large Bore Pipe Weld Data
(cont'd)



Acceptable attributes (%) 93.78

Deviant attributes (%)** 6.22

Acceptable vs deviant attributes

Percent of deviant attributes relative to total deviant attributes ***

Overlap	1.03
Undercut	1.03
Lack of fusion	2.06
Slag	3.09
Porosity	12.37
Weld spatter	18.56
Arc strikes	37.12
Minimum Sect. thickness	19.59
Taper	1.03
Reinforcement	3.09
Fillet/socket weld size	1.03

(b)

** Deviant attributes (%) $= \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4826

Figure A-19. (continued).

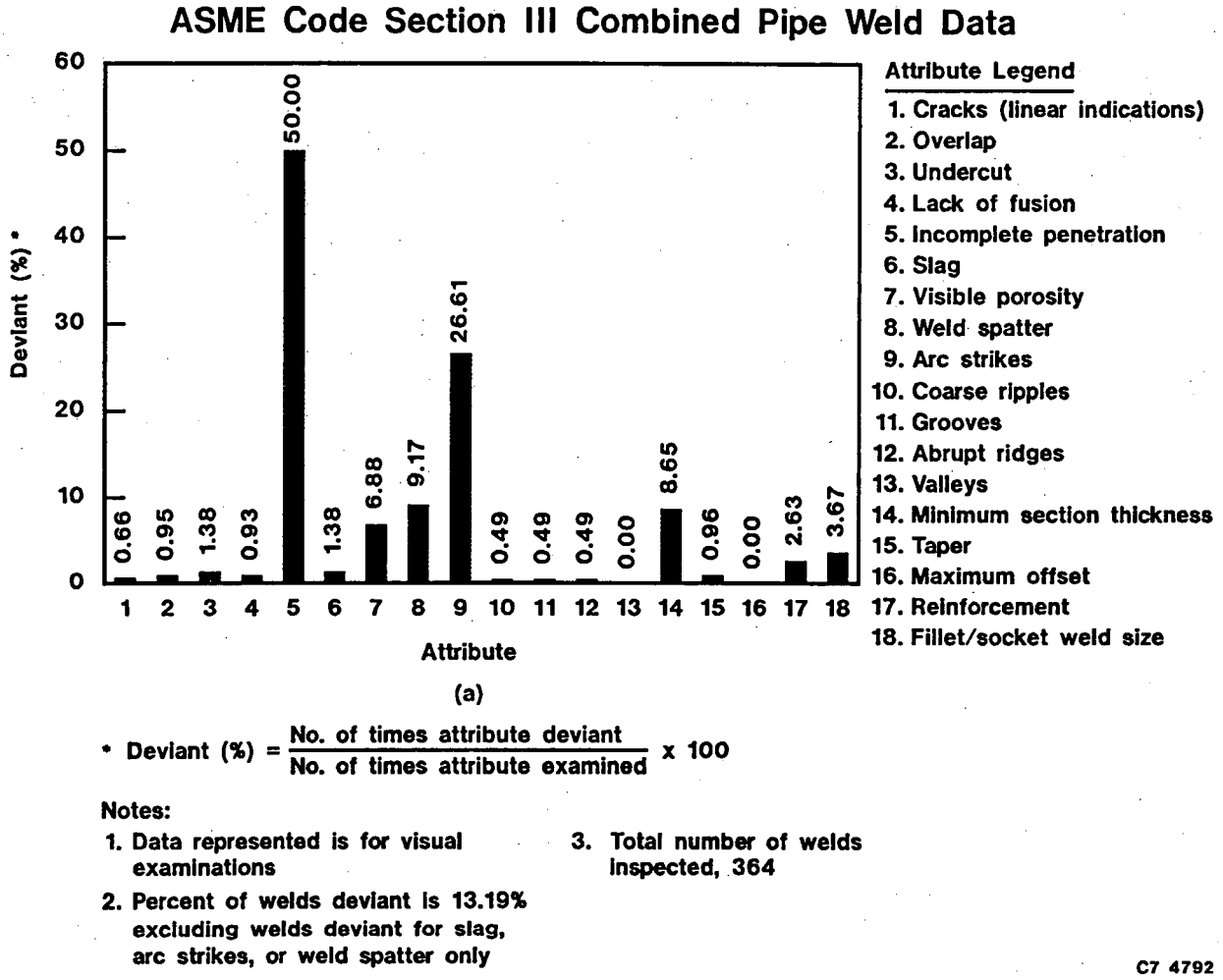
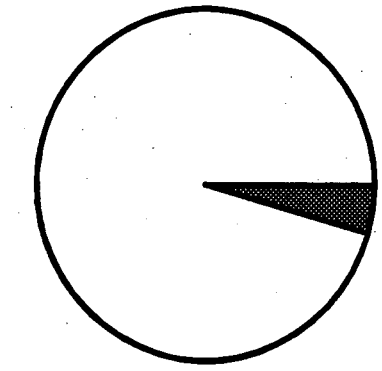


Figure A-20. Visual examination weld data for all ASME Code Section III pipe welds show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total number of deviant attributes.

ASME Code Section III Combined Pipe Weld Data
(cont'd)



Acceptable vs deviant attributes

Acceptable attributes (%) 95.66

Deviant attributes (%)** 4.34

Percent of deviant attributes relative to total deviant attributes ***

Cracks	1.42
Overlap	1.42
Undercut	2.13
Lack of fusion	1.42
Incomplete penetration	1.42
Slag	2.13
Porosity	10.64
Weld spatter	14.18
Arc strikes	41.12
Coarse ripples	0.71
Grooves	0.71
Abrupt ridges	0.71
Minimum sect. thickness	16.31
Taper	0.71
Reinforcement	2.13
Fillet/socket weld size	2.84

(b)

** Deviant attributes (%) $= \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4827

Figure A-20. (continued).

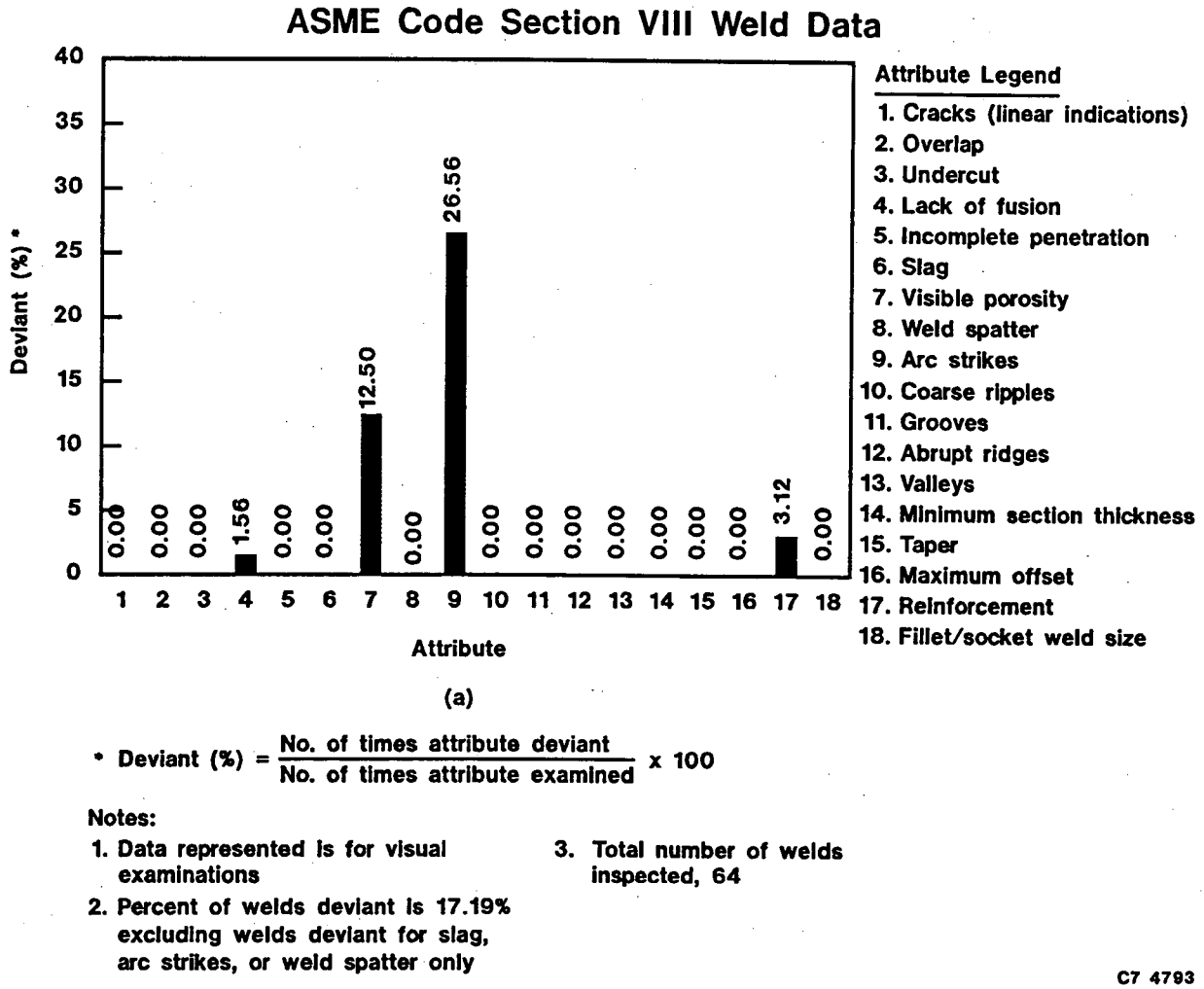
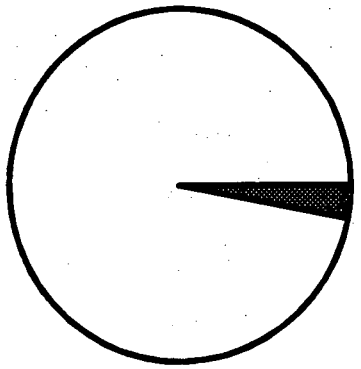


Figure A-21. Visual examination weld data for ASME Code Section VIII welds show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

ASME Code Section VIII Weld Data
(cont'd)



Acceptable attributes (%)
96.91

Deviant attributes (%)**
3.09

Percent of deviant attributes relative to total deviant attributes ***

Lack of fusion	3.57
Porosity	28.57
Arc strikes	60.72
Reinforcement	7.14

Acceptable vs deviant attributes

(b)

** Deviant attributes (%) $= \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4828

Figure A-21. (continued).

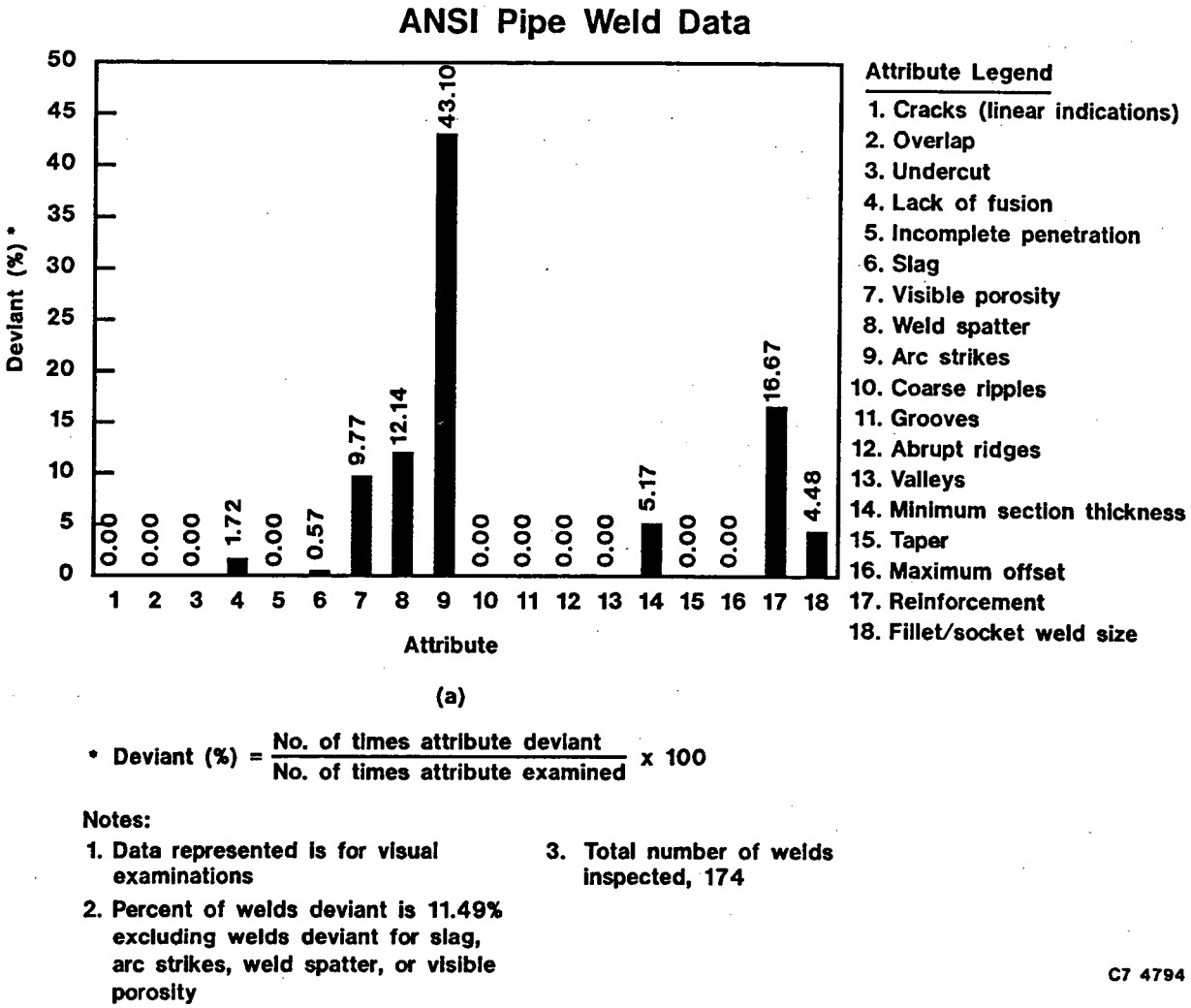
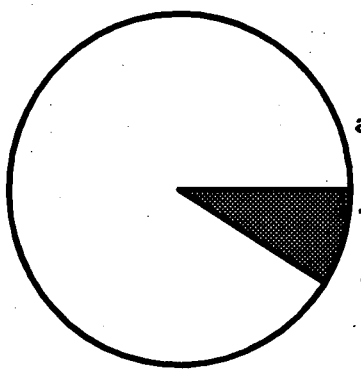


Figure A-22. Visual examination weld data for ANSI piping welds show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

ANSI Pipe Weld Data
(cont'd)



Acceptable attributes (%) 91.10

Deviant attributes (%)** 8.90

Acceptable vs deviant attributes

Percent of deviant attributes relative to total deviant attributes ***

Lack of fusion	2.17
Slag	0.72
Porosity	12.32
Weld spatter	15.22
Arc strikes	54.36
Minimum section thickness	6.52
Reinforcement	6.52
Fillet/socket weld size	2.17

(b)

$$** \text{ Deviant attributes (\%)} = \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$$

$$*** \frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$$

C7 4829

Figure A-22. (continued).

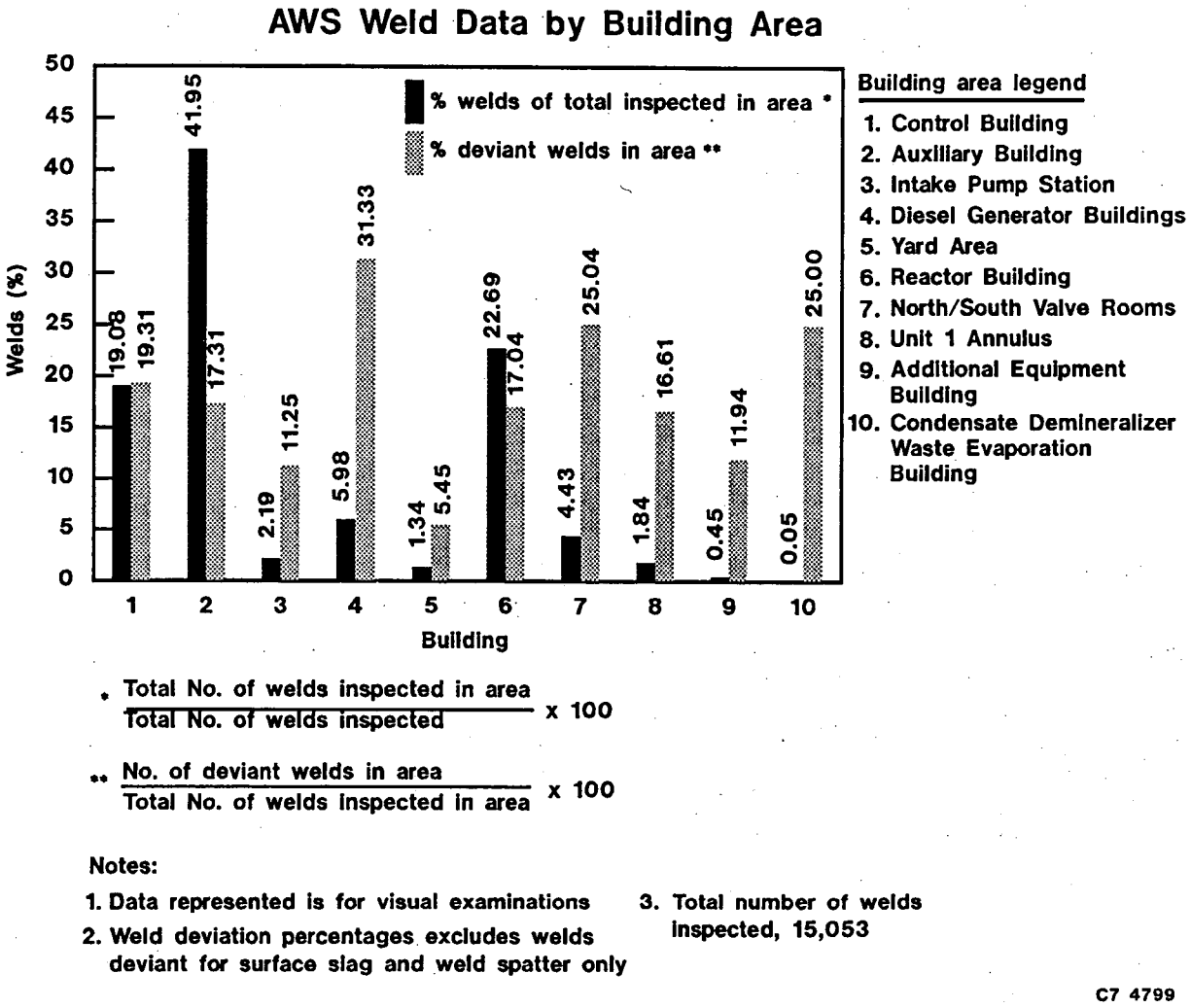


Figure A-23. Visual examination weld data by plant geographic areas (1 through 10) for AWS component classifications showing percent by area of the total welds inspected.

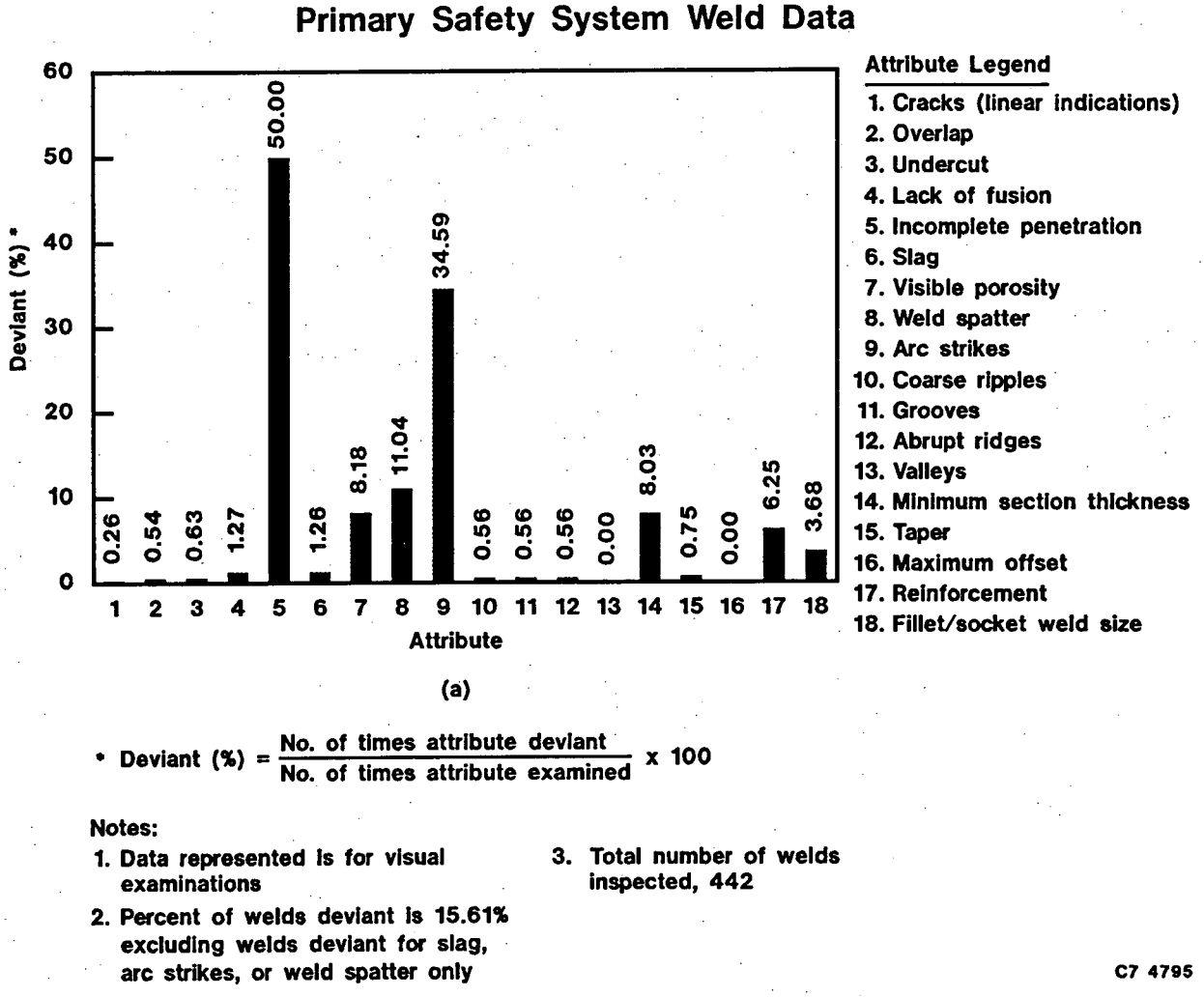
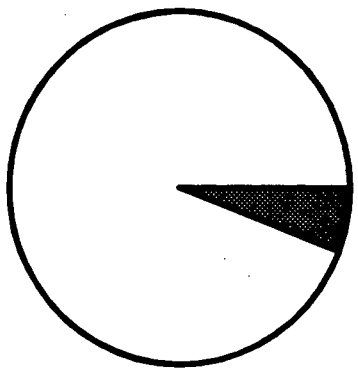


Figure A-24. Visual examination weld data for primary safety system welds show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

Primary Safety System Weld Data
(cont'd)



Acceptable attributes (%) 94.17

Deviant attributes (%)** 5.83

Acceptable vs deviant attributes

(b)

Percent of deviant attributes relative to total deviant attributes ***

Cracks	0.43
Overlap	0.43
Undercut	0.85
Lack of fusion	1.71
Incomplete penetration	0.85
Slag	1.71
Porosity	11.11
Weld spatter	14.96
Arc strikes	47.01
Coarse ripples	0.43
Grooves	0.43
Abrupt ridges	0.43
Minimum sect. thickness	12.39
Taper	0.43
Reinforcement	4.27
Fillet/socket weld size	2.56

** Deviant attributes (%) $= \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4830

Figure A-24. (continued).

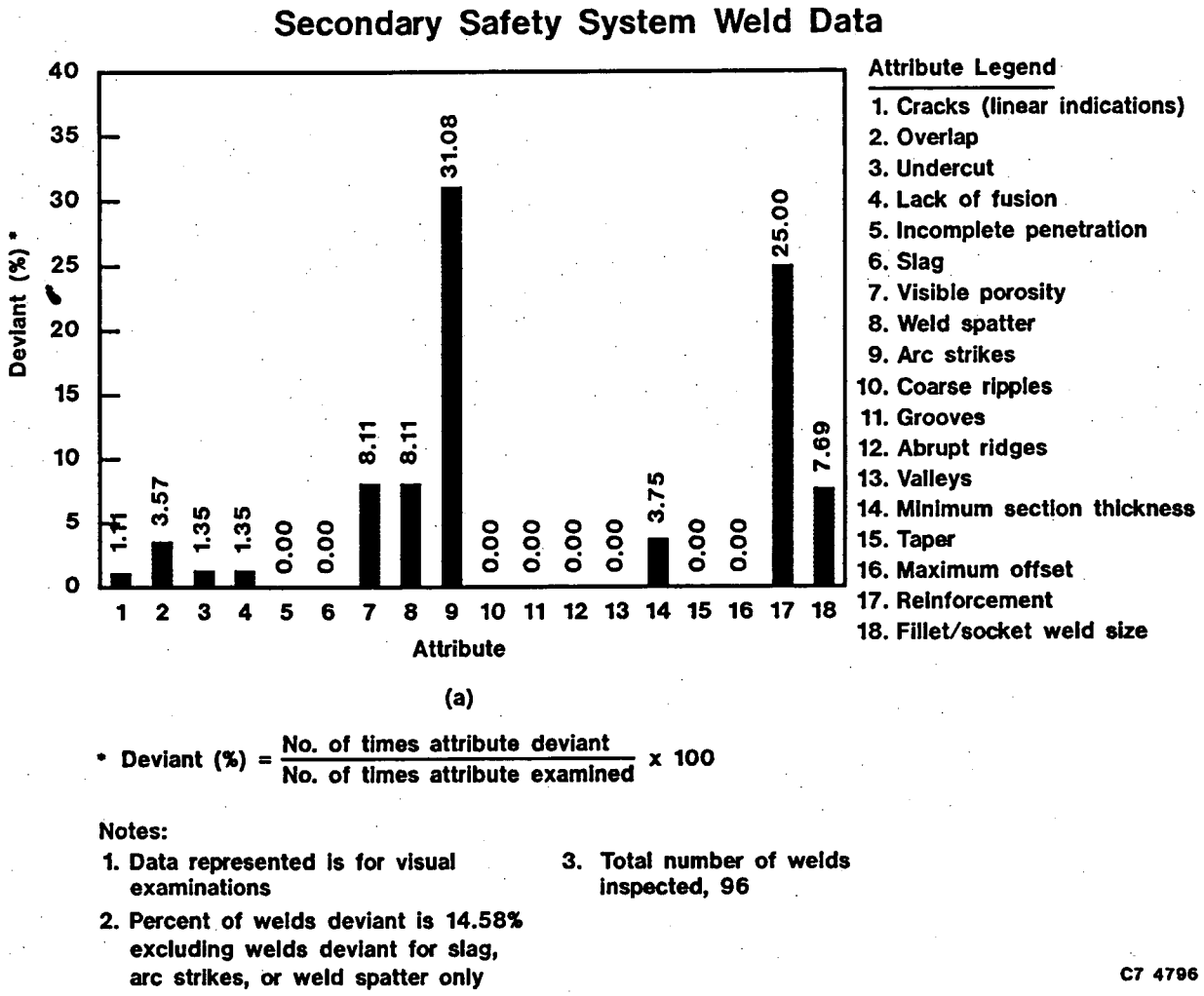
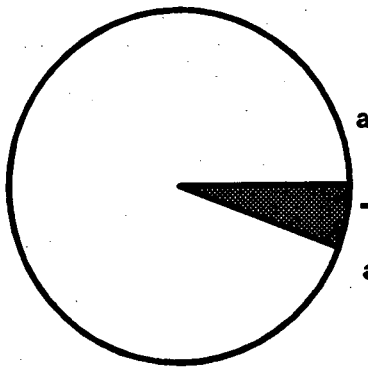


Figure A-25. Visual examination weld data for secondary safety system welds show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

Secondary Safety System Weld Data
(cont'd)



Acceptable attributes (%) 94.24

Deviant attributes (%)** 5.76

Acceptable vs deviant attributes

Percent of deviant attributes relative to total deviant attributes ***

Cracks	2.22
Overlap	2.22
Undercut	2.22
Lack of fusion	2.22
Porosity	13.33
Weld spatter	13.34
Arc strikes	51.12
Minimum sect. thickness	6.67
Reinforcement	4.44
Fillet/socket weld size	2.22

(b)

** Deviant attributes (%) $= \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4831

Figure A-25. (continued).

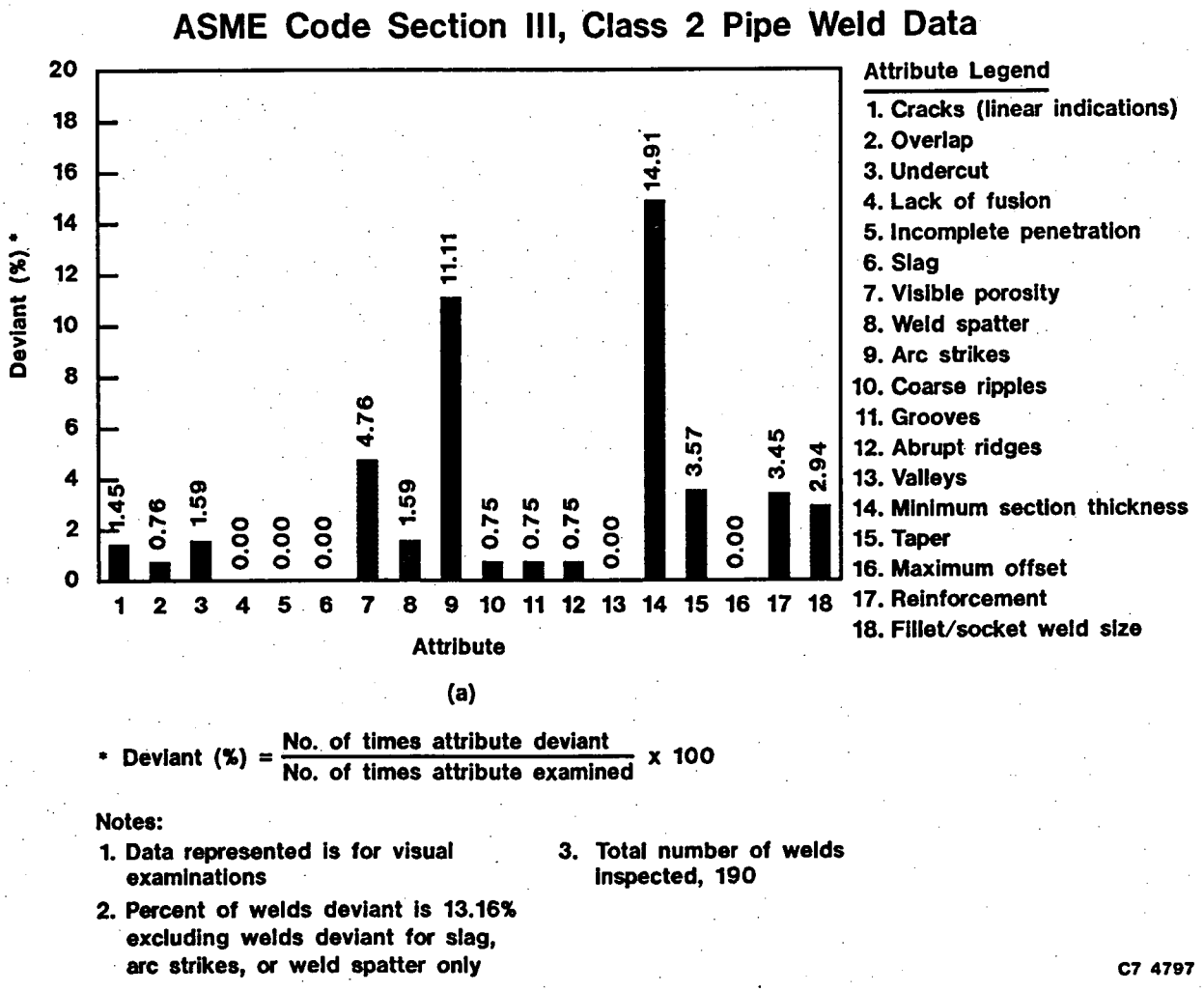
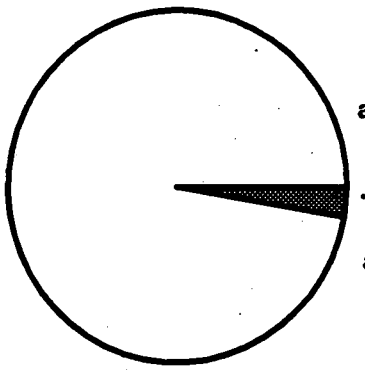


Figure A-26. Visual examination weld data for ASME Code Section III, Class 2 piping welds show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

ASME Code Section III, Class 2 Pipe Weld Data
(cont'd)



Acceptable vs deviant attributes

Acceptable attributes (%) 97.26

Deviant attributes (%)** 2.74

Percent of deviant attributes relative to total deviant attributes ***

Cracks	5.26
Overlap	2.63
Undercut	2.63
Porosity	7.89
Weld spatter	2.63
Arc strikes	18.43
Coarse ripples	2.63
Grooves	2.63
Abrupt ridges	2.63
Minimum sect. thickness	44.75
Taper	2.63
Reinforcement	2.63
Fillet/socket weld size	2.63

(b)

** Deviant attributes (%) $= \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4832

Figure A-26. (continued).

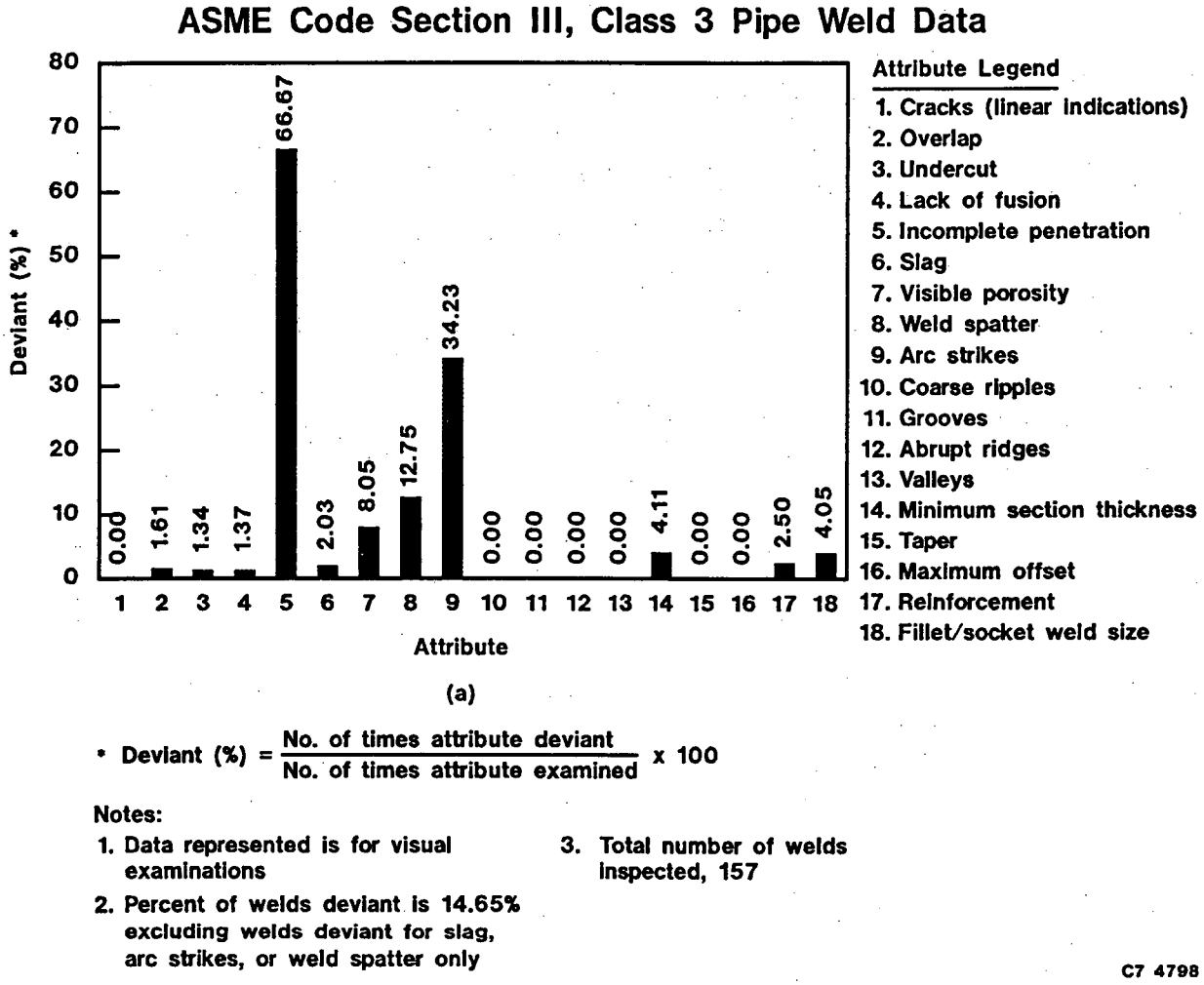
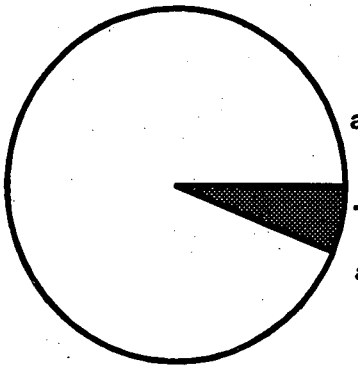


Figure A-27. Visual examination weld data for ASME Code Section III, Class 3 piping welds show views: (a) percent deviant for each attribute inspected and (b) percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

ASME Code Section III, Class 3 Pipe Weld Data
(cont'd)



Acceptable attributes (%) 93.95

Deviant attributes (%)** 6.05

Acceptable vs deviant attributes

Percent of deviant attributes relative to total deviant attributes ***

Overlap	0.97
Undercut	1.94
Lack of fusion	1.94
Incomplete Penetration	1.94
Slag	2.91
Weld spatter	18.45
Arc strikes	49.52
Minimum section thickness	5.83
Reinforcement	1.94
Fillet/socket weld size	2.91
Visible Porosity	11.65

(b)

** Deviant attributes (%) $= \frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4833

Figure A-27. (continued).

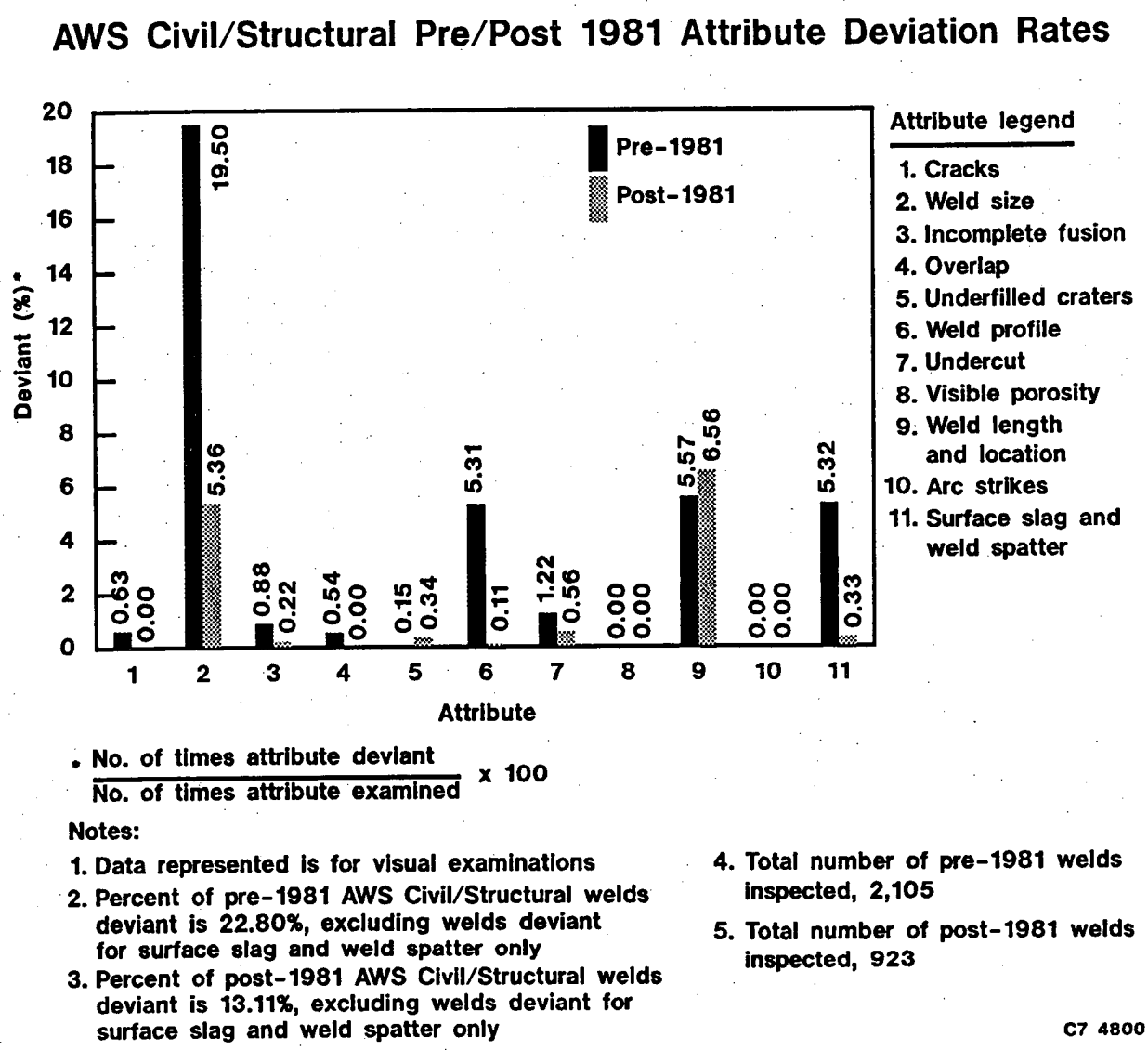


Figure A-28. Visual examination weld data for AWS civil/structural general weld group components (Groups D and E) showing before and after February 1981 percent deviant for each attribute inspected.

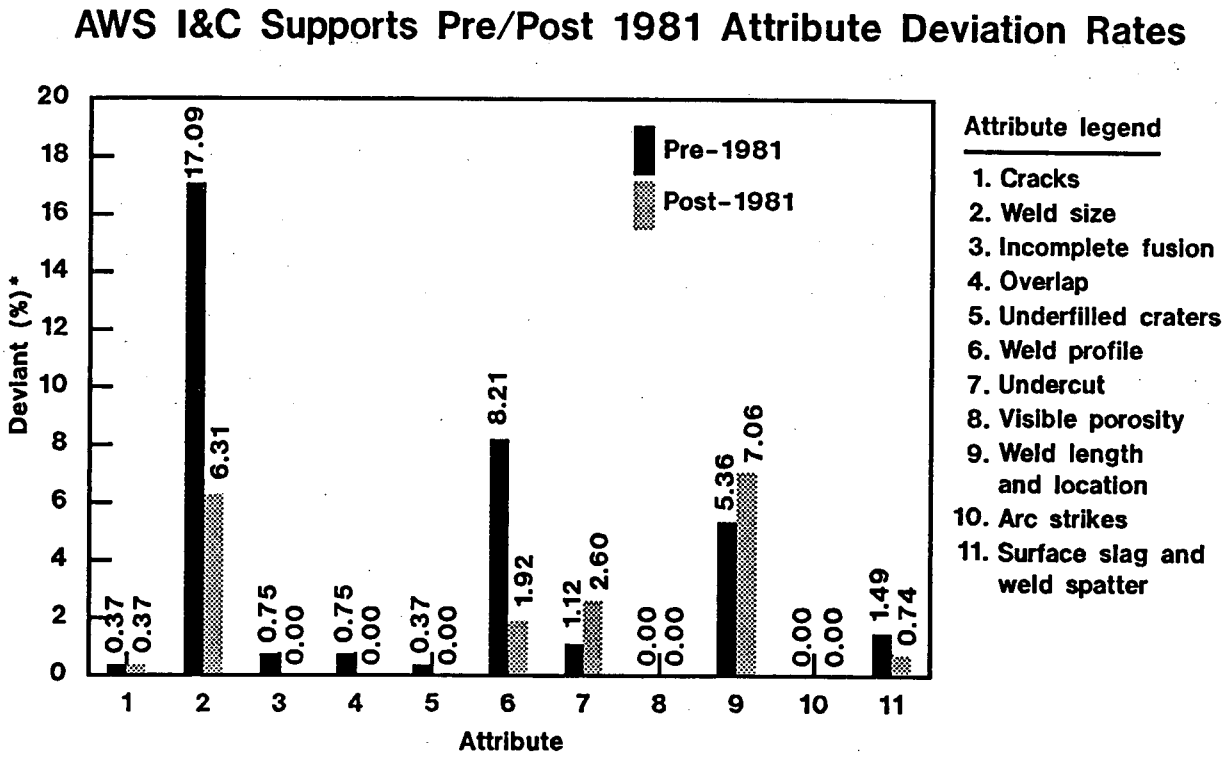


Figure A-29. Visual examination weld data for AWS I&C supports general weld group components (Groups G and H) showing before and after February 1981 percent deviant for each attribute inspected.

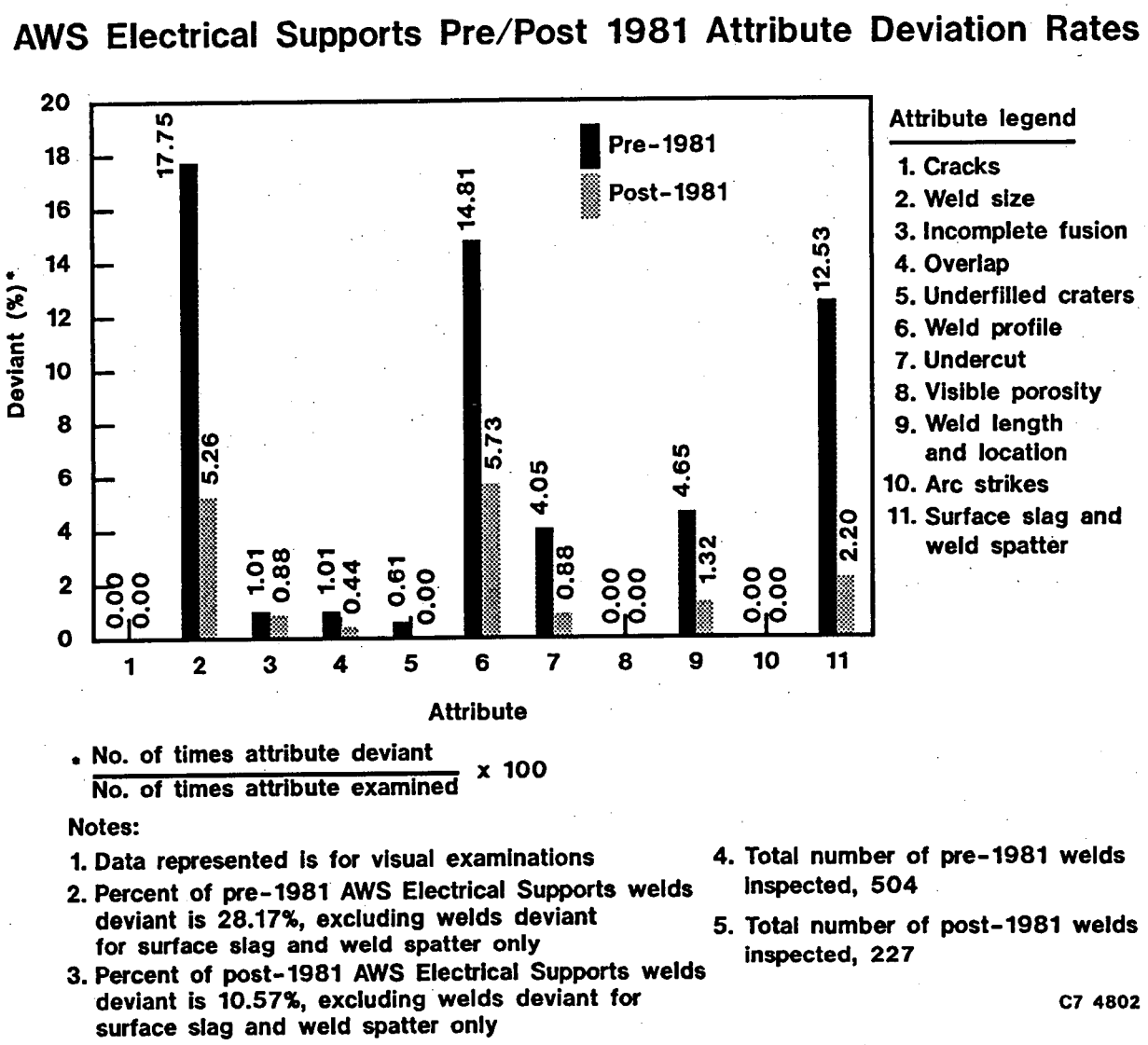
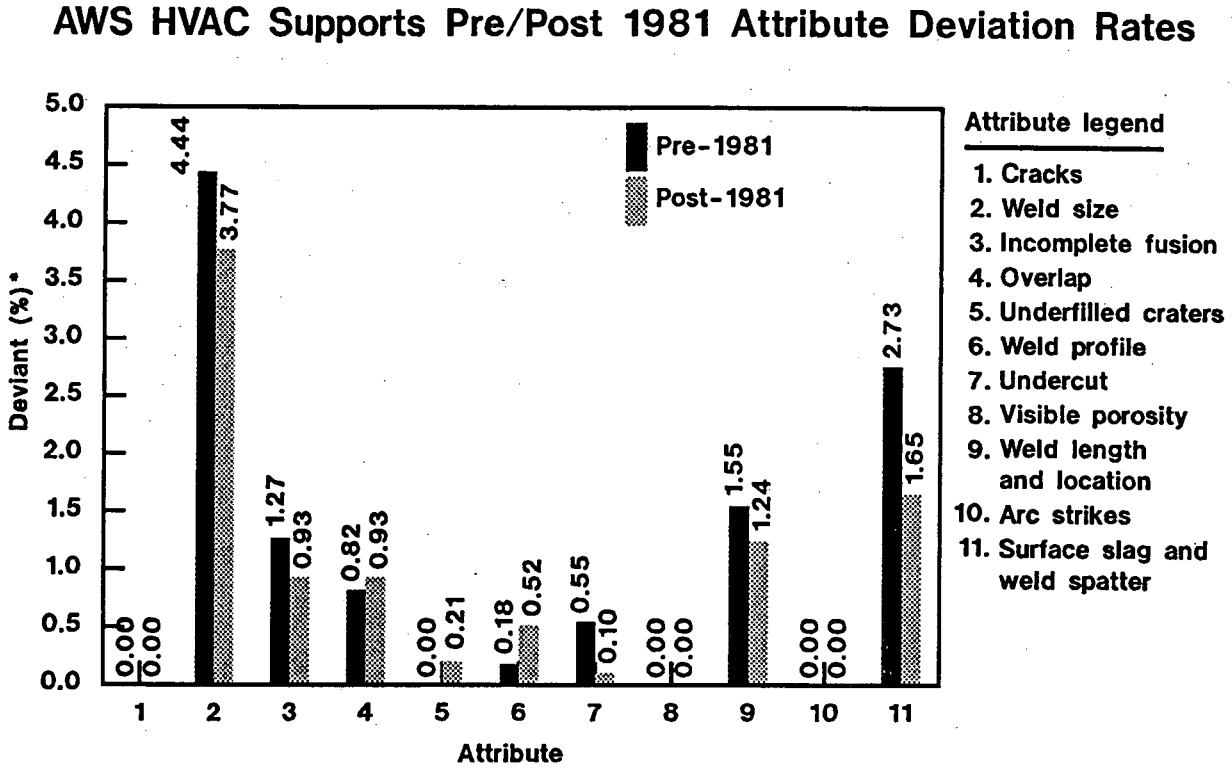


Figure A-30. Visual examination weld data for AWS electrical supports general weld group components (Groups I and J) showing before and after February 1981 percent deviant for each attribute inspected.



* $\frac{\text{No. of times attribute deviant}}{\text{No. of times attribute examined}} \times 100$

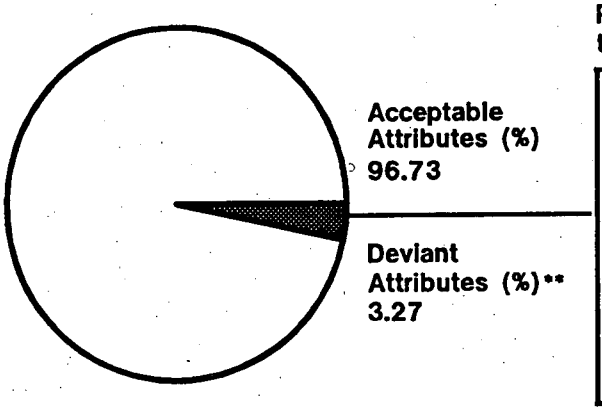
Notes:

1. Data represented is for visual examinations
2. Percent of pre-1981 AWS HVAC Supports welds deviant is 7.33%, excluding welds deviant for surface slag and weld spatter only
3. Percent of post-1981 AWS HVAC Supports welds deviant is 5.32%, excluding welds deviant for surface slag and weld spatter only
4. Total number of pre-1981 welds inspected, 1,105
5. Total number of post-1981 welds inspected, 978

C7 4803

Figure A-31. Visual examination weld data for AWS HVAC supports general weld group components (Groups K and L) showing before and after February 1981 percent deviant for each attribute inspected.

AWS Civil Structural Pre/Post 1981 Attribute Deviation Breakdown



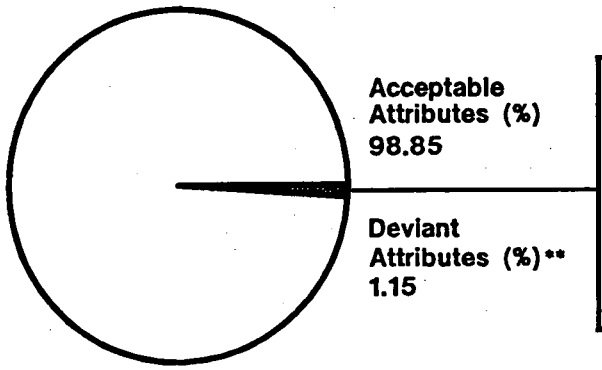
Acceptable vs Deviant Attributes (Pre-1981)

Percent of each deviant attribute relative to total deviant attributes ***

Cracks	1.80
Weld size	44.61
Incomplete fusion	2.49
Overlap	1.52
Underfilled craters	0.41
Weld profiles	14.92
Undercut	3.45
Weld length and location	15.75
Surface slag and weld spatter	15.05

Notes:

1. Data represented is for visual examinations



Acceptable vs Deviant Attributes (Post-1981)

Weld size	35.14
Incomplete fusion	1.80
Underfilled craters	2.70
Weld profiles	0.90
Undercut	4.50
Weld length and location	52.26
Surface slag and weld spatter	2.70

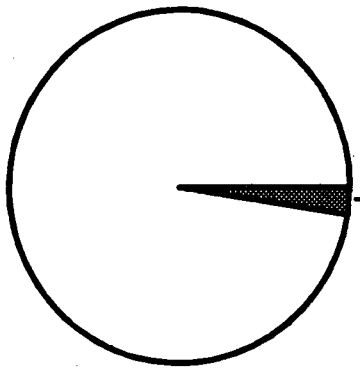
** % deviant attributes = $\frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4804

Figure A-32. Visual examination weld data for AWS civil/structural general weld group components (Groups D and E) showing before and after February 1981 percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS I&C Supports Pre/Post 1981
Attribute Deviation Breakdown



Acceptable Attributes (%) 97.53

Deviant Attributes (%)** 2.47

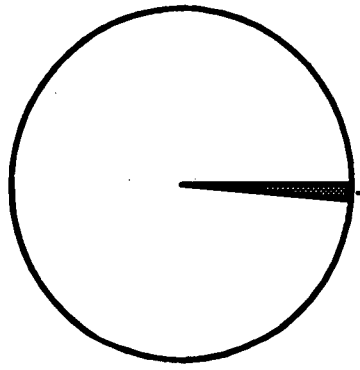
Acceptable vs Deviant Attributes (Pre-1981)

Percent of each deviant attribute relative to total deviant attributes ***

Cracks	1.45
Weld size	28.99
Incomplete fusion	2.90
Overlap	2.90
Underfilled craters	1.45
Weld profiles	31.88
Undercut	4.35
Weld length and location	20.28
Surface slag and weld spatter	5.80

Notes:

1. Data represented is for visual examinations



Acceptable Attributes (%) 98.53

Deviant Attributes (%)** 1.47

Acceptable vs Deviant Attributes (Post-1981)

Cracks	2.44
Weld size	17.07
Weld profiles	12.20
Undercut	17.07
Weld length and location	46.34
Surface slag and weld spatter	4.88

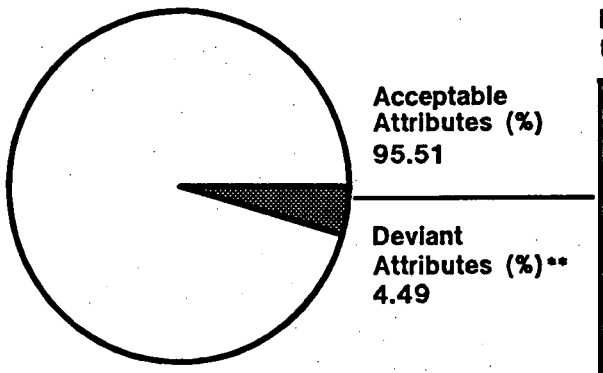
** % deviant attributes = $\frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4805

Figure A-33. Visual examination weld data for AWS I&C supports general weld group components (Groups G and H) showing before and after February 1981 percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS Electrical Supports Pre/Post 1981
Attribute Deviation Breakdown



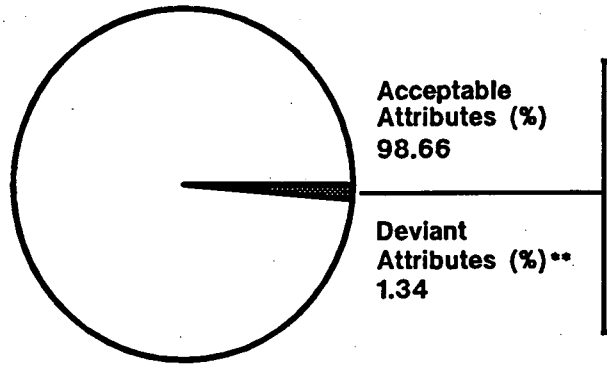
Acceptable vs Deviant Attributes (Pre-1981)

Percent of each deviant attribute relative to total deviant attributes ***

Weld size	17.67
Incomplete fusion	2.16
Overlap	2.16
Underfilled craters	1.29
Weld profiles	31.47
Undercut	8.62
Weld length and location	9.91
Surface slag and weld spatter	26.72

Notes:

1. Data represented is for visual examinations



Acceptable vs Deviant Attributes (Post-1981)

Weld size	18.75
Incomplete fusion	6.25
Overlap	3.12
Weld profiles	40.63
Undercut	6.25
Weld length and location	9.38
Surface slag and weld spatter	15.62

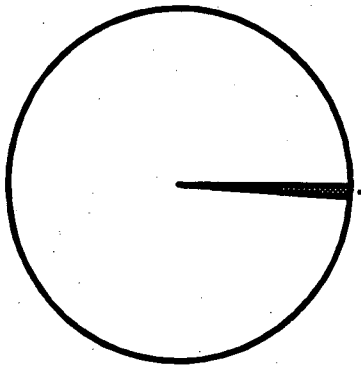
** % deviant attributes = $\frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4806

Figure A-34. Visual examination weld data for AWS electrical supports general weld group components (Groups I and J) showing before and after February 1981 percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

AWS HVAC Supports Pre/Post 1981
Attribute Deviation Breakdown



Acceptable Attributes (%) 98.95

Deviant Attributes (%)** 1.05

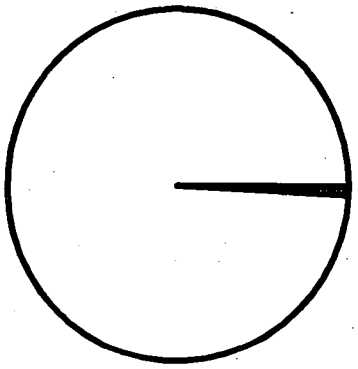
Acceptable vs Deviant Attributes (Pre-1981)

Percent of each deviant attribute relative to total deviant attributes ***

Weld size	38.10
Incomplete fusion	11.11
Overlap	7.14
Weld profiles	1.59
Undercut	4.76
Weld length and location	13.49
Surface slag and weld spatter	23.81

Notes:

1. Data represented is for visual examinations



Acceptable Attributes (%) 99.17

Deviant Attributes (%)** 0.83

Acceptable vs Deviant Attributes (Post-1981)

Weld size	37.94
Incomplete fusion	10.34
Overlap	10.34
Underfilled craters	2.30
Weld profiles	5.75
Undercut	1.15
Weld length and location	13.79
Surface slag and weld spatter	18.39

** % deviant attributes = $\frac{\text{Total No. of deviant attributes}}{\text{Total No. of attributes examined}} \times 100$

*** $\frac{\text{No. of times attribute deviant}}{\text{Total No. of deviant attributes}} \times 100$

C7 4807

Figure A-35. Visual examination weld data for AWS HVAC supports general weld group components (Groups K and L) showing before and after February 1981 percent of acceptable and deviant attributes and tabulation of the percent of each deviant attribute relative to the total deviant attributes.

APPENDIX C

THE TVA CORRECTIVE ACTIONS PLANS DESCRIPTIVE SUMMARY

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THE TVA CORRECTIVE ACTIONS PLANS DESCRIPTIVE SUMMARY

1. DOE/WEP Groups A, B, C, 210, 224, and 245—Lug Issue. Shear lugs on safety-related pipe were not installed in accordance with the design drawings. The TVA has bounded the problem area to include all shear lugs on safety-related systems for which an evaluation will be performed to determine the required weld size. The weld size requirements will be incorporated into the design drawings and the lugs reinspected. Field rework will be performed as required to satisfy the applicable construction code, ASME Code Section III or ANSI B31.1. This issue will be tracked by way of the TVA's SCR W-518-P.

2. DOE/WEP Group 021—Structural Steel Partition Wall. In order to accommodate additional equipment, two structural members were removed from Unit 1 Control Building for floor elevation 755 ft, one anchor connection has one bolt anchor connection where two were required, and the splice details are shown incorrectly. The preliminary corrective action will require an inspection to determine the as-installed condition, document a reanalysis of the structure, and rework as necessary to satisfy the applicable criteria of AISC and AWS D1.1. This item will be tracked by way of the TVA's NCR W547P.

3. DOE/WEP Groups A, B, 024, 210, 249, 253, and 258—RT Review. Radiographs did not meet the requirements of ASME Code Section III. The boundaries of this deficiency consisted of all radiographs for WBNP-1. The corrective action will be to review the radiographs, and those found deficient will be repaired as necessary to satisfy the requirements of ASME Code Section III. This activity will be tracked by way of the TVA's SCRWBNNE88651.

4. DOE/WEP Groups E, 255 and 256—741 ft Floor Elevation. The welded connections at this elevation were not installed in accordance with the design drawings, which created a violation of allowable stress per the design criteria WB-DC-20-9. The corrective action will consist of a 100% walkdown, inspection, engineering evaluation, with repair and documentation as necessary, to satisfy the applicable criteria of AISC and AWS D1.1. This activity will be tracked by way of the TVA's SCRWBNCEB8689.

5. DOE/WEP Groups M and 035—HVAC Ductwork. Safety-related ductwork was fabricated and installed without specific welding requirements from the Engineering or a Quality Assurance Program. This problem area is bounded by all safety-related ductwork, including the Hydrogen Collection System. The corrective action will be to review the applicable engineering and construction documents to ensure that functional, seismic, and quality assurance requirements for safety-related ductwork are clearly and correctly specified. Inspection and rework will be as necessary to satisfy SMACNA per construction specification N3M-914. This activity will be tracked by way of the TVA's SCRWBNMEB8714 and SCRWBNMEB8721.

6. DOE/WEP Group 209—Temporary Attachments, Documentation. The documentation for the removal of the thermocouple lug welds to ASME pressure boundary could not be located. This problem area is bounded by Systems 1, 3, and 67 where postweld heat treatment (PWHT) was required. The corrective action will consist of an attempt to retrieve or reconstruct the documentation, or perform the required nondestructive examination and document as necessary to satisfy the requirements of ASME Code Section III. This activity will be tracked by way of the TVA's NCR-W-599-P.

7. DOE/WEP Group 264—Attachments Classified as ASME MC. This corrective action concerns deficiencies and misclassification of attachments to the Reactor Metal Containment. This problem area is bounded by all welded attachments classified as ASME Code Class MC by the TVA. The preliminary corrective action will consist of a review of all welded attachments and assign the proper classification, and evaluating the DOE/WEP identified deviations. Further corrective action will be as required by Nuclear Engineering Procedure NEP-9.1, Revision 2, with DNE Interim

Change Orders through September 21, 1987. This activity will be tracked by way of the TVA's CAQR WBP870561, WBP870562, WBP870563, and PIRWBNCEB8658.

8. DOE/WEP Group (N/A)—Wall-Mounted Seismic Local Instrument Panels. Fabrication inspection of wall-mounted seismic instrument panels were not documented in accordance with procedural requirements, welds in the panel frames did not have complete joint penetration and fillet welds attaching the mounting pads to the panel frames were undersized. The boundaries of this problem are the wall-mounted seismic local instrument panels in WBNP Unit 1. The corrective action will consist of drawing revisions, rework, and inspection to satisfy the applicable criteria of AISC. This activity will be tracked by way of the TVA's NCR W-559-P.

APPENDIX B
INSPECTION RESULTS REPORTED
FROM INSPECTION DATA BASE

APPENDIX B
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Inspection Report Abstracts

APPENDIX B
INSPECTION RESULTS REPORTED
FROM INSPECTION DATA BASE

The inspection report abstracts presented in this appendix represent the results of the examinations performed by the DOE/WEP at WBNP-Unit 1, before engineering analysis.

An inspection data report for each weld examination group examined by the DOE/WEP tabulates the inspection results. Data provided on these reports includes the DOE/WEP weld examination group designator; total number of examinations and number deviant by component, weld, and weld characteristic.

10/14/87

07:26:25
INS 001-R1

SUMMARY OF INSPECTION DATA REPORT

TOTAL NUMBER OF COMPONENTS:	2182
% OF TOTAL COMPONENT DEVIANT:	39.32 (858)
TOTAL NUMBER OF WELDS:	15849
% OF TOTAL WELD DEVIANT:	21.19 (3359)
TOTAL NUMBER OF ATTRIBUTES:	149088
% OF TOTAL ATTRIBUTE DEVIANT:	3.02 (4507)
% OF COMPONENT WITH DOCUMENT DEVIANT:	0.87 (19)

NOTE:

TVA Prior Resolutions have been removed.
All attributes included in total numbers.
Component deviant summary includes components
with any deviant attributes .

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation Perc. (Column A / # times attribute checked) * 100
D* = % deviants for this attribute. (Column A / Sum of Column A) * 1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 002
GROUP TITLE: EC-SP-2, SPREADER ROOM F/P INSUFFICIENT WELD MATL.
NO. OF INSPECTION TO BE PERFORMED: 2
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (2)
% OF COMPONENTS DEVIANT: 100.00 (2)
TOTAL NUMBER OF WELDS: 2
% OF WELDS DEVIANT: 100.00 (2)
TOTAL CHARACTERISTICS: 18
% CHARACTERISTIC DEVIANT: 27.78 (5)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	2	0.00	0.00
2. Overlap	0	0	0.00	0.00
3. Undercut.....	0	2	0.00	0.00
4. Lack of Fusion.....	0	2	0.00	0.00
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	2	0.00	0.00
7. Visible Porosity.....	0	2	0.00	0.00
8. Weld Spatter	1	2	50.00	20.00
9. Arc Strikes	2	2	100.00	40.00
10. Coarse Ripples.	0	0	0.00	0.00
11. Grooves.....	0	0	0.00	0.00
12. Abrupt Ridges.	0	0	0.00	0.00
13. Valleys.....	0	0	0.00	0.00
14. Min Sect Thickness.	0	2	0.00	0.00
15. Taper.....	0	0	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	2	2	100.00	40.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/4 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 003
GROUP TITLE: EC-SP-3, S. VALVE ROOM STRL. WELDS SUBSURFACE DEF.
NO. OF INSPECTION TO BE PERFORMED: 2
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (2)
% OF COMPONENTS DEVIANT: 50.00 (1)
TOTAL NUMBER OF WELDS: 2
% OF WELDS DEVIANT: 50.00 (1)
TOTAL CHARACTERISTICS: 21
% CHARACTERISTIC DEVIANT: 4.76 (1)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	2	0.00	0.00
2. Weld Size	0	1	0.00	0.00
3. Incomplete Fusion	0	2	0.00	0.00
4. Overlap	0	2	0.00	0.00
5. Underfilled Craters	0	2	0.00	0.00
6. Weld Profiles	0	2	0.00	0.00
7. Undercut	0	2	0.00	0.00
8. Porosity	1	2	50.00	100.00
9. Weld Length and Location	0	2	0.00	0.00
10. Arc Strikes	0	2	0.00	0.00
11. Surface Slag and Weld Spatter	0	2	0.00	0.00

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 1
No. of welds with deviant weld typ: 0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	2	2	50.00(1)	50.00(1)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/5 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 004
GROUP TITLE: EC-SP-4, SLUGGED SEAM WELDS ON BOX ANCHORS
NO. OF INSPECTION TO BE PERFORMED: 2
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (2)
% OF COMPONENTS DEVIANT: 0.00 (0)
TOTAL NUMBER OF WELDS: 4
% OF WELDS DEVIANT: 0.00 (0)
TOTAL CHARACTERISTICS: 40
% CHARACTERISTIC DEVIANT: 0.00 (0)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	4	0.00	0.00
2. Weld Size	0	0	0.00	0.00
3. Incomplete Fusion	0	4	0.00	0.00
4. Overlap	0	4	0.00	0.00
5. Underfilled Craters	0	4	0.00	0.00
6. Weld Profiles	0	4	0.00	0.00
7. Undercut	0	4	0.00	0.00
8. Porosity	0	4	0.00	0.00
9. Weld Length and Location	0	4	0.00	0.00
10. Arc Strikes	0	4	0.00	0.00
11. Surface Slag and Weld Spatter	0	4	0.00	0.00

No. of missing welds	0
No. welds missing due to configuration	0
No. of inaccessible welds	0
No. of welds with deviant weld type	0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	2	4	50.00(1)	25.00(1)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviance for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/6 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 006
GROUP TITLE: RHR 14" SS REDUCED WALL EVALUATION
NO. OF INSPECTION TO BE PERFORMED: 2
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (2)
% OF COMPONENTS DEVIANT: 0.00 (0)
TOTAL NUMBER OF WELDS: 2
% OF WELDS DEVIANT: 0.00 (0)
TOTAL CHARACTERISTICS: 29
% CHARACTERISTIC DEVIANT: 0.00 (0)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	2	0.00	0.00
2. Overlap	0	2	0.00	0.00
3. Undercut.....	0	2	0.00	0.00
4. Lack of Fusion.....	0	2	0.00	0.00
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	2	0.00	0.00
7. Visible Porosity.....	0	2	0.00	0.00
8. Weld Spatter	0	2	0.00	0.00
9. Arc Strikes	0	2	0.00	0.00
10. Coarse Ripples.	0	2	0.00	0.00
11. Grooves.....	0	2	0.00	0.00
12. Abrupt Ridges.	0	2	0.00	0.00
13. Valleys.....	0	2	0.00	0.00
14. Min Sect Thickness.	0	1	0.00	0.00
15. Taper.....	0	2	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	2	0.00	0.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 2

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	2	2	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/7 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 008
GROUP TITLE: EC-SP-8, SYS. 78 ARC STRIKES/METAL EXCAV.
NO. OF INSPECTION TO BE PERFORMED: 6
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (6)
% OF COMPONENTS DEVIANT: 66.67 (4)
TOTAL NUMBER OF WELDS: 6
% OF WELDS DEVIANT: 66.67 (4)
TOTAL CHARACTERISTICS: 14
% CHARACTERISTIC DEVIANT: 28.57 (4)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	2	0.00	0.00
2. Overlap	0	0	0.00	0.00
3. Undercut.....	0	0	0.00	0.00
4. Lack of Fusion.....	0	0	0.00	0.00
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	0	0.00	0.00
7. Visible Porosity.....	0	0	0.00	0.00
8. Weld Spatter	0	0	0.00	0.00
9. Arc Strikes	4	6	66.67	100.00
10. Coarse Ripples.	0	0	0.00	0.00
11. Grooves.....	0	0	0.00	0.00
12. Abrupt Ridges.	0	0	0.00	0.00
13. Valleys.....	0	0	0.00	0.00
14. Min Sect Thickness.	0	6	0.00	0.00
15. Taper.....	0	0	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	0	0.00	0.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 3

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/B times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 009
GROUP TITLE: EC-SP-9, SYS. 72 RB SPRAY @ 713 ARC STRIKES
NO. OF INSPECTION TO BE PERFORMED: 2
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (2)
% OF COMPONENTS DEVIANT: 100.00 (2)
TOTAL NUMBER OF WELDS: 2
% OF WELDS DEVIANT: 100.00 (2)
TOTAL CHARACTERISTICS: 4
% CHARACTERISTIC DEVIANT: 50.00 (2)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	0	0.00	0.00
2. Overlap	0	0	0.00	0.00
3. Undercut.....	0	0	0.00	0.00
4. Lack of Fusion.....	0	0	0.00	0.00
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	0	0.00	0.00
7. Visible Porosity.....	0	0	0.00	0.00
8. Weld Spatter	0	0	0.00	0.00
9. Arc Strikes	1	2	50.00	50.00
10. Coarse Ripples.	0	0	0.00	0.00
11. Grooves.....	0	0	0.00	0.00
12. Abrupt Ridges.	0	0	0.00	0.00
13. Valleys.....	0	0	0.00	0.00
14. Min Sect Thickness.	1	2	50.00	50.00
15. Taper.....	0	0	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	0	0.00	0.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/9 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 012
GROUP TITLE: EC-SP-12, S. VALVE ROOM CRACKED WELDS
NO. OF INSPECTION TO BE PERFORMED: 2
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (2)
% OF COMPONENTS DEVIANT: 50.00 (1)
TOTAL NUMBER OF WELDS: 2
% OF WELDS DEVIANT: 50.00 (1)
TOTAL CHARACTERISTICS: 20
% CHARACTERISTIC DEVIANT: 10.00 (2)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	2	0.00	0.00
2. Weld Size	0	0	0.00	0.00
3. Incomplete Fusion	0	2	0.00	0.00
4. Overlap	0	2	0.00	0.00
5. Underfilled Craters	0	2	0.00	0.00
6. Weld Profiles	1	2	50.00	50.00
7. Undercut	0	2	0.00	0.00
8. Porosity	0	2	0.00	0.00
9. Weld Length and Location	0	2	0.00	0.00
10. Arc Strikes	0	2	0.00	0.00
11. Surface Slag and Weld Spatter	1	2	50.00	50.00

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 1
No. of welds with deviant weld type: 0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	2	2	50.00(1)	50.00(1)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/10 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 013
GROUP TITLE: ERCW 8" LINES @ UNIT 1 ANULUS ENTRY
NO. OF INSPECTION TO BE PERFORMED: 26
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (26)
% OF COMPONENTS DEVIANT: 46.15 (12)
TOTAL NUMBER OF WELDS: 26
% OF WELDS DEVIANT: 46.15 (12)
TOTAL CHARACTERISTICS: 390
% CHARACTERISTIC DEVIANT: 4.62 (18)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	26	0.00	0.00
2. Overlap	0	26	0.00	0.00
3. Undercut.....	0	26	0.00	0.00
4. Lack of Fusion.....	0	26	0.00	0.00
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	26	0.00	0.00
7. Visible Porosity.....	0	26	0.00	0.00
8. Weld Spatter	6	26	23.08	33.33
9. Arc Strikes	10	26	38.46	55.56
10. Coarse Ripples.	0	26	0.00	0.00
11. Grooves.....	0	26	0.00	0.00
12. Abrupt Ridges.	0	26	0.00	0.00
13. Valleys.....	0	26	0.00	0.00
14. Min Sect Thickness.	2	26	7.69	11.11
15. Taper.....	0	26	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	26	0.00	0.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	26	26	7.69(2)	7.69(2)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	25	25	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/11 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 014
GROUP TITLE: LOOP 3 AND 4 T-BAR SHIMS @ 718 ft.
NO. OF INSPECTION TO BE PERFORMED: 4
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (4)
% OF COMPONENTS DEVIANT: 50.00 (2)
TOTAL NUMBER OF WELDS: 35
% OF WELDS DEVIANT: 14.29 (5)
TOTAL CHARACTERISTICS: 385
% CHARACTERISTIC DEVIANT: 2.08 (8)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	35	0.00	0.00
2. Weld Size	3	35	8.57	37.50
3. Incomplete Fusion	2	35	5.71	25.00
4. Overlap	1	35	2.86	12.50
5. Underfilled Craters	0	35	0.00	0.00
6. Weld Profiles	0	35	0.00	0.00
7. Undercut	1	35	2.86	12.50
8. Porosity	0	35	0.00	0.00
9. Weld Length and Location	0	35	0.00	0.00
10. Arc Strikes	0	35	0.00	0.00
11. Surface Slag and Weld Spatter	1	35	2.86	12.50

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 0
No. of welds with deviant weld type: 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/12 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 015
GROUP TITLE: EC-SP-15, BLACK&VEACH WELD DELETION
NO. OF INSPECTION TO BE PERFORMED: 13
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (13)
% OF COMPONENTS DEVIANT: 30.77 (4)
TOTAL NUMBER OF WELDS: 188
% OF WELDS DEVIANT: 6.38 (12)
TOTAL CHARACTERISTICS: 2052
% CHARACTERISTIC DEVIANT: 0.49 (10)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	188	0.00	0.00
2. Weld Size	7	180	3.89	70.00
3. Incomplete Fusion	0	188	0.00	0.00
4. Overlap	0	188	0.00	0.00
5. Underfilled Craters	0	184	0.00	0.00
6. Weld Profiles	0	184	0.00	0.00
7. Undercut	0	188	0.00	0.00
8. Porosity	0	188	0.00	0.00
9. Weld Length and Location	3	188	1.60	30.00
10. Arc Strikes	0	188	0.00	0.00
11. Surface Slag and Weld Spatter	0	188	0.00	0.00

No. of missing welds..... 0
No. welds missing due to configuration.. 0
No. of inaccessible welds..... 0
No. of welds with deviant weld type..... 4

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/13 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 018
GROUP TITLE: EC-SP-18, RT NOT PREFORMED AFTER A REPAIR
NO. OF INSPECTION TO BE PERFORMED: 1
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (1)
% OF COMPONENTS DEVIANT: 0.00 (0)
TOTAL NUMBER OF WELDS: 1
% OF WELDS DEVIANT: 0.00 (0)
TOTAL CHARACTERISTICS: 15
% CHARACTERISTIC DEVIANT: 0.00 (0)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	1	0.00	0.00
2. Overlap	0	1	0.00	0.00
3. Undercut.....	0	1	0.00	0.00
4. Lack of Fusion.....	0	1	0.00	0.00
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	1	0.00	0.00
7. Visible Porosity.....	0	1	0.00	0.00
8. Weld Spatter	0	1	0.00	0.00
9. Arc Strikes	0	1	0.00	0.00
10. Coarse Ripples.	0	1	0.00	0.00
11. Grooves.....	0	1	0.00	0.00
12. Abrupt Ridges.	0	1	0.00	0.00
13. Valleys.....	0	1	0.00	0.00
14. Min Sect Thickness.	0	1	0.00	0.00
15. Taper.....	0	1	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	1	0.00	0.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	1	1	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/14 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 020
GROUP TITLE: WELD 1-003B-T080-06 FINAL NDE
NO. OF INSPECTION TO BE PERFORMED: 1
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (1)
% OF COMPONENTS DEVIANT: 100.00 (1)
TOTAL NUMBER OF WELDS: 1
% OF WELDS DEVIANT: 100.00 (1)
TOTAL CHARACTERISTICS: 9
% CHARACTERISTIC DEVIANT: 11.11 (1)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	1	0.00	0.00
2. Overlap	0	0	0.00	0.00
3. Undercut.....	0	1	0.00	0.00
4. Lack of Fusion.....	0	1	0.00	0.00
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	1	0.00	0.00
7. Visible Porosity.....	0	1	0.00	0.00
8. Weld Spatter	0	1	0.00	0.00
9. Arc Strikes	1	1	100.00	100.00
10. Coarse Ripples.	0	0	0.00	0.00
11. Grooves.....	0	0	0.00	0.00
12. Abrupt Ridges.	0	0	0.00	0.00
13. Valleys.....	0	0	0.00	0.00
14. Min Sect Thickness.	0	1	0.00	0.00
15. Taper.....	0	0	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	1	0.00	0.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/15 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 021
GROUP TITLE: EC-SP-21, STRUCTURAL STEEL PARTITION WALL INSP.
NO. OF INSPECTION TO BE PERFORMED: 1
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (1)
% OF COMPONENTS DEVIANT: 100.00 (1)
TOTAL NUMBER OF WELDS: 279
% OF WELDS DEVIANT: 42.29 (118)
TOTAL CHARACTERISTICS: 2468
% CHARACTERISTIC DEVIANT: 6.77 (167)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	228	0.00	0.00
2. Weld Size	41	187	21.93	24.55
3. Incomplete Fusion	33	228	14.47	19.76
4. Overlap	9	228	3.95	5.39
5. Underfilled Craters	0	228	0.00	0.00
6. Weld Profiles	9	228	3.95	5.39
7. Undercut	9	228	3.95	5.39
8. Porosity	1	228	0.44	0.60
9. Weld Length and Location	5	229	2.18	2.99
10. Arc Strikes	0	228	0.00	0.00
11. Surface Slag and Weld Spatter	60	228	26.32	35.93

No. of missing welds..... 0
No. welds missing due to configuration.. 11
No. of inaccessible welds..... 41
No. of welds with deviant weld type..... 1

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/16 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 022
GROUP TITLE: EC-SP-22, HVAC FRAMES WITH 4" BY 5" CUTOUTS
NO. OF INSPECTION TO BE PERFORMED: 1
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (1)
% OF COMPONENTS DEVIANT: 100.00 (1)
TOTAL NUMBER OF WELDS: 60
% OF WELDS DEVIANT: 96.67 (58)
TOTAL CHARACTERISTICS: 312
% CHARACTERISTIC DEVIANT: 36.54 (114)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	24	0.00	0.00
2. Weld Size	0	0	0.00	0.00
3. Incomplete Fusion	0	24	0.00	0.00
4. Overlap	0	24	0.00	0.00
5. Underfilled Craters	0	24	0.00	0.00
6. Weld Profiles	58	60	96.67	50.88
7. Undercut	0	24	0.00	0.00
8. Porosity	0	24	0.00	0.00
9. Weld Length and Location	1	24	4.17	0.88
10. Arc Strikes	0	24	0.00	0.00
11. Surface Slag and Weld Spatter	55	60	91.67	48.25

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 60
No. of welds with deviant weld type: 0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	1	3	100.00(1)	100.00(3)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/17 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 026
GROUP TITLE: EC-SP-26, HVAC SUPPORTS NOT INSPECTED
NO. OF INSPECTION TO BE PERFORMED: 2
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (2)
% OF COMPONENTS DEVIANT: 0.00 (0)
TOTAL NUMBER OF WELDS: 72
% OF WELDS DEVIANT: 0.00 (0)
TOTAL CHARACTERISTICS: 3
% CHARACTERISTIC DEVIANT: 0.00 (0)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	72	0.00	0.00
2. Weld Size	0	9	0.00	0.00
3. Incomplete Fusion	0	72	0.00	0.00
4. Overlap	0	72	0.00	0.00
5. Underfilled Craters	0	72	0.00	0.00
6. Weld Profiles	0	72	0.00	0.00
7. Undercut	0	72	0.00	0.00
8. Porosity	0	72	0.00	0.00
9. Weld Length and Location	0	72	0.00	0.00
10. Arc Strikes	0	72	0.00	0.00
11. Surface Slag and Weld Spatter	0	72	0.00	0.00

No. of missing welds	0
No. welds missing due to configuration	0
No. of inaccessible welds	0
No. of welds with deviant weld type	0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/18 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 029
GROUP TITLE: EC-SP-29, UNDERSIZED SOCKET WELDS ON ASME PIPE
NO. OF INSPECTION TO BE PERFORMED: 8
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (8)
% OF COMPONENTS DEVIANT: 25.00 (2)
TOTAL NUMBER OF WELDS: 8
% OF WELDS DEVIANT: 25.00 (2)
TOTAL CHARACTERISTICS: 8
% CHARACTERISTIC DEVIANT: 25.00 (2)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	0	0.00	0.00
2. Overlap	0	0	0.00	0.00
3. Undercut.....	0	0	0.00	0.00
4. Lack of Fusion.....	0	0	0.00	0.00
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	0	0.00	0.00
7. Visible Porosity.....	0	0	0.00	0.00
8. Weld Spatter	0	0	0.00	0.00
9. Arc Strikes	0	0	0.00	0.00
10. Coarse Ripples.	0	0	0.00	0.00
11. Grooves.....	0	0	0.00	0.00
12. Abrupt Ridges.	0	0	0.00	0.00
13. Valleys.....	0	0	0.00	0.00
14. Min Sect Thickness.	0	0	0.00	0.00
15. Taper.....	0	0	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	0	0.00	0.00
18. Fillet/Socket Weld Size.....	2	8	25.00	100.00

No. of inaccessible welds 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/19 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 032
GROUP TITLE: EC-SP-32, DEFECTIVE WELD ON HGR 70-ICC-R487
NO. OF INSPECTION TO BE PERFORMED: 1
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (1)
% OF COMPONENTS DEVIANT: 100.00 (1)
TOTAL NUMBER OF WELDS: 8
% OF WELDS DEVIANT: 25.00 (2)
TOTAL CHARACTERISTICS: 88
% CHARACTERISTIC DEVIANT: 2.27 (2)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	8	0.00	0.00
2. Weld Size	2	8	25.00	100.00
3. Incomplete Fusion	0	8	0.00	0.00
4. Overlap	0	8	0.00	0.00
5. Underfilled Craters	0	8	0.00	0.00
6. Weld Profiles	0	8	0.00	0.00
7. Undercut	0	8	0.00	0.00
8. Porosity	0	8	0.00	0.00
9. Weld Length and Location	0	8	0.00	0.00
10. Arc Strikes	0	8	0.00	0.00
11. Surface Slag and Weld Spatter	0	8	0.00	0.00

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 0
No. of welds with deviant weld type: 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/20 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 033
GROUP TITLE: So Valve Rm Hanger at Beam W33X200
NO. OF INSPECTION TO BE PERFORMED: 1
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (1)
% OF COMPONENTS DEVIANT: 0.00 (0)
TOTAL NUMBER OF WELDS: 7
% OF WELDS DEVIANT: 0.00 (0)
TOTAL CHARACTERISTICS: 77
% CHARACTERISTIC DEVIANT: 0.00 (0)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	7	0.00	0.00
2. Weld Size	0	7	0.00	0.00
3. Incomplete Fusion	0	7	0.00	0.00
4. Overlap	0	7	0.00	0.00
5. Underfilled Craters	0	7	0.00	0.00
6. Weld Profiles	0	7	0.00	0.00
7. Undercut	0	7	0.00	0.00
8. Porosity	0	7	0.00	0.00
9. Weld Length and Location	0	7	0.00	0.00
10. Arc Strikes	0	7	0.00	0.00
11. Surface Slag and Weld Spatter	0	7	0.00	0.00

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 0
No. of welds with deviant weld type: 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/21 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 034
GROUP TITLE: EC-SP-34, CRACK IN VALVE BODY/WELD ZONE
NO. OF INSPECTION TO BE PERFORMED: 2
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (2)
% OF COMPONENTS DEVIANT: 0.00 (0)
TOTAL NUMBER OF WELDS: 2
% OF WELDS DEVIANT: 0.00 (0)
TOTAL CHARACTERISTICS: 30
% CHARACTERISTIC DEVIANT: 0.00 (0)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications)	0	2	0.00	0.00
2. Overlap	0	2	0.00	0.00
3. Undercut	0	2	0.00	0.00
4. Lack of Fusion	0	2	0.00	0.00
5. Incomplete Penetration	0	0	0.00	0.00
6. Slag	0	2	0.00	0.00
7. Visible Porosity	0	2	0.00	0.00
8. Weld Spatter	0	2	0.00	0.00
9. Arc Strikes	0	2	0.00	0.00
10. Coarse Ripples.	0	2	0.00	0.00
11. Grooves	0	2	0.00	0.00
12. Abrupt Ridges.	0	2	0.00	0.00
13. Valleys	0	2	0.00	0.00
14. Min Sect Thickness.	0	2	0.00	0.00
15. Taper	0	2	0.00	0.00
16. Maximum Offset	0	0	0.00	0.00
17. Reinforcement	0	2	0.00	0.00
18. Fillet/Socket Weld Size	0	0	0.00	0.00

No. of inaccessible welds 0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	2	2	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	2	2	100.00(2)	100.00(2)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/22 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 202
GROUP TITLE: AUX BLD ELECTRICAL SUPPORTS AT 713ft.(1980 - 1981)
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 32.81 (21)
TOTAL NUMBER OF WELDS: 363
% OF WELDS DEVIANT: 16.53 (60)
TOTAL CHARACTERISTICS: 3796
% CHARACTERISTIC DEVIANT: 2.66 (101)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	363	0.00	0.00
2. Weld Size	11	166	6.63	10.89
3. Incomplete Fusion	12	363	3.31	11.88
4. Overlap	2	363	0.55	1.98
5. Underfilled Craters	0	363	0.00	0.00
6. Weld Profiles	27	363	7.44	26.73
7. Undercut	7	363	1.93	6.93
8. Porosity	0	363	0.00	0.00
9. Weld Length and Location	9	363	2.48	8.91
10. Arc Strikes	0	363	0.00	0.00
11. Surface Slag and Weld Spatter	33	363	9.09	32.67

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 0
No. of welds with deviant weld type: 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/23 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 208
GROUP TITLE: SYSTEM 62,63,68 DRAIN HEADERS THREAD-O-LETS
NO. OF INSPECTION TO BE PERFORMED: 56
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (56)
% OF COMPONENTS DEVIANT: 39.29 (22)
TOTAL NUMBER OF WELDS: 56
% OF WELDS DEVIANT: 39.29 (22)
TOTAL CHARACTERISTICS: 452
% CHARACTERISTIC DEVIANT: 6.42 (29)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	56	0.00	0.00
2. Overlap	0	0	0.00	0.00
3. Undercut.....	0	56	0.00	0.00
4. Lack of Fusion.....	1	56	1.79	3.45
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	56	0.00	0.00
7. Visible Porosity.....	4	56	7.14	13.79
8. Weld Spatter	5	56	8.93	17.24
9. Arc Strikes	18	56	32.14	62.07
10. Coarse Ripples.	0	0	0.00	0.00
11. Grooves.....	0	0	0.00	0.00
12. Abrupt Ridges.	0	0	0.00	0.00
13. Valleys.....	0	0	0.00	0.00
14. Min Sect Thickness.	1	56	1.79	3.45
15. Taper.....	0	1	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	1	0.00	0.00
18. Fillet/Socket Weld Size.....	0	2	0.00	0.00

No. of inaccessible welds 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/24 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 210
GROUP TITLE: WELDER QUALIFICATION BACK-DATE QUESTION
NO. OF INSPECTION TO BE PERFORMED: 60
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (60)
% OF COMPONENTS DEVIANT: 16.67 (10)
TOTAL NUMBER OF WELDS: 60
% OF WELDS DEVIANT: 16.67 (10)
TOTAL CHARACTERISTICS: 675
% CHARACTERISTIC DEVIANT: 1.93 (13)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	60	0.00	0.00
2. Overlap	0	23	0.00	0.00
3. Undercut.....	1	60	1.67	7.69
4. Lack of Fusion.....	0	60	0.00	0.00
5. Incomplete Penetration.....	0	2	0.00	0.00
6. Slag	0	60	0.00	0.00
7. Visible Porosity.....	1	60	1.67	7.69
8. Weld Spatter	1	60	1.67	7.69
9. Arc Strikes	8	60	13.33	61.54
10. Coarse Ripples.	0	23	0.00	0.00
11. Grooves.....	0	23	0.00	0.00
12. Abrupt Ridges.	0	23	0.00	0.00
13. Valleys.....	0	23	0.00	0.00
14. Min Sect Thickness.	1	60	1.67	7.69
15. Taper.....	0	15	0.00	0.00
16. Maximum Offset.....	0	1	0.00	0.00
17. Reinforcement.....	0	21	0.00	0.00
18. Fillet/Socket Weld Size.....	1	41	2.44	7.69

No. of inaccessible welds 1

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	15	15	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	8	8	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/25 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 212
GROUP TITLE: OPEN BUTT WELDING @ CONTAINMENT PENETRATIONS
NO. OF INSPECTION TO BE PERFORMED: 52
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (52)
% OF COMPONENTS DEVIANT: 28.85 (15)
TOTAL NUMBER OF WELDS: 52
% OF WELDS DEVIANT: 28.85 (15)
TOTAL CHARACTERISTICS: 52
% CHARACTERISTIC DEVIANT: 28.85 (15)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	0	0.00	0.00
2. Overlap	0	0	0.00	0.00
3. Undercut.....	0	0	0.00	0.00
4. Lack of Fusion.....	0	0	0.00	0.00
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	0	0.00	0.00
7. Visible Porosity.....	0	0	0.00	0.00
8. Weld Spatter	0	0	0.00	0.00
9. Arc Strikes	0	0	0.00	0.00
10. Coarse Ripples.	0	0	0.00	0.00
11. Grooves.....	0	0	0.00	0.00
12. Abrupt Ridges.	0	0	0.00	0.00
13. Valleys.....	0	0	0.00	0.00
14. Min Sect Thickness.	15	52	28.85	100.00
15. Taper.....	0	0	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	0	0.00	0.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 9

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/26 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 214
GROUP TITLE: WINTER 1983 FABRICATED N/S VALVE ROOM STEEL
NO. OF INSPECTION TO BE PERFORMED: 61
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (61)
% OF COMPONENTS DEVIANT: 26.23 (16)
TOTAL NUMBER OF WELDS: 177
% OF WELDS DEVIANT: 17.51 (31)
TOTAL CHARACTERISTICS: 1886
% CHARACTERISTIC DEVIANT: 2.12 (40)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	176	0.00	0.00
2. Weld Size	11	130	8.46	27.50
3. Incomplete Fusion	7	176	3.98	17.50
4. Overlap	5	176	2.84	12.50
5. Underfilled Craters	0	174	0.00	0.00
6. Weld Profiles	16	174	9.20	40.00
7. Undercut	0	176	0.00	0.00
8. Porosity	0	176	0.00	0.00
9. Weld Length and Location	0	176	0.00	0.00
10. Arc Strikes	0	176	0.00	0.00
11. Surface Slag and Weld Spatter	1	176	0.57	2.50

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 4
No. of welds with deviant weld type: 3

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	41	81	31.71(13)	22.22(18)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/27 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 219
GROUP TITLE: CONTROL BUILDING DUCTWORK SUPPORT WELDS
NO. OF INSPECTION TO BE PERFORMED: 61
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (61)
% OF COMPONENTS DEVIANT: 32.79 (20)
TOTAL NUMBER OF WELDS: 837
% OF WELDS DEVIANT: 7.41 (62)
TOTAL CHARACTERISTICS: 8989
% CHARACTERISTIC DEVIANT: 0.66 (59)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	822	0.00	0.00
2. Weld Size	36	789	4.56	61.02
3. Incomplete Fusion	2	822	0.24	3.39
4. Overlap	2	822	0.24	3.39
5. Underfilled Craters	1	812	0.12	1.69
6. Weld Profiles	0	812	0.00	0.00
7. Undercut	4	822	0.49	6.78
8. Porosity	0	822	0.00	0.00
9. Weld Length and Location	6	822	0.73	10.17
10. Arc Strikes	0	822	0.00	0.00
11. Surface Slag and Weld Spatter	8	822	0.97	13.56

No. of missing welds..... 3
No. welds missing due to configuration.. 4
No. of inaccessible welds..... 20
No. of welds with deviant weld type..... 10

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/28 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 220
GROUP TITLE: ASME SMALL BORE PURGE VERIFICATION
NO. OF INSPECTION TO BE PERFORMED: 5
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (5)
% OF COMPONENTS DEVIANT: 40.00 (2)
TOTAL NUMBER OF WELDS: 5
% OF WELDS DEVIANT: 40.00 (2)
TOTAL CHARACTERISTICS: 39
% CHARACTERISTIC DEVIANT: 5.13 (2)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	5	0.00	0.00
2. Overlap	0	0	0.00	0.00
3. Undercut.....	0	5	0.00	0.00
4. Lack of Fusion.....	0	2	0.00	0.00
5. Incomplete Penetration.....	2	3	66.67	100.00
6. Slag	0	5	0.00	0.00
7. Visible Porosity.....	0	5	0.00	0.00
8. Weld Spatter	0	5	0.00	0.00
9. Arc Strikes	0	5	0.00	0.00
10. Coarse Ripples.	0	0	0.00	0.00
11. Grooves.....	0	0	0.00	0.00
12. Abrupt Ridges.	0	0	0.00	0.00
13. Valleys.....	0	0	0.00	0.00
14. Min Sect Thickness.	0	2	0.00	0.00
15. Taper.....	0	0	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	2	0.00	0.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/29 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 222
GROUP TITLE: PRE JAN 1981 PLATFORMS,STAIRS,LADDERS AS-BUILTS
NO. OF INSPECTION TO BE PERFORMED: 50
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (50)
% OF COMPONENTS DEVIANT: 72.00 (36)
TOTAL NUMBER OF WELDS: 1741
% OF WELDS DEVIANT: 27.34 (476)
TOTAL CHARACTERISTICS: 18124
% CHARACTERISTIC DEVIANT: 3.18 (576)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	4	1707	0.23	0.69
2. Weld Size	224	1078	20.78	38.89
3. Incomplete Fusion	20	1707	1.17	3.47
4. Overlap	13	1707	0.76	2.26
5. Underfilled Craters	4	1695	0.24	0.69
6. Weld Profiles	177	1695	10.44	30.73
7. Undercut	7	1707	0.41	1.22
8. Porosity	0	1707	0.00	0.00
9. Weld Length and Location	57	1707	3.34	9.90
10. Arc Strikes	0	1707	0.00	0.00
11. Surface Slag and Weld Spatter	70	1707	4.10	12.15

No. of missing welds: 17
No. welds missing due to configuration: 9
No. of inaccessible welds: 19
No. of welds with deviant weld type: 15

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/30 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 224
GROUP TITLE: PRESSURE BOUNDARY WELDING VISUAL FINAL ACCEPTANCE
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 50.00 (32)
TOTAL NUMBER OF WELDS: 64
% OF WELDS DEVIANT: 50.00 (32)
TOTAL CHARACTERISTICS: 803
% CHARACTERISTIC DEVIANT: 8.84 (71)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	64	0.00	0.00
2. Overlap	1	45	2.22	1.41
3. Undercut.....	5	64	7.81	7.04
4. Lack of Fusion.....	2	64	3.12	2.82
5. Incomplete Penetration.....	7	29	24.14	9.86
6. Slag	3	63	4.76	4.23
7. Visible Porosity.....	12	64	18.75	16.90
8. Weld Spatter	7	64	10.94	9.86
9. Arc Strikes	21	64	32.81	29.58
10. Coarse Ripples.	0	39	0.00	0.00
11. Grooves.....	0	39	0.00	0.00
12. Abrupt Ridges.	0	39	0.00	0.00
13. Valleys.....	0	39	0.00	0.00
14. Min Sect Thickness.	8	63	12.70	11.27
15. Taper.....	0	0	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	5	62	8.06	7.04
18. Fillet/Socket Weld Size.....	0	1	0.00	0.00

No. of inaccessible welds 33

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	31	31	19.35(6)	19.35(6)
MAG. PARTICLE	7	7	42.86(3)	42.86(3)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/31 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 225
GROUP TITLE: CONDUIT SUPPORTS @ CONTROL BLD. EL. 708 ft.
NO. OF INSPECTION TO BE PERFORMED: 62
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (62)
% OF COMPONENTS DEVIANT: 43.55 (27)
TOTAL NUMBER OF WELDS: 207
% OF WELDS DEVIANT: 19.81 (41)
TOTAL CHARACTERISTICS: 2125
% CHARACTERISTIC DEVIANT: 2.92 (62)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	1	205	0.49	1.61
2. Weld Size	0	75	0.00	0.00
3. Incomplete Fusion	9	205	4.39	14.52
4. Overlap	3	205	1.46	4.84
5. Underfilled Craters	0	205	0.00	0.00
6. Weld Profiles	10	205	4.88	16.13
7. Undercut	8	205	3.90	12.90
8. Porosity	0	205	0.00	0.00
9. Weld Length and Location	20	205	9.76	32.26
10. Arc Strikes	0	205	0.00	0.00
11. Surface Slag and Weld Spatter	11	205	5.37	17.74

No. of missing welds: 1
No. welds missing due to configuration: 0
No. of inaccessible welds: 1
No. of welds with deviant weld type: 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/32 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 227
GROUP TITLE: SURGE LINE TRUSS STIFFENERS FIT-UP
NO. OF INSPECTION TO BE PERFORMED: 35
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (35)
% OF COMPONENTS DEVIANT: 37.14 (13)
TOTAL NUMBER OF WELDS: 159
% OF WELDS DEVIANT: 12.58 (20)
TOTAL CHARACTERISTICS: 1663
% CHARACTERISTIC DEVIANT: 1.02 (17)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	154	0.00	0.00
2. Weld Size	7	129	5.43	41.18
3. Incomplete Fusion	2	154	1.30	11.76
4. Overlap	1	154	0.65	5.88
5. Underfilled Craters	0	152	0.00	0.00
6. Weld Profiles	0	151	0.00	0.00
7. Undercut	5	154	3.25	29.41
8. Porosity	0	154	0.00	0.00
9. Weld Length and Location	1	153	0.65	5.88
10. Arc Strikes	0	154	0.00	0.00
11. Surface Slag and Weld Spatter	1	154	0.65	5.88

No. of missing welds: 4
No. welds missing due to configuration: 0
No. of inaccessible welds: 1
No. of welds with deviant weld type: 2

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/33 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 228
GROUP TITLE: ALL WELDING ON 6" FIRE PROTECTION CHECK VALVES
NO. OF INSPECTION TO BE PERFORMED: 10
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (10)
% OF COMPONENTS DEVIANT: 100.00 (10)
TOTAL NUMBER OF WELDS: 10
% OF WELDS DEVIANT: 100.00 (10)
TOTAL CHARACTERISTICS: 100
% CHARACTERISTIC DEVIANT: 19.00 (19)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	10	0.00	0.00
2. Overlap	0	0	0.00	0.00
3. Undercut.....	0	10	0.00	0.00
4. Lack of Fusion.....	1	10	10.00	5.26
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	1	10	10.00	5.26
7. Visible Porosity.....	7	10	70.00	36.84
8. Weld Spatter	2	10	20.00	10.53
9. Arc Strikes	7	10	70.00	36.84
10. Coarse Ripples.	0	0	0.00	0.00
11. Grooves.....	0	0	0.00	0.00
12. Abrupt Ridges.	0	0	0.00	0.00
13. Valleys.....	0	0	0.00	0.00
14. Min Sect Thickness.	1	10	10.00	5.26
15. Taper.....	0	10	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	10	0.00	0.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/34 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 229
GROUP TITLE: SLAG INCLUSIONS ON STEAM GEN. PDOs
NO. OF INSPECTION TO BE PERFORMED: 18
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (18)
% OF COMPONENTS DEVIANT: 44.44 (8)
TOTAL NUMBER OF WELDS: 70
% OF WELDS DEVIANT: 18.57 (13)
TOTAL CHARACTERISTICS: 700
% CHARACTERISTIC DEVIANT: 3.14 (22)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	2	70	2.86	9.09
2. Weld Size	0	0	0.00	0.00
3. Incomplete Fusion	5	70	7.14	22.73
4. Overlap	4	70	5.71	18.18
5. Underfilled Craters	1	70	1.43	4.55
6. Weld Profiles	6	70	8.57	27.27
7. Undercut	0	70	0.00	0.00
8. Porosity	0	70	0.00	0.00
9. Weld Length and Location	0	70	0.00	0.00
10. Arc Strikes	0	70	0.00	0.00
11. Surface Slag and Weld Spatter	4	70	5.71	18.18

No. of missing welds	0
No. welds missing due to configuration	0
No. of inaccessible welds	34
No. of welds with deviant weld type	0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	18	70	77.78(14)	37.14(26)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/35 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 230
GROUP TITLE: VISUAL ACCEPTANCE FOR PIPE SLEEVES (70-1CC R487)
NO. OF INSPECTION TO BE PERFORMED: 92
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (92)
% OF COMPONENTS DEVIANT: 20.65 (19)
TOTAL NUMBER OF WELDS: 430
% OF WELDS DEVIANT: 13.26 (57)
TOTAL CHARACTERISTICS: 3710
% CHARACTERISTIC DEVIANT: 1.56 (58)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	313	0.00	0.00
2. Weld Size	32	394	8.12	55.17
3. Incomplete Fusion	2	313	0.64	3.45
4. Overlap	1	313	0.32	1.72
5. Underfilled Craters	0	309	0.00	0.00
6. Weld Profiles	15	406	3.69	25.86
7. Undercut	1	313	0.32	1.72
8. Porosity	0	313	0.00	0.00
9. Weld Length and Location	4	410	0.98	6.90
10. Arc Strikes	0	313	0.00	0.00
11. Surface Slag and Weld Spatter	3	313	0.96	5.17

No. of missing welds: 16
No. welds missing due to configuration: 0
No. of inaccessible welds: 5
No. of welds with deviant weld type: 4

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/36 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 250
GROUP TITLE: CABLE TRAY CLIPS
NO. OF INSPECTION TO BE PERFORMED: 78
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (78)
% OF COMPONENTS DEVIANT: 37.18 (29)
TOTAL NUMBER OF WELDS: 154
% OF WELDS DEVIANT: 27.27 (42)
TOTAL CHARACTERISTICS: 307
% CHARACTERISTIC DEVIANT: 13.68 (42)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	0	0.00	0.00
2. Weld Size	0	0	0.00	0.00
3. Incomplete Fusion	0	0	0.00	0.00
4. Overlap	0	0	0.00	0.00
5. Underfilled Craters	0	0	0.00	0.00
6. Weld Profiles	41	153	26.80	97.62
7. Undercut	0	0	0.00	0.00
8. Porosity	0	0	0.00	0.00
9. Weld Length and Location	1	154	0.65	2.38
10. Arc Strikes	0	0	0.00	0.00
11. Surface Slag and Weld Spatter	0	0	0.00	0.00

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 0
No. of welds with deviant weld type: 1

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/37 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 251
GROUP TITLE: J,202,225 EXPANSION
NO. OF INSPECTION TO BE PERFORMED: 30
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (30)
% OF COMPONENTS DEVIANT: 36.67 (11)
TOTAL NUMBER OF WELDS: 198
% OF WELDS DEVIANT: 16.16 (32)
TOTAL CHARACTERISTICS: 540
% CHARACTERISTIC DEVIANT: 8.70 (47)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	0	0.00	0.00
2. Weld Size	20	149	13.42	42.55
3. Incomplete Fusion	0	0	0.00	0.00
4. Overlap	0	0	0.00	0.00
5. Underfilled Craters	0	1	0.00	0.00
6. Weld Profiles	9	194	4.64	19.15
7. Undercut	0	0	0.00	0.00
8. Porosity	0	1	0.00	0.00
9. Weld Length and Location	18	194	9.28	38.30
10. Arc Strikes	0	0	0.00	0.00
11. Surface Slag and Weld Spatter	0	1	0.00	0.00

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 3
No. of welds with deviant weld type: 2

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/38 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 252
GROUP TITLE: NCIG Mechanical Equipment Supports
NO. OF INSPECTION TO BE PERFORMED: 54
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (54)
% OF COMPONENTS DEVIANT: 37.04 (20)
TOTAL NUMBER OF WELDS: 353
% OF WELDS DEVIANT: 43.06 (152)
TOTAL CHARACTERISTICS: 2488
% CHARACTERISTIC DEVIANT: 10.33 (257)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	345	0.00	0.00
2. Weld Size	140	314	44.59	54.47
3. Incomplete Fusion	5	345	1.45	1.95
4. Overlap	9	345	2.61	3.50
5. Underfilled Craters	18	316	5.70	7.00
6. Weld Profiles	8	316	2.53	3.11
7. Undercut	6	345	1.74	2.33
8. Porosity	1	345	0.29	0.39
9. Weld Length and Location	70	244	28.69	27.24
10. Arc Strikes	0	266	0.00	0.00
11. Surface Slag and Weld Spatter	0	237	0.00	0.00

No. of missing welds	4
No. welds missing due to configuration	4
No. of inaccessible welds	5
No. of welds with deviant weld type	0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	29	29	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/39 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 254
GROUP TITLE: Electrical Equipment Supports
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 53.13 (34)
TOTAL NUMBER OF WELDS: 385
% OF WELDS DEVIANT: 37.92 (146)
TOTAL CHARACTERISTICS: 3950
% CHARACTERISTIC DEVIANT: 4.99 (197)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	365	0.00	0.00
2. Weld Size	107	304	35.20	54.31
3. Incomplete Fusion	8	365	2.19	4.06
4. Overlap	8	365	2.19	4.06
5. Underfilled Craters	0	363	0.00	0.00
6. Weld Profiles	42	363	11.57	21.32
7. Undercut	4	365	1.10	2.03
8. Porosity	0	365	0.00	0.00
9. Weld Length and Location	21	365	5.75	10.66
10. Arc Strikes	0	365	0.00	0.00
11. Surface Slag and Weld Spatter	7	365	1.92	3.55

No. of missing welds	4
No. welds missing due to configuration	15
No. of inaccessible welds	3
No. of welds with deviant weld type	16

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/40 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 255
GROUP TITLE: Support Bracing, Strl Expansion (Group E)
NO. OF INSPECTION TO BE PERFORMED: 9
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (9)
% OF COMPONENTS DEVIANT: 100.00 (9)
TOTAL NUMBER OF WELDS: 62
% OF WELDS DEVIANT: 74.19 (46)
TOTAL CHARACTERISTICS: 579
% CHARACTERISTIC DEVIANT: 13.82 (80)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	54	0.00	0.00
2. Weld Size	19	41	46.34	23.75
3. Incomplete Fusion	9	54	16.67	11.25
4. Overlap	5	54	9.26	6.25
5. Underfilled Craters	0	53	0.00	0.00
6. Weld Profiles	13	53	24.53	16.25
7. Undercut	0	54	0.00	0.00
8. Porosity	0	54	0.00	0.00
9. Weld Length and Location	22	54	40.74	27.50
10. Arc Strikes	0	54	0.00	0.00
11. Surface Slag and Weld Spatter	12	54	22.22	15.00

No. of missing welds: 2
No. welds missing due to configuration: 6
No. of inaccessible welds: 0
No. of welds with deviant weld type: 1

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/#1 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 256
GROUP TITLE: Main Frame Structural Expansion (Group E)
NO. OF INSPECTION TO BE PERFORMED: 13
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (13)
% OF COMPONENTS DEVIANT: 76.92 (10)
TOTAL NUMBER OF WELDS: 48
% OF WELDS DEVIANT: 56.25 (27)
TOTAL CHARACTERISTICS: 484
% CHARACTERISTIC DEVIANT: 8.06 (39)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	46	0.00	0.00
2. Weld Size	11	30	36.67	28.21
3. Incomplete Fusion	2	46	4.35	5.13
4. Overlap	2	46	4.35	5.13
5. Underfilled Craters	2	43	4.65	5.13
6. Weld Profiles	2	43	4.65	5.13
7. Undercut	1	46	2.17	2.56
8. Porosity	0	46	0.00	0.00
9. Weld Length and Location	6	46	13.04	15.38
10. Arc Strikes	0	46	0.00	0.00
11. Surface Slag and Weld Spatter	13	46	28.26	33.33

No. of missing welds: 1
No. welds missing due to configuration: 1
No. of inaccessible welds: 0
No. of welds with deviant weld type: 7

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/42 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 257
GROUP TITLE: Stainless Fuel Pool Liner
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 35.94 (23)
TOTAL NUMBER OF WELDS: 64
% OF WELDS DEVIANT: 35.94 (23)
TOTAL CHARACTERISTICS: 906
% CHARACTERISTIC DEVIANT: 3.09 (28)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	64	0.00	0.00
2. Overlap	0	64	0.00	0.00
3. Undercut.....	0	64	0.00	0.00
4. Lack of Fusion.....	1	64	1.56	3.57
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	63	0.00	0.00
7. Visible Porosity.....	8	64	12.50	28.57
8. Weld Spatter	0	64	0.00	0.00
9. Arc Strikes	17	64	26.56	60.71
10. Coarse Ripples.	0	64	0.00	0.00
11. Grooves.....	0	64	0.00	0.00
12. Abrupt Ridges.	0	64	0.00	0.00
13. Valleys.....	0	64	0.00	0.00
14. Min Sect Thickness.	0	64	0.00	0.00
15. Taper.....	0	10	0.00	0.00
16. Maximum Offset.....	0	1	0.00	0.00
17. Reinforcement.....	2	64	3.12	7.14
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	64	64	1.56(1)	1.56(1)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/43 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 260
GROUP TITLE: Group D Expansion
NO. OF INSPECTION TO BE PERFORMED: 30
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (30)
% OF COMPONENTS DEVIANT: 50.00 (15)
TOTAL NUMBER OF WELDS: 1066
% OF WELDS DEVIANT: 13.04 (139)
TOTAL CHARACTERISTICS: 2843
% CHARACTERISTIC DEVIANT: 5.59 (159)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	0	0.00	0.00
2. Weld Size	97	772	12.56	61.01
3. Incomplete Fusion	0	0	0.00	0.00
4. Overlap	0	0	0.00	0.00
5. Underfilled Craters	0	0	0.00	0.00
6. Weld Profiles	45	1031	4.36	28.30
7. Undercut	0	0	0.00	0.00
8. Porosity	0	0	0.00	0.00
9. Weld Length and Location	17	1040	1.63	10.69
10. Arc Strikes	0	0	0.00	0.00
11. Surface Slag and Weld Spatter	0	0	0.00	0.00

No. of missing welds: 7
No. welds missing due to configuration: 2
No. of inaccessible welds: 12
No. of welds with deviant weld type: 15

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/44 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 261
GROUP TITLE: Group 227 Expansion
NO. OF INSPECTION TO BE PERFORMED: 10
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (10)
% OF COMPONENTS DEVIANT: 40.00 (4)
TOTAL NUMBER OF WELDS: 57
% OF WELDS DEVIANT: 8.77 (5)
TOTAL CHARACTERISTICS: 151
% CHARACTERISTIC DEVIANT: 4.64 (7)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	0	0.00	0.00
2. Weld Size	3	42	7.14	42.86
3. Incomplete Fusion	0	0	0.00	0.00
4. Overlap	0	0	0.00	0.00
5. Underfilled Craters	0	0	0.00	0.00
6. Weld Profiles	4	54	7.41	57.14
7. Undercut	0	0	0.00	0.00
8. Porosity	0	0	0.00	0.00
9. Weld Length and Location	0	55	0.00	0.00
10. Arc Strikes	0	0	0.00	0.00
11. Surface Slag and Weld Spatter	0	0	0.00	0.00

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 4
No. of welds with deviant weld type: 1

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/45 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 262
GROUP TITLE: Class I & II Small Bore ASME
NO. OF INSPECTION TO BE PERFORMED: 86
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (86)
% OF COMPONENTS DEVIANT: 2.33 (2)
TOTAL NUMBER OF WELDS: 86
% OF WELDS DEVIANT: 2.33 (2)
TOTAL CHARACTERISTICS: 516
% CHARACTERISTIC DEVIANT: 0.39 (2)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	1	86	1.16	50.00
2. Overlap	0	86	0.00	0.00
3. Undercut.....	0	0	0.00	0.00
4. Lack of Fusion.....	0	0	0.00	0.00
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	0	0.00	0.00
7. Visible Porosity.....	0	0	0.00	0.00
8. Weld Spatter	0	0	0.00	0.00
9. Arc Strikes	0	0	0.00	0.00
10. Coarse Ripples.	0	86	0.00	0.00
11. Grooves.....	0	86	0.00	0.00
12. Abrupt Ridges.	1	86	1.16	50.00
13. Valleys.....	0	86	0.00	0.00
14. Min Sect Thickness.	0	0	0.00	0.00
15. Taper.....	0	0	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	0	0.00	0.00
18. Fillet/Socket Weld Size.....	0	0	0.00	0.00

No. of inaccessible welds 0

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	86	86	3.49(3)	3.49(3)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/46 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 263
GROUP TITLE: Group E Expansion
NO. OF INSPECTION TO BE PERFORMED: 31
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (31)
% OF COMPONENTS DEVIANT: 61.29 (19)
TOTAL NUMBER OF WELDS: 1100
% OF WELDS DEVIANT: 18.82 (207)
TOTAL CHARACTERISTICS: 11169
% CHARACTERISTIC DEVIANT: 3.04 (339)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	1021	0.00	0.00
2. Weld Size	93	961	9.68	27.43
3. Incomplete Fusion	23	1021	2.25	6.78
4. Overlap	19	1021	1.86	5.60
5. Underfilled Craters	2	1018	0.20	0.59
6. Weld Profiles	71	1022	6.95	20.94
7. Undercut	10	1021	0.98	2.95
8. Porosity	0	1021	0.00	0.00
9. Weld Length and Location	53	1021	5.19	15.63
10. Arc Strikes	0	1021	0.00	0.00
11. Surface Slag and Weld Spatter	68	1021	6.66	20.06

No. of missing welds..... 14
No. welds missing due to configuration.. 26
No. of inaccessible welds..... 104
No. of welds with deviant weld type..... 7

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	1	155	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/47 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 264
GROUP TITLE: ASME Class MC welds
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 54.69 (35)
TOTAL NUMBER OF WELDS: 68
% OF WELDS DEVIANT: 54.41 (37)
TOTAL CHARACTERISTICS: 960
% CHARACTERISTIC DEVIANT: 10.21 (98)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	1	68	1.47	1.02
2. Overlap	2	68	2.94	2.04
3. Undercut.....	1	68	1.47	1.02
4. Lack of Fusion.....	6	68	8.82	6.12
5. Incomplete Penetration.....	1	2	50.00	1.02
6. Slag	1	68	1.47	1.02
7. Visible Porosity.....	15	68	22.06	15.31
8. Weld Spatter	14	68	20.59	14.29
9. Arc Strikes	26	68	38.24	26.53
10. Coarse Ripples.	0	68	0.00	0.00
11. Grooves.....	1	68	1.47	1.02
12. Abrupt Ridges.	1	68	1.47	1.02
13. Valleys.....	2	68	2.94	2.04
14. Min Sect Thickness.	0	68	0.00	0.00
15. Taper.....	0	6	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	26	67	38.81	26.53
18. Fillet/Socket Weld Size.....	1	1	100.00	1.02

No. of inaccessible welds 2

Type of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	3	3	33.33(1)	33.33(1)
MAG. PARTICLE	64	65	12.50(8)	12.31(8)
ULTRASONIC	3	3	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/48 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 265
GROUP TITLE: Group G Expansion
NO. OF INSPECTION TO BE PERFORMED: 30
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (30)
% OF COMPONENTS DEVIANT: 30.00 (9)
TOTAL NUMBER OF WELDS: 156
% OF WELDS DEVIANT: 17.95 (28)
TOTAL CHARACTERISTICS: 370
% CHARACTERISTIC DEVIANT: 8.65 (32)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	0	0.00	0.00
2. Weld Size	9	67	13.43	28.12
3. Incomplete Fusion	0	0	0.00	0.00
4. Overlap	0	0	0.00	0.00
5. Underfilled Craters	0	0	0.00	0.00
6. Weld Profiles	9	151	5.96	28.12
7. Undercut	0	0	0.00	0.00
8. Porosity	0	0	0.00	0.00
9. Weld Length and Location	14	152	9.21	43.75
10. Arc Strikes	0	0	0.00	0.00
11. Surface Slag and Weld Spatter	0	0	0.00	0.00

No. of missing welds: 0
No. welds missing due to configuration: 4
No. of inaccessible welds: 0
No. of welds with deviant weld type: 1

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/49 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: 266
GROUP TITLE: Group 254 Expansion
NO. OF INSPECTION TO BE PERFORMED: 30
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (30)
% OF COMPONENTS DEVIANT: 73.33 (22)
TOTAL NUMBER OF WELDS: 171
% OF WELDS DEVIANT: 63.16 (108)
TOTAL CHARACTERISTICS: 503
% CHARACTERISTIC DEVIANT: 24.25 (122)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	0	0.00	0.00
2. Weld Size	98	161	60.87	80.33
3. Incomplete Fusion	0	0	0.00	0.00
4. Overlap	0	0	0.00	0.00
5. Underfilled Craters	0	0	0.00	0.00
6. Weld Profiles	21	171	12.28	17.21
7. Undercut	0	0	0.00	0.00
8. Porosity	0	0	0.00	0.00
9. Weld Length and Location	3	171	1.75	2.46
10. Arc Strikes	0	0	0.00	0.00
11. Surface Slag and Weld Spatter	0	0	0.00	0.00

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 1
No. of welds with deviant weld type: 26

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/50 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: A
GROUP TITLE: ASME SMALL BORE PIPE
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 32.81 (21)
TOTAL NUMBER OF WELDS: 64
% OF WELDS DEVIANT: 32.81 (21)
TOTAL CHARACTERISTICS: 742
% CHARACTERISTIC DEVIANT: 4.31 (32)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	1	64	1.56	3.12
2. Overlap	1	37	2.70	3.12
3. Undercut.....	1	64	1.56	3.12
4. Lack of Fusion.....	0	64	0.00	0.00
5. Incomplete Penetration.....	0	1	0.00	0.00
6. Slag	0	64	0.00	0.00
7. Visible Porosity.....	3	64	4.69	9.38
8. Weld Spatter	1	64	1.56	3.12
9. Arc Strikes	18	64	28.12	56.25
10. Coarse Ripples.	1	32	3.12	3.12
11. Grooves.....	1	32	3.12	3.12
12. Abrupt Ridges.	0	32	0.00	0.00
13. Valleys.....	0	32	0.00	0.00
14. Min Sect Thickness.	4	64	6.25	12.50
15. Taper.....	0	1	0.00	0.00
16. Maximum Offset.....	0	0	0.00	0.00
17. Reinforcement.....	0	2	0.00	0.00
18. Fillet/Socket Weld Size.....	1	61	1.64	3.12

No. of inaccessible welds 1

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	31	31	9.68(3)	9.68(3)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	1	1	100.00(1)	100.00(1)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/51 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: B
GROUP TITLE: ASME LARGE BORE PIPE
NO. OF INSPECTION TO BE PERFORMED: 74
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (74)
% OF COMPONENTS DEVIANT: 47.30 (35)
TOTAL NUMBER OF WELDS: 74
% OF WELDS DEVIANT: 47.30 (35)
TOTAL CHARACTERISTICS: 968
% CHARACTERISTIC DEVIANT: 7.64 (74)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	74	0.00	0.00
2. Overlap	1	49	2.04	1.35
3. Undercut.....	4	74	5.41	5.41
4. Lack of Fusion.....	3	74	4.05	4.05
5. Incomplete Penetration.....	1	5	20.00	1.35
6. Slag	3	73	4.11	4.05
7. Visible Porosity.....	13	74	17.57	17.57
8. Weld Spatter	12	74	16.22	16.22
9. Arc Strikes	27	74	36.49	36.49
10. Coarse Ripples.	0	47	0.00	0.00
11. Grooves.....	0	47	0.00	0.00
12. Abrupt Ridges.	0	47	0.00	0.00
13. Valleys.....	0	47	0.00	0.00
14. Min Sect Thickness.	1	74	1.35	1.35
15. Taper.....	1	57	1.75	1.35
16. Maximum Offset.....	0	5	0.00	0.00
17. Reinforcement.....	6	70	8.57	8.11
18. Fillet/Socket Weld Size.....	2	3	66.67	2.70

No. of inaccessible welds 4

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	22	22	4.55(1)	4.55(1)
MAG. PARTICLE	16	16	18.75(3)	18.75(3)
ULTRASONIC	1	1	0.00(0)	0.00(0)
RADIOGRAPHIC	17	17	35.29(6)	35.29(6)

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/52 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: C
GROUP TITLE: ANSI B31.1 , B31.5
NO. OF INSPECTION TO BE PERFORMED: 107
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (107)
% OF COMPONENTS DEVIANT: 56.07 (60)
TOTAL NUMBER OF WELDS: 107
% OF WELDS DEVIANT: 56.07 (60)
TOTAL CHARACTERISTICS: 990
% CHARACTERISTIC DEVIANT: 8.79 (87)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks (Linear Indications).....	0	107	0.00	0.00
2. Overlap	0	1	0.00	0.00
3. Undercut.....	0	107	0.00	0.00
4. Lack of Fusion.....	1	107	0.93	1.15
5. Incomplete Penetration.....	0	0	0.00	0.00
6. Slag	0	107	0.00	0.00
7. Visible Porosity.....	7	107	6.54	8.05
8. Weld Spatter	13	106	12.26	14.94
9. Arc Strikes	49	107	45.79	56.32
10. Coarse Ripples.	0	0	0.00	0.00
11. Grooves.....	0	0	0.00	0.00
12. Abrupt Ridges.	0	0	0.00	0.00
13. Valleys.....	0	0	0.00	0.00
14. Min Sect Thickness.	7	107	6.54	8.05
15. Taper.....	0	25	0.00	0.00
16. Maximum Offset.....	0	2	0.00	0.00
17. Reinforcement.....	7	42	16.67	8.05
18. Fillet/Socket Weld Size.....	3	65	4.62	3.45

No. of inaccessible welds 1

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/53 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: D
GROUP TITLE: CIVIL, POST FEB 1981
NO. OF INSPECTION TO BE PERFORMED: 67
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (67)
% OF COMPONENTS DEVIANT: 28.36 (19)
TOTAL NUMBER OF WELDS: 923
% OF WELDS DEVIANT: 13.33 (123)
TOTAL CHARACTERISTICS: 9637
% CHARACTERISTIC DEVIANT: 1.15 (111)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	896	0.00	0.00
2. Weld Size	39	727	5.36	35.14
3. Incomplete Fusion	2	896	0.22	1.80
4. Overlap	0	896	0.00	0.00
5. Underfilled Craters	3	878	0.34	2.70
6. Weld Profiles	1	876	0.11	0.90
7. Undercut	5	896	0.56	4.50
8. Porosity	0	896	0.00	0.00
9. Weld Length and Location	58	884	6.56	52.25
10. Arc Strikes	0	896	0.00	0.00
11. Surface Slag and Weld Spatter	3	896	0.33	2.70

No. of missing welds 8
No. welds missing due to configuration.. 14
No. of inaccessible welds 8
No. of welds with deviant weld type 8

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/54 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: E
GROUP TITLE: CIVIL, PRE FEB. 1981
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 59.38 (38)
TOTAL NUMBER OF WELDS: 2105
% OF WELDS DEVIANT: 26.56 (559)
TOTAL CHARACTERISTICS: 22108
% CHARACTERISTIC DEVIANT: 3.27 (724)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	13	2049	0.63	1.80
2. Weld Size	323	1656	19.50	44.61
3. Incomplete Fusion	18	2049	0.88	2.49
4. Overlap	11	2049	0.54	1.52
5. Underfilled Craters	3	2030	0.15	0.41
6. Weld Profiles	108	2032	5.31	14.92
7. Undercut	25	2049	1.22	3.45
8. Porosity	0	2049	0.00	0.00
9. Weld Length and Location	114	2047	5.57	15.75
10. Arc Strikes	0	2049	0.00	0.00
11. Surface Slag and Weld Spatter	109	2049	5.32	15.06

No. of missing welds..... 39
No. welds missing due to configuration.. 16
No. of inaccessible welds..... 15
No. of welds with deviant weld type..... 23

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/55 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

E 3

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: F
GROUP TITLE: PIPE SUPPORTS (NCIG)
NO. OF INSPECTION TO BE PERFORMED: 65
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (65)
% OF COMPONENTS DEVIANT: 23.08 (15)
TOTAL NUMBER OF WELDS: 316
% OF WELDS DEVIANT: 8.54 (27)
TOTAL CHARACTERISTICS: 3328
% CHARACTERISTIC DEVIANT: 0.69 (23)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	308	0.00	0.00
2. Weld Size	10	248	4.03	43.48
3. Incomplete Fusion	0	308	0.00	0.00
4. Overlap	0	308	0.00	0.00
5. Underfilled Craters	0	308	0.00	0.00
6. Weld Profiles	7	308	2.27	30.43
7. Undercut	1	308	0.32	4.35
8. Porosity	0	308	0.00	0.00
9. Weld Length and Location	4	308	1.30	17.39
10. Arc Strikes	0	308	0.00	0.00
11. Surface Slag and Weld Spatter	1	308	0.32	4.35

No. of missing welds: 6
No. welds missing due to configuration: 1
No. of inaccessible welds: 3
No. of welds with deviant weld type: 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Colum A/56 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: G
GROUP TITLE: I&C SUPPORTS, POST FEB. 1981
NO. OF INSPECTION TO BE PERFORMED: 66
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (66)
% OF COMPONENTS DEVIANT: 33.33 (22)
TOTAL NUMBER OF WELDS: 272
% OF WELDS DEVIANT: 15.44 (42)
TOTAL CHARACTERISTICS: 2783
% CHARACTERISTIC DEVIANT: 1.47 (41)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	1	269	0.37	2.44
2. Weld Size	7	111	6.31	17.07
3. Incomplete Fusion	0	269	0.00	0.00
4. Overlap	0	269	0.00	0.00
5. Underfilled Craters	0	260	0.00	0.00
6. Weld Profiles	5	260	1.92	12.20
7. Undercut	7	269	2.60	17.07
8. Porosity	0	269	0.00	0.00
9. Weld Length and Location	19	269	7.06	46.34
10. Arc Strikes	0	269	0.00	0.00
11. Surface Slag and Weld Spatter	2	269	0.74	4.88

No. of missing welds..... 3
No. welds missing due to configuration.. 0
No. of inaccessible welds..... 1
No. of welds with deviant weld type..... 7

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Colum A/57 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

E 5

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: H
GROUP TITLE: I&C SUPPORTS, PRE. FEB. 1981
NO. OF INSPECTION TO BE PERFORMED: 57
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (57)
% OF COMPONENTS DEVIANT: 56.14 (32)
TOTAL NUMBER OF WELDS: 268
% OF WELDS DEVIANT: 22.76 (61)
TOTAL CHARACTERISTICS: 2790
% CHARACTERISTIC DEVIANT: 2.47 (69)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	1	268	0.37	1.45
2. Weld Size	20	117	17.09	28.99
3. Incomplete Fusion	2	268	0.75	2.90
4. Overlap	2	268	0.75	2.90
5. Underfilled Craters	1	268	0.37	1.45
6. Weld Profiles	22	268	8.21	31.88
7. Undercut	3	268	1.12	4.35
8. Porosity	0	268	0.00	0.00
9. Weld Length and Location	14	261	5.36	20.29
10. Arc Strikes	0	268	0.00	0.00
11. Surface Slag and Weld Spatter	4	268	1.49	5.80

No. of missing welds..... 0
No. welds missing due to configuration.. 0
No. of inaccessible welds..... 0
No. of welds with deviant weld type..... 7

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/58 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: I
GROUP TITLE: ELECTRICAL SUPPORTS, POST FEB. 1981
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 17.19 (11)
TOTAL NUMBER OF WELDS: 227
% OF WELDS DEVIANT: 12.78 (29)
TOTAL CHARACTERISTICS: 2384
% CHARACTERISTIC DEVIANT: 1.34 (32)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	227	0.00	0.00
2. Weld Size	6	114	5.26	18.75
3. Incomplete Fusion	2	227	0.88	6.25
4. Overlap	1	227	0.44	3.12
5. Underfilled Craters	0	227	0.00	0.00
6. Weld Profiles	13	227	5.73	40.62
7. Undercut	2	227	0.88	6.25
8. Porosity	0	227	0.00	0.00
9. Weld Length and Location	3	227	1.32	9.38
10. Arc Strikes	0	227	0.00	0.00
11. Surface Slag and Weld Spatter	5	227	2.20	15.62

No. of missing welds: 0
No. welds missing due to configuration: 0
No. of inaccessible welds: 0
No. of welds with deviant weld type: 0

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/59 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: J
GROUP TITLE: ELECTRICAL SUPPORTS, PRE FEB. 1981
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 53.13 (34)
TOTAL NUMBER OF WELDS: 504
% OF WELDS DEVIANT: 35.12 (177)
TOTAL CHARACTERISTICS: 5172
% CHARACTERISTIC DEVIANT: 4.49 (232)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	494	0.00	0.00
2. Weld Size	41	231	17.75	17.67
3. Incomplete Fusion	5	494	1.01	2.16
4. Overlap	5	494	1.01	2.16
5. Underfilled Craters	3	493	0.61	1.29
6. Weld Profiles	73	493	14.81	31.47
7. Undercut	20	494	4.05	8.62
8. Porosity	0	494	0.00	0.00
9. Weld Length and Location	23	495	4.65	9.91
10. Arc Strikes	0	495	0.00	0.00
11. Surface Slag and Weld Spatter	62	495	12.53	26.72

No. of missing welds	4
No. welds missing due to configuration	6
No. of inaccessible welds	0
No. of welds with deviant weld type	1

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/60 times attribute checked) *100
D* = Percent deviants for this attribute. (A/Sum of A) *1

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: K
GROUP TITLE: HVAC SUPPORTS, POST FEB. 1981
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 26.56 (17)
TOTAL NUMBER OF WELDS: 978
% OF WELDS DEVIANT: 6.13 (60)
TOTAL CHARACTERISTICS: 10545
% CHARACTERISTIC DEVIANT: 0.83 (87)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	968	0.00	0.00
2. Weld Size	33	876	3.77	37.93
3. Incomplete Fusion	9	968	0.93	10.34
4. Overlap	9	966	0.93	10.34
5. Underfilled Craters	2	964	0.21	2.30
6. Weld Profiles	5	964	0.52	5.75
7. Undercut	1	968	0.10	1.15
8. Porosity	0	966	0.00	0.00
9. Weld Length and Location	12	968	1.24	13.79
10. Arc Strikes	0	968	0.00	0.00
11. Surface Slag and Weld Spatter	16	969	1.65	18.39

No. of missing welds: 2
No. welds missing due to configuration: 0
No. of inaccessible welds: 9
No. of welds with deviant weld type: 4

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Colum A/61 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

F 9

INSPECTION DATA REPORT ON WELD EVALUATION PROJECT

GROUP DESIGNATOR: L
GROUP TITLE: HVAC SUPPORTS, PRE FEB. 1981
NO. OF INSPECTION TO BE PERFORMED: 64
% INSPECTED (ACTUAL NUMBER INSPECTED): 100.00 (64)
% OF COMPONENTS DEVIANT: 42.19 (27)
TOTAL NUMBER OF WELDS: 1105
% OF WELDS DEVIANT: 9.05 (100)
TOTAL CHARACTERISTICS: 12052
% CHARACTERISTIC DEVIANT: 1.05 (126)

ATTRIBUTES FOR THE VISUAL EXAMINATION:

	A*	B*	C*	D*
1. Cracks	0	1099	0.00	0.00
2. Weld Size	48	1082	4.44	38.10
3. Incomplete Fusion	14	1099	1.27	11.11
4. Overlap	9	1099	0.82	7.14
5. Underfilled Craters	0	1089	0.00	0.00
6. Weld Profiles	2	1089	0.18	1.59
7. Undercut	6	1099	0.55	4.76
8. Porosity	0	1099	0.00	0.00
9. Weld Length and Location	17	1099	1.55	13.49
10. Arc Strikes	0	1099	0.00	0.00
11. Surface Slag and Weld Spatter	30	1099	2.73	23.81

No. of missing welds: 6
No. welds missing due to configuration: 0
No. of inaccessible welds: 4
No. of welds with deviant weld type: 10

ONLY VISUAL EXAMINATIONS WERE PERFORMED FOR THIS GROUP.

A* = Total deviants for this attribute in that group.
B* = Number of times this attribute checked.
C* = Deviation percent (Column A/62 times attribute checked)*100
D* = Percent deviants for this attribute. (A/Sum of A)*1

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INSPECTION DATA SUMMARY OF NON DESTRUCTIVE EXAMINATIONS

TYPE OF NDE	NO. OF TESTS	NO.OF DEVIANTS	% DEVIANT
DYE PENETRANT	337	17	5.04
MAG. PARTICLE	274	17	6.20
ULTRASONIC	203	50	24.63
RADIOGRAPHIC	3109	294	9.46
TOTAL:	3923	378	

INSPECTION DATA SUMMARY REPORT ON NDE TESTS

GROUP DESIGNATOR: 003
GROUP TITLE: EC-SP-3, S. VALVE ROOM STRL. WELDS SUBSURFACE DEF
GROUP SIZE: 2

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	2	2	50.00(1)	50.00(1)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 004
GROUP TITLE: EC-SP-4, SLUGGED SEAM WELDS ON BOX ANCHORS
GROUP SIZE: 2

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	2	4	50.00(1)	25.00(1)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 006
GROUP TITLE: RHR 14" SS REDUCED WALL EVALUATION
GROUP SIZE: 2

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	2	2	0.00(0)	0.00(0)

INSPECTION DATA SUMMARY REPORT ON NDE TESTS

GROUP DESIGNATOR: 012
GROUP TITLE: EC-SP-12, S. VALVE ROOM CRACKED WELDS
GROUP SIZE: 2

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	2	2	50.00(1)	50.00(1)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 013
GROUP TITLE: ERCW 8" LINES @ UNIT 1 ANULUS ENTRY
GROUP SIZE: 26

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	26	26	7.69(2)	7.69(2)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	25	25	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 018
GROUP TITLE: EC-SP-18, RT NOT PREFORMED AFTER A REPAIR
GROUP SIZE: 1

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	1	1	0.00(0)	0.00(0)

INSPECTION DATA SUMMARY REPORT ON NDE TESTS

GROUP DESIGNATOR: 022
GROUP TITLE: EC-SP-22, HVAC FRAMES WITH 4" BY 5" CUTOUTS
GROUP SIZE: 1

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	1	3	100.00(1)	100.00(3)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 034
GROUP TITLE: EC-SP-34, CRACK IN VALVE BODY/WELD ZONE
GROUP SIZE: 2

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	2	2	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	2	2	100.00(2)	100.00(2)

GROUP DESIGNATOR: 203
GROUP TITLE: D.GEN. #5 FIRE PROTECTION WELD PREP.
GROUP SIZE: 12

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	12	12	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

INSPECTION DATA SUMMARY REPORT ON NDE TESTS

GROUP DESIGNATOR: 207
GROUP TITLE: POST WELD HEAT TREAT ON STEAM GEN SPTS.
GROUP SIZE: 31

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	31	31	9.68(3)	9.68(3)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 210
GROUP TITLE: WELDER QUALIFICATION BACK-DATE QUESTION
GROUP SIZE: 60

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	15	15	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	8	8	0.00(0)	0.00(0)

GROUP DESIGNATOR: 214
GROUP TITLE: WINTER 1983 FABRICATED M/S VALVE ROOM STEEL
GROUP SIZE: 92

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	41	81	31.71(13)	22.22(18)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

INSPECTION DATA SUMMARY REPORT ON NDE TESTS

GROUP DESIGNATOR: 224
GROUP TITLE: PRESSURE BOUNDARY WELDING VISUAL FINAL ACCEPTANCE
GROUP SIZE: 64

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	31	31	19.35(6)	19.35(6)
MAG. PARTICLE	7	7	42.86(3)	42.86(3)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 229
GROUP TITLE: SLAG INCLUSIONS ON STEAM GEN. PDO'S
GROUP SIZE: 18

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	18	70	77.78(14)	37.14(26)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 249
GROUP TITLE: RADIOGRAPHIC REVIEW OF ASME COMPONENTS
GROUP SIZE: 1696

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	1696	1696	10.20(173)	10.20(173)

INSPECTION DATA SUMMARY REPORT ON NDE TESTS

GROUP DESIGNATOR: 252
GROUP TITLE: NCIG MECHANICAL EQUIPMENT SUPPORTS
GROUP SIZE: 26

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	29	29	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 252A
GROUP TITLE: ASME MECHANICAL EQUIPMENT SUPPORTS
GROUP SIZE: 28

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	28	28	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 253
GROUP TITLE: RADIOGRAPHIC REVIEWS
GROUP SIZE: 104

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	104	104	20.19(21)	20.19(21)

INSPECTION DATA SUMMARY REPORT ON NDE TESTS

GROUP DESIGNATOR: 257
GROUP TITLE: Stainless Fuel Pool Liner
GROUP SIZE: 64

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	64	64	1.56(1)	1.56(1)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 258
GROUP TITLE: Balance of the Q-list Radiographic Film
GROUP SIZE: 1278

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	1278	1278	7.12(91)	7.12(91)

GROUP DESIGNATOR: 262
GROUP TITLE: Class I & II Small Bore ASME
GROUP SIZE: 86

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	86	86	3.49(3)	3.49(3)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

INSPECTION DATA SUMMARY REPORT ON NDE TESTS

GROUP DESIGNATOR: 263
GROUP TITLE: Group E Expansion
GROUP SIZE: 30

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	0	0	0.00(0)	0.00(0)
MAG. PARTICLE	1	155	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: 264
GROUP TITLE: ASME Class MC Welds
GROUP SIZE: 64

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	3	3	33.33(1)	33.33(1)
MAG. PARTICLE	64	65	12.50(8)	12.31(8)
ULTRASONIC	3	3	0.00(0)	0.00(0)
RADIOGRAPHIC	0	0	0.00(0)	0.00(0)

GROUP DESIGNATOR: A
GROUP TITLE: ASME SMALL BORE PIPE
GROUP SIZE: 64

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	31	31	9.68(3)	9.68(3)
MAG. PARTICLE	0	0	0.00(0)	0.00(0)
ULTRASONIC	0	0	0.00(0)	0.00(0)
RADIOGRAPHIC	1	1	100.00(1)	100.00(1)

INSPECTION DATA SUMMARY REPORT ON NDE TESTS

GROUP DESIGNATOR: B
GROUP TITLE: ASME LARGE BORE PIPE
GROUP SIZE: 74

Type Of NDE Test	Inspected Comp.	Inspected Weld	Component % Deviant	Welds % Deviant
DYE PENETRANT	22	22	4.55(1)	4.55(1)
MAG. PARTICLE	16	16	18.75(3)	18.75(3)
ULTRASONIC	1	1	0.00(0)	0.00(0)
RADIOGRAPHIC	17	17	35.29(6)	35.29(6)

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EXAMINATION PACKAGE INSPECTION DATA SUMMARY

TOTAL NUMBER OF COMPONENTS EXAMINED:	2182
TOTAL NUMBER OF WELDS EXAMINED:	15849
TOTAL NUMBER OF CHARACTERISTICS EXAMINED:	149088
% OF CHARACTERISTICS DEVIANT:	3.02 (4507)

NOTE:

Deviations with TVA prior Resolution have been removed.

INSPECTION DATA SUMMARY FOR SPECIFIC GROUPS

GROUP DESIGNATOR: 002

GROUP TITLE: EC-SP-2, SPREADER ROOM F/P INSUFFICIENT WELD M

TOTAL NO. OF EXAMINATION PACKAGES: 2

% INSPECTIONS COMPLETED: 100.00 (2)

TOTAL NUMBER OF WELDS: 2

TOTAL NO. OF CHARACTERISTICS: 18

% CHARACTERISTICS DEVIANT: 27.78 (5)

GROUP DESIGNATOR: 003

GROUP TITLE: EC-SP-3, S. VALVE ROOM STRL. WELDS SUBSURFACE

TOTAL NO. OF EXAMINATION PACKAGES: 2

% INSPECTIONS COMPLETED: 100.00 (2)

TOTAL NUMBER OF WELDS: 2

TOTAL NO. OF CHARACTERISTICS: 21

% CHARACTERISTICS DEVIANT: 4.76 (1)

NOTE:

1. Deviations with TVA prior Resolution have been removed.

INSPECTION DATA SUMMARY FOR SPECIFIC GROUPS

GROUP DESIGNATOR: 004

GROUP TITLE: EC-SP-4, SLUGGED SEAM WELDS ON BOX ANCHORS

TOTAL NO. OF EXAMINATION PACKAGES: 2

% INSPECTIONS COMPLETED: 100.00 (2)

TOTAL NUMBER OF WELDS: 4

TOTAL NO. OF CHARACTERISTICS: 40

% CHARACTERISTICS DEVIANT: 0.00 (0)

GROUP DESIGNATOR: 006

GROUP TITLE: RHR 14" SS REDUCED WALL EVALUATION

TOTAL NO. OF EXAMINATION PACKAGES: 2

% INSPECTIONS COMPLETED: 100.00 (2)

TOTAL NUMBER OF WELDS: 2

TOTAL NO. OF CHARACTERISTICS: 29

% CHARACTERISTICS DEVIANT: 0.00 (0)

NOTE:

1. Deviations with TVA prior Resolution have been removed.

INSPECTION DATA SUMMARY FOR SPECIFIC GROUPS

GROUP DESIGNATOR: 008

GROUP TITLE: EC-SP-8, SYS. 78 ARC STRIKES/METAL EXCAV.

TOTAL NO. OF EXAMINATION PACKAGES: 6

% INSPECTIONS COMPLETED: 100.00 (6)

TOTAL NUMBER OF WELDS: 6

TOTAL NO. OF CHARACTERISTICS: 14

% CHARACTERISTICS DEVIANT: 28.57 (4)

GROUP DESIGNATOR: 009

GROUP TITLE: EC-SP-9, SYS. 72 RB SPRAY @ 713 ARC STRIKES

TOTAL NO. OF EXAMINATION PACKAGES: 2

% INSPECTIONS COMPLETED: 100.00 (2)

TOTAL NUMBER OF WELDS: 2

TOTAL NO. OF CHARACTERISTICS: 4

% CHARACTERISTICS DEVIANT: 50.00 (2)

NOTE:

1. Deviations with TVA prior Resolution have been removed

INSPECTION DATA SUMMARY FOR SPECIFIC GROUPS

GROUP DESIGNATOR: 012

GROUP TITLE: EC-SP-12, S. VALVE ROOM CRACKED WELDS

TOTAL NO. OF EXAMINATION PACKAGES: 2

% INSPECTIONS COMPLETED: 100.00 (2)

TOTAL NUMBER OF WELDS: 2

TOTAL NO. OF CHARACTERISTICS: 20

% CHARACTERISTICS DEVIANT: 10.00 (2)

GROUP DESIGNATOR: 013

GROUP TITLE: ERCW 8" LINES @ UNIT 1 ANULUS ENTRY

TOTAL NO. OF EXAMINATION PACKAGES: 26

% INSPECTIONS COMPLETED: 100.00 (26)

TOTAL NUMBER OF WELDS: 26

TOTAL NO. OF CHARACTERISTICS: 390

% CHARACTERISTICS DEVIANT: 4.62 (18)

NOTE:

1. Deviations with TVA prior Resolution have been removed.

INSPECTION DATA SUMMARY FOR SPECIFIC GROUPS

GROUP DESIGNATOR: 014

GROUP TITLE: LOOP 3 AND 4 T-BAR SHIMS @ 718 ft.

TOTAL NO. OF EXAMINATION PACKAGES: 4

% INSPECTIONS COMPLETED: 100.00 (4)

TOTAL NUMBER OF WELDS: 35

TOTAL NO. OF CHARACTERISTICS: 385

% CHARACTERISTICS DEVIANT: 2.08 (8)

GROUP DESIGNATOR: 015

GROUP TITLE: EC-SP-15, BLACK&VEACH WELD DELETION

TOTAL NO. OF EXAMINATION PACKAGES: 13

% INSPECTIONS COMPLETED: 100.00 (13)

TOTAL NUMBER OF WELDS: 188

TOTAL NO. OF CHARACTERISTICS: 2052

% CHARACTERISTICS DEVIANT: 0.49 (10)

NOTE:

1. Deviations with TVA prior Resolution have been removed.

INSPECTION DATA SUMMARY FOR SPECIFIC GROUPS

GROUP DESIGNATOR: 018

GROUP TITLE: EC-SP-18, RT NOT PREFORMED AFTER A REPAIR

TOTAL NO. OF EXAMINATION PACKAGES: 1

% INSPECTIONS COMPLETED: 100.00 (1)

TOTAL NUMBER OF WELDS: 1

TOTAL NO. OF CHARACTERISTICS: 15

% CHARACTERISTICS DEVIANT: 0.00 (0)

GROUP DESIGNATOR: 020

GROUP TITLE: WELD 1-003B-T080-06 FINAL NDE

TOTAL NO. OF EXAMINATION PACKAGES: 1

% INSPECTIONS COMPLETED: 100.00 (1)

TOTAL NUMBER OF WELDS: 1

TOTAL NO. OF CHARACTERISTICS: 9

% CHARACTERISTICS DEVIANT: 11.11 (1)

NOTE:

1. Deviations with TVA prior Resolution have been removed.

INSPECTION DATA SUMMARY FOR SPECIFIC GROUPS

GROUP DESIGNATOR: 021

GROUP TITLE: EC-SP-21, STRUCTURAL STEEL PARTITION WALL INSP

TOTAL NO. OF EXAMINATION PACKAGES: 1

% INSPECTIONS COMPLETED: 100.00 (1)

TOTAL NUMBER OF WELDS: 279

TOTAL NO. OF CHARACTERISTICS: 2468

% CHARACTERISTICS DEVIANT: 6.77 (167)

GROUP DESIGNATOR: 022

GROUP TITLE: EC-SP-22, HVAC FRAMES WITH 4" BY 5" CUTOUTS

TOTAL NO. OF EXAMINATION PACKAGES: 1

% INSPECTIONS COMPLETED: 100.00 (1)

TOTAL NUMBER OF WELDS: 60

TOTAL NO. OF CHARACTERISTICS: 312

% CHARACTERISTICS DEVIANT: 36.54 (114)

NOTE:

1. Deviations with TVA prior Resolution have been removed.

INSPECTION DATA SUMMARY FOR SPECIFIC GROUPS

GROUP DESIGNATOR: 026

GROUP TITLE: EC-SP-26, HVAC SUPPORTS NOT INSPECTED

TOTAL NO. OF EXAMINATION PACKAGES: 2

% INSPECTIONS COMPLETED: 100.00 (2)

TOTAL NUMBER OF WELDS: 72

TOTAL NO. OF CHARACTERISTICS: 729

% CHARACTERISTICS DEVIANT: 0.00 (0)

GROUP DESIGNATOR: 029

GROUP TITLE: EC-SP-29, UNDERSIZED SOCKET WELDS ON ASME PIPE

TOTAL NO. OF EXAMINATION PACKAGES: 8

% INSPECTIONS COMPLETED: 100.00 (8)

TOTAL NUMBER OF WELDS: 8

TOTAL NO. OF CHARACTERISTICS: 8

% CHARACTERISTICS DEVIANT: 25.00 (2)

NOTE:

1. Deviations with TVA prior Resolution have been removed

INSPECTION DATA SUMMARY FOR SPECIFIC GROUPS

GROUP DESIGNATOR: 032

GROUP TITLE: EC-SP-32, DEFECTIVE WELD ON HGR 70-ICC-R487

TOTAL NO. OF EXAMINATION PACKAGES: 1

% INSPECTIONS COMPLETED. 100.00 (1)

TOTAL NUMBER OF WELDS: 8

TOTAL NO. OF CHARACTERISTICS: 88

% CHARACTERISTICS DEVIANT: 2.27 (2)

GROUP DESIGNATOR: 033

GROUP TITLE: So Valve Rm Hanger at Beam W33X200

TOTAL NO. OF EXAMINATION PACKAGES: 1

% INSPECTIONS COMPLETED: 100.00 (1)

TOTAL NUMBER OF WELDS: 7

TOTAL NO. OF CHARACTERISTICS: 77

% CHARACTERISTICS DEVIANT: 0.00 (0)

NOTE:

1. Deviations with TVA prior Resolution have been removed.

INSPECTION DATA SUMMARY FOR SPECIFIC GROUPS

GROUP DESIGNATOR: 034

GROUP TITLE: EC-SP-34, CRACK IN VALVE BODY/WELD ZONE

TOTAL NO. OF EXAMINATION PACKAGES: 2

% INSPECTIONS COMPLETED: 100.00 (2)

TOTAL NUMBER OF WELDS: 2

TOTAL NO. OF CHARACTERISTICS: 30

% CHARACTERISTICS DEVIANT: 0.00 (0)

NOTE:

1. Deviations with TVA prior Resolution have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 202

GROUP TITLE: AUX BLD ELECTRICAL SUPPORTS AT 713ft.(1980 - 198

TOTAL NO. OF EXAMINATION PACKAGES: 64

% INSPECTIONS COMPLETED: 100.00 (64)

TOTAL NUMBER OF WELDS: 363

TOTAL NO. OF CHARACTERISTICS: 3796

% CHARACTERISTICS DEVIANT: 2.66 (101)

GROUP DESIGNATOR: 20P

GROUP TITLE: SYSTEM 62,63,68 DRAIN HEADERS THREAD-O-LETS

TOTAL NO. OF EXAMINATION PACKAGES: 56

% INSPECTIONS COMPLETED: 100.00 (56)

TOTAL NUMBER OF WELDS: 56

TOTAL NO. OF CHARACTERISTICS: 452

% CHARACTERISTICS DEVIANT: 6.42 (29)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 210

GROUP TITLE: WELDER QUALIFICATION BACK-DATE QUESTION

TOTAL NO. OF EXAMINATION PACKAGES: 60

% INSPECTIONS COMPLETED: 100.00 (60)

TOTAL NUMBER OF WELDS: 60

TOTAL NO. OF CHARACTERISTICS: 675

% CHARACTERISTICS DEVIANT: 1.93 (13)

GROUP DESIGNATOR: 212

GROUP TITLE: OPEN BUTT WELDING @ CONTAINMENT PENETRATIONS

TOTAL NO. OF EXAMINATION PACKAGES: 52

% INSPECTIONS COMPLETED: 100.00 (52)

TOTAL NUMBER OF WELDS: 52

TOTAL NO. OF CHARACTERISTICS: 52

% CHARACTERISTICS DEVIANT: 28.85 (15)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 214

GROUP TITLE: WINTER 1983 FABRICATED N/S VALVE ROOM STEEL

TOTAL NO. OF EXAMINATION PACKAGES: 61

% INSPECTIONS COMPLETED: 100.00 (61)

TOTAL NUMBER OF WELDS: 177

TOTAL NO. OF CHARACTERISTICS: 1886

% CHARACTERISTICS DEVIANT: 2.12 (40)

GROUP DESIGNATOR: 219

GROUP TITLE: CONTROL BUILDING DUCTWORK SUPPORT WELDS

TOTAL NO. OF EXAMINATION PACKAGES: 61

% INSPECTIONS COMPLETED: 100.00 (61)

TOTAL NUMBER OF WELDS: 837

TOTAL NO. OF CHARACTERISTICS: 8985

% CHARACTERISTICS DEVIANT: 0.66 (59)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 220

GROUP TITLE: ASME SMALL BORE PURGE VERIFICATION

TOTAL NO. OF EXAMINATION PACKAGES: 5

% INSPECTIONS COMPLETED: 100.00 (5)

TOTAL NUMBER OF WELDS: 5

TOTAL NO. OF CHARACTERISTICS: 39

% CHARACTERISTICS DEVIANT: 5.13 (2)

GROUP DESIGNATOR: 222

GROUP TITLE: PRE JAN 1981 PLATFORMS,STAIRS,LADDERS AS-BUILTS

TOTAL NO. OF EXAMINATION PACKAGES: 50

% INSPECTIONS COMPLETED: 100.00 (50)

TOTAL NUMBER OF WELDS: 1741

TOTAL NO. OF CHARACTERISTICS: 18124

% CHARACTERISTICS DEVIANT: 3.18 (576)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 224

GROUP TITLE: PRESSURE BOUNDARY WELDING VISUAL FINAL ACCEPTANC

TOTAL NO. OF EXAMINATION PACKAGES: 64

% INSPECTIONS COMPLETED: 100.00 (64)

TOTAL NUMBER OF WELDS: 64

TOTAL NO. OF CHARACTERISTICS: 803

% CHARACTERISTICS DEVIANT: 8.84 (71)

GROUP DESIGNATOR: 225

GROUP TITLE: CONDUIT SUPPORTS @ CONTROL BLD. EL. 708 ft.

TOTAL NO. OF EXAMINATION PACKAGES: 62

% INSPECTIONS COMPLETED: 100.00 (62)

TOTAL NUMBER OF WELDS: 207

TOTAL NO. OF CHARACTERISTICS: 2125

% CHARACTERISTICS DEVIANT: 2.92 (62)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 227

GROUP TITLE: SURGE LINE TRUSS STIFFENERS FIT-UP

TOTAL NO. OF EXAMINATION PACKAGES: 35

% INSPECTIONS COMPLETED: 100.00 (35)

TOTAL NUMBER OF WELDS: 159

TOTAL NO. OF CHARACTERISTICS: 1663

% CHARACTERISTICS DEVIANT: 1.02 (17)

GROUP DESIGNATOR: 228

GROUP TITLE: ALL WELDING ON 6" FIRE PROTECTION CHECK VALVES

TOTAL NO. OF EXAMINATION PACKAGES: 10

% INSPECTIONS COMPLETED: 100.00 (10)

TOTAL NUMBER OF WELDS: 10

TOTAL NO. OF CHARACTERISTICS: 100

% CHARACTERISTICS DEVIANT: 19.00 (19)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 229

GROUP TITLE: SLAG INCLUSIONS ON STEAM GEN. PDOs

TOTAL NO. OF EXAMINATION PACKAGES: 18

% INSPECTIONS COMPLETED: 100.00 (18)

TOTAL NUMBER OF WELDS: 70

TOTAL NO. OF CHARACTERISTICS: 700

% CHARACTERISTICS DEVIANT: 3.14 (22)

GROUP DESIGNATOR: 230

GROUP TITLE: VISUAL ACCEPTANCE FOR PIPE SLEEVES (70-1CC R487)

TOTAL NO. OF EXAMINATION PACKAGES: 92

% INSPECTIONS COMPLETED: 100.00 (92)

TOTAL NUMBER OF WELDS: 430

TOTAL NO. OF CHARACTERISTICS: 3710

% CHARACTERISTICS DEVIANT: 1.56 (58)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 250

GROUP TITLE: CABLE TRAY CLIPS

TOTAL NO. OF EXAMINATION PACKAGES: 78

% INSPECTIONS COMPLETED: 100.00 (78)

TOTAL NUMBER OF WELDS: 154

TOTAL NO. OF CHARACTERISTICS: 307

% CHARACTERISTICS DEVIANT: 13.68 (42)

GROUP DESIGNATOR: 251

GROUP TITLE: J,202,225 EXPANSION

TOTAL NO. OF EXAMINATION PACKAGES: 30

% INSPECTIONS COMPLETED: 100.00 (30)

TOTAL NUMBER OF WELDS: 198

TOTAL NO. OF CHARACTERISTICS: 540

% CHARACTERISTICS DEVIANT: 8.70 (47)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 252

GROUP TITLE: NCIG Mechanical Equipment Supports

TOTAL NO. OF EXAMINATION PACKAGES: 54

% INSPECTIONS COMPLETED: 100.00 (54)

TOTAL NUMBER OF WELDS: 353

TOTAL NO. OF CHARACTERISTICS: 2488

% CHARACTERISTICS DEVIANT: 10.33 (257)

GROUP DESIGNATOR: 254

GROUP TITLE: Electrical Equipment Supports

TOTAL NO. OF EXAMINATION PACKAGES: 64

% INSPECTIONS COMPLETED: 100.00 (64)

TOTAL NUMBER OF WELDS: 385

TOTAL NO. OF CHARACTERISTICS: 3950

% CHARACTERISTICS DEVIANT: 4.99 (197)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 255

GROUP TITLE: Support Bracing, Strl Expansion (Group E)

TOTAL NO. OF EXAMINATION PACKAGES: 9

% INSPECTIONS COMPLETED: 100.00 (9)

TOTAL NUMBER OF WELDS: 62

TOTAL NO. OF CHARACTERISTICS: 579

% CHARACTERISTICS DEVIANT: 13.82 (80)

GROUP DESIGNATOR: 256

GROUP TITLE: Main Frame Structural Expansion (Group E)

TOTAL NO. OF EXAMINATION PACKAGES: 13

% INSPECTIONS COMPLETED: 100.00 (13)

TOTAL NUMBER OF WELDS: 48

TOTAL NO. OF CHARACTERISTICS: 484

% CHARACTERISTICS DEVIANT: 8.06 (39)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 257

GROUP TITLE: Stainless Fuel Pool Liner

TOTAL NO. OF EXAMINATION PACKAGES: 64

% INSPECTIONS COMPLETED: 100.00 (64)

TOTAL NUMBER OF WELDS: 64

TOTAL NO. OF CHARACTERISTICS: 900

% CHARACTERISTICS DEVIANT: 3.09 (28)

GROUP DESIGNATOR: 260

GROUP TITLE: Group D Expansion

TOTAL NO. OF EXAMINATION PACKAGES: 30

% INSPECTIONS COMPLETED: 100.00 (30)

TOTAL NUMBER OF WELDS: 1066

TOTAL NO. OF CHARACTERISTICS: 2843

% CHARACTERISTICS DEVIANT: 5.59 (159)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 261

GROUP TITLE: Group 227 Expansion

TOTAL NO. OF EXAMINATION PACKAGES: 10

% INSPECTIONS COMPLETED: 100.00 (10)

TOTAL NUMBER OF WELDS: 57

TOTAL NO. OF CHARACTERISTICS: 151

% CHARACTERISTICS DEVIANT: 4.64 (7)

GROUP DESIGNATOR: 262

GROUP TITLE: Class I & II Small Bore ASME

TOTAL NO. OF EXAMINATION PACKAGES: 86

% INSPECTIONS COMPLETED: 100.00 (86)

TOTAL NUMBER OF WELDS: 86

TOTAL NO. OF CHARACTERISTICS: 516

% CHARACTERISTICS DEVIANT: 0.39 (2)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 263

GROUP TITLE: Group E Expansion

TOTAL NO. OF EXAMINATION PACKAGES: 31

% INSPECTIONS COMPLETED: 100.00 (31)

TOTAL NUMBER OF WELDS: 1100

TOTAL NO. OF CHARACTERISTICS: 11169

% CHARACTERISTICS DEVIANT: 3.04 (339)

GROUP DESIGNATOR: 264

GROUP TITLE: ASME Class MC welds

TOTAL NO. OF EXAMINATION PACKAGES: 64

% INSPECTIONS COMPLETED: 100.00 (64)

TOTAL NUMBER OF WELDS: 68

TOTAL NO. OF CHARACTERISTICS: 960

% CHARACTERISTICS DEVIANT: 10.21 (98)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 265

GROUP TITLE: Group G Expansion

TOTAL NO. OF EXAMINATION PACKAGES: 30

% INSPECTIONS COMPLETED: 100.00 (30)

TOTAL NUMBER OF WELDS: 156

TOTAL NO. OF CHARACTERISTICS: 370

% CHARACTERISTICS DEVIANT: 8.65 (32)

GROUP DESIGNATOR: 266

GROUP TITLE: Group 254 Expansion

TOTAL NO. OF EXAMINATION PACKAGES: 30

% INSPECTIONS COMPLETED: 100.00 (30)

TOTAL NUMBER OF WELDS: 171

TOTAL NO. OF CHARACTERISTICS: 503

% CHARACTERISTICS DEVIANT: 24.25 (122)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR GENERAL GROUPS

GROUP DESIGNATOR:	A
GROUP TITLE:	ASME SMALL BORE PIPE
TOTAL NO. OF EXAMINATION PACKAGES:	64
% INSPECTIONS COMPLETED:	100.00 (64)
TOTAL NUMBER OF WELDS:	64
TOTAL NO. OF CHARACTERISTICS:	742
% CHARACTERISTICS DEVIANT:	4.31 (32)

GROUP DESIGNATOR:	B
GROUP TITLE:	ASME LARGE BORE PIPE
TOTAL NO. OF EXAMINATION PACKAGES:	74
% INSPECTIONS COMPLETED:	100.00 (74)
TOTAL NUMBER OF WELDS:	74
TOTAL NO. OF CHARACTERISTICS:	968
% CHARACTERISTICS DEVIANT:	7.64 (74)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR GENERAL GROUPS

GROUP DESIGNATOR: C

GROUP TITLE: ANSI B31.1 , B31.5

TOTAL NO. OF EXAMINATION PACKAGES: 107

% INSPECTIONS COMPLETED: 100.00 (107)

TOTAL NUMBER OF WELDS: 107

TOTAL NO. OF CHARACTERISTICS: 990

% CHARACTERISTICS DEVIANT: 8.79 (87)

GROUP DESIGNATOR: D

GROUP TITLE: CIVIL, POST FEB 1981

TOTAL NO. OF EXAMINATION PACKAGES: 67

% INSPECTIONS COMPLETED: 100.00 (67)

TOTAL NUMBER OF WELDS: 923

TOTAL NO. OF CHARACTERISTICS: 9637

% CHARACTERISTICS DEVIANT: 1.15 (111)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR GENERAL GROUPS

GROUP DESIGNATOR: G

GROUP TITLE: I&C SUPPORTS, POST FEB. 1981

TOTAL NO. OF EXAMINATION PACKAGES: 66

% INSPECTIONS COMPLETED: 100.00 (66)

TOTAL NUMBER OF WELDS: 272

TOTAL NO. OF CHARACTERISTICS: 2783

% CHARACTERISTICS DEVIANT: 1.47 (41)

GROUP DESIGNATOR: H

GROUP TITLE: I&C SUPPORTS, PRE. FEB. 1981

TOTAL NO. OF EXAMINATION PACKAGES: 57

% INSPECTIONS COMPLETED: 100.00 (57)

TOTAL NUMBER OF WELDS: 268

TOTAL NO. OF CHARACTERISTICS: 2790

% CHARACTERISTICS DEVIANT: 2.47 (69)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR GENERAL GROUPS

GROUP DESIGNATOR: I

GROUP TITLE: ELECTRICAL SUPPORTS, POST FEB. 1981

TOTAL NO. OF EXAMINATION PACKAGES: 64

% INSPECTIONS COMPLETED: 100.00 (64)

TOTAL NUMBER OF WELDS: 227

TOTAL NO. OF CHARACTERISTICS: 2384

% CHARACTERISTICS DEVIANT: 1.34 (32)

GROUP DESIGNATOR: J

GROUP TITLE: ELECTRICAL SUPPORTS, PRE FEB. 1981

TOTAL NO. OF EXAMINATION PACKAGES: 64

% INSPECTIONS COMPLETED: 100.00 (64)

TOTAL NUMBER OF WELDS: 504

TOTAL NO. OF CHARACTERISTICS: 5172

% CHARACTERISTICS DEVIANT: 4.49 (232)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

INSPECTION DATA SUMMARY FOR GENERAL GROUPS

GROUP DESIGNATOR:	K
GROUP TITLE:	HVAC SUPPORTS, POST FEB. 1981
TOTAL NO. OF EXAMINATION PACKAGES:	64
% INSPECTIONS COMPLETED:	100.00 (64)
TOTAL NUMBER OF WELDS:	978
TOTAL NO. OF CHARACTERISTICS:	10545
% CHARACTERISTICS DEVIANT:	0.83 (87)

GROUP DESIGNATOR:	L
GROUP TITLE:	HVAC SUPPORTS, PRE FEB. 1981
TOTAL NO. OF EXAMINATION PACKAGES:	64
% INSPECTIONS COMPLETED:	100.00 (64)
TOTAL NUMBER OF WELDS:	1105
TOTAL NO. OF CHARACTERISTICS:	12052
% CHARACTERISTICS DEVIANT:	1.05 (126)

NOTE:

1. Deviations with TVA prior Resolution have been removed.

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INSPECTION DATA SUMMARY REPORT WSMP #1 PLANT VISUAL EXAMINATIONS

COMPONENT CATEGORY	Sample Size	COMPONENTS Number Inspd	COMPONENTS Percent Deviant	WELDS Number Inspd	WELDS Percent Deviant	ATTRIBUTES Number Inspd	ATTRIBUTES Percent Deviant
ALL	2182	2182	39.32	15849	21.19	149088	3.02
ASME	595	595	33.08	597	35.18	6278	6.19
ANSI	163	163	50.31	163	50.31	1442	8.04
AWS	1426	1426	39.83	15089	20.33	141366	2.83
SPECIFIC	79	79	43.04	707	31.12	6709	5.01
SPECIAL	1283	1283	38.63	8199	22.58	68888	3.68
GENERAL	838	838	48.37	6943	18.64	73499	2.23

Original Populations -- Visual Test Results Only

POPULATION			SAMPLE Size	COMPONENTS Inspctd	COMPONENTS % Dev.	WELDS Inspctd	WELDS % Dev.	ATTRIBUTES Inspctd	ATTRIBUTES % Dev.
A	ASME	ASME SMALL BORE PIPE	64	64	32.81(21)	64	32.81(21)	742	4.31(32)
B	ASME	ASME LARGE BORE PIPE	76	76	47.30(35)	76	47.30(35)	968	7.64([illegible])
C	ANSI	ANSI B31.1 , B31.5	107	107	56.07(60)	107	56.07(60)	990	8.79(87)
D	NCIG	CIVIL, POST FEB 1981	67	67	28.36(19)	923	13.33(123)	9637	1.15([illegible])
E	NCIG	CIVIL, PRE FEB. 1981	[illegible]	64	59.38(38)	2108	26.56(559)	22108	3.27(724)
F	NCIG	PIPE SUPPORTS (NCIG)	65	65	23.08(15)	316	8.[illegible](27)	3328	0.69(23)
G	NCIG	I&C SUPPORTS, POST FEB. 1981	66	66	33.33(22)	272	15.44(42)	2783	1.47(41)
H	NCIG	I&C SUPPORTS, PRE. FEB. 1981	57	57	56.14(32)	268	22.76(61)	2790	2.47(69)
I	NCIG	ELECTRICAL SUPPORTS, POST FEB. 1981	64	64	17.19(11)	227	12.78(29)	2304	1.34(32)
J	NCIG	ELECTRICAL SUPPORTS, PRE FEB. 1981	64	64	53.13(34)	504	35.12(177)	5172	4.49(232)
K	NCIG	HVAC SUPPORTS, POST FEB. 1981	64	64	26.56(17)	978	6.13(60)	10545	0.83(87)
L	NCIG	HVAC SUPPORTS, PRE FEB. 1981	64	64	42.19(27)	1105	9.05(100)	12052	1.05(126)
002	ANSI	EC-SP-2, SPREADER ROOM F/P INSUFFICIENT WELD MATL.	2	2	100.00(2)	2	100.00(2)	18	27.78(5)
003	NCIG	EC-SP-3, S. VALVE ROOM STRL. WELDS SUBSURFACE DEF.	2	2	50.00(1)	2	50.00(1)	21	4.76(1)
004	NCIG	EC-SP-4, SLUGGED SEAM WELDS ON BOX ANCHORS	2	2	0.00(0)	4	0.00(0)	60	0.00(0)
006	ASME	RHR 14" SS REDUCED WALL EVALUATION	2	2	0.00(0)	2	0.00(0)	29	0.00(0)
008	ASME	EC-SP-8, SYS. 78 ARC STRIKES/METAL EXCAV.	6	6	66.67(4)	6	66.67(4)	14	28.57(4)
009	ASME	EC-SP-9, SYS. 72 SS SPRAY @ 713 ARC STRIKES	2	2	100.00(2)	2	100.00(2)	4	50.00(2)
012	NCIG	EC-SP-12, S. VALVE ROOM CRACKED WELDS	2	2	50.00(1)	2	50.00(1)	20	10.00(2)
013	ASME	ERCW 8" LINES @ UNIT 1 ANNULUS ENTRY	26	26	46.15(12)	26	46.15(12)	390	4.62(18)
014	NCIG	LOOP 3 AND 4 T-BAR SHIMS @ 718	4	4	50.00(2)	35	14.29(5)	385	2.08(8)
015	NCIG	EC-SP-15, BLACK[illegible] WELD SELECTION	13	13	30.77(4)	188	6.38(12)	2052	0.49(10)
018	ASME	EC-SP-18, RT NOT PERFORMED AFTER A REPAIR	1	1	0.00(0)	1	0.00(0)	15	0.00(0)
020	ASME	WELD 1-[illegible]-TC[illegible]-06 FINAL [illegible]	1	1	100.00(1)	1	100.00(1)	9	11.11(1)
021	NCIG	EC-SP-21, STRUCTURAL STEEL PARTITION WALL INSP.	1	1	100.00(1)	279	42.29(118)	2468	6.77(167)
022	NCIG	EC-SP-22, HVAC FRAMES WITH 6" BY 9" CUTOUTS	1	1	100.00(1)	60	96.67(58)	312	36.54(114)
026	NCIG	EC-SP-26, HVAC SUPPORTS NOT INSPECTED	2	2	0.00(0)	72	0.00(0)	729	0.00(0)
029	ASME	EC-SP-29, UNDERSIZED SOCKET WELDS ON ASME PIPE	8	8	25.00(2)	8	25.00(2)	8	25.00(2)
032	NCIG	EC-SP-32, [illegible]CTIVE WELD ON [illegible] 78-ICE-[illegible]	1	1	100.00(1)	8	25.00(2)	88	2.27(2)
034	ASME	EC-SP-34, CRACK IN VALVE BODY/WELD ZONE	2	2	0.00(0)	2	0.00(0)	30	0.00(0)
202	NCIG	AUX BLD ELECTRICAL SUPPORTS AT 713' (1980 - 1981)	64	64	32.81(21)	363	16.53(60)	3796	2.56([illegible])
204	ANSI	SYSTEM 62,63,68 DRAIN HEADERS THREAD-O-LETS	56	56	39.29(22)	56	39.29(22)	452	6.42(29)
210	ASME	WELDER QUALIFICATION BACK-DATE QUESTION	60	60	16.67(10)	60	16.67(10)	675	1.93(13)
212	ASME	OPEN BUTT WELDING @ CONTAINMENT PENETRATIONS	52	52	28.85(15)	52	28.85(15)	52	28.85(15)
214	NCIG	WINTER 1983 FABRICATED N/S VALVE ROOM STEEL	72	61	26.23(16)	177	17.51(31)	1686	2.12([illegible])
219	NCIG	CONTROL BUILDING DUCTWORK SUPPORT WELDS	61	61	32.79(20)	837	7.41(62)	[illegible]	[illegible](59)
220	ASME	ASME SMALL BORE FLANGE VERIFICATION	5	5	40.00(2)	5	40.00(2)	39	5.13(2)
222	NCIG	PRE JAN 1981 PLATFORMS,STAIRS,LADDERS AS-BUILTS	50	50	72.00(36)	1741	27.34(476)	18124	3.[illegible](575)
224	ASME	PRESSURE BOUNDARY WELDING VISUAL FINAL ACCEPTANCE	64	64	50.00(32)	64	50.00(32)	803	[illegible]
225	NCIG	CONDUIT SUPPORTS @ CONTROL BLD. EL. 708'	62	62	43.55(27)	207	19.81(41)	2125	2.[illegible](62)
227	NCIG	SURGE LINE YOKES STIFFENERS FIT-UP	35	35	37.14(13)	199	12.56([illegible])	1643	[illegible]

Original Populations -- Visual Test Results Only

POPULATION	SAMPLE Size	COMPONENTS Inspd	% Dev.	WELDS Inspd	% Dev.	ATTRIBUTES Inspd	% Dev.
228 ANSI ALL WELDING ON 6 INCH FIRE PROTECTION CHECK VALVES	10	10	100.00(10)	10	100.00(10)	100	19.00(19)
229 NCIG SLAG INCLUSIONS ON STEAM GEN. POD'S	18	18	44.44(8)	70	18.57(13)	700	3.14(22)
230 NCIG VISUAL ACCEPTANCE FOR PIPE SLEEVES (70-10C &687)	92	92	20.65(19)	530	13.26(57)	3710	1.56(58)
		1508	616	11874	2343	123245	1058

Overall % Component Deviant: 38.79
Overall % Weld Deviant : 19.92
Overall % Characteristic Deviant : 2.68

Additional Populations -- Visual Test Results Only

POPULATION			SAMPLE Size	COMPONENTS Inspted	COMPONENTS % Dev.	WELDS Inspted	WELDS % Dev.	ATTRIBUTES Inspted	ATTRIBUTES % Dev.
252	NCIG	NCIG MECHANICAL EQUIPMENT SUPPORTS	26	54	37.04(20)	353	43.06(152)	2488	10.33(257)
252A	ASME	ASME MECHANICAL EQUIPMENT SUPPORTS	28	29	0.00(0)	29	0.00(0)	348	0.00(0)
254	NCIG	Electrical Equipment Supports	66	66	53.13(34)	385	37.92(146)	3950	4.99(197)
257	ASME	Stainless Fuel Pool Liner	64	64	35.94(23)	64	35.94(23)	906	3.09(28)
				211	77	831	321	7692	482

Overall % Component Deviant: 36.49
Overall % Weld Deviant : 38.63
Overall % Characteristic Deviant : 6.27

Expansion Populations -- Visual Test Results Only

POPULATION			SAMPLE Size	COMPONENTS Inspd	COMPONENTS % Dev.	WELDS Inspd	WELDS % Dev.	ATTRIBUTES Inspd	ATTRIBUTES % Dev.
250	NC18	CABLE TRAY CLIPS	78	78	37.18(29)	154	27.27(42)	307	13.68(42)
251	NC18	J,202,225 EXPANSION	30	30	36.67(11)	198	16.16(32)	540	8.70(47)
255	NC18	Support Bracing, Strl Expansion	9	9	100.00(9)	62	74.19(46)	579	13.82(80)
256	NC18	Main Frame Structural Expansion	13	13	76.92(10)	48	56.25(27)	494	8.06(39)
260	NC18	Group B Expansion	30	30	50.00(15)	1066	13.04(139)	2843	5.59(159)
261	NC18	Group 227 Expansion	10	10	40.00(4)	57	8.77(5)	151	4.64(7)
262	ASME	Class I & II Small Bore ASME	86	86	2.33(2)	86	2.33(2)	516	0.39(2)
263	NC18	Group E Expansion	30	31	61.29(19)	1108	18.82(207)	*****	3.04(339)
264	ASME	ASME Class MC Welds	64	64	54.69(35)	68	54.41(37)	960	10.21(98)
265	NC18	Group G Expansion	30	30	30.00(9)	196	17.95(35)	370	8.65(32)
266	NC18	Group 234 Expansion	30	30	73.33(22)	171	63.16(108)	503	24.25(122)
				411	168	3166	673	18422	947

Overall % Component Deviant: 40.15
Overall % Weld Deviant : 21.26
Overall % Characteristic Deviant : 5.25

Expansion Populations -- Radiographic Test Results Only

POPULATION	SAMPLE Size	COMPONENT Inspctd	COMPONENT % Dev.	WELD Inspctd	WELD % Dev.
249 ASME RADIOGRAPHIC REVIEW OF ASME COMPONENTS	1696	1696	10.20(173)	1696	10.20(173)
253 ASME RADIOGRAPHIC REVIEWS	104	104	20.19(21)	104	20.19(21)
258 ASME Balance of the B-list Radiographic Film	1278	1278	7.12(91)	1278	7.12(91)
			285	3078	285

Overall % Component Deviant:
Overall % Weld Deviant : 9.26

NDE Populations -- Liquid Penetrant Test Results

POPULATION			SAMPLE Size	COMPONENT Inspted	COMPONENT % Dev.	WELD Inspted	WELD % Dev.
013	ASME	ERCW 8" LINES @ UNIT 1 ANULUS ENTRY	26	26	7.69(2)	26	7.69(2)
034	ASME	EC-SP-34, CRACK IN VALVE BODY/WELD ZONE	2	2	0.00(0)	2	0.00(0)
210	ASME	WELDER QUALIFICATION BACK-DATE QUESTION	60	15	0.00(0)	15	0.00(0)
224	ASME	PRESSURE BOUNDARY WELDING VISUAL FINAL ACCEPTANCE	64	31	19.35(6)	31	19.35(6)
252	NCIG	NCIG MECHANICAL EQUIPMENT SUPPORTS	26	29	0.00(0)	29	0.00(0)
252A	ASME	ASME MECHANICAL EQUIPMENT SUPPORTS	28	28	0.00(0)	28	0.00(0)
257	ASME	Stainless Fuel Pool Liner	64	64	1.56(1)	64	1.56(1)
262	ASME	Class I & II Small Bore ASME	86	86	3.49(3)	86	3.49(3)
264	ASME	ASME Class MC Welds	64	3	33.33(1)	3	33.33(1)
A	ASME	ASME SMALL BORE PIPE	64	31	9.68(3)	31	9.68(3)
B	ASME	ASME LARGE BORE PIPE	64	22	4.55(1)	22	4.55(1)
				337	17	337	17

Overall % Component Deviant: 5.06
Overall % Weld Deviant : 5.06

NDE Populations -- Ultrasonic Test Results

POPULATION			SAMPLE Size	COMPONENT Inspted	COMPONENT % Dev.	WELD Inspted	WELD % Dev.
003	NCIG	EC-SP-3, S. VALVE ROOM STRL. WELDS SUBSURFACE DEF.	2	2	50.00(1)	2	50.00(1)
004	NCIG	EC-SP-4, SLUGGED SEAM WELDS ON BOX ANCHORS	2	2	50.00(1)	4	25.00(1)
012	NCIG	EC-SP-12, S. VALVE ROOM CRACKED WELDS	2	2	50.00(1)	2	50.00(1)
013	ASME	ERCW 8" LINES B UNIT 1 ANNULUS ENTRY	26	25	0.00(0)	25	0.00(0)
022	NCIG	EC-SP-22, HVAC FRAMES WITH 4" BY 5" CUTOUTS	1	1	100.00(1)	3	100.00(3)
203	NCIG	D.GEN. #5 FIRE PROTECTION WELD PREP.	12	12	0.00(0)	12	0.00(0)
214	NCIG	WINTER 1983 FABRICATED M/S VALVE ROOM STEEL	92	41	31.71(13)	81	22.22(18)
229	NCIG	SLAG INCLUSIONS ON STEAM GEN. PDC'S	18	18	77.78(14)	70	37.14(26)
264	ASME	ASME Class MC Welds	64	3	0.00(0)	3	0.00(0)
8	ASME	ASME LARGE BORE PIPE	74	1	0.00(0)	1	0.00(0)
				107	31	203	50

Overall % Component Deviant: 28.97
Overall % Weld Deviant : 24.63

NDE Populations -- Radiographic Test Results (All)

POPULATION			SAMPLE Size	COMPONENT Inspd	COMPONENT % Dev.	WELD Inspd	WELD % Dev.
006	ASME	RHR 14" SS REDUCED WALL EVALUATION	2	2	0.00(0)	2	0.00(0)
018	ASME	EC-SP-18, RT NOT PREFORMED AFTER A REPAIR	1	1	0.00(0)	1	0.00(0)
034	ASME	EC-SP-34, CRACK IN VALVE BODY/WELD ZONE	2	2	100.00(2)	2	100.00(2)
210	ASME	WELDER QUALIFICATION BACK-DATE QUESTION	60	8	0.00(0)	8	0.00(0)
249	ASME	RADIOGRAPHIC REVIEW OF ASME COMPONENTS	1696	1696	10.20(173)	1696	10.20(173)
253	ASME	RADIOGRAPHIC REVIEW	104	104	20.19(21)	104	20.19(21)
258	ASME	Balance of the Q-list Radiographic Film	1278	1278	7.12(91)	1278	7.12(91)
A	ASME	ASME SMALL BORE PIPE	64	1	100.00(1)	1	100.00(1)
B	ASME	ASME LARGE BORE PIPE	74	17	35.29(6)	17	35.29(6)
				3109	294	3109	294

Overall % Component Deviant: 9.46
Overall % Weld Deviant : 9.46

NDE Populations -- Magnetic Particle Test Results

POPULATION			SAMPLE Size	COMPONENT Inspcd	COMPONENT % Dev.	WELD Inspcd	WELD % Dev.
207	NCIG	POST WELD HEAT TREAT ON STEAM GEN NOZS.	31	31	9.68(3)	31	9.68(3)
224	ASME	PRESSURE P .NDARY WELDING VISUAL FINAL ACCEPTANCE	64	7	42.86(3)	7	42.86(3)
263	NCIG	Group E Expansion	30	1	0.00(0)	155	0.00(0)
264	ASME	ASME Class MC Welds	64	64	12.50(8)	65	12.31(8)
8	ASME	ASME LARGE BORE PIPE	76	16	18.75(3)	16	18.75(3)
				119	17	274	17

Overall % Component Deviant: 14.29
Overall % Weld Deviant : 6.20

NDE Populations -- Radiographic Test Results

POPULATION	SAMPLE Size	COMPONENT Inspctd	COMPONENT % Dev.	WELD Inspctd	WELD % Dev.
249 ASME RADIOGRAPHIC REVIEW OF ASME COMPONENTS	1696	1696	10.20(173)	1696	10.20(173)
253 ASME RADIOGRAPHIC REVIEWS	104	104	20.19(21)	104	20.19(21)
258 ASME Balance of the Q-list Radiographic Film	1278	1278	7.12(91)	1278	7.12(91)
		3078	285	3078	285

Overall % Component Deviant: 9.26
Overall % Weld Deviant : 9.26

INSPECTION DATA SUMMARY FOR SPECIAL GROUPS

GROUP DESIGNATOR: 261

GROUP TITLE: Group 227 Expansion

TOTAL NO. OF EXAMINATION PACKAGES: 10

% INSPECTIONS COMPLETED: 100.00 (10)

TOTAL NUMBER OF WELDS: 57

TOTAL NO. OF CHARACTERISTICS: 151

% CHARACTERISTICS DEVIANT: 4.64 (7)

GROUP DESIGNATOR: 262

GROUP TITLE: Class I & II Small Bore ASME

TOTAL NO. OF EXAMINATION PACKAGES: 86

% INSPECTIONS COMPLETED: 100.00 (86)

TOTAL NUMBER OF WELDS: 86

TOTAL NO. OF CHARACTERISTICS: 516

% CHARACTERISTICS DEVIANT: 0.39 (2)

NOTE:

1. Deviations with TVA prior Resolutions have been removed.

APPENDIX D
WELD EVALUATION PROJECT
GROUP CLOSURE REPORTS

APPENDIX D

WELD EVALUATION PROJECT

GROUP CLOSURE REPORTS

Group Closure Reports - 1987

1.2.3.4.5.6.7.8.9.10.11.12.13.14.15.16.17.18.19.20.21.22.23.24.25.

26.27.28.29.30.31.32.33.34.36.201.202.203.204.205.206/217.207.208.

209.210.211.212.213.214.215/218.216.219.220.221.222.223.224/245.

225.226.227/261.228.229.230.231.232.233.234/236.235.237.238.239.

240.241.242.243.244.246.247.248.249/253/258.252.254/266.257.264.

A/262.B.C.D/260.E/255/256/263.F.G/265.H/259.I.J/250/251.K.L.M/35

gab 12-16-87

Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE WELDS PERFORMED USING THE SHIELDED METAL ARC (SMAW) PROCESS WEP GROUP IDENTIFIER EC-SPL-1	Page 1 of 5 Date 11/11/87 Revision 1 WEP Group No 201

Approved [signature] Date 11-27-87

Reviewed [signature] Prepared [signature] FOR NORMAN STUCKI

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

The employee concerns involving welding by the shielded metal arc process addressed three different subjects:

DRR
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936

Group 1: Management philosophy concerning filler metal control.

Employee Concerns WI-85-041-009/03A21/3.A, IN-85-725-011/03A24/3.A, IN-86-047-001/03B08/3.A, and WI-85-002-001/03B23/3.A.

Group 2: Manufacturing factors.

Employee Concerns IN-86-305-004/03A23/3.A, and IN-85-947-005/03B41/3.A.

Group 3: Improper weld filler metal control.

Employee Concerns IN-85-001-002/03A01/3.A, WI-85-053-004/03B21/3.A, IN-85-768-X06/03A20/3.A, IN-85-454-004/03A08/3.A, IN-85-310-005/03B02/3.A, IN-85-453-009/03A15/3.A, EX-85-061-003/03A25/3.A, IN-85-426-001/03A10/3.A, EX-85-021-001/03A16/3.A, IN-85-352-002/03A06/3.A, IN-85-052-008/03A02/3.A, IN-85-337-002/03A04/3.A, IN-85-424-007/03A13/3.A, IN-85-424-001/03A11/3.A, IN-85-441-003/03A18/3.A, IN-85-234-001/03A05/3.A, IN-85-501-001/03A03/3.A, EX-85-039-001/03A26/3.A, and IN-86-039-001/03B45/3.A

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE WELDS PERFORMED USING THE SHIELDED METAL ARC (SMAW) PROCESS WEP GROUP IDENTIFIER EC-SPL-1	Page 2 of 5 Date 11/11/87 Revision 1 WEP Group No 201

2. Characterization of Issue

Employee Concerns in Group 1 involved the perceived Tennessee Valley Authority (TVA) management philosophy at Watts Bar Nuclear Plant Unit 1 (WBNP-1) pertaining to filler metal control. This issue was outside the scope of the Department of Energy/Weld Evaluation Project (DOE/WEP). DRR WEP 936

Employee Concerns in Group 2 involved improper accountability and traceability of weld filler material.

Employee Concerns in Group 3 identified problems pertaining to improper storage, issue, and control of weld filler material.

3. Summary

The issues for which this group was formed were resolved by document review and engineering evaluation.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 201 (Reference 7.2) was developed to perform an evaluation of the welds in this group. In accordance with the assessment plan for Group 201, the following documents were reviewed: the TVA Quality Assurance Program procedures, American Society of Mechanical Engineers (ASME) and American Welding Society (AWS) codes, TVA historical filler metal inventory log, TVA weekly surveillance reports, and supplier certified material test reports.

An engineering evaluation was also conducted to determine the effect high moisture content electrodes had on welded construction at WBNP-1.

In addition, nondestructive examination (NDE) Evaluation Data Sheet radiographic forms and associated film were reviewed to determine if weld discrepancies were caused by filler material moisture absorption.

5. Findings

The concerns in Group 2 involved manufacturing factors that were not related to filler metal control. However, neither of these concerns were a violation of the ASME or AWS codes (Reference 7.3). DRR WEP 936

The TVA procedures involving filler metal control were reviewed and compared with applicable requirements set forth in AWS and ASME codes. The welding filler material used at WBNP-1 was purchased in

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE WELDS PERFORMED USING THE SHIELDED METAL ARC (SMAW) PROCESS WEP GROUP IDENTIFIER EC-SPL-1	Page 3 of 5 Date 11/11/87 Revision 1 WEP Group No 201

compliance with AWS filler metal specifications. The TVA implementation of filler metal requirements were in accordance with AWS and ASME codes (Reference 7.4).

In 1979, the AWS D1.1 code added a provision to extend exposure time of electrode provided the extended time-maximum moisture test was performed by the user. The TVA elected to use the extended time; therefore, they conducted the required tests. The procurement, storage, issue, and control procedures were revised to incorporate the change in AWS D1.1. The storage requirements as related to holding and drying ovens, method of issue, and control were addressed in Reference 7.5.

The weekly Surveillance Report records were reviewed from 1974 to 1985. The records verified that quality control (QC) surveillance of storage, issue, and control of filler metal was conducted on a continuous basis. Most of the discrepancies involved poor housekeeping, electrodes lying on floors around deposit boxes, in the welding area, record take out, etc. Of the total 76 discrepancies, 49 were in the first 2 years of the program (Reference 7.6).

Several of the employee concerns addressed insufficient accountability and traceability of the weld rod. The ASME Section III paragraph NB-4122 requires filler metal traceability to the component or ". . . a control procedure shall be employed which ensures that the specified materials are used." The TVA utilized process specifications to implement the "control procedure" required by the code. The DOE/WEP's evaluation of TVA's process specifications and their methods of implementing the "control procedure" confirmed that the TVA met the code (Reference 7.7).

The majority of concerns dealt with insufficient control requirements that allowed the possibility of electrodes being used that exceeded the atmospheric exposure time limit. Exceeding the exposure time limits would permit the possibility of excessive moisture absorption into the electrode coating. Excessive moisture causes the possibility of hydrogen diffusion into the deposited weld and heat affected zone (HAZ). When conditions such as material composition, metal thickness, and weld heat input are at certain boundaries, diffusible hydrogen may cause hydrogen-assisted cracking (HAC). An engineering evaluation was conducted to determine the various welding/metallurgical conditions that could exist at WBNP-1. Because the conditions and or factors are interrelated, worst-case boundaries were used in setting up the weld test evaluation. The test conducted by Materials Applications,

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE WELDS PERFORMED USING THE SHIELDED METAL ARC (SMAW) PROCESS WEP GROUP IDENTIFIER EC-SPL-1	Page 4 of 5 Date 11/11/87 Revision 1 WEP Group No 201

Inc. (MAI) simulating welding parameter conditions worse than that postulated by employee concerns exhibited no hydrogen-assisted cracking (Reference 7.8).

An additional evaluation was made on ASME weldments because there was a possibility of hydrogen-assisted cracking in weldments greater than 0.8 in. thick if high moisture content electrodes were used (Reference 7.9). As weld rod control was the same for both ASME- and AWS-type welding, 270 weld operation sheets covering fabrication of items greater than 0.8 in. thick were reviewed for NDE results. Base metal and filler metal control was the same as used for structural welding. The radiographic records were reviewed to determine if any crack-type defects were recorded. All NDE Evaluation Data Sheet radiographic forms reviewed showed no crack-type interpretations. The thickness range reviewed was 0.844 through 1.175 in. Additionally, the DOE/WEP radiographic review of 3091 safety-related pipe welds showed 3 welds, having wall thickness in the 0.8 to 1.175 in. range, which exhibited crack-type indications. The DOE/WEP performed an engineering evaluation of the three welds and determined that the cracks were not the result of hydrogen-assisted cracking (Reference 7.9).

6. Conclusions

The employee concerns regarding improper accountability and traceability of weld filler material were not confirmed. The employee concerns regarding improper storage, issue, and control of weld filler material could not be confirmed. However, the DOE/WEP concludes that TVA's action in the area of the concerns addressed are in compliance with the applicable Final Safety Analysis Report (FSAR) construction code.

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936

7. References

7.1 Employee Concerns WI-85-041-009/03A21/3.A, IN-85-725-011/03A24/3.A, IN-86-047-001/03B08/3.A, WI-85-002-001/03B23/3.A, IN-86-305-004/03A23/3.A, IN-85-947-005/03B41/3.A, IN-85-001-002/03A01/3.A, WI-85-053-004/03B21/3.A, IN-85-768-X06/03A20/3.A, IN-85-454-004/03A08/3.A, IN-85-310-005/03B02/3.A, IN-85-453-009/03A15/3.A, EX-85-061-003/03A25/3.A, IN-85-426-001/03A10/3.A, EX-85-021-001/03A16/3.A, IN-85-352-002/03A06/3.A, IN-85-052-008/03A02/3.A, IN-85-337-002/03A04/3.A, IN-85-424-007/03A13/3.A, IN-85-424-001/03A11/3.A, IN-85-441-003/03A18/3.A, IN-85-234-001/03A05/3.A, IN-85-501-001/03A03/3.A, EX-85-039-001/03A26/3.A, and IN-86-039-001/03B45/3.A.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE WELDS PERFORMED USING THE SHIELDED METAL ARC (SMAW) PROCESS WEP GROUP IDENTIFIER EC-SPL-1	Page 5 of 5 Date 11/11/87 Revision 1 WEP Group No 201

7.2 WEP Assessment Plan 201, "Welds Performed Using the Shielded Metal Arc (SMAW) Process," Rev. 0, August 19, 1986.

7.3 N. D. Stucki, "Concerns Addressing Manufacturing Factors Not Related to Filler Metal Control," WEP Group 201 Documentation Report, September 1987.

7.4 N. D. Stucki, "AWS Filler Metal Specifications," WEP Group 201 Documentation Report, September 1987.

7.5 N. D. Stucki, "TVA Filler Metal Storage Requirements," WEP Group 201 Documentation Report, September 1987.

7.6 N. D. Stucki, "Weekly Surveillance Report Findings," WEP Group 201 Documentation Report, September 1987.

7.7 N. D. Stucki, "Controlled Process As Specified By ASME Code and TVA Process Specifications," WEP Group 201 Documentation Report, September 1987.

7.8 N. D. Stucki and P. D. O'Leary, "Effect of Electrode Condition and The Potential for Hydrogen Assisted Cracking In Structural Welding at Watts Bar Nuclear Plant," Engineering Evaluation Report, November 1986.

7.9 N. D. Stucki notegram to WEP Group 201 File, "Engineering Evaluation of Crack Type Indication Documented Per Weld Numbers 1-0038-D002-08, 1-001A-D009-06 and 1-001A-D003-01A," July 2, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE ELECTRICAL SUPPORT WELDS WEP GROUP IDENTIFIER EC-SPL-2	Page 1 of 3 Date 11/11/87 Revision 1 WEP Group No 202

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ For R. C. Hintz

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-85-055-003.

2. Characterization of Issue

The employee concern reported that electrical supports in the Auxiliary Building on Elevation 713 were welded by unqualified apprentice electricians. The welding occurred during 1980 through 1981. Some of these welds were identified and repaired. However, some welds went uncorrected. Existing weld quality is indeterminate.

The American Welding Society D1.1 does not require that permanent weld records be retained for matching a individual welder to a specific weld joint. Therefore, the issue of welder qualification was not specifically addressed and the Department of Energy/Weld Evaluation Project (DOE/WEP) addressed the issue of weld quality only.

3. Summary

The issue for which the group was formed was resolved by inspection and engineering analysis.

4. Evaluation Methodology

The DOE/WEP developed Assessment Plan No. 202 (Reference 7.2) to evaluate a representative sample per Standard Practice (SP) WEP 3.1.6 (Reference 7.3) from the total population in the specified area, and perform a visual examination on the sample welds. The individual

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE ELECTRICAL SUPPORT WELDS WEP GROUP IDENTIFIER EC-SPL-2	Page 3 of 3 Date 11/11/87 Revision 1 WEP Group No 202

confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 Employee Concern IN-85-055-003.

7.2 WEP Assessment Plan No. 202, "Cable Tray Support Clip Welds (EC-SPL-2)," Rev. 1, September 23, 1986.

7.3 Standard Practice WEP 3.1.6, "Identifying Random Samples from Homogeneous Groups," Rev. 5, October 24, 1986.

7.4 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987.

7.5 DOE/WEP Examination Packages for Group 202 (64 total).

7.6 Group 202 "Inspection Data Report on Weld Evaluation Project," INS 101-R1 and INS 008-R0, August 10, 1987.

7.7 WEP Suitability For Service Summary Review Sheet, Analysis Package WDR 202-0002 R1 (and subsequent packages for Group 202).

7.8 "Generic Problem Analysis of Weld Examination Results From Group 250," Inspection Results and Data Analysis Summary Report, Rev. 1, August 27, 1987.

7.9 "Generic Problem Analysis of Weld Examination Results From Group 251," Inspection Results and Data Analysis Summary Report, Rev. 1, August 27, 1987.

7.10 "Generic Problem Analysis of Weld Examination Results From Groups J, 202, and 225," Inspection Results and Data Analysis Summary Report, Rev. 1, August 24, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE FIRE PROTECTION WELDS IN THE DIESEL GENERATOR BUILDING NUMBER 5 WEP GROUP IDENTIFIER EC-SPL-6	Page 1 of 3 Date 11/11/87 Revision 1 WEP Group No 203

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern WI-85-064-005.

2. Characterization of Issues

The employee concern states: "Fire protection system piping has been improperly welded. Details known to QTC, withheld due to confidentiality."

Additional information obtained from Quality Technology Company (Reference 7.2) by the Department of Energy Weld Evaluation Project (DOE/WEP) determined that the problem area boundary is welds in the Fire Protection System in the Diesel Generator Building Number 5 (DGB 5) were possibly welded using square butt groove welds rather than single bevel V-groove welds as required by design. This substitution of weld preparation configuration could result in incomplete penetration.

The fire protection welds in DGB-5 were required to be installed in accordance with Tennessee Valley Authority (TVA) General Construction Specification G-29M, Process Specification 1.M.1.2 (Reference 7.3) and are classified as TVA Class G (ANSI B31.1-73) (Reference 7.4), safety-related.

3. Summary

The issue for which the group was formed was resolved by nondestructive examination.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE FIRE PROTECTION WELDS IN THE DIESEL GENERATOR BUILDING NUMBER 5 WEP GROUP IDENTIFIER EC-SPL-6	Page 2 of 3 Date 11/11/87 Revision 1 WEP Group No 203

4. Evaluation Methodology

The DOE/WEP Assessment Plan (Reference 7.5) was developed to evaluate the welds in this group. Because the exact location of the suspect welds could not be determined, the butt welds located in DGB-5 were sampled, in accordance with the assessment plan. Review of Drawing 17W586-6 Revision 10 and 0-026-47W850-10-H1R5 (Reference 7.6) disclosed a total of 12 welds within the boundary of inspection. Sampling per Standard Practice WEP 3.1.6 (Reference 7.7) required inspection of all welds.

Lack of penetration would be the most probable defect caused by performing square butt joint welds. Therefore, twelve examination packages (Reference 7.8) were prepared to determine by ultrasonic inspection (Reference 7.9) if any of the twelve welds showed lack of penetration.

DRR WEP 938

5. Findings

The results of the ultrasonic inspection proved satisfactory. No lack of penetration was found in any of the 12 welds (Reference 7.10).

6. Conclusion

The conditions identified in the employee concern were not confirmed. The DOE/WEP concludes that, for the attribute of concern as specified in the referenced assessment plans, the welds meet the Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 Employee Concern WI-85-064-005.

7.2 Quality Technology Company, File Number 1007, dated February 24, 1986.

7.3 TVA General Construction Specification G-29M, Process Specification 1.M.1.2.

7.4 The American Society of Mechanical Engineers, "Power Piping," ANSI B31.1, June 15, 1973, w[illegible] Summer 1973 Addenda.

7.5 WEP Assessment Plan No. 203, "Fire Protection Piping System Safety-Related Welds Located in the Diesel Generator Building No. 5 (EC-SPL-6), Rev. 3, August 21, 1987.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE FIRE PROTECTION WELDS IN THE DIESEL GENERATOR BUILDING NUMBER 5 WEP GROUP IDENTIFIER EC-SPL-6	Page 3 of 3 Date 11/11/87 Revision 1 WEP Group No 203

7.6 TVA Drawings 17W586-6 (R 10) and 0-026-47W850-10-H1R5.

7.7 Standard Practice WEP 3.1.6, "Identifying Random Samples From Homogeneous Groups," Rev. 05, October 24, 1986.

7.8 WEP Group 203, Inspection Results, INS 008-R0, August 21, 1987.

7.9 Standard Practice WEP 3.2.9, "ASME/ANSI Ultrasonic Examination and Acceptance Criteria," July 29, 1986.

7.10 "Generic Problem Analysis of Group 203," Inspection Results and Data Analysis Summary Report, Rev. 0, November 21, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE WELD PROCEDURE NOT FOLLOWED ON INTAKE PIPING WEP GROUP IDENTIFIER EC-SPL-7	Page 1 of 3 Date 11/11/87 Revision 2 WEP Group No 204

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP ? ..10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern PH-85-035-003.

2. Characterization of Issue

Employee Concern PH-85-035-003 indicated that the "32-inch diameter" American Society of Mechanical Engineers (ASME) Section III heavy wall intake pipe from the Pump House (at the river) to the reactor at Watts Bar Nuclear Plant (WBNP) Unit 1, was welded with 6010 welding rod instead of 7018 welding rod as required by procedure. This was said to occur around 1983. | DRR WEP 939

3. Summary

The issue for which this group was formed was resolved by document review.

4. Evaluation Methodology

Special Group 204 was formed to determine if 6010 weld rod was used in place of the 7018 weld rod that was required per the welding procedure used. Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan 204 was developed to determine what weld procedures were allowed, which weld procedures were used, which weld rod was used, and if 6010 weld rod was purchased for Watts Bar Nuclear Power Plant.

Form WEP 320a
Rev. 12/86

WEP Closure Statement — Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE WELD PROCEDURE NOT FOLLOWED ON INTAKE PIPING WEP GROUP IDENTIFIER EC-SPL-7	Page 2 of 3 Date 11/11/87 Revision 2 WEP Group No 204

5. Findings

The DOE/WEP performed an independent review on all Unit 1 and Unit 1 and 2 common intake piping welds between the pumphouse and the reactor building. The review concluded that the system described by the concern was the Essential Raw Cooling Water (ERCW) system. However, the ERCW system contains no 32 inch diameter pipe, only 30 inch and 36 inch.

During the course of investigation, the DOE/WEP determined that the TVA had a system repair and modification program in effect in 1982 for the ERCW system. (This approximate date coincides with the date of the employee concern - 1983.) Some of these weld joints were cut out, and new welds were made during this modification effort. The DOE/WEP reviewed 62 of the weld operation sheets (WOS) associated with the repair and modification process to the ERCW system. It was determined that two qualified Detail Weld Procedures were authorized for these repairs. Procedure SM11-0-1A uses E7010 electrodes for the root pass, and E7018 for the remainder of the weld. This procedure is for welding of open root butt joints. The other procedure was SM11-B-3, for welding butt joints with a backing ring using only E7018 electrodes. | DRR WEP 939

The DOE/WEP review showed that Detail Weld Procedure SM11-B-3 was used. The Weld Filler Material Requisitions showed that E7018 electrodes were issued for the repair and modification (Reference 7.3). DOE/WEP also reviewed the Weld Monitoring Status Report for all intake piping welds between the pump house and the reactor building. This review of 683 entries showed that for shielded metal arc welding only procedures for E7018 electrodes were used.

In addition, the DOE/WEP reviewed a sample of Weld Operation Sheets and Weld Filler Material Requisitions for the original construction of the ERCW System. This review also revealed that for shielded metal arc welding, only E7018 electrodes were used. | DRR WEP 939

A review of TVA weld filler material purchase requisitions established that E 6010 electrodes were never purchased by TVA construction. A purchase order for 50 lbs of E 6010 electrodes by WBN mechanical maintenance, power stores requisition No. 8204 07385 dated June 14, 1984, was the only evidence located for procurement of this electrode. This purchase was for a nonsafety weld application (repair of the turbine building station sump) and was subsequent to the time frame of this concern.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE WELD PROCEDURE NOT FOLLOWED ON INTAKE PIPING WEP GROUP IDENTIFIER EC-SPL-7	Page 3 of 3 Date 11/11/87 Revision 2 WEP Group No 204

Based on the DOE/WEP review and investigation, there is no existing evidence to substantiate the employee concern. Therefore, additional investigation for this concern is unwarranted.

6. Conclusions

The issue identified in the employee concern was not confirmed. The DOE/WEP concludes that the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

DRR
WEP
939

7. References

7.1 Employee Concern PH-85-035-003.

7.2 WEP Assessment Plan No. 204, "Safety-Related Heavy Wall Intake Piping (EC-SPL-7)," Rev. 2, July 15, 1987.

7.3 J. M. Savage Interoffice Correspondence to J. R. Cox, "Special Group 204--Safety-Related Heavy Wall Intake Piping (EC-SPL-), JMS-05-87, EG&G Idaho, Inc., dated August 17, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSPECTION OF WELDS THROUGH CARBO-ZINC PRIMER WEP GROUP IDENTIFIER EC-SPL-8	Page 1 of 4 Date 11/12/87 Revision 1 WEP Group No 205

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ FOR R. C. Hintz

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns IN-85-458-001, IN-85-476-003, IN-85-767-003, IN-86-019-001, NS-85-001-001, PH-85-040-001, WI-85-013-003, WI-85-030-007, WI-85-030-008, WI-85-030-009, WI-85-041-004, WI-85-041-006, WI-85-041-007, WI-85-041-008, and WI-85-041-010.

2. Characterization of Issue

The employee concerns questioned the Tennessee Valley Authorities (TVA) use of TVA visual inspection through carbo-zinc primer 3C.5.4 for reinspection of American Welding Society (AWS) D1.1 welds. The welds in question were all American Welding Society (AWS) welds fabricated prior to November 2, 1981, primed with carbo-zinc and reinspected from December 1, 1981, through January 23, 1984, without removing the primer. There were also concerns that initial inspections may have been performed from December 1, 1981, through January 23, 1984, through carbo-zinc primer.

DRR WEP 940

Inspection of welds through paint is not allowable per the AWS D1.1 code. However, weld reinspection through primer is not a violation of the AWS code. As part of a sample reinspection program, welds were reinspected through primer to determine their adequacy and the adequacy of previous inspections performed on welds made before November 2, 1981. Welds visually inspected for weld quality (porosity, lack of fusion, cracks, etc.) were to have the paint removed prior to inspection.

The Nuclear Safety Review Staff (NSRS) performed the initial investigation into the problem of inspection through primer and had

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSPECTION OF WELDS THROUGH CARBO-ZINC PRIMER WEP GROUP IDENTIFIER EC-SPL-8	Page 2 of 4 Date 11/12/87 Revision 1 WEP Group No 205

found the employee concerns to be valid, but could not determine the extent of welds originally inspected after painting.

The Department of Energy/Weld Evaluation Project (DOE/WEP) Group 205 was formed to determine if the inspection of welds through paint had a detrimental effect on weld quality for the time frame December 1, 1981, through January 23, 1984.

3. Summary

The issue for which this group was formed was resolved by inspection/examination, document review, and engineering analysis.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 205 (Reference 7.3) was developed to extract a representative sample per Standard Practice (SP) WEP 3.1.6 (Reference 7.4) of AWS welds inspected in the time frame of December 1, 1981, to January 23, 1984.

The DOE/WEP determined that the concerns in this group would be adequately addressed by the results of the inspections performed in the DOE/WEP General Groups D, F, G, I, and K, because these results represent all of the AWS DOE/WEP homogeneous general groups that were fabricated and/or inspected in this time frame. In the welds randomly sampled all paint and primer were removed from the welds and heat affected zones, and a 100% visual inspection per SP WEP 3.2.3 (Reference 7.5) was performed.

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WEP
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5. Findings

Qualification tests performed by the TVA (Reference 7.6, page 5 of 14) have shown that visual inspection through carbo-zinc primer is acceptable for weld configuration (overlap, undercut, size, location), large cracks and coarse porosity. It would be unacceptable for locating small cracks and fine porosity.

Based on this qualification, the areas of concern for visual inspection conducted through carbo-zinc primer is limited to small cracks and fine porosity. Of the 1,457 welds visually inspected by the DOE/WEP for Groups D, F, G, I, and K fabricated and/or inspected during the time frame December 1, 1981 through January 23, 1984, one was rejected for a crack and none were rejected for porosity.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSPECTION OF WELDS THROUGH CARBO-ZINC PRIMER WEP GROUP IDENTIFIER EC-SPL-8	Page 3 of 4 Date 11/12/87 Revision 1 WEP Group No 205

The DOE/WEP analysis of the reinspection data compared deviation rates for the welds inspected by the TVA prior to, during, and following the time period described (Reference 7.7). Each relevant attribute was analyzed to determine if any significant differences existed for the deviation rates for each different time period. The analysis indicated that if any initial visual inspections were performed through paint, no significant differences existed between deviation rates and the applicable time pe ds. All components identified as pertaining to the evaluation of welds for Group 205 have been determined by the TVA to be suitable for service. As indicated in closure statements for Groups D, F, G, I and K, the DOE/WEP has concurred with these suitability-for-service analyses and determined that the associated welds meet the applicable construction codes.

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WEP
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6. Conclusions

The issues identified in the employee concerns could not be confirmed. The DOE/WEP concludes with a high degree of confidence that welds in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. The basis for the DOE/WEP's conclusion was the evaluation of groups which included examination of all the weld attributes on the randomly selected components after removing coatings, regardless of whether or not the welds were previously inspected and/or reinspected through the primer. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP also concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled welds within the boundary of this group are in compliance with the applicable FSAR construction code.

7. References

7.1 Employee Concerns IN-85-458-001, IN-85-476-003, IN-85-767-003, IN-86-019-001, NS-85-001-001, PH-85-040-001, WI-85-013-003, WI-85-030-007, WI-85-030-008, WI-85-030-009, WI-85-041-004, WI-85-041-006, WI-85-041-007, WI-85-041-008, and WI-85-041-010.

7.2 TVA Process Specification 3.C.5.4, Watts Bar Nuclear Plant Final Visual Weld Examination," Rev. a, January 25, 1982.

7.3 WEP Assessment Plan No. 205, "Inspection of Welds Through Carbo-Zinc Primer (EC-SPL-8)," Rev. 2, August 18, 1986.

7.4 Standard Practice WEP 3.1.6, "Identifying Random Samples From Homogeneous Groups," Rev. 5, October 24, 1986.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSPECTION OF WELDS THROUGH CARBO-ZINC PRIMER WEP GROUP IDENTIFIER EC-SPL-8	Page 4 of 4 Date 11/12/87 Revision 1 WEP Group No 205

7.5 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987.

7.6 TVA Memorandum, "Watts Bar Nuclear Plant-AWS Weld Program," January 30, 1984.

7.7 DOE/WEP Analysis, "Special Group 205 Inspection Through Paint," July 14, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN/QUALITY INDICATOR GROUP CLOSURE REWORK OF SAFETY-RELATED PROTECTIVE DEVICES WEP GROUP IDENTIFIER EC-SPL-9 and QI-SPL-1	Page 1 of 3 Date 09/22/87 Revision 0 WEP Group No 206 and 217

Approved _____ Date 9-23-87

Reviewed A.E. Bradford 9/23/87 Prepared Dennis Headington 9/22/87

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-86-301-001.

Tennessee Valley Authority (TVA) Nonconforming Condition Reports (NCRs) 3523R0, 3001R3, and 3325R1.

2. Characterization of Issue

Group 206 was formed to address Employee Concern IN-86-301-001. The concerned individual (CI) at TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1) states, "The PDs (Protective Devices) in the Reactor Building, Unit No. 1 have poor quality welds. This is a generic condition throughout the Reactor Building. CI would provide no additional information. Construction Department Concern."

The Department of Energy/Weld Evaluation Project (DOE/WEP) contacted the Quality Technology Company (QTC) for additional information. The CI refused to participate in a follow-up interview and did not want any further contact by the TVA Employee Response Team (ERT) or the QTC.

No time period for the conditions identified in the employee concern could be determined by the DOE/WEP.

Group 217 was formed to address a DOE/WEP concern established during the initial review of TVA NCRs 3523R0, 3001R3, and 3325R1, which relate to safety-related welds associated with PDs installed prior to January 1981. It was felt by the initial review of these NCR's that the welds on the PD's may not conform to the TVA's specified requirements, due to incomplete documentation attached to the NCR's for weld repairs and the reinspection of those repairs.

Form WEP 320a
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN/QUALITY INDICATOR GROUP CLOSURE RE'ORK OF SAFETY-RELATED PROTECTIVE DEVICES EC-SPL-9 and WEP GROUP IDENTIFIER QI-SPL-1	Page 2 of 3 Date 09/22/87 Revision 0 206 and WEP Group No 217

3. Summary

The issue for which these groups were formed was resolved by document review, inspection/examination, and engineering analysis.

4. Evaluation Methodology

The WEP Assessment Plans Nos. 206 and 217 (Reference 7.2) were developed to evaluate safety-related PDs in the Reactor Building, North Valve Room, and South Valve Room by performing a document review (Reference 7.3) and inspection/examination of the associated welds.

5. Findings

A complete review of all TVA drawings pertaining to WBNP-1 PDs was completed by the DOE/WEP in order to identify all safety-related PDs in the Reactor Building and North and South Valve Rooms. Additionally, all available NCRs and other quality indicators (QIs) were reviewed to verify the completeness of TVA's formal reinspection and rework program initiated for PDs installed prior to January 1981 (Reference 7.4). It was determined that all of the safety-related PDs were reinspected and reworked as required. The DOE/WEP verified reinspection records are available for the Unit 1 Reactor Building and North and South Valve Room.

To further address WEP Groups 206 and 217, the DOE/WEP used the inspection/examination results of PDs in WEP Groups D/260, E, and 214. Twenty-eight PDs, comprising a total of 469 welds, were examined. The following determinations were made:

a. There were 430 welds documented as acceptable.

b. The remaining 39 welds contained one or more conditions that required engineering analysis to determine acceptability.

The suitability-for-service analyses (SFSA) performed by the TVA determined all welds evaluated are suitable for service. The DOE/WEP reviewed and concurred with the TVA analysis (Reference 7.4) in accordance with Standard Practice (SP) WEP 3.3.1 (Reference 7.5).

The DOE/WEP performed generic problem analyses (GPA) on WEP Groups D/260, E, and 214. No generic problems were identified.

Documentation deviations for Groups D/260, E, and 214 were reported to the TVA in accordance with Reference 7.6.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN/QUALITY INDICATOR GROUP CLOSURE REWORK OF SAFETY-RELATED PROTECTIVE DEVICES WEP GROUP IDENTIFIER EC-SPL-9 and QI-SPL-1	Page 3 of 3 Date 09/22/87 Revision 0 206 and WEP Group No 217

6. Conclusions

The conditions and issues identified in the employee concern could not be confirmed. The DOE/WEP concludes that the TVA rework and reinspection of welds in these groups met the applicable Final Safety Analysis Report (FSAR) construction code. The DOE/WEP concludes that the welds evaluated in Groups 206 and 217 are in compliance with the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the boundary of these groups are in compliance with the applicable FSAR construction code.

7. References

7.1 Employee Concern IN-86-301-001 and Nonconforming Condition Reports (NCRs) 3523R0, 3001R3, and 3325R1.

7.2 WEP Assessment Plan Nos. 206 and 217, "Bad Welds on PDs Located in the Reactor Building," Rev. 1, August 17, 1987.

7.3 R. J. Roberts notegram to A. E. Bradford, "Justification for Closure--Employee Concerns and Quality Indicators on Welds of Protective Devices Located in Reactor Building, Watts Bar Nuclear Plant Unit 1," EG&G Idaho, Inc., May 27, 1986.

7.4 TVA Suitability-for-Service Analyses and WEP Suitability-for-Service Review Summary Sheets for Groups D/260, E, and 214.

7.5 Standard Practice WEP 3.3.1, "Suitability-for-Service Evaluation Review," Rev. 8, June 8, 1987.

7.6 F. E. Laurent TVA memorandum to F. C. Fogarty, Watts Bar Nuclear Plant--Incomplete or Missing Documentation, T25 870311 882, March 11, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED UNIT 1 STEAM GENERATOR SUPPORTS WEP GROUP IDENTIFIER EC-SPL-10	Page 1 of 4 Date 11/12/87 Revision 1 WEP Group No 207

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Employee Concerns IN-85-641-005, WI-85-081-003, and WI-85-064-002 (Reference 7.1).

2. Characterization of Issue

Employee Concerns IN-85-641-005 and WI-85-081-003 identified that safety related steam generator support welds and attachment welds to embed plates, installed at Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant (WBNP) Unit 1, were not welded in accordance with the TVA welding procedures. The required preheat was not applied to the weld joints. Employee Concern IN-85-641-005 also identified that welders were instructed by their foreman to weld over possible defective welds to make them "look" acceptable. DRR WEP 941

Employee Concern WI-85-064-002 identified that the trusses under the steam generators, installed at TVA WBNP Unit 1, may have been improperly welded. The concerned individual had no further information.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, engineering evaluation, engineering analysis, and the ultrasonic examination results from Group 229.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED UNIT 1 STEAM GENERATOR SUPPORTS WEP GROUP IDENTIFIER EC-SPL-10	Page 2 of 4 Date 11/12/87 Revision 1 WEP Group No 207

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) assessment plan No. 207 (Reference 7.2) was developed to evaluate the activities associated with the welding methodology relative to preheating of welds and improperly welded joints, possibly defective, employed on the steam generator supports.

The DOE/WEP conducted an evaluation of the welds associated with the steam generator supports and identified those welds that would be affected by lack of preheat as the tang plates welded to the upper support beams and an area of welding on the crossover leg supports. (DOE/WEP then provided a marked-up Drawing 48N421 R17 detailing the area in question.) The DOE/WEP randomly selected a sample of welds, of those identified above, from the total population of Group 207, in accordance with Nuclear Construction Issues Group document NCIG-02 (Reference 7.3).

A plant examination of the randomly selected welds (as detailed on Drawing 48N417 R12 and as highlighted on Drawing 48N421 R17) was performed to determine the acceptability of the population. The acceptance criteria used was a magnetic particle (MT) examination in accordance with Standard Practice (SP) WEP 3.2.5 (Reference 7.4). This examination would also determine the effect of "improper welding" and "possible defective welds" being welded over, as stated in the employee concerns. | DRR WEP 941

5. Findings

Thirty-one welds were MT examined from the total population of Group 207 and the following determinations were made (Reference 7.5):

A. Twenty-eight of the welds examined were documented as acceptable without further evaluation.

B. The remaining 3 welds (Examination Package No. 207-0002, 0009, and 0013) were examined and documented as having one or more surface indications that required characterization, in accordance with SP WEP 3.2.16 (Reference 7.6), for determination of final weld acceptance. These 3 welds were characterized and those indications were accepted without further evaluation. Consequently, as a result of the characterization process, grinding produced a violation of weld profile for groove weld thickness for examination Package No. 207-0009. However, the TVA performed a suitability-for-service analysis (SFSA) for the deviant weld identified and determined that the weld was in

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED UNIT 1 STEAM GENERATOR SUPPORTS WEP GROUP IDENTIFIER EC-SPL-10	Page 3 of 4 Date 11/12/87 Revision 1 WEP Group No 207

compliance with the applicable code. The DOE/WEP reviewed the analysis and concurred with the TVA SFSA (Reference 7.7).

During evaluation of Group 207, the DOE/WEP determined that the MT examination data was satisfactory to resolve the issue of "improper welding" and "possible defective welds" being welded over. However, the potential defects that could occur from "lack of preheat," cracking in the root, cannot be detected by the MT examination for the weld joints selected for Group 207. Therefore, DOE/WEP determined that the ultrasonic examination (UT) results from Group 229, which also evaluated steam generator support welds, which are similar in thickness and joint design, would be appropriate to use for conclusive resolution of the "lack of preheat" issue, for Group 207. A review of the UT examination reports, from Group 229, indicated that there were no cracks found in these welds.

The DOE/WEP performed a generic problem analysis of Group 207 and no generic problems were identified (Reference 7.8). Sample expansion or rebounding was not required.

6. Conclusions

The issues identified in the employee concerns could not be confirmed. The DOE/WEP concludes that, for the attributes of concern as specified in the referenced assessment plan, the welds examined in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled welds within the group boundaries also meet the applicable FSAR construction code.

DRR
WEP
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7. References

7.1 Employee Concerns IN-85-641-005, WI-85-081-003, and WI-85-64-002.

7.2 WEP Assessment Plan Group No. 207, "Safety-Related Unit 1 Steam Generator Supports," Rev. 4, October 7, 1987.

7.3 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1986.

7.4 Standard Practice WEP 3.2.5, "Dry Magnetic Particle Examination Methods and Acceptable Criteria," July 25, 1986.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED UNIT 1 STEAM GENERATOR SUPPORTS WEP GROUP IDENTIFIER EC-SPL-10	Page 4 of 4 Date 11/12/87 Revision 1 WEP Group No 207

7.5 WEP Group 207, Inspection Results, INS 008-RO, August 6, 1987.

7.6 WEP Standard Practice 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 25, 1986.

7.7 TVA suitability-for-service analysis and WEP suitability-for-service review summary sheet for examination Package No. 207-0009.

7.8 "Generic Problem Analysis of Weld Examination Results From Group 207," Inspection Results and Data Analysis Summary Report, Rev. 1, August 27, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSTRUMENT PANEL DRAIN THREAD-O-LET WELD ON SYSTEm 62, 63, AND 68 WEP GROUP IDENTIFIER EC-SPL-11	Page 1 of 4 Date 11/12/87 Revision 1 WEP Group No 208

Approved [signature] Date 11-27-87

Reviewed [signature] Prepared [signature] FOR ADAMS STUCKI

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns IN-85-143-001 and IN-85-143-002.

2. Characterization of Issue

These employee concerns stated that instrument drain fittings were welded without procedures and by uncertified welders. The systems were identified as the Chemical and Volume Control System 62, Safety Injection System 63, and Reactor Coolant System 68 at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). The location of welds and the number of welds involved in the concern were indeterminate.

Employee Concern IN-85-143-002 identified fittings that were reworked/redesigned in Unit 2, but not in Unit 1. The redesign issue identified in this employee concern is outside the scope of the DOE/WEP. The rework condition (method used for resolving welds made with uncertified welder, on Unit 2) will be addressed by a representative sample selection and weld inspection on Unit 1.

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3. Summary

The issue for which this group was formed was resolved by inspection/examination, document review, and engineering analysis.

4. Evaluation Methodology

A representative sample selection and weld inspection was used to evaluate the rework concern, because weld records were not required by the applicable construction code.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSTRUMENT PANEL DRAIN THREAD-O-LET WELD ON SYSTEM 62, 63, AND 68 WEP GROUP IDENTIFIER EC-SPL-11	Page 2 of 4 Date 11/12/87 Revision 1 WEP Group No 208

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan for Group 208 (Reference 7.2) was developed to extract a representative sample of the group population, per Standard Practice (SP) WEP 3.1.6 (Reference 7.3), to perform a visual inspection of the selected welds in accordance with SP WEP 3.2.3 (Reference 7.4); to identify any nonconforming conditions in accordance with SP WEP 3.2.2 (Reference 7.5); to process deviation reports in accordance with SP WEP 3.2.11 (Reference 7.6); and to review the TVA's engineering analyses, in accordance with SP WEP 3.3.1 (Reference 7.7). DRR WEP 942

5. Findings

A programmatic review was conducted by the DOE/WEP to establish that the TVA incorporated and complied with code requirements pertaining to welding procedure qualification and welder performance qualification. The TVA procedure WBNP-QCI-4.01, "Storage, Issue and Control of Welding Material," requires that the welding foreman specify on the welding rod requisition slip, the Welding Procedure Specification (WPS) that will be used by the welder. The Quality Control (QC) Welding Material Storage attendant checks welder qualification status to specified WPS before issuing any weld filler material. The QC welding surveillance, implemented by WBNP-QCP-4.3, requires daily monitoring of all welding activity. The welding rod requisition slip, retained by the welder, is used by QC surveillance to verify the WPS specified on the rod slip with that specified on the work package, or weld operation sheet. The QC surveillance also verifies welder qualification status.

A representative sample consisting of 56 components (56 welds) was extracted from the group population and visually inspected. Six welds contained deviations that required engineering analysis to determine acceptability (Reference 7.8).

Examination Package 208-67 was documented as having visually detected lack of fusion that required characterization, and was found acceptable in accordance with SP WEP 3.2.16 (Reference 7.9).

The TVA performed engineering analyses for all deviant welds and determined that these welds are in compliance with the applicable code (Reference 7.10). The DOE/WEP reviewed the analyses in accordance with SP WEP 3.3.1 and concurred with the TVA analyses (Reference 7.11).

In addition, the DOE/WEP performed a generic problem analysis. No generic problems were identified and sample expansion or rebounding was not required (Reference 7.12).

WEP Close Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSTRUMENT PANEL DRAIN THREAD-O-LET WELD ON SYSTEM 62, 63, AND 68 WEP GROUP IDENTIFIER EC-SPL-11	Page 3 of 4 Date 11/12/87 Revision 1 WEP Group No 208

6. Conclusions

The issues identified in the employee concerns were not confirmed. The DOE/WEP concludes that the welds examined in this group meet the applicable Final Safety Analysis Report (FSAR) construction codes. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction codes.

DRR
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7. References

7.1 Employee Concerns IN-85-143-001 and IN-85-143-002.

7.2 WEP Assessment Plan No. 208, "Instrument Panel Drain Thread-O-Let Welds On Systems 62, 63, and 68," May 1, 1986.

7.3 Standard Practice WEP 3.1.6, "Identifying Random Samples from Homogeneous Groups," Rev. 3, November 21, 1986.

7.4 Standard Practice WEP 3.2.3 Appendix A, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987.

7.5 Standard Practice WEP 3.2.2, "Reporting Deviations to TVA," Rev. 7, November 17, 1986.

7.6 Standard Practice WEP 3.2.11, "Processing and Closure of Deviation Reports," Rev. 7, July 6, 1987.

7.7 Standard Practice WEP 3.3.1, "Suitability-for-Service Evaluation Review," Rev. 8, June 8, 1987.

7.8 WEP Group 208 Inspection Data Report on Weld Evaluation Project, INS 101-R1, September 9, 1987, and Inspection Result, INS 008-R0, September 9, 1987.

7.9 Standard practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 25, 1986.

7.10 WEP Deviation Disposition Sheet, DR 208-0072.

7.11 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for Group 208.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSTRUMENT PANEL DRAIN THREAD-O-LET WELD ON SYSTEM 62, 63, AND 68 WEP GROUP IDENTIFIER EC-SPL-11	Page 4 of 4 Date 11/12/87 Revision 1 WEP Group No 208

7.12 "Generic Problem Analysis of Weld Examination Results From Group 208," Inspection Results and Data Analysis Summary Report, Rev. 1, August 25, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE PRESSURE BOUNDARY WELDS REQUIRING POST WELD HEAT TREATMENT WEP GROUP IDENTIFIER EC-SPL-12	Page 1 of 3 Date 11/12/87 Revision 1 WEP Group No 209

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ FOR R.C. KUIZ

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern WI-85-053-003.

2. Characterization of Issue

Employee Concern WI-85-053-003 at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) states in part, "Temporary minor attachments are not documented by responsible department." The employee identified a specific incident to Quality Technology Company (QTC) in which 16 thermocouple nuts were welded on or near an American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code pipe weld in Unit 1.

The TVA Nuclear Safety Review Staff (NSRS) investigated the Employee Concern WI-85-053-003 (Reference 7.2). The employee concern was substantiated when the inspection performed by NSRS revealed that the thermocouple nuts were still welded to the pipe and the documentation pertaining to the welds was voided.

3. Summary

The issue for which the group was formed was evaluated by visual examination, document review, and engineering evaluation and will be resolved upon satisfactory completion of TVA-committed corrective action.

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WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE PRESSURE BOUNDARY WELDS REQUIRING POST WELD HEAT TREATMENT WEP GROUP IDENTIFIER EC-SPL-12	Page 2 of 3 Date 11/12/87 Revision 1 WEP Group No 209

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 209 (Reference 7.3) was developed to perform the following:

a. Extract a representative sample of the group population per Standard Practice (SP) WEP 3.1.6 (Reference 7.4).

b. Review TVA Weld Operation Sheets and/or associated documentation (the TVA Post Weld Heat Treatment Log) to ensure that all welds that needed the installation of temporary attachments (thermocouples) to ASME pressure boundary piping had been properly documented, including installation and removal.

c. For each weld selected, verify visually that the thermocouple lugs associated with the weld were removed.

5. Findings

To determine any generic implications that other temporary attachments were not documented as required per TVA Quality Control Procedure (QCP) 1.7 (Reference 7.5), the DOE/WEP reviewed the TVA Post Weld Heat Treatment (PWHT) Log and found a total of 72 welds that were post weld heat treated. Reviewing the PWHT log was the most positive way to determine where thermocouple nuts (temporary attachments) were welded to ASME components in WBNP-1. A sample of 42 welds was taken, in accordance with SP WEP 3.1.6. The DOE/WEP wrote examination packages (Reference 7.6) to review documentation and perform visual examination to ensure that the thermocouple lugs had been removed for all 42 welds identified. DRR WEP 943

Documentation could not be found for installation or removal of the thermocouple lugs. The conditions were noted on the DOE/WEP examination package-related deviation reports (Reference 7.7). The visual examination performed by the DOE/WEP confirmed that all lugs were removed.

The documentation conditions were noted on the DOE/WEP Corrective Action Deviation Report CADR-209 (Reference 7.8) and will be resolved by the TVA Corrective Action Plan Summary 209 (Reference 7.9). The Corrective Action Plan has been reviewed and concurred with by the DOE/WEP (Reference 7.10). The conditions have also been identified by the TVA on Nonconforming Condition Report (NCR) W-599-P (Reference 7.11).

Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BACK DATING OF WELDER CERTIFICATIONS WEP GROUP IDENTIFIER EC-SPL-13	Page 1 of 4 Date 11/12/87 Revision 1 WEP Group No 210

Approved _____ Date 11-27-87

Reviewed _____ Prepared David Ponke

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns IN-85-965-001, IN-85-965-002, IN-85-089-003, IN-85-770-002, IN-85-770-003, and IN-85-770-X07.

2. Characterization of Issue

The Employee Concerns listed in Section 1 relate to the backdating of eight welder certifications at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). Welds were made by welders with questionable renewal certifications.

The Department of Energy/Weld Evaluation Project (DOE/WEP) requested that the Quality Technology Company (QTC) obtain additional details regarding the welder's certification, and additional information was provided.

Special Group 210 consists of all American Society of Mechanical Engineers (ASME) welds made by each of the welders identified by the employee concerns listed in Section 1. The welders cannot be traced to non-ASME weld joints (Reference 7.2).

These welds have been further bounded by the following welders as provided by the above concerns:

6FVV (1A31-1, 1B13)
6CZZ (1A31-2)
6PWW (1A31-3)
6ALL (1A31-4)
6LLC (1A31-5)
6GQQ (1A31-6, 1B50)
6GJJ (1A31, 1A31-7)
6RRA (1A22)

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BACK DATING OF WELDER CERTIFICATIONS WEP GROUP IDENTIFIER EC-SPL-13	Page 2 of 4 Date 11/12/87 Revision 1 WEP Group No 210

NOTE: Two of the welders (6FVV, 6ALL) identified in the employee concerns did not perform any ASME welds.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, and engineering analysis.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 210 (Reference 7.3) was developed to perform an evaluation of the welds in this group. Group 210 was formed to determine if welding was performed by properly certified welders and to evaluate their weld quality by performing a reexamination using methods originally required by the applicable specification and codes, in accordance with the Assessment Plan No. 210.

An examination was performed, as required by the original acceptance criteria for each weld in the following manner:

a. All welds selected were visually examined in accordance with Appendix A of Standard Practice (SP) WEP 3.2.3 (Reference 7.4).

b. Liquid penetrant examination (PT) originally required on the welds by the TVA were re-performed by the DOE/WEP, in accordance with SP WEP 3.2.4 (Reference 7.5).

c. Welds originally requiring radiographic testing examination (RT) by the TVA were examined and data recorded by the DOE/WEP, in accordance with SP WEP 3.2.13 (Reference 7.6). The original TVA film was interpreted per the acceptance criteria in SP WEP 3.2.6 (Reference 7.7).

d. The existing TVA documentation was obtained and a document review was performed, in accordance with SP WEP 3.2 12 (Reference 7.8).

Nonconforming conditions identified were reported in accordance with SP WEP 3.2.2 (Reference 7.9).

5. Findings

The DOE/WEP examinations were performed on a representative sample (60 welds) from the total population of Group 210 and the following determinations were made (Reference 7.10):

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BACK DATING OF WELDER CERTIFICATIONS WEP GROUP IDENTIFIER EC-SPL-13	Page 3 of 4 Date 11/12/87 Revision 1 WEP Group No 210

a. Fifty welds were documented as acceptable and in compliance with ASME Boiler and Pressure Vessel Code Section III (Reference 7.11).

b. Ten welds were documented as having one or more deviations that require engineering analysis to determine acceptability.

The TVA Engineering Design (ENDES) organization performed an engineering evaluation for each of the deviant welds and determined that the components will perform their intended function. The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group reviewed the TVA evaluation and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.12). DRR WEP 944

The 60 welds were evaluated by a review of the associated weld records and documented as complying to code requirements.

The DOE/WEP performed a generic problem analysis on Group 210. No generic problems were identified and sample expansion or rebounding was not required (Reference 7.13).

The TVA has addressed the issue of welder recertifications. The TVA issued stop work order No. 25 on August 23, 1985, to stop all welding activities until the issue could be resolved. This action was documented in Confirmation of Action Letter (COAL) dated August 23, 1985, Docket Nos. 50-390 and 50-391. The TVA has issued a report, "Final Response to NRC-OIE COAL Welder Recertification Program." This has been resolved by the TVA (Reference 7.14). The DOE/WEP did not address the issue of recertification of welders, because it was outside the DOE/WEP work scope.

6. Conclusions

The issue identified by the employee concerns regarding welder recertification was confirmed and resolved by TVA. However, the DOE/WEP concludes that the welds examined in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, DOE/WEP also concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries meet the applicable FSAR construction code.

7. References

7.1 Employee Concerns IN-85-965-001, IN-85-965-002, IN-85-089-003, IN-85-770-002, IN-85-770-003, and IN-85-770-X07.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BACK DATING OF WELDER CERTIFICATIONS WEP GROUP IDENTIFIER EC-SPL-13	Page 4 of 4 Date 11/12/87 Revision 1 WEP Group No 210

7.2 John Savage speed letter to Frank Laurent, June 25, 1986.

7.3 WEP Assessment Plan 210, "Backdating of Welder Certifications (EC-SPL-13)," Rev. 2, August 28, 1986.

7.4 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987.

7.5 Standard Practice WEP 3.2.4, "Liquid Penetrant Examination Methods and Acceptance Criteria," Rev. 05, November 17, 1986.

7.6 Standard Practice WEP 3.2.13, "Examination of Welds Requiring Radiography," July 19, 1986.

7.7 Standard Practice WEP 3.2.6, "Radiographic Examination Methods and Acceptance Criteria," August 4, 1986.

7.8 Standard Practice WEP 3.2.12, "Review of TVA Weld Operation Sheets for Code-Required Minimums," Rev. 06, April 3, 1987.

7.9 Standard Practice WEP 3.2.2, "Reporting Deviations to TVA," Rev. 07, November 17, 1986.

7.10 WEP Group 210, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 7, 1987, and Inspection Results, INS 008-R0, August 7, 1987.

7.11 The American Society of Mechanical Engineers, "Rules for Construction of Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code, Section III--Division 1, 1971 Edition with Summer 1973 Addend

7.12 TVA Suitability for Service Analysis and DOE/WEP Suitability for Service Review Summary Sheets for Group 210.

7.13 "Generic Problem Analysis of Weld Examination Results From Group 210," Inspection Results and Data Analysis Summary Report, Revision 1, August 18, 1987.

7.14 Guenter Wadewitz letter to M. L. Rayfield, "Final Response to NRC-OIE Confirmation of Action Letter (COAL)-Welder Recertification Program," TVA Memorandum C 24 860508 012, May 8, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY RELATED MAIN STEAM PIPING WELDS WEP GROUP IDENTIFIER EC-SPL-14	Page 1 of 2 Date 08/06/87 Revision 1 WEP Group No 211

Approved [signature] Date 8/18/87

Reviewed [signature] 8-6-87 Prepared [signature]

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-86-190-002.

2. Characterization of Issue

At issue in Employee Concern IN-86-19-002 is whether unqualified welders welded on the main steam piping system at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). The Concerned Individual (CI) stated that welders were qualified on plate and then allowed to weld on the main steam piping.

DRR WEP 757

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodolo

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan 211 was developed to review existing documentation and identify those welders that welded on the main steam system; review welders qualification records, and identify any welders not qualified (Reference 7.2).

5. Findings

Further contact with the CI by Quality Technology Company (QTC) revealed that the CI had no personal knowledge related to the concern

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY RELATED MAIN STEAM PIPING WELDS WEP GROUP IDENTIFIER EC-SPL-14	Page 2 of 2 Date 08/06/87 Revision 1 WEP Group No 211

and that the concern was based on hearsay. There was no knowledge of what tests were given, which welders were involved, or which welds were suspect (Reference 7.3).

The latest TVA computer run of all welders (steamfitter welders) that welded on the main steam piping system was reviewed. The run showed that 50 welders welded all of the groove butt joints.

A review of these welders qualification records revealed that each welder was qualified on pipe per the requirements of The American Society of Mechanical Engineers (ASME) Code, Section IX "Welding and Brazing Qualifications." Socket joints and lap joints were excluded from this investigation because the ASME Code, Section IX QW-452.6 states "any type groove weld in any position on any thickness of material qualifies the welder to weld fillet welds on all base material thickness, fillet size and diameters." A further review of all steamfitter welder qualifications revealed that each welder who has welded at WBNP-1 was qualified on groove butt joints.

A review of 28 Field Operation Packages to identify those welders who welded the various weld joints on the main steam piping, and a check of those welders qualifications, revealed that all welders listed were properly qualified on pipe. No welders listed were qualified on plate only as alleged.

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6. Conclusions

The DOE/WEP concludes the employee concern was not valid and the welder qualifications meet the Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 Employee Concern IN-86-190-002.

7.2 WEP Assessment Plan No. 211, "Safety-Related Main Steam Piping Welds," Rev. 0, August 19, 1986.

7.3 Quality Technology Company Response (NS-File No. 910 and 1002).

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE RADIOGRAPHED WELDS ON PIPING PENETRATING CONTAINMENT WALL WEP GROUP IDENTIFIER EC-SPL-15	Page 1 of 3 Date 11/12/87 Revision 2 WEP Group No 212

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ FOR DENNIS ANDERSON

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-85-579-005.

2. Characterization of Issue

The employee concern indicates that minimum wall thickness may have been encroached upon during the grinding operation to prepare the welds for radiography at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). The weld joints involved are those joining the pipes to the penetration sleeves through the containment shield wall.

3. Summary

The issue for which the group was formed was resolved by inspection/examination and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 212 (Reference 7.2) was developed to inspect/evaluate welds on piping penetrating the containment shield wall. Group 212 was formed to select a sample of 52 welds and perform a 100% ultrasonic thickness measurement of each weld and adjacent base metal, in accordance with Standard Practice (SP) WEP 3.2.8 (Reference 7.3). The ultrasonic thickness measurements were entered on Form WEP-302,

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE RADIOGRAPHED WELDS ON PIPING PENETRATING CONTAINMENT WALL WEP GROUP IDENTIFIER EC-SPL-15	Page 2 of 3 Date 11/12/87 Revision 2 WEP Group No 212

"Visual Examination Checklist for Piping Welds," as visual data. The boundaries for this group were those pipe weld joints joining the pipe to the penetration at the containment shield wall.

The components selected consisted of 31 American Society of Mechanical Engineers (ASME) Class 2 components and 21 ASME Class MC components.

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5. Findings

The ultrasonic thickness measurement inspection resulted in 15 welds with deviations that required engineering analysis to determine acceptability (Reference 7.4). The TVA performed an engineering analysis for each of the deviant welds and determined that these welds are in compliance with the applicable code. The DOE/WEP reviewed and concurred with the TVA engineering analyses (Reference 7.5).

A generic problem analysis concludes that Group 212 has no generic problems, and rebounding or sample expansion is not required (Reference 7.6).

6. Conclusions

The conditions identified by the employee concern were confirmed. However, the DOE/WEP concludes the welds examined in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 Employee Concern IN-85-579-005.

7.2 WEP Assessment Plan No. 212, "Radiographed Welds on Piping Penetrating Containment Wall," Rev. 1, June 24, 1986.

7.3 Standard Practice WEP 3.2.8, "Ultrasonic Thickness Measurement," Rev. 0, August 14, 1986.

7.4 WEP Group 212, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 7, 1987, and Inspection Result, INS 008-R0, August 7, 1987.

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WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE RADIOGRAPHED WELDS ON PIPING PENETRATING CONTAINMENT WALL WEP GROUP IDENTIFIER EC-SPL-15	Page 3 of 3 Date 11/12/87 Revision 2 WEP Group No 212

7.5 TVA Suitability for Service Analyses, and WEP Suitability for Service Review Summary Sheets for Group 212.

7.6 "Generic Problem Analysis of Weld Examination Results From Group 212," Inspection Results and Data Analysis Summary Report, Rev. 0, June 11, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1 SAFETY-RELATED WELDS ASSOCIATED WITH THE REFUELING PIT LINER WEP GROUP IDENTIFIER EC-SPL-16	Page 1 of 4 Date 11/12/87 Revision 2 WEP Group No 213

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ FOR NICKI STUCKI

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern WI-85-081-004.

2. Characterization of Issue

The Concerned Individual (CI) who generated Employee Concern WI-85-081-004 stated, "the stainless steel surrounding the Unit 1 reactor had some bad welds (porosity)."

3. Summary

The issue for which the group was formed was resolved by document review.

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4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan 213 (Reference 7.2) was developed to perform a document review of the subject welds at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) to determine if the welds had been inspected.

5. Findings

At the request of DOE/WEP, the CI through Quality Technology Company (QTC) (References 7.3 and 7.4) provided the following additional information: the welds were located in the refueling pit; welds were made by ironworkers; welds were performed before the

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1 SAFETY-RELATED WELDS ASSOCIATED WITH THE REFUELING PIT LINER WEP GROUP IDENTIFIER EC-SPL-16	Page 2 of 4 Date 11/12/87 Revision 2 WEP Group No 213

reactor building dome was placed (May 8, 1977); welds were made while it was raining. Water trapped in the metal caused the porosity; and the affected area was Unit 1, in the vicinity of the refueling trough and pit.

The DOE/WEP investigation noted that the time frame of the welding by the ironworkers was between 1974 and 1976. Welding of the liner plate by the boilermakers started in September 1976 and continued through 1978. The Unit 1 reactor building dome was placed on May 8, 1977. Based on the above time frame, the individual's concern may be related to any one of three welding tasks:

a. Welding by ironworkers of embedded stainless steel structural material associated with the canal liners.

b. Welding by ironworkers of carbon steel structural material needed to position and support the stainless steel liner supports embedded in the concrete shield walls.

c. Welding by boilermakers of the stainless steel liner plates and components to the structural stainless steel embedded in the concrete shield walls.

The CI statement that ironworkers made the welds prior to the dome being placed indicates the concern is related to welds on the embedded plates and any structural shape attachments to anchor bolts that are supports for the stainless steel pit liner (Reference 7.5). These supports were installed prior to the stainless steel liner plates being erected and were under the scope of work for ironworkers. The structural welding done by the ironworkers was covered by the TVA Construction Specification G29C and American Welding Society (AWS) D1.1-72 Structural Welding Code. Welding inspection and documentation was in accordance with TVA Quality Control Procedure (QCP) 4.3 "WBNP-QCP-Welding Surveillance and Weld Procedure Assignment." This procedure required a weekly welding surveillance report showing compliance status of applicable procedure and specification requirements. A review of the weekly surveillance reports from June 17, 1974, through December 29, 1979, disclosed no comments of unacceptable welding due to porosity. The report did show welding was stopped by inspection in the Auxiliary Building (due to water on the plate in the weld area) until the situation was corrected (Reference 7.6).

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WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1 SAFETY-RELATED WELDS ASSOCIATED WITH THE REFUELING PIT LINER WEP GROUP IDENTIFIER EC-SPL-16	Page 3 of 4 Date 11/12/87 Revision 2 WEP Group No 213

The installation and welding of the stainless steel liner plates were performed by the boilermaker craft. This work jurisdiction is per project agreement with the union. Welding of liner plates to the shield wall structural components started in September 1976. The date of the fit-up inspection in the first liner plate was September 27, 1976. Assuming that all shield walls were poured, cured, and forms removed before fit-up of the canal liner plates could start, tasks "a" and "b" above would have been completed several months earlier. This welding is not safety related and is physically covered by the canal liner plate. No further DOE/WEP inspection effort is possible.

Review of inspection records associated with the subject inaccessible welds did not indicate that TVA had encountered problems with excessive porosity in the welds. The subject welds are inaccessible for reexamination because they are embedded in concrete and covered by the refueling pit liner.

DOE/WEP evaluation of the refueling pit liner plates is addressed in DOE/WEP Group 257 (Reference 7.7).

6. Conclusions

The issues identified in the employee concern could not be confirmed. However, the DOE/WEP concludes that adequate TVA documentation exists to show the welds in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

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7. References

7.1 Employee Concern WI-85-081-004.

7.2 WEP Assessment Plan No. 213, "Welds in the Refueling Pit Area (EC-SPL-16)," Rev. 1, April 10, 1987.

7.3 EG&G Memoranda to Quality Technology Company (QTC), KGT-43-86 and KGT-50-86, dated February 7, 1986, and March 5, 1986, respectively.

7.4 Quality Technology Company (QTC) Responses, File Numbers 843 and 1053, dated February 8, 1986, and March 12, 1986, respectively.

7.5 A. D. Calija notegram to A. E. Bradford, "Concern WI-85-081-004-(EC-SPL-16)," EG&G Idaho, Inc., June 20, 1986.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1 SAFETY-RELATED WELDS ASSOCIATED WITH THE REFUELING PIT LINER WEP GROUP IDENTIFIER EC-SPL-16	Page 4 of 4 Date 11/12/87 Revision 2 WEP Group No 213

7.6 TVA Quality Control Procedure WBNP (QCP) 4.3, "Welding Surveillance and Weld Procedure Assignment," Rev. 0 through 5, June 1975 through November 1978.

7.7 WEP Closure Statement, Group 257" Stainless Steel Liner Plate Welds" Rev. 0 August 1, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE NORTH AND SOUTH VALVE ROOM STRUCTURAL WELDS WEP GROUP IDENTIFIER EC-SPL-17	Page 1 of 5 Date 11/12/87 Revision 1 WEP Group No 214

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns IN-85-671-003 and IN-86-032-002.

2. Characterization of Issue

Employee Concern IN-85-671-003 at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) states that: "Use of preheat blankets for steel members in North and South valve rooms, unit 1 & 2 stopped when one of the blankets caught fire. Crafts (known) use to turn blankets on at the end of the shift so steel would be ready for first shift. After fire, an electrician would come in early (approximately half an hour) to turn blankets on for welders. CI stated that because of heat loss overnight (occurred in winter '83) and short time blankets were turned on in morning, required preheat temperature might not have been obtained. No additional information available."

Employee Concern IN-86-032-002 states that: "Welders were hired by TVA to cosmetically repair structurally defective welds in the north and south valve rooms. Welders were directed to place cover passes over cracks without excavating defective material. No specific welds specified. Management personnel involved in alleged cover-up were specified (names known). CI has no further information."

3. Summary

The issue for which this group was formed was resolved by engineering evaluation, engineering analysis, inspection/examination, and document review.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE NORTH AND SOUTH VALVE ROOM STRUCTURAL WELDS WEP GROUP IDENTIFIER EC-SPL-17	Page 2 of 5 Date 11/12/87 Revision 1 WEP Group No 214

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 214 (Reference 7.2) was developed to perform an evaluation on the structural welds in the North and South Valve Rooms. For the first employee concern (IN-85-671-003), an engineering evaluation was performed by the DOE/WEP to determine the effects of not maintaining the minimum preheat temperature on structural steel.

For the second employee concern (IN-86-032-002), an engineering evaluation was performed by the DOE/WEP to address the issue of welding over cracks.

To supplement these engineering evaluations, the DOE/WEP examined a representative sample of 236 structural welds. Visual (VT) examinations were performed in accordance with Standard Practice (SP) WEP 3.2.3 (Reference 7.3) and ultrasonic (UT) examinations were performed in accordance with SP WEP 3.2.15 (Reference 7.4).

UT examination on these welds were not part of the original acceptance criteria. The DOE/WEP only used UT examination to establish the validity of the concern. The results of the UT examinations required engineering evaluation to determine the acceptability of the welds.

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5. Findings

To address the first employee concern (IN-85-671-003), the DOE/WEP used in its engineering evaluation welds equal to or greater than 1-1/2 in. thickness, because this required a minimum preheat temperature of at least 150°F. The TVA's Process Specification 1.C.1.2 (Reference 7.5) states that, "preheat for welding may be applied by flame, inductance, resistance or any other method of heating which is not detrimental to the materials involved. The minimum preheat temperature specified on the detailed weld procedure shall be maintained for a distance equal to the material thickness or 3 in., whichever is greater, from the weld in all directions."

The DOE/WEP determined that a lack of preheat could cause underbead and toe cracking in the Heat Affected Zone (HAZ) of thick plate (greater than 3/4 in. or 1-1/2 in., depending on material). These cracks are caused by increased hardenability of the HAZ. Hardenability requires a high carbon content combined with fast cooling rates (Reference 7.6). The structural steels used in this population are low carbon steel. Therefore, underbead cracking would not be expected, even if the preheat temperature is not achieved.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE NORTH AND SOUTH VALVE ROOM STRUCTURAL WELDS WEP GROUP IDENTIFIER EC-SPL-17	Page 3 of 5 Date 11/12/87 Revision 1 WEP Group No 214

A DOE/WEP review of American Welding Society (AWS) D1.1-72 (Reference 7.7) and TVA Specification G29C does not indicate that preheating of steel must be continuous without interruption.

The TVA implemented the preheat and interpass temperature requirements of AWS D1.1 in both the Process Specification and the Welding Procedure Specification. During 1983 and 1984, TVA quality assurance audit activities showed Quality Control was audited eight times. A welding and in-process inspection checklist was used in the audit surveillance and preheat was one of the in-process inspection checkpoints, which received a satisfactory surveillance action.

The DOE/WEP takes the following technical position: As long as the preheat blankets were turned on before the start of the new shift and the minimum preheat temperature was obtained before welding, then these conditions are considered insignificant and pose no problem for materials used in the North and South Valve rooms.

To address the second employee concern (IN-86-032-002), the DOE/WEP first performed an engineering evaluation of the issue of welding over surface cracks.

This evaluation determined that two types of cracks were possible due to the type of welding being performed in the North and South Valve Rooms. The first type would be a stress crack that develops from a highly stressed weld joint configuration (normally heavy plate section). This type of crack may propagate up through preceding weld passes if it is not completely removed. This crack (is normally a long crack, several times greater in length than the thickness of the material being welded) is easily detectable. The second type is a crater crack, which is a very shallow surface discrepancy, with a length no longer than the weld puddle at the time the arc is extinguished. Due to the minimal depth of this type of crack, it is possible to weld over a crater crack without propagating the crack (Reference 7.6).

After performing engineering evaluations for both employee concerns, the DOE/WEP supplemented the engineering evaluations with an inspection of a representative sample of 236 structural welds listed in 91 WEP examination packages, in accordance with SP WEP 3.1.6 (Reference 7.8).

Upon inspection of the 236 structural welds, the following determinations were made: (a) 190 welds were documented as

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE NORTH AND SOUTH VALVE ROOM STRUCTURAL WELDS WEP GROUP IDENTIFIER EC-SPL-17	Page 4 of 5 Date 11/12/87 Revision 1 WEP Group No 214

acceptable; (b) 46 welds were visually and ultrasonically examined and documented as having one or more conditions that require engineering analysis to determine acceptability.

Four of the above 46 welds (214-0291, 0077, 0047 and 0065) were documented as having discontinuities that required characterization in accordance with both Standard Practice (SP) WEP 3.2.15 and SP WEP 3.2.16 (Reference 7.9 and 7.10). The weld discontinuities were characterized and found acceptable.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for the 46 welds and determined that the components will perform their intended function. The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the welds are in compliance with the applicable codes (Reference 7.11).

The DOE/WEP performed a generic problem analysis for Group 214 (Reference 7.12). As a result of the deviations identified in Examination Package 214-0077, the DOE/WEP recommended to TVA that additional action be taken to further evaluate the welds in the North and South Valve Rooms (Reference 7.13). The basis for the additional action was to further develop the issue of potentially unacceptable deviations associated with the welds in Group 214. The TVA has elected to resolve this issue (Reference 7.14) in a manner that is designed to be a more detailed review than that recommended by the DOE/WEP.

6. Conclusions

The issues identified in the Employee Concern IN-85-671-003 could not be confirmed. The issues identified in Employee Concern IN-86-032-002 were not confirmed. The DOE/WEP concludes that the welds examined in this group will meet the Final Safety Analysis Report (FSAR) construction code upon resolution by TVA as indicated in Reference 7.14. The DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the welds in the unsampled population will also meet the applicable FSAR construction code upon resolution by TVA as indicated in Reference 7.14.

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7. References

7.1 Employee Concerns IN-86-032-002 and IN-85-671-003.

7.2 WEP Assessment Plan No. 214, "North and South Valve Room Structural Welds," Rev. 5, May 4, 1987.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE NORTH AND SOUTH VALVE ROOM STRUCTURAL WELDS WEP GROUP IDENTIFIER EC-SPL-17	Page 5 of 5 Date 11/12/87 Revision 1 WEP Group No 214

7.3 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987.

7.4 Standard Practice WEP 3.2.15, "Characterization of Weld Discontinuities Using Ultrasonic Test Methods," Rev. 1, October 6, 1986.

7.5 TVA Process Specification TVA 1.C.1.2, "General Welding Procedure Specification," Rev. 3, January 28, 1985.

7.6 D. D. Hansen and N. D. Stucki letter to R. J. Wade, "Engineering Evaluation Addressing Concerns Covering Surface Cracks with Weld Metal and Improper Preheat," DDH-2-87 (Rev. 1), EG&G Idaho, Inc., August 28, 1987.

7.7 American Welding Society, Inc., "Structural Welding Code," AWS D1.1-72, Rev. 2, 1974.

7.8 Standard Practice WEP 3.1.6, "Identifying Random Samples from Homogeneous Groups," Rev. 5, October 24, 1986.

7.9 Standard Practice WEP 3.2.15, "Characterization of Weld Discontinuities Using Ultrasonic Test Methods," Rev. 1, October 6, 1986.

7.10 Standard Practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 28, 1986.

7.11 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for Group 214.

7.12 "Generic Problem Analysis of Weld Examination Results From Group 214," Inspection Results and Data Analysis Summary Report, Rev. 1, August 21, 1987.

7.13 Frank C. Fogarty letter to C. D. Lundin, "Recommendations for Additional Investigations for Causes of Deviations in Multipass Welds on Structural Steel," FCF-96-87, EG&G Idaho, Inc., August 18, 1987.

7.14 Craig Lundin letter to Frank C. Fogarty, "North and South Valve Room Structural Steel," TVA Memorandum CDL87101470, October 14, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN/QUALITY INDICATOR GROUP CLOSURE FAILURE TO MONITOR INTERPASS TEMPERATURE CONTROL WEP GROUP IDENTIFIER QI-SPL-2 and EC-SPL-18	Page 1 of 4 Date 11/12/87 Revision 1 WEP Group No 215 & 218

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ For Douglas Harrison

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s)

Employee Concerns: IN-85-185-001 and IN-85-834-002 (Reference 7.1)

Quality Indicators: U.S. Nuclear Regulatory Commission Report 50-390/78-31-02 (Reference 7.2). Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) W-309-P Revision 0 (R0) (Reference 7.3).

2. Characterization of Issue

Groups 215 and 218 are being combined and will be addressed as one report because of their similarity.

On stainless steel welds in the primary system, interpass temperature limitations set by the weld procedure may not have been monitored and may have been exceeded. NCR W-309-P written by TVA reported a typographical error on a Welding Procedure Specification (WPS), used to weld stainless steel, listing the interpass temperature as 350°F minimum rather than 350° maximum.

Department of Energy/Weld Evaluation Project's (DOE/WEP's) initial review of the referenced Quality Indicators established a concern that exceeding the interpass temperature of 350°F may have an adverse effect on the mechanical properties and microstructure of the heat affected zone (HAZ) of the stainless steel weld joints.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN/QUALITY INDICATOR GROUP CLOSURE FAILURE TO MONITOR INTERPASS TEMPERATURE CONTROL WEP GROUP IDENTIFIER QI-SPL-2 and EC-SPL-18	Page 2 of 4 Date 11/12/87 Revision 1 215 & WEP Group No 218

3. Summary

The issue for which the groups were formed was resolved by engineering evaluation.

4. Evaluation Methodology

In accordance with DOE/WEP Assessment Plans 215 and 218 (References 7.4 and 7.5), an engineering evaluation of the problem of possible excessive heat input caused by high (greater than 350°F) interpass temperature was conducted. The evaluation consisted of a review of the effect of lack of interpass temperature control on the mechanical properties and sensitization of the HAZ of the stainless steel welds.

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5. Findings

NRC Report 50-390/78-31-02 addressed the subject of welders who were apparently not checking the interpass temperature. However, additional investigation by the NRC revealed that the welders were checking interpass temperature. Therefore, this concern warrants no further action.

The WPS was corrected on Revision 2 of WPS GT88-0-3 on 11/13/85 and now reads 350°F maximum interpass temperature.

A literature search of available reports addressing lack of interpass temperature control was conducted by DOE/WEP to determine what effects exceeding the interpass temperature of 350°F, as stated in welding procedure specification (WPS) (GT-8801R5), might have on the stainless steel used at Watts Bar Nuclear Plant 1 Unit 1(WBNP-1). One study using the gas tungsten arc welding (GTAW) process showed that for Types 304, 304L, 316, 316L, and 316H stainless steel at interpass temperatures as high as 752°F had no appreciable effect on the weld microstructure, weld soundness, strength and weld metal and HAZ toughness. Other tests using Types 316 stainless steel heated to 1200°F for 200 hours and 304 stainless steel heated to 1200°F for 527 hours resulted in very little change in the impact and tensile properties (Reference 7.6). At temperatures of 1200°F, the welder will experience a high level of discomfort from the heat and will stop welding.

Associated with the allegation of excessive heat input during welding is the possibility that the level of sensitization may vary appreciably, particularly if the carbon content of the stainless steel is on the high side, 0.076 to 0.08 weight percent. Therefore, DOE/WEP

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN/QUALITY INDICATOR GROUP CLOSURE FAILURE TO MONITOR INTERPASS TEMPERATURE CONTROL WEP GROUP IDENTIFIER QI-SPL-2 and EC-SPL-18	Page 3 of 4 Date 11/12/87 Revision 1 215 & WEP Group No 218

conducted a second literature search to resolve this issue (Reference 7.7). It was concluded from this review that intergranular stress corrosion cracking (IGSCC) in austenitic stainless steel is caused by a combination of three factors. They are, (a) a sensitized microstructure, (b) tensile stresses in the vicinity of the yield stress of the material, and (c) an environment that supports the process. With the exclusion of one of the three contributors, IGSCC will not occur.

For pressurized water reactor (PWR) plants, the environment in the primary coolant system does not support IGSCC. In one test, double U-bend test samples of Types 304 and 316 stainless steel sensitized for 0, 12, and 40 hours at 1150 to 1175°F were exposed for six months to simulated coolant with maximum allowable contamination. No cracking was observed on any test specimen (Reference 7.7).

A literature search was conducted by DOE/WEP on what effect an interpass temperature greater than 350°F, as specified on TVA WPS GT88-0-3 R1 and reported on NCR W-309-P, would have on the mechanical properties and HAZ microstructure of the stainless steel pipe used at WBNP-1. Test results on 304 stainless steel heated to temperatures of 1000°F to 1200°F for 24 hours show that the mechanical properties are not significantly changed compared to the annealed base material (Reference 7.6). Discussions on overheating welds of Type 304 and 316 stainless steel raise questions of sensitization and IGSCC. Tests on Types 304 and 316 stainless steel sensitized for 0, 12, and 40 hours at 1150 to 1175°F were exposed for 6 months to simulated reactor coolant with maximum allowable contaminants. No cracking was observed on any test specimen. This demonstrates the innocuous nature of the pressurized water reactor (PWR) primary coolant regarding IGSCC (Reference 7.6).

6. Conclusions

The issues identified by the concerns in these groups were not confirmed. The DOE/WEP concludes that the welds in these groups meet the applicable Final Safety Analysis Report (FSAR) construction code.

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7. References

7.1 Employee Concerns IN-85-185-001 and IN-85-834-002.

7.2 U.S. Nuclear Regulatory Commission, NRC Inspection Report RII, 50-390/78-31.

Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1 SAFETY-RELATED PIPING WELDS WEP GROUP IDENTIFIER EC-SPL-19	Page 1 of 3 Date 10/30/87 Revision 0 WEP Group No 216

Approved _____ Date 10-31-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern EX-85-021-002.

2. Characterization of Issue

The Employee Concern EX-85-021-002 identified a potential problem where no method/objective evidence was available to verify that pipe fitter welders at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) had used a specific process as required when their weld cards were stamped/updated by QC. This could result in potentially defective pipe welds if the welders had not properly maintained their qualification for the procedure being used.

TVA determined that a problem had existed with their welding recertification program during the time period indicated by the concern. This was a programmatic issue and was resolved by the TVA (Reference 7.2). Therefore, the DOE/WEP has chosen to address the generic implication of the identified problem by examination of the potentially affected piping welds.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, engineering analysis, and engineering evaluation.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) chose to characterize this issue as a concern for potentially defective

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WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1 SAFETY-RELATED PIPING WELDS WEP GROUP IDENTIFIER EC-SPL-19	Page 3 of 3 Date 10/30/87 Revision 0 WEP Group No 216

7. References

7.1 Employee Concern EX-85-021-002.

7.2 Guenter Wadewitz letter to M. L. Rayfield, "Final Response to NRC-OIE Confirmation of Action Letter (Coal)-Welder Recertification Program," TVA Memorandum C24 860508 012, May 8, 1986.

7.3 WEP Assessment Plan No. 216, "Unit 1 Safety-Related Piping Welds," Rev. 3, July 27, 1987.

7.4 "Generic Problem Analysis of Weld Examination Results from Group A," Inspection Results and Data Analysis Summary Report, Rev. 1, August 18, 1987.

7.5 "Generic Problem Analysis of Weld Examination Results from Group B," Inspection Results and Data Analysis Summary Report, Rev. 1, August 27, 1987.

7.6 "Generic Problem Analysis of Weld Examination Results from Group C," Inspection Results and Data Analysis Summary Report, Rev. 1, August 21, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SAFETY-RELATED DUCT SUPPORT IN CONTROL BUILDING WEP GROUP IDENTIFIER QI-SPL-3	Page 1 of 3 Date 09/21/87 Revision 0 WEP Group No 219

Approved [signature] Date 9-22-87

Reviewed [signature] 9/21/87 Prepared [signature] FOR ROLAND D. STUCKI

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 2819.

2. Characterization of Issue

The NCR 2819 identified safety-related duct supports in the Control Building at TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1) as being unacceptable. The specific welds were not identified; only the type of support and general location were indicated. The recommended disposition was to reinspect all duct support welds made prior to March 27, 1980, in the Control Building. The NCR 2819 was subsequently voided, stating nonconformance disposition and action would be addressed per NCR 2576R1 (Reference 7.2). The NCR 2576R1 addressed only bolt hole baseplate discrepancies. The DOE/WEP's concern was that the welds noted in NCR 2819 were not addressed in NCR 2576R. The condition of the discrepant welds could not be determined. Group 219 was formed to evaluate the structural adequacy of the duct supports installed in the Control Building.

3. Summary

The issue for this group was resolved by inspection/examination, engineering analysis, and document review.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 219 (Reference 7.3) was developed to examine the duct support

welds in the Control Building at WBNP-1. A sample of components was selected from the total population of Group 219 by a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group document NCIG-02 was used (Reference 7.4).

A plant visual examination was performed on the randomly selected welds to determine the acceptability of the population. The acceptance criteria used was in accordance with NCIG-01 (Reference 7.5) and the applicable engineering drawings.

5. Findings

The sample consisted of 61 components welded in accordance with American Welding Society (AWS) D1.1 requirements. A total of 837 welds were inspected. Sixty-two welds contained deviations that required engineering analysis to determine acceptability. The discrepant attributes for each weld and component are as stated in Reference 7.6.

The TVA performed suitability-for-service analyses (SFSA) for all deviant welds and determined that these welds are in compliance with the applicable code. The DOE/WEP reviewed the analyses, in accordance with Standard Practice WEP 3.3.1 (Reference 7.7), and concurred with the TVA SFSA (Reference 7.8).

The DOE/WEP performed a generic problem analysis of the aggregate examination results of Groups K, L, and 219 due to similarity of components. No generic problems were identified and sample expansion was not required (Reference 7.9).

6. Conclusions

The DOE/WEP concludes that the welds examined in this group meet the applicable Final Safety Analysis Report (FSAR) construction codes. There are no generic problems associated with the unsampled population. Therefore, DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction codes.

7. References

7.1 TVA Nonconforming Condition Report 2819.

7.2 TVA Nonconforming Condition Report 2576R1.

Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE PURGE GAS NOT VERIFIED PRIOR TO WELDING WEP GROUP IDENTIFIER QI-SPL-4	Page 1 of 3 Date 11/16/87 Revision 2 WEP Group No 220

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____
for Douglas Hanson

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Reports (NCRs) 5093, September 22, 1983; 5164, October 21, 1983; 5211, November 11, 1983; 5385, February 1, 1984; 5389 R1, February 16, 1984; 5493, March 8, 1984.

2. Characterization of Issue

A review of the Weld Operation Sheets (WOS) at TVA's Watts Bar Nuclear Plant Unit 1 (WBNP-1) contained in the above NCRs showed that there is no verification, by the inspector, that purge gas was being used during the welding operation. Therefore, there is some concern that the 24 welds listed on the NCRs in Section 1 may have been welded without a purge gas being used.

3. Summary

The issue for which the group was formed was resolved by visual examination and engineering evaluations.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan 220 (Reference 7.2) was developed to perform visual examinations on the inside diameter (ID) of each of the 24 welds in question for indications of excessive oxidation (sugaring) that, if found, would indicate inadequate purge.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE PURGE GAS NOT VERIFIED PRIOR TO WELDING WEP GROUP IDENTIFIER QI-SPL-4	Page 3 of 3 Date 11/16/87 Revision 2 WEP Group No 220

6. Conclusions

No evidence of oxidation during welding was found. The DOE/WEP concludes that for the attributes of concern as specified in the referenced assessment plan, the welds meet the applicable Final Safety Analysis Report (FSAR) construction code. | DRR WEP 949

7. References

7.1 TVA Nonconforming Condition Reports 5093, 5164, 5211, 5385, 5389, and 5493.

7.2 WEP Assessment Plan No. 220, "Butt Welds Made Without Required Purge," Rev. 3, February 9, 1987.

7.3 D. D. Hansen notegram to A. E. Bradford, "Possible Lack of Purge for Butt and Socket Welds," EG&G Idaho, Inc., June 19, 1986, and change to notegram from D. D. Hansen to A. E. Bradford, "Change to Report on Purge of Weld Joint," EG&G Idaho, Inc., June 22, 1987.

7.4 R. K. Blandford letter to D. D. Hansen, "Engineering Evaluation of Group 220 Weld," RKB-04-87, EG&G Idaho, Inc., June 17, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SAMPLING PLAN SIZE REDUCTION--TVA WBNP WELD RANDOM SAMPLING PROGRAM WEP GROUP IDENTIFIER QI-SPL-5	Page 1 of 5 Date 08/28/87 Revision 1 WEP Group No 221

Approved [signature] Date 8-30-87

Reviewed [signature] Prepared [signature] 8/25/87

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 2375, Rev. 0.

2. Characterization of Issue

At the TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1), a TVA memorandum (Reference 7.2) listed in NCR 2375 in turn references another TVA memorandum from TVA Engineering Design to the WBNP Construction Project Manager (Reference 7.3) that pertains to the Weld Random Sampling Program and states, "We have received weld data information on 57 of the 106 drawings we sent you. The remaining 49 drawings were deleted due to one or more of the reasons listed in the referenced memo." Neither the memorandum of Reference 7.3, nor the memorandum referenced in the TVA Engineering Design memo, identified herein as Reference 7.4, provide technical justification for the reduction in sample size, other than an indication that the weld features of some of the drawings had been reworked, and others were inaccessible. DRR WEP 832

The TVA disposition on NCR 2375 refers to a TVA memorandum that requires identification of all welds that were reinspected during the sampling program and found to be not in conformance with design drawings (Reference 7.5). The data subsequently were to be sent to TVA Engineering Design for evaluation.

3. Summary

The issue for which the group was formed was resolved by document review. DRR WEP 832

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WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SAMPLING PLAN SIZE REDUCTION--TVA WBNP WELD RANDOM SAMPLING PROGRAM WEP GROUP IDENTIFIER QI-SPL-5	Page 2 of 5 Date 08/28/87 Revision 1 WEP Group No 221

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 221 (Reference 7.6) was developed to perform a review of NCR 2375, all supporting NCRs, and TVA memoranda and correspondence to determine whether the reduction of the sample size adversely affects the intent of the NCR 2375 disposition. DRR WEP 832

5. Findings

In the 1980 to 1982 time frame, TVA initiated a program to define all remaining work at the WBNP. During this effort, it was determined by a visual reinspection of a sampling of structural welds that many miscellaneous and structural items (such as cable tray supports, conduit supports, platforms, ladders, and stairs) would not meet the acceptance criteria of TVA General Construction Specification G29C, which were current at that time. As a result of these findings, TVA initiated the Weld Random Sampling Program involving NCRs 2375R, 3054R, 3579R, and 4093R (References 7.1, 7.7, 7.8, and 7.9) covering a period from June 1980 to December 1982. The purpose of the Weld Random Sampling Program was to demonstrate the acceptability of all WBNP structural-type welds made prior to February 6, 1981, in all Category I buildings (Reference 7.10). The TVA considered that the overall Weld Random Sampling Program would provide a statistical norm for all Category I structures at WBNP that would serve as a basis for accepting all of these welds to the applicable visual acceptance criteria.

The original scope of the TVA Weld Random Sampling Program was established by the TVA Engineering Design organization. This was done by random selection of structural welds for visual reinspection, with a sample being taken from each of 106 drawings, which in total represented all of the WBNP Category I safety-related drawings. All data from the reinspection were forwarded to TVA Engineering Design for evaluation. The reinspected welds that did not satisfy all of the visual inspection criteria were analyzed using the actual weld measurements to determine the adequacy for in-service operating conditions.

The TVA reduced the scope of the 1980 to 1982 Weld Random Sampling Program from the total of 106 selected drawings to a new total of 57 drawings. The DOE/WEP obtained all available TVA documentation pertaining to the Weld Sampling Program and completed a comprehensive evaluation to identify a basis for the TVA Engineering Design decision to reduce scope. The documentation reviewed did not cite any reasons for reduction of scope other than the following: some of the welds in

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SAMPLING PLAN SIZE REDUCTION--TVA WBNP WELD RANDOM SAMPLING PROGRAM WEP GROUP IDENTIFIER QI-SPL-5	Page 3 of 5 Date 08/28/87 Revision 1 WEP Group No 221

the sample group of drawing features had been reworked before they could be sample reinspected; and an additional number of welds were inaccessible for reinspection.

A TVA memorandum from TVA Engineering Design to the WBNP Construction Project Manager (Reference 7.3) provided a brief status summary near the end of the sampling program. In this memo, TVA Engineering Design states that they received weld (reinspection) data on 57 of the 106 drawings previously marked up to identify welds for reinspection and sent to WBNP Construction by Engineering Design, and that the remaining 49 drawings were deleted due to one or more of the reasons listed in Reference 7.4

Reference 7.4 does not specifically identify the 49 drawings that were deleted, or the reasons why all 49 were eliminated from the sample total. The memo does indicate that some of the drawings were eliminated because the associated welds no longer exhibited original weld quality, i.e., the welds had been reworked; additionally, it is stated that some of the drawings were deleted from the sample because of features that were considered inaccessible.

In order to obtain clarification of the reason(s) and justification for TVA reduction of sample size in the Weld Random Sampling Program, a DOE/WEP letter was directed to TVA (Reference 7.11) requesting this information for WEP use in completing the evaluation of Quality Indicator (QI)-SPL-5.

A memo was received from TVA (Reference 7.12) in response to the DOE/WEP request for information. The answer provided by TVA for the reduction in sample size reads as follows: "The referenced memorandum questioned the reduced statistical sample size for the weld sampling NCRs 2375R and 3579R. The original sample of 106 drawings constituted the total population of safety critical welds. The reason for rejecting 49 of the drawings was rework of the welds. This rework was felt to bias the sample results since the welds had been improved or modified from the original condition. Therefore, the remaining 57 drawings constituted the sample population."

The TVA has stated that the total of 106 drawings selected for the Weld Random Sampling Program represented the total population of safety critical structural welds for WBNP Units 1 and 2. As the program progressed, 49 of the drawings were rejected. Most of the 49 drawings were eliminated because the associated welds had been reworked, and it was reasoned that retaining these in the sample would bias the reinspection results; additionally, the balance of these 49 drawings was eliminated because of weld inaccessibility which made reinspection impossible.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SAMPLING PLAN SIZE REDUCTION--TVA WBNP WELD RANDOM SAMPLING PROGRAM WEP GROUP IDENTIFIER QI-SPL-5	Page 4 of 5 Date 08/28/87 Revision 1 WEP Group No 221

6. Conclusions

The DOE/WEP concludes that the action by TVA to reduce the number of drawings from 106 to 57 is justified.

DR... WEP 832

7. References

7.1 TVA Nonconforming Condition Report 2375, Rev. 0.

7.2 J. C. Standifer TVA Memorandum to G. Wadewitz, WBNP, "Structural and Miscellaneous Steel-Weld Sampling Program NCR 2375R," SWP821012 043, October 12, 1982.

7.3 J. C. Standifer TVA Memorandum to G. Wadewitz, WBNP "Status of Weld Quality Sampling Program NCRs 2375R, 3579R, and 4093R," SWP820826 153, August 26, 1982.

7.4 G. Wadewitz TVA Memorandum to J. C Standifer, WBNP, "Status of Weld Quality Sampling Program--Reference NCR 2375 and Memorandum SWP820505 050," WBN820616 003, June 16, 1982.

7.5 R. W. Cantrell TVA Memorandum to J. E. Wilkins, WBNP, "Watts Bar Nuclear Plant Nonconformance Report 2375," SWP800708 028, July 8, 1980.

7.6 WEP Assessment Plan 221, "Evaluate Adequacy of Sample Plan (QI-SPL-5)," Rev. 0, June 14, 1986.

7.7 NCR 3054, Rev. 0, "Conduit Supports CS-AB-3635 and CS-AB-3636 A3, Q; Elevation 737 feet; Auxiliary Building Conduit-3 inch-PLC 965," March 12, 1981.

7.8 NCR 3579, Rev. 0, "Platforms, Ladders, and Stairs in Category I Structures Erected and Documented Prior to January 1, 1981," August 24, 1981.

7.9 NCR 4093, Rev. 0, "All Structural and Miscellaneous Steel Except Platforms, Ladders, and Stairs," (See NCR 3579), April 27, 1982.

7.10 R. W. Cantrell TVA Memorandum to J. E. Wilkins, "Sequoyah and Watts Bar Design Projects Manager," SWP 810917044, September 16, 1981.

DRR WEP 832

7.11 K. G. Therp letter to L. E. Martin, "Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant (WBNP) Weld Random Sampling Program, Units 1 and 2," KGT-121-86 EG&G Idaho, Inc., June 2, 1986.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE PLATFORMS, LADDERS AND STAIRS IN CATEGORY 1 STRUCTURES WEP GROUP IDENTIFIER QI-SPL-6	Page 2 of 3 Date 11/16/87 Revision 1 WEP Group No 222

by a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group document NCIG-02 was used (Reference 7.4).

A plant examination of the statistically selected component welds was performed to determine the acceptability of the population. The acceptance criteria used was a visual examination in accordance with NCIG-01 (Reference 7.5) and the applicable engineering drawings, as required by the DOE/WEP Assessment Plan No. 222. The evaluation included a review of the associated weld records to verify compliance with code requirements.

Fifty components comprising 1741 welds were examined from the total population of Group 222.

5. Findings

Upon examination of the 50 components, the following determinations were made: (a) fourteen of the components examined were documented as acceptable; (b) the remaining 36 components were documented as having one or more deviations that required engineering analysis to determine acceptability. In the examination of the 36 components it was found that 476 welds from a total of 1741 had deviations which were required to be evaluated by engineering. DRR WEP 950

A total of 36 Deviation Reports, (DRs) one for each component were initiated by the DOE/WEP. The TVA performed a suitability-for-service (SFS) analysis for each of the 36 components and determined by analysis that the welds are suitable for service and will not affect the intended safety function of these components. The DOE/WEP reviewed TVA's analysis and concurred that the welds meet the applicable code (Reference 7.6).

A DOE/WEP review of TVA weld records in accordance with SP WEP 3.2.12 (Reference 7.7) revealed that the weld records in Group 222 met the minimum requirements of the AWS D1.1 structural code.

The DOE/WEP performed a generic problem analysis of General Group 222. No generic problems were identified and sample expansion or rebounding was not required (Reference 7.8).

6. Conclusions

The DOE/WEP concludes that the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE PLATFORMS, LADDERS AND STAIRS IN CATEGORY 1 STRUCTURES WEP GROUP IDENTIFIER QI-SPL-6	Page 3 of 3 Date 11/16/87 Revision 1 WEP Group No 222

population. Therefore, DOE/WEP also concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries meet the applicable FSAR construction code.

7. References

7.1 TVA Nonconforming Condition Report (NCR) 3579, Rev. 0, August 24, 1981.

7.2 U.S. Nuclear Regulatory Commission (NRC) Inspection Enforcement (IE) Item, WBRD-50-390/81-75 and WBRD-50-391/81-71, June 10, 1982.

7.3 WEP Assessment Plan No. 222, "Platforms, Ladders and Stairs in Category 1 Structures," Rev. 0, April 10, 1986.

7.4 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1985.

7.5 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding At Nuclear Power Plants," NCIG-01, Rev. 2, May 7, 1985.

7.6 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for Group 222.

7.7 Standard Practice WEP 3.2.12, "Review of TVA Weld Operation Sheets for Code-Required Minimums," Rev. 6, April 3, 1987.

7.8 "Generic Problem Analysis of Weld Examination Results From Group 222," Inspection Results and Data Analysis Summary Report, July 17, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE INSPECTIONS PERFORMED BY UNCERTIFIED INSPECTOR WEP GROUP IDENTIFIER QI-SPL-7	Page 1 of 2 Date 08/28/87 Revision 1 WEP Group No 223

Approved _____ Date 8-30-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 4374, Revision 0.

2. Characterization of Issue

The NCR 4374 stated an inspector performed visual weld inspections on hangers at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) while uncertified to the TVA WBNP Quality Control Procedure 4.13, from April 18, 1982, through January 9, 1983.

The Department of Energy/Weld Evaluation Project (DOE/WEP) was unable to determine from the review of NCR 4374 if the hanger welds inspected by the uncertified inspector were reinspected and documented by TVA-certified welding inspectors.

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3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 223 (Reference 7.2) was developed to evaluate the welds in this group. In accordance with the assessment plan, a document review was performed to determine if the hanger welds inspected by the uncertified inspector were reinspected and documented by TVA certified welding inspectors.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE INSPECTIONS PERFORMED BY UNCERTIFIED INSPECTOR WEP GROUP IDENTIFIER QI-SPL-7	Page 2 of 2 Date 08/28/87 Revision 1 WEP Group No 223

5. Findings

The TVA personnel determined that 112 hangers had been inspected by the uncertified inspector during their review of the Support Welding Inspection Verification Cards (Reference 7.3) and attached a list of these cards to NCR 4374. Two of the hangers, Nos. 0012-432-13-200-647 and 1033-W491-9-261, had been removed after they were reinspected, with the documentation being deleted.

The DOE/WEP personnel performed a 100% document review of the Support Welding Inspection Verification Cards for the 110 hangers inspected by the uncertified inspector in lieu of a sample. The document review of the 110 Support Welding Inspection Verification Cards and review of inspector certification records showed that TVA-certified welding inspectors had reinspected the welds originally inspected by the uncertified inspector. During the review of NCR 4374, 98 of the supports were found acceptable by TVA; and 12 were found to have deviant welds. The deviant welds were resolved by the corrective action shown on NCR 4374.

6. Conclusions

The DOE/WEP concludes that the hangers referenced by NCR 4374 were reinspected and the documentation evaluated in this group meets the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 TVA Nonconforming Condition Report 4374, Rev. 0.

7.2 WEP Assessment Plan No. 223, "Uncertified Personnel Performing Final Inspection (QI-SPL-7)," Rev. 0, August 11, 1986.

7.3 Support Welding Inspection Verification Cards (Quantity 120) as listed on NCR 4374, Rev. 0.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE INTEGRAL ATTACHMENT PIPE SUPPORT LUGS FOR ASME AND ANSI SYSTEMS WEP GROUP IDENTIFIER QI-SPL-8 and QI-SPL-21	Page 1 of 3 Date 11/16/87 Revision 1 WEP Group No 224 and 245

Approved [signature] Date 11-22-87

Reviewed [signature] Prepared [signature] FOR ROBERT SCHLER

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Reports (NCRs) 4625, 4759, 4574R, 5962R, 5492R, 3745R, 5559R, 5177R1, 4985R, 4483R, 4507R, 5435R, 5946R, 2064R, 2065R, 3776R1, 5308R, 3632, 2451R, 2882R, 3257R, 3632R, and 4301R.

2. Characterization of Issue

At the TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1), a problem existed with the installation and inspection of safety-related [The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section III, Class 1, 2, and 3 and The American National Standards Institute (ANSI) Standard B31.1] pipe support lugs. A total of 23 NCRs were involved in reporting weld deficiencies associated with attaching lugs to pressure boundary components (Reference 7.2). Based on the DOE/WEP original review of the above listed NCRs it was not clear if the possibility of similar conditions existing on safety-related pipe support lugs not listed in the NCRs had been addressed.

3. Summary

The issue for which these groups were formed was resolved by document review, inspection, and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 224 (Reference 7.3) was developed to perform an evaluation on

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WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE INTEGRAL ATTACHMENT PIPE SUPPORT LUGS FOR ASME AND ANSI SYSTEMS WEP GROUP IDENTIFIER QI-SPL-8 and QI-SPL-21	Page 2 of 3 Date 11/16/87 Revision 1 WEP Group No 224 and 245

a representative sample of 64 safety-related ASME Code Section III and ANSI Standard B31.1 pipe support lugs. A visual (VT) examination was performed on all the welds. A liquid penetrant (PT) and/or a magnetic particle (MT) examination was performed when this was part of the original TVA acceptance criteria. Group 245 was combined with Group 224 because both groups were addressed by the same TVA corrective action plan (Reference 7.4).

5. Findings

A sample from the population of Group 224 of 64 ASME welds was selected in accordance with Standard Practice (SP) WEP 3.1.6 (Reference 7.5). The DOE/WEP performed a VT examination on the sample welds in accordance with SP WEP 3.2.3 (Reference 7.6). Of the 64 welds examined, 34 contained deviations which required an engineering evaluation and were addressed in WEP Deviation Reports (DR's) (Reference 7.7).

DRR WEP 951

During the time the DOE/WEP was examining its sample of 64 safety-related welds, the TVA Division of Nuclear Construction (DNC) - Modification Branch (MB) was independently identifying deviant pipe support lugs located on various safety-related systems.

The TVA elected to evaluate 100% of all pipe support lugs on safety-related (ASME Code Section III and ANSI Standard B31.1) piping systems which required evaluation by engineering to establish acceptability and issue a corrective action plan (CAP). The DOE/WEP reviewed and concurred with the TVA issued CAP (Reference 7.4). This CAP includes all 64 welds listed under WEP Group 224. This removes the safety-related pipe support lugs from the DOE/WEP scope of work.

The suitability for service (SFS) review and generic problem analysis (Reference 7.8) performed by the DOE/WEP are no longer required because of the TVA corrective action.

6. Conclusions

The DOE/WEP concludes that the welds evaluated in these groups will meet the applicable Final Safety Analysis Report (FSAR) construction code upon completion of TVA-committed corrective action.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE INTEGRAL ATTACHMENT PIPE SUPPORT LUGS FOR ASME AND ANSI SYSTEMS WEP GROUP IDENTIFIER QI-SPL-8 and QI-SPL-21	Page 3 of 3 Date 11/16/87 Revision 1 WEP Group No 224 and 245

7. References

7.1 TVA Nonconforming Condition Reports (NCRs) 4625, 4759, 4574R, 5962R, 5492R, 3745R, 5559R, 5177R1, 4985R, 4483R, 4507R, 5435R, 5946R, 2064R, 2065R, 3776R1, 5308R, 3632, 2451R, 2882R, 3257R, 3632R, and 4301R.

7.2 H. R. Richardson notegram to A. E. Bradford, "Justification for Special Group Formation," EG&G Idaho, Inc., April 18, 1986.

7.3 WEP Assessment Plan No. 224, "Integral Attachment Welding Pipe Support Lugs," Rev. 3, July 1, 1987 and WEP Assessment Plan No. 245, "Installation and Inspection of ANSI Lugs," Rev. 0, August 4, 1986.

7.4 Gary Boyd, TVA Corrective Action Plan Summary, "Lug Issue", Population A, B, C, 210, 224, and 245, Rev. 1, July 15, 1987.

7.5 Standard Practice WEP 3.1.6, "Identifying Random Samples from Homogeneous Groups", Rev. 5, October 24, 1986.

7.6 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria", Rev. 18, June 2, 1987.

7.7 WEP Deviation Reports 224-0002, -0005, -0008, -0009, -0010, -0013, -0015, -0019, -0020, -0021, -0024, -0025, -0028, -0030, -0031, -0033, -0034, -0036, -0037, -0040, -0041, -0042, -0045, -0046, -0047, -0048, -0049, -0050, -0051, -0052, -0055, -0056, -0057, -0060, -0063, -0064, -0065, -0067, -0072, and -0076.

7.8 "Generic Problem Analysis of Weld Examination Results From Group 224", Inspection Results and Data Analysis Summary Report, April 24, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE CONDUIT SUPPORTS BETWEEN ELEVATION 708 FOOT AND 728 CONTROL BUILDING WEP GROUP IDENTIFIER QI-SPL-9	Page 1 of 3 Date 11/16/87 Revision 1 WEP Group No 225

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Nonconforming Condition Report (NCR) 2629R (Reference 7.1).

2. Characterization of Issue

Group 225, primarily a subset of General Group J, was formed because a review of Nonconforming Condition Report (NCR) 2629R indicated:

A. Welds do not meet inspection criteria.

B. There is not sufficient documentation to verify that the rework/reinspection of all structural conduit supports on Elevation 708 of the Control Building was done after September 19, 1980 as specified on the NCR (Reference 7.1).

3. Summary

The issue for which the group was formed was resolved by document review, visual examination, and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 225 (Reference 7.2) was developed to evaluate a random sample of 200 conduit supports located between Elevation 708 ft and 728 ft in the Control Building, in accordance with Standard Practice (SP) WEP 3.1.6, "Identifying Random Samples From Homogeneous Groups." A document review was conducted to reveal whether or not any of the welds were reworked/reinspected after September 19, 1980. Based on

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WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE CONDUIT SUPPORTS BETWEEN ELEVATION 708 FOOT AND 728 CONTROL BUILDING WEP GROUP IDENTIFIER QI-SPL-9	Page 2 of 3 Date 11/16/87 Revision 1 WEP Group No 225

the results of the document review the first 62 components from the original random list of 200 conduit supports were selected for visual examination. A 100% visual examination was performed on those components in accordance with SP WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," and checklists. DRR WEP 952

5. Findings

A review of the documentation for the randomly selected components (200) provided evidence that the rework/reinspection was not performed on all of the welds as required by the corrective action on NCR 2629R. Therefore, 62 components (207 welds) were selected from the original random list of 200 conduit supports, and 100% visual inspection of the welds on the selected components was performed per the requirements of SP WEP 3.2.3 "Visual Examination Methods and Acceptance Criteria" and checklists. Reference 7.3 provides deviation details that required engineering analysis to determine acceptability. Weld 225-0123 had a crater crack which was characterized per the requirements of SP WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancy." After removal of the crater crack the weld was reexamined and found to be acceptable.

A Suitability-For-Service (SFS) analysis by Tennessee Valley Authority (TVA) determined that the deviant welds meet all appropriate design criteria. Department of Energy/Weld Evaluation Project (DOE/WEP) concurred with TVA's findings (Reference 7.4) in accordance with Standard Practice WEP 3.3.1 (Reference 7.5).

The DOE/WEP performed a generic problem analysis of the aggregate examination results of Groups J, 202 and 225 due to similarity of components. No generic problems were identified within the boundaries of Group 225. Therefore, no additional sampling or rebounding was required for this group (Reference 7.6). DRR WEP 952

6. Conclusions

The DOE/WEP concludes that, the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled welds within the group boundaries also meet the applicable FSAR construction code.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE CONDUIT SUPPORTS BETWEEN ELEVATION 708 FOOT AND 728 CONTROL BUILDING WEP GROUP IDENTIFIER QI-SPL-9	Page 3 of 3 Date 11/16/87 Revision 1 WEP Group No 225

7. References

7.1 Nonconforming Condition Report 2629R dated September 19, 1980.

7.2 WEP Assessment Plan No. 225, "Conduit Supports Between Elevation 708' and 728' Control Building," Rev. 1, May 20, 1986.

7.3 Group 225 Data Report on Weld Evaluation Project, INS 101-R1 and INS 008-R0 August 10, 1987.

7.4 WEP Suitability for Service Review Summary Sheet, Analysis Package WDR 225-0002 (and subsequent packages for Group 225).

7.5 Standard Practice WEP 3.3.1, "Suitability-for-Service Evaluation Review," Rev. 8, June 8, 1987.

7.6 "Generic Problem Analysis of Weld Examination Results From Groups J, 202, and 225," Inspection Results and Data Analysis Summary Report, Rev. 0, July 14, 1987.

DRR WEP 952

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ALIGNMENT BEAD WELD NOT IN COMPLIANCE WITH PROCEDURE REQUIREMENTS WEP GROUP IDENTIFIER QI-SPL-10	Page 1 of 2 Date 08/20/87 Revision 1 WEP Group No 226

Approved [signature] Date 8/22/87

Reviewed [signature] 8-20-87 Prepared [signature]

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Nuclear Regulatory Commission (NRC) Enforcement Item Number 390/79-25-01.

2. Characterization of Issue

NRC Enforcement Item No. 390/79-25-01 identifies alignment bead weld No. 1-072A-D063-08A which was completed in Unit 1 without performing a liquid penetrant examination or measuring the size of the weld as required by Tennessee Valley Authority (TVA) Process Specification (PS) 4.4.2.1(c), Section 5 (Reference 7.2). Information contained in the NRC report indicated that the problem may not have been an isolated incident.

The subject issue may indicate a problem with TVA's compliance with existing, applicable procedures for examining and documenting alignment bead welds.

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) developed Assessment Plan 226 (Reference 7.3) to perform a review and evaluation of TVA compliance with TVA PS 4.M.2.1(c) for performing alignment bead welds on safety-related piping.

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Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ALIGNMENT BEAD WELD NOT IN COMPLIANCE WITH PROCEDURE REQUIREMENTS WEP GROUP IDENTIFIER QI-SPL-10	Page 2 of 2 Date 08/20/87 Revision 1 WEP Group No 226

5. Findings

DOE/WEP personnel performed an evaluation (Reference 7.4) of all (69) (Reference 7.5) TVA weld operations sheets and weld numbered isometric drawings which document alignment bead welds in accordance with the requirements of TVA PS 4.M.2.1(c). In cases where alignment bead welds did not meet PS 4.M.2.1, TVA initiated a Nonconforming Condition Report (Reference 7.6) and all of these have been properly dispositioned. All of the other alignment bead welds were performed properly in accordance with PS 4.M.2.1.

During review of documentation, NRC Report Number 50-390/81-04 (Reference 7.7) was located by DOE/WEP. The NRC report identified the infraction noted earlier on alignment bead welds and closed the issue, finding TVA's corrective action acceptable. Had DOE/WEP known earlier about the NRC closure of enforcement Item 390/79-25-01, this group would not have been formed.

6. Conclusions

DOE/WEP concludes that the TVA procedure to perform, examine, and document alignment bead welding was available, implemented and in compliance with the applicable Final Safety Analysis Report (FSAR) construction code.

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7. References

7.1 NRC Enforcement Item Number 390/79-25-01.

7.2 TVA Process Specification 4.M.2.1(c), "Specification for Bending or Alignment of Pipe and Tubing," Rev. C, August 28, 1978.

7.3 WEP Assessment Plan No. 226, "Evaluation of Alignment Bead Welds (QI-SPL-10)," Rev. 2, April 20, 1987.

7.4 A. D. Calija notegram to A. E. Bradford, EG&G Idaho, Inc., July 19, 1986.

7.5 TVA Weld Monitoring Status Report for all ASME alignment bead weids.

7.6 TVA Nonconforming Condition Reports 1650, Rev. 0, 1670, Rev. 0, and 1666, Rev. 0.

7.7 NRC Report Number 50-390/81-04, March 19, 1981.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE STIFFENER AND CROSSBRACING WELDS ON SURGE LINE TRUSS WEP GROUP IDENTIFIER EX-SPL-13 and QI-SPL-11	Page 1 of 4 Date 11/16/87 Revision 1 227 and WEP Group No 261

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____
FOR THOMAS STUCKI

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

The Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 3302R, Watts Bar Nuclear Plant Units 1 and 2 (WBNP-1, -2).

2. Characterization of Issue

The corrective action taken as referenced by memorandum, "Watts Bar Nuclear Plant Units 1 and 2--NCR 3302R" (Reference 7.2) did not adequately address the nonconformance noted.

The NCR 3302 Revision 0 identified stiffener and crossbracing connection welds on surge line trusses as not conforming to the design configuration. The web-to-web stiffener welds, and crossbracing connection welds per TVA Drawings 48W1703-06R2, -05R5, -07R3, and -08R2 were specifically addressed. The corrective action stated the drawings would be revised; however, it did not identify which welds were constructed to the original drawings or the revised drawings. It is unknown if the welds identified in the NCR now meet the alternate connection weld details.

3. Summary

The issues for which these groups were formed were resolved by document review, inspection/examination, and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plans Nos. 227 and 261 (References 7.3 and 7.4) were developed to

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE STIFFENER AND CROSSBRACING WELDS ON SURGE LINE TRUSS WEP GROUP IDENTIFIER EX-SPL-13 and QI-SPL-11	Page 2 of 4 Date 11/16/87 Revision 1 227 and WEP Group No 261

evaluate the welds in these groups. In accordance with the assessment plans, a representative sample of the groups population was extracted, per Standard Practice (SP) WEP 3.1.6 (Reference 7.5), and a visual examination was performed, in accordance with the Nuclear Construction Issues Group document NCIG-01 (Reference 7.6). Nonconforming conditions were identified per SP WEP 3.2.2 (Reference 7.7); deviation reports were processed per SP WEP 3.2.11 (Reference 7.8); and reviews of the TVA Suitability-for-Service Analysis performed per SP WEP 3.3.1 (Reference 7.9).

5. Findings

Group 227 consisted of 35 components (159 welds) sampled from stiffener and crossbracing connection welds on the surge line truss. The welds were inspected in accordance with the acceptance criteria of NCIG-01. Twenty one welds were documented as having one or more conditions that required engineering analysis to determine acceptability.

The DOE/WEP performed a generic problem analysis on the deviant welds identified in Group 227 (Reference 7.10). Consequently, expansion Group 261 was formed to evaluate potential generic problems identified during the evaluation of Group 227. Group 261 was formed incorporating 100% of the remaining accessible surge line truss weldments. The expansion group included 10 components (57 welds) that were inspected for the attributes of length and location, weld size, and weld profile.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the deviant welds in both groups and determined that the components will perform their intended function. The DOE/WEP Suitability For Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.11).

The examination results of the weld attributes are listed in the inspection data reports for Groups 227 and 261 (Reference 7.12). There is no generic problem with the weld components in Groups 227 and 261.

6. Conclusions

The conditions for which Groups 227 and 261 were formed were confirmed. The DOE/WEP found that some of the welds did not meet the

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE STIFFENER AND CROSSBRACING WELDS ON SURGE LINE TRUSS WEP GROUP IDENTIFIER EX-SPL-13 and QI-SPL-11	Page 3 of 4 Date 11/16/87 Revision 1 227 and WEP Group No 261

weld detail, however, the welds evaluated in these groups meet the applicable Final Safety Analysis Report (FSAR) construction code.

DRR WEP 953

7. References

7.1 TVA Nonconforming Condition Report (NCR) 3302R Rev. 0.

7.2 P. W. Cantrell memorandum to J. E. Wilkins, "Watts Bar Nuclear Plant Units 1 and 2--NCR 3302R," SWP 81 0615 009, June 12, 1981.

7.3 WEP Assessment Plan No. 227, "Stiffener and Crossbracing Welds on Surge Line Truss," Rev. 1, August 19, 1987.

7.4 WEP Assessment Plan No. 261, "Stiffener and Crossbracing Welds on Surge Line Truss Not Previously Inspected In Group 227," Rev. 0, March 9, 1987.

7.5 Standard Practice WEP 3.1.6, "Identifying Random Samples From Homogeneous Groups," Rev. 3, November 21, 1986.

7.6 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," NCIG-01, Rev. 2, May 7, 1985.

7.7 Standard Practice WEP 3.2.2, "Reporting Deviations to TVA," Rev. 7, November 17, 1986.

7.8 Standard Practice WEP 3.2.11, "Processing and Closure of Deviation Reports," Rev. 7, July 6, 1987.

7.9 Standard Practice WEP 3.3.1, "Suitability-For-Service Evaluation Review," Rev. 8, June 8, 1987.

7.10 "Generic Problem Analysis of Weld Examination Results from Group 227," Inspection Results and Data Analysis Summary Report, Rev. 0, May 26, 1987.

7.11 TVA Suitability-for-Service Analysis and WEP Suitability-for-Service Review Summary Sheets for Groups 227 and 261.

Form WEP 320a
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE STIFFENER AND CROSSBRACING WELDS ON SURGE LINE TRUSS WEP GROUP IDENTIFIER EX-SPL-13 and QI-SPL-11	Page 4 of 4 Date 11/16/87 Revision 1 WEP Group No 227 and 261

7.12 WEP Group 227 Inspection Data Report on Weld Evaluation Project, INS 101-R1 August 21, 1987, Inspection Results, INS 008-R0, August 21, 1987, and WEP Group 261 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 21, 1987, and Inspection Results, INS 008-R0, August 21, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CHECK VALVES IN FIRE PROTECTION SYSTEMS WEP GROUP IDENTIFIER EC-SPL-20	Page 1 of 3 Date 11/16/87 Revision 3 WEP Group No. 228

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____
For Dennis Washington

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern EX-85-020-001.

2. Characterization of Issue

The Concerned Individual (CI) who wrote Employee Concern EX-85-020-001 completed four of eight welds tying in the check valves on 6-inch "fire protection pipe." The remaining four welds had only the root weld completed. This concern involved work slowdown by the original crew, harassment of the CI by the original crew, and a rush job by the foreman to accomplish the assigned work in a short period of time. Details known to Quality Technology Company (QTC) were withheld due to confidentiality. No further information may be released.

DRR WEP 954

3. Summary

The issue for which the group was formed was resolved by visual examination and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 228 (Reference 7.2) was developed to evaluate the welding on all 6-inch check valves in the Fire Protection System. All safety-related welds to 6-inch check valves in the Fire Protection System were examined.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CHECK VALVES IN FIRE PROTECTION SYSTEMS WEP GROUP IDENTIFIER EC-SPL-20	Page 2 of 3 Date 11/16/87 Revision 3 WEP Group No. 228

5. Findings

DOE/WEP has determined through document review that only five 6-inch check valves exist in the Fire Protection System at Watts Bar Nuclear Plant (WBNP) Unit 1. Two installation welds were examined for each 6-inch valve, making a total of ten welds.

The 10 welds were examined and seven were documented as having deviations that required engineering analysis to determine acceptability (Reference 7.3). Only one deviation was found that pertained to aspects related to minimum section thickness. However, this deviation did not validate the employee concern that only a root pass weld was completed.

DRR WEP 954

The results of these examinations were forwarded to Tennessee Valley Authority (TVA) Engineering Design for evaluation. TVA has determined by analysis that the identified deviations will not affect the intended safety function of these components/welds. TVA evaluated the associated welds as acceptable and in compliance with American National Standards Institute (ANSI) B31.1 Power Piping, 1973 (Reference 7.4).

The DOE/WEP Suitability-For-Service Evaluation Engineering (SSEE) group performed a review of the TVA engineering analysis and determined that the deviations identified have been demonstrated to be in compliance with the applicable codes (Reference 7.5).

6. Conclusions

The issue identified in the employee concern was not confirmed. The DOE/WEP concludes that, for the attributes of concern as specified in the referenced assessment plan, the welds meet the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 Employee Concern EX-85-020-001.

7.2 WEP Assessment Plan No. 228, "Check Valves in Fire Protection System," Rev. 0, May 23, 1986.

7.3 Group 228 Data Report on Weld Evaluation Project, INS101-R1, August 5, 1987, and INS008-R0, July 31, 1987.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CHECK VALVES IN FIRE PROTECTION SYSTEMS WEP GROUP IDENTIFIER EC-SPL-20	Page 3 of 3 Date 11/16/87 Revision 3 WEP Group No. 228

7.4 The American Society of Mechanical Engineers, "Power Piping," American National Standard Code for Pressure Piping, ANSI B31.1, June 15, 1973, through Winter 1973.

7.5 WEP Suitability For Service Review Summary Sheet, Analysis Package WDR 228-0003 (and subsequent packages for Group 228).

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED WELDS ON STEAM GENERATOR SUPPORTS WEP GROUP IDENTIFIER EC-SPL-21	Page 1 of 3 Date 11/16/87 Revision 1 WEP Group No 229

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Employee Concern IN-86-184-003 (Reference 7.1).

2. Characterization of Issue

Employee Concern IN-86-184-003 identified that there was a probability of trapped slag in the welds on the steam generator supports at Watts Bar Nuclear Plant Unit 1 (WBNP-1). The concerned individual would provide no further information. In-as-much as trapped slag is not necessarily code rejectable, the issue becomes one of determining if the amount affects the code acceptability of the components in this group.

3. Summary

The issue for which the group was formed was resolved by inspection/examination and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 229 (Reference 7.2) was developed to evaluate the Unit 1 Steam Generator Support welds for embedded slag.

The DOE/WEP identified those welds that would be affected by embedded slag as the multipass fillet and multipass groove welds on all four Unit 1 upper and lower steam generator supports. The DOE/WEP then randomly selected a sample of welds, of those identified above, from the total population of Group 229, in accordance with Nuclear Construction Issues Group document NCIG-02 (Reference 7.3).

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED WELDS ON STEAM GENERATOR SUPPORTS WEP GROUP IDENTIFIER EC-SPL-21	Page 2 of 3 Date 11/16/87 Revision 1 WEP Group No 229

A plant examination of the randomly selected welds was performed to determine the acceptability of the population. The acceptance criteria used was a visual examination in accordance with Standard Practice (SP) WEP 3.2.3 (Reference 7.4) and an ultrasonic examination in accordance with SP WEP 3.2.7 (Reference 7.5). These examinations determined the adequacy of the steam generator support welds.

5. Findings

Eighteen components, consisting of 70 welds, were examined from the total population of Group 229, and the following determinations were made (Reference 7.6):

a. Fifty-six welds, of the total of 70, were visually examined and documented as acceptable without further evaluation.

b. The remaining 14 welds were visually examined and documented as having one or more deviant conditions that required engineering analysis to determine acceptability. Three of these welds (Examination Package Nos. 229-0027, 229-0030, and 229-0076) required characterization, in accordance with SP-WEP 3.2.16 (Reference 7.7), for determination of final acceptance of certain weld attributes. These three welds were characterized and those specific weld attributes were acceptable.

c. Forty-four of the above 70 welds were ultrasonically examined and documented as acceptable without further evaluation.

d. The remaining 26 welds were ultrasonically examined and documented as having one or more deviant conditions that required engineering analysis to determine acceptability.

TVA performed a suitability-for-service analysis (SFSA) for the deviant welds identified and determined that the welds were in compliance with the applicable code. The DOE/WEP reviewed the analysis and concurred with the TVA SFSA (Reference 7.8).

The DOE/WEP performed a generic problem analysis of Group 229 and no generic problems were identified (Reference 7.9). Sample expansion or rebounding was not required.

6. Conclusions

The issue for which this group was formed was not confirmed. The DOE/WEP concludes that, for the attributes of concern as specified in the referenced assessment plan, the welds examined in this group meet

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WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED WELDS ON STEAM GENERATOR SUPPORTS WEP GROUP IDENTIFIER EC-SPL-21	Page 3 of 3 Date 11/16/87 Revision 1 WEP Group No 229

the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 Employee Concern IN-86-184-003.

7.2 WEP Assessment Plan No. 229, "Safety-Related Welds on Steam Generator Supports," Rev. 4, March 23, 1987.

7.3 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 25, 1985.

7.4 Standard practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987.

7.5 Standard practice WEP 3.2.7, "AWS Ultrasonic Examination and Acceptance Criteria," Rev. 2, February 2, 1987.

7.6 WEP Group 229 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 27, 1987, and Inspection Results, INS 008-R0, August 27, 1987.

7.7 Standard practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 28, 1986.

7.8 TVA Suitability for Service Analysis and DOE/WEP Suitability for Service Review Summary Sheets for Group 229.

7.9 "Generic Problem Analysis of Weld Examination Results from Group 229," Inspection Results and Data Analysis Summary Report, Rev. 1, August 27, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SEISMIC HANGERS WITH MISSING, INCOMPLETE, AND DEFICIENT WELDS WEP GROUP IDENTIFIER QI-SPL-12	Page 1 of 4 Date 11/16/87 Revision 1 WEP Group No 230

Approved _____ Date 11-27-87

Reviewed _____ Prepared David Burke

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

This Closure Report includes Group 230 and Group 230 Expansion.

a. Group 230

Nonconformance Report (NCR) 4477R identified a pipe sleeve hanger support with missing, incomplete, and deficient welds. No further evaluation of similar supports was made to determine if this condition existed elsewhere. The NCR was dispositioned to accept the deficient welds (Reference 7.1).

DRR WEP 956

b. Group 230 Expansion

The expansion was formed to evaluate potential problems identified while performing a generic problem analysis of deviant welds identified in Group 230, per Standard Practice WEP 3.3.2 (Reference 7.2).

2. Characterization of Issue

At the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1), Group 230 and the expansion of Group 230 contain seismic pipe sleeve hanger supports, similar to that shown on Drawing 70-1CC-R487, where the structural shapes are welded inside the pipe and may have deficient conditions that are unacceptable.

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SEISMIC HANGERS WITH MISSING, INCOMPLETE, AND DEFICIENT WELDS WEP GROUP IDENTIFIER QI-SPL-12	Page 3 of 4 Date 11/16/87 Revision 1 WEP Group No 230

Suitability-For-Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.8).

4. Group 230 Expansion was formed to evaluate potential problems identified when performing a generic problem analysis of deviant welds for Group 230, per SP WEP 3.3.2 (Reference 7.2).

b. Group 230 Expansion

1. Twenty-five components (82 welds) were accepted.

2. Five components were documented as having one or more deviant conditions. Deviations were found on 10 of 15 welds. The remaining five welds were acceptable.

3. The TVA ENDES organization performed a suitability-for-service analysis (SFSA) for each of the deviant welds and determined that the components will adequately perform their intended function. The DOE/WEP SSEE group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.8).

4. The DOE/WEP Data Analysis Program (DAP) organization concluded that Group 230 and Group 230 Expansion have no generic problems and rebounding or additional sample expansion is not required (Reference 7.5).

6. Conclusions

The DOE/WEP concludes the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore DOE/WEP also concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the group boundaries meet the applicable FSAR construction code.

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7. References

7.1 TVA Nonconforming Condition Report (NCR) 4477R, Rev. 0.

7.2 Standard Practice WEP 3.3.2, "Root Cause and Generic Problem Evaluation," Rev. 07, March 17, 1987.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SEISMIC HANGERS WITH MISSING, INCOMPLETE, AND DEFICIENT WELDS WEP GROUP IDENTIFIER QI-SPL-12	Page 4 of 4 Date 11/16/87 Revision 1 WEP Group No 230

7.3 WEP Assessment Plan No. 230, "Seismic Hangers With Missing, Incomplete, and Bad Welds," Rev. 3, June 29, 1987.

7.4 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptable Criteria," Rev. 18, June 2, 1987.

7.5 "Generic Problem Analysis of Weld Examination Results From Group 230," Inspection Results and Data Analysis Summary Report, Rev. 0, July 16, 1987.

7.6 Standard Practice WEP 3.2.2, "Reporting Deviations to TVA," Rev. 07, November 17, 1986.

7.7 WEP Group 230 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 7, 1987, and Inspection Result, INS 008-R0, August 7, 1987.

7.8 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for Group 230.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BOX ANCHOR EVALUATION WEP GROUP IDENTIFIER EC-SPL-22	Page 1 of 5 Date 11/14/87 Revision 2 WEP Group No 231

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns EX-85-039-003, IN-85-316-005, IN-85-405-001, IN-85-613-001, IN-85-634-001, IN-85-634-002, IN-85-672-001, OW-85-003-001, WBP-6-007-001

2. Characterization of Issue

Pipe anchors commonly used by Tennessee Valley Authority (TVA) at the Watts Bar Nuclear Plant Unit 1 (WBNP-1) are designed such that a box is constructed around the pipe being supported with one end welded to the pipe. The employee concerns contained in this group express concern that the large circumferential weld that attaches a box anchor to the pipe may have caused excessive heat input into the pipe and resulted in degradation of the mechanical properties of the piping.

The opposite end of the anchor is required by TVA design to be unattached to allow for unrestrained linear expansion and contraction of the pipe during heating and cooling. An employee concern also stated that in some cases, the plate (on the unattached end) has been inadvertently welded to the pipe during completion of the end plate seam weld and could damage the pipe if the weld should fail during plant operation (Employee Concern EX-85-039-003).

DOE/WEP welding engineers determined that the worst case scenario would be excessive heat input into stainless steel.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BOX ANCHOR EVALUATION WEP GROUP IDENTIFIER EC-SPL-22	Page 2 of 5 Date 11/14/87 Revision 2 WEP Group No 231

3. Summary

The issue for which the group was formed was resolved by engineering evaluation that included welding and testing six mockup joints.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan 231 was developed to perform an engineering evaluation to determine if the pipe wall minimum thickness would be violated if the weld that inadvertently fused the end plate of the box anchor to the pipe failed during plant operations (Reference 7.2). Two additional engineering evaluations of available reports were conducted to determine the effects of excessive heat input, excess weld metal, thermal stress and extended welding on the weld and heat affected zone (HAZ) (References 7.3, 7.4) and a fourth engineering evaluation was conducted by DOE/WEP to determine the condition of the microstructure when E7018 weld metal, used to weld the end plate on the box anchor, is fused to the Type 304 stainless steel piping material (Reference 7.5).

5. Findings

Several instances were found in the WBNP-1 box anchor installations where carbon steel electrodes (E7018), used to weld the carbon steel end plate of the pipe box anchor, were welded to the stainless steel pipe. TVA's Office of Engineering (OE) determined by calculation that the maximum differential thermal axial expansion or contraction would be 0.031 inch for the worst combination of length and operating temperatures. The anticipated failure of the fused area between the pipe and end plate would be in shear and therefore, not detrimental to the pipe surface. The DOE/WEP agreed with this postulation, but felt that there might be damage to the pipe wall. Therefore, six mockup joints were welded under the DOE/WEP supervision using various combinations of carbon and stainless steel plate and pipe. The mockups were tested, at Singleton Laboratories under the DOE/WEP supervision in the axial direction of the pipes, representative of the loading that will result from differential thermal expansion and contraction during plant operation. Based on the results, it was evident that the mode of failure would be shear through the weld and would not affect the pipe. Visual examination of the sheared surfaces revealed that there was no damage to the pipe wall; i.e., no reduction in pipe wall thickness (Reference 7.6).

DRR WEP 957

Form WEP 320a
Rev. 12/86

WEP Closure Statement — Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BOX ANCHOR EVALUATION WEP GROUP IDENTIFIER EC-SPL-22	Page 3 of 5 Date 11/14/87 Revision 2 WEP Group No 231

A metallurgical examination of samples taken from welds 1 and 2 of Test Coupon No. 1 was conducted at EG&G Idaho and Singleton Laboratories to determine if the E7018 filler metal welded to the stainless steel pipe was detrimental to the microstructure of the weld and HAZ. Test coupon No. 1 was one of six test coupons used to determine mode of failure between the box anchor end plate and plant piping.

The specimens were examined using standard polishing and etching procedures. The specimens were examined for microhardness, degree of sensitization, and defects that may have been caused when welding the E7018 carbon steel filler metal to the stainless steel piping.

No microcracking was found in Sample No. 1. A defect was observed in Sample No. 2 in the base material near the weld. The defect is believed to be intergrannular cracking that resulted from the deformation during testing and not related to welding. A very small amount of porosity was observed at the edge of Sample No. 2. Sensitization was observed in Samples 1 and 2 at the weld interface. However, the depth of sensitization was very small (approximately 0.004 inch). The hardness levels in the carbon steel ranged from 300 to 462 Diamond Pyramid Hardness (DPH) and the Type 304 stainless steel ranged from 191 to 396 DPH Although the hardness values for the carbon steel are at the higher end of the range, there was no evidence of cracking in the weld or heat affected zone (HAZ). Typical values for annealed stainless steel are 190 to 220 DPH. The higher hardness values are related to cold working caused from the shear testing of the sample and not from the welding process and the hardness values were typical for annealed Type 304 stainless steel (Reference 7.5).

A literature search of available reports was conducted to resolve several employee concerns of excessive heat and weld metal, possible metal fatigue in-service, continuous welding and thermal stress. The results of this investigation show that Types 304, 304L, 316, 316L, and 316H stainless steel at interpass temperatures of concern for this group, had no appreciable effect on the weld microstructure, weld soundness, traverse strength, and weld metal and HAZ toughness (Reference 7.3).

Based on fatigue data generated under a U.S. Nuclear Regulatory Commission Project, welded Type 304 stainless steel tested in air at ambient temperature, and at 500°F, exceeded the low cycle fatigue behavior of the unwelded base metal (Reference 7.3).

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BOX ANCHOR EVALUATION WEP GROUP IDENTIFIER EC-SPL-22	Page 4 of 5 Date 11/14/87 Revision 2 WEP Group No 231

Thermal stresses occurred in all welding operations of all materials. For piping systems fabricated from Types 304 and 316 austentic stainless steel, the thermal stresses are of little concern because of the single-phase microstructure and face-centered cubic crystal structure (austenitic phase) which is very tough and ductile over a broad range of temperatures. Thus, the Types 304 and 316 stainless steels can accommodate the thermal stresses associated with welding (Reference 7.3).

Associated with the allegation of excessive heat input during welding is the possibility that the level of sensitization may vary appreciably, particularly if the carbon content of the stainless steel is on the high side (0.076 to 0.08 wt%). Therefore, DOE/WEP conducted a second literature search to resolve this issue. It was concluded from this study that intergranular stress corrosion cracking (IGSCC) in austentic stainless steel is caused by a combination of three factors: a sensitized microstructure, tensile stresses in the vicinity of the yield stress of the material, and an environment that supports the process. With the exclusion of one of the contributors, IGSCC will not occur. For WBNP-1, the chemical environment in the primary system does not support IGSCC (Reference 7.4).

This analysis and evaluation is relevant to all pipe diameters and wall thickness.

6. Conclusions

The issue identified in Employee Concern EX-85-039-003 was confirmed. However, the DOE/WEP concludes that the related piping systems are not adversely affected by the box anchor installations. The remaining employee concerns listed in Section 1 were not confirmed.

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957

7. References

7.1 Employee Concerns EX-85-039-003, IN-85-316-005, IN-85-405-001, IN-85-613-001, IN-85-634-001, IN-85-634-002, IN-85-672-001, OW-85-003-001, WBP-6-007-001.

7.2 WEP Assessment Plan No. 231, "Box Anchor Evaluation," Rev. 0, June 13, 1986.

7.3 D. D. Hansen notegram to A. E. Bradford, "Excessive Heat In-Put Caused from Continuous Welding and Ignoring Interpass Temperature Special Groups 215, 218, 231" EG&G Idaho, Inc., August 25, 1986 (report attached).

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BOX ANCHOR EVALUATION WEP GROUP IDENTIFIER EC-SPL-22	Page 5 of 5 Date 11/14/87 Revision 2 WEP Group No 231

7.4 D. D. Hansen notegram to A. E. Bradford, "Concerns of the Effects of Continuous Welding and Overheating of Piping Welds Special Groups 215, 218, 231," EG&G Idaho, Inc., August 26, 1986 (report attached).

7.5 Joseph C. Danko, Failure Analysis of Box Anchor Rear Plate Fusion Area, Independent Consultant, May 1987.

7.6 D. D. Hansen letter to A. E. Bradford, "Group 231 Fusion of Backplate of Box Anchor to Process Piping," DDH-01-86, EG&G Idaho, Inc., September 29, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED PIPE SUPPORT WELDS WEP GROUP IDENTIFIER EC-SPL-23	Page 1 of 4 Date 11/16/87 Revision 2 WEP Group No 232

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns IN-85-532-006, IN-85-682-002, EX-85-037-002, IN-85-707-003, and WI-85-041-002.

2. Characterization of Issue

The employee concerns listed in Section 1 express concerns regarding the quality of the safety-related welding at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). The concerns and the Department of Energy Weld Evaluation Project (DOE/WEP) characterization of the issues identified are as follows:

a. Employee Concerns IN-85-532-006, and IN-85-682-002 and subsequent investigation of these concerns identified a situation where weld acceptance criteria listed upon hanger drawings was not consistent with the acceptance criteria listed in the applicable Quality Control procedure. The DOE/WEP reviewed the TVA documentation associated with the inspection/acceptance methodology and determined that where a conflict exists between support drawings and general construction specifications, the drawing shall govern. The TVA Drawing 47A050 series allows many alternatives and variables to be used. In the case of these concerns, the TVA Drawing 47A050 series was utilized and was acceptable. The acceptance criteria conflict has been resolved.

b. Employee Concern WI-85-041-002 stated that the qualification/ training of inspectors for structural weld visual examination was questionable and that Level II certification was granted with only two months of on the job training (OJT) which was not

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958

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED PIPE SUPPORT WELDS WEP GROUP IDENTIFIER EC-SPL-23	Page 2 of 4 Date 11/16/87 Revision 2 WEP Group No 232

documented. The concern further stated that the TVA Topical Report has debased ANSI N45.2.6, regarding qualification of Inspection/Examination personnel. The DOE/WEP review of this concern as well as review of the TVA procedure requirements for inspection personnel qualification has determined that the employee concern was based upon the employee opinion. The DOE/WEP determined that all TVA inspection and examination personnel were qualified and certified to an approved TVA program (in accordance with ANSI N45.2.6) which defined the required education, training, and work time experience. There was a sufficient combination of circumstantial and objective evidence to support a conclusion that TVA at Watts Bar, from the beginning of construction, did provide training for visual welding inspectors, and that the training was adequate for the inspectors assigned task.

DRR WEP 958

c. Employee Concerns EX-85-037-002 and IN-85-707-003 identified a perceived problem with TVA utilizing inexperienced welders. The DOE/WEP review of the concerns as well as review of the code requirements for welder qualification has determined that the particular concerns were based upon the employees opinion. The DOE/WEP determined that the TVA procedures for welder qualification were in compliance with the required code. The code requirements for welder performance qualification were designed to verify that a welder had the minimum skills needed to produce a sound weld and there was no reference to minimum training requirements.

Since there was insufficient information to allow isolation of specific welds for evaluation, the DOE/WEP chose to evaluate the generic implications of the problems identified for their potential impact upon the welds associated with the identified population. Significant inadequacies in inspection and/or training, as well as, utilization of an incorrect acceptance criteria would be reflected in the nonacceptability of the subject welds.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, engineering analysis, and engineering evaluation.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED PIPE SUPPORT WELDS WEP GROUP IDENTIFIER EC-SPL-23	Page 3 of 4 Date 11/16/87 Revision 2 WEP Group No 232

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 232 (Reference 7.2) was developed to evaluate the safety-related pipe support welds in this group. Within the DOE/WEP's scope of work, the nature of the listed employee concerns was most appropriately addressed by a general plant examination. Therefore, the results of these examinations were analyzed to determine compliance of the welds to the construction code.

In accordance with the assessment plan for Group 232, the DOE/WEP used the examination results of welds indicated in the closure statement for Group F. The results from this group were satisfactory to resolve Group 232, because the populations have the same boundaries. Therefore, a separate sample for Special Group 232 was not required.

DRR WEP 958

5. Findings

During examination of safety-related pipe support welds in Group F, the DOE/WEP identified weld deviations that required engineering analysis to determine acceptability. However, all deviant components identified have been determined by TVA to be suitable for service. As indicated in the closure statement for Group F, the DOE/WEP has concurred with these suitability-for-service analyses and determined that the associated components meet the applicable construction codes.

Additionally, all components associated with General Group F were determined to have no generic problems and no additional sampling was required (Reference 7.3).

6. Conclusions

The issues identified in the employee concerns relative to their impact on weld acceptability were not confirmed. The DOE/WEP concludes that the population of components containing safety-related pipe support welds are in compliance with the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the boundary of this group are also in compliance with the applicable FSAR construction code.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED PIPE SUPPORT WELDS WEP GROUP IDENTIFIER EC-SPL-23	Page 4 of 4 Date 11/16/87 Revision 2 WEP Group No 232

7. References

7.1 Employee Concerns IN-85-532-006, IN-85-682-002, WI-85-041-002, EX-85-037-002, and IN-85-707-003.

7.2 WEP Assessment Plan No. 232, "Safety-Related Pipe Support Welds," Rev. 1, August 4, 1987.

7.3 "Generic Problem Analysis of Weld Examination Results from Group F," Inspection Results and Data Analysis Summary Report, Rev. 0, June 28, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1 SAFETY-RELATED PIPING WELDS WEP GROUP IDENTIFIER EC-SPL-24	Page 1 of 4 Date 11/16/87 Revision 1 WEP Group No 233

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____
for Douglas Kennaston

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1 10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Qualit Indicator(s) (Reference 7.1)

Employee Concerns: IN-85-469-003, HI-85-040-001, WI-85-030-006, IN-85-247-002, IN-85-627-036, IN-85-310-004, IN-85-298-002, IN-85-627-037, IN-85-155-001, IN-85-280-001, IN-85-458-007, EX-85-037-003, IN-85-982-003, IN-85-460-003, IN-85-845-004, IN-86-184-004, IN-86-046-003, IN-85-632-001, IN-86-249-X02, IN-86-184-002, IN-85-576-001, IN-85-223-002, EX-85-003-X04, IN-85-890-001, WI-85-035-007, IN-85-556-001, WI-85-064-006, EX-85-048-004, IN-85-260-002, WI-85-025-001, IN-85-282-002, WI-85-035-002, IN-85-446-001, IN-85-947-X08, IN-85-260-001, EX-85-003-X06, IN-85-260-X05, WI-85-064-001, IN-85-579-001, IN-85-406-001, IN-85-435-003, IN-85-349-005, EX-85-003-003, IN-86-085-003, WI-85-081-005, and IN-85-445-002.

2. Characterization of Issue

The employee concerns listed in Section 1 identified the following areas of concern:

a. Incompatible base metal
b. Falsified documentation
c. Invalid welder certification/qualification
d. FSAR commitments incorrectly stated
e. Welds not stenciled
f. Unauthorized access into a computer data base
g. ASME weld inspection documentation is inadequate and questionable
h. Unapproved welding technique
i Welds having surface defects
j. Inadequate welding procedures

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1 SAFETY-RELATED PIPING WELDS WEP GROUP IDENTIFIER EC-SPL-24	Page 2 of 4 Date 11/16/87 Revision 1 WEP Group No 233

k. Incorrect pipe design
l. Inadequate TVA quality program
m. Inadequate pipe weld fabrication/repair.

Evaluation of the concerns (References 7.2 and 7.3) did not lead to specific incidents or sources (welders, components, etc.) nor identifiable locations or safety-related systems in the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). Many of the concerns are not safety-related or are Unit 2 concerns, which are outside the scope of the Department of Energy/Weld Evaluation Project (DOE/WEP). However, the DOE/WEP considered that these concerns might indicate a potential for like situations in the safety-related piping systems of WBNP-1. Weld Group 233 was formed to evaluate these concerns relative to WBNP-1.

3. Summary

The issues for which the group was formed were evaluated by inspection/examination, document review, engineering evaluation, and engineering analysis, and will be resolved upon completion of TVA-committed corrective action.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 233 (Reference 7.4) was developed to perform an evaluation of the welds in this group. The nature of the listed employee concerns was most appropriately addressed by a general plant examination for weld quality. The results of these examinations were analyzed to determine if any further action was required.

In accordance with the assessment plan for Group 233, the DOE/WEP used the examination results of the welds indicated in the closure statements for WEP Groups A, B, and C. The results from these groups were satisfactory to resolve Group 233, because these groups included all safety-related piping welds. Therefore, a separate sample for Group 233 was not require

Employee concerns IN-85-406-001, EX-85-003-003, IN-85-445-002, IN-85-458-007, EX-85-003-X04, IN-85-890-001, WI-85-025-001, IN-85-446-001, EX-85-003-X06, and IN-579-001 were addressed by the results for Groups A and B. The remaining Employee concerns were addressed by the results for Groups A, B, and C.

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WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1 SAFETY-RELATED PIPING WELDS WEP GROUP IDENTIFIER EC-SPL-24	Page 3 of 4 Date 11/16/87 Revision 1 WEP Group No 233

5. Findings

During examination of safety-related piping welds in Groups A, B, and C, the DOE/WEP identified conditions that required engineering analysis to establish acceptability. The TVA performed an engineering analysis for each of the deviant welds and determined that these welds will be in compliance with the applicable codes, upon completion of correctve action. As indicated in the closure statements for Groups A, B, and C, the DOE/WEP has concurred with these TVA engineering analyses and determined that the associated components will meet the applicable construction codes upon completion of TVA corrective action.

Additionally, all components associated with General Groups A, B, and C were determined to have no generic problems (References 7.5 through 7.7).

6. Conclusions

The issues addressed by the employee concerns in relation to weld quality could not be confirmed. The DOE/WEP concludes that the populations of components containing safety-related piping welds will meet the applicable Final Safety Analysis Report (FSAR) construction codes upon completion of TVA-committed corrective action. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the boundary of this group are also in compliance with the applicable FSAR construction code.

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959

7. References

7.1 Employee Concerns: IN-85-469-003, HI-85-040-001, WI-85-030-006, IN-85-247-002, IN-85-627-036, IN-85-310-004, IN-85-298-002, IN-85-627-037, IN-85-155-001, IN-85-280-001, IN-85-458-007, EX-85-037-003, IN-85-982-003, IN-85-460-003, IN-85-845-004, IN-86-184-004, IN-86-046-003, IN-85-632-001, IN-86-249-X02, IN-86-184-002, IN-85-576-001, IN-85-923-002, EX-85-003-X04, IN-85-890-001, WI-85-035-007, IN-85-556-001, WI-85-064-006, EX-85-048-004, IN-85-260-002, WI-85-025-001, IN-85-282-002, IN-85-035-002, IN-85-446-001, IN-85-947-X08, IN-85-260-001, EX-85-003-X06, IN-85-260-X05, WI-85-064-001, IN-85-579-001, IN-85-406-001, IN-85-435-003, IN-85-349-005, EX-85-003-003, IN-86-085-003, WI-85-081-005 and IN-85-445-002.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1 SAFETY-RELATED PIPING WELDS WEP GROUP IDENTIFIER EC-SPL-24	Page 4 of 4 Date 11/16/87 Revision 1 WEP Group No. 59

7.2 Master List of WEP Employee Concerns, Department of Energy Weld Evaluation Project, June 23, 1987.

7.3 Employee Concerns Category Review CRV-01 through CRV-09 at TVA Watts Bar Nuclear Plant, Department of Energy Weld Evaluation Project, September 15, 1987. DRR WEP 959

7.4 WEP Assessment Plan No. 233, "Unit 1 Safety-Related Piping Welds," Rev. 2, August 5, 1987.

7.5 "Generic Problem Analysis of Weld Examination Results Form Group A," Inspection Results and Data Analysis Summary Report, Rev. 1, August 24, 1987.

7.6 "Generic Problem Analysis of Weld Examination Results Form Group B," Inspection Results and Data Analysis Summary Report, Rev. 1, August 24, 1987.

7.7 "Generic Problem Analysis of Weld Examination Results Form Group C," Inspection Results and Data Analysis Summary Report, Rev. 1, August 21, 1987.

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Form WEP 320
Rev. 12/86

WEP Clos Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE FITUP VERIFICATION FOR STRUCTURAL WELDS WEP GROUP IDENTIFIER EC-SPL-25 and EC-SPL-27	Page 1 of 4 Date 11/14/87 Revision 2 WEP Group No 234 & 236

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Group 234 Employee Concerns: IN-85-026-001 and WBN-5-001-001.

Group 236 Employee Concerns: IN-85-001-006, IN-85-052-006, IN-85-052-007, IN-85-488-001, IN-85-584-001, IN-85-671-001, IN-85-887-003, WI-85-013-002, and WI-85-041-013.

2. Characterization of Issue

The above employee concerns addressed procedures and implementation documentation for structural welds at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) as to: (a) the acceptability of fit-up verification being performed by the weld foreman rather than quality control, (b) the acceptability of quality control using a surveillance program to verify fit-up compliance, and (c) surveillance program implementation compliance.

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3. Summary

The issue for which this group was formed was resolved by document review and engineering evaluation.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan Nos. 234 and 236 (References 7.2 and 7.3) were developed to perform an engineering evaluation of the fit-up issue in the following manner:

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE FITUP VERIFICATION FOR STRUCTURAL WELDS WEP GROUP IDENTIFIER EC-SPL-25 and EC-SPL-27	Page 2 of 4 Date 11/14/87 Revision 2 WEP Group No 234 & 236

a. The requirements for fit-up, preweld, and material verification inspections were established from applicable quality assurance standards and welding codes during the construction period.

b. The DOE/WEP evaluated the TVA's compliance with the quality assurance standards and welding codes.

5. Findings

The applicable governing regulations cited for inspection criteria in the WBNP Final Safety Analysis Report (FSAR) are 10 CFR 50, Appendix B, Criteria X, "Inspection" (Reference 7.4); Paragraph 11, "Inspection" of ANSI N45.2-1971 (Reference 7.5); American Welding Society AWS D1.1-72, Revision 2 (Reference 7.6); and TVA General Construction Specification G-29 (Reference 7.7).

In-process fit-up inspection is addressed by AWS D1.1-72, which states that the inspector designated by the engineer shall ascertain that all welding is performed in accordance with the requirements of this code. The AWS D1.1 further indicates that the inspector will examine the work to make certain that it meets workmanship requirements.

Further clarification of the intent of AWS D1.1-72 relative to fit-up inspection is given in the 1986 Commentary of AWS D1.1, which indicates that the inspector will inspect work at suitable intervals to make certain that the requirements of the code are met, and that such inspections will be made on a sampling basis prior to assembly, during assembly, and during welding.

The TVA satisfied all of the applicable requirements by generating and issuing quality control (QC) procedures to ensure that all welding is performed in accordance with AWS D1.1 and other applicable codes and specifications.

The TVA Procedure WBNP-QCP-4.3, (Reference 7.8), requires that the Mechanical Engineering Unit reviews drawings for welding, postweld heat treat, inspection, and nondestructive examination requirements. The WBNP-QCP-4.3 procedure also establishes the requirements for inspection surveillance on a daily basis and documentation of the inspections on a weekly basis.

The TVA Procedure WBNP-QCP-2.4 preceded by DEC-QCP-2.4 (Reference 7.9) is used for erection of steel not covered by other procedures. The

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE FITUP VERIFICATION FOR STRUCTURAL WELDS WEP GROUP IDENTIFIER EC-SPL-25 and EC-SPL-27	Page 3 of 4 Date 11/14/87 Revision 2 234 & WEP Group No 236

Civil Engineering Unit is responsible for the inspection and documentation of all welding. The inspection of the welds is performed in accordance with TVA Procedure WBNP-QCP-4.3.

As cited in Specification G-29, TVA Process Specification O.C.1.1(a) (Reference 7.10) and later revisions specifically address welding of structures fabricated or erected in accordance with American Institute of Steel Construction (AISC) requirements. Specification O.C.1.1(a) designates the welder foreman as responsible for in-process verification. The welding surveillance program (WBNP-QCP-4.3) is used by the QC inspector to verify that fit-up is being performed as required. Procedure WBNP-QCP-4.3 also establishes that inspectors will perform all final inspections and that they must be trained and qualified to levels equivalent to Society for Nondestructive Testing SNT-TC-1A.

In performing the document review, The DOE/WEP verified all welding surveillance weekly checklists from 1974 to 1985 contained adequate inspection documentation, as required by WBNP-QCP-4.3, Attachment B.

The comments section of the Welding Surveillance Weekly Checklist substantiated that in-process workmanship and fit-up inspection was being performed on a daily basis in conjunction with inspection required by G-29 process specifications. Therefore, the inspection requirements listed in WBNP QCP-4.3 for fit-up and workmanship inspection are acceptable and satisfy the requirements of AWS D1.1-72, Revision 2. DRR WEP 960

Work that was not performed under the jurisdiction of The WBNP-QCP-4.3 procedure and was performed in accordance with the WBNP-QCP-2.4 procedure is listed in the "Document Tracing System Master Report for Civil Construction." This lists approximately 3100 completed inspection packages. A DOE/WEP review of the inspection packages verified that fit-up inspections were satisfactorily performed on civil construction welds.

6. Conclusions

The issues identified in the employee concerns were not confirmed. The DOE/WEP concludes that the fit-up inspection program implemented by TVA was in accordance with the applicable Final Safety Analysis Report (FSAR) construction code. DRR WEP 960

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE FITUP VERIFICATION FOR STRUCTURAL WELDS WEP GROUP IDENTIFIER EC-SPL-25 and EC-SPL-27	Page 4 of 4 Date 11/14/87 Revision 2 234 S WEP Group No 236

7. References

7.1 Employee Concerns IN-85-001-006, IN-85-052-006, IN-85-052-007, IN-85-488-001, IN-85-584-001, IN-85-671-001, IN-85-887-003, WI-85-013-002, WI-85-041-013, IN-85-026-001, and WBN-5-001-001.

7.2 WEP Assessment Plan No. 234, "Safety-Related Civil Welds" (EC-SPL-25), Rev. 1, December 17, 1986.

7.3 WEP Assessment Plan No. 236, "Fit-up Verification for Structural Welds" (EC-SPL-27), Rev. 3, September 28, 1987.

7.4 Title 10, Code of Federal Regulations, Part 50, Appendix B, Criteria X, "Inspection."

7.5 The American Society of Mechanical Engineers, "Quality Assurance Program Requirements for Nuclear Facilities," ANSI/ASME N45.2-1971.

7.6 American Welding Society, "Structural Welding Code," AWS D1.1-72 with Rev. 2, 1974.

7.7 TVA General Construction Specification G-29, Rev. 0, March 10, 1975.

7.8 TVA Procedure WBNP-QCP-4.3, "Process Control, Welding Surveillance and Weld Procedure Assignment," Rev. 0, June 1985.

7.9 TVA Procedure DEC-QCP-2.4, "Erection and Inspection of Structural and Miscellaneous Steel," Rev. 1, August 6, 1974.

7.10 TVA Process Specification O.C.1.1(a), "Specification for Welding Structures Fabricated in Accordance with Requirements for Buildings", Rev. 0, September 1981.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERNS GROUP CLOSURE SAFETY-RELATED ELECTRICAL SUPPORTS MADE PRIOR TO 1984 WEP GROUP IDENTIFIER EC-SPL-26	Page 1 of 3 Date 11/16/87 Revision 1 WEP Group No 235

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns IN-85-225-001 and IN-85-706-002.

2. Characterization of Issue

The Employee Concerns IN-85-225-001 and IN-85-706-002 reported that prior to 1984, some welds on safety-related electrical supports at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) were made by unqualified welders and were inspected by inspectors who were improperly trained.

Additional information was requested by the Department of Energy/Weld Evaluation Project (DOE/WEP) and provided by Quality Technology Company (QTC) as follows:

a. Inspections in question were visual

b. Concerned Individual (CI) stated that inspectors were inconsistent in applying the inspection criteria due to lack of training and experience

c. Inspectors in question were welding inspectors

d. CI believed the problem resulted in over-inspection and in unsatisfactory weld quality.

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WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERNS GROUP CLOSURE SAFETY-RELATED ELECTRICAL SUPPORTS MADE PRIOR TO 1984 WEP GROUP IDENTIFIER EC-SPL-26	Page 2 of 3 Date 11/16/87 Revision 1 WEP Group No 235

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, engineering analysis, and engineering evaluation.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 235 (Reference 7.2) was developed to evaluate the quality of safety-related electrical support welds in this group. The issue of welder and inspector qualification training was outside the scope of the DOE/WEP. The nature of the listed employee concerns was most appropriately addressed by a general plant examination for weld quality. The results of these examinations were analyzed to determine if any further action was required.

DRR WEP 961

In accordance with the assessment plan for Group 235, the DOE/WEP used the examination results of the components indicated in the closure statements of WEP Groups I and J. The results from these groups were satisfactory to resolve Group 235, because the population was included in the boundaries. Therefore, a separate sample for Special Group 235 was not required.

5. Findings

During examination of safety-related electrical support welds in Groups I and J, the DOE/WEP identified conditions that required engineering analysis to establish acceptability. All components identified have been determined by TVA to be suitable for service. As indicated in closure statements for Groups I and J, the DOE/WEP has concurred with the suitability-for-service analyses and determined that the associated components meet the applicable construction codes.

Additionally, all components associated with Groups I and J, were determined to have no generic problems (References 7.3 and 7.4).

6. Conclusions

The issues identified in the employee concerns could not be confirmed. The DOE/WEP concludes that the welds evaluated in Group 235 are in compliance with the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERNS GROUP CLOSURE SAFETY-RELATED ELECTRICAL SUPPORTS MADE PRIOR TO 1984 WEP GROUP IDENTIFIER EC-SPL-26	Page 3 of 3 Date 11/16/87 Revision 1 WEP Group No 235

the boundary of this group (safety-related electrical supports made prior to 1984) are in compliance with the applicable FSAR construction code.

7. References

7.1 Employee Concerns IN-85-225-001 and IN-85-706-002.

7.2 WEP Assessment Plan No. 235, "Safety-Related Electrical Supports Made Prior to 1984," Rev. 1, July 27, 1987.

7.3 "Generic Problem Analysis of Weld Examination Results Form Group I," Inspection Results and Data Analysis Summary Report, Rev. 2, August 14, 1987.

7.4 "Generic Problem Analysis of Weld Examination Results Form Group J, 202, and 225," Inspection Results and Data Analysis Summary Report, Rev. 1, August 24, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SKEWED FILLET WELDS ON SAFETY RELATED STRUCTURAL COMPONENTS WEP GROUP IDENTIFIER QI-SPL-13	Page 1 of 3 Date 11/16/87 Revision 2 WEP Group No 237

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 2807.

2. Characterization of Issue

The NCR 2807 reported incorrectly made skewed fillet welds[a] on seismic pipe supports at the TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1). The NCR indicated this situation may not necessarily be limited to pipe supports. The DOE/WEP concern was that incorrectly made and/or accepted skewed fillet welds may be a generic problem for other safety-related structural components.

DRR WEP 962

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, engineering analysis, and engineering evaluation.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 237 (Reference 7.2) was developed to evaluate the skewed fillet welds in other safety-related structural components. The

a. A fillet weld whereby the members joined meet at an angle other than 90 degrees.

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SKEWED FILLET WELDS ON SAFETY RELATED STRUCTURAL COMPONENTS WEP GROUP IDENTIFIER QI-SPL-13	Page 2 of 3 Date 11/16/87 Revision 2 WEP Group No 237

nature of the NCR listed was most appropriately addressed by a general plant examination for weld quality in these components. The results of these examinations were analyzed to determine if any further action was required. DRR WEP 962

In accordance with the assessment plan for Group 237, the DOE/WEP used the examination results of the components indicated in the closure statements of WEP Groups D, E, F, G, H, I, J, K, L, and 254. The results from these groups were satisfactory to resolve Group 237, because these populations were the ones that have a potential to contain skewed fillet welds. Therefore, a separate sample for Group 237 was not required.

5. Findings

During examination of safety-related structural welds in Groups D through L and 254, the DOE/WEP identified conditions that required engineering analysis to establish acceptability. All components identified as pertaining to the evaluation of skewed fillet welds for Group 237 have been determined by the TVA to be suitable for service. As indicated in closure statements for Groups D through L and 254, the DOE/WEP has concurred with these suitability-for-service analyses and determined that the associated components meet the applicable construction codes.

Additionally, all components associated with Groups D through L and 254 were determined to have no generic problems associated with skewed fillet welds (References 7.3 through 7.11).

6. Conclusions

The DOE/WEP concludes that there is no generic problem with incorrectly made and/or accepted skewed fillet welds in the subject population. The DOE/WEP concludes that the welds evaluated in Group 237 are in compliance with the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. The DOE/WEP has a high degree of confidence that the populations of uninspected components containing skewed fillet welds also meet the applicable Final Safety Analysis Report (FSAR) construction code. DRR WEP 962

7. References

7.1 TVA Nonconforming Condition Report 2807.

WEP Closure Statement — Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SKEWED FILLET WELDS ON SAFETY RELATED STRUCTURAL COMPONENTS WEP GROUP IDENTIFIER QI-SPL-13	Page 3 of 3 Date 11/16/87 Revision 2 WEP Group No 237

7.2 WEP Assessment Plan No. 237, "Skewed Fillet Welds on Seismic Supports," Rev. 3, September 28, 1987.

7.3 "Generic Problem Analysis of Weld Examination Results from Group D," Inspection Results and Data Analysis Summary Report, Rev. 1, August 13, 1987.

7.4 "Generic Problem Analysis of Weld Examination Results from Group E," Inspection Results and Data Analysis Summary Report, Rev. 0, August 19, 1987.

7.5 "Generic Problem Analysis of Weld Examination Results from Group F," Inspection Results and Data Analysis Summary Report, Rev. 0, June 24, 1987.

7.6 "Generic Problem Analysis of Weld Examination Results from Group G," Inspection Results and Data Analysis Summary Report, Rev. 0, July 10, 1987.

7.7 "Generic Problem Analysis of Weld Examination Results from Group H," Inspection Results and Data Analysis Summary Report, Rev. 1, August 25, 1987.

7.8 "Generic Problem Analysis of Weld Examination Results from Group I," Inspection Results and Data Analysis Summary Report, Rev. 2, August 14, 1987.

7.9 "Generic Problem Analysis of Weld Examination Results from Group J, 202, and 225," Inspection Results and Data Analysis Summary Report, Rev. 0, July 14, 1987.

7.10 "Generic Problem Analysis of Weld Examination Results from Group K, L, 219," Inspection Results and Data Analysis Summary Report, Rev. 0, August 10, 1987.

7.11 "Generic Problem Analysis of Weld Examination Results from Group 254," Inspection Results and Data Analysis Summary Report, Rev. 0, August 4, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE WELDS INSPECTED WITH THE LIQUID PENETRANT METHOD PRIOR TO 1980 WEP GROUP IDENTIFIER QI-SPL-14	Page 1 of 3 Date 11/16/87 Revision 1 WEP Group No 238

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____
FOR DENNIS HUNNICUTT

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

U.S. Nuclear Regulatory Commission (NRC) Enforcement Items Nos. 50-390/79-25-01 and 50-390/80-19-01.

2. Characterization of Issue

The NRC Enforcement Items Nos. 390/79-25-01 and 50-390/80-19-01 identified areas of failure to perform required liquid penetrant examinations and incorrect interpretations of liquid penetrant examination results on welds made prior to 1980 at the TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1).

This group was formed because the documents of record were not conclusive regarding any generic problem potential of liquid penetrant examination deficiencies performed by TVA on The American Society of Mechanical Engineers (ASME) piping systems.

3. Summary

The issue for which the group was formed was evaluated by inspection/examination, document review, engineering analysis, and engineering evaluation, and will be resolved upon completion of TVA-committed corrective action.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 238 (Reference 7.2) was developed to evaluate safety-related piping welds inspected with the liquid penetrant method prior to 1980.

Form WEP 320a
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE WELDS INSPECTED WITH THE LIQUID PENETRANT METHOD PRIOR TO 1980 WEP GROUP IDENTIFIER QI-SPL-14	Page 2 of 3 Date 11/16/87 Revision 1 WEP Group No 238

In accordance with the assessment plan for Group 238, the DOE/WEP used the examination results of the components indicated in the closure statements of the DOE/WEP Groups A, B, 34, 210, 224, 252, 257, and 262. The results from these groups were satisfactory to resolve Group 238 because they contain the welds inspected by the liquid penetrant method. Therefore, a separate sample for Special Group 238 was not required.

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5. Findings

During examination of safety-related piping welds in Groups A, B, 34, 210, 224, 252, 257, and 262, the DOE/WEP identified a number of weld deviations requiring engineering analysis to determine acceptability. The TVA performed an engineering analysis for each of the deviant welds and determined that these welds were in compliance with the applicable code with certain specific exceptions. As indicated in the DOE/WEP closure statements for these groups the DOE/WEP reviewed and concurred with the TVA engineering analyses. All the exceptions are covered by TVA corrective action plans which commit to bringing those welds into compliance with the applicable construction code.

All attributes reexamined by the liquid penetrant method were within acceptable construction code requirements. Two-hundred-forty-six PT examinations were performed within Groups A, B, 34, 210, 224, 252, 257, and 262 by the DOE/WEP (Reference 7.3). The tests were performed to duplicate the examination methods that the TVA had performed and documented (Reference 7.3). With respect to inspectors, no statistically significant information resulted from this analysis; no inspector demonstrated a statistically significant degree of being error prone when performing liquid penetrant examinations.

Additionally, all components associated with Groups A and B were determined to have no generic problems (References 7.4 and 7.5).

6. Conclusions

The DOE/WEP concludes that there is no generic problem regarding TVA's liquid penetrant examinations. The DOE/WEP concludes that the welds evaluated in Group 238 are in compliance with the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the uninspected population of components containing welds inspected with the liquid penetrant method prior to 1980 also meet the applicable FSAR construction code.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE WELDS INSPECTED WITH THE LIQUID PENETRANT METHOD PRIOR TO 1980 WEP GROUP IDENTIFIER QI-SPL-14	Page 3 of 3 Date 11/16/87 Revision 1 WEP Group No 238

7. References

7.1 U.S. Nuclear Regulatory Commission Enforcement Items Nos. 50-390/79-25-01 and 50-390/80-19-01.

7.2 WEP Assessment Plan No. 238, "Welds Inspected with the Liquid Penetrant Method Prior to 1980," Rev. 2, August 4, 1987.

7.3 M. F. DeWitt letter to J. R. Cox, "Group 238 Data Analysis," MFD-01-87, EG&G Idaho, Inc., August 20, 1987.

7.4 "Generic Problem Analysis of Weld Examination Results From Group A," Inspection Results and Data Analysis Summary Report, Rev. 1, August 24, 1987.

7.5 "Generic Problem Analysis of Weld Examination Results From Group B," Inspection Results and Data Analysis Summary Report, Rev. 1, August 24, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement — Evaluation Report	QUALITY INDICATOR GROUP CLOSURE UNIT 1 SAFETY-RELATED WELDS REQUIRING NONDESTRUCTIVE EXAMINATIONS (NDE) WEP GROUP IDENTIFIER QI-SPL-15	Page 1 of 3 Date 11/16/87 Revision 1 WEP Group No 239

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____
for Dennis Hennington

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Nuclear Safety Review Staff (NSRS) Report 1-83-01-WBN.

2. Characterization of Issue

An employee initiated a formal Allegation Report 3-82, that alleged that between January 1977 and December 1978, two Quality Control (QC) inspectors falsified documentation by signing off documentation for magnetic particle (MT) inspections on the Essential Raw Cooling Water and High Pressure Fire Protection Systems that were, in fact, not performed at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). The Department of Energy/Weld Evaluation Project (DOE/WEP) concern is that the conditions identified in the NSRS report could apply for other WBNP-1 safety-related piping welds for which MT inspections are applicable. Therefore, to further assess the generic implications of the incident, welds requiring nondestructive examinations by MT and liquid penetrant (PT) were evaluated by DOE/WEP. Welds requiring radiography, which are not relative to this assessment, have been addressed in Groups 249, 253, and 258 and will be resolved by a corrective action plan provided by TVA.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, and engineering analysis.

WEP Closure Statement — Evaluation Report	QUALITY INDICATOR GROUP CLOSURE UNIT 1 SAFETY-RELATED WELDS REQUIRING NONDESTRUCTIVE EXAMINATIONS (NDE) WEP GROUP IDENTIFIER QI-SPL-15	Page 2 of 3 Date 11/16/87 Revision 1 WEP Group No 239

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 239 (Reference 7.2) was developed to evaluate safety-related piping welds requiring MT and PT examinations. The nature of this quality indicator was most appropriately addressed by a plant examination for weld quality and a documentation review of the associated welds requiring MT and PT examinations. The results of these reviews and examinations would determine if any further action was required.

DRR WEP 964

The combination of General Groups A and B have boundaries and examination requirements that encompass Unit 1 safety-related welds requiring MT and PT examinations. Therefore, the results from these general groups were satisfactory to resolve the issue addressed in Group 239.

5. Findings

During examination of welds in Groups A and B, the DOE/WEP identified weld deviations that required engineering analysis to determine acceptability. All deviant welds identified have been determined by the TVA engineering analyses to be in compliance with the applicable code. The DOE/WEP reviewed and concurred with the TVA engineering analyses. In addition, a total of 47 welds from Groups A and B requiring MT and PT examinations were evaluated by a review of the associated weld records, and were documented as complying with code requirements.

All components associated with General Groups A and B were determined to have no generic problems (References 7.3 and 7.4).

6. Conclusions

The DOE/WEP concludes that the welds evaluated in Groups A and B requiring MT and PT examinations are in compliance with the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP also concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components requiring MT and PT examinations within the boundary of this group are in compliance with the applicable FSAR construction code.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE UNIT 1 SAFETY-RELATED WELDS REQUIRING NONDESTRUCTIVE EXAMINATIONS (NDE) WEP GROUP IDENTIFIER QI-SPL-15	Page 3 of 3 Date 11/16/87 Revision 1 WEP Group No 239

7. References

7.1 Nuclear Safety Review Staff (NSRS) Report 1-83-01-WBN, January 27, 1983.

7.2 WEP Assessment Plan No. 239, "Welds Requiring Magnetic Particle (MT) Examination Between January 1977 and December 1978," Rev. 4, September 23. 1987.

7.3 "Generic Problem Analysis of Weld Examination Results from Group A," Inspection Results and Data Analysis Summary Report, Rev. 1, August 24, 1987.

7.4 "Generic Problem Analysis of Weld Examination Results from Group B," Inspection Results and Data Analysis Summary Report, Rev. 1, August 24, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE WELDING WITHOUT PURGE WEP GROUP IDENTIFIER QI-SPL-16	Page 1 of 2 Date 08/21/87 Revision 0 WEP Group No 240

Approved _____ Date 8-20-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Nuclear Regulatory Commission Enforcement Item 50-390/78-3 and 50-390/79-41.

2. Characterization of Issue

The two quality indicators in Paragraph 1 are enforcement items taken from NRC Inspection Reports. They refer to the maintenance of inert gas purge on pipe welds, where required by the weld procedure. In one case, purge was not maintained, resulting in a weld with oxidation on the inside surface of the pipe. In the other case, exit purge gas oxygen content (1-1/2% to 2%) was found to be above the maximum specified by the weld procedure (1% oxygen).

The initial review of the quality indicators raised a concern as to whether a generic problem existed with maintenance of purge gas flow during welding being properly performed and documented and whether welds identified as being made without purge or with inadequate purge were properly dispositioned.

3. Summary

The issue for which the group was formed was evaluated by document review.

4. Evaluation Methodology

Department of Energy/Weld Evaluation Project (DOE/WEP) conducted a document review of all records associated with the two incidents

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE WELDING WITHOUT PURGE WEP GROUP IDENTIFIER QI-SPL-16	Page 2 of 2 Date 08/21/87 Revision 0 WEP Group No 240

concerning purge gas as described in NRC Enforcement Items 50-390/78-3 and 50-390/79-41 (Reference 7.1).

5. Findings

For resolution of NRC Enforcement Item 50-390/78-3, the inspector was given training on the importance of proper purge gas flow and of the importance of accurate documentation. A Tennessee Valley Authority (TVA) welding engineer demonstrated that 2% oxygen in the purge gas would not lead to excessive oxidation on the inside of the weld. Although this particular incident occurred in Watts Bar Nuclear Plant Unit 2 (WBNP-2), it was evaluated because of the potential impact on WBNP-1.

For resolution of NRC Enforcement Item 50-390/79-41, the weld was cut out and rewelded. The reason for the purge not being maintained was traced to a defective purge flowmeter. All other purge flowmeters were checked for proper operation (Reference 7.3).

DOE/WEP review of NRC Enforcement Items 50-390-78-3 and 50-390/79-41 indicates that NRC was satisfied that compliance with purging requirements was enforced and the reported deficiencies were properly dispositioned. This position is supported by the fact that DOE/WEP review of 100% of the radiographs on safety-related pipe welds showed only three of 3082 that were rejected because of excessive root oxidation.

In performing the required document review, DOE/WEP determined that an evaluation of the generic implication of the deficiencies identified in NCR Enforcement Item 50-390/79-41 was not possible since flowmeters could not be traced to specific welds.

6. Conclusion

The DOE/WEP concludes the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 NRC Enforcement Item 50-390/78-3 and 50-390/79-41.

7.2 WEP Assessment Plan No. 240, "Welds Made Without Required Inert Gas Purge (QI-SPL-16)," Rev. 1, April 6,1987.

7.3 D. Cochran notegram to A. E. Bradford, "Closure of Special Group 240 (QI-SPL-16)," EG&G Idaho, Inc., dated July 30, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE UNIT 1 SAFETY-RELATED STRUCTURAL STEEL WELDS WEP GROUP IDENTIFIER QI-SPL-17	Page 1 of 3 Date 11/16/87 Revision 1 WEP Group No 241

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Reports (NCRs) 4753R1 and 5561R.

2. Characterization of Issue

The NCRs 4753 and 5561 reported deficient structural welds in the Main Steam Valve Room at the TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1). These welds were accepted, later found rejectable, and subsequently repaired. Of concern are similar conditions with structural welds in other areas of WBNP-1.

3. Summary

The issue for which the group was formed was evaluated by inspection/examination, document review, engineering analysis, and engineering evaluation, and will be resolved upon completion of TVA-committed corrective action.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 241 (Reference 7.2) was developed to evaluate the safety-related civil structural welds in this group. The nature of the stated concern was most appropriately addressed by a general plant examination for weld quality. The results of these examinations were analyzed to determine if any further action was required.

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WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE UNIT 1 SAFETY-RELATED STRUCTURAL STEEL WELDS WEP GROUP IDENTIFIER QI-SPL-17	Page 2 of 3 Date 11/16/87 Revision 1 WEP Group No 241

In accordance with the assessment plan for Group 241, the DOE/WEP used the examination results of the welds indicated in the closure statements of WEP Groups D and E. The results from these groups were satisfactory to resolve Group 241, because the populations of Groups D and E include/encompass all safety-related structural steel welds at WBNP-1. Therefore, a separate sample for Group 241 was not required. DRR WEP 965

5. Findings

During examination of structural welds on safety-related systems in Groups D and E, the DOE/WEP identified a number of weld deviations which required engineering analysis to determine acceptability. However, all deviant components identified have been determined by the TVA to be suitable for service, with certain specific exceptions. As indicated in the DOE/WEP closure statements for Groups D and E, the DOE/WEP has concurred with these suitability-for-service analyses and determined that the associated components meet the applicable construction codes. All the exceptions are covered by TVA corrective action plans which commit to bringing those components into compliance with the applicable construction codes.

Additionally, all components associated with Groups D and E were determined to have no generic problems (References 7.3 and 7.4).

6. Conclusions

The DOE/WEP concludes that the safety-related structural steel welds evaluated in Group 241 will be in compliance with the applicable Final Safety Analysis Report (FSAR) construction code upon completion of TVA-committed corrective action. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the boundary of this group also meet the applicable FSAR construction code. DRR WEP 965

7. References

7.1 TVA Nonconforming Condition Reports 4753R1 and 5561R.

7.2 WEP Assessment Plan No. 241, "Unit 1 Safety-Related Structural Steel Welds," Rev. 3, September 8, 1987.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE UNIT 1 SAFETY-RELATED STRUCTURAL STEEL WELDS WEP GROUP IDENTIFIER QI-SPL-17	Page 3 of 3 Date 11/16/87 Revision 1 WEP Group No 241

7.3 "Generic Problem Analysis of Weld Examination Results From Group D," Inspection Results and Data Analysis Summary Report, Rev. 1, August 13, 1987.

7.4 "Generic Problem Analysis of Weld Examination Results From Group E," Inspection Results and Data Analysis Summary Report, Rev. 0, August 19, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE MISSING INSPECTION AND LACK OF INSPECTOR TRAINING WEP GROUP IDENTIFIER QI-SPL-18	Page 1 of 4 Date 11/16/87 Revision 2 WEP Group No 242

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Reports (NCR) 2528, 2529, 3216, 3443, 4201, 4667, 4737, 4909, 5143, 5246, 5305, 5604, 5635, and 6274.

2. Characterization of Issue

Fourteen NCRs on various safety-related systems at the TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1) identified areas where inspectors missed inspections entirely or areas where lack of the inspectors awareness of the acceptance criteria resulted in the acceptance of deficient welds. All of the NCRs were properly dispositioned and closed. The Department of Energy/Weld Evaluation Project (DOE/WEP) concern is that other welds not identified on the NCRs may be deficient and were not evaluated.

DRR WEP 966

3. Summary

The issue for which the group was formed was evaluated by inspection/examination, document review, engineering analysis, and engineering evaluation, and will be resolved upon completion of TVA-committed corrective action.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 242 (Reference 7.2) was developed to evaluate the welds on safety-related systems in this group. The nature of the listed quality indicators was most appropriately

DRR WEP 966

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE MISSING INSPECTION AND LACK OF INSPECTOR TRAINING WEP GROUP IDENTIFIER QI-SPL-18	Page 2 of 4 Date 11/16/87 Revision 2 WEP Group No 242

addressed by a general plant examination for weld quality. The results of these examinations were analyzed to determine if any further action was required.

DRR WEP 966

In accordance with the assessment plan for Group 242, the DOE/WEP used the examination results of the components indicated in the closure statements of WEP Groups A, B, C, D, E, F, G, H, I, J, K, L, 252, and 254. The results from these groups were satisfactory to resolve Group 242, because they encompassed all safety-related systems. Therefore, a separate sample for Group 242 was not required.

5. Findings

During examination of welds on safety-related systems in Groups A through L, 252, and 254, the DOE/WEP identified a number of weld deviations which required engineering analysis to determine acceptability. However, all deviant components identified have been determined by the TVA to be suitable for service, with certain specific exceptions. As indicated in the DOE/WEP closure statements for Groups 252, 254, and A through L, the DOE/WEP has concurred with these suitability-for-service analyses and determined that the associated components meet the applicable construction codes. All the exceptions are covered by TVA corrective action plans which commit to bringing those components in compliance with the applicable construction codes.

Additionally, all components associated with Groups A through L, 252, and 254 were determined to have no generic problems (References 7.3 through 7.15).

6. Conclusions

DRR WEP 966

The DOE/WEP concludes that the welds evaluated in Group 242 will be in compliance with the applicable Final Safety Analysis Report (FSAR) construction code upon satisfactory completion of TVA-committed corrective action. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the boundary of this group will be in compliance with the applicable FSAR construction code.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE MISSING INSPECTION AND LACK OF INSPECTOR TRAINING WEP GROUP IDENTIFIER QI-SPL-18	Page 3 of 4 Date 11/16/87 Revision 2 WEP Group No 242

7. References

7.1 TVA Nonconforming Condition Reports 2528, 2529, 3216, 3443, 4201, 4667, 4737, 4909, 5143, 5246, 5305, 5604, 5635, and 6274.

7.2 WEP Assessment Plan No. 242, "Missing Inspection and Lack of Inspector Training," Rev. 2, September 28, 1987.

7.3 "Generic Problem Analysis of Weld Examination Results from Group A," Inspection Results and Data Analysis Summary Report, Rev. 1, August 18, 1987.

7.4 "Generic Problem Analysis of Weld Examination Results from Group B," Inspection Results and Data Analysis Summary Report, Rev. 1, August 27, 1987.

7.5 "Generic Problem Analysis of Weld Examination Results from Group C," Inspection Results and Data Analysis Summary Report, Rev. 1, August 21, 1987.

7.6 "Generic Problem Analysis of Weld Examination Results from Group D," Inspection Results and Data Analysis Summary Report, Rev. 1, August 13, 1987.

7.7 "Generi Problem Analysis of Weld Examination Results from Group E," Inspection Results and Data Analysis Summary Report, Rev. 0, August 19, 1987.

7.8 "Generic P lem Analysis of Weld Examination Results from Group F," Inspection Results and Data Analysis Summary Report, Rev. 0, June 28, 1987.

7.9 "Generic Problem Analysis of Weld Examination Results from Group G," Inspection Results and Data Analysis Summary Report, Rev. 0, July 10, 1987.

7.10 "Generic Problem Analysis of Weld Examination Results from Group H," Inspection Results and Data Analysis Summary Report, Rev. 1, August 25, 1987.

7.11 "Generic Problem Analysis of Weld Examination Results from Group I," Inspection Results and Data Analysis Summary Report, Rev. 2, August 14, 1987.

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE MISSING INSPECTION AND LACK OF INSPECTOR TRAINING WEP GROUP IDENTIFIER QI-SPL-18	Page 4 of 4 Date 11/16/87 Revision 2 WEP Group No 242

7.12 "Generic Problem Analysis of Weld Examination Results from Group J, 202, and 225," Inspection Results and Data Analysis Summary Report, Rev. 0, July 14, 1987.

7.13 "Generic Problem Analysis of Weld Examination Results from Group K, L, and 219," Inspection Results and Data Analysis Summary Report, Rev. 0, August 10, 1987.

7.14 "Generic Problem Analysis of Weld Examination Results from Group 252," Inspection Results and Data Analysis Summary Report, Rev. 0, August 3, 1987.

7.15 "Generic Problem Analysis of Weld Examination Results from Group 254," Inspection Results and Data Analysis Summary Report, Rev. 0, August 4, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE REVIEW STRUCTURAL AND MISCELLANEOUS FEATURES FOR FIELD CONFIGURATIONS VERSUS APPLICABLE DRAWINGS WEP GROUP IDENTIFIER QI-SPL-19	Page 1 of 3 Date 11/16/87 Revision 2 WEP Group No 243

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Reports (NCRs) 2375R, 3001R1, 3523R, and the U.S. Nuclear Regulatory Commission (NRC) Enforcement Item WBRD-90/81-75.

2. Characterization of Issue

The NCRs 2375, 3001, 3523, and NRC Enforcement Item WBRD-90/81-75 all concerned structural and miscellaneous features where the field weld configuration did not meet applicable drawings at the TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1). These items were corrected; however, there is a Department of Energy/Weld Evaluation Project (DOE/WEP) concern that not all items were identified.

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967

3. Summary

The issue for which the group was formed was evaluated by inspection/examination, document review, engineering analysis, and engineering evaluation, and will be resolved upon completion of TVA-committed corrective action.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 243 (Reference 7.2) was developed to evaluate the structural welds in this group.

In accordance with the assessment plan for Group 243, the DOE/WEP used the examination results of the components indicated in the closure statements of WEP Groups D, E, F, G, H, I, J, K, L, 252, and 254. The results from these groups were satisfactory to resolve Group 243,

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967

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE REVIEW STRUCTURAL AND MISCELLANEOUS FEATURES FOR FIELD CONFIGURATIONS VERSUS APPLICABLE DRAWINGS WEP GROUP IDENTIFIER QI-SPL-19	Page 2 of 3 Date 11/16/87 Revision 2 WEP Group No 243

because the populations had the same boundaries. Therefore, a separate sample for Special Group 243 was not required. DRR WEP 967

5. Findings

During examination of safety-related structural welds in Groups D through L and Groups 252, and 254, the DOE/WEP identified a number of weld deviations, including field weld configurations, that did not meet the applicable drawings and that required engineering evaluation to establish acceptability. However, all deviant components identified have been determined by the TVA to be suitable for service, with the exception of some weld deviations in Group E. As indicated in the closure statements for Groups 252, 254, D, and F through L, the DOE/WEP has concurred with these suitability-for-service analyses and determined that the associated components meet the applicable construction codes.

Additionally, all components associated with Groups D through L, and Groups 252 and 254, were determined to have no generic problems (References 7.3 through 7.12).

Group E had various deviations that required engineering analysis to determine acceptability. Some of the components involved were found to be unsuitable for service. The components that are unsuitable for service will be corrected by TVA corrective action.

6. Conclusions

The DOE/WEP has confirmed that there are some cases of field weld configuration that do not meet the applicable drawings. However, the DOE/WEP concludes that the welds evaluated for Group 243 will be in compliance with the applicable Final Safety Analysis Report (FSAR) construction code upon completion of TVA-committed corrective action. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the populations containing safety-related structural welds also meet the applicable FSAR construction code. DRR WEP 967

7. References

7.1 Tennessee Valley Authority (TVA) Nonconforming Condition Reports, 2375R, 3001R1, 3523R, and the Nuclear Regulatory Commission (NRC) Enforcement Item WBRD-90/81-75.

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE REVIEW STRUCTURAL AND MISCELLANEOUS FEATURES FOR FIELD CONFIGURATIONS VERSUS APPLICABLE DRAWINGS WEP GROUP IDENTIFIER QI-SPL-19	Page 3 of 3 Date 11/16/87 Revision 2 WEP Group No 243

7.2 WEP Assessment Plan No. 243, "Review Structural and Miscellaneous Features for Field Configuration Versus Applicable Drawings," Rev. 2, September 28, 1987.

7.3 "Generic Problem Analysis of Weld Examination Results from Group D," Inspection Results and Data Analysis Summary Report, Rev. 1, August 13, 1987.

7.4 "Generic Problem Analysis of Weld Examination Results from Group E," Inspection Results and Data Analysis Summary Report, Rev. 0, August 19, 1987.

7.5 "Generic Problem Analysis of Weld Examination Results from Group F," Inspection Results and Data Analysis Summary Report, Rev. 0, June 24, 1987.

7.6 "Generic Problem Analysis of Weld Examination Results from Group G," Inspection Results and Data Analysis Summary Report, Rev. 0, July 10, 1987.

7.7 "Generic Problem Analysis of Weld Examination Results from Group H," Inspection Results and Data Analysis Summary Report, Rev. 1, August 25, 1987.

7.8 "Generic Problem Analysis of Weld Examination Results from Group I," Inspection Results and Data Analysis Summary Report, Rev. 2, August 14, 1987.

7.9 "Generic Problem Analysis of Weld Examination Results from Group J, 202, and 225," Inspection Results and Data Analysis Summary Report, Rev. 1, August 24, 1987.

7.10 "Generic Problem Analysis of Weld Examination Results from Group K, L, and 219," Inspection Results and Data Analysis Summary Report, Rev. 0, August 10, 1987.

7.11 "Generic Problem Analysis of Weld Examination Results from Group 252," Inspection Results and Data Analysis Summary Report, Rev. 1, August 27, 1987.

7.12 "Generic Problem Analysis of Weld Examination Results from Group 254," Inspection Results and Data Analysis Summary Report, Rev. 0, August 3, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE INSUFFICIENT, LOST, INCOMPLETE DOCUMENTATION WEP GROUP IDENTIFIER QI-SPL-20	Page 1 of 3 Date 11/16/87 Revision 2 WEP Group No 244

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Reports (NCRs) 2013, 2134, 2191, 2196, 2344, 2999R1, 3101, 3104, 3133, 3134, 3139, 3179, 3244, 3377, 3385, 3456, 3468, 3548, 3593, 3613, 3621, 3645, 3654, 3732R1, 5384R2, 5452, 5459R1, 5580, 5613, 5788, and 5808.

2. Characterization of Issue

The NCRs listed above in Section 1 identified the following:

DRR WEP 968

a. Incomplete documentation

b. Lost documentation

c. Insufficient documentation.

The Department of Energy/Weld Evaluation Project (DOE/WEP) was concerned that other safety-related welds throughout the TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1) may also be inadequately documented.

3. Summary

The issues for which the group was formed were resolved by inspection/examination, engineering analysis, document review, and engineering evaluation.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE INSUFFICIENT, LOST, INCOMPLETE DOCUMENTATION WEP GROUP IDENTIFIER QI-SPL-20	Page 2 of 3 Date 11/16/87 Revision 2 WEP Group No 244

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 244 (Reference 7.2) was developed to perform a document review of the welds in this group. The nature of the listed quality indicators was most appropriately addressed by a general plant examination of weld documentation on safety-related welds. The results of these examinations were analyzed to determine if any further action was required.

In accordance with the assessment plan for Group 244, the DOE/WEP used the examination results of the components indicated in the closure statements of WEP Groups A, B, D, E, F, G, H, I, J, K, L, 252, and 254. The results from these groups were satisfactory to resolve Group 244, because the populations of these groups included safety-related welds. Therefore, a separate sample for Group 244 was not required.

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5. Findings

During the examination, a document review was performed on safety-related welds in Groups A, B, D through L, 252, and 254. During this evaluation, a review of the associated weld records was performed to verify compliance to code requirements.

Of the 1138 documentation packages associated with the components reviewed, 1091 of the documentation packages were in compliance with code requirements; and 47 of the documentation packages were identified as having incomplete/missing documentation. These deviations were forwarded to the TVA for resolution, in accordance with Reference 7.3.

6. Conclusions

The DOE/WEP concludes that the TVA program to document and maintain weld-related records is in compliance with the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 Nonconforming Condition Reports (NCRs) 2013, 2134, 2191, 2196, 2344, 2999R1, 3101, 3104, 3133, 3134, 3139, 3179, 3244, 3377, 3385, 3456, 3468, 3548, 3593, 3613, 3621, 3645, 3654, 3732R1, 5384R2, 5452, 5459R1, 5580, 5613, 5788, and 5808.

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WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE INSUFFICIENT, LOST, INCOMPLETE DOCUMENTATION WEP GROUP IDENTIFIER QI-SPL-20	Page 3 of 3 Date 11/16/87 Revision 2 WEP Group No 244

7.2 WEP Assessment Plan No. 244, "Insufficient, Lost, Incomplete Documentation," Rev. 2, September 28, 1987.

7.3 F. E. Laurent TVA memorandum to F. C. Fogarty, "Watts Bar Nuclear Plant--Incomplete or Missing Documentation," T25 870311 882, March 11, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1, SAFETY-RELATED ELECTRICAL SUPPORTS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER EC-SPL-2	Page 1 of 3 Date 11/16/87 Revision 1 WEP Group No 246

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns IN-85-887-001, WI-85-041-003, EX-85-076-001, IN-86-019-003, and WI-85-030-004.

2. Characterization of Issue

In early 1981, the Tennessee Valley Authority (TVA) Construction Department at Watts Bar Nuclear Plant Unit 1 (WBNP-1) identified a problem with the quality of welds on structural components fabricated and installed per American Welding Society (AWS) D1.1 requirements. The Construction Department requested that the TVA Engineering Design (ENDES) organization perform an engineering evaluation to determine if the acceptance criteria could be modified to prevent what they believed to be unnecessary rework. The ENDES evaluation included a sampling reinspection program and ultimately resulted in issuing two separate weld acceptance criteria for AWS welds/components. In February 1981, ENDES established two different acceptance criteria: one for welds/components made prior to February 13, 1981; and one for welds/components made subsequent to February 13, 1981. Both criteria were incorporated into TVA procedures and employees were instructed to use them.

The five employee concerns listed in Section 1 are all related to the ENDES evaluation of the AWS D1.1 welds and the application of the evaluation and developed acceptance criteria to electrical supports fabricated prior to February 13, 1981. The employee concerns identified the following perceived problems.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1, SAFETY-RELATED ELECTRICAL SUPPORTS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER EC-SPL-2	Page 2 of 3 Date 11/16/87 Revision 1 WEP Group No 246

a. Cable tray supports included in the sample inspection program were not evaluated for groove weld quality.

b. Weld records generated during the sample inspections may have been falsified, because the employee was told by other employees that the sampling of welds may not have been performed as reported.

c. Welds identified for inclusion in the sample inspection were reworked prior to performing the inspection, which would result in an improper conclusion.

d. Inspectors directed to buy off welds on cable trays made prior to February 1981 without additional inspection. Implied supports may not have been inspected at all.

e. Conduit supports had been inspected and accepted in the past that would not meet current acceptance criteria (any support inspected before mid-1984).

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, engineering analysis, and engineering evaluation.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 246 (Reference 7.2) was developed to evaluate the welds in this group. The nature of the listed employee concerns was most appropriately addressed by a general plant examination for weld quality. The results of these examinations were analyzed to determine if any further action was required.

In accordance with the assessment plan for Group 246, the DOE/WEP used the examination results of the components indicated in the closure statement of WEP Group J. The results from this group were satisfactory to resolve Group 246, because the population of Group J included all safety-related electrical supports installed prior to February 13, 1981. Therefore, a separate sample for Group 246 was not required.

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969

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNIT 1, SAFETY-RELATED ELECTRICAL SUPPORTS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER EC-SPL-2	Page 3 of 3 Date 11/16/87 Revision 1 WEP Group No 246

5. Findings

During examination of safety-related civil structural welds in Group J, the DOE/WEP identified a number of weld deviations which required engineering analysis to determine acceptability. However, all deviant components identified have been determined by TVA to be suitable for service. As indicated in the closure statement for Group J, the DOE/WEP has concurred with these suitability-for-service analyses and determined that the associated components meet the applicable construction codes.

Additionally, all components associated with Group J, were determined to have no generic problems and no additional sampling was required (Reference 7.3).

6. Conclusions

The issues identified in the employee concerns could not be confirmed. The DOE/WEP concludes that the population of components of safety-related electrical support welds fabricated and installed prior to February 13, 1981 are in compliance with the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the boundary of this group are in compliance with the applicable FSAR construction code.

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WEP
969

7. References

7.1 Employee Concerns IN-85-887-001, WI-85-041-003, EX-85-076-001, IN-86-019-003, and WI-85-030-004.

7.2 WEP Assessment Plan No. 246, "Electrical Supports Fabricated Prior to February 13, 1981," Rev. 2, August 5, 1987.

7.3 "Generic Problem Analysis of Weld Examination Results From Group J, 202, and 225," Inspection Results and Data Analysis Summary Report, Rev. 1, August 19, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CIVIL STRUCTURES AND MISCELLANEOUS STEEL INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER EC-SPL-3	Page 1 of 4 Date 11/25/87 Revision 1 WEP Group 247

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns WI-85-013-001, IN-85-868-002, and PH-85-032-001.

2. Characterization of Issue

Employee Concerns WI-85-013-001, IN-85-868-002, and PH-85-032-001 identified the following:

a. Employees utilized to perform the inspections on cable tray and conduit supports and miscellaneous steel per the random sampling plan resulting from Nonconforming Condition Report (NCR) 2375 (Reference 7.2) were not qualified or certified to make the judgmental decisions required pertaining to acceptable or rework welds.

b. Concerned individual (CI) stated that welds in Control Building on structural steel were bought off on a weld sample basis and were not good.

c. The subject was the sampling programs for the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) structural welds for supports as a result of NCR's. The basis for selecting the sample and representative sampling were questioned. The CI stated this as a generic concern.

Additional information requests failed to produce further information or clarifications from the Quality Technology Company (QTC).

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970

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CIVIL STRUCTURES AND MISCELLANEOUS STEEL INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER EC-SPL-3	Page 2 of 4 Date 11/25/87 Revision 1 WEP Group 247

The employee concerns listed above imply that welds were bought off based upon sample inspection and therefore imply that bad welds may still exist.

The referenced sample plan was for a TVA reinspection. Department of Energy/Weld Evaluation Project (DOE/WEP) did not evaluate the sample plan or its application. DOE/WEP chose to evaluate weld quality without reference to the TVA plan or TVA reinspection results but rather using the DOE/WEP sampling plan and results. TVA is answering allegations pertaining to the sample plan in the investigation of their QA Subcategory 80407 (Reference 7.3). Therefore, the WEP evaluation was directed toward the potential for defective civil structural welds.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, engineering analysis, and engineering evaluation.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 247 (Reference 7.4) was developed to evaluate the welds in this group. Within the DOE/WEP's scope of work, the nature of the listed employee concerns was most appropriately addressed by a general plant examination for weld quality for the type of components addressed in the employee concerns. The result of these examinations were analyzed to determine if any further actior was required.

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In accordance with the assessment plan for Group 247, the examination results of the components of WEP Groups E, J, 252, and 254 were satisfactory to resolve Group 247. Therefore, a separate sample for Special Group 247 was not required.

5. Findings

During examination of safety-related electrical supports and civil structural welds in Groups E, J, 252, and 254, the DOE/WEP identified weld deviations which require engineering evaluation to establish acceptability. However, all deviant components identified have been determined by TVA to be suitable for service, with certain specific exceptions in Group E. As indicated in the closure statement for group E, the DOE/WEP has concurred with these suitability-for-service analyses and determined that the associated components are in

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CIVIL STRUCTURES AND MISCELLANEOUS STEEL INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER EC-SPL-3	Page 3 of 4 Date 11/25/87 Revision 1 WEP Group 247

compliance with the applicable construction codes with certain exceptions. All the exceptions are covered by TVA corrective action plan which commits to bringing those components in compliance with the applicable construction codes.

Additionally, all components associated with Group E, J, 252, and 254 were determined to have no generic problems (References 7.5 through 7.8).

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WEP
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6. Conclusions

The issues identified by the employee concerns were not confirmed to have had an impact upon weld quality. The DOE/WEP has a high degree of confidence that the safety-related electrical support and civil structural welds installed prior to February 13, 1981, that were evaluated in this group, will be in compliance with the applicable Final Safety Analysis Report (FSAR) construction code upon completion of TVA-committed corrective action. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the boundary of this group also meet the applicable FSAR construction code.

7. References

7.1 Employee Concerns WI-85,013-001, IN-85-868-002, and PH-85-032-001.

7.2 TVA Nonconforming Condition Report 2375 Rev. 0.

7.3 TVA QA Subcategory 80407.

7.4 WEP Assessment Plan No. 247, "Civil Structures and Miscellaneous Steel Installed Prior to February 13, 1981," Rev. 3, November 25, 1987.

7.5 "Generic Problem Analysis of Weld Examination Results from Group E," Inspection Results and Data Analysis Summary Report, Rev. 0, July 8, 1987.

7.6 "Generic Problem Analysis of Weld Examination Results from Groups J, 202, and 225," Inspection Results and Data Analysis Summary Report, Rev 1, August 24, 1987.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CIVIL STRUCTURES AND MISCELLANEOUS STEEL INSTALLED PRIOR TO FEBRUARY 13, 1987 WEP GROUP IDENTIFIER EC-SPL-3	Page 4 of 4 Date 11/25/87 Revision 1 WEP Group 247

7.7 "Generic Problem Analysis of Weld Examination Results from Group 252," Inspection Results and Data Analysis Summary Report, Rev 0, August 3, 1987.

7.8 "Generic Problem Analysis of Weld Examination Results from Group 254," Inspection Results and Data Analysis Summary Report, Rev. 0, August 4, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE WELD INSPECTION DEFICIENCIES FOR INSTRUMENTATION SUPPORTS WEP GROUP IDENTIFIER EC-SPL-5	Page 1 of 2 Date 11/23/87 Revision 1 WEP Group 248

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern WI-85-029-002.

2. Characterization of Issue

The employee concern stated the American Welding Society (AWS) weld inspection deficiencies for instrumentation supports at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) have not been addressed; sample reinspection programs for other structural welds (pipe hangers, cable tray and conduit supports, etc.) did not address instrument support welds installed during the same phase/period of construction.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, engineering analysis, and engineering evaluation.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 248 (Reference 7.2) was developed to evaluate the welds in this group.

In accordance with the assessment plan for Group 248, the DOE/WEP used the examination results of the components indicated in the closure statements of the DOE/WEP Groups G and H. The DOE/WEP Groups G and H comprised all instrument supports fabricated and installed by the

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WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE WELD INSPECTION DEFICIENCIES FOR INSTRUMENTATION SUPPORTS WEP GROUP IDENTIFIER EC-SPL-5	Page 2 of 2 Date 11/23/87 Revision 1 WEP Group 248

TVA. The results from these groups were satisfactory to resolve Group 248, because the populations had the same boundaries. Therefore, a separate sample for Group 248 was not required. DRR WEP 971

5. Findings

During examination of safety-related instrument supports in Groups G and H, the DOE/WEP identified conditions that required engineering analysis to establish acceptability. However, all deviant components identified have been determined by the TVA to be suitable for service. As indicated in the DOE/WEP closure statements for Groups G, and H, the DOE/WEP has concurred with these suitability-for-service analyses and determined that the associated components meet the applicable construction codes.

Additionally, all components associated with Groups G and H were determined to have no generic problems and no additional sampling was required (References 7.3 and 7.4).

6. Conclusions

The issues of weld deficiencies and non-inclusion of instrument supports in re-inspection programs identified in the employee concern were confirmed. However, the DOE/WEP concludes that the welds evaluated in Group 248 are in compliance with the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence that the unsampled components within the boundary of this group containing instrumentation support welds also meet the applicable FSAR construction code. DRR WEP 971

7. References

7.1 Employee Concern WI-85-029-002.

7.2 WEP Assessment Plan No. 248, "Weld Inspection Deficiencies for Instrument Supports," Rev. 2, July 28, 1987.

7.3 "Generic Problem Analysis of Weld Examination Results from Group G," Inspection Results and Data Analysis Summary Report, Rev. 0, July 10, 1987.

7.4 "Generic Problem Analysis of Weld Examination Results from Group H," Inspection Results and Data Analysis Summary Report, Rev. 1, August 25, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EXPANSION GROUP CLOSURE TENNESSEE VALLEY AUTHORITY RADIOGRAPHIC FILM INTERPRETATION EX-SPL-1, EX-SPL-5 and WEP GROUP IDENTIFIER EX-SPL-10	Page 1 of 4 Date 11/23/87 Revision 1 249, 253, and WEP Group No 258

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

During evaluation of the welds randomly selected for General Groups A and B, the Department of Energy/Weld Evaluation Project (DOE/WEP) identified radiographic film that exhibited indications that would not meet The American Society of Mechanical Engineers (ASME) Boiler and Pressure Code acceptance criteria. Additionally, several of the radiographic film were questionable because of geometric unsharpness. To determine the extent of the problems and further isolate a probable cause, the DOE/WEP elected to evaluate a population of welds that contained only welds requiring radiographic examination. Groups 249, 253, and 258 were formed to address potential problems of radiographic film interpretation at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). This effort was initiated prior to determining the need for an expansion (Group 1000), but was later identified as Expansion Group 253. While performing this evaluation, the DOE/WEP discovered additional indications and unsatisfactory film quality. The probable cause of the undetected indications and film was attributed to a particular film interpreter. Expansion Group 249 was formed to evaluate all film interpreted by the subject interpreter. Upon completing the evaluation of welds/film selected for Groups 253 and 249, only 1270 film remained. The DOE/WEP recommended, and the TVA agreed, that the remainder of the TVA-generated film should be reviewed. Expansion Group 258 was formed for that purpose.

DRR
WEP
972

WEP Closure Statement / Evaluation Report	EXPANSION GROUP CLOSURE TENNESSEE VALLEY AUTHORITY RADIOGRAPHIC FILM INTERPRETATION WEP GROUP IDENTIFIER EX-SPL-1, EX-SPL-5 and EX-SPL-10	Page 2 of 4 Date 11/23/87 Revision 1 249, 253, and WEP Group No 258

3. Summary

The issues for which these groups were formed were evaluated by inspection/examination, engineering evaluation, and document review, and will be resolved upon completion of the TVA committed corrective action. | DRR WEP 972

4. Evaluation Methodology

The DOE/WEP Assessment Plan Nos. 249, 253, and 258 (References 7.1, 7.2, and 7.3) were developed to evaluate the welds in these groups. The combined boundaries of the subject groups included 100% of the TVA made radiographs. For evaluation of the geometric unsharpness issue, the welds selected for Group 253 were physically measured. The geometric unsharpness issue was resolved during the evaluation of this group and the requirements for physical measurement were discontinued (Reference 7.1). The remainder of the evaluation requirements for the subject groups were the same. The original TVA film was interpreted, in accordance with Standard Practice (SP) WEP 3.2.6 (Reference 7.5). In accordance with the assessment plans for Groups 249, 253, and 258, the film acceptance or rejection was as follows: | DRR WEP 972

a. Accepted as is,

b. Rejectable due to discontinuities beyond code acceptance standards,

c. Uninterpretable for the following reasons:

(1) sensitivity

(2) density

(3) quality of film

(4) artifacts making interpretation impossible

(5) film missing.

5. Findings

In evaluation of the three subject groups, the DOE/WEP reviewed radiographs for 3064 welds. Of the radiographs (welds) reviewed, 289 had one or more conditions that were interpreted by the DOE/WEP as not meeting code requirements: 233 of these were for indications beyond code acceptance standards and 56 were for film artifacts and/or | DRR WEP 972

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WEP Closure Statement / Evaluation Report	EXPANSION GROUP CLOSURE TENNESSEE VALLEY AUTHORITY RADIOGRAPHIC FILM INTERPRETATION EX-SPL-1, EX-SPL-5 and WEP GROUP IDENTIFIER EX-SPL-10	Page 3 of 4 Date 11/23/87 Revision 1 249, 253, and WEP Group No 258

problems with radiographic technique not associated with in-field code deviant conditions. The quality of film associated with each group, and the number of deviant conditions was as follows:

Group 253--104 films reviewed, 21 films found unacceptable

Group 249--1690 films reviewed, 172 films found unacceptable

Group 258--1270 films reviewed, 96 films found unacceptable.

All conditions were identified on DOE/WEP Examination Package related Deviation Reports for each group.

The reported conditions from each group were transferred from deviation reports to corrective action deviation reports (Reference 7.6, 7.7, and 7.8) which were resolved by a TVA corrective action plan (Reference 7.9). The corrective action plan has been reviewed and approved by the DOE/WEP (Reference 7.10).

DRR
WEP
972

6. Conclusions

The DOE/WEP concludes that the welds evaluated in this group will meet the applicable Final Safety Analysis Report (FSAR) construction code upon completion of the TVA-committed corrective action.

7. References

7.1 WEP Assessment Plan No. 253, "Review of Tennessee Valley Authority (TVA) Radiographic Film (EX-SPL-5)," Rev. 1, March 2, 1987.

7.2 WEP Assessment Plan No. 249, "TVA Radiographic Film Interpretation (EX-SPL-1)," Rev. 0, September 10, 1986.

7.3 WEP Assessment Plan No. 258, "TVA Radiographic Film Interpretation (EX-SPL-10)," Rev. 1, December 24, 1986.

7.4 William S. Burkle letter to K. G. Therp, "Final Report, Radiographic Film Review, Groups A, 8, and 1000," August 20, 1986.

7.5 Standard Practice WEP 3.2.6, "Radiographic Examination Methods and Acceptance Criteria," Rev. 0, August 9, 1986.

7.6 DOE/WEP Corrective Action Deviation Report, CADR 253.

WEP Closure Statement --- Evaluation Report	EXPANSION GROUP CLOSURE TENNESSEE VALLEY AUTHORITY RADIOGRAPHIC FILM INTERPRETATION EX-SPL-1, EX-SPL-5 and WEP GROUP IDENTIFIER EX-SPL-10	Page 4 of 4 Date 11/23/87 Revision 1 249, 253, and WEP Group No 258

7.7 DOE/WEP Corrective Action Deviation Report, CADR 249.

7.8 DOE/WEP Corrective Action Deviation Report, CADR 258.

7.9 TVA Corrective Action Plan Summary, "RT Review, Population A, B, 034, 210, 249, 253, and 258, Rev. 1, June 4, 1987.

7.10 WEP Corrective Action Plan Summary Sheet, WEP Group A, B, 034, 210, 249, 253, and 258.

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E 5

Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EXPANSION GROUP CLOSURE MECHANICAL EQUIPMENT/SUPPORT WELDS WEP GROUP IDENTIFIER EX-SPL-4	Page 1 of 3 Date 11/23/87 Revision 1 WEP Group No 252

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Department of Energy/Weld Evaluation Project (DOE/WEP) Homogeneous Special Group 252 (EX-SPL-4) as identified in Reference 7.1.

2. Characterization of Issue

This group was formed to assess the quality of mechanical equipment/support welds in a population that had not been included in other DOE/WEP general groups at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1).

DRR
WEP
973

3. Summary

The issue for which the group was formed was resolved by inspection/examination and engineering analysis.

4. Evaluation Methodology

As called for in the assessment plan (Reference 7.2), a representative sample was extracted from the groups population per Standard Practice (SP) WEP 3.1.6, "Identifying Random Samples From Homogeneous Groups," and a 100% visual examination of the selected welds was performed. The individual attributes/characteristics considered were identified in SP WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria." WEP Form 305, "Nuclear Construction Issues Group (NCIG)-01 Checklist" was used for American Welding Society (AWS) D1.1-74 welds and WEP Form 302, "Visual Examination Record for ASME/ANSI welds," was used for any American Society of Mechanical Engineers (ASME)/American

E 6

WEP Closure Statement / Evaluation Report	EXPANSION GROUP CLOSURE MECHANICAL EQUIPMENT/SUPPORT WELDS WEP GROUP IDENTIFIER EX-SPL-4	Page 2 of 3 Date 11/23/87 Revision 1 WEP Group No 252

National Standards Institute (ANSI) welds that were selected. Any post-weld nondestructive examination that was performed on the original welds (Reference 7.2) was repeated.

DRR WEP 973

5. Findings

A review of the DOE/WEP examination packages (consisting of 29 components) of the ASME mechanical equipment revealed that there were no deviant attributes found.

A review of the DOE/WEP examination packages (consisting of 25 components) of the mechanical equipment supports, welded to the requirements of AWS D1.1-74, revealed that 21 components had welds with deviant attributes that required engineering analysis to determine acceptability. Reference 7.3 provides deviation details.

The TVA performed a suitability for service (SFS) analysis for the deviant attributes listed in Weld Deviation Reports (WDRs) for Group 252 and determined that the welds met all appropriate design criteria. The DOE/WEP concurred with the TVA's analysis (Reference 7.4) in accordance with Standard Practice (SP) WEP 3.3.1, "Suitability for Service Evaluation Review," (Reference 7.5).

A generic problem analysis (GPA) of weld examination results from Group 252 (Reference 7.6) was performed and the conclusion established that there are no generic problems in accordance with SP WEP 3.3.2 Paragraph 2.1.3 (Reference 7.7). Therefore, no additional sampling or rebounding was required.

6. Conclusions

The DOE/WEP concludes that the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction codes. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 Master Listing and Status of WEP Identified Homogeneous Groups, EG&G Weld Evaluation Project Document 0851A, June 24, 1987.

7.2 WEP Assessment Plan No. 252 "Mechanical Equipment and Related Support Welds," Rev. 1, October 16, 1986.

WEP Closure Statement / Evaluation Report	EXPANSION GROUP CLOSURE MECHANICAL EQUIPMENT/SUPPORT WELDS WEP GROUP IDENTIFIER EX-SPL-4	Page 3 of 3 Date 11/23/87 Revision 1 WEP Group No 252

7.3 WEP Group 252 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 10, 1987, and Inspection Results, INS 008-R0, August 10, 1987.

7.4 WEP Suitability For Service Review Summary Sheet, Analysis Package WDR 252-0036 REV. 0 (and Subsequent Packages For Group 252).

7.5 Standard Practice WEP 3.3.1, "Suitability-For-Service Evaluation Review," Rev. 8, June 8, 1987.

7.6 "Generic Problem Analysis of Weld Examination Results From Group 252, Inspection Results and Data Analysis Summary Report, Rev. 0, August 3, 1987.

7.7 Standard Practice WEP 3.3.2, "Root Cause and Generic Problem Evaluation," Rev. 7, March 17, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	SPECIAL GROUP CLOSURE ELECTRICAL EQUIPMENT AND SUPPORT WELDS WEP GROUP IDENTIFIER EX-SPL-6 and EX-SPL-18	Page 1 of 4 Date 11/16/87 Revision 1 254 and WEP Group No 266

Approved _____ Date 11-27-87

Reviewed _____ Prepared David Bonle

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

Group 254 was formed to assess the quality of welds in electrical equipment and supports in a population that had not been included in other Department of Energy/Weld Evaluation Project (DOE/WEP) general groups at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1).

Group 266 was formed to evaluate potential problems identified from performing a generic problem analysis of deviant welds in Group 254, per Standard Practice (SP) WEP 3.3.2 (Reference 7.1).

3. Summary

The issues for which these groups were formed were resolved by inspection/examination, document review, and engineering analysis.

4. Evaluation Methodology

The DOE/WEP Assessment Plans for Groups 254 and 266 (References 7.2 and 7.3) were developed to perform an evaluation on electrical equipment and support welds in these groups.

In accordance with Assessment Plan No. 254, a 100% visual examination was performed on selected welds per SP WEP 3.2.3 (Reference 7.4). In

E 9

WEP Closure Statement / Evaluation Report	SPECIAL GROUP CLOSURE ELECTRICAL EQUIPMENT AND SUPPORT WELDS WEP GROUP IDENTIFIER EX-SPL-6 and EX-SPL-18	Page 2 of 4 Date 11/16/87 Revision 1 254 and WEP Group No 266

accordance with the Assessment Plan No. 266, the attributes examined for Group 266 were weld size, length and location, and profile based on the data analysis report, "Generic Problem Analysis of Weld Examination Results from Group 254" (Reference 7.5). Nonconforming conditions identified were reported in accordance with SP WEP 3.2.2 (Reference 7.6).

5. Findings

The DOE/WEP examinations were performed on the representative sample of 64 components (385 welds) from the total population of Group 254, and the following determinations were made (Reference 7.7):

a. Thirty components (144 welds) were documented as acceptable without further evaluation.

b. Thirty-four components (146 welds out of a total of 241 welds) were documented as having one or more deviations that required engineering analysis to determine acceptability. The TVA performed suitability-for-service analyses (SFSA) for all deviant welds and determined that these welds are in compliance with the applicable code. The DOE/WEP reviewed the analyses, in accordance with SP WEP 3.3.1 (Reference 7.8), and concurred with the TVA SFSA (Reference 7.9).

c. Examination Packages 254-59 and 254-688 (three welds) were documented as having discontinuities that required characterization, in accordance with SP WEP 3.2.16 (Reference 7.10). The weld discontinuities were characterized and were acceptable.

d. The DOE/WEP identified potential problems when performing a generic problem analysis of the deviant welds in Group 254 per SP WEP 3.3.2, and determined that a sample expansion was needed.

The DOE/WEP examinations were performed on the representative sample of 30 components (171 welds) from the total population for Group 266 and the following determinations were made (Reference 7.11):

a. Eight components (41 welds) were acceptable without further evaluation.

b. Twenty-two components (108 welds out of a total of 130 welds) were documented as having one or more deviations that required engineering analysis to determine acceptability.

WEP Closure Statement / Evaluation Report	SPECIAL GROUP CLOSURE ELECTRICAL EQUIPMENT AND SUPPORT WELDS WEP GROUP IDENTIFIER EX-SPL-6 and EX-SPL-18	Page 3 of 4 Date 11/16/87 Revision 1 254 and WEP Group No 266

The TVA performed suitability-for-service analyses (SFSA) for all deviant welds and determined that these welds are in compliance with the applicable code. The DOE/WEP reviewed the analyses, in accordance with SP WEP 3.3.1 (Reference 7.8), and concurred with the TVA SFSA (Reference 7.9).

Group 254, from whose population Group 266 was formed, was determined to have no generic problems (Reference 7.12). Therefore, additional sampling or rebounding was not required. DRR WEP 974

6. Conclusions

The DOE/WEP concludes the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 Standard Practice WEP 3.3.2, "Root Cause and Generic Problem Evaluation," Rev. 7, March 17, 1987.

7.2 WEP Assessment Plan No. 254, "Electrical Equipment and Support Welds," Rev. 1, October 31, 1986.

7.3 WEP Assessment Plan No. 266, "Electrical Equipment and Support Welds Utilizing Tube Steel for Bracing and Supporting Cable Trays," Rev. 0, May 22, 1987.

7.4 Standard Practice WEP 3.2.3, "Visual Examination Method and Acceptance Criteria," Rev. 18, June 2, 1987.

7.5 "Generic Problem Analysis of Weld Examination Results from Group 254," Inspection Results and Data Analysis Report, Rev. 0, August 4, 1987.

7.6 Standard Practice WEP 3.2.2, "Reporting Deviations to TVA," Rev. 7, November 17, 1986. DRR WEP 974

7.7 WEP Group 254 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 13, 1987, and Inspection Results, INS 008-R0, August 13, 1987.

WEP Closure Statement --- Evaluation Report	SPECIAL GROUP CLOSURE ELECTRICAL EQUIPMENT AND SUPPORT WELDS WEP GROUP IDENTIFIER EX-SPL-6 and EX-SPL-18	Page 4 of 4 Date 11/16/87 Revision 1 254 and WEP Group No 266

7.8 Standard practice WEP 3.3.1, "Suitability-for-Service Evaluation Review," Rev. 8, June 8, 1987.

7.9 TVA Suitability for Service Analyses and WEP Suitability for Service Review Summary Sheets for Groups 254 and 266.

7.10 Standard Practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 25, 1986.

7.11 Group 266 Inspection Data Report On Weld Evaluation Project, INS 101-R1, August 13, 1987, and Inspection Results, INS 008-R0, August 13, 1987.

7.12 "Generic Problem Analysis of Weld Examination Results from Group 266," Inspection Results and Data Analysis Report, Rev. 1, August 27, 1987.

0175C

Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE STAINLESS STEEL LINER PLATE WELDS WEP GROUP IDENTIFIER EX-SPL-9	Page 1 of 3 Date 11/23/87 Revision 1 WEP Group No 257

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____
for Barbara Howard

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Department of Energy/Weld Evaluation Project (DOE/WEP) Homogeneous Special Group 257 (EX-SPL-4) as identified in Reference 7.1.

2. Characterization of Issue

Group 257 was formed to assess the quality of the subject welds in a population that had not been included in the WEP general groups at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1).

DRR WEP 975

3. Summary

The issue for which the group was formed was resolved by inspection/examination.

4. Evaluation Methodology

The DOE/WEP Assessment Plan for Group 257 (Reference 7.2) was developed to evaluate stainless steel plate liner welds located in the reactor well area, transfer canal, spent fuel pool, fuel cask setdown area, and fuel cask loading pit.

The assessment plan called for a representative sample (64 welds), as bounded by the assessment plan, to be inspected per Standard Practice (SP) WEP 3.1.6, "Identifying Random Samples from Homogeneous Groups." The selected welds were examined visually per SP WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria" and liquid penetrant examined per SP WEP 3.2.4, "Liquid Penetrant Examination Methods and

E-13

Acceptance Criteria" (using Appendix A of SP WEP 3.2.4, "Acceptance Criteria for The American Society of Mechanical Engineers (ASME) Section III, ASME Section VIII, and American National Standards Institute (ANSI) B31.1 Welds").

5. Findings

The results of inspections revealed that deviations were found in, or adjacent to, 23 welds. The "Inspection Data Report" (Reference 7.3) lists type and number of deviations. An engineering analysis by the Sargent and Lundy determined that the deviant welds will perform their intended safety function--maintaining a water-tight boundary. The stainless steel liner plate welds were fabricated and inspected by the TVA using ASME standards, recognizing they were not ASME components. The DOE/WEP reviewed Sargent and Lundy's analysis, in accordance with SP WEP 3.3.1 (Reference 7.4), and concurred with their findings that the components are suitable for service (Reference 7.5).

DRR WEP 975

Further data to support the engineering analysis are:

A. A memo from the TVA to the DOE/WEP states that the purpose of the liner plates is to provide a seal boundary, and there is no minimum design required thickness. The basic requirement is that no punctures or ground areas shall penetrate the full thickness of the material (Reference 7.6). This information was used for inspection criteria only.

B. A preoperational leak test conducted by the TVA was acceptable. Therefore, the surface defects found by the DOE/WEP inspectors did not penetrate the full thickness of the weld or liner plates; therefore the liner plates will function as designed (Reference 7.7).

C. Authorization and criteria to use when closing deviation reports (DRs) associated with the arc strikes were given in a letter (Reference 7.8).

A generic problem analysis for this group (Reference 7.9) concluded that none of the weld defects would affect the function of the pool liner to perform as designed. Also, the generic problem analysis did not indicate a potential for welds in the unsampled population to fail during service. No rebounding or expansion of this group was required.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE STAINLESS STEEL LINER PLATE WELDS WEP GROUP IDENTIFIER EX-SPL-9	Page 3 of 3 Date 11/23/87 Revision 1 WEP Group No 257

6. Conclusions

The DOE/WEP concludes that the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, the DOE/WEP concludes with a high degree of confidence, per Nuclear Construction Issues Group document NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

DRR
WEP
975

7. References

7.1 Master Listing and Status of WEP Identified Homogeneous Groups, EG&G Weld Evaluation Document 0851A, April 17, 1987.

7.2 WEP Assessment Plan No. 257, "Stainless Steel Liner Plate Welds," Rev. 0, October 24, 1986.

7.3 WEP Group 257 Inspection Data Report on Weld Evaluation Project, INS101-R1, August 6, 1987, and Inspection Result, INS008-R0, August 6, 1987.

7.4 Standard Practice WEP 3.3.1, "Suitability For Service Evaluation Review," Rev. 8, June 8, 1987.

7.5 TVA Suitability for Service Analysis and DOE/WEP Suitability for Service Review Summary Sheet for Group 257, Analysis Package WDR 257-0001 (and subsequent packages for Group 257).

7.6 James Adair memo to R. J. Wade, "Group 257, Liner Plates Located Reactor Well, Transfer Channel, Spent Fuel Pool," dated November 17, 1986.

7.7 Preoperational Test Instruction W-10.1A "Spent Fuel Pit Leak Test," March 14, 1978.

7.8 K. G. Therp letter to R. R. Gunter, "Closure of Arc Strike Deviation Report (DRs) ASME/ANSI Components," KGT-13-87, EG&G Idaho, Inc., February 6, 1987.

7.9 "Generic Problem Analysis of Weld Examination Results form Group 257," Inspection Results and Data Analysis Summary Report, Rev. 0, May 21, 1987.

Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EXPANSION GROUP CLOSURE ASME SECTION III, CLASS MC (METAL CONTAINMENT) WELDS WEP GROUP IDENTIFIER EX-SPL-16	Page 1 of 3 Date 11/19/87 Revision 0 WEP Group No

Approved [signature] Date 11-25-87

Reviewed [signature] Prepared [signature] for Douglas Atkinson

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

Group 264 was formed to assess the quality of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III, Class MC welds in a population that had not been included in other Department of Energy/Weld Evaluation Project (DOE/WEP) general groups at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1).

3. Summary

The issue for which the group was formed was evaluated by document review, inspection/examination, and engineering evaluation and will be resolved upon completion of TVA-committed corrective action.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 264 (Reference 7.1) was developed to evaluate a sample of 64 components selected from the general population of the ASME Section III, Class MC welds per the requirements of Standard Practice (SP) WEP 3.1.6 (Reference 7.2) by performing a 100% visual/nondestructive examination (NDE) of the selected welds.

WEP Closure Statement --- Evaluation Report	EXPANSION GROUP CLOSURE ASME SECTION III, CLASS MC (METAL CONTAINMENT) WELDS WEP GROUP IDENTIFIER EX-SPL-16	Page 2 of 3 Date 11/19/87 Revision 0 WEP Group No 264

The individual attributes/characteristics considered during inspection of each weld were identified in Appendix A of SP WEP 3.2.3 (Reference 7.3).

If liquid penetrant examination (PT) or magnetic particle examination (MT) were originally required, the welds were examined by the MT/PT method per SP WEP 3.2.4 (Reference 7.4) or SP WEP 3.2.5 (Reference 7.5).

5. Findings

The 64 components selected consisted of 68 welds. Of the 68 welds, 31 were acceptable with no deviant attributes; 37 welds had one or more deviations that required engineering analysis to determine acceptability. Four of the 37 welds, examination packages 264-0022, -0025, -0027, and -0054 were documented as having discontinuities that required characterization in accordance with SP WEP 3.2.16 (Reference 7.10). The discontinuities were characterized and were acceptable.

The results of the inspection of Group 264 were reported to the TVA via a letter from F. C. Fogarty to F. E. Laurent (Reference 7.6). This included a recommendation to review these welds for proper code classification (AWS vs ASME). The deviant attributes are listed in Reference 7.7. The TVA determined from these data that a potential problem existed and requested DOE/WEP to discontinue further evaluation of this group. The TVA has provided a corrective action plan for those deficiencies identified by the DOE/WEP (Reference 7.8). The corrective action plan will complete the assessment of all reported weld deviations and make a determination regarding the existence of any generic safety related weld problems. The DOE/WEP has reviewed and concurred with the TVA's corrective action, in accordance with SP WEP 3.3.3 (Reference 7.9).

6. Conclusions

The DOE/WEP concludes the welds evaluated in this group will be in compliance with the applicable Final Safety Analysis Report (FSAR) construction code, upon completion of TVA-committed corrective action.

7. References

7.1 WEP Assessment Plan No. 264, "ASME Section III Class MC (Metal Containment) welds (EX-SPL-16)," Rev. 1, May 11, 1987.

7.2 Standard Practise WEP 3.1.6, "Identifying Random Samples from Homogeneous Groups," Rev. 5, October 24, 1986.

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WEP Closure Statement --- Evaluation Report	EXPANSION GROUP CLOSURE ASME SECTION III, CLASS MC (METAL CONTAINMENT) WELDS WEP GROUP IDENTIFIER EX-SPL-16	Page 3 of 3 Date 11/19/87 Revision 0 WEP Group No 264

7.3 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987.

7.4 Standard Practice WEP 3.2.4, "Liquid Penetrant Examination Methods and Acceptance Criteria," Rev. 5, November 17, 1986.

7.5 Standard Practice WEP 3.2.5, "Dry Magnetic Particle Examination Methods and Acceptance Criteria," July 25, 1986.

7.6 F. C. Fogarty letter to F. E. Laurent, "Group 264 ASME Class MC Components," FCF-78-87, July 10, 1987.

7.7 WEP Group 264 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 22, 1987, and Inspection Results, INS 008-R0, August 22, 1987.

7.8 Memorandum F. E. Laurent to F. C. Fogarty, "Resolution/Corrective Action For Group 264," July 17, 1987, and TVA Corrective Action Plan Summary for Group 264, October 29, 1987; Tracking No. REK86103072.

7.9 Standard Practice WEP 3.3.3, "Review of TVA prepared Corrective Action for WEP Identified Hardware and/or Programmatic Deficiencies," Rev. 4, July 16, 1987.

7.10 Standard Practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 28, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	GENERAL GROUP CLOSURE ASME SECTION III, CLASS 1, 2 AND 3 SMALL BORE PIPE (2 INCH NPS AND LESS) AND I&C TUBING/PIPE WELDS WEP GROUP IDENTIFIER EX-SPL-14 A and	Page 1 of 5 Date 11/11/87 Revision 1 A and WEP Group No 262

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the employee concerns and/or the quality indicator review.

Group A was formed to assess the quality of welds within the following boundary of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Safety-related American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section III, Class 1, 2, and 3 small bore pipe [2 inch nominal pipe size (NPS) and less] and instrumentation and control (I&C) tubing/pipe welds fabricated and installed by TVA.

Group 262, an expansion of Group A, was formed to evaluate the potential for generic problems that were identified during evaluation of examination data from Group A.

3. Summary

The issues for which these groups were formed were evaluated by inspection/examination, document review, and engineering analysis, and will be resolved upon completion of TVA-committed corrective action and in accordance with Reference 7.1.

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WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE ASME SECTION III, CLASS 1, 2 AND 3 SMALL BORE PIPE (2 INCH NPS AND LESS) AND I&C TUBING/PIPE WELDS WEP GROUP IDENTIFIER A and EX-SPL-14	Page 2 of 5 Date 11/11/87 Revision 1 A and WEP Group No 262

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plans for Groups A and 262 (References 7.2 and 7.3) were developed to evaluate a sample of components selected from the total population of Group A by a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group document NCIG-02 (Reference 7.4) was used.

A plant examination of the statistically selected component welds was performed to determine the acceptability of the population. The acceptance criteria used was all recreatable visual and nondestructive examination (NDE) criteria imposed by the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance to code requirements.

A random sample was extracted from a specified subset of General Group A, in accordance with Assessment Plan No. 262. The attributes considered in the expansion Group 262 welds were cracks and linear indications.

5. Findings

Sixty-four welds were examined from the total population of Group A and the following determinations were made (Reference 7.5):

a. Forty of the welds examined were documented as acceptable and in compliance with ASME Boiler and Pressure Vessel Code Section III, Division 1 (Reference 7.6) without further evaluation.

b. One weld (Examination Package A-0041) was identified as deviant for a geometric unsharpness condition on the radiographic film. This deviation was discovered during the radiographic film review. Subsequently, TVA authorized a 100% examination of radiographic film not previously interpreted by the DOE/WEP. The radiographic film deviation associated with Group A has been addressed in Groups 249, 253, and 258. All radiographic film deviations identified in these groups will be resolved by a corrective action plan provided by TVA (Reference 7.7). The DOE/WEP has concurred with this corrective action plan.

c. The remaining 23 welds were examined and documented as having one or more deviations that required engineering analysis to determine acceptability.

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE ASME SECTION III, CLASS 1, 2 AND 3 SMALL BORE PIPE (2 INCH NPS AND LESS) AND I&C TUBING/PIPE WELDS WEP GROUP IDENTIFIER EX-SPL-14 A and	Page 3 of 5 Date 11/11/87 Revision 1 A and WEP Group No 262

d. Four of the above 23 welds (Examination Package Numbers: A-0014, 0026, 0065, and 0076) required characterization, in accordance with Standard Practice WEP 3.2.16 (Reference 7.8), for determination of final acceptance of certain weld attributes. These 4 welds were characterized and those specific weld attributes were acceptable. DRR WEP 928

The TVA performed an engineering analysis, as allowed by code, for each of the remaining deviant attributes on the 23 welds (identified above in Paragraph c) and determined that these welds are in compliance with the ASME boiler and pressure vessel code Section III and will perform their intended function. The DOE/WEP reviewed and concurred with the TVA engineering analysis (Reference 7.9).

The TVA notified DOE/WEP of generic implications associated with the American Society of Mechanical Engineers/American National Standards Institute (ASME/ANSI) pipe lug welds. This was identified during on going activities by the TVA at Watts Bar and was unrelated to the DOE/WEP work scope. The TVA has elected to evaluate 100% of the pipe lug welds on all safety-related piping systems. The TVA has provided a corrective action plan for resolving the pipe lug issue. The DOE/WEP has concurred with this corrective action plan (Reference 7.10).

An expansion group was formed due to the mandatory code compliance (MCC) deviation (crack) identified in Examination Package A-0065. As stated above in Paragraph c, this deviation was characterized and accepted. The expansion, Special Group 262, consisted of 86 ASME Code Section III, Class 1 and 2 welds randomly selected (Reference 7.11). DRR WEP 928

A general plant examination was performed in accordance with WEP Assessment Plan Group No. 262. The attributes examined for were cracks and linear indications. The examination results of Group 262 are as follows (Reference 7.12):

a. Eighty-three welds were examined and documented as acceptable without further evaluation.

b. The remaining three welds (Examination Package Numbers: 262-0005, 262-0011, and 262-0124) were examined and documented as having one or more deviations which required characterization, in accordance with Standard Practice WEP 3.2.16, for determination of final acceptance of certain weld attributes. These three welds were characterized and documented as acceptable.

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE ASME SECTION III, CLASS 1, 2 AND 3 SMALL BORE PIPE (2 INCH NPS AND LESS) AND I&C TUBING/PIPE WELDS WEP GROUP IDENTIFIER A and EX-SPL-14	Page 4 of 5 Date 11/11/87 Revision 1 WEP Group No A and 262

During evaluation of Group 262, DOE/WEP recommended additional examinations of 51 welds (Reference 7.13) due to the condition identified in examination package 262-0124. The basis for these additional examinations was to further develop the issue of potential non-safety significant conditions. The TVA has elected to resolve this issue in the unsampled populations as indicated in Reference 7.1.

Of the 150 welds evaluated by a review of the associated weld records, 149 documentation packages were in compliance with code requirements and 1 of the documentation packages was identified as having incomplete/missing documentation. These deviations have been identified to TVA for resolution (Reference 7.14).

6. Conclusions

The DOE/WEP concludes the welds evaluated in these groups will meet the applicable Final Safety Analysis Report (FSAR) construction code upon completion of TVA-committed corrective action. With the exception of the pipe lug welding and the radiographic film issues, there are no generic problems. It is the opinion of the DOE/WEP that the remaining population may contain a small percentage of non-safety significant conditions. Based on the inspection results from Group A and 262, these conditions had no affect on the as constructed stresses. Therefore, the DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries would also meet the applicable FSAR construction code. DRR WEP 928

7. References

7.1 F. E. Laurent letter to F. C. Fogarty, "Watts Bar Nuclear Plant, Weld Evaluation Project, Group 262 Expansion Recommendation," FEL 87072757, July 27, 1987.

7.2 WEP Assessment Plan Group A, "ASME Section III, Class 1, 2, and 3 Small Bore Pipe (2-inch NPS And Less) and I&C Tubing/Pipe Welds," Rev. 8, January 21, 1987.

7.3 WEP Assessment Plan Group No. 262, "ASME Section III, Class 1 and 2, Small Bore Piping (2 inch NPS and less) Fabricated Utilizing the Gas Tungsten Arc (GTAW) Welding Process," Rev. 0, March 26, 1987.

7.4 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds." NCIG-02, Rev. 0, September 27, 1985.

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE ASME SECTION III, CLASS 1, 2 AND 3 SMALL BORE PIPE (2 INCH NPS AND LESS) AND I&C TUBING/PIPE WELDS WEP GROUP IDENTIFIER A and EX-SPL-14	Page 5 of 5 Date 11/11/87 Revision 1 A and WEP Group No 262

7.5 WEP Group A, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 13, 1987, and Inspection Results, INS 008-R0, August 13, 1987.

7.6 The American Society of Mechanical Engineers, "Rules for Construction of Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code, Section III--Division 1, 1971 Edition with Summer 1973 Addenda (1974 Edition for heat treatment).

7.7 Gary Boyd, TVA Corrective Action Plan Summary, "RT Review," Rev. 1, June 4, 1987.

7.8 Standard Practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 25, 1986.

7.9 TVA Suitability-for-Service Analysis and WEP Suitability-for-Service Review Summary Sheets for General Group A.

7.10 Gary Boyd, TVA Corrective Action Plan Summary, "Lug Issue," Rev. 1, July 15, 1987.

7.11 "Generic Problem Analysis of Weld Examination Results From Group A," Inspection Results and Data Analysis Summary Report, Rev. 1, August 27, 1987.

7.12 WEP Group 262, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 17, 1987, and Inspection Result, INS 008-R0, August 17, 1987.

7.13 "Generic Problem Analysis of Weld Examination Results From Group 262," Inspection Results and Data Analysis Summary Report, Rev. 0, August 3, 1987.

7.14 F. E. Laurent TVA Memorandum to F. C. Fogarty, "Watts Bar Nuclear Plant--Incomplete or Missing Documentation," T25 870311 882, March 11, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	GENERAL GROUP CLOSURE ASME SECTION III, CLASS 1, 2 AND 3 (TVA CLASS A, B, C, AND D) LARGE BORE PIPE (2 1/2 INCH AND GREATER NPS) WELDS WEP GROUP IDENTIFIER B	Page 1 of 4 Date 11/11/87 Revision 1 WEP Group No B

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the Employee Concerns and/or the Quality Indicator review.

Group B was formed to assess the quality of welds within the following boundary of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Safety-related American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section III, Class 1, 2, and 3 (TVA Class A, B, C, and D) large bore pipe [2-1/2 inch and greater nominal pipe size (NPS)] welds fabricated and installed by TVA.

3. Summary

The issue for which the group was formed was evaluated by inspection/examination, document review, and engineering analysis, and will be resolved upon completion of TVA-committed corrective action.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan for Group B (Reference 7.1) was developed to examine/evaluate a sample of components selected from the total population of Group B by

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE ASME SECTION III, CLASS 1, 2 AND 3 (TVA CLASS A, B, C, AND D) LARGE BORE PIPE (2 1/2 INCH AND GREATER NPS) WELDS WEP GROUP IDENTIFIER B	Page 2 of 4 Date 11/11/87 Revision 1 WEP Group No B

a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group document NCIG-02 (Reference 7.2) was used. DRR WEP 929

A plant examination of the statistically selected component welds was performed to determine the acceptability of the population. The acceptance criteria used was all recreatable visual examination and nondestructive examination (NDE) criteria imposed by the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance to code requirements.

5. Findings

Seventy-four welds were examined from the total population of Group B and the following determinations were made (Reference 7.3):

a. Thirty of the welds examined were documented as acceptable and in compliance with the ASME Code Section III, Division 1 (Reference 7.4) without further evaluation.

b. The remaining 44 welds were documented as having one or more deviations requiring engineering analysis to determine acceptability.

c. Seven of the above 44 welds required characterization, in accordance with Standard Practice WEP 3.2.16 (Reference 7.5), for determination of final acceptance of certain weld attributes. Five welds were characterized and those specific weld attributes were acceptable. The remaining two welds required further engineering analysis, for those specific weld attributes, to determine acceptability. DRR WEP 929

The 74 welds were evaluated by a review of the associated weld records and were documented as complying with code requirements.

During the evaluation of Group B, six welds containing deviations were discovered during the radiographic film review. Consequently, the TVA authorized a 100% examination of radiographic film, not previously interpreted by DOE/WEP. The radiographic film deviations associated with Group B have been addressed in Expansion Groups 249, 253, and 258. All radiographic film deviations identified in these groups will be resolved by a Corrective Action Plan provided by TVA (Reference 7.6). The DOE/WEP has concurred with this corrective action plan associated with Group B.

WEP Closure Statement — Evaluation Report	GENERAL GROUP CLOSURE ASME SECTION III, CLASS 1, 2 AND 3 (TVA CLASS A, B, C, AND D) LARGE BORE PIPE (2 1/2 INCH AND GREATER NPS) WELDS WEP GROUP IDENTIFIER B	Page 3 of 4 Date 11/11/87 Revision 1 WEP Group No B

The TVA performed an engineering analysis for each of the deviant welds, excluding the radiographic deviations identified above, and determined that these welds are in compliance with the applicable code. The DOE/WEP reviewed and concurred with the TVA engineering analyses (Reference 7.7).

The TVA notified DOE/WEP of generic implications associated with the ASME/American National Standards Institute (ANSI) pipe lug welds. This was identified during on going activities by the TVA at Watts Bar and was unrelated to the DOE/WEP work scope. The TVA has elected to evaluate 100% of the pipe lug welds on all safety-related piping systems. The TVA has provided a corrective action plan for resolving the pipe lug issue. The DOE/WEP has concurred with this corrective action plan associated with Group B (Reference 7.8).

The DOE/WEP performed a generic problem analysis of the remainder of Group B. No generic problems, other than pipe lug welding and radiographic film interpretation, were identified and sample expansion or rebounding was not required (Reference 7.9).

6 Conclusions

The DOE/WEP concludes the welds evaluated in this group will meet the applicable Final Safety Analysis Report (FSAR) construction code upon completion of TVA-committed corrective action. With the exception of the pipe lug welding and the radiographic film issues, there are no generic problems associated with the unsampled population. Therefore, DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code. DRR WEP 929

7. References

7.1 WEP Assessment Plan for Group B, "ASME Section III, Class 1, 2, and 3 (TVA Class A, B, C, and D) Large Bore Pipe (2-1/2 inch and greater NPS) Welds," Rev. 7, September 26, 1986.

7.2 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1985.

7.3 WEP Group B, Inspection Data Report on Weld Evaluation Project, INS-101-R1, August 13, 1987, and Inspection Results, INS 008-R0, August 13, 1987.

WEP Closure Statement --- Evaluation Report	GENERAL GROUP CLOSURE ASME SECTION III, CLASS 1, 2 AND 3 (TVA CLASS A, B, C, AND D) LARGE BORE PIPE (2 1/2 INCH AND GREATER NPS) WELDS WEP GROUP IDENTIFIER B	Page 4 of 4 Date 11/11/87 Revision 1 WEP Group No B

7.4 The American Society of Mechanical Engineers, "Rules for Construction Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code, Section III--Division 1. 1971 Edition through Summer 1973 Addenda (1974 Edition for heat treatment).

DRR WEP 929

7.5 Standard Practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 25, 1986.

7.6 TVA Corrective Action Plan Summary, RT Review, Rev. 1, June 4, 1987.

7.7 TVA Suitability-for-Service Analyses and WEP Suitability-for-Service Review Summary Sheets for General Group B.

7.8 TVA Corrective Action Plan Summary, Lug Issue, Rev. 1, July 15, 1987.

7.9 "Generic Problem Analysis of Weld Examination Results form Group B," Inspection Results and Data Analysis Summary Report, Rev. 1, August 27, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement — Evaluation Report	GENERAL GROUP CLOSURE ANSI B31.1, POWER PIPING: TVA CLASSES G, H, M, AND N AND ANSI B31.5, REFRIGERATION PIPING: TVA CLASSES M AND N WEP GROUP IDENTIFIER C	Page 1 of 3 Date 11/12/87 Revision 1 WEP Group No C

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the Employee Concerns and/or the Quality Indicator review.

The quality of welds within the following boundary of Watts Bar Nuclear Plant Unit 1 (WBNP-1) was assessed by statistical evaluation: Safety-related American National Standards Institute (ANSI) B31.1, "Power Piping," TVA Classes G, H, M, and N; and ANSI B31.5, "Refrigeration Piping," TVA Classes M and N welds fabricated and installed by Tennessee Valley Authority (TVA).

3. Summary

The issue for which the group was formed was evaluated by inspection/examination and engineering analysis and will be resolved upon completion of TVA-committed corrective action.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan for Group C (Reference 7.1) was developed to examine/evaluate a sample of components selected from the total population of Group C by a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group (NCIG)-02 (Reference 7.2) was used.

WEP Closure Statement — Evaluation Report	GENERAL GROUP CLOSURE ANSI B31.1, POWER PIPING: TVA CLASSES G, H, M, AND N AND ANSI B31.5, REFRIGERATION PIPING: TVA CLASSES M AND N WEP GROUP IDENTIFIER C	Page 2 of 3 Date 12/2/87 Revision 1 WEP Group No C

A plant examination of the statistically selected component welds was performed to determine the acceptability of the population. The acceptance criteria used were all recreatable visual and nondestructive examinations (NDE) imposed by the applicable engineering drawings.

5. Findings

One hundred and seven welds were examined from the total population of Group C and the following determinations were made (Reference 7.3):

a. Forty-seven of the welds examined were documented as acceptable and in compliance with ANSI B31.1--1973 and ANSI B31.5--1966 (References 7.4 and 7.5) without further evaluation.

b. The remaining 60 welds were examined and documented as having one or more deviations that required engineering analysis to determine acceptability.

c. Five of the above 60 welds (C-0073, 0074, 0078, 0086, and 4009) were documented as having discontinuities that required characterization in accordance with Standard Practice WEP 3.2.16 (Reference 7.6). The weld discontinuities were characterized and were acceptable.

The TVA Engineering Design (ENDES) organization performed an engineering analysis for each of the 60 welds noted in b. above. The analyses established that the components will perform their intended function. The DOE/WEP Suitability-For-Service Evaluation Engineering (SSEE) Group reviewed the TVA analysis and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.7). ORR WEP 930

Prior to completion of WEP Generic Problem Analysis TVA notified DOE/WEP of the potential generic implications associated with The American Society of Mechanical Engineers (ASME)/ANSI pipe lug weld deviations. This was identified during on-going activities by the TVA at Watts Bar and was unrelated to the DOE/WEP work scope. They have elected to evaluate 100% of the pipe lug welds on all safety-related piping systems. The TVA has provided a corrective action plan for resolving the pipe lug issue. The DOE/WEP has concurred with this corrective action plan associated with General Group C (Reference 7.8).

The DOE/WEP performed a generic problem analysis of the remainder of General Group C. No other generic problems were identified and sample expansion or rebounding was not required (Reference 7.9).

WEP Closure Statement — Evaluation Report	GENERAL GROUP CLOSURE ANSI B31.1, POWER PIPING: TVA CLASSES G, H, M, AND N AND ANSI B31.5, REFRIGERATION PIPING: TVA CLASSES M AND N WEP GROUP IDENTIFIER C	Page 3 of 3 Date 11/12/87 Revision 1 WEP Group No C

6. Conclusions

The DOE/WEP concludes the welds evaluated in this group will meet the applicable Final Safety Analysis Report (FSAR) construction code upon completion of TVA-committed corrective action. With the exception of pipe lug welding there are no generic problems associated with the unsampled population. Therefore, DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

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7. References

7.1 WEP Assessment Plan for Group C, "ANSI B31.1, Power Piping; TVA Classes G, H, M, and N; and ANSI B31.5, Refrigeration Piping, TVA Classes M and N," Rev. 4, September 29, 1986.

7.2 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1985.

7.3 Group C Inspection Data Report on Weld Evaluation Project, INS 101-R1 (August 13, 1987) and Inspection Results, INS 008-R0 (August 13, 1987).

7.4 American National Standards Institute, ANSI B31.1, "Power Piping," Code for Pressure Piping, 1973 through Winter 1973.

7.5 American National Standards Institute, ANSI B31.5-1966 (USASI B31.5-1966), "Refrigeration Piping," USA Standard Code for Pressure Piping, published by American Society of Mechanical Engineers, 1966.

7.6 Standard Practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 25, 1986.

7.7 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for General Group C.

7.8 TVA Corrective Action Plan Summary, "Lug Issue," Rev. 1, July 15, 1987.

7.9 "Generic Problem Analysis of Weld Examination Results From Group C," Inspection Results and Data Analysis Summary Report, Rev. 1, August 21, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED CIVIL WELDS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER D and EX-SPL-12	Page 1 of 4 Date 11/11/87 Revision 1 D and WEP Group No 260

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the Employee Concerns and/or the Quality Indicator review.

Group D was formed to assess the quality of welds within the following boundary of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Safety-related civil welds fabricated and installed by TVA, subsequent to February 13, 1981.

Group 260, an expansion of Group D, was formed to evaluate the potential for generic problems identified during the evaluation of examination data from Group D.

3. Summary

The issues for which these groups were formed were resolved by inspection/examination, engineering analysis, and document review.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plans for Group D and 260 (Reference 7.1 and 7.2) were developed to evaluate the sample of components selected from the total population

of Group D by a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group document NCIG-02 (Reference 7.3) was used.

A plant examination of the statistically selected component welds was performed to determine the acceptability of the population. The acceptance criteria used was a visual examination in accordance with NCIG-01 (Reference 7.4) and the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance to code requirements.

The attributes considered in the visual inspection of Group 260 were weld size, profile, length and location.

5. Findings

Sixty-seven components, consisting of 923 welds, were examined from the total population of Group D and the following determinations were made (Reference 7.5):

a. Forty-eight of the components examined were documented as acceptable without further evaluation.

b. The remaining 19 components were examined and documented as having 123 welds, out of a total of 525 welds, with one or more deviations that required engineering analysis to determine acceptability.

c. One of the above 123 welds (D-0149) was documented as having discontinuities that required characterization in accordance with Standard Practice WEP 3.2.16 (Reference 7.6). The weld discontinuities were characterized and were acceptable.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the deviant component welds. Their analyses determined that the components will perform their intended function. The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.7).

The DOE/WEP performed a generic problem analysis of General Group D. Consequently, an expansion group was formed to evaluate potential generic problems identified during evaluation of examination data from Group D (Reference 7.8).

WEP Closure Statement — Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED CIVIL WELDS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER D and EX-SPL-12	Page 3 of 4 Date 11/11/87 Revision 1 D and WEP Group No 260

The expansion, Special Group 260, consisted of 30 safety-related civil components (1066 total welds) randomly selected from a bounded subset of the Group D population. A visual examination was performed in accordance with the assessment plan for Group 260 and the following determinations were made (Reference 7.9):

a. Fifteen of the components examined were documented as acceptable without further evaluation.

b. The remaining 15 components were examined and documented as having 138 welds, out of a total of 1011 welds, with one or more deviations that require engineering analyses to determine acceptability.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the deviant component welds. Their analyses determined that the components will perform their intended function. The DOE/WEP Suitability For Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.10).

The inspection results from Group 260 provided the basis for determining that Group D had no generic problems (Reference 7.11). Therefore, additional sampling or rebounding was not required. ORR WEP 931

Of the 97 components evaluated by a review of the associated weld records, 95 of the documentation packages were in compliance with code requirements and 2 of the documentation packages were identified as having incomplete/missing documentation. These deviations have been identified to TVA for resolution (Reference 7.12).

6. Conclusions

The DOE/WEP concludes the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 WEP Assessment Plan Group D, "Safety-Related Civil Welds Fabricated and Installed Subsequent to February 13, 1981," Rev. 4, July 8, 1986.

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED CIVIL WELDS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER D and EX-SPL-12	Page 4 of 4 Date 11/11/87 Revision 1 D and WEP Group No 260

7.2 WEP Assessment Plan Group 260, "Safety-Related Civil, Main Structural Framework, Installed Subsequent to February 13, 1981," Rev. 0, March 9, 1987.

7.3 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1985.

7.4 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," NCIG-01, Rev. 2, May 1985;

7.5 WEP Group D, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 13, 1987 and Inspection Result, INS 008-R0, August 13, 1987.

7.6 Standard Practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 25, 1986.

7.7 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for General Group D.

7.8 "Generic Problem Analysis of Weld Examination Results From Group D." Inspection Results and Data Analysis Summary Report, Rev. 1, August 13, 1987.

7.9 WEP Group 260, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 17, 1987 and Inspection Result, INS 008-R0, August 17, 1987.

7.10 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for Group 260.

7.11 "Generic Problem Analysis of Weld Examination Results From Group 260," Inspection Results and Data Analysis Summary Report, Rev. 1, August 27, 1987.

7.12 F. E. Laurent TVA Memorandum to F. C. Fogarty, "Watts Bar Nuclear Plant--Incomplete or Missing Documentation, 125 870311 882, March 11, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement — Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED CIVIL WELDS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER E, EX-SPL-7, EX-SPL-8, and EX-SPL-15	Page 1 of 6 Date 11/11/87 Revision 1 E, 255, 256, and WEP Group No 263

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the Employee Concerns and/or the Quality Indicator Review.

Group E was formed to assess the quality of welds within the following boundary of Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Safety-related civil welds fabricated and installed by the TVA prior to February 13, 1981.

Groups 255 and 256 were formed after inspection and analysis of Group E identified unsuitable-for-service (UFS) components. The purpose of these groups was to examine those populations of structural components which were similar in configuration to those identified as UFS.

Expansion Group 263 was formed as a result of a generic problem analysis of the repopulated sample from Group E, which indicated the potential for a generic problem with safety-related civil welds.

3. Summary

The issue for which Group E was formed was resolved by inspection/examination, document review, and engineering analysis.

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WEP Closure Statement — Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED CIVIL WELDS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER E, EX-SPL-7, EX-SPL-8, and EX-SPL-15	Page 2 of 6 Date 11/11/87 Revision 1 WEP Group No E, 255, 256, and 263

The issues for which Groups 255, 256, and 263 were formed were evaluated by inspection/examination, document review, and engineering analysis and will be resolved by TVA-committed corrective action.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plans for Groups E, 255, 256, and 263 (References 7.1, 7.2, 7.3 and 7.4) were developed to evaluate the welds in these groups.

A sample of components was selected from the total population of Group E by a random selection process. The multiple sampling plan described in the Nuclear Construction Issues Group document NCIG-02 (Reference 7.5) was used. The acceptance criteria used was a visual examination in accordance with NCIG-01 (Reference 7.6) and the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance with code requirements in accordance with Standard Practice WEP 3.2.12 (Reference 7.7).

Groups 255 and 256 were removed from the DOE/WEP scope of work by the TVA as indicated below in Section 5.

In accordance with the DOE/WEP Assessment Plan for Group 263, a sample of components was selected from a defined subset of the Group E population by a random selection process. The acceptance criteria used was a visual examination in accordance with NCIG-01, nondestructive examinations (NDE), and the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance with code requirements in accordance with Standard Practice WEP 3.2.12.

5. Findings

A random sample, consisting of 64 components, was selected from the Group E population. Of the 64 components selected, 10 components were identified as unsuitable-for-service (UFS). These 10 components were evaluated in accordance with Standard Practice (SP) WEP 3.3.5 (Reference 7.8). This evaluation isolated the cause of the UFS conclusions and two distinct problem area boundaries were identified. These two boundable areas of concern resulted in the formation of Groups 255 and 256. The formation of these two groups included the transfer of nine components (support bracing) from Group E to Group 255 and 13 components (main structural beams) from Group E to Group 256. The assessment plans for Group 255 and 256 denoted that the inspections results from these 22 components would further define

WEP Closure Statement — Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED CIVIL WELDS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 E, EX-SPL-7, EX-SPL-8, WEP GROUP IDENTIFIER and EX-SPL-15	Page 3 of 6 Date 11/11/87 Revision 1 E, 255, 256, and WEP Group No 263

the boundable areas. Consequently, the TVA elected to remove Groups 255 and 256 from the DOE/WEP work scope and evaluate 100% of these components. The TVA provided a corrective action plan for resolution of Groups 255 and 256 (Reference 7.9). The DOE/WEP concurred with this corrective action plan and terminated all further investigations/analyses concerning these two groups.

The DOE/WEP then repopulated Group E to a sample size of 64 with the addition of 22 components. The DOE/WEP examination results for this group (2105 welds) are as follows (Reference 7.10):

a. Twenty-six of the components (289 welds) were examined and documented as acceptable without further evaluation.

b. The remaining 38 components (1816 welds) were examined and documented as having 559 welds with one or more deviations requiring engineering analysis to determine acceptability.

c. Five of the above 559 welds (Examination Package Numbers: E-0085, E-0404, E-0549, E-0622, and E-0741) required characterization in accordance with the DOE/WEP Standard Practice WEP 3.2.16 (Reference 7.11) for determination of final acceptance of certain weld attributes. These five welds were characterized and those weld attributes that were characterized were found acceptable. The TVA performed suitability-for-service analyses (SFSA) for all of the deviant welds identified and determined that these welds are in compliance with the applicable code. The DOE/WEP reviewed the analyses in accordance with Standard Practice SP WEP 3.3.1 (Reference 7.12) and concurred with the TVA SFSA (Reference 7.13).

d. The above sixty-four components were evaluated by a review of the associated weld records. Sixty-three of the documentation packages were in compliance with code requirements and one package was identified as having incomplete/missing documentation. This condition was identified to TVA for resolution. It is being tracked by TVA as indicated in Reference 7.14.

The DOE/WEP performed a generic problem analysis of General Group E (Reference 7.15). Consequently, an expansion group was formed to evaluate potential generic problems identified during evaluation of examination data from Group E.

The expansion, Special Group 263, consisted of 31 safety-related civil components randomly selected from the Group E population. Visual and

WEP Closure Statement — Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED CIVIL WELDS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER E, EX-SPL-7, EX-SPL-8, and EX-SPL-15	Page 4 of 6 Date 11/11/87 Revision 1 E, 255, 256, and WEP Group No 263

nondestructive examinations were performed in accordance with the DOE/WEP assessment plan for Group 263 and the following determinations were made (Reference 7.16):

a. Twelve of the components (186 welds) were examined and documented as acceptable without further evaluation.

b. Eighteen components (792 welds) were examined and documented as having 199 welds with one or more deviations requiring engineering analysis to determine acceptability. The TVA performed SFSA for all of the deviant welds identified and determined that these welds are in compliance with the applicable code. The DOE/WEP reviewed the analyses in accordance with SP WEP 3.3.1 and concurred with the TVA SFSA (Reference 7.17).

c. The remaining component (22 welds), Package WEP 263-0060, was evaluated as unsuitable for service (UFS) due to a configuration problem and not a welding related problem (Reference 7.18). The TVA has provided a tracking mechanism (CAQR) that will follow the configuration problem to its resolution (Reference 7.19). The TVA will resolve this issue as a separate concern unrelated to the weld evaluation project.

d. The above thirty-one components were evaluated by a review of the associated weld records. The documents complied with code requirements.

The inspection results from Group 263 provided the basis for determining that Group E had no generic problems with regard to weld quality (Reference 7.20). Therefore, additional sampling or rebounding was not required. DRR WEP 932

6. Conclusions

The DOE/WEP concludes the welds evaluated in the repopulated Group E meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore DOE/WEP concludes, with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundary also meet the applicable FSAR construction code. The DOE/WEP also concludes that the welds evaluated in Groups 255, 256, and 263 will meet the applicable FSAR construction code upon completion of TVA committed corrective action. DRR WEP 932

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED CIVIL WELDS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER E, EX-SPL-7, EX-SPL-8, and EX-SPL-15	Page 5 of 6 Date 11/11/87 Revision 1 E, 255, 256, and WEP Group No 263

7. References

7.1 WEP Assessment Plan General Group E, "Safety-Related Civil Welds Fabricated and Installed Prior to February 13, 1981," Rev. 4, April 16, 1987.

7.2 WEP Assessment Plan No. 255, "Support Bracing on Elevation 741 of the Control Building," Rev. 0, October 22, 1986.

7.3 WEP Assessment Plan No. 256, "Mainframe Structural Floor Beams and Connections," Rev. 0, October 22, 1986.

7.4 WEP Assessment Plan Group 263, "Safety-Related/Safety Significant Civil Components and Associated Welds Fabricated and Installed Prior to February 13, 1981," Rev. 1, May 15, 1987.

7.5 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1985.

7.6 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," NCIG-01, Rev. 2, May 1985;

7.7 Standard Practice WEP 3.2.12, "Review of TVA Weld Operation Sheets for Code-Required Minimums," Rev. 6, April 3, 1987.

7.8 Standard practice WEP 3.3.5, "Project Procedures," Rev. 2, May 17, 1987.

7.9 TVA Corrective Action Plan Summary for 741 Floor Elevation (Population E, 255, and 256), Rev. 1, July 17, 1987.

7.10 WEP Group E, Inspection Data Report on Weld Evaluation Project, INS-101-R1, August 13, 1987, and Inspection Results, INS-008-R0, August 13, 1987.

7.11 Standard Practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 25, 1986.

7.12 Standard practice WEP 3.1.1, "Suitability-for-Service Evaluation Review," Rev. 8, June 8, 1987.

7.13 TVA Suitability for Service Analyses and DOE/WEP Suitability for Service Review Summary Sheets for General Group E.

WEP Closure Statement — Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED CIVIL WELDS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 E, EX-SPL-7, EX-SPL-8, WEP GROUP IDENTIFIER and EX-SPL-15	Page 6 of 6 Date 11/11/87 Revision 1 E, 255, 256, and WEP Group No 263

7.14 F. E. Laurent memorandum to F. C. Fogarty, "Watts Bar Nuclear Plant--Incomplete or Missing Documentation," T25 0870311 882, March 11, 1987.

7.15 "Generic Problem Analysis of Weld Examination Results from Group E," Inspection Results and Data Analysis Summary Report, Rev. 0, August 19, 1987.

7.16 WEP Group 263, Inspection Data Report on Weld Evaluation Project, INS-101-R1, August 18, 1987, and Inspection Results, INS-008-R0, August 18, 1987.

7.17 TVA Suitability for Service Analyses and DOE/WEP Suitability for Service Review Summary Sheets For Expansion Special Group 263.

7.18 F. C. Fogarty letter to C. D. Lundin, "Disposition of Group 263 Unsuitable-For-Service Component," FCF-87-87, EG&G Idaho, Inc., August 6, 1987.

7.19 TVA Condition Adverse to Quality Report (CAQR) No. WBP870661, Rev. 1, September 29, 1987 and TVA Memo REM87100868, "Group Closure of Group 263," October 8, 1987.

7.20 "Generic Problem Analysis of Weld Examination Results From Group 263," Inspection Results and Data Analysis Summary Report, Rev. 1, August 28, 1987.

Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE PIPE SUPPORTS (EXCLUDING I&C SUPPORTS) WEP GROUP IDENTIFIER F	Page 1 of 3 Date 08/31/87 Revision 0 WEP Group No F

Approved _____ Date 9-1-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.15 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the Employee Concerns and/or the Quality Indicator review.

Group F was formed to assess the quality of welds within the following boundary of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Pipe supports (excluding I&C supports) fabricated and installed, on or associated with safety-related pipe, by TVA.

3. Summary

The issue for which the group was formed was resolved by document review, inspection/examination, and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan for Group F (Reference 7.1) was developed to evaluate a sample of components selected from the total population of Group F by a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group document NCIG-02 (Reference 7.2) was used.

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE PIPE SUPPORTS (EXCLUDING I&C SUPPORTS) WEP GROUP IDENTIFIER F	Page 2 of 3 Date 08/31/87 Revision 0 WEP Group No F

A plant examination of the statistically selected component welds was performed to determine the acceptability of the population. The acceptance criteria used was a visual examination in accordance with NCIG-01 (Reference 7.3) and the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance to code requirements.

5. Findings

Sixty-five components, consisting of 316 welds were examined from the total population of Group F and the following determinations were made (Reference 7.4):

a. Fifty of the components examined were documented as acceptable without further evaluation.

b. The remaining 15 components were examined and documented as having 27 welds, out of a total of 103 welds, with one or more deviations that required engineering analysis to determine acceptability.

The TVA Engineering Design (EnDES) organization performed a suitability-for-service analysis (SFSA) for each of the 15 deviant components. Their analyses determined that the components will adequately perform their intended function. The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.5).

Sixty-five components were evaluated by a review of the associated weld records. Sixty-four of the documentation packages were in compliance with code requirements and one of the documentation packages was identified as having incomplete/missing documentation. This deviation has been identified to TVA for resolution (Reference 7.7).

The DOE/WEP performed a generic problem analysis of general Group F. No generic problems were identified and sample expansion or rebounding was not required (Reference 7.6).

6. Conclusions

The DOE/WEP concludes the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, DOE/WEP concludes with a high degree of

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE PIPE SUPPORTS (EXCLUDING I&C SUPPORTS) WEP GROUP IDENTIFIER F	Page 3 of 3 Date 08/31/87 Revision 0 WEP Group No F

confidence, per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 WEP Assessment Plan for Group F, "Pipe Supports Excluding I&C Supports," Rev. 4, September 29, 1986.

7.2 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection for Welds," NCIG-02, Rev. 0, September 27, 1985.

7.3 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," NCIG-01, Rev. 2, May 1985.

7.4 WEP Group F, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 13, 1987, and Inspection Result, INS 008-R0, August 13, 1987.

7.5 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for General Group F.

7.6 "Generic Problem Analysis of Weld Examination Results From Group F," Inspection Results and Data Analysis Summary Report, Rev. 0, June 24, 1987.

7.7 TVA Memorandum No. T25 870311 882 "Watts Bar Nuclear Plant--Incomplete or Missing Documentation," March 11, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED INSTRUMENT SUPPORTS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER G and 265	Page 1 of 4 Date 11/11/87 Revision 1 WEP Group No G and 265

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the Employee Concerns and/or the Quality Indicator review.

Group G was formed to assess the quality of welds within the following boundary of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Safety-related instrument supports, fabricated and installed by TVA, subsequent to February 13, 1981.

Although inspection and engineering analysis determined that all of the sampled population were suitable for service, a generic problem analysis indicated the need for additional evaluation and Group 265 was formed as an expansion of Group G.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plans for Groups G and 265 (References 7.1 and 7.2) were developed to

evaluate the sample of components selected from the total population of Group G by a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group document NCIG-02 was used (Reference 7.3).

A plant examination of the statistically selected component welds was performed to determine the acceptability of the populations. The acceptance criteria used was a visual examination in accordance with NCIG-01 (Reference 7.4) and the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance with code requirements.

Subsequent to forming expansion Group 265, a visual examination was performed in accordance with DOE/WEP Assessment Plan for Group 265. Expansion Group 265 consisted of 30 safety-related instrument supports (156 total welds) randomly selected from a bounded subset of the Group G population.

5. Findings

Sixty-Six components, consisting of 272 welds, were examined from the total population of Group G and the following determinations were made (Reference 7.5):

a. Forty-four of the components examined were documented as acceptable without further evaluation.

b. The remaining 22 components were examined and documented as having 42 welds, out of a total of 80 welds, with one or more deviations that required engineering analysis to determine acceptability.

c. One of the above 42 welds were documented as having discontinuities that required characterization in accordance with Standard Practice WEP 3.2.16 (Reference 7.6). The weld discontinuities were characterized and were acceptable.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the 22 deviant components and determined that the components will perform their intended function. The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.7).

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED INSTRUMENT SUPPORTS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER G and 265	Page 3 of 4 Date 11/11/87 Revision 1 G and WEP Group No 265

The DOE/WEP performed a generic problem analysis for General Group G (Reference 7.8). Consequently, expansion Group 265 was formed and evaluated.

The following determinations were made concerning evaluation of the expansion special Group 265 (Reference 7.9):

a. Twenty-one of the components examined were documented as acceptable without further evaluation.

b. The remaining nine components were examined and documented as having 28 welds, out of a total of 67 welds, with one or more deviations that required engineering analysis to determine acceptability.

As a result of the DOE/WEP examinations/evaluations and TVA SFSA, DOE/WEP has determined that the welds associated with this expansion group are suitable for service (Reference 7.10).

The inspection results from Group 265 provided the basis for determining that Group G had no generic problems (Reference 7.11). Therefore, additional sampling or rebounding was not required.

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Of the 96 components evaluated by a review of the associated weld records, 93 of the documentation packages were in compliance with code requirements and 3 of the documentation packages were identified as having incomplete/missing documentation. These deviations have been identified to TVA for resolution (Reference 7.12).

6. Conclusions

The DOE/WEP concludes the welds, on the selected components evaluated in these groups, meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 WEP Assessment Plan for Group G, "Safety-Related Instrument Supports Fabricated and Installed Subsequent to February 13, 1981," Rev. 4, October 20, 1986.

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED INSTRUMENT SUPPORTS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER G and 265	Page 4 of 4 Date 11/11/87 Revision 1 G and WEP Group No 265

7.2 WEP Assessment Plan Group No. 265, "Safety-Related Instrument Supports Fabricated and Installed Subsequent to February 13, 1981 (Weld Size, Profile, Length and Location)," Rev. 0, May 5, 1987.

7.3 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1985.

7.4 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," NCIG-01," Rev. 2, May 1985.

7.5 WEP Group G, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 13, 1987, and Inspection Result, INS 008-R0, August 13, 1987.

7.6 WEP Standard Practice 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware discrepancies," August 25, 1986.

7.7 TVA Suitability for Service Analysis and DOE/WEP Suitability for Service Review Summary Sheets for Group G.

7.8 "Generic Problem Analysis of Weld Examination Results From Group G," Inspection Results and Data Analysis Summary Report, Rev. 0, July 10, 1987.

7.9 WEP Group 265, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 17, 1987 and Inspection Result, INS 008-R0, August 17, 1987.

7.10 TVA Suitability for Service Analysis and DOE/WEP Suitability for Service Review Summary Sheets for Expansion Special Group 265.

7.11 "Generic Problem Analysis of Weld Examination Results From Group 265," Inspection Results and Data Analysis Summary Report, Rev. 1, August 28, 1987.

7.12 TVA Memorandum No. T25 870311 882 "Watts Bar Nuclear Plant Incomplete or Missing Documentation," March 11, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED INSTRUMENT SUPPORTS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER H and EX-SPL-11	Page 1 of 4 Date 09/02/87 Revision 0 WEP Group No H and 259

Approved [signature] Date 9-2-87

Reviewed [signature] 9-2-87 Prepared [signature]

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the employee concerns and/or quality indicator review.

Group H was formed to assess the quality of welds within the following boundary of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Safety-related instrument support welds fabricated and installed by TVA prior to February 13, 1981.

Expansion Group 259 was formed in accordance with the sampling plan indicated in the Nuclear Construction Issues Group document NCIG-02 (Reference 7.1) as a result of a generic problem analysis of Group H that indicated the potential for a generic problem with welded instrument supports.

3. Summary

The issue for which these groups were formed were resolved by document review, inspection/examination, and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plans for Groups H and 259 (References 7.2 and 7.3) were developed to

evaluate the sample of components selected from the total population of Group H by a random selection process. The multiple sampling plan described in NCIG-02 was used.

A plant examination was performed on the randomly selected components to determine the acceptability of the population. The acceptance criteria used was a visual examination in accordance with NCIG-01 (Reference 7.4) and the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance with code requirements.

5. Findings

Fifty-seven components, consisting of 268 welds, were examined from the total population of Group H, and the following determinations were made (Reference 7.5):

a. Twenty-five of the components examined were documented as acceptable without further evaluation.

b. The remaining 32 components were examined and documented as having 100 welds, out of a total of 133 welds, with one or more deviations that required engineering analysis to determine acceptability.

c. One of the above 61 welds (H-0031) was documented as having a discontinuity that required characterization in accordance with Standard Practice WEP 3.2.16 (Reference 7.6). The weld discontinuity was characterized and was acceptable.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the 32 deviant components and determined that the components will perform their intended function. The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.7).

Expansion Group 259 was recommended by DOE/WEP based on the results of the consequence analysis and the causal analysis of Group H, in which the consequence analysis demonstrated a potential for a generic problem and the causal analysis isolated the area for expansion. Consequently, TVA elected to reexamine the as-constructed and as-designed percents of allowable stress. Following reevaluation of stresses, conservatism was removed from the calculations to more accurately reflect the effects of weld deviations. These revised

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED INSTRUMENT SUPPORTS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER H and EX-SPL-11	Page 3 of 4 Date 09/02/87 Revision 0 WEP Group No H and 259

stresses were used in a second consequence analysis and the results indicated that the components in the unsampled population of Group H would not exceed the allowable stresses. Therefore, the DOE/WEP determined that General Group H has no generic problems and sample expansion or rebounding (Group 259) was not required (Reference 7.8).

Of the 57 components that were evaluated by a review of the associated weld records, 52 of the documentation packages were in compliance with code requirements and 5 of the documentation packages were identified as having incomplete/missing documentation. These deviations have been identified to the TVA for resolution (Reference 7.9).

6. Conclusions

The DOE/WEP concludes the welds, on the selected components evaluated in these groups, meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev 0, September 27, 1985.

7.2 WEP Assessment Plan Group H, "Safety-Related Instrument Supports Fabricated and Installed Prior to February 13, 1981," Rev. 4, October 20, 1986.

7.3 WEP Assessment Plan No. 259, "Safety-Related Instrument Supports Fabricated Prior to February 13, 1981, and Inspected by the Subject Inspector," Rev. 0, March 9, 1987.

7.4 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," NCIG-01, Rev. 2, May 1985.

7.5 WEP Group H, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 13, 1987, and Inspection Result, INS 008-R0, August 13, 1987.

7.6 Standard Practice WEP 3.2.16, "Surface Conditioning and Characterizing Weld/Hardware Discrepancies," August 25, 1986.

WEP Closure Statement --- Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED INSTRUMENT SUPPORTS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER H and EX-SPL-11	Page 4 of 4 Date 09/02/87 Revision 0 H and WEP Group No 259

7.7 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for General Group H.

7.8 "Generic Problem Analysis of Weld Examination Results from General Group H," Inspection Results and Data Analysis Summary Report, Rev. 1, August 25, 1987.

7.9 F. E. Laurent TVA Memorandum to F. C. Fogarty, "Watts Bar Nuclear Plant--Incomplete or Missing Documentation," T25 870311 882, March 11, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED ELECTRICAL SUPPORTS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER I	Page 1 of 3 Date 08/31/87 Revision 0 WEP Group No I

Approved _____ Date 9-1-87

Reviewed _____ 8/31/87 Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the Employee Concerns and/or the Quality Indicator review.

Group I was formed to assess the quality of welds within the following boundary of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Safety-related electrical support welds, fabricated and installed by TVA at WBNP-1, subsequent to February 13, 1981.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan for Group I (Reference 7.1) was developed to examine/evaluate a sample of components selected from the total population of Group I by a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group document NCIG-02 (Reference 7.2) was used.

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED ELECTRICAL SUPPORTS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER I	Page 2 of 3 Date 08/31/87 Revision 0 WEP Group No I

A plant examination of the statistically selected component welds was performed to determine the acceptability of the population. The acceptance criteria used was a visual examination in accordance with NCIG-01 (Reference 7.3) and the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance with code requirements.

5. Findings

Sixty-four components, consisting of 227 welds, were examined from the total population of Group I and the following determinations were made (Reference 7.4):

a. Fifty-three of the components examined were documented as acceptable without further evaluation.

b. The remaining 11 components were examined and documented as having 29 welds, out of a total of 48 welds, with one or more deviations that required engineering analysis to determine acceptability.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the 11 deviant components and determined that the components will perform their intended function. The DOE/WEP Suitability For Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.5).

Sixty-four components were evaluated by a review of the associated weld records and were documented as complying to code requirements.

The DOE/WEP performed a generic problem analysis of General Group I. No generic problems were identified and sample expansion or rebounding was not required (Reference 7.6).

6. Conclusions

The DOE/WEP concludes the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled population. Therefore, DOE/WEP concludes with a high degree of confidence per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED ELECTRICAL SUPPORTS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER I	Page 3 of 3 Date 08/31/87 Revision 0 WEP Group No I

7. References

7.1 WEP Assessment Plan for General Group I, "Safety-Related Electrical Supports Fabricated and Installed Subsequent to February 13, 1981," Rev. 4, October 20, 1986.

7.2 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1985.

7.3 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," NCIG-01, Rev. 2, May 7, 1985.

7.4 WEP Group I, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 13, 1987 and Inspection Result, INS 008-R0, August 13, 1987.

7.5 TVA, Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for General Group I.

7.6 "Generic Problem Analysis of Weld Examination Results From Group I," Inspection Results and Data Analysis Summary Report, Rev. 2, August 14, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED ELECTRICAL SUPPORTS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER J, EX-SPL-2 and EX-SPL-3	Page 1 of 5 Date 11/11/87 Revision 1 J, 250, and WEP Group No 251

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the Employee Concerns and/or the Quality Indicator review.

Group J was formed to assess the quality of welds within the following boundary of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Safety-related electrical supports fabricated and installed by TVA prior to February 13, 1981.

Groups 250 and 251 were formed as expansion groups in accordance with the sampling plan described in Nuclear Construction Issues Group document NCIG-02 (Reference 7.1) as a result of a generic problem analysis of Group J. The aggregate analysis of General Group J and Special Groups 202 and 225 indicated potential for a generic problem with welded electrical supports.

3. Summary

The issues for which these groups were formed were resolved by inspection/examination, document review, and engineering analysis.

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED ELECTRICAL SUPPORTS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER J, EX-SPL-2 and EX-SPL-3	Page 2 of 5 Date 11/11/87 Revision 1 J, 250, and WEP Group No 251

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plans for Groups J, 250, and 251 (Reference 7.2, 7.3, and 7.4) were developed to evaluate the sample of components selected from the total population of Group J by a random selection process. The multiple sampling plan described in NCIG-02 was used.

A plant examination of the statistically selected component welds was performed to determine the acceptability of the population. The acceptance criteria used was a visual examination in accordance with NCIG-01 (Reference 7.5) and the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance to code requirements in accordance with Standard Practice (SP) WEP 3.2.12 (Reference 7.6).

A random sample limited to cable tray clip welds was selected for evaluation, in accordance with DOE/WEP Assessment Plan No. 250. A random sample of a defined subset of the populations of Groups J, 202, and 225 was selected for evaluation in accordance with the assessment plan for Group 251.

5. Findings

Sixty-four components, consisting of 504 welds, were examined from the total population of Group J and the following determinations were made (Reference 7.7):

a. Thirty of the components examined were documented as acceptable without further evaluation.

b. The remaining 34 components were examined and documented as having 177 welds, out of a total of 380 welds, with one or more deviations that require engineering analysis to determine acceptability.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the deviant component welds and determined that the components will perform their intended function. The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.8).

The DOE/WEP performed a generic problem analysis of the aggregate examination results of Groups J, 202, and 225 due to similarity of

components. Consequently, two expansion groups were formed to evaluate potential generic problems identified during the evaluation of examination data (Reference 7.7).

The expansion, Special Groups 250 and 251, contained a total of 108 safety-related electrical supports (352 total welds) randomly selected from defined subsets of the Groups J, 202, and 225 populations. A visual examination was performed in accordance with DOE/WEP Assessment Plan Nos. 250 and 251 and the following determinations were made (Reference 7.10):

a. Sixty-eight of the components examined were documented as acceptable without further evaluation.

b. The remaining 40 components were examined and documented as having 74 welds, out of a total of 137 welds, with one or more deviations that required engineering analysis to determine acceptability.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the deviant component welds and determined that the components will perform their intended function. The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.11).

Of the 172 components evaluated by a review of the associated weld records, 170 of the documentation packages were in compliance with code requirements and 2 of the documentation packages were identified as having incomplete/missing documentation. These deviations have been identified to the TVA for resolution (Reference 7.14).

The inspection results from Groups 250 and 251 provided the basis for determining that Group J had no generic problems (Reference 7.12 and 7.13). Therefore, additional sampling or rebounding was not required.

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6. Conclusions

The DOE/WEP concludes the welds evaluated in these groups meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled populations. Therefore, DOE/WEP concludes with a high degree of

confidence, per NCIG-02, that the unsampled components within the boundaries of these groups also meet the applicable FSAR onstruction code.

7. References

7.1 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1985.

7.2 WEP Assessment Plan Group J, "Safety-Related Electrical Supports Fabricated and Installed Prior to February 13, 1981," Rev. 2, July 9, 1986.

7.3 WEP Assessment Plan No. 250, "Cable Tray Support Clip Welds," Rev. 2, October 6, 1986.

7.4 WEP Assessment Plan No. 251, "Electrical Support Welds (Excluding Cable Tray Support Clip Welds)," Rev. 1, May 18, 1987.

7.5 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," NCIG-01, Rev. 2, May 1985.

7.6 Standard Practice WEP 3.2.12, "Review of TVA Weld Operation Sheets for Code-Required Minimums," Rev 6, April 3, 1987.

7.7 WEP Group J, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 7, 1987, and Inspection Result, INS 008-R0, August 7, 1987.

7.8 TVA Suitability for Service Analysis and DOE/WEP Suitability for Service Review Summary Sheets for General Group J.

7.9 "Generic Problem Analysis of Weld Examination Results from Groups J, 202, and 225," Inspection Results and Data Analysis Summary Report, Rev. 1, August 24, 1987.

7.10 WEP Group 250 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 7, 1987, and Inspection Results, INS 008-R0, August 7, 1987. WEP Group 251, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 12, 1987 and Inspection Results, INS 008-R0, August 11, 1987.

7.11 TVA Suitability for Service Analysis and DOE/WEP Suitability for Service Review Summary Sheets for Expansion Special Groups 250 and 251.

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED ELECTRICAL SUPPORTS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER J, EX-SPL-2 and EX-SPL-3	Page 5 of 5 Date 11/11/87 Revision 1 J, 250, and WEP Group No 251

7.12 "Generic Problem Analysis of Weld Examination Results from Group 250," Inspection Results and Data Analysis Summary Report, Rev. 1, August 28, 1987.

7.13 "Generic Problem Analysis of Weld Examination Results from Group 251," Inspection Results and Data Analysis Summary Report, Rev. 1, August 28, 1987.

7.14 F. E. Laurent TVA Memorandum to F. C. Fogarty "Watts Bar Nuclear Plant--Incomplete or Missing Documentation," T25 870311 882, March 11, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED HVAC DUCT HANGER/ SUPPORT WELDS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER K	Page 1 of 3 Date 08/31/87 Revision 0 WEP Group No K

Approved [signature] Date 9-1-87

Reviewed [signature] 9-1-87 Prepared [signature]

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the Employee Concerns and/or the Quality Indicator review.

Group K was formed to assess the quality of welds within the following boundary of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Safety-related heating, ventilation, and air conditioning (HVAC) duct hanger/support welds, fabricated and installed by TVA at WBNP-1, subsequent to February 13, 1981.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, engineering analysis, and document review.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan for Group K (Reference 7.1) was developed to examine/evaluate a sample of components selected from the total population of Group K by a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group document NCIG-02 was used (Reference 7.2).

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED HVAC DUCT HANGER/ SUPPORT WELDS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER K	Page 2 of 3 Date 08/31/87 Revision 0 WEP Group No K

A plant examination of the statistically selected component welds was performed to determine the acceptability of the population. The acceptance criteria used was a visual examination in accordance with NCIG-01 (Reference 7.3) and the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance with code requirements.

5. Findings

Sixty-four components, consisting of 978 welds, were examined from the total population of Group K and the following determinations were made (Reference 7.4):

a. Forty-seven of the components examined were documented as acceptable without further evaluation.

b. The remaining 17 components were examined and documented as having 60 welds, out of a total of 403 welds, with one or more deviations that required engineering analysis to determine acceptability.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the 17 deviant components and determined that the components will perform their intended function. The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.5).

The DOE/WEP performed a generic problem analysis of the aggregate examination results of Groups K, L, and 219 due to similarity of components. No generic problems were identified and sample expansion was not required (Reference 7.6).

Sixty-four components were evaluated by a review of the associated weld records. Fifty-nine of the documentation packages were in compliance with code requirements and five of the documentation packages were identified as having incomplete/missing documentation. These deviations have been identified to TVA for resolution (Reference 7.7).

6. Conclusions

The DOE/WEP concludes the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. There are no generic problems associated with the unsampled

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED HVAC DUCT HANGER/ SUPPORT WELDS FABRICATED AND INSTALLED SUBSEQUENT TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER K	Page 3 of 3 Date 08/31/87 Revision 0 WEP Group No K

population. Therefore, DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 WEP Assessment Plan for Group K, "Safety-Related HVAC Duct Hanger/Support Welds Fabricated and Installed Subsequent to February 13, 1981," Rev. 3, September 29, 1986.

7.2 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1985.

7.3 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding At Nuclear Power Plants," NCIG-01, Rev. 2, May 7, 1985.

7.4 WEP Group K, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 13, 1987 and Inspection Result, INS 008-R0, August 13, 1987.

7.5 TVA, Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for General Group K.

7.6 "Generic Problem Analysis of Weld Examination Results From Group K, L, 219," Inspection Results and Data Analysis Summary Report, Rev. 0, August 10, 1987.

7.7 TVA Memorandum No. T25 870311 882 "Watts Bar Nuclear Plant--Incomplete or Missing Documentation," March 11, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED HVAC DUCT HANGER WELDS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER L	Page 1 of 3 Date 08/31/87 Revision 0 WEP Group No L

Approved [signature] Date 9-1-87

Reviewed [signature] 9-1-87 Prepared [signature]

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Not applicable.

2. Characterization of Issue

The purpose of weld reexamination of a general group is to determine weld quality in systems, areas, and components that may not have been identified by the Employee Concerns and/or the Quality Indicator review.

Group L was formed to assess the quality of welds within the following boundary of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Safety-related heating, ventilation, and air conditioning (HVAC) duct hanger welds, fabricated and installed by TVA at WBNP-1, prior to February 13, 1981.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, engineering analysis, and document review.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan for Group L (Reference 7.1) was developed to examine/evaluate a sample of components selected from the total population of Group L by

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED HVAC DUCT HANGER WELDS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER L	Page 2 of 3 Date 08/31/87 Revision 0 WEP Group No L

a random selection process. The multiple sampling plan described in Nuclear Construction Issues Group document NCIG-02 was used (Reference 7.2).

A plant examination of the statistically selected component welds was performed to determine the acceptability of the population. The acceptance criteria used was a visual examination in accordance with NCIG-01 (Reference 7.3) and the applicable engineering drawings. The evaluation included a review of the associated weld records to verify compliance with code requirements.

5. Findings

Sixty-four components, consisting of 1105 welds, were examined from the total population of Group L and the following determinations were made (Reference 7.4):

a. Thirty-seven of the components examined were documented as acceptable without further evaluation.

b. The remaining 27 components were examined and documented as having 100 welds, out of a total of 675 welds, with one or more deviations that required engineering analysis to determine acceptability.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the 27 deviant components and determined that the components will perform their intended function. The DOE/WEP Suitability-For-Service Evaluation Engineering (SSEE) Group reviewed the TVA SFSA and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.5).

Sixty-four components (1105 welds) were evaluated by a review of the associated weld records and were documented as complying to code requirements.

The DOE/WEP performed a generic problem analysis of the aggregate examination results of Groups K, L, and 219 due to similarity of components. No generic problems were identified and sample expansion or rebounding was not required (Reference 7.6).

6. Conclusions

The DOE/WEP concludes the welds, on the selected components evaluated in this group, meet the applicable Final Safety Analysis Report (FSAR)

WEP Closure Statement / Evaluation Report	GENERAL GROUP CLOSURE SAFETY-RELATED HVAC DUCT HANGER WELDS FABRICATED AND INSTALLED PRIOR TO FEBRUARY 13, 1981 WEP GROUP IDENTIFIER L	Page 3 of 3 Date 08/31/87 Revision 0 WEP Group No L

construction code. There are no generic problems associated with the unsampled population. Therefore, DOE/WEP concludes with a high degree of confidence, per NCIG-02, that the unsampled components within the group boundaries also meet the applicable FSAR construction code.

7. References

7.1 WEP Assessment Plan for Group L, "Safety-Related HVAC Duct Hanger Welds Fabricated and Installed Prior to February 13, 1981," Rev. 3, September 29, 1986.

7.2 Nuclear Construction Issues Group, "Sampling Plan for Visual Reinspection of Welds," NCIG-02, Rev. 0, September 27, 1985.

7.3 Nuclear Construction Issues Group, "Visual Weld Acceptance Criteria for Structural Welding at Nuclear Power Plants," NCIG-01, Rev. 2, May 7, 1985.

7.4 WEP Group L, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 13, 1987 and Inspection Result, INS 008-R0, August 13, 1987.

7.5 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for General Group L.

7.6 "Generic Problem Analysis of Weld Examination Results From Group K, L, 219," Inspection Results and Data Analysis Summary Report, Rev. 0, August 10, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN AND QUALITY INDICATOR GROUP CLOSURE SAFETY-RELATED DUCT WORK SYSTEMS WEP GROUP IDENTIFIER M & EC-SP-15	Page 1 of 3 Date 11/11/87 Revision 1 M and WEP Group No 35

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ FOR R. E. BEDFORD

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns relative to Department of Energy/Weld Evaluation Project (DOE/WEP) Group 35: PH-85-012-X03
IN-85-137-001
PH-85-012-001
IN-85-658-002

General Group M: Group M was formed to evaluate the validity and adequacy of the actions taken for the acceptance of welding on safety-related heating, ventilating, and air conditioning (HVAC) systems.

2. Characterization of Issue

In early 1981, TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1) identified problems with weld quality on their safety-related HVAC systems. In April 1981, TVA initiated a stop work order on all safety-related HVAC systems. Subsequent to the investigation of the problems, TVA initiated corrective action activities which included revision to site construction procedures for incorporation of more precise acceptance criteria for inspection and testing of welds. One of the acceptance methods incorporated was the acceptance of the subject welds made prior to August 1980, based upon review of surveillance inspection records and the results of a pneumatic leak test of the associated duct.

The employee concerns listed in Specific Group 35 identified perceived problems that could potentially affect the integrity of the welding of

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN AND QUALITY INDICATOR GROUP CLOSURE SAFETY-RELATED DUCT WORK SYSTEMS WEP GROUP IDENTIFIER M & EC-SP-15	Page 2 of 3 Date 11/11/87 Revision 1 M and WEP Group No 35

safety-related HVAC Systems. Three of the concerns identify inadequate inspections and/or lack of inspections being performed. The fourth concern identifies a possible inadequate weld procedure utilized on HVAC systems.

The DOE/WEP formed Specific Group 35 to perform an evaluation of the welds identified by the subject employee concerns. Additionally, TVA requested that DOE/WEP form a general group to evaluate the validity and adequacy of the actions taken for acceptance of welding on safety-related HVAC systems at WBNP-1.

3. Summary

The issue for which the group was formed was evaluated by document review and will be resolved upon satisfactory completion of TVA committed corrective action.

4. Evaluation Methodology

The DOE/WEP Assessment Plans for Groups M and 35 (Reference 7.2) were developed to evaluate the weld acceptance methods utilized by the TVA for safety-related HVAC duct work. If the evaluation by the DOE/WEP engineering showed the TVA's methods to be adequate, the assessment was to be closed. However, if the evaluation showed the TVA's weld acceptance program was inadequate, then the DOE/WEP was to perform an independent examination of the subject welds.

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935

When unacceptable conditions were found as a result of the evaluation, then the DOE/WEP recommended to the TVA additional recovery efforts and the required corrective action to close the issue of potentially inadequate welds.

5. Findings

The DOE/WEP engineering did not fully complete the evaluation as defined in the referenced assessment plans prior to TVA removing safety-related HVAC systems from the DOE/WEP workscope. The DOE/WEP did, however, determine that the basis for TVA's acceptance of the safety-related HVAC duct welds was inadequate. Acceptance of welds using a pneumatic test as allowed by Sheet Metal and Air Conditioning National Association (SMACNA) standard (Reference 7.3) does not establish the structural adequacy of the HVAC welds. An interim report of the evaluation activities and results, as well as the DOE/WEP recommendations to resolve the issue, are in Reference 7.4. Based on the results of the investigation the three employee concerns related to inadequate inspection and/or lack of inspection are

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935

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN AND QUALITY INDICATOR GROUP CLOSURE SAFETY-RELATED DUCT WORK SYSTEMS WEP GROUP IDENTIFIER M & EC-SP-15	Page 3 of 3 Date 11/11/87 Revision 1 M and WEP Group No 35

confirmed. The fourth concern related to the use of 7018 weld rod was not confirmed. TVA procedures allow the use of 7018 weld rod on material thicknesses of 1/16 inch.

Subsequent to their review of the draft DOE/WEP report, the TVA elected to perform a reinspection and retesting of the safety-related HVAC systems and removed the effort from the DOE/WEP workscope. The TVA provided the DOE/WEP with a summary of their corrective action plan for resolving the HVAC issue (Reference 7.5). The DOE/WEP has concurred with the TVA corrective action plan.

6. Conclusions

The issues identified in Employee Concerns PH-85-012-001, PH-85-012-X03, and IN-85-137-001 were confirmed. The issue identified in Employee Concern IN-85-658-002 was not confirmed. However, the DOE/WEP concludes that welds in the populations for these groups will meet the applicable TVA construction specification upon completion of TVA committed corrective action. DRR WEP 935

7. References

7.1 Employee Concerns PH-85-012-001, PH-85-012-X03, IN-85-658-002, and IN-85-137-001.

7.2 WEP Assessment Plan, General Group M, "Safety-Related Ductwork Systems," Rev. 0, August 4, 1986 and WEP Assessment Plan No. 035, "Lack of Inspections on Safety-Related HVAC Duct (EC-SP-15)," Rev. 1, July 17, 1986.

7.3 Sheet Metal and Air Conditioning Contractors National Association Incorporated; Low Velocity Duct Construction Standards and High Velocity Duct Construction Standards.

7.4 F. C. Fogarty letter to R. E. Kosky, "Heating, Ventilation and Air Conditioning Ducting Weld Quality Evaluation," FCF-114-87, October 30, 1987. DRR WEP 935

7.5 Corrective Action Plan Summary for Resolution of Safety-Related HVAC Ductwork Weld Quality, General Group M, July 18, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CRACKED WELDS IN UNIT-1 PIPE WHIP RESTRAINTS IN THE NORTH VALVE ROOM WEP GROUP IDENTIFIER EC-SP-1	Page 1 of 3 Date 11/16/87 Revision 2 WEP Group No 001

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____
FOR A.K. BRADFORD

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-86-297-001.

2. Characterization of Issue

The Concerned Individual (CI) initiated an employee concern which states: "In the North Valve Room of Unit 1, on the large pipe whip restraints, approximately 1983, there were several welds that were cracked. CI was laid off before the welds were repaired."

This group was formed specifically to determine if the welds identified by the concerned individual had been reinspected for linear indications and reworked after his termination in March 1983.

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

The Department of Energy Weld Evaluation Project (DOE/WEP) Assessment Plan 001 (Reference 7.2) required a review of documentation associated with nonconformance reports (NCRs) for the four areas in the North Valve Room in question. If the documentation review concluded that the welds were reworked, reinspected, and found acceptable after the date of the concern, this group could be closed.

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Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CRACKED WELDS IN UNIT-1 PIPE WHIP RESTRAINTS IN THE NORTH VALVE ROOM WEP GROUP IDENTIFIER EC-SP-1	Page 2 of 3 Date 11/16/87 Revision 2 WEP Group No 001

5. Findings

The DOE/WEP requested (Reference 7.3) that the Quality Technology Company (QTC) contact the CI in an effort to locate the problem welds. In response to the request of the DOE/WEP, the CI, through the QTC (Reference 7.4), furnished drawings with the areas containing the welds of concern highlighted. Drawing numbers are 48W1708-03 Revision 14 and 48W1708-04 Revision 13 (Reference 7.5). The DOE/WEP also requested that QTC determine the termination date of the concerned individual. This date was reported as being March 23, 1983 (Reference 7.4). DRR WEP 976

Upon request from the DOE/WEP, the TVA Weld Task Group supplied a documentation package which contained the reinspection and rework records for the welds identified by the CI. The repair and reinspection was accomplished in November and December 1983 (NCR 4753) and the first three months of 1984 (NCR 5561).

NCR 4753 (Reference 7.6) consisted of a general inspection of all welds in the whip restraints located in the North Valve Room. Both ultrasonic and visual examinations were performed on the partial penetration and full penetration welds. This would identify surface and subsurface cracking. Visual examination was performed in the fillet welds. Repair of the welds consisted of grinding out and repairing defective full and partial penetration welds and, in some cases, supplementing with fillet welds. All of these cases were documented by drawing changes.

Repair of fillet weld defects, which were principally undersized, consisted of filling out the welds to the specified size, then visually inspecting the repair weld.

NCR 5561 (Reference 7.7) consisted of verification of proper backgouging on bevel welds and filling out the fillet welds to proper size. Another major effort was to verify that engineering had reviewed weld configuration changes and that changes in weld configuration had been incorporated on the drawings.

The result of the effort related to these two NCRs was reinspection, rework and reverification of weld documentation on the pipe whip restraints in this area.

The NCRs and associated inspection records for the welds in the area identified by the CI were reviewed. The records indicated that the welds were repaired, reinspected, and accepted in accordance with

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CRACKED WELDS IN UNIT-1 PIPE WHIP RESTRAINTS IN THE NORTH VALVE ROOM WEP GROUP IDENTIFIER EC-SP-1	Page 3 of 3 Date 11/16/87 Revision 2 WEP Group No 001

procedural and specification requirements. The welding was performed to TVA's General Construction Specification G-29C (Reference 7.8).

6. Conclusions

The issue identified in the Employee Concern was confirmed. However, review of the documentation associated with the NCRs confirmed that the welds in the areas in question were inspected, reworked, reinspected and accepted subsequent to the CI terminating TVA employment. DRR WEP 976

7. References

7.1 Employee Concern IN-86-297-001.

7.2 WEP Assessment Plan No. 001, "Cracked Welds in Unit-1 Pipe Whip Restraints in the North Valve Room (EC-SP-1)," Rev. 0, March 28, 1986.

7.3 Letter K. G. Therp to Scott Schum, Workmanship/Specific Weld Problems, KGT-30-86, dated January 29, 1986.

7.4 QTC Response Sheet, File Number 1059, dated March 12, 1986.

7.5. Drawings 48W1708-03 (Rev. 14) and 48W1708-04 (Rev. 13).

7.6 Tennessee Valley Authority Nonconformance Report 4753.

7.7 Tennessee Valley Authority Nonconformance Report 5561.

7.8 Tennessee Valley Authority General Construction Specification G-29C, Process Specification 3.C.5.2(R2), Paragraph 4.4.1, March 7, 1983.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSUFFICIENT WELD MATERIAL WEP GROUP IDENTIFIER EC-SP-2	Page 1 of 3 Date 11/16/87 Revision 2 WEP Group No. 002

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.2.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-86-093-001.

2. Characterization of Issue

Employee Concern IN-86-093-001 identified fire protection weld-o-let(s) having insufficient weld(s) on the header pipe to the weld-o-let(s). This condition is in the control building stairway to the southeast office by the spreader room of Watts Bar Nuclear Plant Unit 1 (WBNP-1), as shown in Tennessee Valley Authority (TVA) drawing 47W491-23,R9 (Reference 7.2).

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3. Summary

The issue for which the group was formed was resolved by visual examination and engineering analysis.

4. Evaluation Methodology

Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan 002 (Reference 7.3) was developed to evaluate the identified fire protection weld-o-let(s). The DOE/WEP method used to evaluate Employee Concern IN-86-093-001 consisted of the following:

a. A 100% visual examination was performed in accordance with DOE/WEP Standard Practice (SP) WEP 3.2.3, Appendix A (Reference 7.4).

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSUFFICIENT WELD MATERIAL WEP GROUP IDENTIFIER EC-SP-2	Page 2 of 3 Date 11/16/87 Revision 2 WEP Group No. 002

b. All deviant conditions identified were reported in accordance with SP WEP 3.2.2 (Reference 7.5).

Any deviant conditions found as a result of this examination were reviewed in conjunction with TVA Engineering Design for resolution.

5. Findings

The DOE/WEP visual examination of the identified welds determined the following:

a. Examination Package 002-0001 (Reference 7.6): weld spatter, numerous arc strikes, and underfill as documented in DOE/WEP Deviation Report (DR) 002-0001 (Reference 7.7).

b. Examination Package 002-0002 (Reference 7.6): numerous arc strikes and underfill as documented in DOE/WEP Deviation Report (DR) 002-0002 (Reference 7.6).

Details of the examination results are listed in Reference 7.8. The results of these examinations were documented in the DOE/WEP Deviation Reports and forwarded to TVA Engineering Design for resolution. TVA's evaluation determined that the identified discrepancies will not affect the intended safety function of these components. Therefore, TVA established that the associated welds are acceptable and in compliance with ANSI (American National Standards Institute) B31.1 (Reference 7.9).

The DOE/WEP Suitability for Service Evaluation Engineering group performed a review of the TVA engineering analysis (Reference 7.10) and determined that the conditions identified have been demonstrated by appropriate evaluations to be in compliance with the requirements of ANSI B31.1.

DRR WEP 977

6. Conclusions

The conditions identified by the employee concern were confirmed. However, the DOE/WEP concludes that the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 Employee Concern IN-86-093-001.

7.2 TVA Drawing 47W491-23, Rev. 9.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE INSUFFICIENT WELD MATERIAL WEP GROUP IDENTIFIER EC-SP-2	Page 3 of 3 Date 11/16/87 Revision 2 WEP Group No. 002

7.3 WEP Assessment Plan No. 002, "Insufficient Weld Material," Rev. 1, June 11, 1986.

7.4 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Appendix A, Rev. 18, Date June 2, 1987.

7.5 Standard Practice WEP 3.2.2 "Reporting Deviations to TVA," Rev. 7, November 17, 1986.

7.6 DOE/WEP Examination Package 002-0001 and 002-0002.

7.7 DOE/WEP Group 002 Deviation Reports (DR) 002-0001, July 8, 1986, and 002-0002, July 8, 1986.

7.8 WEP Group 002 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 10, 1987, and Inspection Result, INS 008-R0, August 10, 1987.

7.9 The American Society of Mechanical Engineers, "Power Piping," ANSI B31.1, June 5, 1973, with Summer 1973 Addenda.

7.10 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for Group 002.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SOUTH VALVE ROOM STRUCTURAL WELDS--SUBSURFACE DEFECTS WEP GROUP IDENTIFIER EC-SP-3	Page 1 of 4 Date 11/16/87 Revision 1 WEP Group No 003

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-86-032-001.

2. Characterization of Issue

The Employee Concern regarding the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) stated the following three concerns: (1) "The structural steel in the South Valve Room (SVR) Unit 1 has defective welds. (2) Beam at A1-K, 733 foot 10 inch is mislocated on embed plate. D13 detail Drawing 48W1707-13. (3) Welds on beam at A15-K 733 foot 10 inch have carbon arc slag imbedded in them. B18 Detail Drawing 48W1707-18. CI has no further information. Construction Department Concern."

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The TVA General Welding Procedures Specification G-29C (Reference 7.2) states that, "Prior to welding over previously deposited weld metal, all slag shall be removed and the weld and adjacent base metal shall be wire brushed. This requirement shall apply not only to successive layers but also to individual passes and to the weld crater area when welding is resumed after any interruption . . ."

3. Summary

The issue for which this group was formed was resolved by inspection/examination, document review, and engineering analysis.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SOUTH VALVE ROOM STRUCTURAL WELDS--SUBSURFACE DEFECTS WEP GROUP IDENTIFIER EC-SP-3	Page 2 of 4 Date 11/16/87 Revision 1 WEP Group No 003

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 003 (Reference 7.3) was developed to perform a document review and examine the subject welds.

The first concern referencing defective welds on structural steel in the South Valve Room (SVR) in WBNP-1 was addressed by DOE/WEP Groups D/260, E, and 214.

The second concern referencing a beam mislocated on an embedded plate was addressed by the Quality Technology Company (QTC) (Reference 7.4).

The third concern referencing welds on a beam with carbon arc slag, located at A15-line and K-line was addressed, in accordance with the assessment plan for this group, by 100% visual (VT) and ultrasonic (UT) examinations of the subject welds. These welds were only required to be VT examined by the original code. However, UT examinations were performed to establish if deviations were present. Because UT was not part of the original acceptance criteria, the extent of deviations, if present, were to be established so that engineering evaluation could determine if the welds are acceptable.

5. Findings

The first concern did not reference specific welds; therefore, the DOE/WEP used the results given in WEP closure statements for Groups D/260, 214, and E to address the concern.

For the second concern, the DOE/WEP reviewed the Employee Response Team (ERT) Investigation Report prepared by QTC, and found that the beam referenced by the concerned individual (CI) was installed correctly. The DOE/WEP performed an engineering walk down and concurred with QTC's verification that the beam was installed correctly.

For the third concern, the DOE/WEP determined that the CI was referencing four welds (Nos. 48W1707-18-7A, 48W1707-18-7B, 48W1707-18-8A, and 48W1707-18-8B). The correct coordinate per the ERT Investigation Report is the intersection of 15-line and L-line, 733 ft-10 in. elevation.

Two of the four welds, weld Nos. 48W1707-18-8A (QTC Weld No. 3) and 48W1707-18-8B (QTC Weld No. 4) (References 7.5 and 7.6) were UT examined and found rejectable by Industrial Laboratories Inc. (ILI) (Reference 7.7) prior to the DOE/WEP formulating Group 003. Because

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WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SOUTH VALVE ROOM STRUCTURAL WELDS--SUBSURFACE DEFECTS WEP GROUP IDENTIFIER EC-SP-3	Page 3 of 4 Date 11/16/87 Revision 1 WEP Group No 003

these two rejectable welds were reported to TVA as part of the ERT Investigation Report, they were removed from the WEP scope and were not reexamined by the DOE/WEP. Evaluation of examination results reported by ILI on these two welds will be resolved per TVA Corrective Action Tracking Document (CATD) No. 50400-W8N-11 (Reference 7.8). DRR WEP 978

The two remaining welds, Nos. 48W1707-18-7A and 48W1707-18-7B, are full penetration groove welds. The DOE/WEP performed VT and UT examinations on these welds, and found them to contain conditions that required engineering analysis to determine acceptability.

Through a VT examination, the DOE/WEP found weld No. 48W1707-18-7A to be partially inaccessible. This condition was reported to the TVA for suitability-for-service analysis (SFSA) (Reference 7.9). The TVA took credit in its engineering calculations for only the accessible portion of the weld joint and found the weld suitable for service. The DOE/WEP reviewed the TVA engineering calculations and concurred with the results. The results of the UT examination of this weld performed by the DOE/WEP indicated the weld was acceptable.

Through a VT examination, the DOE/WEP found weld No. 48W1707-18-7B to contain porosity, and this condition was reported as deviant to the TVA. The TVA took the technical position, with the concurrence of the DOE/WEP, that, in amounts up to 5% of weld volume, porosity 1/16-in. or less in diameter observed in welds receiving only VT examination would be considered as not affecting SFSA (Reference 7.10). The UT examination on this weld performed by the DOE/WEP was acceptable. DRR WEP 978

Welds 48W1707-18-7A and 48W1707-18-7B are two flange welds located at the same structural connection. The DOE/WEP also performed VT inspection of the associated fillet welds on the web of this connection. These fillet welds were not in the original inspection scope, but the results of inspection of these welds were required to perform stress analysis as part of the SFSA cited above (Reference 7.9).

6. Conclusions

The conditions identified by visual examination in the first concern were not confirmed. The conditions identified in the second and third concerns were also not confirmed. The DOE/WEP concludes that the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SOUTH VALVE ROOM STRUCTURAL WELDS--SUBSURFACE DEFECTS WEP GROUP IDENTIFIER EC-SP-3	Page 4 of 4 Date 11/16/87 Revision 1 WEP Group No 003

7. References

7.1 Employee Concern IN-86-032-001.

7.2 TVA General Welding Procedures Specification G-29C, Process Specification 1.C.1.2, Rev. 2, Paragraph 11.1.6.

7.3 WEP Assessment Plan No. 003, "South Valve Room Structural Welds--Subsurface Defects," Rev. 6, August 3, 1987.

7.4 Employee Response Team Investigation Report, Material/Welding Problems Identified in the South Valve Room, performed by Ray Chappell, March 6, 1986.

7.5 TVA Weld Sheet 48W1707-18-8A (QTC Weld No. 3).

7.6 TVA Weld Sheet 48W1707-18-8B (QTC Weld No. 4).

7.7 Industrial Laboratories, Inc., Ultrasonic Inspection Reports No. 1 through 19, IL/Inc. Job No. 452329, November 22, 1985 through November 29, 1985.

7.8 TVA Corrective Action Tracking Document No. 50400-W8N-11.

7.9 TVA Suitability-for-Service Analyses and WEP Suitability-for-Service Review Summary Sheets for Group 003.

7.10 T. L. Bridges letter to K. G. Therp, "Disposition of Weld Spatter, Arc Strike, Crater Cracks, Porosity, and Overlap Weld Discrepancies," TLB-05-86, EG&G Idaho, Inc., June 30, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY RELATED BOX ANCHOR WITH SLUGGED SEAM WELD WEP GROUP IDENTIFIER EC-SP-4	Page 1 of 3 Date 11/16/87 Revision 3 WEP Group No 004

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern WI-85-035-004.

2. Characterization of Issue

The employee concern stated the following for welds on a box anchor at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1): Welding on a box anchor at Elevation 737' 0" Auxiliary Building on the Essential Raw Cooling Water (ERCW) line. A seam weld running along the length of a structural box anchor was slugged with a 1/2-inch or 5/8-inch diameter piece of rebar and then covered with weld filler metal. DRR WEP 979

The TVA General Welding Procedures Specification G-29C, Process Specification 1.C.1.2, Revision A, Paragraph 11.1.11 (Reference 7.2) states that, "Caulking or slugging of welds shall not be permitted."

As defined in Reference 7.3, slugging is the act c adding a separate piece or pieces of material in a joint before or during welding that results in a welded joint not complying with design, drawing, or specification requirements.

3. Summary

The issue for which the group was formed was resolved by document review, inspection/examination, and engineering evaluation. DRR WEP 979

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY RELATED BOX ANCHOR WITH SLUGGED SEAM WELD WEP GROUP IDENTIFIER EC-SP-4	Page 2 of 3 Date 11/16/87 Revision 3 WEP Group No 004

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 004 (Reference 7.4) was developed to perform a 100% visual (VT) examination and ultrasonic (UT) examination of the subject welds.

5. Findings

The DOE/WEP Employee Concern-Quality Indicator Assessment (EC-QIA) group, in advance of the weld inspection, performed a thorough review of the TVA design isometric drawings to identify all the box anchor supports located in the Auxiliary Building, on the ERCW System (System 67), at the 737 ft elevation. All the box anchor design and construction drawings were also reviewed. These drawings provided the DOE/WEP EC-QIA group with the current "as constructed" condition. The designs were studied to evaluate the feasibility of slugging box anchor seam welds on structural tube steel with a 1/2-inch or 5/8-inch diameter rebar in the seam joint. Typical TVA box anchor designs, constructed of tube steel, are listed on WBNP Drawing 47B100-2 (Reference 7.5).

A DOE/WEP EC-QIA group review of the ERCW isometric drawings determined that a total of 10 structural box anchor supports unique to that system, existed between the 737 ft floor elevation and the 755 ft ceiling elevation in the Auxiliary Building at WBNP-1. Through the process of elimination, the DOE/WEP examined two of these box anchors. The remaining eight box anchors were eliminated from the investigation, through a field walkdown by the DOE/WEP EC-QIA group, for the following reasons: two were found to be in the WBNP Unit 2; three were found to contain no seam welds; and the last three were established by a review of drawings to contain no seam welds and were completely embedded in concrete.

The two box anchor designs that were reviewed, P/Ns 47A060-67-24 and 47A060-67-75, had seam joint weld prep bevels large enough to sustain a 1/2-inch or 5/8-inch diameter rebar within the weld envelope (Reference 7.6). A UT examination performed by the DOE/WEP on the seam welds of box anchor assembly P/N 47A060-67-24 identified a lack of fusion at the root, a condition not related to slugging. There was no evidence of slugging. A UT examination on the seam welds of box anchor assembly P/N 47A060-67-75 indicated no rejectable indications (Reference 7.7).

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY RELATED BOX ANCHOR WITH SLUGGED SEAM WELD WEP GROUP IDENTIFIER EC-SP-4	Page 3 of 3 Date 11/16/87 Revision 3 WEP Group No 004

6. Conclusions

The condition identified in the employee concern was not confirmed. The DOE/WEP concludes that the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

DRR WEP 979

7. References

7.1 Employee Concern WI-85-035-004.

7.2 TVA General Welding Procedures Specification G-29C, Process Specification 1.C.1.2 Rev. A, Paragraph 11.1.11.

7.3 American Welding Society (AWS), Welding Handbook, 7th Edition, Vol. 1, Fundamentals of Welding, 1976, p. 316.

7.4 WEP Assessment Plan No. 004, "Safety Related Box Anchor with Slugged Seam Weld," Rev. 4, August 21, 1986.

7.5 TVA Seismic Category I Structures Drawing No. 47B100-2, Rev. 6.

7.6 R. S. Seigler notegram to A. E. Bradford, "Employee Concern WI-85-035-004/06B42/6.C," EG&G Idaho, Inc., April 15, 1986.

7.7 WEP Group 004 Inspection Data Report on Weld Evaluation Project, INS-101-R1, August 14, 1987, and Inspection Result, INS 008-R0, August 14, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BURIED SAFETY-RELATED WELDS WEP GROUP IDENTIFIER EC-SP-5	Page 1 of 3 Date 11/23/87 Revision 3 WEP Group No 005

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-86-155-003.

2. Characterization of Issue

Employee Concern IN-86-155-003 identified safety-related pipe buried, beneath the Reactor Building of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1), without documentation for acceptance of welds.

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At DOE/WEP's request, the concerned individual provided additional information through Quality Technology Company (QTC) regarding the employee concern. There are three specific, safety-related systems, all of which were welded by TVA, associated with this concern. The three systems are: System 1 (main steam), System 3 (main and auxiliary feed water) and System 7 (turbine extraction traps and drains).

3. Summary

The issue for which this group was formed was resolved by document review.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan 005 (Reference 7.2) was developed to evaluate weld acceptance documentation of the safety-related systems buried beneath the WBNP-1

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BURIED SAFETY-RELATED WELDS WEP GROUP IDENTIFIER EC-SP-5	Page 2 of 3 Date 11/23/87 Revision 3 WEP Group No 005

Reactor Building. The DOE/WEP requested that Quality Technology Company (QTC) contact the concerned individual and determine the system numbers that were in question (Reference 7.3). The DOE/WEP performed an engineering review to determine if the systems identified were safety-related and buried beneath the Unit 1 Reactor Building and then performed a 100% document review of inspection records for the welds in those systems, to ensure the required weld acceptance documentation was on record.

If the concerned individual had identified safety-related systems that were buried beneath the Unit 1 Reactor Building and the documentation review concluded that required documentation was on record, or if the concerned individual did not identify the safety-related systems of concern, this group would be closed.

DRR WEP 980

5. Findings

The DOE/WEP requested the TVA (via notegram dated March 13, 1986) to supply the DOE/WEP with complete weld history records (Operation Sheets, NDE Data Sheets, etc.) for the welds of the three specific systems identified, which are safety-related and buried beneath the Unit 1 Reactor Building (Reference 7.5). The TVA responded that System 1 and 3 have no buried piping or welds, and System 7 contains no safety-related welds.

The DOE/WEP performed an independent review of the associated TVA drawings for the identified systems and established that System 1 and 3 have no buried pipe/welds and that System 7 is not safety-related, which confirms TVA's evaluation.

6. Conclusions

The DOE/WEP concludes that the employee concern was not valid and did not warrant further investigation.

7. References

7.1 Employee Concern IN-86-155-003.

7.2 WEP Assessment Plan No. 005, "Buried Safety-Related Welds," Rev. 1, March 27, 1987.

7.3 K. G. Therp letter to Mr. Owen Thero, Quality Technology Company, "Inspector Qualification and Certification Related Employee Concerns," KGT-44-86, EG&G Idaho, Inc., dated February 26, 1986.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE BURIED SAFETY-RELATED WELDS WEP GROUP IDENTIFIER EC-SP-5	Page 3 of 3 Date 11/23/87 Revision 3 WEP Group No 005

7.4 QTC response form File Number 1005, February 26, 1986.

7.5 R. J. Roberts notegram to Steve Stagnolia, "Data on Buried Pipe (IN-86-155-003) Employee Concern," EG&G Idaho, Inc., dated March 13, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE REDUCED WALL THICKNESS IN ATTACHMENT WELDS, STAINLESS STEEL PIPE-TO-RHR PUMPS WEP GROUP IDENTIFIER EC-SP-6	Page 1 of 5 Date 11/16/87 Revision 3 WEP Group No 006

Approved _____ Date 11-27-87

Reviewed _____ Prepared David Parks

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-85-299-003.

2. Characterization of Issue

This concern pertains to 13 welds in the stainless steel piping of the Residual Heat Removal (RHR) systems at elevation 692 feet in the Auxiliary Building of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant, Unit 1 (WBNP-1). The Employee Concern stated that welds appear to have excessive metal removed at butt weld connections.

The Concerned Individual (CI), in response to an EG&G inquiry through the Quality Technology Company (QTC) for any additional information and clarification, stated that similar problems also exist in a 10-inch line at elevation 692 feet on the south wall of Unit 2; however, the Unit 2 problem will not be addressed by Department of Energy/Weld Evaluation Project (DOE/WEP) because the work scope for weld evaluation applied to Unit 1 only.

3. Summary

The issue for which this group was formed was resolved by inspection/examination, review of TVA's original radiographics, and engineering analysis.

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WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE REDUCED WALL THICKNESS IN ATTACHMENT WELDS, STAINLESS STEEL PIPE-TO-RHR PUMPS WEP GROUP IDENTIFIER EC-SP-6	Page 2 of 5 Date 11/16/87 Revision 3 WEP Group No 006

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 006 (Reference 7.2) was developed to perform a 100% examination of this specific group, in accordance with Standard Practice (SP) WEP 3.1.3, Appendix A, paragraph 4a (Reference 7.3). This group was initially bounded to a total of 13 welds in the 14-inch stainless steel piping attached to the two Unit 1 RHR pumps, Numbers 1A-A and 1B-B. A walkdown by the DOE/WEP and further investigation determined that 11 of the 13 welds were performed by vendors on subcontract to TVA during the fabrication of piping subassemblies. These 11 welds were subsequently excluded from the group as the DOE/WEP work scope addressed only welds made by the TVA. The remaining two welds were welds RHRF-D046-4 and RHRF-D046-10. These welds join 14-inch diameter, Schedule 40 stainless steel pipe to the two RHR pumps at elevation 692 feet in the Auxiliary Building of Unit 1.

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981

Examinations and data collections were performed on welds RHRF-D046-4 and RHRF-D046-10 in this group as follows:

a. Visual Examination (VT)--DOE/WEP examination using Form WEP 302, "Visual Examination Record for ASME/ANSI Welds" (Attachment 1) and the acceptance criteria of Appendix A to SP WEP 3.2.3 (Reference 7.4).

b. Radiographic (RT) Data Collection--DOE/WEP review of TVA original RT film using Form WEP 311 "Radiographic Examination Checklist," shown in SP WEP 3.2.6 (Reference 7.5) and Form WEP 3.3.1, "RT Data Collection Sheet," shown in SP WEP 3.2.13 (Reference 7.6).

c. Ultrasonic Test (UT)--DOE/WEP examination using the VT Form WEP 302, to record minimum section thickness as measured by UT methods defined by SP WEP 3.2.9, "ASME/ANSI Ultrasonic Examination and Acceptance Criteria," and the acceptance criteria in Appendix D (Reference 7.7).

5. Findings

Results of the DOE/WEP VT examination, UT examination, and review of TVA original RT film for RHR System welds RHRF-D046-4 and RHRF-D046-10 are contained in Examination Packages 006-0008 and 006-0015, respectively (References 7.8 and 7.9).

The VT examination determined that both of the welds examined are acceptable in all 14 of the attributes that were examined. The results of this examination are presented on page 3A of each of the examination packages.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE REDUCED WALL THICKNESS IN ATTACHMENT WELDS, STAINLESS STEEL PIPE-TO-RHR PUMPS WEP GROUP IDENTIFIER EC-SP-6	Page 3 of 5 Date 11/16/87 Revision 3 WEP Group No 006

The DOE/WEP review of the TVA original RT film addressed all of the data pertinent to radiographic examination of the two welds. The data are summarized on the "Radiographic Examination Checklist" and the "RT Data Collection Sheet," pages 4 and 4A of each examination package. The RT film views and examination data found by the DOE/WEP indicated acceptable quality for both welds. DRR WEP 981

The UT examination performed by the DOE/WEP verified acceptable thicknesses in the welds and the piping elbows (base material) adjacent to each of the welds. The minimum thickness of weld RHRF-D046-4 and adjacent elbow was found to be 0.500 and 0.533 inch, respectively. The minimum thickness of weld RHRF-D046-10 and corresponding elbow was found to be 0.468 and 0.515 inch, respectively. The measured thicknesses in all instances exceed the nominal pipe wall of 0.438 inch (and 0.383 inch minimum, based on ±12.5% manufacturing tolerance) for 14-inch, Schedule 40 pipe, which was the minimum DOE/WEP acceptance level. The UT examination data are presented on page 5A of each of the examination packages.

The configuration of the nozzle on each of the RHR pumps prevents a determination of nozzle wall thickness adjacent to the welds because of inaccessibility for UT examination techniques. Because it was not possible to obtain a UT measurement of nozzle wall thickness during the DOE/WEP UT examination, Deviation Reports DR 006-0008 and DR 006-0015 (References 7.10 and 7.11) were prepared by the DOE/WEP to document the inaccessible conditions of welds RHRF-D046-4 and RHRF-D046-10 as items requiring engineering analysis to determine acceptability. The SFS evaluations were prepared by the TVA as a basis for acceptance of the RHR pump nozzles (wall thickness) without the UT thickness verification. As stated in the TVA SFS reports, the nozzle is vendor supplied as part of the pump assembly. The SFS reports further state that nominal minimum section thickness, based on the manufacturer's information, is 0.649 inch. The reports also stated that a 0.649-inch nozzle wall thickness is well above the nominal wall of 0.438 inch (and 0.383 inch minimum) for 14-inch, Schedule 40 pipe, which was the DOE/WEP examination criterion for acceptance on the adjacent piping, and that there is no reason to suspect a nozzle minimum wall violation. The SFS reports were reviewed and approved (Reference 7.12 and 7.13) by the DOE/WEP with a concurrence that the "as-built" conditions are acceptable as recorded on Form WEP 324 in accordance with DOE/WEP SP 3.3.1 (Reference 7.14). DRR WEP 981

The TVA Weld Operation Sheet (WOS) for each of the two welds, included as page 7 in each of the examination packages, was reviewed by the DOE/WEP to verify that the welding procedure, welder, filler metal

type, and NDE report numbers are indicated. The WOS for each weld contained the required information, as shown by DOE/WEP approvals on the WOS Review Checklist, included as page 6 in each examination package.

6. Conclusions

The conditions identified in the employeee concern were not confirmed. The DOE/WEP concludes that both welds evaluated in conjunction with this group meet the Final Safety Analysis Report (FSAR) construction code.

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981

7. References

7.1 Employee Concern IN-85-299-003.

7.2 WEP Assessment Plan No. 006, "Reduced Wall Thickness (EC-SP-6)," Rev. 6, August 12, 1986.

7.3 Standard Practice WEP 3.1.3, "Establishing Homogeneous Groups and Boundaries," Rev. 8, December 18, 1986.

7.4 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987, and Form 302, "Visual Examination Record for ASME/ANSI Welds."

7.5 Standard Practice WEP 3.2.6, "Radiographic Examination Methods and Acceptance Criteria," Rev. 0, August 9, 1986, and Form 311, "Radiographic Examination Checklist."

7.6 Standard Practice WEP 3.2.13, "Examination of Welds Requiring Radiography," Rev. 0, July 19, 1986, and Form 331, "RT Data Collection Sheet."

7.7 Standard Practice WEP 3.2.9, "ASME/ANSI Ultrasonic Examination and Acceptance Criteria," Rev. 0, July 29, 1986.

7.8 DOE/WEP Examination Package 006-0008.

7.9 DOE/WEP Examination Package 006-0015.

7.10 WEP Examination Package-Related Deviation Report, Form 313, Report No. DR 006-0008.

7.11 WEP Examination Package-Related Deviation Report, Form 313, Report No. DR 006-0015.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE REDUCED WALL THICKNESS IN ATTACHMENT WELDS, STAINLESS STEEL PIPE-TO-RHR PUMPS WEP GROUP IDENTIFIER EC-SP-6	Page 5 of 5 Date 11/16/87 Revision 3 WEP Group No 006

7.12 WEP Suitability For Service Review Summary Sheet for Analysis Package 006-0008.

7.13 WEP Suitability For Service Review Summary Sheet for Analysis Package 006-0015.

7.14 Standard Practice WEP 3.3.1, "Suitability-for-Service Evaluation Review," Rev. 8, June 8, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE 18-INCH DIAMETER CARBON STEEL PIPE LOCATED IN THE REACTOR BUILDING AT THE 713-FOOT ELEVATION NEAR THE PERSONNEL/EQUIPMENT HATCH WEP GROUP IDENTIFIER EC-SP-7	Page 1 of 3 Date 11/16/87 Revision 3 WEP Group No 007

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-85-080-001.

2. Characterization of Issue

The Employee Concern IN-85-080-001 stated a problem in which an 18-inch diameter carbon steel pipe located in the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) Reactor Building near the personnel hatch had arc strikes that were left unrepaired. The TVA General Construction Specification G29M (Reference 7.2) states that, "all welds and adjacent base material where applicable shall be free of cracks, overlap and undercut in excess . . . weld spatter, and arc strikes."

3. Summary

The issue for which the group was formed was resolved by document review and field verification.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 007 (Reference 7.3) was developed to perform a 100% examination of the subject 18-inch diameter carbon steel pipe in the area noted by the employee concern.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE 18-INCH DIAMETER CARBON STEEL PIPE LOCATED IN THE REACTOR BUILDING AT THE 713-FOOT ELEVATION NEAR THE PERSONNEL/EQUIPMENT HATCH WEP GROUP IDENTIFIER EC-SP-7	Page 2 of 3 Date 11/16/87 Revision 3 WEP Group No 007

5. Findings

During a DOE/WEP preliminary engineering evaluation, it was determined that the weld examination was inappropriate, because the pipe was temporary, and that a system walk down and drawing review would satisfactorily address this issue.

The DOE/WEP performed an investigation that included:

a. Walk downs of all areas around the personnel hatch in an attempt to locate an 18-inch diameter pipe in WBNP-1.

b. Reviews of piping drawings and composite drawings to determine whether any pipe with an 18-inch diameter exists in the area around the personnel hatch.

Through discussions with TVA construction personnel, it was learned that during July 1983, a 14-inch diameter temporary line was located near the personnel hatch in WBNP-1. This pipe was used to supply raw cooling water to the Reactor Building coolers. Additionally, a 14-inch diameter carbon steel pipe is now installed in WBNP-2 for the same purpose, and it will be removed following completion of Unit 2 construction. The TVA Welding Task Group (WTG) also performed a thorough investigation and could not locate in the area of concern, in WBNP-1, an 18-inch diameter carbon steel line (Reference 7.4).

The DOE/WEP concluded after a review of the information pertaining to this employee concern, including findings and information obtained from the Welding Task Group (WTG), that this concern could not be verified, because no 18-inch or comparable-size pipe could be located within the vicinity of the personnel hatch in WBNP-1.

6. Conclusions

The issue identified in the employee concern was not confirmed. The DOE/WEP concludes that the Concerned Individual (CI) was either referencing an arc strike on a temporary 14-inch diameter line located in WBNP-1, which was subsequently removed, or was referencing a 14-inch diameter temporary line installed in WBNP-2, which will be removed following the completion of construction.

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982

7. References

7.1 Employee Concern IN-85-080-001.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE 18-INCH DIAMETER CARBON STEEL PIPE LOCATED IN THE REACTOR BUILDING AT THE 713-FOOT ELEVATION NEAR THE PERSONNEL/EQUIPMENT HATCH WEP GROUP IDENTIFIER EC-SP-7	Page 3 of 3 Date 11/16/87 Revision 3 WEP Group No 007

7.2 TVA, General Construction Specification G29M, "Process Specification 3.M.5.1," Rev. 6, Part B, Section B.1.1.

7.3 WEP Assessment Plan No. 007, "Justification to Close Specific Group 07," Rev. 1, April 6, 1987.

7.4 Guenter Wadewitz, TVA Memorandum C24 860326001, to K. G. Therp, March 26, 1986.

7.5 H. Richardson notegram to A. E. Bradford, "Watts Bar Nuclear Plant--Employee Concern IN-85-080-001," EG&G Idaho, Inc., April 8, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNREPAIRED ARC STRIKE WEP GROUP IDENTIFIER EC-SP-8	Page 1 of 3 Date 11/16/87 Revision 2 WEP Group No 008

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ for A.E. Bernard

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-85-460-X04.

2. Characterization of Issue

The Employee Concern (EC) states that there is an arc strike 2 x 3/16 inch in the Class C line of System 78 (Spent Fuel Pit Cooling) in the Auxiliary Building, Unit 1, Elevation 732 ft at the A7 and V or U wall. While the arc strike itself is not a violation of the Final Safety Analysis Report (FSAR) construction code (Reference 7.2), it is a deviation from TVA specification G-29C (Reference 7.3). DOE/WEP was concerned that it might not have been evaluated for cracking or significant material thickness reduction, which would violate the code.

3. Summary

The issue for which this group was formed was resolved by inspection/examination and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 008 (Reference 7.4) was developed to perform a thorough examination of the subject piping at the specified location. All unrepaired arc strikes were evaluated to ensure that the structural integrity of the pipe wall is not in question.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNREPAIRED ARC STRIKE WEP GROUP IDENTIFIER EC-SP-8	Page 2 of 3 Date 11/16/87 Revision 2 WEP Group No 008

The evaluation included a visual (VT) examination of the pipe surfaces for arc strikes, in accordance with Appendix A of Standard Practice (SP) WEP 3.2.3 (Reference 7.5), and an ultrasonic thickness (UT) examination of all arc strikes and/or excavated areas that could possibly violate minimum wall requirements, in accordance with SP WEP 3.2.8 (Reference 7.6).

5. Findings

The System 78 piping located at the elevation and area identified by the concerned individual (CI) consisted of approximately 22 ft of 3-in. piping, 2-1/2 ft of 8-in. piping, and 36 ft of 10-in. piping. The surface of each pipe section was visually examined and a total of 53 arc strikes were identified (Reference 7.7). There were two arc strikes identified that were as large or slightly larger than the size given by the CI. All of the identified arc strikes had no measurable depth and no cracking. The TVA takes the technical position, with the concurrence of the DOE/WEP, that arc strikes have no technical significance with respect to suitability for service (Reference 7.8). In performing the examination of pipe surfaces, several areas of inaccessibility were noted on the 10-in. and 3-in. pipe. Based on an engineering analysis of the arc strikes found, the DOE/WEP considers the existence of arc strikes in inaccessible areas to be less likely and of no more significance from the standpoint of code acceptance than the ones evaluated.

6. Conclusions

The existence of an arc strike about the size identified in the employee concern was confirmed. However, the DOE/WEP concludes that none of the arc strikes required repair and the piping evaluated in conjunction with this group meets the applicable Final Safety Analysis Report (FSAR) construction code.

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983

7. References

7.1 Employee Concern IN-85-460-X04.

7.2 The American Society of Mechanical Engineers, "Rules for Construction of Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code, Section III--Division 1, 1971 Edition with Summer 1973 Addenda (1974 Edition for Heat Treatment).

7.3 TVA General Construction Specification G-29C, Process Specific 3.C.5.2, Rev. 9, May 21, 1985.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNREPAIRED ARC STRIKE WEP GROUP IDENTIFIER EC-SP-8	Page 3 of 3 Date 11/16/87 Revision 2 WEP Group No 008

7.4 WEP Assessment Plan No. 008, "Arc Strikes/Metal Excavation," Rev. 3, August 11, 1987.

7.5 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987.

7.6 Standard Practice WEP 3.2.8, "Ultrasonic Thickness Measurement," Rev. 2, August 14, 1986.

7.7 WEP Examination Packages-Related Deviation Reports, DR-008-0001, -0002. -0004, -0005, and -0006.

7.8 T. L. Bridges letter to K. G. Therp, "Disposition of Weld Spatter, Arc Strike, Crater Cracks, Porosity, and Overlap Weld Discrepancies," TLB-05-86, EG&G Idaho, Inc., June 30, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE ARC STRIKE/BASE METAL EXCAVATION WEP GROUP IDENTIFIER EC-SP-9	Page 1 of 4 Date 11/19/87 Revision 2 WEP Group No 009

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns IN-85-460-X05, IN-85-270-001, IN-85-246-002, and IN-86-133-001.

2. Characterization of Issue

The Employee Concerns (ECs) listed in Section 1 document an area of base metal excavation resulting from arc strike removal operations on 10-inch stainless steel piping of System 72, at 713 ft elevation in the Auxiliary Building of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). The excavation possibly caused reduction of pipe wall thickness beyond minimum code requirements.

The concerns also identified unrepaired arc strikes.

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3. Summary

The issue for which the group was formed was resolved by document review, inspection/examination, and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 009 (Reference 7.2) was developed to ensure that the arc strike and affected base metal had been adequately removed, and to determine if the minimum wall thickness had been encroached upon as a result of the excavation/removal operation. For the DOE/WEP inspection, the minimum wall thickness was as defined in the DOE/WEP Standard Practice (SP) WEP 3.2.3, Appendix A, (Reference 7.3).

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE ARC STRIKE/BASE METAL EXCAVATION WEP GROUP IDENTIFIER EC-SP-9	Page 2 of 4 Date 11/19/87 Revision 2 WEP Group No 009

The DOE/WEP method used to evaluate the concerns in this group consisted of the following:

a. A visual (VT) examination of the base metal for arc strike removal, and base metal excavations, in accordance with SP WEP 3.2.3, Appendix A (Reference 7.3).

b. An ultrasonic (UT) thickness examination on the base metal of the excavated areas to verify minimum wall thickness, in accordance with SP WEP 3.2.8 (Reference 7.4).

c. A comparison of the "as-found" condition to the original TVA inspection records to verify that the original repairs were adequately documented, in accordance with TVA site procedures.

Any unacceptable conditions found as a result of this examination shall be reviewed in conjunction with TVA Engineering Design for resolution.

DRR WEP 984

5. Findings

The DOE/WEP visual examination and ultrasonic thickness examination of the identified piping determined the following (Reference 7.5):

a. Examination Package 009-0001 (Reference 7.6): The thickness of the pipe in the area of the removed arc strike was determined to be below the minimum wall established by ANSI B36.19. This was documented in DOE/WEP Deviation Report (DR) 009-0001 (Reference 7.8). The minimum wall thickness required is 0.320 in. (i.e., 87.5% of nominal wall thickness). Actual minimum pipe wall thickness in the area of arc strike excavation was determined to be 0.103 in.

b. Examination Package 009-0002 (Reference 7.6): Arc strikes were located on the pipe and the adjacent valve body, as documented in DOE/WEP DR 009-0002 (Reference 7.7).

DRR WEP 984

Also, DOE/WEP compared the DOE/WEP "as-found" conditions to the original TVA inspection records and determined the following:

a. Examination Package 009-0001: The TVA documented the arc strike removal on the appropriate form, Arc Strike Removal Operation Sheet. The TVA documented the pipe wall thickness of the excavation/removal area at 0.123 in.; however, the pipe wall thickness recorded by DOE/WEP examination is 0.103 in., as documented in DR 009-0001.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE ARC STRIKE/BASE METAL EXCAVATION WEP GROUP IDENTIFIER EC-SP-9	Page 3 of 4 Date 11/19/87 Revision 2 WEP Group No 009

NOTE: The difference of the wall thicknesses recorded may be attributed to the unlike measurement techniques utilized; depth micrometer versus ultrasonic examination. (The DOE/WEP verified the actual wall thickness with ultrasonics, using a 1/4-in. diameter transducer).

b. Examination Package 009-0002: The arc strikes that were documented on DOE/WEP DR-009-0002 were not documented by the TVA.

The results of these examinations were forwarded to TVA Engineering Design for resolution and the TVA has determined the following:

a. Examination Package 009-0001: By computation, the remaining wall thickness satisfied the minimum design wall thickness requirements of the The American Society of Mechanical Engineers (ASME) Code.

b. Examination Package 009-0002: Arc strike conditions with no associated discrepancy, such as a crack or a reduction in pipe wall thickness below the required minimum, were not in violation of the ASME Code.

The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group performed a review of the TVA engineering analysis (Reference 7.8) and determined that the conditions identified have been demonstrated by appropriate evaluations to be in compliance with the applicable codes (Reference 7.9).

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6. Conclusion

The issue identified by the employee concerns was confirmed. However, the DOE/WEP concludes that the components evaluated in conjunction with this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 Employee Concerns IN-85-460-X05, IN-85-270-001, IN-85-246-002, and IN-86-133-001.

7.2 WEP Assessment Plan No. 009, "Arc Strike/Base Metal Excavation," Rev. 0, March 28, 1986.

7.3 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, Appendix A, June 2, 1987.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE ARC STRIKE/BASE METAL EXCAVATION WEP GROUP IDENTIFIER EC-SP-9	Page 4 of 4 Date 11/19/87 Revision 2 WEP Group No 009

7.4 Standard Practice WEP 3.2.8, "Ultrasonic Thickness Measurement," Rev. 0, April 17, 1986.

7.5 WEP Group 009 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 7, 1987, and Inspection Result, INS 008-R0, August 7, 1987.

7.6 WEP Examination Package 009-0001 and 009-0002.

7.7 WEP Group 009, Deviation Reports 009-0001 and 009-0002.

7.8 TVA Suitability for Service Analysis, and WEP Suitability for Service Review Summary Sheets (009-0001 and 009-0002) for Group 009.

7.9 The American Society of Mechanical Engineers, "Rules for Construction of Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code, Section III--Division 1, 1971 Edition with Summer 1973 Addenda (1974 Edition for Heat Treatment).

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SLUGGED WELD IN MAIN STEAM JET IMPINGEMENT SLEEVE WEP GROUP IDENTIFIER EC-SP-10	Page 1 of 3 Date 11/18/87 Revision 2 WEP Group No 010

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ for Rick C. Hite

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Employee Concerns HI-85-049-001 and IN-85-851-001.

2. Characterization of Issue

The two employee concerns above identified an incident where a circumferential weld connecting two Main Steam Jet Impingement Sleeves together was "slugged." Slugging a weld violated the requirements of TVA Process Specification 3.C.5.2 (Reference 7.2) which required thorough fusion between weld material and base material. American Welding Society-Welding, Terms, and Definitions, A3.0-80 defines "slugging" as follows: "The act of adding a separate piece or pieces of material in a joint before or during welding that results in a welded joint not complying with design, drawing or specification requirements." The slugged weld could possibly affect the integrity of the Main Steam Jet Impingement Sleeve.

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3. Summary

The issue for which the group was formed was resolved by engineering evaluation.

4. Evaluation Methodology

Specific Group 010 was formed to address the employee concerns involving a slugged weld and to determine if the slugged weld would affect the integrity of the Main Steam Jet Impingement Sleeve. Part of the concern dealt with the ordering of an apprentice welder to

E-4

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SLUGGED WELD IN MAIN STEAM JET IMPINGEMENT SLEEVE WEP GROUP IDENTIFIER EC-SP-10	Page 2 of 3 Date 11/18/87 Revision 2 WEP Group No 010

complete welding and, because this is considered to be an intimidation/harassment issue, is outside the scope of the WEP to evaluate. The Department of Energy/Weld Evaluation Project (DOE/WEP) wrote Assessment Plan 010 (Reference 7.3) to evaluate the results of the TVA's engineering evaluation/stress analysis (Reference 7.4) performed on the slugged weld and to address the possibility that similar conditions may exist elsewhere in the plant by establishing a boundary of all ASME welds made by the two welders involved in slugging the impingement sleeve. American National Standards Institute (ANSI) B31.1 and American Welding Society (AWS) D1.1 do not require that permanent weld records be retained for matching a individual welder to a specific joint. Therefore, ANSI and AWS welds could not be bounded specifically for this group. The plan also called for an evaluation of the ASME welds that could be potentially slugged by 100 percent volumetric examination or a review of the results of original radiography/ultrasonic examinations performed by the TVA. DRR WEP 985

5. Findings

Employee Concern IN-85-851-001 was determined from a visual inspection performed by the Nuclear Safety Review Staff (NSRS) to be a valid concern and was reported to the TVA in a memorandum dated February 7, 1986 from K. W. Whitt to L. Martin (Reference 7.1) and Quality Technology Corporation (QTC) Report, Concern Number IN-85-851-001 (Reference 7.1). Deviant conditions were noted and confirmed by the TVA on Nonconforming Condition Report (NCR) W-325-P (Reference 7.5). DOE/WEP accepted this conclusion.

Employee concern HI-85-049-001 also identifies the slugged weld. This concern dealing with the foreman ordering apprentice welders to complete the weld, was considered by QTC to be an intimidation/harassment issue, and was therefore outside the scope of the DOE/WEP. The DOE/WEP determined that any action resulting from this intimidation/harassment issue will be accomplished through the appropriate departments within the TVA organization. DRR WEP 985

The TVA completed an engineering evaluation/stress analysis to determine if the structural integrity of the Main Steam Jet Impingement Sleeve had been adversely affected by the slugged weld. The TVA concluded that the slugged weld would not prevent the sleeve from performing its proper function. The DOE/WEP reviewed the TVA's evaluation/analysis and concurred with their results (Reference 7.4).

In order to address the possible generic implications of this incident, the DOE/WEP requested additional information from the TVA to

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WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SLUGGED WELD IN MAIN STEAM JET IMPINGEMENT SLEEVE WEP GROUP IDENTIFIER EC-SP-10	Page 3 of 3 Date 11/18/87 Revision 2 WEP Group No 010

determine who each of the welders were in order to evaluate any other welds performed by the welders involved (Reference 7.6). The individuals identified by the TVA were steamfitters and had welded on piping and associated components. The resulting group that was evaluated involved 82 ASME welds made by the two welders. The DOE/WEP reviewed the drawings for each of the welds to determine if their configuration would permit slugging. Review has shown that 79 welds in the group were small bore (two inch and less in diameter) pipe welds, which would make it virtually impossible to slug a weld joint of this configuration (Reference 7.7). Three other welds were to attach lifting lugs and were later removed.

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The evaluation by the DOE/WEP found that there were no ASME welds made by the welders in question that were susceptible to slugging. Based on these findings, a post weld volumetric examination of the welds was not performed.

6. Conclusions

The issue identified in the employee concerns was confirmed by the NSRS. The DOE/WEP concludes that the engineering analysis performed by the TVA has shown the weld evaluated in this group meets the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 Employee Concerns HI-85-049-001 and IN-85-851-001.

7.2 TVA General Construction Specification G29C, Process Specification 3.C.5.2, Rev. 9, May 21, 1985.

7.3 WEP Assessment Plan No. 010, "Slugged Welds (EC-SP-10)," Rev. 2, August 20, 1986.

7.4 R. K. Blandford letter to A. E. Bradford "Review of Employee Concern HI-85-049, Main Steam Sleeve Evaluation," RKB-2-86, EG&G Idaho, Inc., October 10, 1986.

7.5 TVA Nonconforming Condition Report W-325-P.

7.6 K. G. Therp letter to F. E. Laurent "Evaluation of the Weld Evaluation Project (WEP) Formulated Group No. 10," KGT-208-86, August 5, 1986.

7.7 A. D. Calija notegram to A. E. Bradford, EG&G Idaho, Inc. July 30, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE REACTOR CAVITY EMBEDDED BULKHEAD PLATES AND SUPERSTRUCTURE WELDS, WBNP-1 WEP GROUP IDENTIFIER EC-SP-11	Page 1 of 5 Date 11/16/87 Revision 1 WEB Group No 011

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-85-442-008.

2. Characterization of Issue

Employee Concern (IN-85-442-008) stated that on June 7, 1985, a Tennessee Valley Authority (TVA) engineering evaluation was written concerning the lack of installation documentation on embedded bulkhead plates in the reactor cavity superstructure of the Reactor Building at the Watts Bar Nuclear Plant Unit 1 (WBNP-1). Documentation for installation of these plates was not verified prior to concrete being poured. Additionally, the concerned individual (CI) stated that the engineering evaluation determined the plate installation to be adequate based on the completion and signature approvals of the concrete pour prerequisite requirements. The CI added that the installation of the embedded bulkhead plates was not part of the verification of concrete pour prerequisites, which concern items only relative to concrete.

The second part of the employee concern pertained to a document accountability system Item 00948W9331011 in which reactor cavity bulkhead structure welds were accepted by a TVA engineering evaluation based on the results of a previously conducted random sample weld verification program at WBNP. The CI stated that these welds could not have been verified at all because they are embedded in concrete; therefore, the TVA does not know the weld quality, or even if the welds are there at all.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE REACTOR CAVITY EMBEDDED BULKHEAD PLATES AND SUPERSTRUCTURE WELDS, WBNP-1 WEP GROUP IDENTIFIER EC-SP-11	Page 2 of 5 Date 11/16/87 Revision 1 WEP Group No 011

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 011 (Reference 7.2) was developed to perform a 100% review of all available documents associated with the embedded bulkhead plate welds and the reactor cavity superstructure welds to evaluate the adequacy of documentation. If the review indicated that there were existing procedures applicable to the documentation requirements for TVA-performed welds, and that the TVA complied with these procedures, the group could be closed. Although welded subassembly components of the embedded structure were performed by an outside supplier, welds to complete the final assembly were performed by the TVA. The DOE/WEP addressed only welds performed by the TVA.

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5. Findings

Welded subassembly components of the reactor cavity embedded structure for WBNP-1 were fabricated by an outside supplier on TVA Contract No. 76K61-820198 (INRYCO P.O. No. 21C-5002). The bulkhead plate subassembly components were then fitted up in place by the TVA and welded into a final assembly during the construction of the reactor building.

An engineering review was made of all available welding documentation associated with the embedded bulkhead welds and reactor cavity superstructure welds made by the TVA. The reviewed documentation included a TVA Structural Steel Inspection Report (Reference 7.3) for WBNP-1 that represented a summary verification of acceptance on welds in the reactor cavity embedded structure, in accordance with TVA Quality Control Procedure WBNP-QCP-2.4 (Reference 7.4). However, the report in some instances documented the welds by group classification rather than by individual weld. The DOE/WEP requested the TVA (Reference 7.5) to determine if weld inspection data existed for individual welds. The TVA replied to the DOE/WEP request for information in a TVA memorandum (Reference 7.6). The TVA memorandum also addressed the TVA Random Sample Weld Verification Program of 1980 to 1982 and the rationale used in applying the results of the program to verify quality of welds that were installed in the embedded structure in 1978. Results of the DOE/WEP document review and evaluation of the two concern items follow:

E-8

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE REACTOR CAVITY EMBEDDED BULKHEAD PLATES AND SUPERSTRUCTURE WELDS, WBNP-1 WEP GROUP IDENTIFIER EC-SP-11	Page 3 of 5 Date 11/16/87 Revision 1 WEP Group No 011

a. Documentation During Reactor Building Unit 1 Construction

Concrete pour records are shown on References 7.7 and 7.8. The various installations required to support the concrete pour were initialed by foremen and engineers to signify a completed status in preparation for pour; however, the concrete pour cards were not intended to be the documentation for structure welds, as implied by the Concerned Individual. Rather, weld inspection data are documented by other means, as required by TVA Quality Control Procedures (QCP).

At the DOE/WEP request, the TVA searched their records for an engineering evaluation document dated June 7, 1985, referenced in EC IN-85-442-008, but could not locate that document. Therefore, the DOE/WEP approach was to locate and assess all of the documentation available pertaining to TVA-performed welds in the reactor cavity embedded structure during the WBNP-1 construction phase. DRR WEP 986

The DOE/WEP was unable to locate a TVA inspection package that contains inspection data for every individual (TVA) weld on the embedded structure. However, the TVA Structural Steel Inspection Report for WBNP-1 (Reference 7.3) represented a summary verification of overall weld inspection, in accordance with WBNP-QCP-2.4 (Reference 7.4).

A review of the TVA Structural Steel Inspection Report for the embedded parts showed weld inspector buy-offs for inspection of fit-up and weld quality on TVA welds performed in completing the WBNP-1 reactor cavity embedded parts assembly. This, according to the TVA, constituted all of the available documentation that verified the inspection and acceptance of the subject welds prior to covering them with concrete. The Structural Steel Inspection Report (Reference 7.3) showed that welding on the reactor cavity embedded bulkhead assembly (El.715-725 ft) was performed by the TVA during the period from November 19, 1976, to May 5, 1978. The TVA concrete pour records dated May 30, 1978 (Reference 7.7), and June 22, 1978 (Reference 7.8), were not used for buying-off structural welds (Reference 7.9).

The above findings support that documentation of the TVA welds was processed for the Unit 1 reactor cavity embedded welds in accordance with TVA procedures during construction of the reactor building. The CI's statement that concrete pour cards were used to buy off embedded welds could not be substantiated.

E 9

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE REACTOR CAVITY EMBEDDED BULKHEAD PLATES AND SUPERSTRUCTURE WELDS, WBNP-1 WEP GROUP IDENTIFIER EC-SP-11	Page 4 of 5 Date 11/16/87 Revision 1 WEP Group No 011

b. Engineering Design (ENDES) Random Sample Weld Verification Program

The TVA weld sampling program was directed toward structural welds made before February 6, 1981. The weld sampling program properly included the reactor cavity embedded structure because these were Category I structural welds made before February 6, 1981.

The engineering evaluation per QCI-1.08 (Reference 7.10) of the weld sampling program results stated that welds were structurally adequate but did not meet the geometric and cosmetic requirements of TVA Specification G29C and WBNP-QCP-4.3 (Reference 7.11). The weld deviations were dispositioned as having acceptable weld quality by Nonconforming Condition Report (NCR) 2375RO (Reference 7.12) through the TVA Engineering Design (ENDES) Weld Sampling Program. DRR WEP 986

The DOE/WEP could find no evidence or documentation that would suggest that the embedded bulkhead welds did not meet the requirements of TVA Specification G29C prior to concrete being poured. A review of the Steel Inspection Report (Reference 7.3) for the embedded parts shows weld inspector buy-offs for the TVA welds performed in completing the structure. TVA Construction Specification N3G-881, paragraph 3.1.2.2 (Reference 7.13) reads as follows: "All standard welds require visual examination at a minimum; but the drawing requirements impose a more detailed examination where applicable." It is a standard TVA practice that inspections of structural welds included visual examination as a minimum even when more rigorous inspections were specified.

It is the opinion of the DOE/WEP that the embedded welds were not accepted by the concrete pour documentation or by a weld sampling program. The acceptance of the embedded welds occurred during installation to the requirements that were applicable at the time of construction. Additional reconfirmation of acceptability of the embedded welds is indicated by TVA Memorandum SWP '82 1217 042 from J. C. Standifer to G. Wadewitz dated December 10, 1982, which is included as a part of Reference 7.12, but which was not necessary to resolve this issue.

6. Conclusions

The issues and conditions identified in the employee concern were not confirmed. The DOE/WEP concludes that the documentation evaluated in this group meets the applicable Final Safety Analysis Report (FSAR) construction code.

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE REACTOR CAVITY EMBEDDED BULKHEAD PLATES AND SUPERSTRUCTURE WELDS, WBNP-1 WEP GROUP IDENTIFIER EC-SP-11	Page 5 of 5 Date 11/16/87 Revision 1 WEP Group No 011

7. References

7.1 Employee Concern IN-85-442-008.

7.2 WEP Assessment Plan No. 011, "Welds Associated with Embedded Beams (EC-SP-11)," Rev. 1, June 30, 1987.

7.3 TVA, Structural Steel Inspection Report WBNP-QCP-2.4, Attachment A, for Drawing 48N933.

7.4 TVA, Quality Control Procedure WBNP-QCP-2.4, "Erection and Inspection of Structural and Miscellaneous Steel," Rev. 2, June 17, 1977.

7.5 K. G. Therp letter to L. E. Martin (TVA), "Reactor Cavity Embedded Bulkhead Plates and Superstructure Welds, Watts Bar Nuclear Plant Unit 1 (WBNP-1)," KGT-101-86, May 13, 1986, without Attachments.

7.6 L. E. Martin memorandum to K. G. Therp (EG&G), "Watts Bar Nuclear Plant, Welding Task Group (WTG), WBN Reactor Cavity Embedded Plates, No. T25 860627 860," June 27, 1986.

7.7 TVA, Concrete Pour Card, May 30, 1978, Attachment O of WBNP QCP-2.2, Rev. 2, "Concrete Placement and Documentation."

7.8 TVA, Concrete Pour Card, June 22, 1978, Attachment O of WBNP QCP-2.2, Rev. 2, "Concrete Placement and Documentation."

7.9 TVA, Quality Control Procedure WBNP-QCP-1.47, "Concrete/Grout Preplacement Inspection," Rev. 0, May 6, 1982.

7.10 TVA, Quality Control Instruction WBNP-QCI-1.08, "Engineering Evaluation Identification 48W933 1011," Rev. 3, June 4, 1982.

7.11 TVA, Quality Control Procedure WBNP-QCP-4.3, "Welding Surveillance and Weld Procedure Assignment," Rev. 3, May 16, 1977.

7.12 TVA, Nonconforming Condition Report (NCR) 2375, Rev. 0, June 11, 1980.

7.13 TVA, Construction Specification N3G-881, "Identification of structures, systems, and components covered by the Watts Bar Nuclear Plant Quality Assurance Program, Rev. 0, August 12, 1977.

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E 11

Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SOUTH VALVE ROOM UNSATISFACTORY WELDS WEP GROUP IDENTIFIER EC-SP-12	Page 1 of 3 Date 11/16/87 Revision 1 WEP Group No 012

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ FOR ROBERT S. SELLER

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns PH-85-027-001, PH-85-027-002, PH-85-027-004, PH-85-027-005, PH-85-027-006, and PH-85-027-007.

2. Characterization of Issue

The employee concerns identified two American Welding Society (AWS) welds on two structural beams in the South Valve Room of Watts Bar Nuclear Plant Unit 1 (WBNP-1) that had improper repairs, possible subsurface defects, and weld inspections that were not performed. The Department of Energy/Weld Evaluation Project (DOE/WEP) requested additional information from the Quality Technology Company (QTC) and was given the exact location of the welds the concerned individual (CI) was referencing.

DRR WEP 987

3. Summary

The issue for which the group was formed was resolved by inspection/examination, engineering analysis and engineering evaluation.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 012 (Reference 7.2) was developed to perform an evaluation of the two welds in this group. The original Tennessee Valley Authority (TVA) acceptance criteria for these two structural welds was a visual examination. However, because the CI referenced possible subsurface defects, the DOE/WEP decided to perform both a visual (VT) examination in accordance with Standard Practice

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SOUTH VALVE ROOM UNSATISFACTORY WELDS WEP GROUP IDENTIFIER EC-SP-12	Page 2 of 3 Date 11/16/87 Revision 1 WEP Group No 012

(SP) WEP 3.2.3 (Reference 7.3) and an ultrasonic (UT) examination in accordance with SP WEP 3.2.7 (Reference 7.4), of the two welds to determine compliance with the applicable code requirements.

5. Findings

The two welds identified by the CI on all the employee concerns were Weld Nos. 48W1707-14-4S and 48W1707-16-5B (Reference 7.5).

The DOE/WEP, through a VT examination, found weld 48W1707-14-4S to have an unacceptable profile and surface slag. A UT examination performed on this weld detected a lack of fusion. Deviation Report (DR) 012-0001 was initiated by the DOE/WEP and sent to the TVA for a suitability-for-service analysis (SFSA). Sargent & Lundy performed a SFSA for the TVA and determined that the unacceptable profile, surface slag, and lack of fusion would not affect the ability of the weld to perform its intended function. The DOE/WEP reviewed the Sargent & Lundy analysis, in accordance with SP WEP 3.3.1 (Reference 7.6) and has concurred with the analysis (Reference 7.7).

DRR WEP 987

The DOE/WEP, through a VT examination, found weld 48W1707-16-5B to be partially inaccessible. For this reason, DR 012-0002 was initiated and sent to the TVA for a SFSA. Three inaccessible areas were originally reported on the weld deviation report. These areas were examined further using UT and the inaccessible areas of the weld were shown to be acceptable. The weld geometry corresponded to the design and Sargent & Lundy stated that no calculations were required to determine suitability of the weld. The DOE/WEP concurred with that statement.

6. Conclusions

The employee concerns with regard to Weld 48W1707-14-4S were confirmed. The employee concerns with regard to Weld 48W1707-16-5B were not confirmed. However, the DOE/WEP concludes that the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 Employee Concerns PH-85-027-001, PH-85-027-002, PH-85-027-004, PH-85-027-005, PH-85-027-006, and PH-85-027-007.

7.2 WEP Assessment Plan No. 012, "South Valve Room Unsatisfactory Welds," Rev. 6, July 1, 1987.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SOUTH VALVE ROOM UNSATISFACTORY WELDS WEP GROUP IDENTIFIER EC-SP-12	Page 3 of 3 Date 11/16/87 Revision 1 WEP Group No 012

7.3 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria", Rev. 18, June 2, 1987.

7.4 Standard Practice WEP 3.2.7, "AWS Ultrasonic Examination Methods and Acceptance Criteria", Rev. 2, February 2, 1987.

7.5 TVA Drawing No. 48W1707-14, "Structural Steel Sections and Details South Main Steam Valve Rooms," Section A14-A14 and TVA Drawing No. 48W1707-16, "Structural Steel Details South Main Steam Valve Rooms," Section F16-F16.

7.6 Standard Practice WEP 3.3.1, "Suitability-for-Service Evaluation Review," Rev. 8, June 8, 1987.

7.7 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for Group 012.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNACCEPTABLE WELDS ON FOUR, 8-INCH DIAMETER ERCW STAINLESS STEEL LINES IN UNIT 1 ANNULUS AREA WEP GROUP IDENTIFIER EC-SP-13	Page 1 of 4 Date 11/16/87 Revision 1 WEP Group No C13

Approved _____ Date 11-17-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern WI-85-050-001.

2. Characterization of Issue

The Employee Concern (EC) WI-85-050-001 stated that unacceptable welds are located on four 8-inch diameter Essential Raw Cooling Water (ERCW) pipe lines (System 67) found in the annulus area of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). The Concerned Individual (CI) believed that the welds were unacceptable due to (a) deteriorated base metal and (b) lack of penetration and weld root oxidation (sugaring) due to loss of purge.

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3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, engineering analysis and engineering evaluation.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 013 (Reference 7.2) was developed to perform 100% visual (VT), liquid penetrant (PT), and ultrasonic (UT) examinations on all 26 welded pipe joints involved. The purpose of the examinations was to assess the welds mentioned by the CI, in the area of the annulus, and to determine if they met the requirements of The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III.

WEP Closure Statement — Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNACCEPTABLE WELDS ON FOUR, 8-INCH DIAMETER ERCW STAINLESS STEEL LINES IN UNIT 1 ANNULUS AREA WEP GROUP IDENTIFIER EC-SP-13	Page 2 of 4 Date 11/16/87 Revision 1 WEP Group No 013

5. Findings

a. To assess deteriorated base metal, the DOE/WEP Weld Engineering group determined that the CI was referencing the possibility of overheating (caused by exceeding the interpass temperature) of the base metal (pipe) during the welding operation of various weld joints. An engineering report was generated (Reference 7.3) to address employee concerns that referenced excessive heat and weld metal and continuous welding and thermal stresses. The report showed that for Types 304, 304L, 316, 316L, and 316H stainless steel, at temperatures as high as 750°F, there was no appreciable effect on the microstructure, weld soundness, strength, or toughness.

b. To assess lack of penetration and weld root oxidation (sugaring) due to loss of purge, the DOE/WEP performed an investigation that included:

(1) Reviewing TVA piping isometric sketches for System 67 (ERCW) in the locale of WBNP-1 annulus and found that four 8-inch diameter ERCW pipes contained 26 welded pipe joints to be examined

(2) Reviewing all the TVA VT, PT, and UT inspection sheets for each of the 26 welds involved

DRR WEP 988

(3) Walking down all four 8-inch diameter ERCW (System 67) pipe lines in the annulus area of WBNP-1

(4) Performing 100% VT and PT examinations on all 26 welded pipe joints

(5) Performing UT examinations, in three areas around each weld, on all 26 pipe joints to determine lack of penetration.

The lack of penetration is the most likely defect to result from sugaring due to lack of purge. The DOE/WEP performed UT examinations (in three areas around each weld) on all 26 welded pipe joints in question, and no lack of penetration was found. Lack of penetration associated with sugaring can be detected by UT. If there was full penetration, sugaring on the weld drop-through cannot be detected by UT. No sugaring of the weld is expected, because no lack of penetration was detected by the UT examination.

DRR WEP 988

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNACCEPTABLE WELDS ON FOUR, 8-INCH DIAMETER ERCW STAINLESS STEEL LINES IN UNIT 1 ANNULUS AREA WEP GROUP IDENTIFIER EC-SP-13	Page 3 of 4 Date 11/16/87 Revision 1 WEP Group No 013

Inspections performed by the DOE/WEP found that of the 26 welded pipe joints examined, 14 were acceptable as they existed in the field, and the remaining 12 had conditions that require engineering analysis to determine acceptability: 3 contained arc strikes, 1 contained arc strikes and linear indications, 3 contained arc strikes and weld spatter, 1 contained arc strikes, weld spatter and a linear indication, 2 contained arc strikes with indeterminate depths, and the remaining 2 welded pipe joints were limited to weld spatter.

The TVA Engineering Design (ENDES) organization performed an engineering analysis for each of the reported conditions. Their analyses determined that the components will perform their intended function. The DOE/WEP Suitability-For-Service Evaluation Engineering (SSEE) Group reviewed the TVA analysis and concurred that the deviant welds are in compliance with the applicable codes (Reference 7.4).

Two DRs were initiated for the linear indications, the attributes were characterized[a] and accepted in accordance with the DOE/WEP Standard Practice (SP) WEP 3.2.16 (Reference 7.5).

Two DRs were initiated for arc strikes with indeterminate depths, the attributes were characterized and accepted in accordance with the DOE/WEP (SP) WEP 3.2.16.

DRR WEP 988

In all cases, the engineering analysis confirmed that the ERCW piping (System 67) welds in question comply with the ASME Code, Section III. The nondestructive examinations (NDE) performed, failed to confirm any of the unacceptable weld conditions stated by the CI.

6. Conclusions

The issues identified in the employee concern were not confirmed. The DOE/WEP concludes that the welds evaluated in conjunction with this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

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a. Those activities required to determine size of a discontinuity to arrive at a final acceptance status of the inspection attribute or to provide information required to evaluate the discrepancy significance.

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WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE UNACCEPTABLE WELDS ON FOUR, 8-INCH DIAMETER ERCW STAINLESS STEEL LINES IN UNIT 1 ANNULUS AREA WEP GROUP IDENTIFIER EC-SP-13	Page 4 of 4 Date 11/16/87 Revision 1 WEP Group No 013

7. References

7.1 Employee Concern WI-85-050-001.

7.2 WEP Assessment Plan No. 013, "Defective Welds," Rev. 4, September 9, 1986.

7.3 Dr. Joseph C. Danko, Responses to Eight Employee Concerns Relating to Improper Welding of Austentic Stainless Steel, Engineering Evaluation Report, August 1986.

7.4 TVA Suitability-for-Service Analysis and WEP Suitability-for-Service Review Summary Sheets for Group 13.

7.5 Standard Practice WEP 3.2.16, "Surface Conditioning and Characterization Weld/Hardware Discrepancies," Rev. 0, August 28, 1986.

7.6 T. L. Bridges letter to K. G. Therp "Disposition of Weld Spatter, Arc Strike, Crater Cracks, Porosity, and Overlap Weld Discrepancies," TLB-05-86, June 30, 1986.

7.7 WEP Group 13 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 21, 1987, and Inspection Result, INS 008-R0, August 21, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED WELDS ASSOCIATED WITH THE T-BAR SHIMS WEP GROUP IDENTIFIER EC-SP-14	Page 1 of 4 Date 11/17/87 Revision 1 WEP Group No 014

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern IN-85-641-002

2. Characterization of Issue

The referenced employee concern noted the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1), cold and hot leg motion restraints (T-Bars) used on the Reactor Coolant System (RCS) (System 68), Elevation 718 ft-0 in. in the primary containment, exhibited cracks due to bad workmanship and not following welding specifications. This occurred sometime in 1982, in Loops No. 3 and 4.

3. Summary

The issue for which the group was formed was resolved by inspection/examination, document review, and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 014 (Reference 7.2) was developed to perform a 100% visual (VT) examination of T-Bar welds in RCS loops 3 and 4, in accordance with Standard Practice (SP) WEP 3.2.3 (Reference 7.3).

5. Findings

After performing a document review, the DOE/WEP established that:

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WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED WELDS ASSOCIATED WITH THE T-BAR SHIMS WEP GROUP IDENTIFIER EC-SP-i4	Page 2 of 4 Date 11/17/87 Revision 1 WEP Group No 014

a. The T-Bars for loops 3 and 4 were constructed initially by the TVA and signed acceptable during the period 1978 to 1979 (Reference 7.4).

b. The TVA initiated a Nonconforming Condition Report (NCR) 3700 for deviant welds found on the hot and cold leg motion restraints (T-bars) (Reference 7.5).

c. The TVA completed reinspection of the T-Bars between January 8, 1982, and January 23, 1982.

d. The TVA initiated a revision to NCR 3700 recommending that the welds be reworked, repaired, and/or used as is (Reference 7.6).

e. The TVA completed the rewelding of the hot and cold leg motion restraints (T-Bars) to the liner plate in loops 3 and 4 on July 14, 1982 (Reference 7.4).

f. A partial release from nonconforming status was signed off on July 10, 1983 for NCR 3700 Rev. 1.

After performing the document review, the DOE/WEP visually examined loops 3 and 4.

Four components consisting of thirty-five welds were examined, and the following determinations were made:

a. Two of the components (Nos. 48W937-3-HLL-3 and 48W937-3-HLL-4) were examined and documented as being acceptable.

b. The remaining two components (Nos. 48W937-3-CLL-3 and 48W937-3-CLL-4) were examined and documented as having five conditions that required engineering analysis to determine acceptability.

c. Cracks were noted on unspecified alignment tack welds that are not included in the boundaries of this group. These cracks have no detrimental effects on the intended function of the component, because alignment tack welds are used as a fabrication tool and are not part of the restraint. These alignment tack welds are also non-load bearing.

Component No. 48W937-3-CLL-3 had various conditions which required evaluation; one was first thought to be a crack. The weld was

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED WELDS ASSOCIATED WITH THE T-BAR SHIMS WEP GROUP IDENTIFIER EC-SP-14	Page 3 of 4 Date 11/17/87 Revision 1 WEP Group No 014

characterized,[a] in accordance with Standard Practice (SP) WEP 3.2.16 (Reference 7.7), by an informational magnetic particle (MT) examination. The suspected crack was determined not to be a crack, but a material interface between two pieces of welded material.

The TVA Engineering Design (ENDES) organization performed a suitability-for-service analysis (SFSA) for each of the found conditions, and determined that the components will perform their intended function. The DOE/WEP Suitability for Service Evaluation Engineering (SSEE) group reviewed the TVA SFSA and concurred that the welds are in compliance with the applicable codes (Reference 7.8).

6. Conclusions

The employee concern was not confirmed except for one apparent (but not actual) crack and some tack weld cracks which are not safety related. The DOE/WEP concludes the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. DRR WEP 989

7. References

7.1 Employee Concern IN-85-641-002.

7.2 WEP Assessment Plan No. 014, "Safety Related Welds Associated with the T-Bar Shims," Rev. 2, August 7, 1987.

7.3 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria", Rev. 7, June 2, 1987.

7.4 TVA, Final Steel Acceptance Sheet, 48W937-3-511 PR, Hot and Cold Leg Loop 3 and Loop 4, July 14, 1982.

7.5 TVA Nonconforming Condition Report (NCR) 3700, Rev. 0, October 6, 1981.

7.6 TVA Nonconforming Condition Report (NCR) 3700, Rev. 1, March 17, 1982.

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a. Characterization is defined as those activities required to determine size of a discontinuity to arrive at a final acceptance status of the inspection attribute or to provide information required to evaluate the discrepancy significance.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE SAFETY-RELATED WELDS ASSOCIATED WITH THE T-BAR SHIMS WEP GROUP IDENTIFIER EC-SP-14	Page 4 of 4 Date 11/17/87 Revision 1 WEP Group No 014

7.7 Standard Practice WEP 3.2.16, "Surface Conditions and Characterizing Weld/Hardware Discrepancies", Rev. 0, August 28, 1986.

7.8 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets for Group 014.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE DELETION OF STRUCTURAL WELDS ON BERGEN-PATERSON DESIGNED PIPE SUPPORTS WEP GROUP IDENTIFIER QI-SP-2	Page 1 of 3 Date 09/21/87 Revision 0 WEP Group No. 015

Approved [signature] Date 9-22-87

Reviewed [signature] 9/21/87 Prepared [signature] FOR ROBERT S. SEIGLER

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 4484, Revisions 0 and 1.

2. Characterization of Issue

A 1982 Black & Veatch (B&V) Independent Review disclosed that TVA quality inspectors at Watts Bar Nuclear Plant Unit 1 (WBNP-1) misinterpreted various Bergen-Paterson (B-P) design drawings and inappropriately eliminated the inspection of inside fillet welds on all structural members (HP-shapes, structural tubing, angles, and channels) of box hangers. The B-P drawings (Reference 7.2) allowed deletion of inside fillet welds on W-shape members only.

A Department of Energy/Weld Evaluation Project (DOE/WEP) audit of the B&V 1982 Independent Review could not ensure that the box hangers presently installed in the field match the current B-P design drawings.

3. Summary

The issue for which the group was formed was resolved by document review, visual examination, and engineering analysis.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 015 (Reference 7.3) was developed to perform a 100% visual examination (VT) on all 13 box hangers identified by B&V during its 1982 independent review. The DOE/WEP performed an investigation that included:

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE DELETION OF STRUCTURAL WELDS ON BERGEN-PATERSON DESIGNED PIPE SUPPORTS WEP GROUP IDENTIFIER QI-SP-2	Page 2 of 3 Date 09/21/87 Revision 0 WEP Group No. 015

a. Reviewing the B&V 1982 Independent Review Report and its associated TVA document; NCR 4484, Revisions 0 and 1.

b. Performing visual examinations on all supports in this group (Reference 7.4).

5. Findings

After auditing B&V's 1982 Independent Review, the DOE/WEP was not assured that all the B&P designed box hanger drawings matched what was actually fabricated in the field.

The DOE/WEP concluded, after reviewing all information pertaining to this QI, that the best way to correctly assess this problem was to compare the 1982 B&V Independent Review (Reference 7.6) results presented in the 13 B&V Finding Reports with the visual results of the 13 B&P designed hangers. Structural welds on all 13 B-P box supports were examined by the DOE/WEP in order to provide information on weld quality to TVA Engineering, for the purpose of performing a suitability-for-service engineering analysis, if needed. Initially, eight DRs (015-0001, -0004, -0005, -0008, -0009, -0011, -0012, and -0013) were initiated by the DOE/WEP as a result of the B&V Finding Report review. However, four DRs (015-0004, -0009, -0011, and -0013) were written, which were later found not to be appropriate and would not have been written if the design data had been available to the inspectors (Reference 7.7). The other four were initiated due to the following:

DOE/WEP DR 015-0001 was initiated because the hanger contained undersized welds. DR 015-0005 was initiated because the weld attaching a structural plate to an embedded plate was on the wrong side. DR 015-0008 was initiated because the fillet weld symbol called out on the drawing, that attached a channel member to a wide flange, is the wrong type weld. DR 015-0012 was initiated because all the skewed welds were undersized.

All four DRs were sent to the TVA for a suitability-for-service (SFS) analysis. The TVA performed suitability-for-service analyses (SFSA) for all deviant welds and determined that these welds are in compliance with the applicable code. The DOE/WEP reviewed the analyses in accordance with Standard Practice (SP) WEP 3.3.1 (Reference 7.8) and concurred with the TVA SFSA (Reference 7.9).

The DOE/WEP concludes that generic implications were adequately addressed by the TVA per Engineering Change Notice (ECN) 3100 (Reference 7.10) and Nonconformance Report (NCR) WBNSWP 8248

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE DELETION OF STRUCTURAL WELDS ON BERGEN-PATERSON DESIGNED PIPE SUPPORTS WEP GROUP IDENTIFIER QI-SP-2	Page 3 of 3 Date 09/21/87 Revision 0 WEP Group No. 015

(Reference 7.11). NCR 8242 covers the WBNP Unit 1 U.S. Nuclear Regulatory Commission (NRC) - Inspection Enforcement (IE) Bulletin 79-14 inspection effort.

6. Conclusions

The DOE/WEP concludes the components evaluated in conjunction with this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 TVA Nonconforming Condition Report (NCR) 4484, Rev. 1, January 28, 1983.

7.2 Bergen-Paterson Pipe Support Corp., Drawing No. STD 6000-1 (Sheets 1 and 2).

7.3 WEP Assessment Plan No. 015, "Deletion of Structural Welds Due to Drawing Misinterpretation," Rev. 2, June 4, 1986.

7.4 WEP Group 15 Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 21, 1987, and Inspection Result, INS 008-R0, August 21, 1987.

7.5 R. R. Gunter letter to A. R. Rowley, "Weld Deviations in Group 015," RRG-02-86, EG&G Idaho, Inc., September 29, 1986.

7.6 B&V 1982 Independent Review of a Portion of Plant As-Built Design, Project 10520, Issued to H. L. Jones, TVA.

7.7 R. R. Gunter letter to L. C. Brown, "Weld Deviations in Group 015 Examination Packages," RRG-02-87, EG&G Idaho, Inc., May 15, 1987.

7.8 Standard Practice WEP 3.3.1, "Suitability-for-Service Evaluation Review," Rev. 8, June 8, 1987.

7.9 TVA Suitability for Service Analyses and WEP Suitability for Service Review Summary Sheets for Group 015.

7.10 TVA Engineering Change Notice (ECN) 3100, Rev. 1, February 2, 1983.

7.11 TVA Nonconformance Report WBNSWP 8248, Rev. 1, November 25, 1983.

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Form WEP 320
Rev. 12/86

WEP Closure Statement — Evaluation Report	QUALITY INDICATOR GROUP CLOSURE IMPROPER SIGNATURES ON NDE REPORTS FOR VISUAL EXAMINATION (VT) AND PENETRANT EXAMINATION (PT) WEP GROUP IDENTIFIER QI-SP-3	Page 1 of 2 Date 11/17/87 Revision 1 WEP Group No 016

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ for A.E. BRADFORD

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s)

Tennessee Valley Authority (TVA) Nonconforming Condition Reports (NCRs) 4576R and 4941 (References 7.1 and 7.2).

2. Characterization of Issue

The NCRs identified in Section 1 describe two separate incidents in which a welding inspector's signature was either written or transferred improperly on the original NDE reports for VT and PT by another inspector. The NCRs identifying the specific concerns indicated that, when questioned, the inspectors whose names appeared on the NDE report had stated that they had performed the inspections. Due to the workload at the time, other inspectors had written the inspector's name on the NDE report. The DOE/WEP was concerned that TVA had not taken correct action, as required by TVA procedures, in the inspection of these welds and/or closure of these two NCRs.

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3. Summary

The issue for which the group was formed was resolved by document review and inspection/examination.

4. Evaluation Methodology

The Department of Energy Weld Evaluation Project (DOE/WEP) Assessment Plan 16 (Reference 7.3) required reinspection of both welds.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE IMPROPER SIGNATURES ON NDE REPORTS FOR VISUAL EXAMINATION (VT) AND PENETRANT EXAMINATION (PT) WEP GROUP IDENTIFIER QI-SP-3	Page 2 of 2 Date 11/17/87 Revision 1 WEP Group No 016

5. Findings

The DOE/WEP obtained and reviewed the documentation and inspection records associated with the subject welds and concurs with TVA's judgement that the two incidents do not constitute falsification of records.

The TVA procedure that was in effect at the time of the two incidents (Reference 7.6) stated in part, "Inspection and test records shall, as a minimum, identify the item, the inspector or data recorders ...." Therefore, it was established that the actions taken related to the two NCRs had been per TVA procedures. Had the person helping fill out the form co-signed the form, it would have clarified the actual situation.

Additionally, in determining the current status of the subject welds it was determined that Weld No. 1-015A-T018-13 was removed from the system by a redesign effort as documented by ECN 3371 (Reference 7.4). Weld No. 1-001A-D009-16 was found to be Code acceptable and fully documented.

6. Conclusions

The DOE/WEP concludes that the actions taken by TVA in the closure of the two NCRs were correct and in accordance with TVA procedures and the weld meets the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 TVA Nonconforming Condition Report 4576R.

7.2 TVA Nonconforming Condition Report 4941.

7.3 WEP Assessment Plan No. 16, "Improper Signatures or Transfer of Signatures on the Original NDE Reports for VT and PT (QI-SP-3)," Rev. 1, September 19, 1986.

7.4 TVA Engineering Change Notice ECN 3371.

7.5 TVA-WBNP Repair Weld Operation Sheet No. 1091.

7.6 TVA Quality Control Procedure, "Quality Assurance Records," WBNP-QCP 1.8, Rev. 2, December 12, 1977.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --------- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ACCEPTANCE OF NDE REPORTS BY A LEVEL I MAGNETIC PARTICLE (MT) INSPECTOR WEP GROUP IDENTIFIER QI-SP-4	Page 1 of 3 Date 08/21/87 Revision 1 WEP Group No 17

DRR WEP 780

Approved [signature] Date 8-23-87

Reviewed [signature] 8-21-87 Prepared [signature] 8/21/87

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 4582.

2. Characterization of Issue

The NCR 4582 documented that a Level I Magnetic Particle (MT) inspector signed Weld Operation Sheets (WOS), accepting the final MT examination of welds at the TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1). Acceptance of welds by MT examination must be accomplished by an inspector holding a Level II or Level III MT certification (Reference 7.2).

The DOE/WEP's concern was: Did TVA have adequate justification to void NCR 4582?

DRR WEP 780

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 17 (Reference 7.3) was developed to ensure that the MT examinations indicated on NCR 4582 were performed by a certified Level II or Level III inspector, and to determine if the signatures on the Field Weld Operation Sheets constituted acceptance of the items.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ACCEPTANCE OF NDE REPORTS BY A LEVEL I MAGNETIC PARTICLE (MT) INSPECTOR WEP GROUP IDENTIFIER QI-SP-4	Page 2 of 3 Date 08/21/87 Revision 1 WEP Group No 17

The DOE/WEP method used to evaluate Quality Indicator Group No. 17 consisted of a document review of the Weld Operation Sheets (Reference 7.4), associated NDE Surface Evaluation Data Sheets (Reference 7.5), and the applicable TVA procedures (Reference 7.6), as indicated in the DOE/WEP Assessment Plan No. 17.

5. Findings

The DOE/WEP performed a review of the TVA program requirements, that were in effect at the time the WOSs were signed, and the associated documentation and determined that:

a. The NCR 4582 addressed welds that are located in TVA WBNP-1 and -2. The DOE/WEP addressed only the welds in Unit 1, as stipulated in the Project Management Plan (PMP).

b. In addition to MT examinations, visual examination (VT) hold points were also released by the Level I MT inspector. Therefore, all DOE/WEP findings applied to both VT and MT code/site requirements.

The DOE/WEP determined that the MT/VT examinations were evaluated and accepted by a certified Level II inspector. These examinations were documented on the appropriate form, NDE Surface Evaluation Data Sheets (Reference 7.5), then referenced on the Weld Operation Sheets, by the Level I inspector. The Weld Operation Sheets were completed in accordance with WBNP-QCI-4.03 (Reference 7.7). The WOSs do not constitute an inspection record of acceptance, but rather ensured the records of acceptance exist and were acceptable.

The Level I MT inspector did not accept the MT/VT inspection but only referenced these data on the corresponding Field Weld Operation Sheet. The methods used by TVA for entering completion indications for nondestructive examination points on Weld Operation Sheets does not violate the requirements of The American Society of Mechanical Engineers (ASME) Code, Section III.

6. Conclusions

The DOE/WEP concludes that TVA had adequate justification to void NCR 4582.

7. References

7.1 TVA, Nonconforming Condition Report (NCR) 4582, January 12, 1983.

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WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ACCEPTANCE OF NDE REPORTS BY A LEVEL I MAGNETIC PARTICLE (MT) INSPECTOR WEP GROUP IDENTIFIER QI-SP-4	Page 3 of 3 Date 08/21/87 Revision 1 WEP Group No 17

7.2 TVA Quality Training Program, Section III-2, "Training, Qualification and Certification Procedure for Nondestructive Examination and Welding Inspection Personnel, Rev. 2, March 25, 1985.

7.3 WEP Assessment Plan No. 017, "Acceptance of NDE Reports by a Level I Magnetic Particle (MT) Examiner," Rev. 0, March 28, 1986.

7.4 TVA Weld Operation Sheets 1-26-F-6-1, 1-26-F-6-2, and 1-26-F-6-3.

7.5 TVA NDE Surface Evaluation Data Sheets D1678, D1679, and D1680.

7.6 TVA, Procedures: WBN-QCI-1-11-2, Rev. 8, October 14, 1986, "Qualification/Certification of Construction Quality Control Inspectors;" WBN-QCP-4.13. Rev. 1, May 11, 1984, "MTM Magnetic Particle Examination;" and WBN-QCP-4.13, Rev. 7, January 17, 1986, "Final Visual Weld Examination."

7.7 TVA, Procedure WBNP-QCI-4.03, "Process Control, Welding Surveillance, and Weld Procedure Assignment, Rev. 5, March 5, 1984.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE "WINDOW" GROUND INTO FIELD WELD WAS NOT RADIOGRAPHED AFTER REPAIR WEP GROUP IDENTIFIER QI-SP-5	Page 1 of 3 Date 11/17/87 Revision 3 WEP Group No 018

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 6575.

2. Characterization of Issue

The Department of Energy/Weld Evaluation Project (DOE/WEP) discovered that to view the repair of Weld 1-0638-D087-14-R1, a "window" was ground into the weld approximately opposite the weld repair area, but after the repair this "window" was never volumetrically examined.

3. Summary

The issue for which the group was formed was resolved by document review and inspection/examination.

4. Evaluation Methodology

The DOE/WEP Assessment Plan No. 018 (Reference 7.3) was developed to inspect/evaluate all repair "windows" to ensure they had been properly repaired and dispositioned. The DOE/WEP identified all large-bore welds with rejected radiography (RT) hold points in which excavation of the root was required to effect the repair. The RTs for these welds were reviewed to ensure that all required repair sectors and potential "window" areas had been radiographed. An examination package was prepared by the DOE/WEP to perform the RTs on any "window" requiring this inspection.

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Form WEP 320a
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE "WINDOW" GROUND INTO FIELD WELD WAS NOT RADIOGRAPHED AFTER REPAIR WEP GROUP IDENTIFIER QI-SP-5	Page 2 of 3 Date 11/17/87 Revision 3 WEP Group No 018

5. Findings

At a time when the size and scope of the DOE/WEP was being determined and the actual weld examination program had not been initiated, a DOE/WEP employee identified a weld repair in which a "window" was ground in a weld approximately opposite the repair area. This "window," when subsequently welded, was not inspected to the requirements of the original weld. This is contrary to Article NB-4453.4 of Reference 7.2 which required examination of weld repairs to be repeated as required by the original weld criteria: Article NB 5220 of Reference 7.2 required that circumferential butt welded joints be radiographed. The concern was documented via the proper procedure in place at that time, the TVA Nonconforming Condition Report (NCR 6575). The DOE/WEP then formed the group based on the employee discovery.

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A review was performed by the DOE/WEP to determine which welds had rejected RT hold points. The applicable Weld Repair Data Sheets were reviewed to determine which welds required excavation down to the root. Approximately 3870 data sheets were reviewed and 634 welds were identified as requiring repair down to the root. Of these, it was further determined that for four welds "window" areas had been used to view the repair. Review of radiographs for the four welds indicated that one weld, 1-0639-D087-14-R1, which was previously identified on NCR 6575, had not had the "window" area radiographed (Reference 7.4). All other welds had been cut out, rewelded, and radiographed (Reference 7.5). As a result, an Examination Package was prepared (Reference 7.6) to perform and document a visual examination and the required RT. TVA performed the RT on May 17, 1986.

In accordance with Reference 7.7, upon evaluation of the radiographic film for Weld 1-0639.D087-14, and review of the TVA documentation, DOE/WEP determined that the technique utilized was correct and the weld meets the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section III (Reference 7.2).

6. Conclusions

It is DOE/WEP's conclusion that, for the issue of concern as specified in the referenced assessment plan, the weld identified meets the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 TVA Nonconforming Condition Report (NCR) 6575.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE "WINDOW" GROUND INTO FIELD WELD WAS NOT RADIOGRAPHED AFTER REPAIR WEP GROUP IDENTIFIER QI-SP-5	Page 3 of 3 Date 11/17/87 Revision 3 WEP Group No 018

7.2 The American Society of Mechanical Engineers, "Rules for Construction of Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code, Section III--Division 1, 1971 Edition with Summer 1973 Addenda (1974 Addition for Heat Treatment).

7.3 DOE/WEP Assessment Plan 018, "Window Ground Into Field Weld Was Not Radiographed After Repair," Rev. 1, November 12, 1987. | DRR WEP 991

7.4 K. G. Therp letter to A. E. Bradford, "Specific Group 18 (QI-SP-5) "Window" Ground Into Field Weld was not Radiographed After Repair," October 6, 1986.

7.5 M. B. McLean Memo to T. Parcell, "WEP Assessment Plan No. 18," April 18, 1986.

7.6 DOE/WEP Examination Package 018-0001.

7.7 R. T. Kay letter to F. C. Fogarty, "Radiographic Review Justification," April 28, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE RECONSTRUCTION OF MISSING WELD MATERIAL REQUISITION CHITS WEP GROUP IDENTIFIER QI-SP-6	Page 1 of 3 Date 11/23/87 Revision 2 WEP Group No 019

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Reports (NCRs) 4390, Revisions 0, 1, and 2.

2. Characterization of Issue

The NCR 4390 identified a problem in which 16 welds attaching lugs to subassemblies at TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1) were performed using weld rod issued incorrectly on a "white" weld material requisition (used for ANSI B31.1 welds) rather than the "green" weld material requisition [used for American Society of Mechanical Engineers (ASME) welds] required by TVA WBNP-QCI-4.01 (Reference 7.2). The "white" weld material requisition chits are discarded at the end of each shift; the "green" weld material requisition chits are retained until all welding required by the Weld Operation Sheet is completed. The 7018 weld rod issued on the "white" weld material requisition was used on ASME Boiler and Pressure Vessel Code, Section III piping systems. The NCR 4390 stated that the weld material requisitions had been reconstructed and that the reconstruction was not done in accordance with TVA procedure WBNP-QCI-1.08 (Reference 7.3). The weld material requisitions were reconstructed to provide the information that was missing from the weld operation sheets. Revision 1 of NCR 4390 was dispositioned to remove the 16 lugs and reinstall them using correctly documented materials. Subsequently, Revision 2 of NCR 4390 revised the disposition to require only reconstructing the documentation.

The Department of Energy/Weld Evaluation Project (DOE/WEP) personnel concluded, based on review of all NCR revisions, that it was

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE RECONSTRUCTION OF MISSING WELD MATERIAL REQUISITION CHITS WEP GROUP IDENTIFIER QI-SP-6	Page 2 of 3 Date 11/23/87 Revision 2 WEP Group No 019

indeterminate whether or not the welds were removed or only the documentation reconstructed. Additionally, it is questionable if the documentation complies with the TVA requirements for reconstruction. | DRR WEP 992

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

The DOE/WEP Assessment Plan 019 (Reference 7.4) was written to perform a document review of the welding documentation for the lugs identified by NCR 4390. The document review was to determine if the lugs were removed and reinstalled using the required documentation per the disposition of NCR 4390, Revision 1, or if the lugs were left in place and the required documentation reconstructed per the disposition of NCR 4390, Revision 2. The document review was also to determine if the information contained in NCR 4390, Revision 2, was correct and within QCI 1.08 requirements for reconstruction of documentation.

5. Findings

The DOE/WEP review of the TVA weld operation sheets showed that the 16 lugs were not removed, but the documentation was reconstructed as required per the disposition of NCR 4390, Revision 2. Documentation was obtained for review per Assessment Plan 019 (Assessment Method Section), with the exception of the Welding Material Requisition Chits that had been discarded. In addition, Inspector's Daily Log Sheets dated October 5, 1982, October 7, 1982, October 8, 1982, and October 12, 1982 (Reference 7.5), were obtained for the inspector who performed inspections on the lugs prior to initiation of NCR 4390, Revision 0. | DRR WEP 992

The inspector log sheets were used by the TVA to reconstruct the information that was missing from the weld operation sheets. The inspector log sheets are for the partially completed welds and one completed weld, providing information on who performed the welding, what weld procedure was used, and also the type weld filler material used.

Review of welding qualifications for the six welders on NCR 4390, Revision 2, has shown that all were qualified to use weld procedure SM-11-B-3A on the thickness and type of material the welding was performed on.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE RECONSTRUCTION OF MISSING WELD MATERIAL REQUISITION CHITS WEP GROUP IDENTIFIER QI-SP-6	Page 3 of 3 Date 11/23/87 Revision 2 WEP Group No 019

Review of documentation for this group has shown that the missing information from the weld operation sheets was reconstructed and documented on NCR 4390, Revision 2, as required. The reconstructed documentation meets the requirements of QCI 1.08. The TVA inspection documentation indicates that all of the lug welds have received acceptable fit-up, final visual, and final liquid penetrant examinations as required by TVA drawing 47B333-0A-03 (Reference 7.7). DRR WEP 992

6. Conclusions

The DOE/WEP concludes the weld documentation evaluated in this group meets the applicable TVA requirements and the welds that remain in the plant were accepted by the TVA in accordance with the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 TVA Nonconforming Condition Reports 4390, Rev. 0, 1, and 2.

7.2 TVA WBNP-QCI-4.01, "Procurement, Storage, Issue, and Control of Welding Materials," Rev. 1, March 11, 1982.

7.3 TVA WBNP-QCI-1.08, "Quality Assurance Records," Rev. 4, November 19, 1982.

7.4 WEP Assessment Plan No. 019, "Reconstruction of Missing Documentation (QI-SP-6)," Rev. 0, March 28, 1986.

7.5 TVA Inspector Log Sheets for Quality Control Inspector J. A. Manning, dated October 5, 1982, October 7, 1982, October 8, 1982, and October 12, 1982.

7.6 TVA Field Weld Operation Sheets, Numbers 1-01-F-1-69, 1-01-F-3-63, 1-01-F-6-37 and 1-01-F-9-5.

7.7 TVA Drawing 47B333-0A-3.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE LOST DOCUMENTATION FOR WELD NUMBER 1-003B-T080-06 WEP GROUP IDENTIFIER QI-SP-7	Page 1 of 2 Date 11/18/87 Revision 3 WEP Group No 020

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ for Lisa C. Fouts

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 5807, Rev. 0 and 1.

2. Characterization of Issue

NCR 5807 identified lost weld documentation for weld number 1-0038-T080-06 which is a weld fabricated to the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section III. The disposition of NCR 5807 was use-as-is based on information entered by TVA Weld Engineering Unit into the "Weld Monitoring Status Report" (Reference 7.2). The Weld Monitoring Status Report does not provide information as to who performed the inspections or what acceptance criteria were used. Since the information available was inconclusive regarding actual inspection of the weld, the inspection to determine acceptability was performed by the Department of Energy/Weld Evaluation Project (DOE/WEP).

3. Summary

The issue for which the group was formed was resolved by inspection/examination and documentation review.

4. Evaluation Methodology

Specific Group 020 was formed by DOE/WEP to assure that weld number 1-0038-T080-06 complied with the requirements of ASME Section III. The DOE/WEP Assessment Plan 020 (Reference 7.3) required a 100% visual examination of weld number 1-0038-T080-06.

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Form WEP 320a
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE LOST DOCUMENTATION FOR WELD NUMBER 1-003B-T080-06 WEP GROUP IDENTIFIER QI-SP-7	Page 2 of 2 Date 11/18/87 Revision 3 WEP Group No 020

5 Findings

Visual examination by the DOE/WEP per Examination Package 020-0001 (Reference 7.4) of weld number 1-003B-T080-06 reported three arc strikes on the base material adjacent to the weld. The three arc strikes were reported on DOE/WEP Deviation Report 020-0001 (Reference 7.5). The deviations required that an engineering analysis be performed to determine acceptability. The TVA performed an evaluation of the effect of the arc strikes on the weld. The evaluation concluded that the three arc strikes which had no associated discrepancies, such as cracks or any reduction in base material thickness below the minimum required, were acceptable and that the presence of the arc strikes does not violate ASME Section III requirements. The DOE/WEP concurred with the results of the TVA's evaluation on Suitability for Service review summary sheet 020-0001 (Reference 7.6). DRR WEP 993

The original weld operation sheet for weld No. 1-003B-T080-06 (Reference 7.7) was found by the TVA Welding Task Group after this group had been formed by the DOE/WEP. If the original weld operation sheet had been included in the package supplied to DOE/WEP this group would never have been formed.

6. Conclusions

The DOE/WEP concludes the weld evaluated in this group meets the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 TVA Nonconforming Condition Report 5807, Rev. 0 and 1.

7.2 TVA Weld Monitoring Status Report for weld number 1-003B-T080-06.

7.3 WEP Assessment Plan No. 020, "Lost Documentation (QI-SP-7)," Rev. 0, March 28, 1986.

7.4 DOE/WEP Examination Package 020-001.

7.5 DOE/WEP Deviation Report 020-0001.

7.6 WEP Suitability for Service Review Summary Sheet 020-0001.

7.7 TVA Weld Operation Sheet for weld Number 1-003B-T080-6.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE STRUCTURAL STEEL PARTITION WALL WEP GROUP IDENTIFIER QI-SP-8	Page 1 of 2 Date 11/18/87 Revision 1 WEP Group No 021

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 3454, Rev. 0.

2. Characterization of Issue

NCR 3454 required TVA to visually inspect a sample of the structural steel partition wall welds (Drawing 48N1322-1) at Elevation 755 of the Control Building at Watts Bar Nuclear Plant Unit 1 (WBNP-1). No documentation could be found to prove that a visual inspection had been performed.

3. Summary

The issue for which this group was formed was evaluated by inspection/examination, and will be resolved upon completion of TVA-committed corrective action.

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4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 21 (Reference 7.2) was developed to perform a 100% visual examination of the welds on the structural steel partition wall to determine the actual field condition of the welds.

5. Findings

The DOE/WEP review of TVA Drawing 48N1322-1 identified 279 welds on the structural steel partition wall. Visual examination performed by

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE STRUCTURAL STEEL PARTITION WALL WEP GROUP IDENTIFIER QI-SP-8	Page 2 of 2 Date 11/18/87 Revision 1 WEP Group No 021

the DOE/WEP per Examination Package 021-0001 (Reference 7.3) noted 118 deviant welds requiring engineering analysis to determine acceptability. The deviations are contained in Reference 7.4.

The deviations were reported on Deviation Report 021-0001 (Reference 7.5). The deviations will be resolved by TVA Corrective Action Plan Summary 021-0001 (Reference 7.6). The Corrective Action Plan has been reviewed and concurred with by DOE/WEP (Reference 7.7).

6. Conclusions

The DOE/WEP concludes that the welds evaluated in this group will meet the applicable Final Safety Analysis Report (FSAR) construction code upon completion of the TVA committed corrective action. DRR WEP 994

7. References

7.1 TVA Nonconforming Condition Report 3454, Rev. 0.

7.2 WEP Assessment Plan No. 021, "Structural Steel Partition Wall (QI-SP-8)," Rev. 0, March 31, 1986.

7.3 DOE/WEP Examination Package 021-0001.

7.4 WEP Group 021, Inspection Data Report on Weld Evaluation Project, INS 101-R1, August 10, 1987, and Inspection Result, INS 009-R0, August 10, 1987.

7.5 WEP Deviation Report 021-0001, July 20, 1986.

7.6 TVA Corrective Action Plan Summary 021-0001, "Structural Steel Partition Wall," June 4, 1987.

7.7 Corrective Action Plan Review Summary Sheet, WEP Group 021, July 17, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE HVAC FRAME NUMBER MK16 WEP GROUP IDENTIFIER (QI-SP-9)	Page 1 of 2 Date 11/18/87 Revision 2 WEP Group No 022

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ For R.C. Hinz

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 4522, Revision 0.

2. Characterization of Issue

HVAC Frame Number MK16 in the Unit 1 Auxiliary Building has an unspecified number of 4 by 5-inch sections cut from the bottom side of the frame and welded back in. According to the NCR the replaced sections appear to have a weld only on the inside and the weld does not fully penetrate the thickness of the member. No written approval can be found to justify the cutting of the frame or the rewelding.

NCR 4522, Rev. 0, was dispositioned by TVA Use-As-Is with no indication of the location, number, weld inspection, or engineering analysis of the cut out and rewelded areas.

3. Summary

The issue for which this group was formed was resolved by inspection/examination, and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan 022 (Reference 7.2) was developed to examine the 4 by 5-inch repair weld sections on HVAC frame number MK16. Repair section welds were to be visually examined (VT) in accordance with Standard Practice (SP) WEP 3.2.3 for full penetration and were to undergo ultrasonic examination (UT) in areas that were inaccessible to VT. Final

DRR WEP 995

DRR WEP 995

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE HVAC FRAME NUMBER MK16 WEP GROUP IDENTIFIER (QI-SP-9)	Page 2 of 2 Date 11/18/87 Revision 2 WEP Group No 022

examination information was to be submitted to TVA for analysis of the frame in the as-built condition.

5. Findings

The DOE/WEP located twelve 4 by 5-inch cut out sections which accounted for a total of 60 welds. The VT and UT performed by the DOE/WEP per Examination Package 022-0001 (Reference 7.3) had noted various weld deviations which are identified in DOE/WEP Examination Package-Related Deviation Report 022-0001 (Reference 7.4). All of the 60 welds exhibited incomplete penetration. Further details of the deviations are noted in Reference 7.5.

An engineering analysis by the Sargent and Lundy Corporation for TVA (Reference 7.6) was performed to determine if the deviant welds would have any effect on the HVAC frames suitability for service. The engineering analysis found the HVAC frame to be suitable for service, and DOE/WEP concurred (Reference 7.7). This analysis is adequate justification to disposition the NCR "use-as-is."

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6. Conclusions

The DOE/WEP concludes the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 TVA Nonconforming Condition Report 4522, Rev. 0.

7.2 WEP Assessment Plan No. 22, "HVAC Frame Number MK 16 (QI-SP-9)," Rev. 5, August 27, 1987.

7.3 DOE/WEP Examination Package 022-0001.

7.4 DOE/WEP Examination Package-Related Deviation Report 022-0001.

7.5 Group 022, "Inspection Data Report on Weld Evaluation Project," INS 101-R1, INS 008-R0, August 11, 1987.

7.6 Sargent and Lundy Engineering Evaluation 022-0001, "Miscellaneous Steel Embedded Parts; Auxiliary Building, Elevation 786.0 ft," Rev. 0, March 28, 1987.

7.7 DOE/WEP Suitability For Service Review Summary Sheet WOR 022-0001, Rev. 0 and 1 (and subsequent packages for Group 022).

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ARC STRIKES ON UNIT 1 REACTOR COOLANT PUMPS 3 AND 4 WEP GROUP IDENTIFIER QI-SP-10	Page 1 of 4 Date 11/18/87 Revision 3 WEP Group No 023

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 1315, Rev. 0.

2. Characterization of Issue

The NCR 1315, Rev. 0 indicated that, following TVA repair of arc strikes on the inside of reactor coolant pump casings at the TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1), inspection was not performed to ensure that minimum casing wall thickness was not violated. The disposition recommended by TVA in NCR 1315 excluded any requirement to measure wall thickness after rework because of a stated minute amount of metal removed (approximately 0.005 to 0.007 inch estimate). Additionally, TVA stated that they did not have proper ultrasonic (UT) equipment available at the time to measure the wall thickness. No other reasons were cited for not making a more positive determination that the minimum wall was present.

DRR WEP 996

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan 023 (Reference 7.5) was developed to perform an investigation to determine whether the reduction of wall thickness necessary to remove

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ARC STRIKES ON UNIT 1 REACTOR COOLANT PUMPS 3 AND 4 WEP GROUP IDENTIFIER QI-SP-10	Page 2 of 4 Date 11/18/87 Revision 3 WEP Group No 023

arc strikes in the reactor coolant pump casings caused a violation of minimum design wall; or determine that the deviation was dispositioned in a manner that provided adequate assurance the part is acceptable in the reworked condition. If the investigation determined that the wall thickness remaining was acceptable, or that the deviation was dispositioned in a manner that provided adequate assurance of component acceptability, the group could be closed.

DRR WEP 996

5. Findings

The Quality Indicator (QI-SP-10) pertained to arc strikes found on the inside of pump casings supplied by Westinghouse for WBNP-1 reactor coolant pumps, Loops 3 and 4. The Westinghouse Nonconformance Reports FDR-WAT-10080 and FDR-WAT-10081 (References 7.2 and 7.3) documented a recommendation of the pump manufacturer for TVA onsite rework of the Loop 3 and 4 pump casings, with instructions as follows: Repair per The American Society of Mechanical Engineers (ASME) Code 1971 Edition, Section III and 1972 Summer Addendum paragraphs NB-2576 and NB-2546 (Reference 7.4). The Westinghouse documented only required repair by buffing and liquid penetrant examination to satisfy the acceptance criteria of the ASME Boiler and Pressure vessel Code. Because of the small amount of metal removed, Westinghouse did not require a measurement of wall thickness. The Westinghouse NCRs, with recommended repair action, have approval signatures of the Westinghouse Field Engineer and Westinghouse Site Manager as authorized by the Supplier Facility, Westinghouse EMD.

A TVA NCR 1315R (Reference 7.1), initiated on the same date as the Westinghouse NCRs FDR-WAT-10080 and FDR-WAT-10081, described the nonconformances as follows: apparent arc strikes, three on the interior surface of Pump Casing 4 at approximately 310 degrees from outlet nozzle and five on the interior surface of Pump Casing 3 at approximately 340 degrees from outlet nozzle. The disposition recommended by the TVA in NCR 1315R was to "use-as-is" after minor buffing of the area removed all visible indications of the apparent arc strike and acid etch and liquid penetrant inspection of the area revealed no surface irregularities. Due to the minute amount of metal removed (approximately 0.005 to 0.007 inch estimate of a 4.5-inch thick component) and a lack of proper ultrasonic equipment to verify wall thickness, the TVA recommended that no further action be taken. Further, it was stated in the NCR 1315R that Westinghouse site personnel (pump manufacturer's representatives) concurred with the disposition recommended by the TVA. This disposition was also concurred with by TVA Engineering Design on NCR 1315R by approval signature and by a TVA memorandum (Reference 7.6).

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ARC STRIKES ON UNIT 1 REACTOR COOLANT PUMPS 3 AND 4 WEP GROUP IDENTIFIER QI-SP-10	Page 3 of 4 Date 11/18/87 Revision 3 WEP Group No 023

A TVA Corrective Action Report 78-1 (Reference 7.7) addresses the corrective action of buffing/grinding affected areas, acid etch, and liquid penetrant inspection on the casing for reactor Coolant Pump 4. Three individual TVA Arc Strike Removal Operation Sheets, Nos. 1-68-F-1-60, 1-68-F-1-61 and 1-68-F-1-62 (References 7.8, 7.9, and 7.10, respectively) were generated to accomplish rework of the three arc strikes on Pump Casing 4. A TVA nondestructive examination (NDE) Surface Evaluation Data Sheet was completed to document each of the rework operations and results of NDE inspection on the three arc strikes of Pump 4. The NDE Data Sheets for 1-68-F-1-60, -61, and -62 are shown by the TVA NDE Surface Evaluation Data Sheets (References 7.11, 7.12, and 7.13, respectively).

A TVA Corrective Action Report 78-2 (Reference 7.14) was generated to address corrective action of buffing/grinding affected areas, acid etch, and liquid penetrant inspection for Reactor Coolant Pump 3. An Arc Strike Removal Operation Sheet 1-68-F-1-63 (Reference 7.15) and NDE Surface Evaluation Data Sheet for 1-68-F-1-63 (Reference 7.16) were generated for rework and inspection of the six arc strikes. These covered all of the arc strikes on the casing of Pump 3 as they were all located in one area. Although the NCR 1315R refers to five arc strikes on the interior surface of the Pump Casing 3, there were actually six arc strikes in a localized area as shown by the sketch of Arc Strike Removal Operation Sheet 1-68-F-1-63.

6. Conclusions

The DOE/WEP concludes the components evaluated in this group were dispositioned in a manner that ensures they meet the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 TVA Nonconforming Condition Report 1315, Rev. 0.

7.2 Westinghouse Nonconformance Report FDR-WAT-10080, December 1, 1978.

7.3 Westinghouse Nonconformance Report FDR-WAT-10081, December 1, 1978.

7.4 The The American Society of Mechanical Engineers, "Rules for Construction of Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code, Section III--Division 1, 1971 Edition with Summer 1973 Addenda (1974 Edition for Heat Treatment).

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WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ARC STRIKES ON UNIT 1 REACTOR COOLANT PUMPS 3 AND 4 WEP GROUP IDENTIFIER QI-SP-10	Page 4 of 4 Date 11/18/87 Revision 3 WEP Group No 023

7.5 WEP Assessment Plan No. 023, "Arc Strikes on Unit 1 Reactor Coolant Pumps 3 and 4 (QI-SP-10)," Rev. 1, February 25, 1987.

7.6 TVA Memorandum, R. M. Pierce to T. B. Northern Jr., Subject: Watts Bar Nuclear Plant Units 1 and 2-NSSS-Contract 71C62-54114-1, Westinghouse Electric Corporation, December 6, 1978.

7.7 TVA Corrective Action Report No. 78-1, November 22, 1978.

7.8 TVA Operation Sheet No. 1-68-F-1-60, November 27, 1978.

7.9 TVA Operation Sheet No. 1-68-F-1-61, November 27, 1978.

7.10 TVA Operation Sheet No. 1-68-F-1-62, November 27, 1978.

7.11 TVA NDE Surface Evaluation Data Sheet, Weld 1-68-F-1-60, November 28, 1978.

7.12 TVA NDE Surface Evaluation Data Sheet, Weld 1-68-F-1-61, November 28, 1978.

7.13 TVA NDE Surface Evaluation Data Sheet, Weld 1-68-F-1-62, November 28, 1978.

7.14 TVA Corrective Action Report No. 78-2, December 1, 1978.

7.15 TVA Arc Strike Removal Operation Sheet No. 1-68-F-1-63, December 2, 1978.

7.16 TVA NDE Surface Evaluation Data Sheet, Weld 1-68-F-1-63, December 3, 1978.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE FAILURE TO IDENTIFY WELDER QUALIFICATION TEST PARAMETERS CORRECTLY ON THE WELDERS PERFORMANCE QUALIFICATION RECORDS WEP GROUP IDENTIFIER QI-SP-12	Page 1 of 3 Date 11/18/87 Revision 2 WEP Group No 025

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ for Dennis Hamilton

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Original Concern(s)/Quality Indicator(s)

Corrective Action Report WB-CAR-85-31 (Reference 7.1).

2. Characterization of Issue

Corrective Action Report WB-CAR-85-31 identified a review of welding qualification records indicated 32 of 270 contained discrepancies. Most were clerical and typographical errors. However, five mechanical maintenance welders had errors in their welder qualification records and may have welded outside the parameters for which they were qualified.

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

In Department of Energy Weld Evaluation Project (DOE/WEP) Assessment Plan 025 (Reference 7.2), the evaluation was to be accomplished in two steps: (1) Determination of the dates of transfer of the five welders from Sequoyah Nuclear Power Plant (SQN) to Watts Bar Nuclear Plant (WBN). (2) Review of Weld Performance Qualification Records and Weld Monitoring Status Reports during the five welders' period of employment at Watts Bar through January 1986, to determine if any welds had been made that were outside the range of thickness specified in the qualification records.

Form WEP 320a
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SEISMIC PIPE SUPPORTS WELD DEFECTS WEP GROUP IDENTIFIER QI-SP-11	Page 2 of 2 Date 08/25/87 Revision 0 WEP Group No 024

5. Findings

The NCR was released April 26, 1983, with the writer's proposed disposition. Engineering Change Notice (ECN) 2555 (Reference 7.3) was issued to correct the drawings. The Department of Energy/Weld Evaluation Project (DOE/WEP) could not locate physical evidence of calculations performed by TVA to evaluate the as-built condition. Upon formation of the WEP Group 024 for evaluation, TVA Engineering performed an engineering analysis of the as-constructed condition to ensure that the deficiencies reported by the NCR would not impair the ability of the hardware involved to perform its safety function (Reference 7.4). Results of the TVA engineering analysis was provided to DOE/WEP for review and concurrence. DOE/WEP reviewed the analysis and concurred with the TVA engineering justification for acceptance of the as-constructed condition (Reference 7.5).

6. Conclusions

The DOE/WEP concludes that the analysis performed by TVA is adequate to disposition the NCR.

7. References

7.1 TVA Nonconforming Condition Report (NCR) 4139, Rev. 0.

7.2 WEP Assessment Plan No. 024, "Deficient Welds," Rev. 1, April 17, 1987.

7.3 Engineering Change Notice 2555, dated October 15, 1982.

7.4 Frank Pickering, Calculations for NCR 4139 Rev. 0, March 26, 1986.

7.5 W. B. Bigney Memo to R. Gunter, November 17, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE FAILURE TO IDENTIFY WELDER QUALIFICATION TEST PARAMETERS CORRECTLY ON THE WELDERS PERFORMANCE QUALIFICATION RECORDS WEP GROUP IDENTIFIER QI-SP-12	Page 1 of 3 Date 11/18/87 Revision 2 WEP Group No 025

Approved [signature] Date 11-27-87

Reviewed [signature] Prepared [signature] for Dennis Harrington

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Original Concern(s)/Quality Indicator(s)

Corrective Action Report WB-CAR-85-31 (Reference 7.1).

2. Characterization of Issue

Corrective Action Report WB-CAR-85-31 identified a review of welding qualification records indicated 32 of 270 contained discrepancies. Most were clerical and typographical errors. However, five mechanical maintenance welders had errors in their welder qualification records and may have welded outside the parameters for which they were qualified.

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

In Department of Energy Weld Evaluation Project (DOE/WEP) Assessment Plan 025 (Reference 7.2), the evaluation was to be accomplished in two steps: (1) Determination of the dates of transfer of the five welders from Sequoyah Nuclear Power Plant (SQN) to Watts Bar Nuclear Plant (WBN). (2) Review of Weld Performance Qualification Records and Weld Monitoring Status Reports during the five welders' period of employment at Watts Bar through January 1986, to determine if any welds had been made that were outside the range of thickness specified in the qualification records.

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE FAILURE TO IDENTIFY WELDER QUALIFICATION TEST PARAMETERS CORRECTLY ON THE WELDERS PERFORMANCE QUALIFICATION RECORDS WEP GROUP IDENTIFIER QI-SP-12	Page 2 of 3 Date 11/18/87 Revision 2 WEP Group No 025

5. Findings

It was found that only one of the five welders in question had been transferred from SQN to WBN. The exact date of transfer could not be established by DOE/WEP. Therefore, all retained WBN welding records pertaining to the welder were reviewed 100% to determine if he performed any welding out of the ranges he was qualified for.

The other four welders were transferred from WBN construction welding to WBN Mechanical Maintenance welding.

Mechanical Maintenance does not have a Weld Monitoring Status Report. Therefore, DOE/WEP reviewed the Mechanical Maintenance weld rod issue cards, maintenance requests and work plans. The weld rod issue cards document the date welding was performed and reference the maintenance requests and/or work plans. The referenced maintenance requests and work plans contained information on the thickness of material welded. This information was used to determine if any weld had been made that was outside the range of thickness specified on the Weld Performance Qualification Records.

Tennessee Valley Authority (TVA) mechanical maintenance is required by TVA procedure AI-9.4.2 (Reference 7.3) to retain weld documentation on Critical Safety System Components (CSSC), but is not required to retain weld records on non-CSSC systems. Therefore, only CSSC weld records were reviewed.

The review of Mechanical Maintenance documentation for the period in question (1979-1986) showed that none of the five welders had made any welds outside of their area of qualification (Reference 7.4).

DRR WEP 997

6. Conclusions

The DOE/WEP concludes that the documentation reviewed in this group meets the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 Corrective Action Report WB-CAR-85-31, dated September 30, 1985.

7.2 WEP Assessment Plan No. 025, "Failure to Identify Welders Qualification Test Parameters Correctly on the Welders Performance Qualification Records," Rev. 0, March 31, 1986.

Form WEP 320a
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE FAILURE TO IDENTIFY WELDER QUALIFICATION TEST PARAMETERS CORRECTLY ON THE WELDERS PERFORMANCE QUALIFICATION RECORDS WEP GROUP IDENTIFIER QI-SP-12	Page 3 of 3 Date 11/18/87 Revision 2 WEP Group No 025

7.3 TVA WBNP Administrative Instruction A1-9.4.2, Rev. 6, Control of Weld Documentation, Paragraph 2.

7.4 R. C. Hinz notegram to A. E. Bradford Justification for Closure, EG&G Idaho, Inc., dated September 4, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --------- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SPECIFIC HVAC SUPPORTS NOT INSPECTED WEP GROUP IDENTIFIER QI-SP-13	Page 1 of 3 Date 11/18/87 Revision 3 WEP Group No 026

Approved [signature] Date 11-27-87

Reviewed [signature] Prepared [signature] for Dennis Hearaveston

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 3450, Revision 0.

2. Characterization of Issue

Two Type 47A055-208 Heating, Ventilating, and Air Conditioning (HVAC) supports identified on NCR 3450 as support Numbers 0-65-RB-H-2001 and 0-65-RB-H-2002 (identified in Drawings 1065-DW915-15H-2001 and 1065-DW915-15H-2002) (Reference 7.2) were reported as inaccessible on NCR 3450, which calls out welds that were not inspected due to inaccessibility. NCR 3450 was marked void without any type of justification.

3. Summary

The issue for which this group was formed was resolved by inspection/examination, document review, and engineering analysis. DRR WEP 998

4. Evaluation Methodology

Because no inspection was performed on inaccessible welds and no justification was found for voiding NCR 3450, the Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan 026 (Reference 7.3) called for a 100% visual examination per Standard Practice (SP) Weld Evaluation Project (WEP) 3.2.3.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SPECIFIC HVAC SUPPORTS NOT INSPECTED WEP GROUP IDENTIFIER QI-SP-13	Page 2 of 3 Date 11/18/87 Revision 3 WEP Group No 026

Two examination packages (Reference 7.4) were prepared for visual examination of HVAC duct supports 0-65-RB-H-2001 and 0-65-RB-H-2002. Review of Drawing 47A055-208, components 0-65-RB-H-2001 and 0-65-RB-H-2002 disclosed a total of 64 welds per support within the boundary of inspection.

5. Findings

NCR 3450 reported the subject welds inaccessible apparently due to close proximity of the crossbracing; however, the DOE/WEP found adequate space to complete a visual examination.

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Visual examination of the welds performed by DOE/WEP per Examination Packages 026-0001 and 026-0002 were documented as having missing welds that required engineering analysis to determine acceptability.

The TVA performed a Suitability-for-Service (SFS) analysis from the weld inspection information provided by the DOE/WEP. The DOE/WEP reviewed the TVA's stress calculations (Reference 7.5) and concluded that stresses have been correctly calculated and conclusions relative to stresses being within code allowables were correctly stated.

Subsequently, two TVA Support Variance Sheets (SVS) No. MSS-208-1 and No. MSS-208-2 (Reference 7.6), which deleted inaccessible welds on tube steel cross bracing, were found by DOE/WEP during normal document review activities. Welds found to be missing in Packages 026-0001 and 026-0002 were the same welds that were deleted by SVS No. MSS-208-1 and No. MSS-208-2.

The DOE/WEP revised Examination Packages 026-0001 and 026-0002 (Reference 7.4) to include SVS No. MSS-208-1 and SVS No. MSS-208-2. The addition of the SVSs deleted the requirement for welds and therefore eliminated the deviations as reportable deficient conditions.

The voiding of NCR 3450 (dated July 12, 1981) may be attributed to the SVS (dated July 2, 1981) which deleted the welds in question, but was not referenced as justification on the NCR.

The identified SVSs apply only to the referenced supports in NCR 3450.

6. Conclusions

The DOE/WEP concludes that the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SPECIFIC HVAC SUPPORTS NOT INSPECTED WEP GROUP IDENTIFIER QI-SP-13	Page 3 of 3 Date 11/18/87 Revision 3 WEP Group No 026

7. References

7.1 TVA NCR 3450, Rev. 0.

7.2 TVA Drawings 1065-DW915-15H-2001 and 1065-DW915-15H-2002.

7.3 DOE/WEP Assessment Plan 026, "Specific HVAC Supports Not Inspected," Rev. 1, June 15, 1987.

7.4 DOE/WEP Examination Packages 026-0001 and 026-0002.

7.5 DOE/WEP Suitability for Service Review Summary Sheet WDR 026-0001, Rev. 1, December 31, 1986 and WDR 026-0002, Rev. 2, December 1, 1986.

7.6 TVA Support Variance Sheets (SVS) Numbers MSS-208-2 and MSS-208-1.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ASME SECTION III HYDROSTATIC TEST ON REWORKED PIPE WELDS WEP GROUP IDENTIFIER QI-SP-14	Page 1 of 3 Date 11/18/87 Revision 2 WEP Group No 027

Approved [signature] Date 11-27-87

Reviewed [signature] Prepared [signature] for Richard C. Hine

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 3782, Rev. 0, 1, and 2.

2. Characterization of Issue

NCR 3782, Revisions 0 and 1 identified various piping welds, fabricated in accordance with American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code Section III, which had been reworked resulting in penetration of the pressure boundaries. NCR 3782, Revision 2 identified welds that were reworked without their pressure boundaries being penetrated and also deleted the welds covered under Revisions 0 and 1. If a pressure boundary weld which was already hydrostatically tested is penetrated, the weld must be hydrostatically retested per ASME Section III, Article NB-6110 (Reference 7.2). The information contained in the NCR was insufficient to provide assurance that ASME Code requirements for hydrostatic testing had been completed following rework of the pressure boundary welds.

3. Summary

The issue for which the group was formed was resolved by document review.

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ASME SECTION III HYDROSTATIC TEST ON REWORKED PIPE WELDS WEP GROUP IDENTIFIER QI-SP-14	Page 2 of 3 Date 11/18/87 Revision 2 WEP Group No 027

4. Evaluation Methodology

The DOE/WEP Assessment Plan 027 (Reference 7.3) was written to perform a review of hydrostatic test packages for the following weld numbers that were noted in NCR-3782.

1-003A-T003-22	1-015A-T001-18A
1-003A-T004-13	1-015A-T003-01
1-003A-T005-27	1-015A-T003-20
1-003A-T065-3B	1-015A-T008-01
1-003B-D001-6P	1-015A-T008-20
1-003B-D003-04A	1-015A-T014-01
1-015-T001-01	1-015A-T014-20

5. Findings

The review of TVA hydrostatic test packages (Reference 7.4) for the 14 welds above has shown the welds were hydrostatically tested after they were reworked. The hydrostatic tests performed satisfied the minimum test pressure of 1481 psi as required by Article NB-6110 of Reference 7.2 and as noted in Reference 7.5.

6. Conclusions

The DOE/WEP concludes the TVA documentation evaluated in this group provides assurance that the applicable Final Safety Analysis Report (FSAR) construction code requirements for hydrostatic testing had been completed following rework of the pressure boundary welds.

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7. References

7.1 TVA Nonconforming Condition Report 3782, Rev. 0, 1, and 2.

7.2 The American Society of Mechanical Engineers "Rules for Construction of Nuclear Power Plant Components," ASME Boiler and Pressure Vessel Code, Section III--Division 1, 1971 Edition with Summer 1973 Addenda (1974 Edition for Heat Treatment).

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7.3 WEP Assessment Plan No. 027, "ASME Section III Hydro Test-vs-American National Standards Institute B31.1 Pressure Test on Steam Generators and Associated Piping (QI-SP-14)," Rev. 0, April 10, 1986.

7.4 TVA Hydrostatic Test Packages: 1-001-47W801-1-3-B, 1-015-47W801-2-3-01, 1-015-47W801-2-3-02, 1-015-47W801-2-3-03, 1-015-47W801-2-3-04.

Form WEP 320a
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ASME SECTION III HYDROSTATIC TEST ON REWORKED PIPE WELDS WEP GROUP IDENTIFIER QI-SP-14	Page 3 of 3 Date 11/18/87 Revision 2 WEP Group No 027

7.5 C. V. Dyer notegram to A. E. Bradford "Potential Closure of Specific 027," EG&G Idaho, Inc., April 15, 1986. DRR WEP 999

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Form WEP 320
Rev. 12/86

WEP Closure Statement — Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SUSPECT WELD(S) ON DIESEL AIR DRYER 1A-1 WEP GROUP IDENTIFIER QI-SP-15	Page 1 of 2 Date 11/18/87 Revision 2 WEP Group No 028

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. **Employee Concern(s)/Quality Indicator(s)**
2. **Characterization of Issue**
3. **Summary**
4. **Evaluation Methodology**
5. **Findings**
6. **Conclusions**
7. **References**

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Corrective Action Report (CAR) 82-10.

2. Characterization of Issue

The CAR 82-10 identified welding performed on Diesel Air Dryer 1A-1, at TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1), without approved instructions. The recommended corrective action defined the cause and steps to prevent recurrence, inclusively. However, the recommended corrective action did not address or provide a resolution for the deficiency.

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 028 (Reference 7.2) was developed to evaluate the activities associated with the welding methodology employed on Diesel Air Dryer 1A-1. The DOE/WEP method used to evaluate Group 028 consisted of:

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a. Determining the weld covered by CAR 82-10

b. Performing a detailed document review of the identified weld to determine if the deficiency reported by CAR 82-10 had been corrected.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE SUSPECT WELD(S) ON DIESEL AIR DRYER 1A-1 WEP GROUP IDENTIFIER QI-SP-15	Page 2 of 2 Date 11/18/87 Revision 2 WEP Group No 028

5. Findings

To further define the deficiency, at the DOE/WEP's request, the TVA provided the following information (Reference 7.3): Air Dryer 1A-1 base plate (Weld 1A-1-BP-1) was plug welded using a brass backing plate in lieu of comparable material (carbon steel), as specified in TVA Process Specification (PS) 1.M.1.2(C), Paragraph 13.0 (Reference 7.4).

The DOE/WEP performed a detailed document review of the documentation associated with Weld 1A-1-BP-1 and determined that Work Plan (WP) Instructions 1812-Rev. 2, Step 38 (Reference 7.5) identified the process taken by the TVA to rework the nonconforming condition (Weld 1A-1-BP-1). WP 1812-Revision 2 defined the description of work, instructions, and inspections necessary, for Weld 1A-1-BP-1 to conform to the original TVA requirements of WP-1812-Rev. 1 (Reference 7.5). The TVA Weld Data Sheet (Reference 7.5) documented the acceptance of the reworked weld.

Therefore, the DOE/WEP determined that the corrective action taken by TVA rendered the weld acceptable to the original TVA requirements.

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6. Conclusions

The DOE/WEP concludes that the welds evaluated by this group were repaired and inspected in accordance with the applicable Final Safety Analysis Report (FSAR) construction code.

7. References

7.1 TVA Corrective Action Report (CAR) 82-10, September 17, 1982.

7.2 WEP Assessment Plan No. 028, "Suspect Welds on Diesel Air Dryer 1A-1," Rev. 0, June 21, 1986.

7.3 Gary Pitzel TVA memo, to Mick Gray, "Corrective Action Report No. 82-10, Workplan 1812," March 19, 1986.

7.4 TVA, Process Specification (PS) 1.M.1.2 Rev. C, May 20, 1981, "General Welding Procedure."

7.5 TVA, Work Plan "Work Plan Change Form," 1812, Attachment C, Rev. 1, September 4, 1982, and Rev. 2, October 7, 1982, and TVA Weld Data Sheet.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE UNDERSIZE SOCKET WELDS ON ASME PIPING WEP GROUP IDENTIFIER QI-SP-16	Page 1 of 3 Date 11/18/87 Revision 3 WEP Group No 029

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 5495.

2. Characterization of Issue

The NCR 5495 was initiated to address the substitution of Schedule 80 pipe in lieu of the required Schedule 40 pipe for System 67, essential raw cooling water (ERCW) 1/2 inch vent line Weld Numbers 1-067C-T260-74 through -77, 1-067C-T407-01 and -02, and 1-067C-T406-01 and -02 at TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1). The disposition of the NCR did not address the increase in weld size required for the Schedule 80 pipe. Subsequently, the TVA did not perform a reinspection to ensure that the socket weld size was adequate for the Schedule 80 pipe.

DRR WEP 1001

3. Summary

The issue for which the group was formed was resolved by inspection/examination and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 029 (Reference 7.2) was developed to ensure that the minimum socket weld size met the requirements of the substituted Schedule 80 pipe, where Schedule 40 pipe was originally required. The minimum socket weld size was determined in accordance with The American

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE UNDERSIZE SOCKET WELDS ON ASME PIPING WEP GROUP IDENTIFIER QI-SP-16	Page 2 of 3 Date 11/18/87 Revision 3 WEP Group No 029

Society of Mechanical Engineers (ASME) Code, Section III, Paragraph NB-4427, and Figure NB-4427-1 (Reference 7.3) and the Standard Practice (SP) WEP 3.2.3, Appendix A (Reference 7.4).

The DOE/WEP method used to evaluate Quality Indicator, QI-SP-16, consisted of a 100% visual examination of the welds identified in Section 2, in accordance with SP WEP 3.2.3, Appendix A (Reference 7.4). DRR WEP 1001

Any unacceptable conditions found as a result of this examination were reviewed in conjunction with TVA Engineering Design organization for resolution.

5. Findings

The DOE/WEP visual examination (VT) of the identified welds determined that:

a. Socket Weld Numbers 1-067C-T260-74 and -75, 1-067C-T407-01 and -02, and 1-067C-T406-01 and -02 were inspected and documented as being in compliance with the ASME Code.

b. Socket Weld Numbers 1-067C-T260-76 and -77 were inspected and documented as having insufficient weld size that required engineering analysis to determine acceptability. Deviation Report (DR) Numbers 029-0003 and 029-0004 were generated to identify the deviant conditions (Reference 7.5). The required socket weld size is 0.160 inch. The subject welds were undersize approximately less than 1/64 inch to less than 1/32 inch for 50 to 75% around the pipe.

The results of these examinations were forwarded to the TVA Engineering Design organization for resolution. The TVA determined that the welds installed are larger than the original design requirements for Schedule 40 pipe, and meet the requirements of the ASME Code.

The DOE/WEP Suitability for Service Evaluation Engineering group performed a review of the TVA engineering analysis (Reference 7.6), and determined that the nonconforming conditions identified have been demonstrated by appropriate evaluations to be in compliance with the provisions of ASME Code, Section III (Reference 7.7). DRR WEP 1001

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE UNDERSIZE SOCKET WELDS ON ASME PIPING WEP GROUP IDENTIFIER QI-SP-16	Page 3 of 3 Date 11/18/87 Revision 3 WEP Group No 029

6. Conclusion

The DOE/WEP concludes that the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code. DRR WEP 1001

7. References

7.1 TVA, Nonconforming Condition Report No. 5495, March 8, 1984.

7.2 WEP Assessment Plan No. 029, "Undersize Socket Welds on ASME Piping," Rev. 1, November 5, 1987. DRR WEP 1001

7.3 The American Society of Mechanical Engineers, "Fabrication," ND 4000 ASME Boiler and Pressure Vessel Code, Section III--Division 1, 1971 Edition with Summer 1973 Addenda (1974 Edition for Heat Treatment). DRR WEP 1001

7.4 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, Appendix A, June 2, 1987.

7.5 DOE/WEP DR Nos. 029-0003 and 029-0004.

7.6 TVA Suitability for Service Analysis and WEP Suitability for Service Review Summary Sheets Analysis Package WDR 029-0003 and WDR 029-004.

7.7 The American Society of Mechanical Engineers, "Design," ND3000, ASME Boiler and Pressure Vessel Code, Section III--Division 1, 1971 Edition with Summer 1973 Addenda (1974 Edition for Heat Treatment). DRR WEP 1001

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE WELDING OUTSIDE OF LIMITATIONS WEP GROUP IDENTIFIER QI-SP-17	Page 1 of 3 Date 11/18/87 Revision 2 WEP Group No 030

Approved _____ Date 11-27-87

Reviewed _____ Prepared David Poke

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Reports (NCRs) 5304, Rev. 0; and 5330, Rev. 0.

2. Characterization of Issue

The Nonconforming Condition Reports (NCRs) in Section 1 all concern specific welds made by allegedly uncertified welders at TVA's Watts Bar Nuclear Plant Unit 1 (WBNP-1). During the initial DOE/WEP evaluation of TVA NCRs the justification used for disposition of these NCRs was questioned. The specific problem of each NCR and questionable disposition is detailed as follows:

NCR 5304--The Feedwater System had nine specific welds that were identified as having been performed by an uncertified welder (6JJT). The questionable justification for the disposition of this NCR appears to be erroneous for a "use-as-is" disposition. ASME code indicates a change in weld filler F-number is a requalification requirement.

NCR 5330--The Essential Raw Cooling Water System had one weld that was discovered to have been performed without verification that the welder (6QB) was certified to use the filler metal indicated. The questionable justification for the disposition of this NCR appears to be erroneous for a "use-as-is" disposition. The ASME code indicates a change in weld filler F-number is a requalification requirement.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE VESSEL PENETRATION SLEEVES WITH CONFLICTING WELD PREPARATION THICKNESS WEP GROUP IDENTIFIER Q1-SP-18	Page 1 of 4 Date 11/18/87 Revision 1 WEP Group No 031

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ for A.E. Bemford

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 1047 R, Revision 0.

2. Characterization of Issue

NCR 1047R was issued to document a condition where the machined weld preparations of five containment vessel penetration sleeves did not meet the dimensional tolerances specified on the design drawings. The sleeves had been installed and the discrepancies were noted while attempting weld fit-up with the mating components. The TVA disposition of the NCR indicated the condition could be corrected by repair/rework of the mating bellows nozzles.

The DOE/WEP review of the information contained within the NCR and supporting documentation raised questions concerning whether the proposed rework could be accomplished and whether the end result would be in compliance with the applicable code requirements.

3. Summary

The issue for which the group was formed was evaluated by document review, ultrasonic thickness measurements, and engineering analysis.

4. Evaluation Methodology

The DOE/WEP assessment of this issue (Reference 7.2) required a review of the fabrication and inspection records associated with the subject penetrations to assure that the repair and subsequent fit-up was

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE WELDING OUTSIDE OF LIMITATIONS WEP GROUP IDENTIFIER QI-SP-17	Page 3 of 3 Date 11/18/87 Revision 2 WEP Group No 030

6. Conclusions

The DOE/WEP concludes the welders evaluated in this group were qualified to the applicable Final Safety Analysis Report (FSAR) construction code.

DRR WEP 1002

7. References

7.1 TVA Nonconforming Condition Reports 5304, and 5330.

7.2 WEP Assessment Plan No. 030, "Welding Outside of Limitations," Rev. 1, March 25, 1987.

7.3 D. Cochran notegram to A. E. Bradford, "Closure of Group 30 (QI-SP-17)," EG&G Idaho, Inc., April 19, 1986.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE VESSEL PENETRATION SLEEVES WITH CONFLICTING WELD PREPARATION THICKNESS WEP GROUP IDENTIFIER Q1-SP-18	Page 1 of 4 Date 11/18/87 Revision 1 WEP Group No 031

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ for A.E. Desmond

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 1047 R, Revision 0.

2. Characterization of Issue

NCR 1047R was issued to document a condition where the machined weld preparations of five containment vessel penetration sleeves did not meet the dimensional tolerances specified on the design drawings. The sleeves had been installed and the discrepancies were noted while attempting weld fit-up with the mating components. The TVA disposition of the NCR indicated the condition could be corrected by repair/rework of the mating bellows nozzles.

The DOE/WEP review of the information contained within the NCR and supporting documentation raised questions concerning whether the proposed rework could be accomplished and whether the end result would be in compliance with the applicable code requirements.

3. Summary

The issue for which the group was formed was evaluated by document review, ultrasonic thickness measurements, and engineering analysis.

4. Evaluation Methodology

The DOE/WEP assessment of this issue (Reference 7.2) required a review of the fabrication and inspection records associated with the subject penetrations to assure that the repair and subsequent fit-up was

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE VESSEL PENETRATION SLEEVES WITH CONFLICTING WELD PREPARATION THICKNESS WEP GROUP IDENTIFIER Q1-SP-18	Page 2 of 4 Date 11/18/87 Revision 1 WEP Group No 031

accomplished in accordance with the applicable code requirements. Additionally, the as-built wall thicknesses for each penetration sleeve and mating pipe wall were measured.

5. Findings

The DOE/WEP performed a detailed review of the available documentation associated with each of the final welds joining the five subject penetrations. The Field Weld Operation Sheets for each weld (References 7.3, 7.4, 7.5, 7.6 and 7.7) indicate fitup inspections were verified by both the TVA inspector and the Authorized Nuclear Inspector. The TVA Nondestructive Examination (NDE) Reports for each weld (References 7.8, 7.9, 7.10, 7.11, and 7.12) indicated that the welds were initially rejected. The deviant conditions were corrected by grinding the inside root area of each weld and the ground areas were re-radiographed and accepted by TVA.

Based upon this review the DOE/WEP concluded that TVA had achieved weld fitup for each penetration and documented acceptance of the final welds.

The DOE/WEP measured the as-built wall thicknesses of the mating components and identified several areas where the specified wall thickness had been encroached upon. The readings taken (Reference 7.13) were analyzed by TVA (Reference 7.14) and found to be within design allowable values. The DOE/WEP reviewed the calculations and concurred with the results.

The DOE/WEP reviewed the radiographic film associated with the subject penetrations while performing evaluations required by WEP Groups 249 and 253. The welds/radiographs of four of the five subject penetrations were found to be unacceptable (References 7.15, 7.16, 7.17 and 7.18). The deficiencies are as follows:

Penetration Number	Weld ID Number	Deficiency
13A	1-001A-D001-05A	Aligned Porosity (WEP DR-249-0020)
13B	1-001A-D003-05A	None
13C	1-001A-D006-05A	Incomplete Fusion and Porosity (WEP DR-249-1783)
12B	1-003B-D002-14A	Root Concavity (Film Density) (WEP DR-258-613)
12C	1-003B-D002-06A	Incomplete Penetration and Root Concavity (Film Density) (WEP DR-258-0612)

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE VESSEL PENETRATION SLEEVES WITH CONFLICTING WELD PREPARATION THICKNESS WEP GROUP IDENTIFIER Q1-SP-18	Page 3 of 4 Date 11/18/87 Revision 1 WEP Group No 031

The fact that TVA had accepted the radiographs is attributed to the problems with film interpretation that have already been identified by the DOE/WEP. Groups 249, 253 and 258 wer formed to address this issue and have resulted in review of 100% of the TVA made welds requiring radiographic examination. The welds that are defective will be resolved by the TVA corrective action (Reference 7.19). The DOE/WEP has reviewed and concurred with the TVA Corrective Action Plan. DRR WEP 1003

6. Conclusions

The DOE/WEP concludes the welds in this group will meet the applicable Final Safety Analysis Report (FSAR) construction code upon completion of the TVA committed corrective action.

7. References

7.1 TVA Nonconforming Condition Report, 1047R.

7.2 WEP Assessment Plan No. 031, "Containment Vessel Penetration to Bellows Nozzle Fitup Verification (Q1-SP-18)," Rev. 3, June 19, 1987.

7.3 TVA Field Weld Operation Sheet, No. 7223 (Weld Number 1-001A-D001-05A, Penetration Number 13A).

7.4 TVA Field Weld Operation Sheet, No. 7082 (Weld Number 1-001A-D003-05A, Penetration Number 13B).

7.5 TVA Field Weld Operation Sheet, No. 7083 (Weld Number 1-001A-D006-05A, Penetration Number 13C).

7.6 TVA Field Weld Operation Sheet, No. 7085 (Weld Number 1-003B-D002-14A, Penetration Number 12B).

7.7 TVA Field Weld Operation Sheet, No. 7084 (Weld Number 1-003B-D002-06A, Penetration 12C).

7.8 TVA NDE Reports for Weld Number 1-001A-D001-05A (Penetration 13A).

7.9 TVA NDE Reports for Weld Number 1-001A-D003-05A (Penetration 13B).

7.10 TVA NDE Reports for Weld Number 1-001A-D006-05A (Penetration 13C).

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE VESSEL PENETRATION SLEEVES WITH CONFLICTING WELD PREPARATION THICKNESS WEP GROUP IDENTIFIER Q1-SP-18	Page 4 of 4 Date 11/18/87 Revision 1 WEP Group No 031

7.11 TVA NDE Reports for Weld Number 1-003B-D002-14A (Penetration 12B).

7.12 TVA NDE Reports for Weld Number 1-003B-D002-06A (Penetration 12C).

7.13 Don Armour notegram to Dennis Headington, "WEP Group Number 31 "D" meter readings with "D" meter Number 489575," EG&G Idaho, Inc. July 13, 1987.

7.14 TVA Design Calculations, "Design Control Summary Design verification, Code. No. WB-031-xxxx," Sargent & Lundy, July 30, 1987.

7.15 Form WEP 313, "WEP Examination Package-Related Deviation Report," Number DR 249-0020, (Weld Number 1-001A-D006-05A).

7.16 Form WEP 313, "WEP Examination Package-Related Deviation Report," Number DR 249-1783, (Weld Number 1-001A-D006-05A).

7.17 Form WEP 313, "WEP Examination Package-Related Deviation Report," Number DR 258-0613, (Weld Number 1-003B-D002-14A).

7.18 Form WEP 313, "WEP Examination Package-Related Deviation Report," Number DR 258-0612, (Weld Number 1-003B-D002-06A).

7.19 TVA Corrective Action Plan Summary, "RT Review Populations A, B, 034, 210, 249, 253, and 258," Rev. 1, July 17, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	QUALITY INDICATOR GROUP CLOSURE LACK OF JUSTIFICATION FOR USE-AS-IS DISPOSITION ON SEISMIC PIPE SUPPORT 70-1CC-R487 WEP GROUP IDENTIFIER QI-SP-19	Page 1 of 3 Date 11/18/87 Revision 3 WEP Group No 032

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 4477, Revision 0.

2. Characterization of Issue

Seven welds on Seismic Pipe Support 70-1CC-R487 described by Drawing 70-1CC-R487 (Reference 7.2) were reported as deficient on NCR 4477. The reported nonconforming conditions included undercut, slag inclusions, lack of fusion, and undersize welds at TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1). The nonconforming welds were dispositioned use-as-is without enough information supplied in the NCR to support the disposition as required by TVA Quality Assurance Procedure (QAP) 15.01, (Reference 7.3).

3. Summary

The issue for which the group was formed was resolved by inspection/examination and engineering analysis.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 032 (Reference 7.4) was developed to perform a visual examination of all welds on Seismic Pipe Support 70-1CC-R487 using Standard Practice (SP) WEP 3.2.3, Form 305, Visual Examination Record for Nuclear Construction Issues Group NCIG-01 Welds (Reference 7.5). Group 032 was formed to ensure that there was proper technical

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WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE LACK OF JUSTIFICATION FOR USE-AS-IS DISPOSITION ON SEISMIC PIPE SUPPORT 70-1CC-R487 WEP GROUP IDENTIFIER QI-SP-19	Page 2 of 3 Date 11/18/87 Revision 3 WEP Group No 032

justification for the use-as-is disposition of NCR 4477. The DOE/WEP visual examination results (using NCIG-01 acceptance criteria) were to be used to supply the TVA engineers (performing the required suitability for service analysis) with information on any nonconforming weld conditions found in order to evaluate the welds in their as-constructed condition.

DRR WEP 1004

5. Findings

Visual examination performed by the DOE/WEP per Examination Package 032-0001 (Reference 7.6) of the welds revealed two undersize fillet welds which were reported on DOE/WEP Deviation Report 032-0001 (Reference 7.7).

The TVA performed a suitability for service analysis from the weld inspection information provided by the DOE/WEP. The DOE/WEP engineers reviewed the TVA's stress calculations (per SP WEP 3.3.1, SFS Evaluation Review Reference 7.8) which were performed assuming all inside welds were missing and all outside welds were only 50% of their required length; this is a far more conservative analysis than if performed using the weld inspection deviations noted by the TVA or the DOE/WEP. The DOE/WEP engineers have concurred with the acceptable results of the SFS analysis performed by the TVA.

The use-as-is disposition of NCR 4477 was justified by the TVA using a conservative SFS analysis in which the TVA found the as-constructed condition of the component acceptable for its intended use. The use of an acceptable analysis by the TVA to use the welds in their as-constructed condition satisfies the requirements of the TVA procedure QCI 1.02.

Following formation and examination of this group it was determined from the information provided to the DOE/WEP that engineering calculations had been prepared by the TVA to support the original NCR disposition. Had these calculations been referenced on the NCR this group may have not been formed.

6. Conclusions

The DOE/WEP concludes that the use-as-is disposition of the component is acceptable for its intended use, and the welds evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE LACK OF JUSTIFICATION FOR USE-AS-IS DISPOSITION ON SEISMIC PIPE SUPPORT 70-1CC-R487 WEP GROUP IDENTIFIER QI-SP-19	Page 3 of 3 Date 11/18/87 Revision 3 WEP Group No 032

7. References

7.1 TVA Nonconforming Condition Report 4477, Rev. 0.

7.2 TVA Drawing 70-1CC-R487, Rev. 901, July 27, 1977.

7.3 TVA Quality Assurance Procedure QAP 15.01, "Control of Nonconformances," Rev. 3, June 6, 1978.

7.4 WEP Assessment Plan No. 032, "Defective Welds (QI-SP-19)," Rev. 2, April 10, 1986.

7.5 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987.

7.6 DOE/WEP Examination Package 032-0001.

7.7 DOE/WEP Deviation Report 032-0001, May 13, 1986.

7.8 Standard Practice WEP 3.3.1, "Suitability for Service Analysis Review," Rev. 8, June 8, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE POOR QUALITY OF WEL _ ON A HANGER INSTALLED IN UNIT 1 SOUTH VALVE ROOM WEP GROUP IDENTIFIER EC-SP-16	Page 1 of 4 Date 11/18/87 Revision 1 WEP Group No 033

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____ FOR LOWRY E. SCHLICK

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concerns IN-85-085-001 and IN-85-085-002

2. Characterization of Issue

The two employee concerns addressed the quality of pipe support (hanger) welds in the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1) South Valve Room (SVR). In addition, these employee concerns addressed the following: (a) Employee Concern IN-85-085-001 stated that the hanger was installed two weeks prior to hot functional testing, and (b) Employee Concern IN-85-085-002 questioned how these poor quality hanger welds passed quality control (QC) inspection. The concerned individual (CI) felt the inspection reports were falsified by QC inspectors.

DRR WEP 1005

3. Summary

The issue for which the group was formed was resolved by document review and inspection/examination.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 033 (Reference 7.2) was developed to perform an engineering walkdown and visual inspection for the purpose of isolating the particular hanger referenced by the CI. After isolating the hanger, the DOE/WEP visually examined the subject welds.

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE POOR QUALITY OF WELDS ON A HANGER INSTALLED IN UNIT 1 SOUTH VALVE ROOM WEP GROUP IDENTIFIER EC-SP-16	Page 2 of 4 Date 11/18/87 Revision 1 WEP Group No 033

5. Findings

The DOE/WEP identified four pipe supports (listed below) between 1-M line and 11-M line, at the 754 ft-10 in. elevation (Reference 7.3)

a. MK-038-1AFW-V177 (Auxiliary Feedwater)
b. MK-01A-315 (Main Steam)
c. MK-01A-427 (Main Steam)
d. MK-01A-437 (Main Steam).

In order to determine which of the four pipe supports the CI was referencing, a review was conducted of when hot and mini-hot functional testing was performed. Then, a review of the visual weld inspection cards was performed.

A DOE/WEP search for information on hot functional testing documentation identified test data package transmittals (References 7.4 and 7.5) for Reactor Coolant System Heatup and Reactor Coolant System Hot Functional Testing. This testing included the Auxiliary Feedwater System (System 003) and other systems found in the SVR. The package for Test No. W-1.1 indicated that field preoperational testing was conducted from May 13, 1983, to July 17, 1983. The package for Test No. W-1.2 indicated that hot functional testing was conducted from July 17, 1983, to August 19, 1983. Mini-hot functional testing was conducted in the SVR from July 26, 1984, to September 11, 1984 (Reference 7.6).

The DOE/WEP reviewed TVA Visual Weld Inspection Cards (Reference 7.7) for the four pipe supports. Hanger Nos. MK-038-1AFW-177, MK-01A-427, and MK-01A-315 (Reference 7.8) were all signed off as being acceptable between October 30, 1981, and April 20, 1982. Hanger No. MK-01A-437 was signed off as acceptable on June 3, 1984, approximately one month before mini-hot functional testing. At the time the CI sighted bad vertical welds on hanger No. MK-01A-437, the hanger was being reworked. This was evidenced by TVA Field Change Request (FCR) 4-11736 (Reference 7.9) and TVA Visual Weld Inspection Cards. Hanger No. MK-01A-437 was partially signed off as acceptable on March 5, 1984, and completely signed off as acceptable on June 3, 1984. | DRR WEP 1005

The DOE/WEP determined from this information that hanger No. MK-01A-437 was what the CI was referencing.

Because Employee Concern IN-85-085-002 mentioned the possibility of the inspection data being falsified, the DOE/WEP visually examined the

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE POOR QUALITY OF WELDS ON A HANGER INSTALLED IN UNIT 1 SOUTH VALVE ROOM WEP GROUP IDENTIFIER EC-SP-16	Page 3 of 4 Date 11/18/87 Revision 1 WEP Group No 033

vertical welds that attached hanger No. MK-01A-437 to the W33 x 200 structural beam located between 6-U line and 6-M line, at elevation 754 ft-10 in. in the SVR.

A total of seven structural welds were visually examined in accordance with Standard Practice (SP) WEP 3.2.3 (Reference 7.10) and found acceptable.

6. Conclusions

The issues identified in the employee concerns were not confirmed. The DOE/WEP concludes that the welds and associated documentation evaluated in this group meet the applicable Final Safety Analysis Report (FSAR) construction code.

DRR WEP 1005

7. References

7.1 Employee Concerns IN-85-085-001 and IN-85-085-002.

7.2 WEP Assessment Plan No. 033, "South Valve Room Hanger at Elevation 754 ft-10 in.," Rev. 2, August 27, 1987.

7.3 T. C. Ellis notegram to R. S. Seigler, "Locating Possible Welds Identified on Employee Concern IN-85-085-001," EG&G Idaho, Inc., May 5, 1987.

7.4 WBNP Unit 1, Test Data Package Transmittal, Test No. W-1.1, "Reactor Coolant System Heatup," February 24, 1984.

7.5 WBNP Unit 1, Preoperational Test Data Package Transmittal, Test No. W-1.2, "Reactor Coolant Hot Functional Test," November 15, 1983.

7.6 TVA Mini-Hot Functional Test Data on Work Plan No. 3163, WBNP-QCI-1.30, Rev. 7, Attachment C, "Work Control," June 4, 1984.

7.7 TVA Visual Weld Inspection Card, WBNP-QCP-4.23, Appendix 4, Attachment A, for Hanger Nos. MK-038-1AFW-V177, MK-01A-315, MK-01A-427, and MK-01A-437.

7.8 EDS Nuclear Inc., and Bergen-Paterson Pipe Support Corporation Hanger Drawings MK-038-1AFW-V177, MK-01A-315, MK-01A-427, and MK-01A-437.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE POOR QUALITY OF WELDS ON A HANGER INSTALLED IN UNIT 1 SOUTH VALVE ROOM WEP GROUP IDENTIFIER EC-SP-16	Page 4 of 4 Date 11/18/87 Revision 1 WEP Group No 033

7.9 TVA Field Change Request (FCR) H-11736, July 17, 1984, WBNP-QCI-1.13, Rev. 10, Attachment A, "Preparation and Documentation of Field Change Requests," December 19, 1983.

7.10 Standard Practice WEP 3.2.3, "Visual Examination Methods and Acceptance Criteria," Rev. 18, June 2, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement --- Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CRACK IN VALVE BODY RUNNING INTO WELD ZONE WEP GROUP IDENTIFIER EC-SP-17	Page 1 of 3 Date 11/18/87 Revision 1 WEP Group No 34

Approved _____ Date 11-27-87

Reviewed _____ Prepared _____

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Employee Concern(s)/Quality Indicator(s) (Reference 7.1)

Employee Concern PH-85-035-002.

2. Characterization of Issue

The Employee Concern stated: "The 3-inch stainless steel valve located on top of the pressurizer in Unit 1, System 68, has a lamination crack running through the valve body into the weld zone on weld upstream from the valve." Review of Drawing WBN-E2879-1C-232 has shown the weld was either No. 1-068A-D232-02 or 1-068A-D232-06.

3. Summary

The issue for which the group was formed was evaluated by inspection/examination, document review, and engineering evaluation, and will be resolved upon satisfactory completion of TVA-committed corrective action.

4. Evaluation Methodology

The Department of Energy/Weld Evaluation Project (DOE/WEP) Assessment Plan No. 34 (Reference 7.2) was developed to perform a visual examination, liquid penetrant examination, and a review of existing radiographic film to locate any possible areas of cracking on weld Nos. 1-068A-D232-02 and 1-068A-D232-06. This group was formed to evaluate the concern and to attempt to locate a lamination crack

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1006

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CRACK IN VALVE BODY RUNNING INTO WELD ZONE WEP GROUP IDENTIFIER EC-SP-17	Page 2 of 3 Date 11/18/87 Revision 1 WEP Group No 34

through a 3-inch stainless steel valve body into the weld zone on the weld upstream from the valve. The valve is located on top of the Unit 1 pressurizer.

5. Findings

The TVA performed an evaluation of the subject valves (Reference 7.3) and did not located any area of cracking in the weld or weld zone of the existing valves. The TVA records show that the subject valves were removed and replaced. The DOE/WEP examined the TVA-performed welds associated with the replacement valves.

The DOE/WEP believes the "lamination cracking" identified by the concerned individual was actually a forging lap, which is typically a shallow surface discontinuity. An effective means of detecting such a discontinuity would be a surface examination method such as PT or VT.

The DOE/WEP performed visual examinations (VT), liquid penetrant examinations (PT),and a review of the TVA radiographic film for weld Nos. 1-068A-D232-02 and 1-068A-D232-06 per Examination Packages 34-0001 and 34-0002 (Reference 7.4). The VT and PT of the two welds showed no indication of cracking in the welds or adjacent base material.

The DOE/WEP found film quality deviations and noted them on deviation reports (Reference 7.5). The deviations were noted on DOE/WEP Corrective Action Deviation Report Number 34 (Reference 7.6), and will be resolved by a TVA corrective action (Reference 7.7). The corrective action plan has been reviewed and concurred with by DOE/WEP (Reference 7.8).

Based on the results of the examinations performed by the TVA and the examinations performed by DOE/WEP, there was no evidence to substantiate the employee concern of lamination cracking in or adjacent to weld Nos. 1-068A-D232-02 and 1-068A-D232-06.

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1006

6. Conclusions

The issue identified in the employee concern was not confirmed. The DOE/WEP concludes the welds evaluated in this group will meet the applicable Final Safety Analysis Report (FSAR) construction code upon completion of TVA-committed corrective action.

Form WEP 320a
Rev. 12/86

WEP Closure Statement / Evaluation Report	EMPLOYEE CONCERN GROUP CLOSURE CRACK IN VALVE BODY RUNNING INTO WELD ZONE WEP GROUP IDENTIFIER EC-SP-17	Page 3 of 3 Date 11/18/87 Revision 1 WEP Group No 34

7. Reference

7.1 Employee Concern PH-85-035-002.

7.2 WEP Assessment Plan No. 34, "Crack in Valve Body Running Into Weld Zinc (EC-SP-17)," Rev. 4, August 20, 1986.

7.3 TVA Watts Bar Nuclear Plant Employee Concerns Task Group Material Control CEG, Subcategory MC-300: Installation, Element: Valves (cracked), May 28, 1986.

7.4 DOE/WEP Examination Packages 34-0001 and 34-0002.

7.5 DOE/WEP Examination Package-Related Deviation Reports, 34-0001 and 34-0002.

7.6 DOE/WEP Corrective Action Deviation Report 34.

7.7 TVA Corrective Action Plan Summary, RT review, Populations A, B, 034, 210, 249, 253, and 258, Rev. 1, June 4, 1987.

7.8 WEP Corrective Action Plan Review Summary Sheet, WEP Group A, B, 034, 210, 249, 253, and 258, July 17, 1987.

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Form WEP 320
Rev. 12/86

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ARC STRIKE REMOVAL AREA ON PRESSURIZER RELIEF TANK WEP GROUP IDENTIFIER QI-SP-1	Page 1 of 3 Date 11/18/87 Revision 2 WEP Group No 036

Approved _____ Date 11-27-87

Reviewed _____ Prepared David Poole

Address the following items in the space remaining on this page and on additional pages as needed (see Standard Practice WEP 3.1.10 for specific instructions).

1. Employee Concern(s)/Quality Indicator(s)
2. Characterization of Issue
3. Summary
4. Evaluation Methodology
5. Findings
6. Conclusions
7. References

1. Original Concern(s)/Quality Indicator(s) (Reference 7.1)

Tennessee Valley Authority (TVA) Nonconforming Condition Report (NCR) 717R and NCR 717R-R1.

2. Characterization of Issue

NCR 717R refered to an arc strike on TVA Watts Bar Nuclear Plant Unit 1 (WBNP-1) pressurizer relief tank (WAT-RCATPR-01). The initial DOE/WEP review of this NCR indicated that corrective action may be incomplete because inspection may not have been performed for minimum wall thickness. | DRR WEP 1007

3. Summary

The issue for which the group was formed was resolved by document review.

4. Evaluation Methodology

The Department of Energy Weld Evaluation Project (DOE/WEP) Assessment Plan 036 (Reference 7.2) for this group was developed to perform a review of the complete documentation package to determine if an ultrasonic thickness measurement was performed after the arc strike was removed. The documentation must show that the minimum wall thickness was not violated following the removal of the arc strike when welding was not performed. | DRR WEP 1007

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ARC STRIKE REMOVAL AREA ON PRESSURIZER RELIEF TANK WEP GROUP IDENTIFIER QI-SP-1	Page 2 of 3 Date 11/18/87 Revision 2 WEP Group No 036

5. Findings

The review showed that TVA NCR 717R identified a 1-inch diameter, 3/8-inch maximum depth hole burned in the WBNP-1 pressurizer relief tank shell. This original NCR was dispositioned to repair the indication and was approved by TVA Design Engineering. The problem was referred to the tank manufacturer (Westinghouse) for repair instruction. The indication and repair instructions are documented in Westinghouse Field Deficiency Report (FDR) WAT-10029 (Reference 7.3). The repair instruction required as a minimum:

a. Grind out the arc strike to prepare a suitable welding groove and remove all contamination

b. Magnetic Particle Test (MT) inspect the groove

c. Weld

d. Grind and MT the final weld surface.

The repair was to be performed to procedures in accordance with The American Society of Mechanical Engineers (ASME) Code Section VIII, Division 1, and was to result in the issuance of an amended code data report for the tank. Because the interior of the tank is painted, repair of the paint would be required following welding, in accordance with the paint manufacturers instruction.

The TVA commenced rework in accordance with the Westinghouse instruction but discovered the arc strike was not as deep as originally thought. It was determined to be 13/16 inch long, 9/16 inch wide, and 7/64 inch deep. Upon this discovery, the arc strike was removed by light grinding, feathered, and the wall thickness was ultrasonically measured. The repair area was acid etched following grinding and no traces of copper contamination or heat affected zone was found. Actions are documented on the NCR and its attachments (Reference 7.1). | DRR WEP 1007

The condition after completion of repair was documented on TVA NCR 717R-R1 (Reference 7.1) and was dispositioned to "use-as-is." This disposition was accepted by TVA Design Engineering, as documented in attachments to the NCR, and was forwarded along with all measurement data to Westinghouse for evaluation and acceptance.

Westinghouse reissued FDR WAT-10029 (Reference 7.4) to document the "as-found" conditions and the repair and measurements that resulted. Calculations were performed that confirmed that the revised condition resulted in a satisfactory remaining wall thickness. Westinghouse

WEP Closure Statement / Evaluation Report	QUALITY INDICATOR GROUP CLOSURE ARC STRIKE REMOVAL AREA ON PRESSURIZER RELIEF TANK WEP GROUP IDENTIFIER QI-SP-1	Page 3 of 3 Date 11/18/87 Revision 2 WEP Group No 036

Engineering and Site Manager concurrence with the action taken and a statement that all conditions of FDR WAT-10029 have been met and can be considered closed is attached to the revised FDR.

6. Conclusions

The DOE/WEP concludes that TVA's implementation of corrective action required to resolve the nonconforming condition was appropriate and was adequately documented.

7. References

7.1 Tennessee Valley Authority Nonconforming Condition Report 717R, and 717R-R1.

7.2 WEP Assessment Plan No. 036, "Arc Strikes on Pressurizer Relief Tank (QI-SP-1)," Rev. 2, March 23, 1987.

7.3 Westinghouse Electric Corporation Field Deficiency Report Number WAT-10029.

7.4 Westinghouse Electric Corporation Field Deficiency Report Number WAT-10029 (Addendum).

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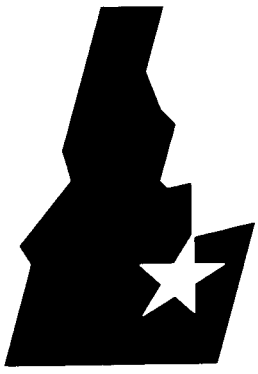
DOE/ID-10152
December 1986

Weld Program Review

Department of Energy
Weld Evaluation Project
TVA Watts Bar Plant Unit 1

W. H. Borter



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WELD PROGRAM REVIEW

DEPARTMENT OF ENERGY
WELD EVALUATION PROJECT
TVA WATTS BAR PLANT UNIT 1

William H. Borter

December 1986

U.S. Department of Energy
Idaho Operations Office

ABSTRACT

Results are presented of a review of the implementation of programmatic requirements in welding and inspection functions associated with construction of the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). The review was performed for the U.S. Department of Energy (DOE) Weld Evalution Project (WEP) by EG&G Idaho, Inc., to assess compliance of the TVA weld program (to fabricate safety-related components) with requirements in the WBNP-1 Final Safety Analysis Report (through February 1, 1986). More than 1100 requirements/criteria from twenty-odd regulatory guides, codes, and standards were utilized to evaluate the TVA weld program.

ACKNOWLEDGMENTS

Acknowledgment is extended to the many participants in the weld program review, which is part of the Department of Energy's Weld Evaluation Project at the Tennessee Valley Authority's Watts Bar Nucler Plant Unit 1. In particular, acknowledgment is made of the contribution to the programmatic review by Douglas D. Hansen, Joseph S. Mitchell, Paul D. O'Leary, Nolan D. Stucki, and R. W. Swayne.

CONTENTS

WELD PROGRAM REVIEW

DEPARTMENT OF ENERGY
WELD EVALUATION PROJECT
TVA WATTS BAR PLANT UNIT 1

1. INTRODUCTION

The scope of the Department of Energy Weld Evaluation Project (WEP) conducted by EG&G Idaho, Inc., was to establish that programmatic requirements from applicable codes and standards had been incorporated in the welding program at the Tennessee Valley Authority (TVA) Watts Bar Nuclear Plant Unit 1 (WBNP-1). Specifically, the objectives were to assess compliance of the TVA safety-related weld program to the requirements in the WBNP Final Safety Analysis Report (FSAR) including amendments through February 1, 1986, and to provide TVA, as applicable, with a report of the deficiencies in the weld program.

The programmatic review performed by WEP can be divided into two areas (quality/regulatory guides and codes/standards). The quality/regulatory guides area includes welding quality assurance requirements from ANSI standards (N45.2 and its daughter standards), ASME Boiler and Pressure Vessel Code Section III NA-4000, and welding quality-related NRC regulatory guides. The codes/standards area of review includes fabrication and inspection activities as established in AWS D1.1, ANSI B31.1, and B31.5, ASME Code Section III, and construction-related NRC regulatory guides. All documents cited herein are listed in Section 9 (References).

The review was confined to welding and inspection activities associated with field fabrication and installation performed by TVA at Watts Bar. These activities were performed by two organizations at WBNP-1. The first organization is the Office of Construction (hereafter referred to as "Construction"), which performed the installation and fabrication of safety-related items. The second organization is the Office of Nuclear Power Operations (hereafter referred to as "Operations") which performed modification and repairs to safety-related items of already installed and fabricated systems that were completed and turned over by Construction.

Based on these two areas of review and the two organizations performing activities at WBNP-1, the review is divided into the following eight categories.

1. Current Construction quality/regulatory guides
2. Past Construction quality/regulatory guides
3. Current Construction codes/standards
4. Past Construction codes/standards
5. Current Operations quality/regulatory guides
6. Past Operations quality/regulatory guides
7. Current Operations codes/standards
8. Past Operations codes/standards.

The *current* category represents the programs of the TVA Construction and Operation organizations that was in effect at WBNP-1 on February 1, 1986. The *past* category represents the programs that had been in effect at WBNP-1 from the date of the first safety-related welds made by the Construction and Operations organizations. The dates of the first safety-related welds are listed below.

First Safety-Related Welds

Construction	
AWS D1.1	September 13, 1974
ASME Section III	April 18, 1974
ANSI B31.1	April 18, 1974
ANSI B31.5	April 18, 1974
Operations	
All Codes	December 19, 1982

In the category of past Construction quality/regulatory guides, it was not necessary in all checklists to use the date of the first safety-related weld. This was because some regulatory guides and their corresponding ANSI N45.2 daughter standards had not been issued until after the first safety-related weld.

The date used in the programmatic review was the earliest date the regulatory guide or the corresponding N45.2 daughter standard was issued. If the date was prior to the date the first safety-related weld was made, then the date of the first safety-related weld was used.

The review of the quality/regulatory guides was to verify that quality assurance requirements from regulatory guides, ASME Code Section III, and ANSI standards (N18.7 and N45.2 and its daughter standards) related to inspection and welding activities were incorporated into the TVA Quality Assurance Program. These TVA documents include Quality Assurance Manuals, Quality Assurance Program Policies, and Quality Assurance Procedures.

The review of the codes/standards was to verify that technical requirements from regulatory guides, ASME Code Sections III and XI, ANSI B31.1 and B31.5, and AWS D1.1 related to inspection and welding activities were incorporated into the implementing documents. These TVA documents include Quality Control Instructions, Quality Control Procedures, and Process Specifications.

2. IDENTIFYING TVA'S PROGRAMMATIC COMMITMENTS

The first task performed by WEP was to establish the codes and standards committed to by TVA as indicated by the WBNP Final Safety Analysis Report for activities performed by TVA at WBNP-1 related to the welding and inspection of safety-related items.

Table 1[a] lists the regulatory guides and ANSI N45.2 series standards (quality/regulatory guides) and the codes and standards (codes/standards) found applicable to the welding and inspection activities performed by TVA at WBNP-1. The data listed after each document is the issue date of the document which TVA has committed to meet. All of the regulatory guides, codes, and standards are listed (by issuing agency, title, and issue date) in Section 9, References.

a. All tables are located in Section 10, Tables.

3. EVALUATION OF TVA'S COMPLIANCE TO PROGRAMMATIC COMMITMENTS

The evaluation of the welding program at WBNP-1 was limited to welding and inspection activities performed by TVA and associated with construction of safety-related items, which includes the following:

- Qualification of welders
- Assignment and documentation of welders
- Control and issue of filler material
- Qualification of inspectors
- Inspection of welding activities.

The evaluation did not include activities associated with the TVA Office of Engineering, which include the following:

- Design of components and weldments
- Development and control of drawings
- Assignments of jurisdictional boundaries and related codes and standards
- Qualification of welding and nondestructive examination procedures
- Procurement of material.

4. PROGRAMMATIC REQUIREMENTS IDENTIFIED FROM COMMITMENTS

After establishing the list shown in Table 1, the WEP evaluation team reviewed each of the referenced documents to identify the criteria in the document that was applicable to the welding and inspection activities performed by TVA at WBNP-1. The result was the development of the series of checklists (listed in Tables 2 through 5), which identify the applicable criteria for each of the documents listed in Table 1. In addition, checklists were developed to specifically address the five programs related to TVA welding and inspection activities at WBNP-1. The result is that the criteria in the checklists corresponding to the documents listed in Table 1 are also addressed in the checklists developed to cover the five programs. This duplication was to ensure that all criteria related to welding and inspection activities performed by TVA at WBNP-1 had been addressed. The five programs are:

- Qualification of welders
- Assignment and documentation of welders
- Control and issue of filler material
- Qualification of inspectors
- Inspection of welding activities.

It was determined that there have been two TVA welding and inspection programs in effect at WBNP-1. They were the Construction program and the Nuclear Power (Operations) program, both of which have been used to perform welding and inspection activities on safety-related items.

Based on this determination, the evaluation team divided the welding and inspection program into four segments:

1. Quality/regulatory guide requirements (Construction); checklists for these requirements are in Appendix A
2. Code/standard requirements (Construction); checklists for these requirements are in Appendix B
3. Quality/regulatory guide requirements (Operations); checklists for these requirements are in Appendix C
4. Code/standard requirements (Operations); checklists for these requirements are in Appendix D.

The result of incorporating the requirements of the five programs with the quality/regulatory guides and codes/standards are (a) 13 checklists for Construction (Table 3) and 14 checklists for Operations (Table 5) that address codes/standards requirements, and (b) 11 checklists for Construction (Table 2) and 10 checklists for Operations (Table 4) that address quality/regulatory guide requirements.

Each checklist lists the applicable criteria (requirements) that pertains to TVA's welding and inspection activities performed at WBNP-1, and also gives (a) the subject of the criteria, (b) the location (document) where the criteria can be found in the TVA program, and (c) whether the document is in compliance with the requirements of the criteria.

Two sets of checklists (listed in Tables 2 and 3) were developed to address quality/regulatory guide and codes/standards requirements in the Construction program. Table 2 lists the checklists (contained in Appendix A) developed to address the criteria relating to quality requirements applicable to the Construction activities at WBNP-1. Checklists Q-1 through Q-11 (Appendix A) are for quality requirements as established in quality/regulatory guide related documents; the Q in the checklist identifying number denotes quality requirements for Construction. Table 3 lists the checklists (contained in Appendix B) developed to address the criteria relating to technical requirements applicable to the Construction activities at WBNP-1. Checklists C-1 through C-13 (Appendix B) are for technical requirements as established in codes/standards related documents; the C in the checklist identifying number denotes code requirements for Construction.

Two sets of checklists (listed in Tables 4 and 5) were developed to address quality/regulatory guides and codes/standards requirements in the Operations program. Table 4 lists the checklists (contained in Appendix C) developed to address the criteria relating to quality requirements applicable to the Operations activities at WBNP-1. Checklists QNP-1 through QNP-10 (Appendix C) are for quality requirements as established in quality/regulatory guide related documents; QNP in the checklist identifying number denotes quality requirements for Nuclear Power (Operations). Table 5 lists the checklists (contained in Appendix D) developed to address the criteria relating to technical requirements applicable to the Operations activities at WBNP-1. Checklists CNP-1 through CNP-14 (Appendix D) are for technical requirements as established in codes/standards related documents; the CNP in the checklist identifying number denotes code requirements for Nuclear Power (Operations).

5. COMPARISON OF PROGRAMMATIC REQUIREMENTS TO TVA'S ESTABLISHED PROGRAM

Using the checklists listed in Tables 2 and 3 (and contained in Appendixes A and B), WEP reviewed the Construction program to verify if the quality/regulatory guides and codes/standards criteria had been incorporated into the program. The same type of reviews were performed for Operations using the checklists listed in Tables 4 and 5 (contained in Appendixes C and D). Five important aspects were taken into consideration during this review:

1. Only activities related to TVA welding and inspection actions at WBNP-1 were addressed in this review.
2. The criteria from a code/standard and quality/regulatory guide may show up in more than one checklist. It was intended that these checklists overlap.
3. This review was to establish if the criteria had been incorporated into some aspect of the program at WBNP-1. It was not intended to verify that all TVA procedures/specifications included each of the criteria.
4. This review was to verify that quality assurance requirements related to inspection and welding activities from regulatory guides, ASME Code Section III, and ANSI Standards (N18.7 and N45.2 and its daughter standards) have been incorporated into the Quality Assurance Program. These TVA documents include Quality Assurance Manuals, Quality Assurance Program Policies (QAPP), and Quality Assurance Procedures (QAP).
5. This review was to verify that technical requirements related to inspection and welding activities from regulatory guides, ASME Code Section III, ANSI B31.1 and B31.5, and AWS D1.1 have been incorporated into the implementing documents. These TVA documents include Quality Control Instructions (QCI), Quality Control Procedures (QCP), and Process Specifications (P.S.).

After the review to determine if the criteria had been incorporated into the present day program, a review was made to establish if the criteria had been in the program from the time of the first safety-related weld.

Not all checklists were required to be traced back to the date of the first safety-related weld. For checklists addressing the quality/regulatory guide requirements established through the regulatory guides and their corresponding ANSI N45.2 daughter standards, the date established for the review is that listed below.

Regulatory Guide	Issued	ANSI	Issued	Date Used In Review[a]
1.28	1972	N45.2	1971	04/18/74
1.38	1973	N45.2.2	1972	04/18/74
1.94	04/75	N45.2.5	07/08/74	07/08'74
1.58	08/73	N45.2.6	01/25/73	04/18/74
1.116	06/76	N45.2.8	05/20/75	05/20/75
1.88	08/74	N45.2.9	06/06/74	06/06/74

a. The date used in the programmatic review was the earliest date the regulatory guide or the corresponding N45.2 series standard was issued. If this date was prior to the first safety-related weld, then the date of April 18, 1974, was used.

The criteria or requirements that were not incorporated in the program or had not been incorporated from the first-safety related weld are noted in Tables 6 through 12. Tables 6, 7, 8, and 9 list the checklists and the criteria from each of the checklists that had not been incorporated. Tables 10, 11, and 12 list the same criteria but by code/standard and give the response from TVA on why that criteria had not been incorporated. Descriptions of Tables 6 through 12 are given below.

Table 6 lists the criteria, by checklists, that were found not to have been incorporated into the TVA Quality Assurance Program (Construction) on the date of the first safety-related weld or the applicable date of the Regulatory Guide or related ANSI N45.2 and daughter standards. Listed with each criterion is the date that the criterion was first incorporated.

Table 7 lists the criteria, by checklists, that were found not to have been incorporated into the Construction installation and fabrication program on the date of the first safety-related weld. Listed with the criterion is the date that the criterion was first incorporated.

Table 8 lists the criteria, by checklists, that were found not to have been incorporated into the TVA

Quality Assurance Program (Operations) on the date of the first safety-related weld. (It was found that all criteria were in the program from the date of the first safety-related weld.)

Table 9 lists the criteria, by checklists, that were found not to have been incorporated into the Operations repair and modification program.

Table 10 lists the criteria, by code or standard, that were found not to have been incorporated into the TVA Quality Assurance Program (Construction) on the date of the first safety-related weld or the applicable date of the regulatory guide or related ANSI N45.2 and daughter standards. Listed with each criterion is the date that the criterion was first incorporated and a comment why that criterion had not been incorporated prior to the date listed.

Table 11 lists the criteria, by code, that were found not to have been incorporated into the Construction installation and fabrication program on the date of the first safety-related weld. Listed with each criterion is the date that the criterion was first incorporated and a comment why that criterion had not been incorporated prior to the date listed.

Table 12 lists the criteria, by code, that were found not to have been incorporated into the Operations repair and modification program. Listed with each criterion is a comment why that criterion had not been incorporated.

6. RESULTS OF THE EVALUATION OF TVA'S CURRENT PROGRAM

The results of the programmatic review of the current program are presented in the following four categories.

1. Current Construction quality/regulatory guides
2. Current Operations quality/regulatory guides
3. Current Construction codes/standards
4. Current Operations codes/standards.

Each of the categories is presented with its results. WEP found that Category 1 (current Construction quality/regulatory guides), Category 2 (current Operations quality/regulatory guides), and Category 3 (current Construction codes/standards), had incorporated all applicable requirements. Category 4 (current Operation codes/standards) has some criteria that have not been incorporated, which are noted in Table 12 with the reasons given by TVA why the criteria were not incorporated.

1. *Current Construction Quality/Regulatory Guides*

   WEP found that all applicable quality assurance requirements from regulatory guides, codes, and standards relating to inspection and welding activities were incorporated into the current TVA Quality Assurance Program applicable to Construction.

2. *Current Operations Quality/Regulatory Guides*

   WEP found that all applicable Quality Assurance requirements from regulatory guides, codes, and standards relating to inspection and welding activities were incorporated into the current TVA Quality Assurance Program applicable to Operation.

3. *Current Construction Codes/Standards*

   WEP found that all applicable technical requirements from regulatory guides, codes, and standards relating to inspection and welding activities, were incorporated into the current Construction installation and fabrication program.

4. *Current Operations Codes/Standards*

   WEP found that of the applicable technical requirements from regulatory guides, codes, and standards relating to inspection and welding activities, all criteria except eleven criteria from AWS D1.1 were incorporated into the current Operations repair and modification program.

   The criteria from AWS D1.1 that had not been incorporated into the current program fell into the following three groups:

   a. Alternate heat treatment temperature

   b. Nondestructive testing (NDE) other than magnetic particle (MT) and dye penetrant (PT)

   c. Magnetic particle and dye penetrant testing.

   TVA noted that the criteria addressing these three groups had not been used because they had not been required at Watts Bar, and if any were required they would be incorporated into the program.

7. RESULTS OF THE EVALUATION OF TVA'S PROGRAM PRIOR TO ITS CURRENT PROGRAM

The results of the programmatic review of the past program are presented in the following four categories.

1. Past Construction quality/regulatory guides
2. Past Operations quality/regulatory guides
3. Past Construction codes/standards
4. Past Operations codes/standards.

Each of the categories is presented with its results. Category 2 (past Operations quality/regulatory guides) had incorporated all criteria from the time of the first safety-related weld. For an early period in the Construction program, criteria from Category 1 (past Construction quality/regulatory guides) and Category 3 (past Construction codes/standards) were not incorporated; these criteria are noted in Tables 10 and 11, along with the reasons given by TVA why the criteria were not incorporated. For Category 4 (past Operations codes/standards) some criteria have not been incorporated; these criteria are noted in Table 12, along with the reasons given by TVA as to why the criteria were not incorporated.

1. *Past Construction Quality/Regulatory Guides*

   WEP found that all applicable quality assurance requirements from ASME Section III relating to inspection and welding activities had been incorporated into the TVA Quality Assurance Program from the first safety-related weld (April 18, 1974).

   In the review of the non-ASME Quality Assurance Program, it was found that all applicable requirements, as established by regulatory guides and corresponding ANSI N45.2 standards (and related daughter standards), except those in five areas, had been incorporated into the Quality Assurance Program from the first safety-related weld (April 18, 1974).

   These five areas are listed below, with the date WEP was able to find the requirements first fully addressed in the TVA Quality Assurance Program applicable to construction:

   - Quality Assurance Program 05/28/74
   - Organization 05/28/74
   - Control of Measuring and Test Equipment 12/23/74
   - Inspection, Test, and Operating Status 02/20/76
   - Quality Assurance Records 06/10/75

   TVA issued a quality assurance manual (OEDC) on May 28, 1974, to cover activities performed by the Engineering, Design, and Construction Organizations. This was the earliest TVA quality assurance document WEP was able to locate that addressed the five areas. Review of this manual established that the areas of (a) Quality Assurance Program and (b) Organization met the requirements as established in the applicable quality/regulatory guides. The review also disclosed that the sections of the Quality Assurance Manual that addressed (a) Control of Measuring and Test Equipment, (b) Inspection, Test and Operating Status and (c) Quality Assurance Records, established responsibilities only for the development of procedures. The dates listed above are of the first TVA quality assurance documents found by WEP to fully address these three areas.

   As noted above, all applicable requirements, including the five areas, were found addressed in the Quality Assurance Program for ASME Section III.

2. *Past Operations Quality/Regulatory Guides*

   WEP found that all applicable quality assurance requirements from regulatory guides, codes, and standards relating to inspection and welding activities were incorporated into the TVA Quality Assurance Program applicable to Operations from the time of the first safety-related weld.

3. *Past Construction Codes/Standards*

   WEP found that of the applicable technical requirements from regulatory guides, codes, and standards relating to inspection and welding activities, all but 11 criteria from AWS D1.1 and 13 criteria from ASME Section III had been incorporated into the construction installation and fabrication program at the time of the first safety-related weld.

   The criteria from AWS D1.1 that had not been incorporated fall into the following groups:

   a. Alternate heat treatment temperature

b . Nondestructive testing (NDE) other than magnetic particle (MT) and dye penetrant (PT)

c . Magnetic particle and dye penetrant testing.

TVA noted that the criteria addressing these three groups had not been used at Watts Bar prior to the date it was incorporated into the program.

The criteria from ASME Section III that had not been incorporated fall into the following groups.

a . Nondestructive testing (NDE) of weld edge preparation

b . Elimination and repair of defects in base material

c . Minimum thickness of fabricated material

d . Ultrasonic examination.

TVA noted that (a) if NDE of the weld edge preparation had been required prior to the incorporation of the criteria into the program, the requirement would have been noted on the drawing, and (b) the elimination and repair of defects in base material and the verification of minimum thickness was addressed on a case by case basis with nonconformance reports (NCRs). TVA also noted that ultrasonic examination had not been used at Watts Bar prior to the incorporation of the criteria into the program.

4. *Past Operations Codes/Standards*

WEP found that all applicable technical requirements from regulatory guides, codes, and standards relating to inspection and welding activities, except 11 criteria from AWS D1.1 noted in the results of the current program, had been incorporated into the Operations repair and modification program at the time of the first safety-related weld.

8. CONCLUSIONS

The conclusions of the programmatic review are presented in terms of quality/regulatory guides criteria and codes/standards criteria that have been incorporated in the TVA welding program through the Construction program and the Operations program.

Construction Program

Quality/Regulatory Guides. Of the 115 criteria associated with the quality/regulatory guide checklists relating to the Construction Program, WEP found that all criteria had been incorporated into the current program. In addition, all criteria had been incorporated in the program from the time of the first safety-related weld or the date that the applicable regulatory guide/ANSI standard became effective, except for 18 criteria that had been incorporated just after the start of welding. As TVA has noted in Table 10, these 18 criteria had been addressed in early documents applicable to Watts Bar but could not be retrieved from the TVA historical file.

Codes/Standards. Of the 480 criteria associated with the codes/standards checklists relating to the Construction program, WEP found all criteria had been incorporated into the current program. In addition, all criteria had been incorporated into the program from the time of the first safety-related weld, except for 24 criteria that were not addressed in the early part of the program. These criteria were added in the early phase of construction, but as TVA has noted in Table 11 had always been addressed through other means such as nonconformance reports and construction drawings or had not been utilized at Watts Bar prior to the date incorporated.

Operations Program

Quality/Regulatory Guides. Of the 94 criteria associated with the quality/regulatory guide checklists relating to the Operations program, WEP found that all had been incorporated into the program from the first safety-related weld.

Codes/Standards. Of the 484 criteria associated with the codes/standards checklists relating to the Operations program, WEP found that all criteria had been incorporated from the first safety-related weld, except for 11 criteria. As TVA has noted in Table 12, these 11 criteria have not been required in activities performed by Operations.

9. REFERENCES

1. *Quality Assurance Program Requirements (Design and Construction)*, USNRC Regulatory Guide 1.28, Revision 0, June 7, 1972.

2. *Control of Ferrite Content in Stainless Steel Weld Metal*, USNRC Regulatory Guide 1.31, Revision 3, April 1978.

3. *Quality Assurance Program Requirements (Operations)*, USNRC Regulatory Guide 1.33, Revision 2, February 1978.

4. *Quality Assurance Requirements for Packaging, Shipping, Receiving, Storage, and Handling of Items for Water-Cooled Nuclear Power Plants*, USNRC Regulatory Guide 1.38, Revision 2, May 1977.

5. *Control of the Use of Sensitized Stainless Steel*, USNRC Regulatory Guide 1.44, Revision 0, May 1973.

6. *Control of Preheat Temperature for Welding of Low-Alloy Steel*, USNRC Regulatory Guide 1.50, Revision 0, May 1973.

7. *Qualification of Nuclear Power Plant Inspection, Examination, and Testing Personnel*, USNRC Regulatory Guide 1.58, Revision 1, September 1980.

8. *Welder Qualification for Areas of Limited Accessibility*, USNRC Regulatory Guide 1.71, Revision 0, December 1973.

9. *Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records*, USNRC Regulatory Guide 1.88, Revision 2, October 1976.

10. *Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants*, USNRC Regulatory Guide 1.94, Revision 1, April 1976.

11. *Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems*, USNRC Regulatory Guide 1.116, Revision 0-R, June 1976.

12. *Administrative Controls and Quality Assurance for the Operational Phase of Nuclear Power Plants*, ANSI/ASME N18.7, 1976.

13. *Quality Assurance Program Requirements for Nuclear Facilities*, ANSI/ASME N45.2, 1971.

14. *Packaging, Shipping, Receiving, Storage, and Handling of Items for Nuclear Power Plants*, ANSI/ASME N45.2.2, 1972.

15. *Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Structural Concrete, Structural Steel, Soil, and Foundations During the Construction Phase of Nuclear Power Plants*, ANSI/ASME N45.2.5, 1974.

16. *Qualifications of Inspection, Examination, and Testing Personnel for Nuclear Power Plants*, ANSI/ASME N45.2.6, 1978.

17. *Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants*, ANSI/ASME N45.2.8, 1975.

18. *Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants*, ANSI/ASME N45.2.9, 1974.

19. ASME Boiler and Pressure Vessel Code, *Rules for Construction of Nuclear Power Plant Components*, Section III—Division 1, 1971 Edition with Summer 1973 Addenda (1974 Addition for Heat Treatment).

20. ASME Boiler and Pressure Vessel Code, *Rules for Inservice Inspection of Nuclear Power Plant Components*, Section XI, Division 1, 1980 Edition with Winter 1981 Addenda.

21. The American Society of Mechanical Engineers, *Power Piping*, ANSI B31.1, June 15, 1973, with Summer 1973 Addenda.

22. The American Society of Mechanical Engineers, *Refrigeration Piping*, ANSI B31.5-1966.

23. American Welding Society, *Structural Welding Code*, AWS D1.1-72 with Revision 2, 1974.

24. *Tennessee Valley Authority Watts Bar Nuclear Plant Final Safety Analysis Report*, Tennessee Valley Authority, Chattanooga, TN.

25. *Quality Assurance Program Description for Design, Construction, and Operation*, Tennessee Valley Authority, TVA TR75-1.

26. *Personnel Qualification and Certification in Nondestructive Testing*, American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A 1975 Edition.

27. *Personnel Qualification and Certification in Nondestructive Testing*, American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A 1980 Edition.

10. TABLES

Contents

Table 1. Applicable Quality/Regulatory Guides and Codes/Standards

Regulatory Guides	ANSI Standards
1.28 (06/72)	N18.7 (1976)
1.31 (04/78)	N45.2 (1971)
1.33 (02/78)	N45.2.2 (1972)
1.38 (05/77)	N45.2.5 (1974)
1.44 (05/73)	N45.2.6 (1978)
1.50 (05/73)	N45.2.8 (1975)
1.58 (09/80)	N45.2.9 (1974)
1.71 (12/73)	
1.88 (10/76)	
1.94 (04/76)	
1.116 (06/76)	

Codes and Standards	
ASME Section III	(1971-S73 and 1974 for Heat Treatment)
ANSI B31.1	(1973-S73)
ANSI B31.5	(1966)
AWS D1.1	(1972, Rev. 2, 1974)
ASME Section XI	(1980-W81)
ASNT SNT-TC-1A	(1975 and 1980)

Table 2. Index of Quality/Regulatory Guide Checklists: Construction

Checklist Q-1	ASME Section III, 1971 through Summer 1973, Quality Assurance Program Requirements.
Checklist Q-2	Regulatory Guide 1.28 and ANSI N45.2, Quality Assurance Program Requirements for Nuclear Power Plants.
Checklist Q-3	Regulatory Guide 1.31, Control of Ferrite Content in Stainless Steel Weld Metal.
Checklist Q-4	Regulatory Guide 1.38 and ANSI N45.2.2, Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants.
Checklist Q-5	Regulatory Guide 1.44, Control of the Use of Sensitized Stainless Steel.
Checklist Q-6	Regulatory Guide 1.50, Control of Preheat Temperature for Welding of Low-Alloy Steels.
Checklist Q-7	Regulatory Guide 1.58 and ANSI N45.2.6, Qualification of Inspection, Examination, and Testing Personnel for Nuclear Power Plants.
Checklist Q-8	Regulatory Guide 1.71, Welder Qualification for Areas of Limited Accessibility.
Checklist Q-9	Regulatory Guide 1.94 and ANSI N45.2.5, Supplementary Quality Assurance Requirements for Installation, Inspection and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants.
Checklist Q-10	Regulatory Guide 1.116 and ANSI N45.2.8, Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants.
Checklist Q-11	ASME Section III, ANSI N45.2.9 and Regulatory Guide 1.88, Quality Assurance Record Requirements.

Table 3. Index of Code/Standard Checklists: Construction

Checklist C-1	Filler Metal Control
Checklist C-2	Welder Qualification AWS D1.1 Rev. 2-74
Checklist C-3	Welder Qualification ASME Section IX 1971-S 73
Checklist C-4	Inspection of Welding Activities ASME Section III 1971-S 73
Checklist C-5	Inspection of Welding Activities AWS D1.1 Rev. 2-74
Checklist C-6	Inspection of Welding Activities ANSI B31.1 1973-S 73
Checklist C-7	Inspection of Welding Activities ANSI B31.5 1966
Checklist C-8	ASNT SNT-TC-1A 1975 (NDE Personnel Qualification)
Checklist C-9	Assignment and Documentation of Welders
Checklist C-10	ASME Section III 1971 Edition through Summer 1973 Addenda (1974 Edition for Heat Treatment)
Checklist C-11	AWS D1.1 Rev. 2-74
Checklist C-12	ANSI B31.1 1973-S 73
Checklist C-13	ANSI B31.5 1966

Table 4. Index of Quality/Regulatory Guide Checklists: Operations

Checklist QNP-1	Regulatory Guide 1.31, Control of Ferrite Content in Stainless Steel Weld Metal.
Checklist QNP-2	Regulatory Guide 1.33, ANSI N18.7 and N45.2, Quality Program Requirements (Operations).
Checklist QNP-3	Regulatory Guide 1.38 and ANSI N45.2.2, Packaging, Shipping, Receiving, Storage and Handling of Items for Nuclear Power Plants.
Checklist QNP-4	Regulatory Guide 1.44, Control of the Use of Sensitized Stainless Steel.
Checklist QNP-5	Regulatory Guide 1.50, Control of Preheat Temperature for Welding of Low-Alloy Steels.
Checklist QNP-6	Regulatory Guide 1.58 and ANSI N45.2.6, Qualification of Inspection, Examination, Testing Personnel for Nuclear Power Plants.
Checklist QNP-7	Regulatory Guide 1.71, Welder Qualification for Areas of Limited Accessibility.
Checklist QNP-8	Regulatory Guide 1.94 and ANSI N45.2.5, Supplementary Quality Assurance Requirements for Installation, Inspection and Testing of Structural Concrete and Structural Steel During the Construction Phase of Nuclear Power Plants.
Checklist QNP-9	Regulatory Guide 1.116 and ANSI N45.2.8, Supplementary Quality Assurance Requirements for Installation, Inspection, and Testing of Mechanical Equipment and Systems for the Construction Phase of Nuclear Power Plants.
Checklist QNP-10	ASME Section III, ANSI N45.2.9 and Regulatory Guide 1.88, Quality Assurance Record Requirements.

Table 5. Index of Code/Standard Checklists: Operations

Checklist CNP-1	Filler Metal Control
Checklist CNP-2	Welder Qualification AWS D1.1 Rev. 2-74
Checklist CNP-3	Welder Qualification ASME Section IX 1971-S 73
Checklist CNP-4	Inspection of Welding Activities ASME Section III 1971-S 73
Checklist CNP-5	Inspection of Welding Activities AWS D1.1 Rev. 2-74
Checklist CNP-6	Inspection of Welding Activities ANSI B31.1 1973-S 73
Checklist CNP-7	Inspection of Welding Activities ANSI B31.5 1966
Checklist CNP-8	ASNT SNT-TC-1A 1980 (NDE Personnel Qualification)
Checklist CNP-9	Assignment and Documentation of Welders
Checklist CNP-10	ASME Section III 1971 Edition through Summer 1973 Addenda (1974 Edition for Heat Treatment)
Checklist CNP-11	AWS D1.1 Rev. 2-74
Checklist CNP-12	ANSI B31.1 1973-S 73
Checklist CNP-13	ANSI B31.5 1966
Checklist CNP-14	ASME Section XI 1980-W 81

Table 6. Quality/Regulatory Guide Checklists Results: Construction

Q-1 All criteria have been traced back to the date of the first safety-related weld made by Construction.

Q-2 All criteria except the five listed below from ANSI N45.2 have been traced back to the date of the first safety-related weld made by Construction (April 18, 1974).

ANSI N45.2

Criteria	Subject	Date Traced Back To
1. 2	Quality Assurance Program	05/28/74
2. 3	Organization	05/28/74
3. 13	Control of Measuring and Test Equipment	12/23/74
4. 15	Inspection, Test and Operating Status	02/20/76
5. 18	Quality Assurance Records	06/10/75

Q-3 All criteria have been traced back to the date of the first safety-related weld made by Construction.

Q-4 All criteria except the two listed below from ANSI N45.2.2 have been traced back to the date of the first safety-related weld made by Construction (April 18, 1974).

ANSI N45.2.2

Criteria	Subject	Date Traced Back To
1. 2.5	Measuring and Test Equipment	12/23/74
2. 8.0	Records	06/10/75

Q-5 All criteria have been traced back to the date of the first safety-related weld made by Construction.

Q-6 All criteria have been traced back to the date of the first safety-related weld made by Construction.

Q-7 All criteria have been traced back to the date of the first safety-related weld made by Construction.

Q-8 All criteria have been traced back to the date of the first safety-related weld made by Construction.

Q-9 All criteria except the two from ANSI N45.2.5 listed below have been traced back to the date of the issue of ANSI N45.2.8 (May 20, 1975).

ANSI N45.2.5

Criteria	Subject	Date Traced Back To
1. 2.5	Measuring and Test Equipment	12/23/74
2. 7	Records	06/10/75

Q-10 All criteria except the one listed below from ANSI N45.2.8 have been traced back to the date of the issue of ANSI N45.2.8 (May 20, 1975).

ANSI N45.2.8

Criteria	Subject	Date Traced Back To
1. 7.0	Records	06/10/75

Table 6. (Continued)

Q-11 All criteria except the eight listed below from ANSI N45.2.9 have been traced back to the date of the issue of ANSI N45.2.9 (June 6, 1974).

	ANSI N45.2.9	
Criteria	Subject	Date Traced Back To
1. 2	General Requirements	06/10/75
2. 2.1	QA Record System	06/10/75
3. 2.2	Categories	06/10/75
4. 3.2	Records Administration	06/10/75
5. 4	Receipt of Records	06/10/75
6. 5	Storage, Preservation, and Safekeeping	06/10/75
7. 6	Retrieval	06/10/75
8. 7	Disposition	06/10/75

Table 7. Code/Standard Checklists Results: Construction

C-1 All criteria have been traced back to the date of the first safety-related weld made by Construction.

C-2 All criteria have been traced back to the date of the first safety-related weld made by Construction.

C-3 All criteria have been traced back to the date of the first safety-related weld made by Construction.

C-4 All criteria except the three listed below from ASME Section III have been traced back to the date of the first safety-related weld made by Construction (April 18, 1974).

ASME Section III

Criteria	Subject	Date Traced Back To
1. NB-4130	Elimination and Repair of Defects in Base Material	08/04/78
2. NB-5130	Examination of Weld Edge Preparation	03/21/79
3. NB-5330	Ultrasonic Acceptance Standard	01/22/75

C-5 All criteria have been traced back to the date of the first safety-related weld made by Construction.

C-6 All criteria have been traced back to the date of the first safety-related weld made by Construction.

C-7 All criteria have been traced back to the date of the first safety-related weld made by Construction.

C-8 All criteria have been traced back to the date of the first safety-related weld made by Construction.

C-9 All criteria have been traced back to the date of the first safety-related weld made by Construction.

C-10 All criteria except the twelve listed below from ASME Code Section III have been traced back to the date of the first safety-related weld made by Construction (April 18, 1974).

ASME Section III

Criteria	Subject	Date Traced Back To
1. NB-2545	Magnetic Particle Examination of Base Material	09/22/78
2. NB-2546	Liquid Penetrant Examination of Base Material	09/07/78
3. NB-4131	Elimination and Repair of Defects in Base Material	08/04/78
4. NB-4132	Documentation of Repair Welds in Base Material	08/04/78
5. NB-4214	Minimum Thickness of Fabricated Materials	08/04/78
6. NB-5130	Examination of Weld Edge Preparation	03/21/79
7. NB-5330	Ultrasonic Acceptance Standards	01/22/75
8. NC-4130	Elimination and Repair of Defects in Base Material	08/04/78
9. ND-4130	Elimination and Repair of Defects in Base Material	08/04/78
10. NE-4131	Rules Governing Elimination and Repair	08/04/78
11. NE-4214	Minimum Thickness of Fabricated Materials	08/04/78
12. NE-5330	Ultrasonic Acceptance Standards	01/22/75

Table 7. (Continued)

C-11 All criteria except the eleven listed below from AWS D1.1 have been traced back to the date of the first safety-related AWS D1.1 weld made by Construction (September 13, 1974).

AWS D1.1

Criteria	Subject	Date Traced Back To
1. 3.9.2	Alternate or Lower Heat Treatment Temperature	03/22/79
2. 6.7.3	Radiographic Testing	07/27/78
3. 6.7.4	Ultrasonic Testing	02/15/80
4. 6.7.5	Magnetic Particle Testing	05/13/77
5. 6.7.6	Dye Penetrant Testing	05/04/76
6. 8.15.2	NDE of Welds Except UT	07/27/78
7. 8.15.3	Ultrasonic Testing of Welds	02/15/80
8. 9.25.2	NDE of Welds Except UT	07/27/78
9. 9.25.3	Ultrasonic Testing of Welds	02/15/80
10. 10.17.2	NDE of Welds Except UT	07/27/78
11. 10.17.3	Ultrasonic Testing of Welds	02/15/80

C-12 All criteria have been traced back to the date of the first safety-related weld made by Construction.

C-13 All criteria have been traced back to the date of the first safety-related weld made by Construction.

Table 8. Quality/Regulatory Guide Checklists Results: Operations

QNP-1	All criteria have been traced back to the date of the first safety-related weld made by Operations.
QNP-2	All criteria have been traced back to the date of the first safety-related weld made by Operations.
QNP-3	All criteria have been traced back to the date of the first safety-related weld made by Operations.
QNP-4	All criteria have been traced back to the date of the first safety-related weld made by Operations.
QNP-5	All criteria have been traced back to the date of the first safety-related weld made by Operations.
QNP-6	All criteria have been traced back to the date of the first safety-related weld made by Operations.
QNP-7	All criteria have been traced back to the date of the first safety-related weld made by Operations.
QNP-8	All criteria have been traced back to the date of the first safety-related weld made by Operations.
QNP-9	All criteria have been traced back to the date of the first safety-related weld made by Operations.
QNP-10	All criteria have been traced back to the date of the first safety-related weld made by Operations.

Table 9. Code/Standard Checklists Results: Operations

CNP-1 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-2 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-3 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-4 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-5 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-6 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-7 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-8 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-9 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-10 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-11 All criteria except the eleven listed below from AWS D1.1 are in the present program and have been traced back to the date of the first safety-related weld made by Operations. These eleven criteria were found to have never been incorporated into the program.

AWS D1.1

Criteria	Subject
1. 3.9.2	Alternate or Lower Heat Treatment Temperature
2. 6.7.3	Radiographic Testing
3. 6.7.4	Ultrasonic Testing
4. 6.7.5	Magnetic Particle Testing
5. 6.7.6	Dye Penetrant Testing
6. 8.15.2	NDE of Welds Except UT
7. 8.15.3	Ultrasonic Testing
8. 9.25.2	NDE of Welds Except UT
9. 9.25.3	Ultrasonic Testing
10. 10.17.2	NDE of Welds Except UT
11. 10.17.3	Ultrasonic Testing

CNP-12 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-13 All criteria have been traced back to the date of the first safety-related weld made by Operations.

CNP-14 All criteria have been traced back to the date of the first safety-related weld made by Operations.

Table 10. Criteria not incorporated at time of first safety-related weld from Quality/ Regulatory Guide Checklists: Construction

Criteria	Subject	First Date Found Addressed at WBNP	Comments
	ANSI N45.2		
2	Quality Assurance Program	5/28/74	—[a]
3	Organization	5/28/74	—[b]
13	Control of Measuring and Test Equipment	12/23/74	—[c]
15	Inspection, Test and Operating Status	2/20/76	—[e]
18	Quality Assurance Records	6/10/75	—[d]
	ANSI N45.2.2		
2.5	Measuring and Test Equipment	12/23/74	—[c]
8.0	Records	6/10/75	—[d]
	ANSI N45.2.5		
2.5	Measuring and Test Equipment	12/23/74	—[c]
8.0	Records	6/10/75	—[d]
	ANSI N45.2.8		
8.0	Records	6/10/75	—[d]
	ANSI N45.2.9		
2	General Requirements	6/10/75	—[d]
2.1	QA Record System	6/10/75	—[d]
2.2	Categories	6/10/75	—[d]
3.2	Records Administration	6/10/75	—[d]
4	Receipt of Record	6/10/75	—[d]
5	Storage, Preservation, and Safekeeping	6/10/75	—[d]
6	Retrieval	6/10/75	—[d]
7	Disposition	6/10/75	—[d]

a. Covered in QAPP-2 (Quality Assurance Program); OEDC-QAP-2.0 (May 28, 1974) also covered this criterion. Prior to May 28, 1974, this criterion was covered in quality assurance and quality control procedures prepared by Watts Bar. This was established by TVA in R. B. Kelly letter No. L16860618802, June 19, 1986. WEP has not been able to locate a copy of these procedures.

b. Covered in QAPP-1 (Organization); OEDC-QAP-1.0 (May 28, 1974) also covered this criterion. Prior to May 28, 1974, this criterion was covered in quality assurance and quality control procedures prepared by Watts Bar. This was established by TVA in R. B. Kelly letter No. L16860618802, June 19, 1986. WEP has not been able to locate a copy of these procedures.

c. Covered in QAPP-12 (Control of Measuring and Test Equipment); DEC-QCP-1.12 (December 23, 1974) also covered these criteria. Prior to December 23, 1974, these criteria were covered in quality assurance and quality control procedures prepared by Watts Bar. This was established by TVA in R. B. Kelly letter No. L16860618802, June 19, 1986. WEP has not been able to locate a copy of these procedures.

d. Covered in QAPP-17 (Quality Assurance Records), June 10, 1975. Prior to June 10, 1975, these criteria were covered in quality assurance and quality control procedures prepared by Watts Bar. This was established by TVA in R. B. Kelly letter No. L16860618802, June 19, 1986. WEP has not been able to locate a copy of these procedures.

e. Covered in QAPP-14 (Inspection, Test, and Operation Status); DEC-QAP-14.01 (February 20, 1976) also covered in this criterion. Prior to February 20, 1976, this criterion was covered in quality assurance and quality control procedures prepared by Watts Bar. This was established by TVA in R. B. Kelly letter No. L16860618802, June 19, 1986. WEP has not been able to locate a copy of these procedures.

Table 11. Criteria not incorporated at time of first safety-related weld from Code/ Standard Checklists: Construction

Criteria	Subject	First Date Addresed at WBNP	Comments
	AWS D1.1		
3.9.2	Alternate or lower heat treatment temperature	03/22/79	—[a]
6.7.3	Radiographic testing	07/27/78	—[b]
6.7.4	Ultrasonic testing	02/15/80	—[b]
6.7.5	Magnetic particle testing	05/13/77	—[c]
6.7.6	Dye penetrant testing	05/04/76	—[c]
8.15.2	NDE of welds except UT	07/27/78	—[b]
8.15.3	UT of welds	02/15/80	—[b]
9.25.2	NDE of welds except UT	07/27/78	—[b]
9.25.3	UT of welds	02/15/80	—[b]
10.17.2	NDE of welds except UT	07/27/78	—[b]
10.17.3	UT of welds	02/15/80	—[b]
	ASME III		
NB-2545	MT examination of base metal	09/22/78	—[g]
NB-2546	LP examination of base metal	09/07/78	—[f]
NB-4130	Elimination and repair of defects	08/04/78	—[d]
NB-4131	Elimination and repair of defects in base material	08/04/78	—[d]
NB-4132	Documentation of repair welds in base material	08/04/78	—[d]
NB-4214	Minimum thickness of fabricated material	08/04/78	—[d]
NB-5130	Examination of weld edge preparation	03/21/79	—[e]
NB-5330	Ultrasonic acceptance standards	01/22/75	—[h]
NC-4130	Elimination and repair of defects in base material	08/04/78	—[d]
ND-4130	Elimination and repair of defects in base material	08/04/78	—[d]
NE-4131	Rules governing elimination and repair	08/04/78	—[d]
NE-4214	Minimum thickness of fabricated materials	08/04/78	—[d]
NE-5330	Ultrasonic acceptance standards	01/22/75	—[h]

a. Prior to March 29, 1979, this criterion was not addressed in Watts Bar procedures. Per telephone conversation with TVA (John White), it was established that this criterion had not been used at Watts Bar prior to 3-22-79. This position was confirmed by TVA in L. E. Martin letter No. T25860618833, June 18, 1986.

b. TVA letter from John White, dated March 13, 1986, established that prior to July 27, 1978, for RT and February 15, 1980, for UT, Watts Bar did not perform RT or UT on structural welds. This position was confirmed by TVA in L. E. Martin letter No. T25860618833, June 18, 1986.

c. TVA letter from John White, dated May 8, 1986, established that prior to May 13, 1977, for MT and May 4, 1976, for PT, Watts Bar did not perform MT or PT on AWS welds. It also stated that if MT or PT had been required an ASME Section III procedure would have been used. This position was confirmed by TVA in L. E. Martin letter No. T25860618833, June 18, 1986.

d. TVA letter from John White, March 21, 1986, established that prior to August 4, 1978, repair to base material surface defects, when required, was addressed in nonconformance reports (NCRs) on an as-needed basis. This position was confirmed by TVA in L. E. Martin letter No. T25860618833, June 18, 1986.

e. TVA letter from John White, March 21, 1986, established that prior to March 21, 1979, examination of weld edge preparation, when required, was addressed by Engineering on applicable drawings. This position was confirmed by TVA in L. E. Martin letter No. T25860618833, June 18, 1986.

Table 11. (Continued)

f. TVA letter from John White, March 21, 1986, established that prior to September 7, 1978, LP examination of base metal repairs, when required, was addressed in nonconformance reports (NCRs) on an as-needed basis. This position was confirmed by TVA in to L. E. Martin letter No. T25860618833, June 18, 1986.

g. TVA letter from John White, March 21, 1986, established that prior to September 22, 1978, MT examination of base metal repairs, when required, was addressed in nonconformance reports (NCRs) on an as-needed basis. This position was confirmed by TVA in to L. E. Martin letter No. T25860618833, June 18, 1986.

h. TVA response, May 8, 1986, to WEP (Paul O'Leary) request dated April 23, 1986, by John White established that prior to January 22, 1975, UT was not performed at Watts Bar. This position was confirmed by TVA in L. E. Martin letter No. T25860618833, June 18, 1986.

Table 12. Criteria not incorporated at time of first safety-related weld from Code/ Standard Checklists: Operations

Criteria	Subject	First Date Found Addressed at WBNP	Comments
	AWS D1.1		
3.9.2	Alternate or Lower Heat Treatment Temperature	Not Addressed	—[a]
6.7.3	Radiographic Testing	Not Addressed	—[a]
6.7.4	Ultrasonic Testing	Not Addressed	—[a]
6.7.5	Magnetic Particle Testing	Not Addressed	—[a]
6.7.6	Dye Penetrant Testing	Not Addressed	—[a]
8.15.2	NDE of Welds Except UT	Not Addressed	—[a]
8.15.3	UT of Welds	Not Addressed	—[a]
9.25.2	NDE of Welds Except UT	Not Addressed	—[a]
9.25.3	UT of Welds	Not Addressed	—[a]
10.17.2	NDE of Welds Except UT	Not Addressed	—[a]
10.17.3	UT of Welds	Not Addressed	—[a]

a. TVA letter from Gary Pitzl, May 2, 1986, established that Nuclear Power (Operations) has not had a need to address any of these criteria for activities performed at Watts Bar. It also established that if a need does arise provisions are in the Operations program to incorporate the required process specification from G-29. This position was confirmed by TVA in a L. E. Martin letter No. T25860618833, June 18, 1986.

APPENDIX A

QUALITY/REGULATORY GUIDE CHECKLISTS: CONSTRUCTION

APPENDIX A
QUALITY/REGULATORY GUIDE CHECKLISTS: CONSTRUCTION

Contents

Checklist Q-1

QUALITY/REGULATORY GUIDE REQUIREMENTS
ASME SECTION III 1971 THROUGH S73
QUALITY ASSURANCE PROGRAM REQUIREMENTS

NOTE: Quality assurance manual is OEDC QA Manual for ASME Section III Nuclear Power Plant Components (NCM) Revision 43.

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
NA-4111	Establishment of quality assurance program	NCM 1.1 (R14) NCM 5.1 (R23)	X	
NA-4120	Evaluation of the program	NCM 1.7 (R16) NCM 11.1 (R17)	X	
NA-4210	Authority and responsibility of quality assurance personnel	NCM 1.5.0 (R19)	X	
NA-4220	Qualification of personnel	NCM 1.9 (R9)	X	
NA-4221	Personnel records	NCM 9.1 (R19)	X	
NA-4320	Categories of specific responsibilities	NCM 1.5.0 (R19) NCM 11.1 (R17)	X	
NA-4410	Design control	NCM 2.3 (R12) NCM 2.4 (R11)	X	
NA-4420	Quality control procedure	NCM 1.5.0 (R19)	X	
NA-4430	Document control	NCM 2.3 (R12) NCM 2.4 (R11)	X	
NA-4442.1	Establishment and maintenance of identification and control measures	NCM 3.7 (R15) NCM 5.1 (R23)	X	
NA-4451	Establishment of fabrication control measures	NCM 4.1 (R22) NCM 5.1 (R23) NCM 8.1 (R16)	X	
NA-4452	Process control checklist	NCM 4.1 (R22)	X	
NA-4460	Handling, storage, shipping and presentation	NCM 3.6 (R18) NCM 3.7 (R15)	X	
NA-4510	Establishment of examinations and tests	NCM 4.1 (R22) NCM 6.1 (R22)	X	
NA-4520	Hold points	NCM 4.1 (R22)	X	
NA-4530	Checklists of examinations tests and inspections	NCM 4.1 (R22)	X	
NA-4540	Examination or process status	NCM 4.1 (R22)	X	
NA-4550	Nonconforming material parts or components	NCM 10.2 (R23)	X	
NA-4600	Calibration of measurement and test equipment	NCM 7.1 (R18)	X	
NA-4920	Maintenance and access to QA records	NCM 9.1 (R19)	X	
NA-4930	Content of records	NCM 9.1 (R19)	X	

Checklist Q-2

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.28 REV. 0 (SAFETY GUIDE 28/6-7-72) & ANSI N45.2-1971
QUALITY ASSURANCE PROGRAM REQUIREMENTS FOR NUCLEAR POWER PLANTS

NOTE: Regulatory Guide 1.28 endorses ANSI N45.2-1971 without any additions or exceptions.

The following criteria are from ANSI N45.2-1971 to meet the criteria of 10 CFR 50 Appendix B.

			Compliance	
Criteria	Title/Subject	TVA Document	Yes	No
2	Quality assurance program	QAPP 2 (R8)	X	
3	Organization	QAPP 1 (R5)	X	
6	Instruction, procedure and drawings	QAPP 5 (R5)	X	
7	Document control	QAPP 6 (R4)	X	
9	Identification and control of materials, parts, and components	QAPP 8 (R3)	X	
10	Control of special processes	QAPP 9 (R2)	X	
11	Inspection	QAPP 10 (R3)	X[a]	
13	Control of measuring and test equipment	QAPP 12 (R2)	X	
14	Handling, storage and shipping	QAPP 13 (R2)	X	
15	Inspection, test and operating status	QAPP 14 (R5)	X	
16	Nonconforming items	QAPP 15 (R5)	X	
18	Quality assurance records	QAPP 17 (R3)	X	

a. QAPP 10 (R3) does not address "Hold Points," but the Watts Bar Quality Control Instruction (QCI-4.03) does. Also, QAPP 10 (R2) addresses "Hold Points"; it appears this aspect of the document was removed in the rewrite of Rev. 2 for the incorporation into QAPP 5, but this incorporation was not made.

Checklist Q-3

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.31, REV. 3, APRIL 1978
CONTROL OF FERRITE CONTENT IN STAINLESS STEEL WELD METAL

NOTE: Regulatory Guide 1.31 supplements the ASME code requirements to ensure control of delta ferrite in welds in austenitic stainless steel core support structures and Class 1 and 2 components.

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
1.0	Verification of delta ferrite of filler materials	PF-1015 (R7) Para 2.0 and 2.2	X	
2.0	Ferrite measurement	PF-1015 (R7) Para 2.2.1 and 2.2.3	X	
3.0	Instrumentation	PF-1015 (R7) Para 2.2.3	X	
4.0	Acceptability of test results	PF-1015 (R7) Para 4.0	X	
5.0	Quality assurance	PF-1015 (R7) Para 5.0	X	

a. PF-1015 is the Purchase Specification for stainless steel filler material.

Checklist Q-4

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.38 REV. 2 MAY 1977-ANSI N45.2.2-1972
PACKAGING, SHIPPING, RECEIVING, STORAGE AND HANDLING OF ITEMS FOR NUCLEAR POWER PLANTS

NOTE: Reg. Guide 1.38 supplements or modifies the requirements of ANSI N45.2.2 as identified in the following.

- Standards referenced by N45.2.2 are subject to independent acceptance by the NRC.
- Bags containing desiccants shall not be produced from materials containing fluorides, chlorides, sulfur, lead, zinc, copper or mercury.
- The standard applies to the operational phase of the plant.
- In shipping, carriers are exempt from NRC regulations for transport.
- Changes *should* to *shall* in (1) (a)
- Use of tapes produced from elements containing halogens, sulphur, mercury, etc., is restricted.
- Tapes are allowed to be colored to contrast with the material.

The following criteria are from ANSI N45.2.2-1972.

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
1.3	Responsibility	QAPP 13 (R2)	X	
2.3	Results	QAPP 13 (R2)	X	
2.4	Personnel qualification	QAPP 10 (R3) QAP 2.2 (R5)	X	
2.5	Measuring and test equipment	QAPP 12 (R2)	X	
3.4	Methods of preservation	QAPP 13 (R2)	X	
3.5	Caps, plugs, tapes and adhesives	QCP 1.36 (R9) P.S.4.M.1.1 (R9)	X	
3.9	Marking	QAPP 8 (R2)	X	
4.4	Identification and marking	QAPP 8 (R2)	X	
6.4	Control of items in storage	QAPP 8 (R2)	X	
6.5	Removal of items from storage	QAPP 8 (R2)	X	
8.0	Records	QAPP 17 (R3)	X	

Checklist Q-5

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.44, REV. 0, MAY 1973
CONTROL OF THE USE OF SENSITIZED STAINLESS STEEL

Unstabilized, austenitic stainless steel of the AISI Type 3XX series used for components that are part of (1) the reactor coolant pressure boundary, (2) systems required for reactor shutdown, (3) systems required for emergency core coolant, and (4) reactor vessel internals that are relied upon to permit adequate core cooling for any mode of normal operation or under credible postulated accident conditions should meet the following criteria:

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
Cleaning	(1) Material should be suitably cleaned and protected against contaminants capable of causing stress corrosion cracking	P.S.4.M.1.1 (R9) Para 3.1.1 (see footnote a)	X	
Solution heat treat	(2) Material from which components and systems are fabricated should be solution heat treated to produce a nonsensitized condition	FSAR Para 5.2.5.2 (see footnote b)	X	
Verification	(3) Non-sensitization of material should be verified using ASTM A262-70 "Recommended Practices for Detecting Susceptibility to Intergranular Attack in Stainless Steel" practice A or E or another method to show nonsensitization	FSAR Para 5.2.5.3[b]	X	
Material subjected to 800°-1500°F subsequent to solution HT	(4) Material subjected to sensitizing temperature, subsequent to solution heat treating per subparagraph C.2 and in accordance with subparagraph C.3, L grade material should not have carbon content greater than 0.03%	FSAR Para 5.2.5.5[b]	X	
Exceptions	(a) Material exposed to reactor coolant with controlled concentration of less than 0.01 ppm dissolved 0_2 at temperatures above 200°F during normal operations	FSAR Para 5.7.5.5[b]	X	
	(b) Material in form of casting or weld metal with ferrite content of at least 5%	FSAR Para 5.2.5.7[b]	X	

Checklist Q-5

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.44, REV. 0, MAY 1973
CONTROL OF THE USE OF SENSITIZED STAINLESS STEEL (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
Exceptions (continued)	(c) Piping is solution annealed, exposed to temperature in range of 800-1500°F and has been limited to welding operation, sufficiently small diameter in event of postulated failure the reactor can be shut down and cooled in orderly manner provided makeup is provided by reactor coolant makeup system only	FSAR Para 5.2.5.5[b]	X	
Material subjected to 800°-1500°F during HT or processing other than welding	(5) Retest is not required for: (a) Cast of weld metal with ferrite content of 5% or more or,	FSAR Para 5.2.5.7[b]	X	
	(b) Carbon content of 0.03% or less	FSAR Para 5.2.5.6[b]	X	
	(c) Material exposed to special processing provided the processing is properly controlled to develop uniform product and adequate documentation exists	FSAR Para 5.2.5.7[b]	X	
Welding	(6) Welding practices and, if necessary, material composition should be controlled to avoid excessive sensitization of base metal HAZ.	P.S.1.M.1.2 (R4) Para.8.0[a]	X	

a. Noted from WBNP Safety Evaluation Report, Paragraph 5.2.3:

The controls imposed upon austenitic stainless steel are either in accordance with Regulatory Guides 1.31, and 1.44, or, if they are not in accordance with these Regulatory Guides, the positions and actions taken have previously been accepted by the NRC.

The material selection, fabrication practices, examination procedures, and protection procedures performed provide reasonable assurance that the austenitic stainless steel in the reactor coolant pressure boundary will be in a metallurgical condition which precludes susceptibility to stress corrosion cracking during service.

b. Items (2), (3), (4), and (5) are engineering functions that are performed at locations other than the fabrication site at Watts Bar Unit 1. Therefore, these criteria have been included in this checklist for information only.

Checklist Q-6

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.50, REV. 0, MAY 1973
CONTROL OF PREHEAT TEMPERATURE FOR WELDING OF LOW-ALLOY STEELS

Regulatory Guide 1.50—Regulatory position is that weld fabrication for low alloy steel components should comply with the fabrication requirements specified in Section III and Section IX of ASME code supplemented by the following criteria.

			Compliance	
Criteria	Title/Subject	TVA Document	Yes	No
(1) WPS	(a) Specify minimum preheat and maximum interpass temperature (b) WPS be qualified at minimum preheat temperature	P.S.1.M.1.2 (R4) Para 3.0 (see footnote a)	X	b
(2) Production Welds	Preheat temperature maintained until PWHT has been performed			b
(3) Production Welds	Should be monitored to verify limits on preheat and interpass temperature are maintained	P.S.1.M.1.2 (R4) Para 9.0[a]	X	
(4) Requirement of 1, 2, and 3 not met	If 1, 2, and 3 not met, weld subject to rejection. Soundness of weld may be verified by acceptable examination procedure			b

a. Noted from WBNP Safety Evaluation Report SER Para 5.2.3: The controls imposed on welding preheat temperatures are not in total conformance with the recommendations of Regulatory Guide 1.50, "Control of Preheat Temperature for Welding Low Alloy Steels." However, the acceptance of WCAP-8577 by the NRC allows an alternative to regulatory position 2, which was followed. The applicant also did not meet regulatory position 1.b, which requires that weld procedure qualifications be performed at the minimum preheat temperature. The NRC agrees that qualification within the range of preheat temperature allowed by ASME Code is acceptable because it is not possible to control the temperature of a welding qualification plate to a given temperature with no tolerances. Accordingly, it is the NRC position that the controls imposed provide reasonable assurance that cracking of components made from low alloy steels will not occur during fabrication and minimize the possibility of subsequent cracking as a result of hydrogen being retained in the weldment.

b. TVA has noted an exception to this item in their commitments to the NRC.

Checklist Q-7

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.58 REV. 1 SEPTEMBER 1980 AND ANSI N45.2.6-1978
QUALIFICATION OF INSPECTION, EXAMINATION, AND TESTING PERSONNEL FOR NUCLEAR POWER PLANTS

For requirements for welding and nondestructive examination personnel, see Checklist C-8 ASNT SNT-TC-1A 1975, NDE Personnel Qualification. QTPM = Quality Training Program Manual.

NOTE: Reg. Guide 1.58 supplements or modifies the requirements of ANSI N45.2.6-1978 as identified in the following:

- Personnel who perform inspection, examination, or testing in accordance with SNT-TC-1A are not intended to be covered by N45.2.6.
- Other documents referenced by N45.2.6 are subject to independent acceptance by the NRC.
- Personnel performing preoperational testing, or survey party chiefs, are not within the scope of RG 1.58 Rev 1.

The following criteria are from ANSI N45.2.6-1978.

			Compliance	
Criteria	Title/Subject	TVA Document	Yes	No
1.3	Responsibility	QTPM III (R4) Section 1	X	
2.1.1	Indoctrination	QTPM III-1 (R3) Para.2.1	X	
2.1.2	Training	QTPM III-1 (R3) Para.2.1	X	
2.2	Determination of initial capability	QTPM III-1 (R3) Para.2.2	X	
2.3	Evaluation of performance	QTPM III-1 (R3) Para.2.4	X	
2.4	Written certification of qualification	QTPM III-1 (R3) Para.2.2	X[a]	
2.5	Physical	QTPM III-1 (R3) Para 2.2	X	
3.1	Qualifications General	QTPM III-1 (R3) Para 2.2	X[a]	
3.5	Education & Experience	QTPM III-1 (R3) Para 2.2	X	
4.0	Performance	QTPM III-1 (R3) Para 2.1	X	
5	Records	QTPM III-1 (R3) Para 6.0	X	

a. TVA has noted an exception to this item in their commitments to the NRC.

Checklist Q-8

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.71 REV. 0 DECEMBER 1973
WELDER QUALIFICATION FOR AREAS OF LIMITED ACCESSIBILITY

The scope of the Regulatory Guide is applicable when fabricating or repair welding on wrought low-alloy and high alloy steels, nickel base alloys, static and centrifugal castings and bimetallic joints.

NOTE: Reg. Guide 1.71 supplements ASME Section IX-71 Para. Q-3(c) Special Positions.

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
C-1	When physical conditions restrict welders access to a production weld to less than 12 to 14 in. in any direction from weld joint, special performance qualification is required using simulated access conditions	FSAR/Westinghouse response to Reg. 1.71 FSAR (Q&A) 122.5		a
C-2.a	Requalification is required when significantly different restricted accessibility conditions occur			a
C-2.b	Requalification is required when any of the essential welding variables listed in Section IX are changed	P.S.1.M.1.2 (R4) Para 4.0 and 8.0	X	
C-3	Production welding should be monitored and adherence to welding qualification requirements should be certified	QCI-4.03 (R6) Para. 6.2	X	

a. TVA has noted an exception to this item in their commitments to the NRC.

Checklist Q-9

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.94 REV. 1, APRIL 1976 & ANSI N45.2.5-1974
SUPPLEMENTARY QUALITY ASSURANCE REQUIREMENTS FOR INSTALLATION, INSPECTION AND TESTING OF STRUCTURAL CONCRETE AND STRUCTURAL STEEL DURING THE CONSTRUCTION PHASE OF NUCLEAR POWER PLANTS

NOTE: Reg. Guide 1.94 supplements or modifies the requirements of ANSI N45.2.5-1974 as identified in the following:

- Standards referenced by N45.2.5 are subject to independent acceptance by the NRC.
- Other regulatory positions on this standard relate to the placement of concrete and do not affect the TVA WB welding program.

The following criteria are from ANSI N45.2.5-1974.

Criteria	Title/Subject	TVA Document	Compliance	
			Yes	No
1.3	Responsibility	QAPP 10 (R3)	X	
2.3	Results	QAPP 10 (R3)	X	
2.4	Personnel qualifications	QAP 2.2 (R5) QAP 2.3 (R6)	X	
2.5	Measuring & test equipment	QAPP 12 (R2)	X	
3.1	Verification of material	QAPP 8 (R2)	X	
3.3	Construction processes	QAPP 9 (R2)	X	
5.5	Welding	QAPP 9 (R2)	X	
6.1	Data analysis and evaluation general	QAPP 10 (R3)	X	
6.3	Steel construction test data evaluation and analysis	QAPP 10 (R3)	X	
7	Records	QAPP 17 (R3)	X	

Checklist Q-10

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.116 REV. O JUNE 1976 & ANSI N45.2.8-1975
SUPPLEMENTARY QUALITY ASSURANCE REQUIREMENTS FOR INSTALLATION, INSPECTION, AND TESTING OF MECHANICAL EQUIPMENT AND SYSTEMS FOR THE CONSTRUCTION PHASE OF NUCLEAR POWER PLANTS

NOTE: Reg. Guide 1.116 (R0) endorses ANSI N45.2.8-1975 with provision that the ANSI documents referenced in Section 8 are subject to independent acceptance by the NRC and that N45.2.8 is applicable to the "Preoperational and initial start up" and the "Operational" phases of the plant.

The following criteria are from ANSI N45.2.8-1975.

			Compliance	
Criteria	Title/Subject	TVA Document	Yes	No
1.3	Responsibility	QAPP 2 (R8)	X	
2.1	Planning	QAPP 9 (R2) QAPP 10 (R3)	X	
2.3	Results	QAPP 10 (R3)	X	
2.5	Receiving, storage	QAPP 13 (R2)	X	
2.7	Personnel qualifications	QAPP 10 (R3)	X	
2.8	Measuring and test	QAPP 12 (R2)	X	
2.9	Prerequisities	QAPP 10 (R3)	X	
	Pre-installation Verification			
3.2	Identification	QAPP 8 (R2)	X	
3.3	Processes and procedures	QAPP 9 (R2)	X	
3.4	Physical condition	QAPP 13 (R2) QAPP 15 (R5)	X	
3.5	Site conditions	WBNP-QCP-1.36 (R9)	X	
	Control During Installation Process			
4.1	General	QAPP 9 (R2)	X	
4.2	Process and procedure control	QAPP 9 (R2)	X	
4.3	Examination	QAPP 10 (R3)	X	
4.4	Inspection	QAPP 10 (R3)	X	
7.0	Records	QAPP 17 (R3)	X	

Checklist Q-11

QUALITY/REGULATORY GUIDE REQUIREMENTS
ASME SECTION III 1971 Edition w/Summer 1973 Addenda and N45.2.9-1974 and Regulatory Guide 1.88, Rev. 2, October 1976
QUALITY ASSURANCE RECORD REQUIREMENTS

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
ASME				
NA-4920	Maintenance and access	QAPP 17 (R3) All	X	
NA-4930	Retention of records	QAPP 17 (R3) Para 5.0	X	
N45.2.9				
2	General requirements	QAPP 17 (R3) All	X	
2.1	QA record system	QAPP 17 (R3) Para 1.0	X	
2.2	Categories	QAPP 17 (R3) Para 5.1 and 5.2	X	
3.2	Records administration	QAPP 17 (R3) Para 6 and 7	X	
4	Receipt of records	QAP 17.1 (R11) Para 7.3	X	
5	Storage, preservation, and safekeeping	QAP 17.1 (R11) Para 7.5	X[a]	
6	Retrieval	QAP 17.1 (R11) Para 7.5	X	
7	Disposition	QAP 17.1 (R11) Para 7.7	X	

a. TVA has noted an exception to this item in their commitments to the NRC.

APPENDIX B

CODE/STANDARD CHECKLISTS: CONSTRUCTION

APPENDIX B
CODE/STANDARD CHECKLISTS: CONSTRUCTION

Contents

Checklist C-1

CODE/STANDARD REQUIREMENTS
FILLER METAL CONTROL

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
ANSI N45.2				
14	Measures established to control storage	QCI-1.36 (R12) Para 1.1	X	
ANSI N45.2.2				
6.1.1	Storage conditions	QCI-1.36 (R12) Para 6.1	X	
6.1.2	Level of storage welding Level B	QCI-1.36 (R12) Para 6.1 and 6.2	X	
6.2.1	Access to storage shall be controlled	QCI-1.36 (R12) Para 6.1.1	X	
6.3	Storage methods	QCI-1.36 (R12) Para 6.1	X	
6.4	Control of items	QCI-1.36 (R12) Para 6.1	X	
6.5	Removal of items	QCI-1.36 (R12) Para 6.4.1	X	
ASME Section III				
NB-2440 NB-4411	Minimize absorption of moisture by flux cored, and coated electrodes	QCI-1.36 (R12) Para 6.4.2	X	
NB-2152	Maintain identification	QCI-1.36 (R12) Para 6.3.2	X	
NB-4122	Material identification	QCI-4.01 (R5) Para 6.2 and 6.5	X	
AWS D1.1				
4.1.3	Protected or stored so characteristics are not affected	QCI-4.01 (R5) Para 6.2	X	
4.9.2	Electrodes for manual shielded metal-arc welding	QCI-4.01 (R5) Para 6.3	X	
4.18.1.1	Electrodes shall be dry and in suitable condition—GMAW, FCAW	QCI-4.01 (R5) Para 6.2	X	
B31.1	Issue and storage not addressed in code.			
B31.5	Issue and storage not addressed in code.			

Checklist C-2

CODE/STANDARD REQUIREMENTS
WELDER QUALIFICATION AWS D1.1-Rev. 2-74

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
5.15	General	P.S.1.C.2.2 (R1) Para 1.2	X	
5.16.1	Groove weld plate	P.S.1.C.2.2 (R1) Para 2.2	X	
5.16.1.3	Fillet weld plate	P.S.1.C.2.2 (R1) Para 2.2	X	
5.16.2	Pipe groove	P.S.1.C.2.2 (R1) Para 2.2	X	
5.16.2.3	Pipe groove	P.S.1.C.2.2 (R1) Para 2.2	X	
5.16.3	Thickness range qualified plate	P.S.1.C.2.2 (R1) Para 2.2 and 2.4	X	
5.16.4	Thickness range qualified pipe	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17	Limitation of variables	P.S.1.C.2.2 (R1) Para 2.2 and 2.4	X	
5.17.1	Limitation of variables	P.S.1.C.2.2 (R1) Para 2.2 and 2.4	X	
5.17.1.1	Qualification to steel listed in code qualified for all listed	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17.1.2	Qualification to each process	P.S.1.C.2.2 (R1)Para 2.4	X	
5.17.1.3	Identification of electrodes welder qualified for	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17.1.4	Electrode and shielding combination	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17.1.5	Position qualified	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17.1.6	Change in diameter wall pipe grouping	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17.1.7	Change in progression	P.S.1.C.2.2 (R1) Para 2.2	X	
5.18	Groove weld plate qualification test plate unlimited thickness	P.S.1.C.2.2 (R1) Para 2.2	X	
5.19	Groove weld plate qualification test plate limited thickness	P.S.1.C.2.2 (R1) Para 2.2	X	
5.20	Groove weld qualification test for butt joints on pipe	P.S.1.C.2.2 (R1) Para 2.2	X	
5.22	Fillet welds	P.S.1.C.2.2 (R1) Para 2.5	X	
5.23	Position of test welds	P.S.1.C.2.2 (R1) Para 2.5	X	
5.24	Base metal	P.S.1.C.2.2 (R1) Para 2.4	X	
5.25	Welding procedure	P.S.1.C.2.2 (R1) Para 5.1	X	
5.26	Test specimens, number, type, and preparation	P.S.1.C.2.2 (R1) Para 2.2	X	
5.26.1	Type and number shown in Table 5.26.1	P.S.1.C.2.2 (R1) Para 2.2	X	

Checklist C-2

CODE/STANDARD REQUIREMENTS
WELDER QUALIFICATION AWS D1.1-Rev. 2-74 (continued)

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
5.26.2	Guided bend figure	P.S.1.C.2.2 (R1) Para 5.2	X	
5.26.4	Fillet weld break and macroetch test	P.S.1.C.2.2 (R1) Para 6.1.1	X	
5.27	Method of testing	P.S.1.C.2.2 (R1) Para 6.1.1 and 6.1.2	X	
5.27.1	Root-face-side-bend	P.S.1.C.2.2 (R1) Para 6.1.1	X	
5.27.2	Fillet weld break test	P.S.1.C.2.2 (R1) Para 6.1.1	X	
5.27.3	Macro etch	P.S.1.C.2.2 (R1) Para 6.1.1	X	
5.27.4	Radiography test	P.S.1.C.2.2 (R1) Para 6.2	X	
5.28	Test results required	P.S.1.C.2.2 (R1) Para 6.1.2	X	
5.28.3	Macroetch test	P.S.1.C.2.2 (R1) Para 6.1.2	X	
5.28.4	Radiography test	P.S.1.C.2.2 (R1) Para 6.2	X	
5.28.5	Visual examination	P.S.1.C.2.2 (R1) Para 5.2	X	
5.28.5.5	Root surface	P.S.1.C.2.2 (R1) Para 5.2	X	
5.29	Retest	P.S.1.C.2.2 (R1) Para 3.0 and 3.1(a), (b)	X	
5.30	Period of effectiveness	P.S.1.C.2.2 (R1) Para 4.0	X	
5.31	Records	P.S.1.C.2.2 (R1) Para 2.3	X	

a. TVA at Watts Bar is using QCI-4.02 R7 for welder performance qualifiation. This instruction references G29C Process Specifications, which would be P.S.1.C.2.2.

Checklist C-3

CODE/STANDARD REQUIREMENTS
WELDER QUALIFICATION
ASME SECTION IX 1971 S 73 ADDENDA

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
Q-20	General			
(a)	Determination ability of welder	P.S.1.M.2.2 (R3) Para 1.2	X	
(b)	Test may be terminated	P.S.1.M.2.2 (R3) Para 2.4	X	
(c)	Maintain records of WPS by contractor used for qualification	P.S.1.M.2.2 (R3) Para 2.5	X	
(d)	Welder shall be assigned identifying letter or symbol	P.S.1.M.2.2 (R3) Para 2.6	X	
Q-21	Qualification of welders and welding operators			
(a)	Welders			
	(1) Mechanical tests	P.S.1.M.2.2 (R3) Para 6.2	X	
	(2) Radiograph	P.S.1.M.2.2 (R3) Para 6.2	X	
	(3) Grooves qualify for fillets	P.S.1.M.2.2 (R3) Para 2.7	X	
Q-22	Essential variables			
	W-1 change in filler Metal F. No.	P.S.1.M.2.2 (R3) Para 2.2	X	
	W-2 change in position	P.S.1.M.2.2 (R3) Para 2.2	X	
	W-3 Progression	P.S.1.M.2.2 (R3) Para 6.0	X	
	W-4 Omission of backing strip	P.S.1.M.2.2 (R3) Para 6.0	X	
	W-5 Addition of backing in gas welding	P.S.1.M.2.2 (R3) Para 6.0	X	
	W-6 Change one process to another	P.S.1.M.2.2 (R3) Para 6.0	X	
	W-7 Omission or addition of consumable insert	P.S.1.M.2.2 (R3) Para 6.0	X	
	W-8 Omission of gas backing	P.S.1.M.2.2 (R3) Para 6.0	X	
Q-23	Test joint			
	(a) WPS available dimensions of test material	P.S.1.M.2.2 (R3) Para 6.0	X	
	(b) Plate or pipe	P.S.1.M.2.2 (R3) Para 6.0	X	
	(c) Can substitute carbon steel for other material	P.S.1.M.2.2 (R3) Para 6.0	X	

Checklist C-3

CODE/STANDARD REQUIREMENTS
WELDER QUALIFICATION
ASME SECTION IX 1971 S 73 ADDENDA (continued)

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
Q-24	Type and No. of Test specimens			
	(a) Table Q.24.1, 2 or 3	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(1) Qualification on plate with backing also qualifies for pipe, 1G and 2G	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(2) Qualification on plate without backing also qualifies pipe, 1G and 2G	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(3) Qualification double welded plate also double welded pipe 1G and 2G	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(4) All other positions pipe qualities for plate but not vice versa	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(b) Type & No. Test per Q-24.1 and Figures Q-13 a,b,c	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(c) 5G and 6G requires 4 bend coupons	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(d) Manual shielded arc may be qualified by x-ray	P.S. 1.M.2.2 (R3) Para 6.0 and 7.0	X	
Q-25	Retest	P.S.1.M.2.2 (R3) Para 3.0	X	
Q-26	Renewal of qualification	P.S.1.M.2.2 (R3) Para 4.0	X	

a. TVA at Watts Bar is using QCI-4.02 R7 for welder performance qualification. This instruction references the G29M Process Specification, which would be P.S.1.M.2.2.

Checklist C-4

CODE/STANDARD REQUIREMENTS
INSPECTION OF WELDING ACTIVITIES
ASME III 1971-S73

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NB-2545	Magnetic Particle (base metal)	QCP-4.13 MTM (R1) Att. A, Para 10.3	X	
NB-2546	Liquid Penetrant (base metal)	QCP-4.13 PTM (R4) Att. A, Para 9.3	X	
NB-4122	Material identification	QCI-4.01 (R5) Para 6.2.1.4 and 6.2.1.5	X	
NB-4130	Elimination and repair of defects	QCP-4.13 FU&VM (R7) Att. A, Para 5.0	X	
NB-4231.1	Tack welds	QCP-4.13 FU&VM (R7) Att. A, Para A.9	X	
NB-4231.2	Temporary attachments and their removal	QCI-1.07 (R11) Att. A, Para 6.4.1.1	X	
NB-4232.1	Fairing of offsets	QCP-4.13 FU&VM (R7) Att. A, Para B.2.3	X	
NB-4233	Alignment requirements when component surfaces are inaccessible	QCP-4.13 FU&VM (R7) Att. A, Para A.4.1	X	
NB-4322	Maintenance and certification of records	QCI-4.02 (R7) Para 6.4	X	
NB-4322.1	Identification of joints by welder	QCP-4.13 FU&VM (R7) Att. A, Para 7.0	X	
NB-4421	Backing rings	QCP-4.13 FU&VM (R7) Att. A, Para A.3	X	
NB-4424	Surfaces of weld	QCP-4.13 FU&VM (R7) Att. A, Para B.2	X	
NB-4426.2	Thickness of weld reinforcement for piping	QCP-4.13 FU&VM (R7) Att. A, Para B.6	X	[b]
NB-4427	Shape and size of fillets and socket welds	QCP-4.13 FU&VM (R7) Att. A, Para B.7	X	[b]
NB-4435	Welding of temporary or minor permanent attachments	QCI-1.07 (R11) Para 6.4.1.1	X	
NB-4452	Elimination of surface defects	QCP-4.13 FU&VM (R7) Att. A, Para 6.0	X	
NB-4453	Requirements for making repair of welds	QCP-4.13 FU&VM (R7) Att. A, Para 6.3	X	
NB-4622.2	Time-temperature recordings	P.S.2.M.1.1 (R4) Para 6.0	X	
NB-5130	Examination of weld edge preparation surfaces	QCP-4.13 FU&VM (R7) Att. A, Para A.2	X	

Checklist C-4

CODE/STANDARD REQUIREMENTS
INSPECTION OF WELDING ACTIVITIES
ASME III 1971-S73 (continued)

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NB-5320	Radiographic acceptance standards	QCP-4.13 RTM (R1) Att. A, Para 13.0	X	
NB-5330	Utrasonic acceptance standards	QCP-4.13 UTM (R2) Att. A, Para 10.0	X	
NB-5340	Magnetic particle acceptance standards	QCP-4.13 MTM (R1) Att. A, Para 10.0	X	b
NB-5350	Liquid penetrant acceptance standards	QCP-4.13 PTM (R4) Att. A, Para 9.0	X	

a. NC and ND makes reference to NB for requirements. In addition, NE inspection activities are identical to those of NB and, therefore, have not been listed.

b. TVA has taken provisions of later code editions.

Checklist C-5

CODE/STANDARD REQUIREMENTS
INSPECTION OF WELDING ACTIVITIES
AWS D1.1-Rev 2-74

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
3.2.3	Visual inspection and repair of plate cut edges	P.S.1.C.1.2 (R3) Para 6.5	X	
3.3.1	Assembly, fit-up requirements	P.S.1.C.1.2 (R3) Para 7.1	X	
3.3.2	Partial joint penetration groove weld fit-up	P.S.1.C.1.2 (R3) Para 7.3	X	
3.3.3	Butt weld alignment	P.S.1.C.1.2 (R3) Para 7.4	X	
3.3.4	Groove weld joint tolerance	P.S.1.C.1.2 (R3) Para 7.7	X	
3.3.5	Groove produced by gouging	P.S.1.C.1.2 (R3) Para 11.1.7	X	
3.3.7.2	Tack weld requirements	P.S.1.C.1.2 (R3) Para 8.1-8.8	X	
3.6	Weld profile	QCP-4.13 VTC (R2) Att. A, Para 6.0	X	
3.10	Cleaning and protective coatings	QCP-4.13 VTC (R2) Att. A, Para 5.0	X	
4.2	Preheat and interpass temperature requirements	P.S.1.C.1.2 (R3) Para 10.0-10.5	X	
4.4	Arc strikes	QCP-4.13 VTC (R2) Att. A, Para 5.0	X	
6.1-6.4	General inspection requirements	QCI-4.03 (R6) all	X	
6.5	Inspection of work and records	QCP-4.13 VTC (R2) Att. A, Para 7.0	X	

a. QCI-4.03 R6 Paragraph 5.1.1 states that the welding engineering unit shall assign the detailed welding procedure (DWP). The DWPs reference P.S.1.C.1.2.

Checklist C-6

CODE/STANDARD REQUIREMENTS
INSPECTION OF WELDING ACTIVITIES
B31.1-1973-S73

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
111.3.1	Socket weld requirement	QCP-4.13 FU&VM (R7) Att. A, Para A.8	X	
111.4	Fillet welds	QCP-4.13 FU&VM (R7) Att. A, Para A.8, and B.7	X	a
127.3.1	Butt welds			
A.1	End prepration	QCP-4.13 FU&VM (R7) Att. A, Para A.1	X	
A.2	Dimensions	QCP-4.13 FU&VM (R7) Att. A, Para A.2	X	
A.3	Boring end of pipe	QCP-4.13 FU&VM (R7) Att. A, Para A.2	X	
A.4	Upset of end of pipe	QCP-4.13 FU&VM (R7) Att. A, Para A.2	X	
B.	Cleaning	QCP-4.13 FU&VM (R7) Att. A, Para A.1	X	
C.	Alignment	QCP-4.13 FU&VM (R7) Att. A, Para A.4	X	
D.	Spacing	QCP-4.13 FU&VM (R7) Att. A, Para A.4	X	
127.4.1B	Environment	P.S.1.M.1.2 (R4) Para 14.1	X	
127.4.2B	Tack welds	QCP-4.13 FU&VM (R7) Att. A, Para A.9	X	
127.4.2C	Gradual transition of weld	QCP-4.13 FU&VM (R7) Att. A, Para B.2.3	X	
127.4.2D	As-welded surfaces	QCP-4.13 FU&VM (R7) Att. A, Para B.2	X	
D.2	Reinforcement	QCP-4.13 FU&VM (R7) Att. A, Para B.6	X	
D.3	Undercut	QCP-4.13 FU&VM (R7) Att. A, Para B.5	X	
127.4.4	Fillet welds	QCP-4.13 FU&VM (R7) Att. A, Para B.7	X	a
127.4.5	Seal welds	QCP-4.13 FU&VM (R7) Att. A, Para B.8.1	X	
127.5.1	Qualification general	P.S.1.M.1.2 (R4) Para 3.1	X	
131.2.3	Minimum preheat	P.S.1.M.1.2 (R4) Para 9.4 and 9.5	X	
136.4	Mandatory examinations Table 136.4	QCP-4.13 FU&VM (R7) all QCP-4.13 UTM (R2) all QCP-4.13 MTM (R1) all QCP-4.13 PTM (R4) all	X	

a. TVA has taken provisions of later code editions.

Checklist C-7

CODE/STANDARD REQUIREMENTS
INSPECTION OF WELDING ACTIVITIES
ANSI B31.5-1966

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
527.3.1 (a)	Butt joint end prep	QCP-4.13 FU&VM (R7) Att. A, Para A.2.	X	
527.3.1 (b)	Cleaning	QCP-4.13 FU&VM (R7) Att. A, Para A.1	X	
527.3.1 (c)	Alignment	QCP-4.13 FU&VM (R7) Att. A, Para A.4	X	
527.3.1 (d)	Spacing	QCP-4.13 FU&VM (R7) Att. A, Para A.4	X	
527.4.2 (b)	Tack welds	QCP-4.13 FU&VM (R7) Att. A, Para A.9	X	
527.4.2 (d)(1)	External surface undercut	QCP-4.13 FU&VM (R7) Att. A, Para B.5	X	
527.4.2 (d)(2)	Reinforcement	QCP-4.13 FU&VM (R7) Att. A, Para B.6	X	
527.4.4	Socket and fillet welds	QCP-4.13 FU&VM (R7) Att. A, Para B.7	X	
527.4.5	Seal welds	QCP-4.13 FU&VM (R7) Att. A, Para B.8.1	X	
527.4.6 (C-E)	Weld branch connections	QCP-4.13 FU&VM (R7) Att. A, Para B.2, B.4, and B.7	X	
527.6	Records-procedures and welder qualifications	P.S.1.M.1.2 (R4) Para 3.1 and 4.1	X	
527.7	Defect repairs	QCP-4.13 FU&VM (R7) Att. A, Para 6.0	X	
531.2.3	Verification of preheat temperature	P.S.1.M.1.2 (R4) Para 9.4	X	
531.3.3	Postheat treatment	P.S.1.M.1.2 (R4) Para 10.1	X	
536	Inspection	QCP-4.13 FU&VM (R7) all	X	

Checklist C-8

CODE/STANDARD REQUIREMENTS
ASNT SNT-TC-1A 1975
NDE PERSONNEL QUALIFICATION

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
4.1	Levels of qualification	QTP III-2 (R2) Para 2.1	X	
4.3	Three levels of qualification	QTP III-2 (R2) Para 2.1	X	
5.1	Written practice established	QTP III-2 (R2) all	X	
5.2	Guidelines	QTP III-2 (R2) Sections 3, 4, and 5	X	
5.3	Describe responsibilities of each level	QTP III-2 (R2) Para 2.1		
6.1 and 6.2	Personnel shall have sufficient education, etc.	QTP III-2 (R2) Para 2.2.A, 2.2B, and 3	X	
6.3	Level III candidate shall satisfy 6.3.1 criteria	QTP III-2 (R2) Para 2.1.A		
7.1	Sufficient organized training	QTP III-2 (R2) sec 3	X	
7.3	Sufficient examinations	QTP III-2 (R2) sec 4	X	
8.2	Administer examination	QTP III-2 (R2) Para 4.A.2, 4.A.3, and 4.A.4	X	
8.2.a	Physical examination	QTP III-2 (R2) Para 2.2.C	X	
8.2.b	General examination	QTP III-2 (R2) Para 4.B.1	X	
8.2.c	Specific examination	QTP III-2 (R2) Para 4.B.2	X	
8.2.d	Practical examination	QTP III-2 (R2) Para 4.B.3	X	
8.4	Level III examination	QTP III-2 (R2) Para 2.1.A.3	X	
8.6.1	Examination grading	QTP III-2 (R2) Para 4.A	X	
8.6.2	Composite grade	QTP III-2 (R2) Para 4.A.1	X	
8.6.3	Weight factors	QTP III-2 (R2) Para 4.A.1	X	
8.6.4	Passing grade	QTP III-2 (R2) Para 4.A.1	X	
8.7	Re-examination	QTP III-2 (R2) Para 4.D	X	
9.2	Certification practices	QTP III-2 (R2) all	X	
9.3	Certification based on demonstration	QTP III-2 (R2) Para 5.A	X	
9.6	Copies shall be maintained	QTP III-2 (R2) Para 9.0	X	
9.6.1	Qualification records shall be maintained	QTP III-2 (R2) Para 9.0	X	
9.7.1	Recertification criteria	QTP III-2 (R2) Para 7.0	X	
9.7.3	Interruption of service	QTP III-2 (R2) Para 6.A.2	X	
10.1	Termination of employee certification	QTP III-2 (R2) Para 5.D	X	

Checklist C-9

CODE/STANDARD REQUIREMENTS
ASSIGNMENT AND DOCUMENTATION OF WELDERS

Criteria	Title/Subject	TVA Document	Compliance	
			Yes	No
ASME Section III NB 4321	Performance qualification in accordance with ASME Section IX	P.S.1.M.1.2 (R4) Para 4.0	X	
ASME Section III NB 4322.1	Identification to joint by welder or welder operator	P.S.3.M.5.1 (R6) Para 7.0	X	
ANSI B31.1 127.5.1	Performance qualification in accordance with ASME Section IX	P.S.1.M.1.2 (R4) Para 4.0	X	
ANSI B31.1 127.6	Welding performed identified by welder symbol	P.S.3.M.5.1 (R6) Para 7.0	X	
AWS D1.1-74 5.3	Performance qualification in accordance with Part III of this code	P.S.1.C.1.2 (R3) Para 5.15	X	
USASI (ANSI) B31.5-66 527.5.1	Performance qualification with ASME Section IX	P.S.1.M.1.2 (R4) Para 4.0	X	
USASI (ANSI) B31.5-66 527.6	Welding performed identified by welder symbol	P.S.3.M.5.1 (R6) Para 7.0	X	

Checklist C-10

CODE/STANDARD REQUIREMENTS
ASME SECTION III 1971 EDITION THROUGH SUMMER 1973 ADDENDA
(1974 EDITION FOR HEAT TREATMENT)

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NB-2545	Magnetic Particle (base metal)	QCP-4.13 MTM (R1) Att. A, Para 10.3	X	
NB-2546	Liquid Penetrant (base metal)	QCP-4.13 PTM (R4) Att. A, Para. 9.3	X	
NB-4122	Materials identification	P.S.1.M.3.1 (R7) Para 3.0	X	
NB-4125	Testing of welding and brazing materials	P.S.1.M.1.2 (R4) Para 6.0	X	
NB-4131	Rules governing elimination and repair of defects	P.S.4.M.5.1 (R3) Para all	X	
NB-4132	Documentation of repair welds of base materials	P.S.4.M.5.1 (R3) Para 6.0	X	
NB-4211.1	Preheating before thermal cutting	P.S.1.M.1.2 (R4) Para 5.3	X	
NB-4214	Minimum thickness of fabricated materials	P.S.4.M.5.1 (R3) Para 2.2	X	
NB-4231.1	Tack welds	P.S.1.M.1.2 (R4) Para 14.2 and 14.3	X	
NB-4231.2	Temporary attachments and their removal	P.S.1.M.1.2 (R4) Para 14.17 and 14.4	X	b
NB-4232.1	Fairing of offsets	P.S.1.M.1.2 (R4) Para 11.1	X	
NB-4233	Alignment requirements when component surfaces are inaccessible	P.S.3.M.5.1 (R6) Para A.4.1	X	
NB-4311	Types of welding processes permitted	P.S.1.M.1.2 (R4) Para 3.1	X	
NB-4321	Required qualification	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
NB-4322	Maintenance and certification of records	P.S.1.M.2.2 (R3) Para 2.0	X	
NB-4322.1	Identification of joints by welder	P.S.3.M.5.1 (R6) Para 7.0	X	
NB-4323	Welding prior to qualification	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
NB-4411	Identification, storage and handling of welding materials	P.S.1.M.1.2 (R4) Para 6.3	X	
NB-4412	Cleanliness and protection of welding surfaces	P.S.1.M.1.2 (R4) Para 5.4	X	
NB-4421	Backing rings	P.S.1.M.1.2 (R4) Para 13.0	X	

Checklist C-10

CODE/STANDARD REQUIREMENTS
ASME SECTION III 1971 EDITION THROUGH SUMMER 1973 ADDENDA
(1974 EDITION FOR HEAT TREATMENT) (continued)

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NB-4422	Peening	P.S.1.M.1.2 (R4) Para 14.18	X	
NB-4423	Double-welded joints	P.S.1.M.1.2 (R4) Para 14.5, 14.6 and 15.4.3.2	X	
NB-4424	Surfaces of weld	P.S.3.M.5.1 (R6) Para B.2 and B.5	X	
NB-4425	Welding components of different diameters	P.S.1.M.1.2 (R4) Para 11.1	X	
NB-4426.2	Thickness of weld reinforcement for piping	P.S.3.M.5.1 (R6) Para B.6	X	[b]
NB-4427	Shape and size of fillets and socket welds	P.S.3.M.5.1 (R6) Figures 3 and 4	X	[b]
NB-4428	Seal welds of threaded joints	P.S.3.M.5.1 (R6) Para B.8	X	
NB-4435	Welding of temporary or minor permanent attachment	P.S.1.M.1.2 (R4) Para 10.0, 14.4, and 14.17	X	
NB-4452	Elimination of surface defects	P.S.1.M.1.2 (R4) Para 15.6 and 15.7	X	
NB-4453	Requirements for making repair of welds	P.S.1.M.1.2 (R4) Para 15.0	X	[b]
NB-4610	Welding preheat requirements	P.S.1.M.1.2 (R4) Para 9.0	X	
NB-4612	Preheating methods	P.S.1.M.1.2 (R4) Para 9.0	X	
NB-4621	Heating and cooling method (PWHT)	P.S.2.M.1.1 (R4) Para 3.0	X	
NB-4622.1	Requirements for PWHT	P.S.2.M.1.1 (R4) Table 1	X	
NB-4622.2	Time-temperature recordings	P.S.2.M.1.1 (R4) Para 6.0	X	
NB-4622.4	Minimum holding temperature and time	P.S.2.M.1.1 (R4) Para 4.0	X	
NB-4622.7	Exemptions to mandatory requirements	P.S.4.M.5.1 (R3) Table 2	X	[b]
NB-4623	Cooling rate above 800°F	P.S.2.M.1.1 (R4) Para 3.0	X	
NB-4624.3	Local heating	P.S.3.M.1.1 (R4) Para 2.3	X	
NB-5113	Post examination and cleaning	QCP-4.13 PTM (R4) Att. A, Para 11.0	X	
NB-5130	Examination of weld edge preparation surfaces	QCP-4.13 FU&VM (R7) Att. A, Para A.2.1.1	X	

Checklist C-10

CODE/STANDARD REQUIREMENTS
ASME SECTION III 1971 EDITION THROUGH SUMMER 1973 ADDENDA
(1974 EDITION FOR HEAT TREATMENT) (continued)

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NB-5320	Radiographic acceptance standards	QCP-4.13 RTM (R1) Att. A, Para 13.0	X	
NB-5330	Ultrasonic acceptance standards	QCP-4.13 UTM (R1) Att. A, Para 10.0	X	
NB-5340	Magnetic particle acceptance standards	QCP-4.13 MTM (R1) Att. A, Para 10.0	X	[b]
NB-5350	Liquid penetrant acceptance standards	QCP-4.13 PTM (R3) Att. A, Para 9.0	X	
NB-5500	Qualification of nondestructive examination personnel	QCP-4.13 PTM (R3) Att. A, Para 3.0 QCP-4.13 MTM (R1) Att. A, Para 4.0 QCP-4.13 FU&VM(R7) Att. A, Para 3.0 QCP-4.13 UTM (R2) Att. A, Para 12.6 QCP-4.13 RTM (R1) Att. A, Para 15.0	X	
NC-4130	Elimination and repair of defects	P.S.4.M.5.1 (R3) Para all	X	
NC-4421	Backing rings	P.S.1.M.1.2 (R4) Para 13.0	X	
ND-4130	Elimination and repair of defects	P.S.4.M.5.1 (R3) Para all	X	
ND-4421	Backing rings	P.S.1.M.1.2 (R4) Para 13.0	X	
NE-4122	Materials identification	P.S.1.M.3.1 (R7) Para 3.0	X	
NE-4125	Testing of welding and brazing materials	P.S.1.M.1.2 (R4) Para 6.0	X	
NE-4131	Rules governing the elimination and repair of defects	P.S.4.M.5.1 (R3) Para all	X	
NE-4211.1	Preheating before thermal cutting	P.S.1.M.1.2 (R4) Para 5.3	X	
NE-4214	Minimum thickness of fabricated materials	P.S.4.M.5.1 (R3) Para 2.2	X	
NE-4231.1	Tack welds	P.S.1.M.1.2 (R4) Para 14.2 and 14.3	X	
NE-4232.1	Fairing of offsets	P.S.1.M.1.2 (R4) Para 11.1	X	
NE-4311	Types of welding processes permitted	P.S.1.M.1.2 (R4) Para 3.1	X	
NE-4321	Required qualification	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	

Checklist C-10

CODE/STANDARD REQUIREMENTS
ASME SECTION III 1971 EDITION THROUGH SUMMER 1973 ADDENDA
(1974 EDITION FOR HEAT TREATMENT) (continued)

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NE-4322	Maintenance and certification of records	P.S.1.M.2.2 (R3) Para 2.0	X	
NE-4322.1	ID of joints by welder	P.S.3.M.5.1 (R6) Para 7.0	X	
NE-4323	Welding prior to qualification	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
NE-4411	ID, storage and handling of welding materials	P.S.1.M.3.1 (R7) Para all	X	
NE-4412	Cleanliness and protection of welding surfaces	P.S.1.M.1.2 (R4) Para 5.4	X	
NE-4421	Backing rings	P.S.1.M.1.2 (R4) Para 13.0	X	
NE-4422	Peening	P.S.1.M.1.2 (R4) Para 14.18	X	
NE-4423	Single and double welded joints	P.S.1.M.1.2 (R4) Para 14.5, 14.6, 15.4.3.2, 11.3 and 11.4	X	
NE-4424	Surfaces of weld	P.S.3.M.5.1 (R6) Para B.2 and B.5	X	
NE-4425	Welding components of different diameters	P.S.1.M.1.2 (R4) Para 11.1	X	
NE-4426.1	Weld reinforcement for vessels	P.S.3.M.5.1 (R6) Table 3	X	
NE-4427	Shape and size of fillets	P.S.3.M.5.1 (R6) Para B7	X	
NE-4428	Seal welds of threaded joints	P.S.3.M.5.1 (R6) Para B.8	X	
NE-4435	Welding of temporary or minor permanent attachments	P.S.1.M.1.2 (R4) Para 14.4 and 14.7	X	
NE-4452	Elimination of surface defects	P.S.1.M.1.2 (R4) Para 15.6 and 15.7	X	
NE-4453	Requirements for making repair welds	P.S.1.M.1.2 (R4) Para 15.0	X	
NE-4610	Welding preheat requirements	P.S.1.M.1.2 (R4) Para 9.0	X	
NE-4612	Preheating methods	P.S.1.M.1.2 (R4) Para 9.0	X	
NE-4621	Vessels required to be PWHT	P.S.2.M.1.1 (R4) Para 3.0	X	
NE-4622.1	Requirements for PWHT	P.S.2.M.1.1 (R4) Table 1	X	
NE-4622.2	Time-temperature recordings	P.S.2.M.1.1 (R4) Para 6.0	X	
NE-4622.4	Minimum holding temperature and time	P.S.2.M.1.1 (R4) Para 4.0	X	

Checklist C-10

CODE/STANDARD REQUIREMENTS
ASME SECTION III 1971 EDITION THROUGH SUMMER 1973 ADDENDA
(1974 EDITION FOR HEAT TREATMENT) (continued)

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NE-4622.7	Exemptions to mandatory requirements	P.S.4.M.5.1 (R3) Table 2	X	b
NE-4623	Cooling rate above 800°F	P.S.2.M.1.1 (R4) Para 3.0	X	
NE-4624.3	Local heating	P.S.2.M.1.1 (R4) Para 2.3	X	
NE-5113	Post examination cleaning	QCP-4.13 PTM (R4) Att. A, Para 11.0	X	
NE-5320	Radiographic acceptance standards	QCP-4.13 RTM (R1) Att. A, Para 13.0	X	
NE-5330	Ultrasonic acceptance standards	QCP-4.13 UTM (R2) Att. A, Para 10.0	X	
NE-5340	Magnetic particle acceptance standards	QCP-4.13 MTM (R1) Att. A, Para 10.0	X	b
NE-5350	Liquid penetrant acceptance standards	QCP-4.13 PTM (R4) Att. A, Para 9.0	X	
NE-5800	Qualification of NDE personnel	QCP-4.13 PTM (R4) Att. A, Para 3.0 QCP-4.13 MTM (R1) Att. A, Para 4.0 QCP-4.13 FU&VM (R7) Att. A, Para 3.0 QCP-4.13 UTM (R2) Att. A, Para 12.0 QCP-4.13 RTM (R1) Att. A, Para 15.0	X	

a. NC and ND make reference to NB for requirements. Only paragraphs of NC and ND which establish different requirements have been listed.

b. TVA has taken provisions from later codes.

Checklist C-11

CODE/STANDARD REQUIREMENTS
AWS D1.1—Rev 2-74

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
3.1.3	Weld restrictions during inclement conditions and temperature	P.S.1.C.1.2 (R3) Para 11.1.4	X	
3.1.4	Adherence to size and length of weld as specified by design requirements	P.S.1.C.1.2 (R3) Para 11.1.5	X	
3.2.1	Condition of base metal	P.S.1.C.1.2 (R3) Para 6.1, 6.3 and 6.2	X	
3.2.2	Oxygen cutting requirements	P.S.1.C.1.2 (R3) Para 6.5	X	
3.2.3	Visual inspection and repair of plate cut edges	P.S.0.C.1.1 (R1) Para 3.2.2	X	
3.3.1	Assembly, fit-up requirements	P.S.1.C.1.2 (R3) Para 7.1	X	
3.3.2	Partial Joint penetration groove weld fit-up	P.S.1.C.1.2 (R3) Para 7.3	X	
3.3.3	Butt weld alignment	P.S.1.C.1.2 (R3) Para 7.4	X	
3.3.4	Groove weld joint tolerance	P.S.1.C.1.2 (R3) Para 7.7	X	
3.3.5	Groove produced by gouging	P.S.1.C.1.2 (R3) Para 11.1.7	X	
3.3.6	Usage of alignment clamps	P.S.1.C.1.2 (R3) Para 7.8	X	
3.3.7	Tack weld requirement	P.S.1.C.1.2 (R3) Para 8.1-8.8	X	
3.4	Control of distortion and shrinkage stresses	P.S.1.C.1.2 (R3) Para 12.1-12.8	X	
3.5	Dimensional tolerances	P.S.1.C.1.2 (R3) Para 7.1-7.8 P.S.0.C.1.1 (R1) Para 3.5	X	
3.6	Weld profile	P.S.3.C.5.4 (R2) Para 6.1-6.1.16	X	
3.6.3	Base metal thinning and surface finishing	P.S.3.C.5.4 (R2) Para 6.1.16	X	
3.6.4	Undercut for buildings	P.S.3.C.5.4 (R2) Para 6.1.5, 6.2.4, 6.2.1 and 6.2.3	X	
3.7.1-3.7.2	Repair of weld and base metal	P.S.1.C.1.2 (R3) Para 13.0-13.5	X	
3.7.3	Straightening distorted areas by heating	P.S.1.C.1.2 (R3) Para 13.5	X	
3.7.4	Repair approval	P.S.1.C.1.2 (R3) Para 13.1	X	
3.7.5	Engr. notification prior to cutting completed welds	P.S.1.C.1.2 (R3) Para 13.1 and 13.5	X	

Checklist C-11

CODE/STANDARD REQUIREMENTS
AWS D1.1—Rev 2-74 (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
3.7.6	Scope requirement for rework of inaccessible welds	P.S.1.C.1.2 (R3) Para 13.4	X	
3.8	Peening	P.S.1.C.1.2 (R3) Para 11.1.10	X	
3.9	Stress relief heat treatment	P.S.1.C.1.2 (R3) Para 14.0-14.2 P.S.2.C.1.1 (R0) Para 3.0	X	
3.9.2	Alternate or lower heat treatment temperature	P.S.2.C.1.1 (R0) Para 3.2	X	
3.10.1	Cleaning and protective coatings	P.S.1.C.1.2 (R3) Para 15.1	X	
4.1.3	Filler metal storage	P.S.1.C.1.2 (R3) Para 9.4.2, 9.1.2, 9.1.3	X	
4.2	Preheat and interpass temperature requirements	P.S.1.C.1.2 (R3) Para 10.0-10.5	X	
4.4	Arc strikes	P.S.1.C.1.2 (R3) Para 8.9	X	
4.5	Interpass cleaning	P.S.1.C.1.2 (R3) Para 11.1.6	X	
4.6	Groove weld termination	P.S.1.C.1.2 (R3) Para 11.1.7, 11.1.8, 11.1.9	X	
4.7	Groove weld backing	P.S.1.C.1.2 (R3) Para 11.1.7, 11.1.8	X	
4.8	Caulking of welds	P.S.1.C.1.2 (R3) Para 11.1.11	X	
4.9.1	SMAW electrodes per latest edition of code	P.S.1.C.1.2 (R3) Para 9.1.1	X	
4.9.2 4.9.3	Requirements of low-hydrogen covered electrodes	P.S.1.C.1.2 (R3) Para 9.1.2, 9.1.3	X	
5.3	Welder qualification per parts III, IV, V of AWS D1.1	P.S.1.C.1.2 (R3) Para 5.1	X	
5.15-5.31	Welder qualification test	P.S.1.C.1.2 (R3) Para 5.1	X	
5.32-5.42	Welding operator qualification	P.S.1.C.1.2 (R3) Para 5.1	X	
5.43-5.52	Qualification of tackers	P.S.1.C.1.2 (R3) Para 5.1	X	
6.1-6.4	General inspection requirements	P.S.1.C.1.2 (R3) all	X	
6.5	Inspection of work and records	QCP 4.13 VTC (R2) Att. A, all	X	
6.7.3	Radiographic testing per code	QCP-4.13 RTC (R1) Att. A, all	X	

Checklist C-11

CODE/STANDARD REQUIREMENTS
AWS D1.1—Rev 2-74 (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
6.7.4	Ultrasonic testing per code	QCP-4.13 UTC (R1) Att. A, all	X	
6.7.5	Magnetic particle testing per ASTM spec. E109 and AWS D1.1	QCP-4.13 MTC (R1) Att. A, all	X	
6.7.6	Dye penetrant inspection per ASTM Spec. E165 and D1.1	QCP-4.13 PTC (R3) Att. A, all	X	
8.14	Temporary welds	P.S.1.C.1.2 (R3) Para 8	X	
8.15.1	Visual inspection of welds	QCP-4.13 VTC (R2) Att. A, Para 6.0	X	
8.15.2	NDE of welds except UT	QCP-4.13 MTC (R1) Att. A, Para 8.0 QCP-4.13 RTC (R1) Att. A, Para 5.0 QCP-4.13 PTC (R3) Att. A, Para 7.0	X	
8.15.3	UT of welds	QCP-4.13 UTC (R1) Att. A, Para 1.1	X	
9.22.1	Edge preparation	P.S.1.C.1.2 (R3) Para 19.3	X	
9.22.2	Oxygen cut surfaces	P.S.1.C.1.2 (R3) Para 6.5	X	
9.24	Temporary welds	P.S.1.C.1.2 (R3) Para 8.8	X	
9.25.1	Visual inspection of welds	QCP-4.13 VTC (R2) Att. A, Para 6.0	X	
9.25.2	NDE of welds except UT	QCP-4.13 MTC (R1) Att. A, Para 8.0 QCP-4.13 RTC (R1) Att. A, Para 5.0 QCP-4.13 PTC (R3) Att. A, Para 7.0	X	
9.25.3	UT of welds	QCP-4.13 UTC (R1) Att. A, Para 1.1	X	
10.14.1	Fit-up of fillet welds	P.S.1.C.1.2 (R3) Para 7.1	X	
10.14.2	Girth weld	P.S.1.C.1.2 (R3) Para 7.5	X	
10.14.3	Groove weld configuration	P.S.1.C.1.2 (R3) Para 7.7	X	
10.15	Temporary welds	P.S.1.C.1.2 (R3) Para 8.0	X	
10.17.1	Visual inspection of welds	QCP-4.13 VTC (R2) Att. A, Para 6.0	X	
10.17.2	NDE of welds except UT	QCP-4.13 MTC (R1) Att. A, Para 8.0 QCP-4.13 RTC (R1) Att. A, Para 5.0 QCP-4.13 PTC (R3) Att. A, Para 7.0	X	
10.17.3	UT of welds	QCP-4.13 UTC (R1) Att. A, Para 1.1	X	

Checklist C-12

CODE/STANDARD REQUIREMENTS
ANSI B31.1-1973-S73

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
111.1	General (welded joints)	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
111.2	Butt welds	P.S.1.M.1.2 (R4) Para 7.0 and 13.0	X	
111.3	Socket welds	P.S.1.M.1.2 (R4) Para 7.1 Drawing M.1.2-11 R6	X	
111.3.1	Requirements	P.S.1.M.1.2 (R4) Para 7.2 Drawing M.1.2-11 R6	X	
111.4	Fillet welds	P.S.1.M.1.2 (R4) Para 7.0	X	[a]
111.5	Seal welds	P.S.1.M.1.2 (R4) Para 7.0	X	
111.6 A-F	Circumferential joints	P.S.1.M.1.2 (R4) Para 7.0	X	
111.6.1 G7	Welded socket type or sleeve type joints	P.S.1.M.1.2 (R4) Para 7.0	X	
127.1.1	Welding processes	P.S.1.M.1.2 (R4) Para 3.1	X	
127.2.1	Filler metal	P.S.1.M.1.2 (R4) Para 6.1	X	
127.2.2	Backing rings	P.S.1.M.1.2 (R4) Para 6.1	X	
127.3.1	Butt welds (see A.1 through A.4 below)			
A.1	End preparation	P.S.1.M.1.2 (R4) Para 5.0	X	
A.2	Dimensions	P.S.1.M.1.2 (R4) Para 7.0	X	
A.3	Boring end of pipe	P.S.1.M.1.2 (R4) Para 5.0	X	
A.4	Upset of end of pipe	P.S.1.M.1.2 (R4) Para 5.0	X	
B	Cleaning	P.S.1.M.1.2 (R4) Para 5.4 P.S.3.M.5.1 (R6) Para A.1	X	
C	Alignment	P.S.1.M.1.2 (R4) Para 11.0 P.S.3.M.5.1 (R6) Para A.4	X	
D	Spacing	P.S.1.M.1.2 (R4) Para 11.2 and 11.3	X	
127.3.2	Fillet welds	P.S.1.M.1.2 (R4) Para 7.0	X	
127.4	Procedure (see A and B below)			
127.4.1	General (see A and B below)			
A.	Qualification of WPS	P.S.1.M.1.2 (R4) Para 3.1	X	
B.	Environment	P.S.1.M.1.2 (R4) Para 14.1	X	

CODE/STANDARD REQUIREMENTS
ANSI B31.1-1973-S73 (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
127.4.2	Girth butt welds (see A through D below)			
A.	Girth butt welds	P.S.1.M.1.2 (R4) Para 7.0	X	
B.	Tack welds	P.S.1.M.1.2 (R4) Para 14.3	X	
C.	Dimensional	P.S.1.M.1.2 (R4) Para 11.1	X	
D.	As-welded surfaces	P.S.1.M.1.2 (R4) Para 12.1	X	
D.1	Surface condition	P.S.1.M.1.2 (R4) Para 12.1	X	
D.2	Reinforcements	P.S.1.M.1.2 (R4) Para 12.1	X	
D.3	Undercut	P.S.3.M.5.1 (R6) Para B.5	X	
D.4	Surface conditioning	P.S.1.M.1.2 (R4) Para 15.7	X	
127.4.3	Longitudinal butt welds	P.S.1.M.1.2 (R4) Para 7.0	X	
127.4.4	Fillet welds	P.S.3.M.5.1 (R6) Para B.7.1, B.7.2	X	a
127.4.5	Seal welds	P.S.3.M.5.1 (R6) Para B.8.1	X	
127.4.9	Attachment welds	P.S.1.M.1.2 (R4) Para 7.1	X	
127.4.10	Heat Treatment	P.S.1.M.1.2 (R4) Para 10.1	X	
127.4.11	Weld defect repairs	P.S.1.M.1.2 (R4) Para 15.0	X	
127.5	Qualification (see 127.5.1 through 127.5.3 below)			
127.5.1	General	P.S.1.M.1.2 (R4) Para 3.1	X	
127.5.2	Welding responsibility	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
127.5.3	Qualification responsibility			
A.	Procedures	P.S.1.M.1.2 (R4) Para 3.1	X	
B.	Welders and welding operators	P.S.1.M.1.2 (R4) Para 4.1	X	
127.6	Qualification records	P.S.1.M.2.2 (R3) Para 2.5 and 2.6 P.S.3.M.5.1 (R6) Para 7.0	X	
131.2.1	Preheating	P.S.1.M.1.2 (R4) Para 9.0	X	
131.2.2	Preheat dissimilar materials	P.S.1.M.1.2 (R4) Para 9.0	X	
131.2.3	Check preheating	P.S.1.M.1.2 (R4) Para 9.4-9.5	X	

Checklist C-12

CODE/STANDARD REQUIREMENTS
ANSI B31.1-1973-S73 (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
131.3	Postheat treatment (see 131.3.1 through 131.3.5 below)			
131.3.1	Postheat treatment different thickness	P.S.2.M.1.1 (R4) Para 4.0 P.S.1.M.1.2 (R4) Para 10.0	X	
131.3.2	Heating methods	P.S.2.M.1.1 (R4) Para 2.0	X	
131.3.3	Dissimilar metals	P.S.1.M.1.2 (R4) Para 10.0	X	
131.3.4	P-1 material	P.S.1.M.1.2 (R4) Para 10.0	X	
131.3.5	Local	P.S.1.M.1.2 (R4) Para 10.0 P.S.2.M.1.1 (R4) Para 2.3.1	X	
132.1 to 132.7	Preheating	P.S.1.M.1.2 (R4) Para 9.0	X	
133.3 to 133.6	Postheat treatment	P.S.2.M.1.1 (R4) Para all	X	
136.4.2	Visual examination	QCP-4.13 FU&VM (R7) Att. A, Part B	X	
136.4.3	Magnetic particle examination	QCP-4.13 MTM (R1) Att. A, Para 10.0	X	
136.4.4	Liquid penetrant examination	QCP-4.13 PTM (R4) Att. A, Para 9.0	X	
136.4.5	Radiography	QCP-4.13 RTM (R0) Att. A, Para 13.0	X	

a. TVA has taken provisions of later code editions.

Checklist C-13

CODE/STANDARD REQUIREMENTS
ANSI B31.5-1966

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
527.2.1	Filler material	P.S.1.M.3.1 (R7) Para 2.1	X	
527.2.2	Backing rings	P.S.1.M.3.1 (R7) Para 2.1	X	
527.3.1	Butt Welds	P.S.1.M.1.2 (R4) Para 5.1	X	
	A. End prep	P.S.1.M.1.2 (R4) Para 5.1	X	
	B. Cleaning	P.S.1.M.1.2 (R4) Para 5.4	X	
	C. Alignment	P.S.1.M.1.2 (R4) Para 11.1	X	
	D. Spacing	P.S.1.M.1.2 (R4) Para 11.2, 11.3, and 11.4	X	
527.3.2	Fillet welds	P.S.1.M.1.2 (R4) Para 7.1	X	
527.4	Procedures			
527.4.1	General	P.S.1.M.1.2 (R4) Para 14.1	X	
527.4.2	Butt welds	P.S.1.M.1.2 (R4) Para 7.1	X	
527.4.4	Socket & fillet weld	P.S.3.M.5.1 (R6) Para B.7	X	
527.4.5	Seal welds	P.S.3.M.5.1 (R6) Para B.8	X	
527.5	Qualifications			
527.5.1	General	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
527.6	Records	P.S.3.M.5.1 (R6) Para 7.0 P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
527.7	Defect repair	P.S.1.M.1.2 (R4) Para 15.0	X	
531.2	Preheat			
531.2.1	Preheat	P.S.1.M.1.2 (R4) Para 9.0	X	
531.2.2	Preheat dissimilar material	P.S.1.M.1.2 (R4) Para 9.3	X	
531.2.3	Checking preheat	P.S.1.M.1.2 (R4) Para 9.4	X	
531.3.1 531.3.2	Postheat treatment	P.S.1.M.1.2 (R4) Para 10.0	X	
531.3.3	Heating method	P.S.2.M.1.1 (R4) Para 2.0	X	
531.3.4	Dissimilar metals	P.S.1.M.1.2 (R4) Para 10.1	X	
531.3.5	Temperature measurement	P.S.2.M.1.1 (R4) Para 5.0	X	
531.3.6	Interruption of welding prior to PWHT	P.S.1.M.1.2 (R4) Para 14.20 and 14.21	X	
531.3.7	PWHT compatibility with base metal	P.S.1.M.1.2 (R4) Para 10.1	X	

Checklist C-13

CODE/STANDARD REQUIREMENTS
ANSI B31.5-1966 (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
531.3.8	Holding temp	P.S.2.M.1.1 (R4) Para 4.0	X	
531.3.9	Local PWHT	P.S.2.M.1.1 (R4) Para 2.3	X	
536	Inspection			
536.1	Final inspection	QCP-4.13 FU&VM (R7) Att. A, Part B	X	
536.1.2	Circumferential welds	QCP-4.13 FU&VM (R7) Att. A, Part B	X	

APPENDIX C

QUALITY/REGULATORY GUIDE CHECKLISTS: OPERATIONS

APPENDIX C
QUALITY/REGULATORY GUIDE CHECKLISTS: OPERATIONS

Contents

Checklist QNP-1

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.31, REV. 3, APRIL 1978
CONTROL OF FERRITE CONTENT IN STAINLESS STEEL WELD METAL

NOTE: Regulatory Guide 1.31 supplements the ASME code requirements to ensure control of delta ferrite in welds in austenitic stainless steel core support structures and Class 1 and 2 components.

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
1.0	Verification of delta ferrite of filler materials	PF-1015 (R7) Para 2.0 and 2.2	X	
2.0	Ferrite measurement	PF-1015 (R7) Para 2.2.1 and 2.2.3	X	
3.0	Instrumentation	PF-1015 (R7) Para 2.2.3	X	
4.0	Acceptability of test results	PF-1015 (R7) Para 4.0	X	
5.0	Quality assurance	PF-1015 (R7) Para 5.0	X	

a. PF-1015 is the Purchase Specification for stainless steel filler material.

Checklist QNP-2

QUALITY/REGULATORY GUIDE REQUIREMENTS REGULATORY GUIDE 1.33, REV. 2, FEBRUARY 1978, INCLUDING ANSI N18.7-1976 AND N45.2-1971 QUALITY ASSURANCE PROGRAM REQUIREMENTS (OPERATION)

NOTE: Regulatory Guide 1.33 endorses ANSI N18.7-1976 and ANSI N45.2-1971 (see footnote a).

The following criteria are from ANSI N45.2-1971.

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
2	Quality assurance Program	OP-QAP-2.1 (R3)	X	
3	Organization	OP-QAP-1.1 (R3)	X	
6	Installation, procedures, and drawings	OP-QAP-5.1 (R2)	X	
7	Document control	OP-QAP-6.1 (R2)	X	
9	Identification and control of materials parts, and components	OP-QAP-8.1 (R2)	X	
10	Control of special processes	OP-QAP-9.1 (R2)	X	
11	Inspection	OP-QAP-10.1 (R2)	X	
13	Control of measuring and test equipment	QP-QAP-12.1 (R3)	X	
14	Handling, storage, and operating status	OP-QAP-13.1 (R2)	X	
15	Inspection, test, and operating status	OP-QAP-14.1 (R2)	X	
16	Nonconforming items	OP-QAP-15.1 (R2)	X	
18	Quality assurance records	OP-QAP-17.1 (R2)	X	

a. The comparison chart in ANSI N18.7 shows the relationship between N18.7-1976 requirements and N45.2-1971 requirements. Based on review of these documents, within the scope of this project, repair and modification activities meeting N45.2-1971 also meet Regulatory Guide 1.33, with the following additional requirement:

R.G. 1.33, Paragraph 9 and N18.7, Paragraphs 5.2.7 and 5.3.5 also require preparation of maintenance procedures, including weld repair activity procedures. This requirement is addressed in OQAM Part II, Section 2.3, Paragraph 3.0, and in AI-9.15.

Checklist QNP-3

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.38 REV. 2 MAY, 1977-ANSI N45.2.2-1972
PACKAGING, SHIPPING, RECEIVING, STORAGE AND HANDLING OF ITEMS FOR NUCLEAR POWER PLANTS

NOTE: Reg. Guide 1.38 supplements or modifies the requirements of ANSI N45.2.2 as identified in the following.

- Standards referenced by N45.2.2 are subject to independent acceptance by the NRC.
- Bags containing desiccants shall not be produced from materials containing fluorides, chlorides, sulfur, lead, zinc, copper or mercury.
- The standard applies to the operational phase of the plant.
- In shipping, carriers are exempt from NRC regulations for transport.
- Changes *should* to *shall* in (1) (a)
- Use of tapes produced from elements containing halogens, sulphur, mercury, etc., is restricted.
- Tapes are allowed to be colored to contrast with the material.

The following criteria are from ANSI N45.2.2-1972.

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
1.3	Responsibility	OP-QAP-13.1 (R2) Para 5.1	X	
2.3	Results	OP-QAP-10.1 (R2) Para 6.1.3.2.A,B	X	
2.4	Personnel Qualification	OP-QAP-10.1 (R2) Para 6.1.3.1.A	X	
2.5	Measuring and test equipment	OP-QAP-12.1 (R3) Para 6.2	X	
3.4	Methods of preservation	OP-QAP-13.1 (R2) Para 5.1.1	X	
3.5	Caps, plugs, tapes and adhesives	AI-5.6 (R7) Para 4.5	X	
3.9	Marking	OP-QAP-8.1 (R2) Para 6.1.3	X	
4.4	Identification and marking	OP-QAP-8.1 (R2) Para 6.1.1	X	
6.4	Control of items in storage	OP-QAP-8.1 (R2) Para 6.3.1	X	
6.5	Removal of items from storage	OP-QAP-8.1 (R2) Para 6.3.2	X	
8.0	Records	OP-QAP-8.1 (R2) Para 6.3.1	X	

Checklist QNP-4

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.44, REV. 0, MAY 1973
CONTROL OF THE USE OF SENSITIZED STAINLESS STEEL

Unstabilized, austenitic stainless steel of the AISI Type 3XX series used for components that are part of (1) the reactor coolant pressure boundary, (2) systems required for reactor shutdown, (3) systems required for emergency core coolant, and (4) reactor vessel internals that are relied upon to permit adequate core cooling for any mode of normal operation or under credible postulated accident conditions should meet the following criteria:

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
Cleaning	(1) Material should be suitably cleaned and protected against contaminants capable of causing stress corrosion cracking	AI-5.6 (R7) Attachment 1 Para 3.4.4 (see footnote a)	X	
Solution heat treat	(2) Material from which components and systems are fabricated should be solution heat treated to produce a nonsensitized condition	FSAR Para 5.2.5.2 (see footnote b)	X	
Verification	(3) Non-sensitization of material should be verified using ASTM A262-70 "Recommended Practices for Detecting Susceptibility to Intergranular Attack in Stainless Steel" practice A or E or another method to show nonsensitization	FSAR Para 5.2.5.3[b]	X	
Material subjected to 800°-1500°F subsequent to solution HT	(4) Material subjected to sensitizing temperature, subsequent to solution heat treating per subparagraph C.2 and in accordance with subparagraph C.3, L grade material should not have carbon content greater than 0.03%	FSAR Para 5.2.5.5[b]	X	
Exceptions	(a) Material exposed to reactor coolant with controlled concentration of less than 0.01 ppm dissolved 0_2 at temperatures above 200°F during normal operations	FSAR Para 5.7.5.5[b]	X	
	(b) Material in form of casting or weld metal with ferrite content of at least 5%	FSAR Para 5.2.5.7[b]	X	

Checklist QNP-4

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.44, REV. 0, MAY 1973
CONTROL OF THE USE OF SENSITIZED STAINLESS STEEL (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
Exceptions (continued)	(c) Piping is solution annealed, exposed to temperature in range of 800-1500°F and has been limited to welding operation, sufficiently small diameter in event of postulated failure the reactor can be shut down and cooled in orderly manner provided makeup is provided by reactor coolant makeup system only	FSAR Para 5.2.5.5[b]	X	
Material subjected to 800°-1500°F during HT or processing other than welding	(5) Retest is not required for: (a) Cast of weld metal with ferrite content of 5% or more or,	FSAR Para 5.2.5.7[b]	X	
	(b) Carbon content of 0.03% or less	FSAR Para 5.2.5.6[b]	X	
	(c) Material exposed to special processing provided the processing is properly controlled to develop uniform product and adequate documentation exists	FSAR Para 5.2.5.7[b]	X	
Welding	(6) Welding practices and, if necessary, material composition should be controlled to avoid excessive sensitization of base metal HAZ.	P.S.1.M.1.2 (R4) Para 8.0[a]	X	

a. Noted from WBNP Safety Evaluation Report, Paragraph 5.2.3:

The controls imposed upon austenitic stainless steel are either in accordance with Regulatory Guides 1.31 and 1.44, or, if they are not in accordance with these Regulatory Guides, the positions and actions taken have previously been accepted by the NRC.

The material selection, fabrication practices, examination procedures, and protection procedures performed provide reasonable assurance that the austenitic stainless steel in the reactor coolant pressure boundary will be in a metallurgical condition, which precludes susceptibility to stress corrosion cracking during service.

b. Items (2), (3), (4), and (5) are engineering functions that are performed at locations other than the fabrication site at Watts Bar Unit 1. Therefore, these criteria have been included in this checklist for information only.

Checklist QNP-5

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.50, REV. 0, MAY 1973
CONTROL OF PREHEAT TEMPERATURE FOR WELDING OF LOW-ALLOY STEELS

Regulatory Guide 1.50—Regulatory position is that weld fabrication for low alloy steel components should comply with the fabrication requirements specified in Section III and Section IX of ASME code supplemented by the following.

Criteria	Title/Subject	TVA Document	Compliance	
			Yes	No
(1) WPS	(a) Specify minimum preheat and maximum interpass temperature (b) WPS be qualified at minimum preheat temperature	P.S.1.M.1.2 (R4) Para 3.0 (see footnote a)	X	 b
(2) Production Welds	Preheat temperature maintained until PWHT has been performed			b
(3) Production Welds	Should be monitored to verify limits on preheat and interpass temperature are maintained	P.S.1.M.1.2 (R4) Para 9.0 (see footnote a)	X	
(4) Requirement of 1, 2, and 3 not met	If 1, 2, and 3 not met weld subject to rejection. Soundness of weld may be verified by acceptable examination procedure	Not applicable		b

a. *Noted from WBNP Safety Evaluation Report Para 5.2.3:*

The controls imposed on welding preheat temperatures are not in total conformance with the recommendations of Regulatory Guide 1.50, "Control of Preheat Temperature for Welding Low Alloy Steels." However, the acceptance of WCAP-8577 by the NRC allows an alternative to regulatory position 2, which was followed. The applicant also did not meet regulatory position 1.b, which requires that weld procedure qualifications be performed at the minimum preheat temperature. The NRC agrees that qualification within the range of preheat temperature allowed by ASME Code is acceptable because it is not possible to control the temperature of a welding qualification plate to a given temperature with no tolerances. Accordingly, it is the NRC's position that the controls imposed provide reasonable assurance that cracking of components made from low alloy steels will not occur during fabrication and minimize the possibility of subsequent cracking as a result of hydrogen being retained in the weldment.

b. TVA has noted an exception to these items in their commitments to the NRC.

Checklist QNP-6

QUALITY/REGULATORY GUIDE REQUIREMENTS REGULATORY GUIDE 1.58 REV. 1 SEPTEMBER 1980 AND ANSI N45.2.6-1978 QUALIFICATION OF INSPECTION, EXAMINATION, AND TESTING PERSONNEL FOR NUCLEAR POWER PLANTS

AI-10.4 (R3) March 16, 1985 established that NQAM, Part II, Section 5.3A October 12, 1984 is to be used. For requirements for welding and nondestructive examination personnel see checklist CNP-8 ASNT SNT-TC-1A 1980 NDE Personnel Qualification.

NOTE: Reg. Guide 1.58 supplements or modifies the requirements of ANSI N45.2.6-1978 as identified in the following.

- Personnel who perform inspection, examination or test in accordance with SNT-TC-1A are not intended to be covered by N45.2.6.
- Other documents referenced by N45.2.6 are subject to independent acceptance by the NRC.
- Personnel performing preoperational testing or survey party chiefs are not within the scope of RG 1.58 Rev. 1.

The following criteria are from ANSI N45.2.6-1978.

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
1.3	Responsibility	NQAM, Section 5.3 A Responsibility	X	
2.1.1	Indoctrination	NQAM, Section 5.3 A Para 2.2.3	X	
2.1.2	Training	NQAM, Section 5.3.A Para 2.0	X	
2.2	Determination of initial capability	NQAM, Section 5.3 A Para 5.0	X	
2.3	Evaluation of performance	NQAM, Section 5.3 A Para 5.0	X	
2.4	Written certification of qualification	NQAM, Section 5.3 A Para 6.0	X	
2.5	Physical	NQAM, Section 5.3 A Para 1.2	X	
3.1	Qualifications General	NQAM, Section 5.3 A Para 4.0	X[a]	
3.5	Education & Experience	NQAM, Section 5.3 A Para 3.0	X	
4.0	Performance	NQAM, Section 5.3 A Para 4.0	X	
5	Records	NQAM, Section 5.3 A Para 6.0	X	

a. TVA has noted an exception to this item in their commitments to the NRC.

Checklist QNP-7

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.71 REV. 0 DECEMBER 1973
WELDER QUALIFICATION FOR AREAS OF LIMITED ACCESSIBILITY

The scope of the Regulatory Guide is applicable when fabricating or repair welding on wrought low-alloy and high alloy steels, nickel base alloys, static and centrifugal castings and bimetallic joints.

NOTE: Reg. Guide 1.71 supplements ASME Section IX-71 Para. Q-3(c) Special Positions.

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
C-1	When physical conditions restrict welders access to a production weld to less than 12 to 14 in. in any direction from weld joint, special performance qualification is required using simulated access conditions	FSAR/Westinghouse response to Reg. 1.71 FSAR (Q&A) 122.5		a
C-2.a	Requalification is required when significantly different restricted accessibility condition occurs			a
C-2.b	Requalification is required when any of the essential welding variables listed in Section IX are changed	P.S.1.M.1.2 (R4) Para 4.0 and 8.0	X	
C-3	Production welding shall be monitored and adherence to welding qualification requirements should be certified.	AI-9.4.2 (R6) Para 6.6	X	

a. TVA has noted an exception to this item in their commitments to the NRC.

Checklist QNP-8

QUALITY/REGULATORY GUIDE REQUIREMENTS REGULATORY GUIDE 1.94 REV. 1, APRIL 1976 & ANSI N45.2.5-1974 SUPPLEMENTARY Q.A. REQUIREMENTS FOR INSTALLATION, INSPECTION AND TESTING OF STRUCTURAL CONCRETE AND STRUCTURAL STEEL DURING THE CONSTRUCTION PHASE OF NUCLEAR POWER PLANTS.

NOTE: Reg. Guide 1.94 supplements or modifies the requirements of ANSI N45.2.5-1974 as identified in the following:

- Standards referenced by N45.2.5 are subject to independent acceptance by the NRC.
- Other regulatory positions on this standard relate to the placement of concrete and do not affect the TVA WB welding program.

The following criteria are from ANSI N45.2.5-1974.

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
1.3	Responsibility	OP-QAP-1.1 (R3) Para 5.0	X	
2.3	Results	OP-QAP-1.1 (R3) Para 5.2.1.7	X	
2.4	Personnel qualifications	OP-QAP-2.6 (R1) Para 6.3	X	
2.5	Measuring & test equipment	OP-QAP-12.1 (R3) Para 1.0 and 2.0	X	
3.1	Verification of material	OP-QAP-14.1 (R2) Para 6.0	X	
3.3	Construction processes	OP-QAP-9.1 (R2) Para 6.0	X	
5.5	Welding	OP-QAP-9.1 (R2) Para 6.0	X	
6.1	Data analysis and evaluation general	OP-QAP-15.1 (R2) Para 5.1.1	X	
6.3	Steel construction test data evaluation and analysis	OP-QAP-15.1 (R2) Para 5.1.1	X	
7	Records	OP-QAP-17.1 (R2) Para 6.0	X	

Checklist QNP-9

QUALITY/REGULATORY GUIDE REQUIREMENTS
REGULATORY GUIDE 1.116 REV. 0, JUNE 1976 & ANSI N45.2.8-1975
SUPPLEMENTARY Q.A. REQUIREMENTS FOR INSTALLATION, INSPECTION, AND TESTING OF MECHANICAL EQUIPMENT AND SYSTEMS FOR THE CONSTRUCTION PHASE OF NUCLEAR POWER PLANTS

NOTE: Reg. Guide 1.116 Rev. 0 endorses ANSI N45.2.8-1975 with provision that the ANSI documents referenced in Section 8 are subject to independent acceptance by the NRC and that N45.2.8 is applicable to the "Preoperational and initial start up" and the "Operational" phases of the plant.

The following criteria are from ANSI N45.2.8-1975.

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
1.3	Responsibility	OP-QAP-14.1 (R2) Para 5.1	X	
2.1	Planning	OP-QAP-14.1 (R2) Para 6	X	
2.3	Results	OP-QAP-14.1 (R2) Para 6.2	X	
2.5	Receiving, storage	OP-QAP-13.1 (R2) Para 5 OP-QAP-7.1 (R2) Para 5.1.1	X X	
2.7	Personnel qualifications	OP-QAP-2.6 (R3) Para 6	X	
2.8	Measuring and test	OP-QAP-12.1 (R3) Para 5.1.1	X	
2.9	Prerequisities	OP-QAP-5.1 (R2) Para 6	X	
	Pre-installation Verification			
3.2	Identification	OP-QAP-8.1 (R2) Para 6	X	
3.3	Processes and procedures	OP-QAP-9.1 (R2) Para 5.1.1	X	
3.4	Physical condition	OP-QAP-10.1 (R2) Para 6	X	
3.5	Site conditions	OP-QAP-13.1 (R2) Para 6	X	
	Control During Installation Process			
4.1	General	OP-QAP-9.1 (R2) Para 6	X	
4.2	Process and procedure control	OP-QAP-9.1 (R2) Para 6.3.1	X	
4.3	Examination	OP-QAP-14.1 (R2) Para 6	X	
4.4	Inspection	OP-QAP-10.1 (R2) Para 6	X	
7.0	Records	OP-QAP-17.1 (R2) Para 6	X	

Checklist QNP-10

QUALITY/REGULATORY GUIDE REQUIREMENTS
ASME SECTION III 1971 Edition w/Summer 1973 Addenda, N45.2.9-1974 and Regulatory Guide 1.88, Rev. 2, October 1976
QUALITY ASSURANCE RECORD REQUIREMENTS

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
ASME				
NA-4920	Maintenance and access	OP-QAP-17.1 (R2) Para 6.1.2	X	
NA-4930	Retention of records	OP-QAP-17.1 (R2) Para 6.1.3.1 and 6.1.3.2	X	
N45.2.9				
2	General requirements	OP-QAP-17.1 (R2) Para 6	X	
2.1	QA Record System	OP-QAP-17.1 (R2) Para 6	X	
2.2	Categories	OP-QAP-17.1 (R2) Para 6.1.3.1. and 6.1.3.2	X	
3.2	Records administration	OP-QAP-17.1 (R2) Para 6	X	
4	Receipt of records	OP-QAP-17.1 (R2) Para 5.1.3	X	
5	Storage, preservation, and safekeeping	OP-QAP-17.1 (R2) Para 6.1.2.1	X	
6	Retrieval	OP-QAP-17.1 (R2) Para 6.1.2.2	X	
7	Disposition	OP-QAP-17.1 (R2) Para 6.1.4	X	

APPENDIX D

CODE/STANDARD CHECKLISTS: OPERATIONS

APPENDIX D
CODE/STANDARD CHECKLISTS: OPERATIONS

Contents

Checklist CNP-1

CODE/STANDARD REQUIREMENTS
FILLER METAL CONTROL

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
ANSI N45.2				
14	Measures established to control storage	AI-9.4.1 (R0) Para 5.1	X	
ANSI N45.2.2				
6.1.1	Storage conditions	AI-9.4.1 (R0) Para 5.1	X	
6.1.2	Level of storage welding Level B	AI-9.4.1 (R0) Para 5.1.3, and 5.1.4	X	
6.2.1	Access to storage shall be controlled	AI-9.4.1 (R0) Para 5.2.2	X	
6.3	Storage methods	AI-9.4.1 (R0) Para 5.1	X	
6.4	Control of items	AI-9.4.1 (R0) Para 5.1	X	
6.5	Removal of items	AI-9.4.1 (R0) Para 5.1 and 5.2	X	
ASME Section III				
NB-2440 NB-4411	Minimize absorption of moisture by flux cored, and coated electrodes	AI-9.4.1 (R0) Para 5.1	X	
NB-2152	Maintain identification	AI-9.4.1 (R0) Para 5.1.5	X	
NB-4122	Materials Identification	AI-9.4.1 (R0) Para 5.1.5	X	
AWS D1.1				
4.1.3	Protected or stored so characteristics are not affected	AI-9.4.1 (R0) Para 5.1	X	
4.9.2	Electrodes for manual shielded metal-arc welding	AI-9.4.1 (R0) Para 5.2	X	
4.18.1.1	Electrodes shall be dry and in suitable condition—GMAW, FCAW	AI-9.4.1 (R0) Para 5.1.3	X	
B31.1	Issue and storage not addressed in code.			
B31.5	Issue and storage not addressed in code.			

Checklist CNP-2

CODE/STANDARD REQUIREMENTS
WELDER QUALIFICATION AWS D1.1-Rev. 2-74

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
5.15	General	P.S.1.C.2.2 (R1) Para 1.2	X	
5.16.1	Groove weld plate	P.S.1.C.2.2 (R1) Para 2.2	X	
5.16.1.3	Fillet weld plate	P.S.1.C.2.2 (R1) Para 2.2	X	
5.16.2	Pipe groove	P.S.1.C.2.2 (R1) Para 2.2	X	
5.16.2.3	Pipe groove	P.S.1.C.2.2 (R1) Para 2.2	X	
5.16.3	Thickness range qualified plate	P.S.1.C.2.2 (R1) Para 2.2 and 2.4	X	
5.16.4	Thickness range qualified pipe	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17	Limitation of variables	P.S.1.C.2.2 (R1) Para 2.2 and 2.4	X	
5.17.1	Limitation of variables	P.S.1.C.2.2 (R1) Para 2.2 and 2.4	X	
5.17.1.1	Qualification to steel listed in code qualified for all listed	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17.1.2	Qualification to each process	P.S.1.C.2.2 (R1) Para 2.2 and 5.1	X	
5.17.1.3	Identification of electrodes welder qualified for	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17.1.4	Electrode and shielding combination	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17.1.5	Position qualified	P.S.1.C.2.2 (R1) Para 2.2 and 2.4	X	
5.17.1.6	Change in diameter wall pipe grouping	P.S.1.C.2.2 (R1) Para 2.2	X	
5.17.1.7	Change in progression	P.S.1.C.2.2 (R1) Para 2.2	X	
5.18	Groove weld plate qualification test plate unlimited thickness	P.S.1.C.2.2 (R1) Para 2.2	X	
5.19	Groove weld plate qualification test plate limited thickness	P.S.1.C.2.2 (R1) Para 2.2	X	
5.20	Groove weld qualification test for butt joints on pipe	P.S.1.C.2.2 (R1) Para 2.2	X	
5.22	Fillet welds	P.S.1.C.2.2 (R1) Para 2.5	X	
5.23	Position of test welds	P.S.1.C.2.2 (R1) Para 2.2	X	
5.24	Base metal	P.S.1.C.2.2 (R1) Para 2.2	X	
5.25	Welding procedure	P.S.1.C.2.2 (R1) Para 5.1	X	

Checklist CNP-2

CODE/STANDARD REQUIREMENTS
WELDER QUALIFICATION AWS D1.1-Rev. 2-74 (continued)

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
5.26	Test specimens, number, type, and preparation	P.S.1.C.2.2 (R1) Para 2.2	X	
5.26.1	Type and number shown in Table 5.26.1	P.S.1.C.2.2 (R1) Para 2.2	X	
5.26.2	Guided bend figure	P.S.1.C.2.2 (R1) Para 5.2	X	
5.26.4	Fillet weld break and macroetch test	P.S.1.C.2.2 (R1) Para 6.1.1	X	
5.27	Method of testing	P.S.1.C.2.2 (R1) Para 6.1.1 and 6.1.2	X	
5.27.1	Root-face-side-bend	P.S.1.C.2.2 (R1) Para 6.1.1	X	
5.27.2	Fillet weld break test	P.S.1.C.2.2 (R1) Para 6.1.1	X	
5.27.3	Macro etch	P.S.1.C.2.2 (R1) Para 6.1.1	X	
5.27.4	Radiography test	P.S.1.C.2.2 (R1) Para 6.2	X	
5.28	Test results required	P.S.1.C.2.2 (R1) Para 6.1.2	X	
5.28.3	Macroetch test	P.S.1.C.2.2 (R1) Para 6.1.2	X	
5.28.4	Radiography test	P.S.1.C.2.2 (R1) Para 6.2	X	
5.28.5	Visual examination	P.S.1.C.2.2 (R1) Para 5.2	X	
5.28.5.5	Root surface	P.S.1.C.2.2 (R1) Para 5.2	X	
5.29	Retest	P.S.1.C.2.2 (R1) Para 3.0 and 3.1(a), (b)	X	
5.30	Period of effectiveness	P.S.1.C.2.2 (R1) Para 4.0	X	
5.31	Records	P.S.1.C.2.2 (R1) Para 2.3	X	

a. Supplement A to DPM N73M2 requires the use of P.S.1.C.2.2 for Welder Qualification Testing.

Checklist CNP-3

CODE/STANDARD REQUIREMENTS
WELDER QUALIFICATION
ASME SECTION IX 1971 S 73 ADDENDA

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
Q-20	General			
(a)	Determination ability of welder	P.S.1.M.2.2 (R3) Para 1.2	X	
(b)	Test may be terminated	P.S.1.M.2.2 (R3) Para 2.4	X	
(c)	Maintain records of WPS by contractor used for qualification	P.S.1.M.2.2 (R3) Para 2.5	X	
(d)	Welder shall be assigned identifying letter or symbol	P.S.1.M.2.2 (R3) Para 2.6	X	
Q-21	Qualification of welders and welding operators			
(a)	Welders			
	(1) Mechanical tests	P.S.1.M.2.2 (R3) Para 6.2	X	
	(2) Radiograph	P.S.1.M.2.2 (R3) Para 6.2	X	
	(3) Grooves qualify for fillets	P.S.1.M.2.2 (R3) Para 2.7	X	
Q-22	Essential variables			
	W-1 change in filler Metal F. No.	P.S.1.M.2.2 (R3) Para 2.2	X	
	W-2 change in position	P.S.1.M.2.2 (R3) Para 2.2	X	
	W-3 Progression	P.S.1.M.2.2 (R3) Para 6.0	X	
	W-4 Omission of backing strip	P.S.1.M.2.2 (R3) Para 6.0	X	
Q-22	W-5 Addition of backing in gas welding	P.S.1.M.2.2 (R3) Para 6.0	X	
	W-6 Change one process to another	P.S.1.M.2.2 (R3) Para 6.0	X	
	W-7 Omission or addition of consumable insert	P.S.1.M.2.2 (R3) Para 6.0	X	
	W-8 Omission of gas backing	P.S.1.M.2.2 (R3) Para 6.0	X	
Q-23	Test joint			
	(a) WPS available dimensions of test material	P.S.1.M.2.2 (R3) Para 6.0	X	
	(b) Plate or pipe	P.S.1.M.2.2 (R3) Para 6.0	X	
	(c) Can substitute carbon steel for other material	P.S.1.M.2.2 (R3) Para 6.0	X	
Q-24	Type and No. of Test specimens			
	(a) Table Q.24.1, 2 or 3	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(1) Qualification on plate with backing also qualifies pipe 1G and 2G	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	

Checklist CNP-3

CODE/STANDARD REQUIREMENTS
WELDER QUALIFICATION
ASME SECTION IX 1971 S 73 ADDENDA (continued)

Criteria	Title/Subject	TVA Document[a]	Compliance Yes	Compliance No
Q-24	(2) Qualification on plate without backing also qualifies pipe 1G and 2G	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(3) Qualification double welded plate also qualifies double welded pipe 1G and 2G	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(4) All other positions pipe qualifies for plate but not vice versa	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(b) Type & No. Test per Q-24.1 and Figures Q-13 a,b,c	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(c) 5G and 6G requires 4 bend coupons	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
	(d) Manual shielded arc may be qualified by x-ray	P.S.1.M.2.2 (R3) Para 6.0 and 7.0	X	
Q-25	Retest	P.S.1.M.2.2 (R3) Para 3.0	X	
Q-26	Renewal of qualification	P.S.1.M.2.2 (R3) Para 4.0	X	

a. Supplement A to DPM N73M2 requires the use of P.S.1.M.2.2 for Welder Qualification Testing.

Checklist CNP-4

CODE/STANDARD REQUIREMENTS
INSPECTION OF WELDING ACTIVITIES
ASME III 1971-S73

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NB-2545	Magnetic Particle (base metal)	N-MT-2 (R1) Para 7.0	X	
NB-2546	Liquid Penetrant (base metal)	N-PT-4 (R2) Para 5.0	X	
NB-4122	Material identification	AI-9.4.2 (R6) Para 6.4, and 6.5	X	
NB-4130	Elimination and repair of defects	AI-9.15 (R6) Para 7.1	X	
NB-4231.1	Tack welds	N-VT-3 (R4) Para 5.2.9	X	
NB-4231.2	Temporary attachments and their removal	P.S.1.M.1.2 (R4) Para 14.4 and 14.17	X	
NB-4232.1	Fairing of offsets	N-VT-3 (R4) Para 6.2	X	
NB-4233	Alignment requirements when component surfaces are inaccessible	N-VT-3 (R4) Para 6.2	X	
NB-4322	Maintenance and certification of records	AI-9.4.2 (R6) Para 6.7	X	
NB-4322.1	Identification of joints by welder	AI-9.4.2 (R6) Para 6.2	X	
NB-4421	Backing rings	P.S.1.M.1.2 (R4) Para 13.0	X	
NB-4424	Surfaces of weld	N-VT-3 (R4) Para 6.2	X	
NB-4426.2	Thickness of weld reinforcement for piping	N-VT-3 (R4) Para 6.2.6	X	
NB-4427	Shape and size of fillets and socket welds	N-VT-3 (R4) Para 6.2.7.1	X	b
NB-4435	Welding of temporary or minor permanent attachments	P.S.1.M.1.2 (R4) Para 14.2, and 14.4	X	b
NB-4452	Elimination of surface defects	N-VT-3 (R4) Para 6.2.2	X	
NB-4453	Requirements for making repair of welds	P.S.1.M.1.2 (R4) Para 15.0	X	
NB-4622.2	Time-temperature recordings	P.S.2.M.1.1 (R4) Para 6.0	X	
NB-5130	Examination of weld edge preparation surfaces	N-VT-3 (R4) Para 5.2	X	
NB-5320	Radiographic acceptance standards	N-RT-1 (R4) Para 8.0	X	
NB-5330	Utrasonic acceptance standards	N-UT-8 (R5) Para all	X	
NB-5340	Magnetic particle acceptance standards	N-MT-2 (R2)Para 7.0	X	b
NB-5350	Liquid penetrant acceptance standards	N-PT-1 (R6) Para 5.0	X	

a. NC and ND make reference to NB for requirements. In addition, NE inspection activities are identical to those of NB and, therefore, have not been listed.

b. TVA has taken provisions of later code editions.

Checklist CNP-5

CODE/STANDARD REQUIREMENTS
INSPECTION OF WELDING ACTIVITIES
AWS D1.1-Rev 2-74

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
3.2.3	Visual inspection and repair of plate cut edges	N-VT-2 (R2) Para 4.1	X	
3.3.1	Assembly, fit-up requirements	N-VT-2 (R2) Para 4.2	X	
3.3.2	Partial joint penetration groove weld fit-up	N-VT-2 (R2) Para 4.2	X	
3.3.3	Butt weld alignment	N-VT-2 (R2) Para 4.3	X	
3.3.4	Groove weld joint tolerance	N-VT-2 (R2) Para 4.2	X	
3.3.5	Groove produced by gouging	N-VT-2 (R2) Para 4.2	X	
3.3.7.2	Tack weld requirements	N-VT-2 (R2) Para 4.4	X	
3.6	Weld profile	N-VT-2 (R2) Para 5.7.3, 5.7.8, and 5.7.9	X	
3.10	Cleaning and protective coatings	N-VT-2 (R2) Para 5.4	X	
4.2	Preheat and interpass temperature requirements	N-VT-2 (R2) Para 4.5	X	
4.4	Arc strikes	N-VT-2 (R2) Para 5.3	X	
6.1-6.4	General inspection requirements	N-VT-2 (R2) Para 5.0 AI-9.4.2 (R6) Para 6.0	X	
6.5	Inspection of work and records	N-VT-2 (R2) Para 6.0	X	

Checklist CNP-6

CODE/STANDARD REQUIREMENTS
INSPECTION OF WELDING ACTIVITIES
B31.1-1973-S73

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
111.3.1	Socket weld requirement	N-VT-3 (R4) Para 5.2.8	X	
111.4	Fillet welds	N-VT-3 (R4) Para 6.2.7	X	
127.3.1	Butt welds			
A.1	End prepration	N-VT-3 (R4) Para 5.2.1	X	
A.2	Dimensions	N-VT-3 (R4) Para 5.2.2	X	
A.3	Boring end of pipe	N-VT-3 (R4) Para 5.2.2	X	
A.4	Upset of end of pipe	N-VT-3 (R4) Para 5.2	X	
B.	Cleaning	N-VT-3 (R4) Para 5.2.1	X	
C.	Alignment	N-VT-3 (R4) Para 5.2.4	X	
D.	Spacing	N-VT-3 (R4) Para 5.1	X	
127.4.1B	Environment	P.S.1.M.1.2 (R4) Para 14.1	X	
127.4.2B	Tack welds	N-VT-3 (R4) Para 5.2.9	X	
127.4.2C	Gradual transition of weld	N-VT-3 (R4) Para 6.2.2.3	X	
127.4.2D	As-welded surfaces	N-VT-3 (R4) Para 6.2.2	X	
D.2	Reinforcement	N-VT-3 (R4) Para 6.2.6	X	
D.3	Undercut	N-VT-3 (R4) Para 6.2.5	X	
127.4.4	Fillet welds	M-VT-3 (R4) Para 6.2.7	X	a
127.4.5	Seal welds	N-VT-3 (R4) Para 6.2.8	X	
127.5.1	Qualification general	P.S.1.M.1.2 (R4) Para 3.1	X	
131.2.3	Minimum preheat	P.S.1.M.1.2 (R4) Para 9.4 and 9.5	X	
136.4	Mandatory examinations Table 136.4	N-MT-1 (R5) all N-PT-1 (R6) all N-RT-1 (R4) all N-VT-3 (R4) all	X	

a. TVA has taken provisions of later code editions.

Checklist CNP-7

CODE/STANDARD REQUIREMENTS
INSPECTION OF WELDING ACTIVITIES
ANSI B31.5-1966

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
527.3.1 (a)	Butt joint end prep	N-VT-3 (R4) Para 5.0	X	
527.3.1 (b)	Cleaning	N-VT-3 (R4) Para 5.0	X	
527.3.1 (c)	Alignment	N-VT-3 (R4) Para 5.2.4	X	
527.3.1 (d)	Spacing	N-VT-3 (R4) Para 5.1	X	
527.4.2 (b)	Tack welds	N-VT-3 (R4) Para 5.2.9	X	
527.4.2 (d)(1)	External surface undercut	N-VT-3 (R4) Para 6.2.5	X	
527.4.2 (d)(2)	Reinforcement	N-VT-3 (R4) Para 6.2.6	X	
527.4.4	Socket and fillet welds	N-VT-3 (R4) Para 6.2.7	X	
527.4.5	Seal welds	N-VT-3 (R4) Para 6.2.8	X	
527.4.6 (C-E)	Weld branch connections	N-VT-3 (R4) Para 5.1	X	
527.6	Records-procedures and welder qualfications	P.S.1.M.1.2 (R4) Para 3.1 and 4.1	X	
527.7	Defect repairs	P.S.1.M.1.2 (R4) Para 15.0	X	
531.2.3	Verification of preheat temperature	P.S.1.M.1.2 (R4) Para 9.4	X	
531.3.3	Postheat treatment	P.S.1.M.1.2 (R4) Para 10.1	X	
536	Inspection	N-VT-3 (R4) Para 5.0	X	

Checklist CNP-8

CODE/STANDARD REQUIREMENTS
ASNT SNT-TC-1A 1980
NDE Personnel Qualification

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
4.1	Levels of qualification	0202.14 (R0) Para 4.2.2	X	
4.3	Three levels of qualification	0202.14 (R0) Para 4.2.2	X	
5.1	Written practice established	0202.14 (R0) Para all	X	
5.2	Describe responsibilities of each level	0202.14 (R0) Para 4.1.2	X	
6.1 and 6.2	Personnel shall have sufficient education, etc.	0202.14 (R0) Para 4.1.5	X	
6.3	Level III requirements	0202.14 (R0) Table 1	X	
7.1	Sufficient organized training	0202.14 (R0) Para 4.1.5, Table 1	X	
8.1	Administer examination	0202.14 (R0) Para 4.1.6	X	
8.1.1	Physical examination	0202.14 (R0) Para 4.2.4	X	
8.1.2	General examination	0202.14 (R0) Para 4.2.4	X	
8.1.3	Specific examination	0202.14 (R0) Para 4.2.4	X	
8.1.4	Practical examination	0202.14 (R0) Para 4.2.4	X	
8.3.3	Level III examination	0202.14 (R0) Para 4.2.4	X	
8.4.1	Examination grading	0202.14 (R0) Para 4.2.5	X	
8.4.2	Composite grade	0202.14 (R0) Para 4.2.5	X	
8.4.3	Weight factors	0202.14 (R0) Para 4.2.5, Table 2	X	
8.4.4	Passing grade	0202.14 (R0) Table 2	X	
8.5	Re-examination	0202.14 (R0) Para 4.1.6	X	
9.2	Certification practices	0202.14 (R0) Para 4.1.7, and 4.1.8	X	
9.3	Certification based on demonstration	0202.14 (R0) Table 2	X	
9.6	Copies shall be maintained	0202.14 (R0) Para 4.1.7	X	
9.6.1	Qualification records shall be maintained	0202.14 (R0) Para 4.1.7	X	
9.7.1	Recertification criteria	0202.14 (R0) Para 4.1.8	X	
9.7.3	Interruption of service	0202.14 (R0) Para 4.1.8	X	
10.1	Termination of employee certification	0202.14 (R0) Para 4.1.9	X	

Checklist CNP-9

CODE/STANDARD REQUIREMENTS
ASSIGNMENT AND DOCUMENTATION OF WELDERS

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
ASME Section III NB 4321	Performance qualification in accordance with ASME Section IX	P.S.1.M.1.2 (R4) Para 4.0	X	
ASME Section III NB 4322.1	Identification to joint by welder or welder operator	P.S.3.M.5.1 (R6) Para 7.0	X	
ANSI B31.1 127.5.1	Performance qualification in accordance with ASME Section IX	P.S.1.M.1.2 (R4) Para 4.0	X	
ANSI B31.1 127.6	Welding performed identified by welder symbol	P.S.3.M.5.1 (R6) Para 7.0	X	
AWS D1.1-74 5.2	Performance qualification in accordance with Part III of this code	P.S.1.C.1.2 (R3) Para 5.1	X	
USASI (ANSI) B31.5-66 527.5.1	Performance qualification with ASME Section IX	P.S.1.M.1.2 (R4) Para 4.0	X	
USASI (ANSI) B31.5-66 527.6	Welding performed identified by welder symbol	P.S.3.M.5.1 (R6) Para 7.0	X	

CODE/STANDARD REQUIREMENTS
ASME SECTION III 1971 EDITION THROUGH SUMMER 1973 ADDENDA
(1974 EDITION FOR HEAT TREATMENT)

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NB-2545	Magnetic Particle (base metal)	N-MT-2 (R1) Para 7.0	X	
NB-2546	Liquid Penetrant (base metal)	N-PT-4 (R2) Para 5.0	X	
NB-4122	Materials identification	P.S.1.M.3.1 (R7) Para 3.0	X	
NB-4125	Testing of welding and brazing materials	P.S.1.M.1.2 (R4) Para 6.0	X	
NB-4131	Rules governing elimination and repair of defects	P.S.4.M.5.1 (R3) Para all	X	
NB-4132	Documentation of repair welds of base materials	P.S.4.M.5.1 (R3) Para 6.0	X	
NB-4211.1	Preheating before thermal cutting	P.S.1.M.1.2 (R4) Para 5.3	X	
NB-4214	Minimum thickness of fabricated materials	P.S.4.M.5.1 (R3) Para 2.2	X	
NB-4231.1	Tack welds	P.S.1.M.1.2 (R4) Para 14.2 and 14.3	X	
NB-4231.2	Temporary attachments and their removal	P.S.1.M.1.2 (R4) Para 14.17 and 14.4	X	[b]
NB-4232.1	Fairing of offsets	P.S.1.M.1.2 (R4) Para 11.1	X	
NB-4233	Alignment requirements when component surfaces are inaccessible	P.S.3.M.5.1 (R6) Para A.4.1	X	
NB-4311	Types of welding processes permitted	P.S.1.M.1.2 (R4) Para 3.1	X	
NB-4231	Required qualification	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
NB-4322	Maintenance and certification of records	P.S.1.M.2.2 (R3) Para 2.0	X	
NB-4322.1	Identification of joints by welder	P.S.3.M.5.1 (R6) Para 7.0	X	
NB-4323	Welding prior to qualification	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
NB-4411	Identification, storage and handling of welding materials	P.S.1.M.1.2 (R4) Para 6.3	X	
NB-4412	Cleanliness and protection of welding surfaces	P.S.1.M.1.2 (R4) Para 5.4	X	
NB-4421	Backing rings	P.S.1.M.1.2 (R4) Para 13.0	X	
NB-4422	Peening	P.S.1.M.1.2 (R4) Para 14.18	X	

CODE/STANDARD REQUIREMENTS
ASME SECTION III 1971 EDITION THROUGH SUMMER 1973 ADDENDA
(1974 EDITION FOR HEAT TREATMENT) (continued)

Criteria[a]	Title/Subject	TVA Document	Compliance	
			Yes	No
NB-4423	Double-welded joints	P.S.1.M.1.2 (R4) Para 14.5, 14.6 and 15.4.3.2	X	
NB-4424	Surfaces of weld	P.S.3.M.5.1 (R6) Para B.2 and B.5	X	
NB-4425	Welding components of different diameters	P.S.1.M.1.2 (R4) Para 11.1	X	
NB-4426.2	Thickness of weld reininforcement for piping	P.S.3.M.5.1 (R6) Para B.6	X	b
NB-4427	Shape and size of fillets and socket welds	P.S.3.M.5.1 (R6) Figures 3 and 4	X	b
NB-4428	Seal welds of threaded joints	P.S.3.M.5.1 (R6) Para B.8	X	
NB-4435	Welding of temporary or minor permanent attachments	P.S.1.M.1.2 (R4) Para 10.0, 14.4, and 14.17	X	
NB-4452	Elimination of surface defects	P.S.1.M.1.2 (R4) Para 15.6 and 15.7	X	
NB-4453	Requirements for making repair of welds	P.S.1.M.1.2 (R4) Para 15.0	X	b
NB-4610	Welding preheat requirements	P.S.1.M.1.2 (R4) Para 9.0	X	
NB-4612	Preheating methods	P.S.1.M.1.2 (R4) Para 9.0	X	
NB-4621	Heating and cooling method (PWHT)	P.S.2.M.1.1 (R4) Para 3.0	X	
NB-4622.1	Requirements for PWHT	P.S.2.M.1.1 (R4) Table 1	X	
NB-4622.2	Time-temperature recordings	P.S.2.M.1.1 (R4) Para 6.0	X	
NB-4622.4	Minimum holding temperature and time	P.S.2.M.1.1 (R4) Para 4.0	X	
NB-4622.7	Exemptions to mandatory requirements	P.S.4.M.5.1 (R3) Table 2	X	b
NB-4623	Cooling rate above 800°F	P.S.2.M.1.1 (R4) Para 3.0	X	
NB-4624.3	Local heating	P.S.2.M.1.1 (R4) Para 2.3	X	
NB-5113	Post examination cleaning	N-PT-4 (R2) Para 4.8	X	
NB-5130	Examination of weld edge preparation surfaces	N-VT-3 (R4) Para 5.2.2	X	
NB-5320	Radiographic acceptance standards	N-RT-1 (R4) Para 8.0	X	
NB-5330	Ultrasonic acceptance standards	N-UT-8 (R5) Para All	X	

CODE/STANDARD REQUIREMENTS
ASME SECTION III 1971 EDITION THROUGH SUMMER 1973 ADDENDA
(1974 EDITION FOR HEAT TREATMENT) (continued)

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NB-5340	Magnetic particle acceptance standards	N-MT-2 (R1) Para 7.0	X	[b]
NB-5350	Liquid penetrant acceptance standards	N-PT-4 (R2) Para 5.0	X	
NB-5500	Qualification of nondestructive examination personnel	N-PT-4 (R2) Para 3.2 N-MT-2 (R1) Para 3.0 P.S.3.M.5.1 (R3) Para 3.0 N-RT-1 (R4) Para 3.0	X	
NC-4130	Elimination and repair of defects	P.S.4.M.5.1 (R3) Para all	X	
NC-4421	Backing rings	P.S.1.M.1.2 (R4) Para 13.0	X	
ND-4130	Elimination and repair of defects	P.S.4.M.5.1 (R3) Para all	X	
ND-4421	Backing rings	P.S.1.M.1.2 (R4) Para 13.0	X	
NE-4122	Materials identification	P.S.1.M.3.1 (R7) Para 3.0	X	
NE-4125	Testing of welding and brazing materials	P.S.1.M.1.2 (R4) Para 6.0	X	
NE-4131	Rules governing the elimination and repair defects	P.S.4.M.5.1 (R3) Para all	X	
NE-4211.1	Preheating before thermal cutting	P.S.1.M.1.2 (R4) Para 5.3	X	
NE-4214	Minimum thickness of fabricated materials	P.S.4.M.5.1 (R3)Para 2.2	X	
NE-4231.1	Tack welds	P.S.1.M.1.2 (R4) Para 14.2 and 14.3	X	
NE-4232.1	Fairing of offsets	P.S.1.M.1.2 (R4) Para 11.1	X	
NE-4311	Types of welding processes permitted	P.S.1.M.1.2 (R4) Para 3.1	X	
NE-4321	Required qualification	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
NE-4322	Maintenance and certification of records	P.S.1.M.2.2 (R3) Para 2.0	X	
NE-4322.1	ID of joints by welder	P.S.3.M.5.1 (R6) Para 7.0	X	
NE-4323	Welding prior to qualification	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
NE-4411	ID, storage and handling of welding materials	P.S.1.M.3.1 (R7) Para all	X	

CODE/STANDARD REQUIREMENTS
ASME SECTION III 1971 EDITION THROUGH SUMMER 1973 ADDENDA
(1974 EDITION FOR HEAT TREATMENT) (continued)

Criteria[a]	Title/Subject	TVA Document	Compliance Yes	Compliance No
NE-4412	Cleanliness and protection of welding surfaces	P.S.1.M.1.2 (R4) Para 5.4	X	
NE-4421	Backing rings	P.S.1.M.1.2 (R4) Para 13.0	X	
NE-4422	Peening	P.S.1.M.1.2 (R4) Para 14.18	X	
NE-4423	Single and double welded joints	P.S.1.M.1.2 (R4) Para 14.5, 14.6 and 15.4	X	
NE-4424	Surfaces of weld	P.S.3.M.5.1 (R6) Para B.2 and B.5	X	
NE-4425	Welding components of different diameters	P.S.1.M.1.2 (R4) Para 11.1	X	
NE-4426.1	Weld reinforcement for vessels	P.S.3.M.5.1 (R6) Table 3	X	
NE-4427	Shape and size of fillets	P.S.3.M.5.1 (R6) Para B.7	X	
NE-4428	Seal welds of threaded joints	P.S.3.M.5.1 (R6) Para B.8	X	
NE-4435	Welding of temporary or minor permanent attachments	P.S.1.M.1.2 (R4) Para 14.4 and 14.17	X	
NE-4452	Elimination of surface defects	P.S.1.M.1.2 (R4) Para 15.6 and 15.7	X	
NE-4453	Requirements for making repair welds	P.S.1.M.1.2 (R4) Para 15.0	X	
NE-4610	Welding preheat requirements	P.S.1.M.1.2 (R4) Para 9.0	X	
NE-4612	Preheating methods	P.S.1.M.1.2 (R4) Para 9.0	X	
NE-4621	Vessels required to be PWHT	P.S.2.M.1.1 (R4) Para 3.0	X	
NE-4622.1	Requirements for PWHT	P.S.2.M.1.1 (R4) Table 1	X	
NE-4622.2	Time-temperature recordings	P.S.2.M.1.1 (R4) Para 6.0	X	
NE-4622.4	Minimum holding temperature and time	P.S.2.M.1.1 (R4) Para 4.0	X	
NE-4622.7	Exemptions to mandatory requirements	P.S.4.M.5.1 (R3) Table 2	X	[b]
NE-4623	Cooling rate above 800°F	P.S.2.M.1.1 (R4) Para 3.0	X	
NE-4624.3	Local heating	P.S.2.M.1.1 (R4) Para 2.3	X	
NE-5113	Post examination cleaning	N-PT-4 (R2) Para 4.8	X	
NE-5320	Radiographic acceptance standards	N-RT-1 (R4) Para 8.0	X	
NE-5330	Ultrasonic acceptance standards	N-UT-23 (R2) Para All	X	

Checklist CNP-10

CODE/STANDARD REQUIREMENTS
ASME SECTION III 1971 EDITION THROUGH SUMMER 1973 ADDENDA
(1974 EDITION FOR HEAT TREATMENT) (continued)

Criteria[a]	Title/Subject	TVA Document	Compliance	
			Yes	No
NE-5340	Magnetic particle acceptance standards	N-MT-2 (R1) Para 7.0	X	[b]
NE-5350	Liquid penetrant acceptance standards	N-PT-4 (R2) Para 5.0	X	
NE-5500	Qualification of NDE personnel	N-PT-4 (R2) Para 3.2 N-MT-4 (R2) Para 3.0 N-UT-22 (R0) Para 3.0 N-RT-1 (R4) Para 3.0	X	

a. NC and ND make reference to NB for requirements. Only paragraphs of NC and ND which address different requirements have been listed.

b. TVA has taken provisions of later code editions.

Checklist CNP-11

CODE/STANDARD REQUIREMENTS
AWS D1.1—Rev 2-74

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
3.1.3	Weld restrictions during inclement conditions and temperature	P.S.1.C.1.2 (R3) Para 11.1.4	X	
3.1.4	Adherence to size and length of weld as specified by design requirements	P.S.1.C.1.2 (R3) Para 11.1.5	X	
3.2.1	Condition of base metal	P.S.1.C.1.2 (R3) Para 6.1, 6.3 and 6.2	X	
3.2.2	Oxygen cutting requirements	P.S.1.C.1.2 (R3) Para 6.5	X	
3.2.3	Visual inspection and repair of plate cut edges	P.S.0.C.1.1 (R1) Para 3.2.2	X	
3.3.1	Assembly, fit-up requirements	P.S.1.C.1.2 (R3) Para 7.1	X	
3.3.2	Partial Joint penetration groove weld fit-up	P.S.1.C.1.2 (R3) Para 7.3	X	
3.3.3	Butt weld alignment	P.S.1.C.1.2 (R3) Para 7.4	X	
3.3.4	Groove weld joint tolerance	P.S.1.C.1.2 (R3) Para 7.7	X	
3.3.5	Groove produced by gouging	P.S.1.C.1.2 (R3) Para 11.1.7	X	
3.3.6	Usage of alignment clamps	P.S.1.C.1.2 (R3) Para 7.8	X	
3.3.7	Tack weld requirement	P.S.1.C.1.2 (R3) Para 8.1-8.8	X	
3.4	Control of distortion and shrinkage stresses	P.S.1.C.1.2 (R3) Para 12.1-12.8	X	
3.5	Dimensional tolerances	P.S.1.C.1.2 (R3) Para 7.1-7.8 P.S.0.C.1.1 (R1) Para 3.5	X	
3.6	Weld profile	N-VT-2 (R2) Para 5.7.8	X	
3.6.3	Base metal thinning and surface finishing	N-VT-2 (R2) Para 5.7.3 Para 6.1.16	X	
3.6.4	Undercut for buildings	N-VT-2 (R2) Para 5.7.2	X	
3.7.1-3.7.2	Repair of weld and base metal	P.S.1.C.1.2 (R3) Para 13.0-13.5	X	
3.7.3	Straightening distorted areas by heating	P.S.1.C.1.2 (R3) Para 13.5	X	
3.7.4	Repair approval	P.S.1.C.1.2 (R3) Para 13.1	X	
3.7.5	Engr. notification prior to cutting completed welds	P.S.1.C.1.2 (R3) Para 13.1 and 13.5	X	

CODE/STANDARD REQUIREMENTS
AWS D1.1—Rev 2-74 (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
3.7.6	Scope requirement for rework of inaccessible welds	P.S.1.C.1.2 (R3) Para 13.4	X	
3.8	Peening	P.S.1.C.1.2 (R3) Para 11.1.10	X	
3.9	Stress relief heat treatment	P.S.1.C.1.2 (R3) Para 14.0-14.2	X	
3.9.2	Alternate or lower heat treatment			X
3.10.1	Cleaning and protective coatings	P.S.1.C.1.2 (R3) Para 15.1	X	
4.1.3	Filler metal storage	P.S.1.C.1.2 (R3) Para 9.4.2, 9.1.2, 9.1.3	X	
4.2	Preheat and interpass temperature requirements	P.S.1.C.1.2 (R3) Para 10.0-10.5	X	
4.4	Arc strikes	P.S.1.C.1.2 (R3) Para 8.9	X	
4.5	Interpass cleaning	P.S.1.C.1.2 (R3) Para 11.1.6	X	
4.6	Groove weld termination	P.S.1.C.1.2 (R3) Para 11.1.7, 11.1.8, 11.1.9	X	
4.7	Groove weld backing	P.S.1.C.1.2 (R3) Para 11.1.7, 11.1.8	X	
4.8	Caulking of welds	P.S.1.C.1.2 (R3) Para 11.1.11	X	
4.9.1	SMAW electrodes per latest edition of code	P.S.1.C.1.2 (R3) Para 9.1.1	X	
4.9.2 4.9.3	Requirements of low-hydrogen covered electrodes	P.S.1.C.1.2 (R3) Para 9.1.2, 9.1.3	X	
5.3	Welder qualification per parts III, IV, V of AWS D1.1	P.S.1.C.1.2 (R3) Para 5.1	X	
5.15-5.31	Welder qualification test	P.S.1.C.1.2 (R3) Para 5.1	X	
5.32-5.42	Welding operator qualification	P.S.1.C.1.2 (R3) Para 5.1	X	
5.43-5.52	Qualification of tackers	P.S.1.C.1.2 (R3) Para 5.1	X	
6.1-6.4	General inspection requirements	N-VT-2 (R2) all P.S.1.C.1.2 (R3) all	X	
6.5	Inspection of work and records	N-VT-2 (R2) all P.S.1.C.1.2 (R3) all	X	
6.7.3	Radiographic testing per code			X

Checklist CNP-11

CODE/STANDARD REQUIREMENTS
AWS D1.1—Rev 2-74 (continued)

Criteria	Title/Subject	TVA Document	Compliance	
			Yes	No
6.7.4	Ultrasonic testing per code			X
6.7.5	Magnetic particle testing per ASTM spec. E109 and AWS D1.1			X
6.7.6	Dye penetrant inspection per ASTM Spec. E165 and D1.1			X
8.14	Temporary welds	P.S.1.C.1.2 (R3) Para 8	X	
8.15.1	Visual inspection of welds	N-VT-2 Para 5.0	X	
8.15.2	NDE of welds except UT			X
8.15.3	UT of welds			X
9.22.1	Edge preparation	P.S.1.C.1.2 (R3) Para 19.3	X	
9.22.2	Oxygen cut surfaces	P.S.1.C.1.2 (R3) Para 6.5	X	
9.24	Temporary welds	P.S.1.C.1.2 (R3) Para 8.8	X	
9.25.1	Visual inspection of welds	N-VT-2 (R2) all	X	
9.25.2	NDE of welds except UT			X
9.25.3	UT of welds			X
10.14.1	Fit-up of fillet welds	P.S.1.C.1.2 (R3) Para 7.1	X	
10.14.2	Girth weld	P.S.1.C.1.2 (R3) Para 7.5	X	
10.14.3	Groove weld configuration	P.S.1.C.1.2 (R3) Para 7.7	X	
10.15	Temporary welds	P.S.1.C.1.2 (R3) Para 8.0	X	
10.17.1	Visual inspection of welds	N-VT-2 (R2) Para 5.0	X	
10.17.2	NDE of welds except UT			X
10.17.3	UT of welds			X

CODE/STANDARD REQUIREMENTS
ANSI B31.1-1973-S73

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
111.1	General (welded joints)	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
111.2	Butt welds	P.S.1.M.1.2 (R4) Para 7.0 and 13.0	X	
111.3	Socket welds	P.S.1.M.1.2 (R4) Para 7.1 Drawing M.1.2-11 R6	X	
111.3.1	Requirements	P.S.1.M.1.2 (R4) Para 7.2 Drawing M.1.2-11 R6	X	
111.4	Fillet welds	P.S.1.M.1.2 (R4) Para 7.0	X	[a]
111.5	Seal welds	P.S.1.M.1.2 (R4) Para 7.0	X	
111.6 A-F	Circumferential joints	P.S.1.M.1.2 (R4) Para 7.0	X	
111.6.1 G7	Welded socket type or sleeve type joints	P.S.1.M.1.2 (R4) Para 7.0	X	
127.1.1	Welding processes (see A.1 through A.4 below)	P.S.1.M.1.2 (R4) Para 3.1	X	
127.2.1	Filler metal	P.S.1.M.1.2 (R4) Para 6.1	X	
127.2.2	Backing rings	P.S.1.M.1.2 (R4) Para 6.1	X	
127.3.1	Butt welds (see A.1 through A.4 below)			
A.1	End preparation	P.S.1.M.1.2 (R4) Para 5.0	X	
A.2	Dimensions	P.S.1.M.1.2 (R4) Para 7.0	X	
A.3	Boring end of pipe	P.S.1.M.1.2 (R4) Para 5.0	X	
A.4	Upset of end of pipe	P.S.1.M.1.2 (R4) Para 5.0	X	
B	Cleaning	P.S.1.M.1.2 (R4) Para 5.4 P.S.3.M.5.1 (R6) Para A.1	X	
C	Alignment	P.S.1.M.1.2 (R4) Para 11.0 P.S.3.M.5.1 (R6) Para A.4	X	
D	Spacing	P.S.1.M.1.2 (R4) Para 11.2 and 11.3	X	
127.3.2	Fillet welds	P.S.1.M.1.2 (R4) Para 7.0	X	
127.4	Procedure (see A and B below)			
127.4.1	General (see A and B below)			
A.	Qualification of WPS	P.S.1.M.1.2 (R4) Para 3.1	X	
B.	Environment	P.S.1.M.1.2 (R4) Para 14.1	X	

CODE/STANDARD REQUIREMENTS
ANSI B31.1-1973-S73 (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
127.4.2	Girth butt welds (see A through D below)			
A.	Girth butt welds	P.S.1.M.1.2 (R4) Para 7.0	X	
B.	Tack welds	P.S.1.M.1.2 (R4) Para 14.3	X	
C.	Dimensional	P.S.1.M.1.2 (R4) Para 11.1	X	
D.	As-welded surfaces	P.S.1.M.1.2 (R4) Para 12.1	X	
D.1	Surface condition	P.S.1.M.1.2 (R4) Para 12.1	X	
D.2	Reinforcements	P.S.1.M.1.2 (R4) Para 12.1	X	
D.3	Undercut	P.S.3.M.5.1 (R6) Para B.5	X	
D.4	Surface conditioning	P.S.1.M.1.2 (R4) Para 15.7	X	
127.4.3	Longitudinal butt welds	P.S.1.M.1.2 (R4) Para 7.0	X	
127.4.4	Fillet welds	P.S.3.M.5.1 (R6) Para B.7.1, B.7.2	X	a
127.4.5	Seal welds	P.S.3.M.5.1 (R6) Para B.8.1	X	
127.4.9	Attachment welds	P.S.1.M.1.2 (R4) Para 7.1	X	
127.4.10	Heat Treatment	P.S.1.M.1.2 (R4) Para 10.1	X	
127.4.11	Weld defect repairs	P.S.1.M.1.2 (R4) Para 15.0	X	
127.5	Qualification (see 127.5.1 through 127.5.3 below)			
127.5.1	General	P.S.1.M.1.2 (R4) Para 3.1	X	
127.5.2	Welding responsibility	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
127.5.3	Qualification responsibility			
A.	Procedures	P.S.1.M.1.2 (R4) Para 3.1	X	
B.	Welders and welding operators	P.S.1.M.1.2 (R4) Para 4.1	X	
127.6	Qualification records	P.S.1.M.2.2 (R3) Para 2.5 and 2.6 P.S.3.M.5.1 (R6) Para 7.0	X	
131.2.1	Preheating	P.S.1.M.1.2 (R4) Para 9.0	X	
131.2.2	Preheat dissimilar materials	P.S.1.M.1.2 (R4) Para 9.0	X	
131.2.3	Check preheating	P.S.1.M.1.2 (R4) Para 9.4-9.5	X	

Checklist CNP-12

CODE/STANDARD REQUIREMENTS
ANSI B31.1-1973-S73 (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
131.3	Postheat treatment (see 131.3.1 through 131.3.5 below)			
131.3.1	Postheat treatment different thickness	P.S.2.M.1.1 (R4) Para 4.0 P.S.1.M.1.2 (R4) Para 10.0	X	
131.3.2	Heating methods	P.S.2.M.1.1 (R4) Para 2.0	X	
131.3.3	Dissimilar metals	P.S.1.M.1.2 (R4) Para 10.0	X	
131.3.4	P-1 material	P.S.1.M.1.2 (R4) Para 10.0	X	
131.3.5	Local	P.S.1.M.1.2 (R4) Para 10.0 P.S.2.M.1.1 (R4) Para 2.3.1	X	
132.1 to 132.7	Preheating	P.S.1.M.1.2 (R4) Para 9.0	X	
133.3 to 133.6	Postheat treatment	P.S.2.M.1.1 (R4) Para all	X	
136.4.2	Visual examination	N-VT-3 (R4)	X	
136.4.3	Magnetic particle examination	N-MT-1 (R5)	X	
136.4.4	Liquid penetrant examination	N-PT-1 (R6)	X	
136.4.5	Radiography	N-RT-1 (R4)	X	

a. TVA has taken provisions of later code editions.

CODE/STANDARD REQUIREMENTS
ANSI B31.5-1966

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
527.2.1	Filler material	P.S.1.M.3.1 (R7) Para 2.1	X	
527.2.2	Backing rings	P.S.1.M.3.1 (R7) Para 2.1	X	
527.3.1	Butt Welds	P.S.1.M.1.2 (R4) Para 5.1	X	
	A. End prep	P.S.1.M.1.2 (R4) Para 5.1	X	
	B. Cleaning	P.S.1.M.1.2 (R4) Para 5.4	X	
	C. Alignment	P.S.1.M.1.2 (R4) Para 11.1	X	
	D. Spacing	P.S.1.M.1.2 (R4) Para 11.2, 11.3, and 11.4	X	
527.3.2	Fillet welds	P.S.1.M.1.2 (R4) Para 7.1	X	
527.4	Procedures			
527.4.1	General	P.S.1.M.1.2 (R4) Para 14.1	X	
527.4.2	Butt welds	P.S.1.M.1.2 (R4) Para 7.1	X	
527.4.4	Socket & fillet weld	P.S.3.M.5.1 (R6) Para B.7	X	
527.4.5	Seal welds	P.S.3.M.5.1 (R6) Para B.8	X	
527.5	Qualifications			
527.5.1	General	P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
527.6	Records	P.S.3.M.5.1 (R6) Para 7.0 P.S.1.M.1.2 (R4) Para 3.0 and 4.0	X	
527.7	Defect repair	P.S.1.M.1.2 (R4) Para 15.0	X	
531.2	Preheat			
531.2.1	Preheat	P.S.1.M.1.2 (R4) Para 9.0	X	
531.2.2	Preheat dissimilar material	P.S.1.M.1.2 (R4) Para 9.3	X	
531.2.3	Checking preheat	P.S.1.M.1.2 (R4) Para 9.4	X	
531.3.1 531.3.2	Postheat treatment	P.S.1.M.1.2 (R4) Para 10.0	X	
531.3.3	Heating method	P.S.2.M.1.1 (R4) Para 2.0	X	
531.3.4	Dissimilar metals	P.S.1.M.1.2 (R4) Para 10.1	X	
531.3.5	Temperature measurement	P.S.2.M.1.1 (R4) Para 5.0	X	
531.3.6	Interruption of welding prior to PWHT	P.S.1.M.1.2 (R4) Para 14.20 and 14.21	X	
531.3.7	PWHT compatibility with base metal	P.S.1.M.1.2 (R4) Para 10.1	X	

Checklist CNP-13

CODE/STANDARD REQUIREMENTS
ANSI B31.5-1966 (continued)

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
531.3.8	Holding temp	P.S.2.M.1.1 (R4) Para 4.0	X	
531.3.9	Local PWHT	P.S.2.M.1.1 (R4) Para 2.3	X	
536	Inspection			
536.1	Final inspection	N-VT-3 (R4)	X	
536.1.2	Circumferential welds	N-VT-3 (R4)	X	

Checklist CNP-14

CODE/STANDARD REQUIREMENTS
ASME SECTION XI (REPAIR RULES)
1980 THROUGH WINTER 1981

Criteria	Title/Subject	TVA Document	Compliance Yes	Compliance No
IWA-1400 (j) and (k)	Repair records	Part II, Section 2.3, Para 3.3 Procedure 1402.02	X	
IWA-4120	Additional rules and requirements	NQAM, Part II, Section 2.3, Para 3.1.3 Procedure 1402.02	X	
IWA-4130	Repair program	NQAM, Part II, Section 2.3, Para 3.0 and 3.1.2 Procedure 1402.02	X	
IWA-4140	Inspection	NQAM, Part II, Section 2.3 Procedure 1402.02	X[a]	
IWA-4200	Material	NQAM, Part II, Section 2.3, Para 3.0 and 3.1.2 Procedure 1402.02	X	
IWA-4300	Welding and welder qualifications	NQAM, Part II, Section 2.3, Para 3.0 and 3.1.2 Procedure 1402.02	X	

a. The TVA program exempts involvement of the ANII for tack and seal welds to valve seats. This exemption was accepted by the ANIA (Hartford Steam Boiler) on May 6, 1983.