WELDING

CORRECTIVE ACTION PROGRAM PLAN

WATTS BAR NUCLEAR PLANT

FINAL REPORT

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ENCLOSURE 1

WATTS BAR NUCLEAR PLANT

UNIT 1

WELDING

CORRECTIVE ACTION PROGRAM PLAN

FINAL REPORT

PREFACE

TVA has completed the reviews, evaluations, and weld repairs associated with the Welding Corrective Action Program (CAP) plan. The Welding CAP Final Report details the areas reviewed and the actions completed.

Completion of the Welding CAP included reinspections, evaluations, calculations, assessments, engineering walkthroughs, walkdowns, and ensuing repairs or rework. Although some activities remain to be completed, they mainly include completing the hydrostatic testing, N-5 review, and N-5 supplements. TVA has reviewed the remaining activities for the potential of additional discovery or repair work and determined the risk is minimal. These remaining activities are being tracked by an administrative control process and are tied to a scheduled system or milestone completion date.

Several major program reviews have been performed to verify the progress made by TVA during completion of this CAP. In addition to inspections completed by NRC and audits by the TVA Quality Assurance organization, a Program Modification Effectiveness Evaluation (PMEE) was performed by a corporate evaluation team. This corporate evaluation team assessed the effectiveness of the current nuclear welding program at WBN. There were no deficiencies identified, and the overall determination was that the welding program at Watts Bar is adequate to meet licensing requirements.

An ASME team audit was also performed during the completion of the Welding CAP which included a review to determine the adequacy of the welding program controls as well as the actual work being performed. This audit concluded that the welding control program and actual work being performed were adequate to meet ASME requirements.

Based on audits and reviews, TVA has determined that the programmatic and hardware requirements have been sufficiently completed to support issuance of a Final Report for the Welding CAP.

WELDING

CORRECTIVE ACTION PROGRAM (CAP) PLAN

FINAL REPORT

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WELDING
CORRECTIVE ACTION PROGRAM (CAP) PLAN
FINAL REPORT

1.0 INTRODUCTION

During the course of Tennessee Valley Authority (TVA) work at its nuclear plants, conditions related to welding were identified that may not have met TVA licensing requirements. These conditions were identified by the United States Nuclear Regulatory Commission (NRC), the TVA Nuclear Safety Review Staff (NSRS), and TVA personnel through quality indicators such as nonconformance reports, audit findings, employee concerns, and NRC inspection reports. The documents relating to these conditions for WBN are referenced in Attachment 1.

In October 1985, NRC requested a meeting with TVA to discuss welding program concerns including the TVA plan to address, resolve, and correct identified problems (Reference 1). In addition, the Employee Concerns Special Program (ECSP) instituted at the Watts Bar Nuclear Plant (WBN) to address employee concerns raised before February 1, 1986, provided additional questions about the adequacy of TVA welding activities.

After assessing the above issues, TVA concluded that additional reviews were needed to determine the adequacy of the overall TVA welding program including that at WBN. The TVA Welding Project (WP) was established as an independent group in late 1985 to conduct these reviews. The responsibility of the WP was to provide TVA, NRC, and the public with a high degree of confidence in the adequacy of the overall TVA welding program and in the reliability of the welded structures, systems, and components, including those at WBN.

At the request of the NRC (Reference 2), vendor-supplied welds for WBN were added to the scope of the TVA weld evaluation (Reference 3). Specific employee concerns related to vendor welding were evaluated by the WP. The remaining vendor welds were evaluated by TVA in a separate evaluation program (see Attachment 5, Item 5).

In January 1989, TVA submitted the Welding CAP to the NRC as a method to address the welding issues at WBN. The subject CAP was revised in May 1989 to incorporate the results of the Phase I and II submittals and revised for a second time in October 1990 to document TVA's method of issuing safety-related welding specifications. The CAP identified the specific corrective actions required by the WP including weld repairs, reworks, and recommended program enhancements to resolve open welding issues. The CAP was reviewed by NRC and concurred with in Inspection Report 390/90-04 dated May 17, 1990, reference NRC Safety Evaluation Report Supplement 7.

Concurrent with implementation of this CAP plan, additional welding adverse conditions were identified. Although these items were not included in the scope of the Welding CAP, they were completed in conjunction with the activities defined in the Welding CAP (see Attachment 6).

2.0 OBJECTIVE

The objective of this CAP plan was to provide assurance that WBN Unit 1 safety-related welds meet (or will meet upon completion of corrective actions) TVA licensing requirements. This objective was accomplished by conducting a comprehensive review of the TVA welding program to determine the adequacy of welded, safety-related structures, systems, and components currently in place at WBN including the adequacy of vendor-supplied welds. In addition, TVA sought to determine any remedial actions that may be needed, to take those actions deemed necessary to enhance the TVA welding program, and to ensure that future welding activities at WBN are in accordance with licensing requirements.

3.0 SCOPE

The scope of this CAP included WBN Unit 1 safety-related welding. TVA's review for this CAP was inclusive of the WBN written welding program and the welds associated with safety-related structures, systems, and components; piping welds, welds in buildings and miscellaneous steel, and welds in component supports; e.g., pipe, instrument and control, electrical, and heating, ventilation, and air conditioning (HVAC). This CAP also provided the specific corrective actions, including weld repairs and rework, and their implementation for the WBN Unit 1 welding program.

Employee concerns related to both TVA and vendor welding were also evaluated. In addition, vendors providing safety-related welded components were reviewed and sixteen (16) vendors were selected for evaluation using quality indicators defined by the WP.

The discovery and recurrence controls related to completion of this CAP are completed. The hardware and software items not completed are identified in the Welding CAP work completion punchlist (Attachment 8). This list has been reviewed to ensure that the remaining corrective actions will not affect recurrence controls or programs already in place. Items remaining on the punchlist are tied to system completion items and schedule closure dates. They are being tracked administratively in accordance with the plant completion schedule.

4.0 DESCRIPTION OF PROGRAM

Evaluation of the WBN welding program was conducted in three phases. As part of the overall Weld Project corrective action program for TVA welding, the TVA WP maintained responsibility for work performed during the following phases.

- Phase I was a programmatic assessment of the WBN welding program.
- Phase II was an in-depth review of the implementation of the WBN welding program.

- Phase III was an evaluation, integration, and upgrading of welding-related programs and procedures to ensure that future welding activities at TVA, including those at WBN, will be conducted in accordance with licensing requirements.

Phases I and II were independent assessments of WBN welding activities performed by the Department of Energy Weld Evaluation Project (DOE/WEP) in conjunction with the TVA Weld Project. DOE selected EG&G Idaho, Inc. to perform this independent assessment. TVA performed the work related to the Phase III effort. The following is a discussion of the major elements of the CAP including corrective actions resulting from WP, DOE/WEP, ECSP, and Nuclear Quality Assurance (NQA) efforts. Fragnets for CAP activities are shown in Attachments 2 and 3.

4.1 Phase I Program

The Phase I program, initiated in January 1986, was a comprehensive programmatic assessment of the WBN safety-related welding program. The assessment was accomplished by the TVA WP (a team of personnel independent of WBN management) as well as by a team of personnel from DOE and its contractor, EG&G Idaho, Inc. The three TVA line organizations that were responsible for defining and implementing the welding program at WBN - Nuclear Engineering, Nuclear Construction, and Nuclear Operations were evaluated during this phase of the program.

The purpose of this assessment was threefold: (1) to determine the quality assurance and technical requirements for welding by reviewing the codes, standards, and regulations to which TVA committed for the design, construction, and operation of the plant, (2) to determine if the welding commitments were reflected in the design output documents, and (3) to determine if the construction and operation programs reflected the quality and technical requirements of these design output documents (Reference 4).

The Nuclear Engineering program evaluation was based on the following elements: (Note the commitment tracking number and closure status for each commitment is also shown.)

1. Determination of the welding-related commitments from the FSAR and other licensing documents. (NCO890012001 closed)

2. Determination if the welding-related commitments were properly reflected in the design output documents. (NCO890012002 closed)

3. Analysis of quality indicators and employee concerns applicable to NE for indications of programmatic deficiencies. (NCO890012003 closed)

4. Determination of the adequacy of the Nuclear Engineering program to produce documents that correctly reflect the technical requirements required by the welding commitments. (NCO890012004 closed)

The Nuclear Construction program evaluation was based on the following elements:

1. A review of the construction site implementing procedures to determine if they correctly incorporate and convey the necessary welding requirements. (NCO890012005 closed)

2. Evaluation of weld repair and weld cutout rates of safety-related pipe welds. (NCO890012006 closed)

3. Analysis of quality indicators and employee concerns applicable to Nuclear Construction for indications of programmatic deficiencies. (NCO890012007 closed)

The Nuclear Operation program evaluation was based on the following elements:

1. A review of the Nuclear Operation site implementing procedures to determine if they correctly incorporate and convey the necessary welding requirements. (NCO890012008 closed)

2. Analysis of quality indicators and employee concerns applicable to Nuclear Operation for indications of programmatic deficiencies. (NCO890012009 closed)

Two deficiencies relating to program implementation were identified during the Phase I effort: hardware to mitigate the effects of pipe rupture and HVAC ductwork.

In the area of pipe rupture mitigative hardware, requirements of the construction specification had not been incorporated into the site implementing procedures in some instances. Because of a change to the engineering criteria for visual inspection which occurred in February 1981, the visual inspections performed on pipe rupture mitigative devices fabricated after February 1981 may not have been to the same criteria specified in the construction specification. The differences in the criteria were not significant enough to warrant a sample selection for reinspection during Phase II. Nevertheless, those pipe rupture mitigative devices that were inspected during the Phase II effort were shown by engineering calculations to be acceptable as is. (NCO890012010 closed)

In the area of HVAC ductwork, the FSAR requirements for HVAC fabrication required compliance with the Sheet Metal and Air Conditioning Contractors National Association (SMACNA) code. The SMACNA code allows techniques based on constructor's skills and technology. It does not provide requirements normally commensurate with safety-related requirements. This HVAC concern resulted in TVA initiating a corrective action plan for the welding of the Seismic Category I HVAC duct (Attachment 4, Item 5).

In addition, the Phase I program resulted in several general and programmatic recommendations for improving the WBN welding program, including recommendations for training and revisions to engineering specifications. A complete list of these recommendations is included in the Phase I report (Reference 16). (NCO890012011 closed)

The DOE/WEP assessment was completed and the results were included in the DOE/WEP report forwarded to the NRC on February 17, 1988. The TVA Phase I report was forwarded to NRC on February 21, 1989 (Reference 16). This report also includes the results of the DOE/WEP assessment.

4.2 Phase II Program

Phase II was an in-depth review of the implementation of the safety-related welding program at WBN. The purpose of this phase was to investigate the as-found condition of safety-related welds (and their associated documentation) at WBN. In addition, the results of the Phase II reinspections and investigations were used to assess the conclusions and recommendations of the Phase I review. The three principal elements of this phase of the evaluation were: (NCO890012012 closed)

1. A physical reinspection of certain welded structures and components in the plant,

2. A detailed evaluation of the welding-related employee concerns identified through the WBN ECSP, and

3. A review and analysis of about 8000 welding-related quality indicators produced since 1972.

The WP, in concert with the ECSP, performed an evaluation of employee concerns related to welding. Both DOE/WEP and WP evaluated employee concerns that involved safety-related weld issues at WBN Unit 1. The specific issue raised in each concern was investigated in detail as it pertained to welding. These reviews considered documents issued from the beginning of construction through 1985. Where appropriate, cognizant TVA individuals were interviewed. Where the employee concerns raised issues relating to the quality of TVA welds, the results of the DOE/WEP reinspections were also included in the evaluations. As a result, the issues raised by the employee concerns were addressed by both the WP evaluations and the DOE/WEP reinspection effort.

The DOE/WEP evaluated the WBN Unit 1 TVA performed safety-related plant welds by dividing those welds into groups. Groups were formed from the TVA employee concerns and quality indicators (nonconformance reports and 50.55(e) reports that documented weld-related problems and deficiencies) to isolate suspected problem areas. The overall plant weld quality was measured through logical, homogeneous, and general groups. DOE/WEP identified 115 groups of welded items or components, which included approximately 18,000 welds, and developed an assessment plan for each group. The welds were then evaluated using various combinations of document review, engineering evaluation, and physical reinspection of the hardware.

About 70 percent of the evaluations were performed by reinspection/reexamination, using visual inspection and nondestructive examination. The reinspection results of these welds were used to evaluate the quality of welds and the field implementation of the welding program and to address specific employee concerns and quality indicators.

During the Phase II inspection, nine areas of deficiency were identified for which corrective actions were initiated, either as a direct result of the DOE/WEP reinspections, by TVA concurrently with the reinspections, and/or as a result of employee concern evaluations. The nine areas of deficiency and the associated corrective actions are summarized in Attachment 4, Items 1 through 9.

Also, during the Phase II evaluation, other conditions were identified which required further evaluation and/or resolution. Corrective actions were required for three of these conditions listed in Attachment 4, Items 10, 11, and 12. The remainder of these conditions were evaluated and resolved and are described in Attachment 5.

As a result of the Phase I and Phase II efforts, recommendations were made to modify and enhance the TVA welding program. In addition to programmatic changes, welds have been repaired or replaced when necessary to meet structural requirements (see Attachment 4).

For those employee concerns reviewed by both the WP and DOE/WEP the results of the reviews and corrective actions identified were the same. Details of the employee concern reviews are included in the DOE/WEP reports DOE/ID-10175-2,-8, and -9. Results of the TVA employee concern evaluation have been included in the ECSP WBN Subcategory Report 50400 and TVA Welding Category Report 50000. (NCO890012013 closed)

The DOE/WEP and TVA Phase II reports concluded that the welds which were evaluated were in compliance with TVA commitments or would be upon completion of committed corrective actions and that there was a high degree of confidence (at least a 95/95 confidence level) that the unsampled portions of the safety-related welds met TVA licensing commitments.

The results of the DOE/WEP review and evaluation were presented in 10 reports issued in November 1987. The transmittal letter to NRC dated February 17, 1988, described these 10 reports as a "ten-volume report" (Reference 5).

The DOE/WEP evaluation is complete and the results are included in the aforementioned DOE/WEP report. The TVA Phase II report was forwarded to NRC in April 1989 (Reference 17). (NCO890012014 closed)

4.3 Phase III Program

Phase III started approximately in May 1989. It was an evaluation, integration, and upgrading of welding-related programs and procedures to ensure that future welding activities at TVA, including those at WBN, were conducted in accordance with licensing requirements. This phase was accomplished in four steps: (NCO890012017 closed)

1. Evaluation of the effectiveness of modifications to the welding program as a result of the Phase I and Phase II efforts. This evaluation identified as the PMEE Report was specific to each TVA nuclear site including WBN (Reference 19).

2. Completion of a Root Cause Analysis to determine the most basic, fundamental cause(s) of the TVA welding problems including those at WBN. An integrated assessment of identified welding-related problems was included in this analysis (Reference 18).

3. Development of a recurrence control plan for TVA welding problems. At WBN this was based upon the results of the above two items and the WBN corrective actions (Reference 18).

4. Generation of the WP Final Report to document the overall, final results of the WP for all TVA nuclear sites including WBN (Reference 18).

The Phase I and Phase II reports for the WBN evaluation provide recommendations for program improvement. These recommendations, which were provided to appropriate line organizations in preliminary form, were based on areas and items needing improvement that became evident during the Phase I and Phase II work.

The welding program was modified based on the recommendations from the Phase I and Phase II efforts. After implementation of these modifications, NQA performed an evaluation of the effectiveness of these program modifications and concluded that welding requirements are addressed in corporate level documents that have unified the program. NQA also verified that the program is implemented through site procedures, and that the site procedures adequately implement the corporate program requirements. (NCO890012018 closed)

A recurrence control plan was implemented based on a culmination of recommendations, site-specific WP evaluations, interim welding program changes, and recommendations resulting from the evaluation of the root cause analysis. The results of the Phase III program, including the recurrence control plan were included in the WP Final Report forwarded to the NRC in August 1989 (Reference 18).

In addition to the aforementioned activities, each TVA nuclear organization associated with welding made applicable revisions to its individual program to establish a single, unified program. This unified program can be implemented for initial construction, modification, and maintenance activities within the particular organization's area of responsibility. The Welding Program Coordination Team (WPCT), described below, reviewed the summation of these parts to assure an effective, overall program for TVA. The changes made to the program, new procedures and specifications were verified to provide sufficient controls to assure compliance with TVA licensing commitments. Summaries of the organizational activities and WPCT charter and scope are provided as follows: (NCO890012021 closed)

1. Welding Program Coordination Team

   The Weld Project Coordination Team was formed as the result of a recommendation presented by NQA during an evaluation of the NQA welding program performed in April 1988. A three-member team was formed consisting of a member from each of NQA, Nuclear Construction, and Nuclear Engineering. These members were selected by the Vice Presidents of NQA, Nuclear Construction, and Nuclear Engineering, and were given the necessary authority to make program changes.

   The objective of this team was to optimize the Nuclear Power welding activities among NQA, Nuclear Construction, and Nuclear Engineering. This team was and continues to be responsible for ensuring an effective transition of remaining activities from the WP to the appropriate line organizations. (NCO890012022 closed)

2. Nuclear Engineering Welding Program

   Two major activities were completed within Nuclear Engineering to provide additional assurance that adequate and effective welding requirements are included in design output documents for future construction, modification, and maintenance activities. These are as follows:

   - In addition to the WP review, Nuclear Engineering conducted a comprehensive review of licensing and regulatory commitments relating to welding. Based on the review results, new specifications were prepared or existing specifications revised to delineate these requirements. These design output specifications in turn are used to prepare implementing documents. (NCO890012023 closed)

   - Historically, the G-29 specification, "Process Specification for Welding, Heat Treatment, Nondestructive Examination, and Allied Field Fabrication Operations," consisted of a mixture of welding and welding-related specifications, implementing procedures such as NDE and welder

performance qualification procedures, and the welding procedures for the physical welding process. These were prepared by Nuclear Engineering and issued to TVA nuclear sites.

WBN committed in the Welding CAP to improve the welding specification program by issuing new Nuclear Engineering specifications as necessary. To complete this commitment, TVA General Construction Specification G-29 was modified to make it more user friendly and to consolidate welding engineering requirements. The implementing procedures for this specification were then issued by the applicable user organizations. (NCO890012024 closed)

3. Nuclear Construction Welding Program (Nuclear Construction is currently identified as Modifications)

The TVA corporate office developed an integrated program for the control of field welding and related processes (Welding and Special Processes Program, [WASPP]). This program consolidated the existing programs into a single, unified program which has been implemented for construction, modification, and maintenance activities.

This program is defined in accordance with an integrated system of quality assurance program and management procedures within the Nuclear Procedures System. This system provides for interorganizational review of directives and standards generated within that system.

The essential program elements addressed by standards in this program are as follows:

- Process control for welding and related processes (WASPP-201)
- Weld filler material control (WASPP-202)
- Welder qualification and continuity (WASPP-203)

Site Standard Practice (SSP)-7.50, "Controlling Welding, Brazing, and Soldering (WBS) Processes," providing a welding activity verification at each TVA nuclear plant site, was developed. This procedure gives the overall field welding program a continuing site management overview that serves to detect and correct any problems in the installation program at the implementing level.

Because of recommendations in the Phase I and Phase II Reports, TVA had planned to have detailed field installation instructions written from engineering instructions. TVA has decided that the organization-level procedures SSP-7.50;

SSP-7.51, "Controlling WBS Material"; and SSP-7.52, "Qualification, Certification, and Continuity of Personnel Performing WBS"; and design document G-29 provide sufficient detailed requirements so that a further breakdown into lower tier procedures is not necessary. These procedures are implemented directly by the field engineers.

4. NQA Welding Program

NQA identified and implemented changes to its portion of the welding program. These are as follows:

- The welding quality assurance program was revised in 1980 to include HVAC ductwork (see Attachment 4, page 5 of 8, Item 5). (NCO890012026 closed)

- Prior to 1986, personnel responsible for quality activities at WBN reported to Nuclear Construction. To provide additional assurance of organizational independence as required by 10 CFR 50, Appendix B, TVA assigned total quality responsibilities to NQA in 1986. Quality functions, including inspection, examination, surveillance, and assurance activities, are now the responsibility of NQA. (NCO890012027 closed)

  A corporate Level III monitoring program has been implemented to reinforce and calibrate inspection/examination personnel that are certified to the TVA Quality Assurance Program. This program encompasses visual inspection and NDE (including radiography and rereview of radiographic film) including a periodic sampling of welding-related work by certified Level III individuals knowledgeable of the standards, procedures, and methods used. This program includes observation of actual work activities and review of resulting documentation. (NCO890012028 closed)

- As a result of an evaluation performed in 1980, training programs were evaluated and necessary changes made to provide a more clear, concise training program for welding-related quality activities. (NCO890012029 closed)

- Proficiency testing and examinations have been added to the program for certification of contractor personnel performing quality inspections and examinations. (NCO890012030 closed)

- A peer review program was implemented in which certified inspectors perform reinspections of work previously inspected by other certified inspectors. Results are compared and discussed and corrective actions implemented as necessary. This program provides another level of confidence for the quality assurance process. (NCO890012031 closed)

- In addition to the required compliance audits, a program for performance-based audits was implemented in 1988. This program is more of a preventive than a corrective program and is based upon "real time" auditing by auditors with extensive experience in the area being audited. (NCO890012032 closed)

- The various methods for documenting and dispositioning nonconforming conditions were consolidated into a single program (Corrective Action Program) which provides a more controllable program designed to accelerate disposition and closure. (NCO890012033 closed)

In addition, NQA implemented a plan, which (as with Nuclear Construction) provides a single, unified welding program for NQA. Activities as delineated by this plan are as follows: (NCO890012034 closed)

- Assign the responsibility for NQA welding activities to one NQA central office branch. The Vice President of Nuclear Quality Assurance assigned this responsibility to the NDE/Engineering branch in June 1988.

- Designate one individual within the NDE/Engineering branch to develop, implement, coordinate, and maintain NQA's overall welding program. This individual was assigned in June 1988. The Quality Assessment Group currently has responsibility for assigning this individual.

- Designate a NQA individual at each site as the site NQA welding representative. This individual was assigned for WBN in August 1988.

- Collect and review NQA audit and surveillance reports from the WBN site and those performed by NQA central staff at WBN involving welding activities from January 1986 to December 1988 to determine if adequate audit/surveillance has been and is being performed. Identify program changes indicated as necessary by the results of the review. It was concluded that the audit surveillance activities at the plants were adequate at that time, and program changes were not necessary. The evaluation of the WBN audit program from the time the first safety-related weld was made at WBN Unit 1 (April 1974) to early 1986 was performed by a composite team of TVA and DOE/WEP personnel (see Attachment 5, Item 1).

- Collect and review examples of the NQA inspection/examination reports that are currently required for welds and welding activities to determine their adequacy. Identify changes indicated to be necessary by the results of the review. It was concluded that changes were not necessary.

- Perform a review of the adequacy and effectiveness of working level items and activities such as implementing procedures, training programs, and qualifications

of personnel. Identify and implement changes as deemed necessary. These reviews have been performed by NQA and documented in audit reports WB88817, WBA89917, SSA90102, SSA91107, WBA92205, and WBA92214.

- Perform an in-depth review of NQA's overall welding program to determine which activities should be revised or added. The results of WBN applicable corrective action programs, WP Phase I and II reports, the Root Cause Analysis, the WP Final Report, and other activities mentioned above have been considered. NQA sponsored and developed Nuclear Power Standard STD-7.3, "Control of Special Processes", to provide a uniform welding program for Nuclear Power's various organizations involved with welding.

4.4 Recurrence Control

To establish recurrence controls for welding-related programmatic problems or issues, the WP evaluated the root cause analysis for specific issues. The majority of the root causes were related to carelessness, lack of direction, inadequate instructions, and inadequate supervision. Deficiencies relating to the design and auditing process were also found to have contributed to the identified problems.

The recommendations and conclusions of the WP Phase I, II, and the WP Final Report were integrated with the results of WBN specific corrective action programs into a Recurrence Control Plan. The overall WBN welding program was modified to preclude a recurrence of similar problems with welding activities in the future.

Recurrence control measures for specific nonconforming weld deficiencies discovered during the Weld CAP program activities are documented in the corrective action reports referenced within this report and attachments.

The Recurrence Control Plan is described in detail in the Weld Project Final Report and actions taken are summarized as follows:

1. The recommendations from the Phase I, Phase II, and Final Reports have been evaluated and changes made accordingly (identified in the aforementioned reports).

2. TVA has consolidated its construction, modifications, maintenance, engineering, and quality assurance welding programs into one unified welding program. (NCO890012019, 020, 021 closed)

3. TVA has developed a Nuclear Power Standard for the "Quality Assurance Program Requirements for Special Processes" (STD-7.3). (NCO890192001 closed)

4. TVA has performed a Program Modifications Effectiveness Evaluation (PMEE). (NCO890012017 closed)

5. The TVA Weld Project Coordination Team will be performing periodic welding overviews, exclusive of the NQA audit and surveillance programs, to provide management with a means of appraisal and feedback. This is a corporate program for overview of the nuclear welding program that includes all plants. In addition, WBN has an overview program which verifies compliance with site procedures for special processes. The attributes verified are detailed in SSP-7.50.

5.0 PROGRAM IMPLEMENTATION

Implementation of corrective actions of the CAP is the responsibility of the affected WBN line organizations. Recommendations of the WP Phase I, Phase II, and Final Reports have been evaluated by the applicable line organizations and implemented as recommended or mutually agreed upon by the line organization. Implementation of these recommendations may have occurred differently than recommended; however, modifications to the welding program, as a result of the WP Phase I, Phase II, and Final Report recommendations, were evaluated by NQA and the WPCT to determine their effectiveness. The results of this evaluation concluded that the commitment requirements addressed in corporate-level documents have unified the program, and that the program is adequately implemented through site procedures. (NCO890012058 closed) (NCO860124080 closed)

6.0 PROGRAM INTERFACES

Interface with other WBN corrective action programs included the hanger analysis and update program (HAAUP) review of shear lugs (Attachment 4, Item 3, shear lugs). In addition, the overall results of the welding program were considered and factored into other corrective action programs such as conduit, cable tray, HAAUP, HVAC, and platforms. Several Independent Deviation Reports (IDRs) identified problems other than welding such as lost records, improper support configuration, and improper documentation. These conditions, when applicable, were documented as conditions adverse to quality (CAQs) which also formed part of the basis for other corrective action programs such as conduit, cable tray, instrument, and HVAC support CAPs. These IDRs and the corresponding corrective action document are identified in TVA Calculation WCG-1-135 and Attachment 7.

7.0 PROGRAM DOCUMENTATION

The DOE/WEP evaluations as previously discussed in this CAP were documented in a series of welding reports. These reports were transmitted to the NRC in February 1988 (Reference 5).

The WP issued three welding reports, Phase I, February, 1989; Phase II, April, 1989; and the Final Report, August, 1989, which present TVA's basis for determining that welding of structures, systems, and components currently in place at WBN is adequate to meet TVA's licensing requirements.

This report, its references, and the completion status of the specific corrective actions referenced herein are the basis for closure of the Welding CAP.

8.0 VERIFICATION OF COMPLETION

Verification of the Welding Project completion was performed by NQA. This verification ensures that issues pertaining to this special project are adequately addressed to support licensing of Watts Bar Nuclear Plant (Reference T87921110823).

The verification was in accordance with the Integrated Verification Plan through focused and selective monitoring, reviews, and audits. The selected areas reviewed included:

1. Closure of open issues, CAQs, Corrective Action Tracking Documents (CATDs), and Administrative Control Process

2. Closure of CAP commitments

3. Implementation of Recurrence Control

4. Effective Program Implementation

Remaining work associated with the Weld CAP is administratively tracked and coordinated with the plant system completion schedule. The Welding CAP punchlist tracks these items by their associated tracking document. (Attachment 8).

9.0 LICENSING ASSESSMENT AND CONCLUSIONS

Comprehensive Phase I and Phase II reviews of the WBN-written welding program and safety-related weldments for WBN Unit 1 identified a number of deficiencies requiring associated corrective actions. Phase III reviews were performed to evaluate and integrate

the results of Phase I and Phase II reviews to define recommendations for programmatic improvement and recurrence control. Completion of these reviews and the implementation of the corrective actions provides TVA with reasonable assurance that the WBN welding program and safety-related weldments meet applicable WBN licensing requirements. In addition, there is reasonable assurance that future welding activities will meet licensing requirements. FSAR revisions were submitted to NRC for approval, and licensing commitment changes were initiated where needed to meet existing/defined commitments. These changes and approvals have been completed and the required revisions completed.

The remaining open work activities listed in this closure report (Attachment 8) are the result of activities scheduled to be completed in conjunction with system turnover. These remaining activities mainly consist of closing documentation records, completing ASME data reports, and hydrostatic testing and do not represent program problems or discovery work.

10.0 REFERENCES

1. NRC letter to TVA, "Welding Concerns," October 29, 1985 (L44851105451)

2. NRC letter to TVA, "Request for Additional Information Concerning the Project Management Plan for the Department of Energy Weld Evaluation Project for the Watts Bar Nuclear Plant, Units 1 and 2," July 24, 1986 (L44860731726) (included vendor welds)

3. TVA letter to NRC, December 5, 1986 (L44861205806) (Added vendor welds to the scope of the weld cap)

4. TVA WP Volume 1, "Program Description," January 17, 1986 (L44860117808)

5. TVA letter to NRC, February 17, 1988 (L44880217808)

6. TVA letter to NRC, "Watts Bar Nuclear Plant - Units 1 and 2 Inadequate As-Constructed Weld Connections for Control Building Structural Framing - Final Report," August 11, 1987 (L44870811800)

7. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Units 1 and 2 Questionable Weld Radiographs Previously Accepted," July 7, 1988 (L44880707808)

8. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Units 1 and 2 Deficient Welds for Hanger Lugs on ASME Code Piping," February 27, 1989 (L44890227802)

9. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Units 1 and 2 Improper Fabrication, Inspection, and Documentation of Wall-Mounted Instrument Panels," March 16, 1988 (L44880316809)

10. TVA letter to NRC, "Watts Bar Nuclear Plant (WBN) Units 1 and 2 Safety-Related HVAC Duct Welding," April 12, 1988 (L44880421806)

11. TVA internal report, "Watts Bar Nuclear Plant (WBN) - Quality Assurance Program Review," November 25, 1987 (TI9871125981)

12. NRC letter to TVA, "Meeting Summary for the June 26, 1987 Meeting Between NRC and TVA Regarding Commitment to ASME Section III Requirements for Welding Activities," July 2, 1987 (T03870714908)

13. TVA memorandum to NRC addressing 390/86-21-05, September 25, 1988 (T03880929884)

14. TVA letter to NRC, "Application of Later Versions of ASME Section III," August 21, 1987, (L44870821811) updated in (L44890306802)

15. TVA letter to NRC, "Vendor Weld Review," March 27, 1989 (L44890327803)

16. TVA letter to NRC, "Phase I Weld Report," February 21, 1989 (L44890221804)

17. TVA letter to NRC, "Phase II Weld Report," April 10, 1989 (L44890410807)

18. TVA letter to NRC, "Welding Project Final Report," August 25, 1989 (L44890825800)

19. Program Modification Effectiveness Evaluation Report, December 5, 1991 (B45911205252)

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12.0 ACRONYMS USED

Acronym	Meaning
ACP	Administrative Control Program
ADGB	Additional Diesel Generator Building
ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
AWS	American Welding Society
CAP	Corrective Action Program
CAQ	Condition Adverse to Quality
CAQR	Condition Adverse to Quality Report
CATD	Corrective Action Tracking Document
CFR	Code of Federal Regulations
DCN	Design Change Notice
DOE	Department of Energy
EAI	Engineering Administration Instruction
EC	Employee Concern
ECN	Engineering Change Notice
ECSP	Employee Concerns Special Program
ERCW	Essential Raw Cooling Water
FSAR	Final Safety Analysis Report
HAAUP	Hanger and Analysis Up-Date Program
HVAC	Heating, Ventilation, and Air Conditioning
IDR	Independent Deviation Report
LIC	Licensing
LOF	Lack of fusion
LOP	Lack of penetration
NCO	Nuclear Central Office (NRC Commitment)
NC	Nuclear Construction
NCR	Nonconforming Condition Report
NDE	Nondestructive Examination
NE	Nuclear Engineering
NO	Nuclear Operations
NQA	Nuclear Quality Assurance
NRC	Nuclear Regulatory Commission
NSRS	Nuclear Safety Review Staff
PER	Problem Evaluation Report
PM	Project Management
PMEE	Program Modification Effectiveness Evaluation
PWHT	Postweld heat treatment
QA	Quality Assurance
QAM	Quality Assurance Manual
QAP	Quality Assurance Procedure
QI	Quality Indicator

Acronym	Meaning
RCA	Root Cause Analysis
RHR	Residual Heat Removal
RIMS	Records and Information Management System
SCAR	Significant Corrective Action Report
SCR	Significant Condition Report
SMACNA	Sheet Metal and Air Conditioning Contractors Nat. Assoc.
SSP	Site Standard Practice
STD	Nuclear Power Standard
TVA	Tennessee Valley Authority
URI	Unresolved Item
WASPP	Welding and Special Processes Program
WBEP	Watts Bar Engineering Project
WBN	Watts Bar Nuclear Plant
WBNP	Watts Bar Nuclear Plant
WDR	Weld Deviation Report
WEP	Weld Evaluation Project
WP	Welding Project
WPCT	Weld Program Coordination Team

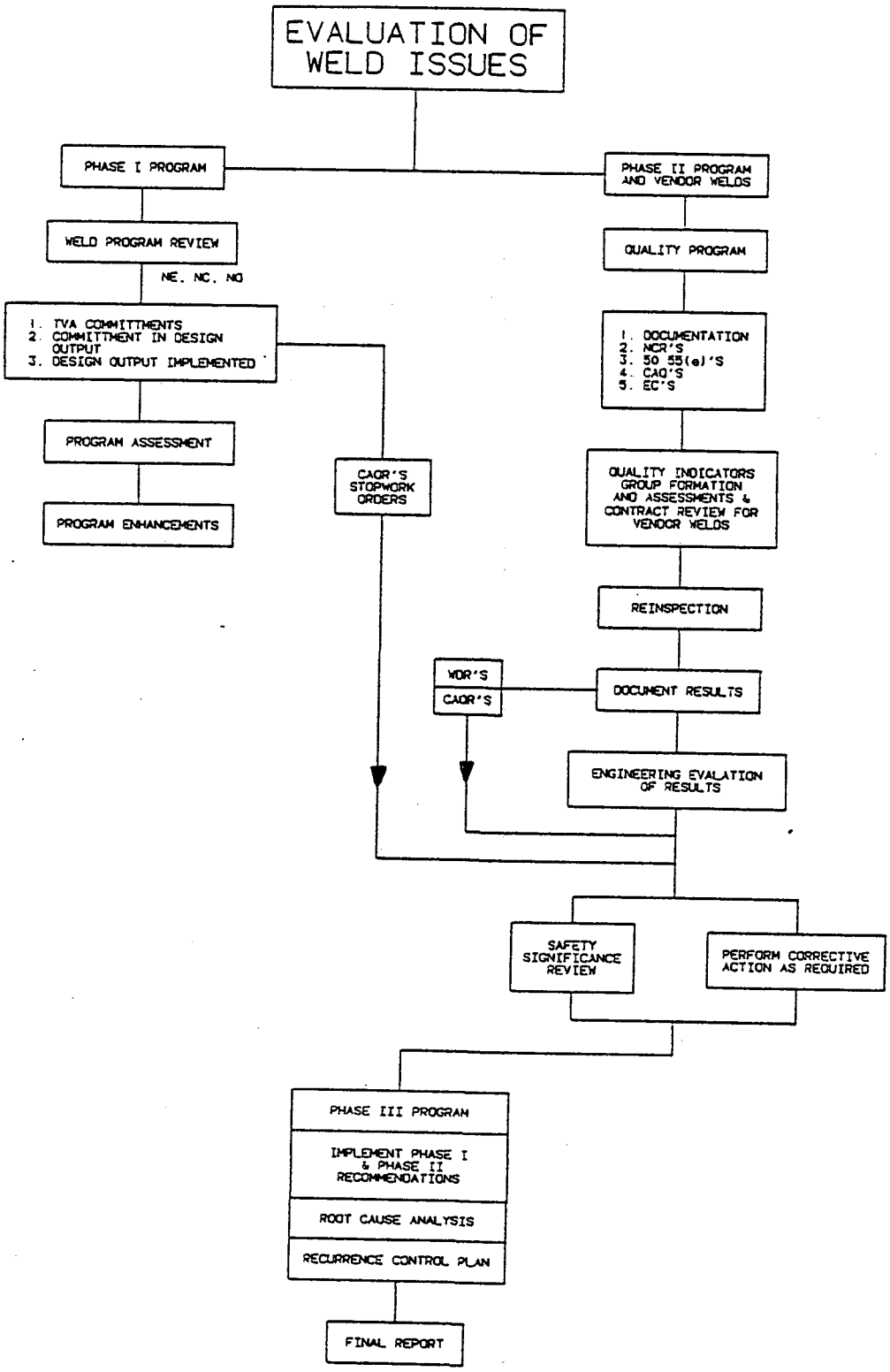
BASIS OF CAP

Approximately 606 employee concerns potentially involving welding were reviewed to evaluate their applicability to welding problems; 134 were determined to be outside the defined DOE/WEP scope. The DOE/WEP then evaluated the 472 employee concerns that involved the TVA-performed safety-related weld issues at Watts Bar. The groupings established by DOE/WEP to evaluate the issues that were identified as potential problems are found in the Weld Evaluation Project Aggregate Results of Weld Assessment Report, DOE/ID-10175-8, and Weld Evaluation Project Formation of Homogeneous Groupings of Welds, DOE/ID-10175-2 (Reference 5).

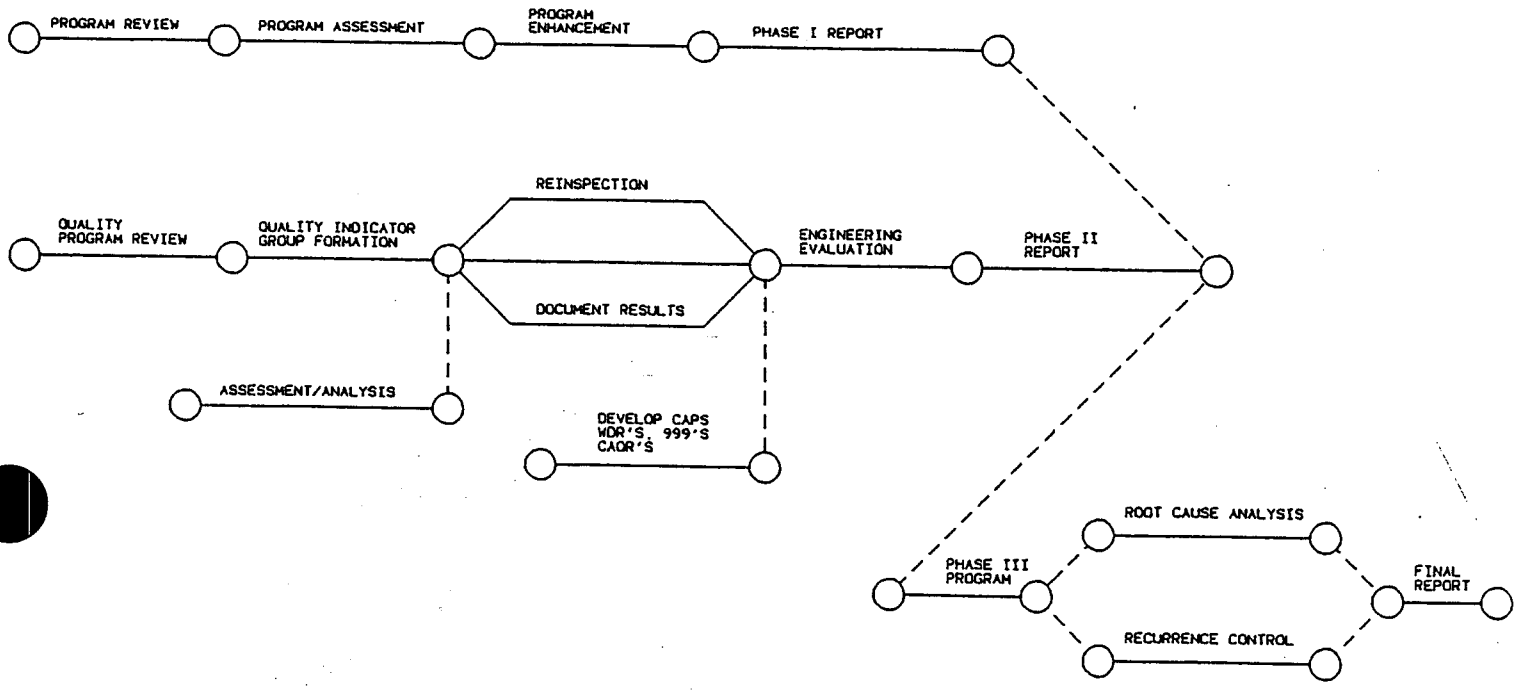
The welding subcategory report refers to 390 employee concerns evaluated by TVA. DOE/WEP report evaluated 472 employee concerns which included the 390 evaluated by TVA. The employee concerns addressed by the DOE/WEP and not addressed in the subcategory report included welding related issues that dealt with QA/QC practices, intimidation and harassment, engineering practices and design, management and personnel.

Approximately 8,000 quality documents such as NCRs and 10 CFR 50.55(e) reports were reviewed to determine possible problem areas. The types of documents reviewed are discussed in Weld Evaluation Project Formation of Homogeneous Groupings of Welds DOE/ID-10175-2. The individual listing of each document is in the master list of Quality Indicators reviewed by DOE/WEP and documented in January 1987 (T31920602862). This is available to NRC upon request.

FRAGNET


EVALUATION OF WELD ISSUES
PHASE I PROGRAM
PHASE II PROGRAM AND VENDOR WELDS
WELD PROGRAM REVIEW
NE. NC. NO
1. TVA COMMITTMENTS
2. COMMITTMENT IN DESIGN OUTPUT
3. DESIGN OUTPUT IMPLEMENTED
PROGRAM ASSESSMENT
PROGRAM ENHANCEMENTS
CAQR'S STOPWORK ORDERS
QUALITY PROGRAM
1. DOCUMENTATION
2. NCR'S
3. 50 55(e)'S
4. CAQ'S
5. EC'S
QUALITY INDICATORS GROUP FORMATION AND ASSESSMENTS & CONTRACT REVIEW FOR VENDOR WELDS
REINSPECTION
WOR'S
CAQR'S
DOCUMENT RESULTS
ENGINEERING EVALATION OF RESULTS
SAFETY SIGNIFICANCE REVIEW
PERFORM CORRECTIVE ACTION AS REQUIRED
PHASE III PROGRAM
IMPLEMENT PHASE I & PHASE II RECOMMENDATIONS
ROOT CAUSE ANALYSIS
RECURRENCE CONTROL PLAN
FINAL REPORT

FRAGNET


PROGRAM REVIEW
PROGRAM ASSESSMENT
PROGRAM ENHANCEMENT
PHASE I REPORT
QUALITY PROGRAM REVIEW
QUALITY INDICATOR GROUP FORMATION
REINSPECTION
DOCUMENT RESULTS
ENGINEERING EVALUATION
PHASE II REPORT
ASSESSMENT/ANALYSIS
DEVELOP CAPS WDR'S, 999'S CAOR'S
PHASE III PROGRAM
ROOT CAUSE ANALYSIS
RECURRENCE CONTROL
FINAL REPORT

DEFICIENCIES ADDRESSED IN PHASE II REPORT

1. Structural Platform Welds - Elevation 741.0

As a result of Weld Deviation Reports (WDRs) for the WBN weld program, calculations were made to check the adequacy of the as-constructed welded connections for mainframing and bracing due to cable tray support loads in the Control Building (Elevation 741.0). Ten WDRs were determined to have connections exceeding design allowables as a result of these evaluations for Unit 1. This problem was identified by DOE/WEP during its evaluation and is included under TVA's Significant Corrective Action Report (SCR) WBNCEB8689 which was reported under 10 CFR 50.55(e) (Reference 6).

TVA performed a walkdown to inspect, evaluate, and document the field-welded connections of structural platforms at Elevation 741.0. Configurations not meeting design criteria allowables were subsequently redesigned. Deficient welds were subsequently replaced or repaired to the applicable design criteria. The boundary for this corrective action, although commonly specified as Elevation 741.0, included welded connections on Elevations 729.0, 741.0, and 755.0 of the Control Building and 776.0 of the Auxiliary Building. As part of the bounding process, a drawing search of structural and miscellaneous steel drawings was conducted to determine if other welded connections having ambiguous weld specifications existed. These were included in the boundary evaluations. Over 1000 connections were evaluated. (ECN 6740 RIMS B26871112505) (RIMS B41871002834)

TVA evaluated the specific safety implications of this deficiency by performing a reanalysis of the floor structure using the latest design criteria. This reanalysis assumed that the deficient connections failed, forcing loads to redistribute to other structural members. Evaluation of the floor framing system indicated that the ultimate strengths of the steel members and connections were not exceeded and, therefore, no members were in danger of failing to perform their intended safety function.

(This item was closed by NRC in Inspection Report 390, 391/89-04.) (NCO890012036 closed)

2. Radiographs for ASME Piping Welds

The DOE/WEP weld inspection program included the review of radiographs of ASME Section III piping which were completed during the construction period of Unit 1. Approximately 400 previously accepted radiographs, representing 86 welds, were reevaluated. The review identified indications in two welds that did not meet ASME Section III requirements.

Further investigation of these 400 radiographs by TVA, which included additional radiography, identified one additional unacceptable indication. The radiographic review population was subsequently expanded to include radiographs associated with ASME Section III piping welds. This expanded review involved approximately 2,700 welds and associated radiography.

In this expanded review, two separate radiographic reviews were completed, i.e., one review by a Level II examiner and one by a Level III examiner. An estimated 500 radiographs were rejected representing about 350 welds. Of these, approximately 185 welds had unacceptable indications. The remainder were rejected because of radiographic technique discrepancies or base material indications. (This includes 58 socket welds which were radiographed at the request of Westinghouse.) These radiographs were also evaluated for unacceptable indications.

Indications which deviated from ASME Section III requirements were identified. Corrective actions, including repair of unacceptable indications and radiography for technique and film quality discrepancies, are complete.

TVA identified two welds in the containment sleeves at the residual heat removal (RHR) sump suction with radiographic indications which exceeded the acceptance criteria of ASME Section III. These sleeves are part of the containment pressure boundary and not the RHR system pressure boundary. As such, they will experience no more than peak containment pressure during a design basis accident. Because the welds are embedded in concrete, repair would be extremely difficult. TVA requested and received approval in accordance with 10 CFR 50.55a(a)(3) of an alternative to ASME Section III requirements. Reference Inspection Report 390, 391/89-04. (NCO870028018 closed)

TVA performed an evaluation of the Unit 1 welds with rejectable indications utilizing the criteria of ASME Section XI, paragraph IWB 3640, and the proposed criteria for IWB 3650 (which has been approved by the ASME Boiler and Pressure Vessel Committee and is in the process for adoption by the ASME). The result of this evaluation is that, using current piping stresses and conservative assumptions for flaw sizes, all but one of the welds with unacceptable radiographic indications in systems performing safety-related functions would have maintained their integrity for the design life of the plant had they not been identified and repaired. (Calc CEB-CQS-421, B41880608003)

One weld, when subjected to the worst design loading conditions, exceeded the conservative allowable flaw limits established by ASME Section XI. This weld is located in a portion of the steam generator wet layup system which performs no safety function (Category I (L) only) and was unnecessarily classified ASME Section III. Evaluation of this weld demonstrates that even if it failed, it would not have compromised the safe operation or shutdown of the plant.

This problem was identified under SCR WBN NEB 8651 which was reported under 10 CFR 50.55(e) (Reference 7) and closed by NRC in Inspection Report 390,391/89-04. (NCO890012037 closed) (NCO890012055 closed) (NCO870028009 open due to system hydro) (NCO870031002 closed)

3. Piping Shear Lugs

During rework activities on Unit 1 pipe supports, it was discovered that welds joining the piping shear lugs to the pipe did not exhibit complete penetration as required by the design drawings. In addition, the welds on some of the shear lugs did not extend the entire length of the lug. This nonconformance was also identified by DOE/WEP during its evaluation and was documented in SCR W-518-P for Unit 1 and reported per 10 CFR 50.55(e) (Reference 8).

An evaluation was performed to determine safety significance of SCR W-518-P by selectively inspecting 120 existing lugs and performing evaluations based on design loads. Although the lugs were originally designed for a full penetration weld, the evaluation was, in general, based on the measured external fillet weld reinforcement which is consistent with ASME Code Case N-318. Of the 120 lugs, 115 were suitable for service with only the fillet welds. For the remaining five lugs, the required minimum weld penetration was determined and was confirmed to meet design requirements for the existing installation.

ASME Section III, Class 1, lugs were determined to be acceptable by ultrasonic examination or inspection for backgouging. (NCO870074002 closed)

Lugs on ASME Section III, Class 2 and Class 3 code piping, where full penetration welds were specified on the design drawings, were reanalyzed using ASME Code Case N-318 to determine the required size for fillet welds or partial penetration welds. For lugs found not to have a reinforcing fillet weld, the required minimum penetration was established. For welds not meeting minimum requirements, fillet welds meeting the requirements of Code Case N-318 would be added. The WBN FSAR was revised by Amendment 64, sent to NRC August 16, 1990, to allow the use of ASME Code Case N-318 as endorsed by NRC Regulatory Guide 1.84.

Additionally, although the ASME Code Case is not applicable to B31.1 code piping, its logic is being used in the same manner on Category I(L) pressure boundary lugs attached with full penetration welds to this class piping located in Category I structures. B31.1 welds were evaluated to determine if the existing fillet welds are of sufficient size to meet design requirements. The evaluation is being completed as part of TVA's Hanger and Analysis Update Program (HAAUP).

This item was closed by NRC in Inspection Report 390, 391/89-04.
(NCO890012038 closed, NCO870074023 open, NCO870074009 open)
Reinspection of Class 2, 3, and B31.1 welds has been completed.

During the WEP reinspection of shear lug 10A, a liquid penetrant examination identified an unacceptable linear indication. This indication was identified on CAQR WBP880117. This CAQR was listed in the Welding CAP matrix as contributing to the basis of the Welding CAP. The corrective action for this CAQR has been completed and the CAQR closed.

4. Wall-Mounted Instrument Panels

The seismic adequacy of approximately 122 Unit 1, site-fabricated local instrument panels in several safety-related systems at WBN was questioned because of discrepancies identified in the fabricated configuration. Weld joints were shown on the design drawings to require full penetration single-bevel welds. However, these welds were found to generically lack the required complete penetration and joint configuration. In addition, TVA did not perform adequate structural (configuration and material verification) inspections of the instrument panels which, in conjunction with the identified weld deficiency, render the overall adequacy of the panels indeterminate. This problem was identified by TVA for Unit 2 and reviewed for applicability for Unit 1 and is included under TVA's Corrective Action Report SCR-W-559-PS, which was reported under 10 CFR 50.55(e) (Reference 9).

TVA performed static load testing on two panels that were determined to exhibit the least amount of effective weld. The static tests demonstrated that the existing Unit 1 panels meet long-term service qualification requirements with a significant margin. Therefore, only the two panels that were tested were replaced.

Work is complete including the reinspection of the two panels which were replaced and a revision to the drawings to reflect the as-constructed condition for the remaining panels. (DCN P-01127A)

(This item was closed by NRC in Inspection Report 390, 391/89-04.)
(NCO890012039 closed)

5. HVAC Ductwork Welding

Safety-related ductwork (including the hydrogen collection system) was fabricated and installed (1978 timeframe) without a Quality Assurance Program and without specific welding requirements from engineering.

A Quality Assurance Program for these systems was established in 1980. Subsequently, the engineering design drawings were revised (December 1980) to require full penetration welds. Welds completed before this full penetration requirement were not visually inspected for compliance with this criteria. As a result, in April 1981, a TVA stopwork order was issued (QAM 810401-002) to document the lack of a Quality Assurance Program and the failure to report a significant deficiency. The stopwork order was lifted in September 1981 based, in part, upon the development of an "alternate acceptance criteria" for inspection and testing. The alternate acceptance criteria established for the HVAC system included a leak test in lieu of visual weld inspection for inaccessible welds. Later, the "alternate acceptance criteria" was authorized to apply not only to inaccessible welds but to all welds. This criteria was incorporated into Construction Specification N3M-914, Revision 2, and was applied to all safety-related HVAC ductwork, including the hydrogen collection system. Because the leak tests were performed to 25 percent over design pressure with less than 1 percent of total volume leakage, the systems were accepted as constructed.

During review of the welded HVAC ductwork by the Weld Evaluation Project, it was identified that some partial penetration welds existed where full penetration welds are specified. This condition had escaped recognition because the alternate acceptance criteria specified in Revision 2 of the Construction Specification N3M-914 permitted leak tests in lieu of weld inspection. A TVA stopwork order on the circumferential welds in safety-related HVAC ducts (spiral-welded duct and hydrogen collection pipe) was issued on January 12, 1987. In order to qualify the partial penetration welds, TVA developed a program to establish the structural adequacy of the welds in safety-related ductwork for operating conditions including a seismic event. This program included completing weld surveys, seismic analysis, and weld repairs, as required.

The safety significance evaluation for the HVAC Duct Welding Concern is documented in the Nuclear Engineering calculation entitled "Safety Significance Evaluation for Seismic Category I HVAC Duct Welding Concern" (B41 880705 800). The applicable design drawings have been revised to reflect the new acceptance criteria.

This problem was identified by DOE/WEP during its evaluation and is included under Significant Condition Reports WBN MEB 8714 and 8721 which was reported under 10 CFR 50.55(e) (Reference 10). (This item was closed by NRC in 390/90-24.) (NCO890012040 closed)

6. Structural Steel Partition Wall - Elevation 755.0

The corrective action plan for TVA's 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 WBN Unit 1. No documentation could be found to prove that the visual inspections required by this NCR had been performed.

The WEP review of TVA drawing 48N1322-1 identified 279 welds required to fabricate the structural steel partition wall. Visual inspection performed by WEP indicated 118 deficient welds requiring engineering analysis to determine structural acceptability and two structural steel beams which were found removed to accommodate HVAC equipment. Also, one bolt anchor connection had only one bolt anchor in place of two, and the splice details were shown incorrectly. The corrective action specified was to document reanalysis of the structure, perform a review for safety significance, and revise calculations and drawings as required, and repair, as necessary (DCN P00693A).

Engineering calculation, WCG-1-12 (B41880512800), has determined that the wall would not have failed assuming the identified conditions had gone undetected. (This item was closed by NRC in Inspection Report 390, 391/89-04.) (NCO890012041 closed)

7. Temporary Attachments - Piping

Employee Concern WI-85-053-003 indicated that the documentation for the required NDE of postweld heat treatment thermocouple (minor temporary attachments) removal areas could not be located. This condition was documented utilizing NCR-W-599-P. The areas in question were identified and the required magnetic particle examinations were performed. There were no rejectable areas identified. However, minimum wall thickness requirements were not met on two components and four welds due to grinding operations. These were identified in corrective action documents WBP880430 and NCR 8651. Work to correct these deficiencies has been completed. This item was identified by DOE/WEP and is included in its report DOE/ID 10175-2, Reference 5. (NCO890012042 closed)

8. Classification of Containment Liner Welds

During the review of WBN Unit 1 welding, several discrepancies were identified by TVA and DOE/WEP personnel on drawings for ASME Section III Class MC (metal containment systems) welds. Some attachments were classified as TVA Piping Class I which had never been defined. This issue was resolved under TVA's corrective action plans for WBP870561, WBP870562, and WBP870563. The affected drawings have been revised to reflect the correct class by DCN P-00385-B for Unit 1. DOE/WEP reported that some attachments that were classified as metal containment system welds possibly should have

been classified as AWS welds. TVA's review of the design drawings revealed that the welds were properly classified. These welds were installed as TVA Class B welds which are equivalent to ASME Code Class MC; therefore, there was no impact on hardware. (This item was closed by NRC in Inspection Report 390,391/89-04.) (NCO890012043 closed)

9. Monorail Assembly - Missing Structural Brace

During the DOE/WEP reinspection of Group 263, "Safety-Related Civil Welds Fabricated and Installed Prior to February 13, 1981," the component selected at random for reinspection was found to vary from the as-constructed drawing. A support brace noted as having been installed was missing. The engineering evaluation of the component, a monorail support assembly, showed the component to be unacceptable for use. The missing brace had never been installed, but now has been installed as part of the corrective actions taken for CAQR WBP 870661. (This item was closed by NRC in Inspection Report 390,391/89-04.) (NCO890012035 closed)

10. Independent Weld Deviation Reports (IDRs)

During the course of field work by DOE/WEP and TVA personnel, perceived hardware discrepancies outside the scope of the Unit 1 weld evaluation were identified and documented on IDRs. These IDRs have been evaluated by the responsible WBN line organization to determine their validity and to determine if the condition was adverse to quality.

Of 474 IDRs issued, approximately 50 CAQRs were issued addressing approximately 250 of the issues raised in the IDRs. Most of these CAQRs have been evaluated and are completed. A listing of the IDRs and the corresponding corrective action document is contained in Calculation WCG-1-315 (B2688120003). The CAQs and work remaining to be completed are identified in Attachments 7 and 8.

11. Main Steam Impingement Sleeve

Employee Response Team Investigation Report IN-85-851-001 (DOE/ID-1-175-2) identified discrepancies in several welds on one of the main steam impingement sleeves located outside of the Unit 1 Auxiliary Building. Sixteen welds, six long seams and two girth seams were examined using the ultrasonic techniques specified in N-UT-18. These examinations revealed one indication in one girth seam which was confirmed to be a slugged weld.

This discrepancy was initially resolved by NCR W-325-P in which it was determined by analysis that the condition of the weld did not impair the ability of the sleeve to function as designed. Subsequently it was decided to repair the weld. The repair was controlled by maintenance requests MR A-679568, MR A-649124, and WO92-02942-00.

CATD 50444-WBN-01 evaluated and dispositioned the remaining discrepancies. This CATD is in a "hold verify" status for closure.

12. North/South Valve Rooms

Selected structural welds in the Unit 1 north/south valve room were visually and ultrasonically inspected by DOE/WEP to address an employee concern with the issue of welding over cracks. Upon inspection of 236 welds, 46 welds needed further characterization for engineering evaluation. The welds in question were determined to be acceptable for use. However, DOE/WEP recommended further inspection of four similar welded connections in the north/south valve room that may have higher calculated stresses than the ultrasonically examined welds. A magnetic particle inspection conducted by TVA of four similar weld connections identified several discontinuities that did not meet code acceptance requirements. These deficiencies have been resolved by CAQR WBP900082, WBPER920165, and Work Order 92-05951-00. (NCO890012053 and 890012054 closed)

OTHER ACTIVITIES ASSOCIATED WITH WELDING

1. Audit Program Review

At the request of NRC, a review of the WBN audit program for the period of 1974 through 1986 was conducted by a joint team of TVA and DOE/WEP personnel. This team determined that for the subject period, 134 audits directly relating to welding were performed. The team concluded that welding activities at WBN have been audited every year from the beginning of safety-related welding activities in 1974 (Reference 11). The results of this review are included in the TVA Phase II report (Reference 17).

(This item was closed by NRC in Inspection Report 390,391/90-04.)

2. Evaluation of Generic Nonconforming Condition Reports (NCRs)

A number of generic (containing large populations of welds) NCRs were initiated throughout the TVA welding program beginning in 1980. The nonconforming conditions related principally to the geometric attributes of fillet and socket welds. At WBN, NCRs were issued against large groups of like items, e.g., structural steel welds, electrical support welds, pipe support welds, etc. Because many of the weld deviations reported through the DOE/WEP reinspections also related to weld geometry (size, length, and location), WP elected to review the NCRs to determine if a significant number of the currently reported deviations might also have been addressed earlier by the TVA Quality Assurance Program.

TVA conducted a number of sample reinspections to evaluate hardware addressed by the NCRs. Based on the sample selected, the entire population of components was considered to be acceptable. WP compared the conclusions of these NCRs with DOE/WEP Unit 1 conclusions and documented the results of the comparison in Section 4.2.4 of the WP Final Report.

The results of the comparison are that TVA and EG&G both concluded that the welds in question, which were resolved by inspection/examination, document review, and engineering analysis, now meet the WBN FSAR requirements. Since there were no generic problems associated with the remaining unsampled components within the weld populations by EG&G, TVA and EG&G both conclude with a high degree of confidence that the unsampled components within these populations also meet the WBN FSAR requirements.

The following NCRs for the hardware indicated are covered by this activity:

NCR 2019R	Pipe Supports
NCR 2111R R4	ASME Code Fillet Welds
NCR 2375R1	Cable Tray Supports Miscellaneous Steel Items Conduit Supports
NCR 2654R R1	HVAC Duct Supports
NCR WBNSWP8008 NCR 2807R	Fillet Welded Skewed T-Joints
NCR 3001R3	Pipe Rupture Protection Devices
NCR 3523R	Protection Devices before 1-1-81
NCR 3579R	Misc. Platforms, Ladders, and Stairs
NCR 4093R	All Structural and Misc. Steel except Platforms, Ladders, and Stairs,
NCR 4753R	Structural Steel

(This item was closed by NRC in Inspection Report 390,391/90-04.)
(NCO890012047 closed)

3. Code Applicability for Work Performed After Completion of N-5 Data Reports

After completion of the N-5 Data Reports for ASME Section III piping systems, welding activities have been performed at WBN in accordance with ASME Section XI, Inservice Inspection. In June 1987, a meeting was held between TVA and the NRC to discuss code applicability for these activities. The NRC advised TVA that they consider WBN to be a plant still under construction, and the NRC position, provided in a July 1987 letter (Reference 12), stated that ASME welding activities at WBN should be performed to the construction Code of Record, ASME Section III, 1971 Edition through Summer 1973 Addenda. In addition, the NRC required TVA to review any such activities to identify where work was performed in accordance with ASME Section XI or by a nonstamp holder. TVA was required to identify these as exceptions to the Code of Record and to request approval from the NRC for the proposed alternatives as prescribed by 10 CFR 50.55a(a)(3).

TVA revised the WBN welding program to require that welding activities affecting ASME code systems be performed in accordance with the construction Code of Record.

TVA reviewed repair, replacement, and modification activities performed on ASME code systems since the completion of the system N-5 data report forms. This review identified several workplans and maintenance requests that represent exceptions to the construction Code of Record. (NCO870246014, 024, 025, and 032 closed)

TVA evaluated these exceptions and determined that welding was performed in accordance with the technical requirements of ASME Section III. However, required pressure tests were performed in accordance with ASME Section XI rather than ASME Section III. In addition, some of the workplans and maintenance requests did not have the required Authorized Nuclear Inspector (ANI) review for material acceptance. TVA subsequently provided these documents to the ANI for approval. (NCO870246040 closed)

The pressure tests will be reperformed in accordance with ASME Section III, (Remaining Work punchlist, Attachment 8). Work will be in compliance with ASME Section III or exceptions will be submitted to the NRC for review and concurrence. (NCO890012048 open)

4. Code of Record

NA-1140 of ASME Section III addresses the use of later editions and addenda of the Code that are less restrictive than the Code of Record (1971 Edition through Summer 1973 Addenda for WBN). TVA's original interpretation of this requirement was inappropriate, in that, necessary governing documents were not revised and concurrence was not obtained for cases where less restrictive editions/addenda were utilized.

TVA reviewed 21 welding and welding-related specifications to determine where less restrictive editions/addenda were utilized. Twenty-one areas were identified that were less restrictive than the Code of Record.

Each area was evaluated and justification provided. The results of the evaluations and the justifications were forwarded to the NRC in August 1987 (Reference 14). In June 1988, Watts Bar Engineering Project procedure WBEP-3.18, "Use of Later Editions and Addenda in Code Cases to the ASME Code," was issued to control and document the use of later code provisions. Additionally, other design output sources, e.g., design criteria, weld and NDE assignment drawings, and use-as-is nonconformance dispositions were reviewed to capture other possible uses of later code provisions prior to the implementation of WBEP-3.18 (now EAI-8.01). Past usage of later code provisions has been identified and documented. EAI-8.01 will control the future use of later code provisions (NCO890012049 closed).

5. Welds on Vendor-Supplied Equipment

At the request of the NRC (Reference 2), vendor welds were added to the scope of TVA's weld evaluation. This evaluation was assigned to WBN NQA (Reference 3) to complete. The following vendors were selected by using quality indicators compiled by the WP. Deviant conditions were evaluated by Nuclear Engineering. A report was submitted to NRC in late March 1989 (Reference 15) which provides results, recommendations, and corrective actions resulting from the evaluations. (NCO890012050, NCO870336 series closed)

Vendor	Quality Indicator	Status
1) York Electro	WBP871191	As a result of the dynamic analysis performed on a sample of the vendor panels, NE determined that the vendor welds provided meet design specification requirements.
2) PDM	NCR 1725	The radiograph/weld sectors for Units 1 and 2 refueling water storage tanks were reviewed with an unacceptable rejection rate by TVA inspectors. This examination sample was expanded to include the primary makeup water storage tanks (2) also fabricated by PDM. Unacceptable welds were repaired to meet ASME requirements or an alternate acceptance in accordance with 10 CFR 50.55a has been processed. (CAQR WBP880190, Alternative Request L44890921803)
3) Bergen Patterson	E.C. IN-85-127-001	Previous corrective actions adequately addressed vendor deficiencies - no reinspection required.

4) Broad Line	NCR 1168	The radiographs of vendor welds have been reevaluated to AWS building code criteria. Defects were found and technique deficiencies were detected. They were accepted by engineering analysis. The evaluation and acceptance are documented in CAQRWBP880750.
5) W Valve Operators	NCR 6454	Previous corrective actions adequately addressed vendor deficiencies - no reinspection required.
6) Radiation Monitor	NCR 2785R	Previous corrective action adequately addressed scope of vendor deficiencies - no reinspection required.
7) Dravo	NCR 2944R	Reinspection complete. Only minor surface conditions were identified during the visual weld reinspections of the vendor welds. These conditions were corrected on WBP880075 and WBP880096.
8) Masoneilan	NCR 3555	Reinspection complete. The undersized welds identified have been determined by NE calculation to be acceptable. CAQRs WBP880245 and WBP880250 were closed with a use-as-is disposition.
9) CBI	NCR 6179	Previous corrective actions adequately addressed vendor deficiencies.
10) Tube Turn	NCR 2638	Previous corrective actions adequately addressed vendor deficiencies.
11) WRD-NTD	NCR 3380R	Previous corrective actions adequately addressed vendor deficiencies.
12) Stearn Rogers	NCR 4073	Previous corrective actions adequately addressed vendor deficiencies.

13) Yuba	IN-85-657-001	Previous corrective actions adequately addressed vendor deficiencies.
14) Accumul. Tanks	NCR 6747	Previous corrective actions adequately addressed vendor deficiencies.
15) Opeilaka Tank	IN-85-960-001	Previous corrective actions adequately addressed vendor deficiencies.
16) Julieus Mock	NCRs 6341 and 6345	Previous corrective actions adequately addressed vendor deficiencies.

6. Radiograpic Film Review

During the nondestructive examination (NDE) Level II and Level III examiner review (2 separate reviews) of radiographs for ASME Section III piping welds, radiographs for 16 welds were determined to have 18 radiographic identification discrepancies. (Two welds were identified to have two different types of discrepancies.)

Of the approximately 2650 WBN Unit 1 and common (to Unit 2) ASME Section III piping welds requiring radiographic testing, approximately 2080 welds were radiographed, interpreted as acceptable during construction, and independently reviewed and accepted. The remaining approximately 570 welds required repair or reradiographed, either during construction and/or as a result of the review program. This population of approximately 570 welds was selected as the basis for identifying radiographic identification discrepancies.

Of these 570 welds, approximately 400 welds required repair during initial construction. Of these 400 welds, approximately 300 welds did not require repair and/or additional radiography as a result of the second review. The remaining approximately 270 welds required repair and/or additional radiography as a result of the second review.

As part of the second review, the Level III examiner matched the repair radiographs (400 welds) to the original radiographs for repaired welds to ensure that the correct area was repaired and that the repair radiograph matched the original weld. No additional discrepancies were identified. During repair and/or reradiography of the 270 weld population, the new radiographs, verified as corresponding to the correct welds, were compared against the existing radiographs. Two additional discrepancies were identified and corrected.

TVA believed that the results of the two independent rereviews of the ASME Section III piping welds (2650 population) and the additional evaluations of the 270 and 300 weld populations (about 22 percent of total population) demonstrated the ASME piping welds requiring radiography complied with TVA licensing commitments and that further evaluation for unidentified radiographs is not necessary. (NCO890012055 closed) (NRC closed this item in Inspection Report 390, 391/89-04.) Note: An additional review of the radiographs is further discussed in Attachment 6, Item 5.

7. Fillet Weld Adequacy

The NRC identified a concern (390/86-21-05) relating to verification of fillet weld adequacy. The concern specifically involved the fitup requirements of the American Welding Society (AWS) Structural Welding Code-Steel (AWS Dl.1).

Both DOE/WEP and the WP evaluated this concern. The DOE/WEP evaluation concluded that "verification of fit-up for structural steel is not a safety-significant issue at WBNP-1" (Reference 5). The WP concluded that even though the program changed somewhat throughout the period of structural welding, the minimum requirements of AWS Dl.1 were met (Reference 13). Revision of applicable procedures and training of personnel involved with fitups have enhanced the program.

(NRC closed this item in Inspection Report 390, 391/89-04)

WELDING RELATED ISSUES IDENTIFIED AFTER ISSUING WELDING CAP

1. Undersize Nozzle Welds in ASME Components

An NRC team inspection conducted in October 1989 identified undersized nozzle-to-shell welds on 8 of 12 inspected tanks, filters, and heat exchangers in ASME Class 2 and 3 systems (NOV 390/89-200-41). The corrective action to resolve this deficiency is based on an industry survey of other utilities and TVA's inspections of components at WBN. The plan included inspecting accessible nozzle-to-shell fillet welds for those components that are most susceptible to failure or have the greatest safety significance resulting from weld failure, and inspecting accessible nozzle-to-shell fillet welds of one component from each vendor that does not meet the criteria for most susceptible to failure or greatest safety significance. TVA has evaluated those welds found to be undersized for adequacy to fulfill the intended function.

TVA has inspected and evaluated the 79 components identified for evaluation. Six nozzles required repair. The repairs are complete and await hydrostatic testing.

TVA has identified in its materials Procurement Quality Supplier Information Center (SIC) suppliers of tanks, heat exchangers, and filters having undersized nozzle-to-shell fillet welds, and identified vendors listed in the SIC which could supply these ASME components. Existing procedures require that preparers of source surveillance plans and supplier audit programs review the SIC information in developing these plans. This was documented and evaluated in WBP890514 (also see NCO900064017, Remaining Work punch list, Attachment 8)(DCN-15737-A, Workplan-15737-A, DCN-M14483A) (NRC closed this item in Inspection Report 390/92-38)

2. Lack of Penetration (LOP)/Lack of Fusion (LOF) in ASME Class 3 Welds

During a July 1990 NRC inspection by radiography for internal corrosion of ASME Class 3 piping welds which had not been previously radiographed, several examples of lack of penetration/lack of fusion were identified.

TVA developed a corrective action plan to demonstrate the adequacy of ASME Class 3 butt welds. This plan involves determining the postulated worst flaw by radiography of a statistical sample of welds, ultrasonic flaw sizing, and metallography; identifying the highest stress locations using both ASME Section III and Section XI methods assuming the worst flaws are located at these welds.

This evaluation determined that only three weld locations were identified which required radiographic examination to verify weld quality. All three welds were radiographed and found to be well within an analytically acceptable flaw size.

Although the analysis indicated that the Class 3 welds were acceptable, TVA elected to proceed with repairing any weld which contained lack of penetration (LOP) and/or lack of fusion (LOF) exceeding 10% in circumferential length. Engineering analysis indicated that a maximum of 18% would be acceptable. Repairs were performed under maintenance requests MR A-64607, A-646081, A-646082, A-646084, A-646085, A-646086, A-646099, A-656384, and A-644083.

To prevent recurrence TVA has developed a random radiography requirement to assure proper feedback into the welding system during the fabrication of Class 3 systems. (SSP-7.50, SSP-3.01)

CAQR WBP900336SCA documents this condition and its evaluation. (CAQR is closed) (NCO910013009 is open pending completion of hydrostatic testing) (remaining work punchlist, Attachment 8)

3. Faulty Ultrasonic Testing Methods Used by EG&G

A sample of ASME Class 3 welds found by radiographic examination to contain LOF/LOP defects (Item 2 above) had previously been examined and accepted by ultrasonic examination performed by EG&G. EG&G had performed ultrasonic examination on groups of both piping and structural welds to address various welding-related employee concerns. Failure of the EG&G ultrasonic examination to detect LOF/LOP in this case raised questions about the validity of results and conclusions based on its examination of other welds.

Investigation by TVA and APTECH Engineering Services revealed that the problem resulted from insufficient sensitivity of the particular ultrasonic technique used by EG&G for flaw evaluation in piping welds and could be isolated to two groups of pipe welds. The groups were No. 013 (ASME Class 3 ERCW piping) and No. 213 (B31.1 Code Fire Protection piping in the Additional Diesel Generating Building [ADGB]). TVA response to NRC Unresolved Item 50-390/90-20-03 with supporting information from APTECH report B26910114900 documents this evaluation. (NRC closed this item in Inspection Report 390/91-05)

4. LOF/LOP in ANSI B31.1 Welds

ANSI B31.1 Code welds in the ADGB Fire Protection System represented one of the two groups of welds for which an employee concern had been addressed by EG&G using potentially ineffective ultrasonic examination (see Item 3 above). TVA, utilizing methods similar to those described for Class 3 welds, has reexamined these welds by both ultrasonics and radiography. The results of these examinations have been analyzed and the welds found to be acceptable. Closed CAQR WBP 910101PER documents this condition and its evaluation.

5. NRC Review of Radiographs

A concern associated with the availability of and control of welding records, specifically with radiographs and associated records at the Seabrook nuclear facility could apply to WBN. The concerns were apparently isolated incidents, but they raised potential questions with regard to the thoroughness of the licensee's 100 percent review effort and the ability of the NRC to exercise its oversite responsibilities.

In anticipation of possibly similar issues being raised, TVA and NRC have completed the following actions:

- TVA performed a walkdown of WBN, Unit 1 to physically identify Class 1 and sample Class 2 field welds which required radiography to verify weld documentation.

- TVA and NRC independently reviewed radiographic film records for Class 1 and Class 2 welds that required radiography to ensure the records contained the correct film.

- The NRC completed a 100 percent independent review of TVA radiographs from Class 1 and Class 2 TVA-fabricated welds.

A total of 2516 welds were reviewed for ASME code acceptance. The inspection indicated that, overall, the weld quality and film quality were good. Only three welds were repaired as a result of this review. These three welds contained indications of an interpretative nature. TVA took immediate corrective action for all discrepancies identified. The NRC indicated that follow-up inspections will occur throughout the completion of WBN Unit 1 to ensure all TVA welds are reviewed. This is being tracked by the NRC as inspector follow-up item IFI 390/91-18-04.

6. Establish Boundaries of ASME Section III Jurisdiction

During system completion review, TVA has identified examples of changes in TVA piping class that resulted in an incorrect determination of ASME code applicability. To determine extent-of-condition, TVA will review the flow diagrams for those systems containing ASME Section III piping to identify any other instance(s) of welds that have an incorrect determination of ASME applicability. This is being tracked by PER WBPER920195.

7. N-5 Code Data Report Program

During the Unit 1 ASME N-5 review process errors were noted in the original documentation. To resolve these errors TVA established a N-5 work group. The work group charter is to review all completed N-5 data reports. The scope of this review applies to the ASME Code Section III, Division 1, fabricated and installed piping including instrumentation. This review is being completed in three phases. Phase I includes the activities involved with closing SCAR WBP900145SCA. Phase II is the initiation of any addenda to the original N-5 data reports. Phase III includes the initiation of any supplements to the N-5 for work performed after the initial code certification. These activities are schedule for completion in conjunction with the WBN system completion and turnover schedule. This activity is being tracked by SCAR WBP900145SCA and URI 390/90-27-02.

OPEN CONDITION ADVERSE TO QUALITY AND INDEPENDENT DEVIATION REPORTS IN THE WELDING CAP MATRIX BEING ADDRESSED BY OTHER CAPS OR SPECIAL PROJECTS

The following list contains those CAQs and associated IDRs which are still open at this time and lists the CAP which is providing the corrective action for each.

	CAQ	IDR	CAP
1.	SCRWBN6463SCA (Drg. & Proc. Misinterpretation) (PWL-CG)	999-0040 WTG-0103	Conduit Supports These two IDRs are acceptable by calculations B41871130838 and B41871130837. The CAP does not specifically list these IDRs, but the generic issues identified are addressed by SCRWBN6463SCA.
2.	WBP880450PER (QA Record Quality) (PWL-BT)	WTG-0014 WTG-0015 WTG-0016 WTG-0043 WTG-0050 WTG-0053 WTG-0054 WTG-0091 WTG-0092 WTG-0094 WTG-0095 WTG-0096 WTG-0113 thru WTG-0118 WTG-0121 WTG-0129	QA Records
3.	WBP870036SCA (QA Records) (PWL-BX)	WTG-0126	QA Records The QA Records CAP specifically addressees the conditions reported in WTG-0126. However, the CAP does not specifically list WTG-0126.

4.	WBN870316SCA (HVAC Deficiencies) (PWL-WE)	WTG-0010 WTG-0011 WTG-0012 WTG-0101 WTG-0102	HVAC Supports
5.	NCRW334PSCA (Instr. Supports) (PWL-HB)	IDRs which are not specifically identified in W334P that will be resolved as part of the population represented by W334P. (B26860409007 and C24860707003) WTG-0017 thru 0021 WTG-0034, 0035 WTG-0072 WTG-0075, 0076 WTG-0079 thru 0081 WTG-0093	Instr. Lines
6.	WBP871061PER (Support Span) (PWL-CG)	999-0044	Conduit Supports 999-0044 is not specifically identified in this PER or CAP; however, the CAP requires a verification of support spacing.
7.	WBP880544PER (Support Design) (PWL-WE)	999-0043 999-0248	HVAC Supports Both IDRs are included in the CAP.
8.	WBP871315SCA (PWL-WT)	999-0304 999-0305 999-0306 999-0131	Welding Spent Fuel Storage Racks

**REMAINING WORK
FROM WELDING CAP**

ACTION TO BE COMPLETED	TRACKING ITEM NUMBER	SYSTEM
Replace and pressure test coupon removal areas in HVAC duct	Remaining Work List (RWL) for WP N-MEB8721-1	30
Hydrotest (ASME III/XI letter) References 12, 20	NCO870246039 (*)	62, 63, 68, 70, 74
	NCO870028009 WBNNEB8651	1, 3, 15, 30, 32, 33, 41, 43, 61, 62, 63, 67, 68, 70, 72, 74, 77, 78, 87, 94
	NCO870246015	3
	NCO870246021	1
	NCO870246023	1, 26, 63
	NCO870246041	1, 2, 15, 26, 30, 31, 32, 41, 43, 61, 62, 63, 65, 67, 68, 70, 72, 74, 77, 78, 81, 84, 85, 90
	NCO890012048 (*)	1, 3A, 3, 15, 32, 43, 61, 62, 63, 68, 72, 74, 77, 78, 81
	WBP871095PER (*)	1, 3, 15, 26, 30, 31, 32, 41, 43, 61, 62, 63, 65, 67, 68, 70, 72, 74, 77, 78, 81, 84, 85, 90
Hydrotest ASME XI VT-2 buried piping welds	NCO870246035	67
Hydrotest repair welds (Welds repaired as a result of VT and radiograph reviews.)	NCO890001005	68
	SCRW506PSCA	72

ACTION TO BE COMPLETED	TRACKING ITEM NUMBER	SYSTEM
The analysis for shear lugs is complete, documentation pending hanger analysis and update program completion	NCO870074009 NCO870074023	01, 03, 12, 18, 24, 25, 26, 29, 31, 32, 33, 36, 39, 40, 41, 44, 59, 61, 62, 63, 65, 67, 68, 70, 72, 74, 77, 78, 81, 82
Closure of Maintenance Requests (MRs) associated with WP reinspection activities	NCO890012059	292, 602, 666, 667, 668, 68
Hydrotest Tube-Turns containment penetrations	NCO890256006 WBP880310SCA	1, 3
Prepare N-5 Supplements References 12, 20	NCO870246009	1, 3, 15, 18, 26, 30, 31, 32, 41, 43, 59, 61, 62, 63, 64, 65, 67, 68, 70, 72, 74, 78, 81, 90
	NCO870246013	
	NCO870246038	
	NCO870246039 (*)	
	NCO890012048 (*)	
	WBP900145SCA	
	WBP871095PER (*)	

(*) This item is listed twice, hydro and N-5.

NON-CAP REMAINING WORK

Review ASME III flow drawings	WBPER920195	Closing on a system completion basis
Hydrotest repair weld from vendor nozzle inspection	NCO900064017 WR-C102982	77
Hydrotest repair welds as a result of Class III review	NCO910013009	67, 26, 78

ENCLOSURE 2

NRC INSPECTIONS WELDING RELATED

	RESIDENT INSPECTION	REGION II INSPECTION	NRR TEAM INSPECTION	EMPLOYEE CONCERNS	WELDER QUAL	WELD INSPECTION	QC QUALIFICATION	RADIOGRAPHY	ULTRASONICS	LP/MT EXAMS	EG & G	WELDING PROCEDURE	STRUCTURAL WELDING	PIPE WELDING	HVAC WELDING	VENDOR WELDING	PIPE SUPPORTS	CLOSURE REPORT
1985																		
390/85-03, 391/85-04		X				X											X	
390/85-18, 391/85-16	X					X	X										X	
URI 390/85-18-04							X											390/85-27
390/85-27, 391/85-23	X					X	X											
390/85-45, 391/85-36	X									X				X				
URI 390/85-45-02										X								390/88-06
URI 391/85-36-02														X				390/85-53
IFI 391/85-36-03										X								390, 391/87-07
390/85-50, 391/85-41	X													X				
IFI 390/85-50-01, 391/85-41-02						X								X				390, 391/90-15, 391/92-20
390/85-52, 391/85-42	X				X	X		X							X			
IFI 390/85-52-03					X													390/87-05
IFI 391/85-42-03					X													390/87-05
IFI 390/85-52-04								X										390/87-07
IFI 391/85-42-04								X										390, 391/87-07
NOV 390/85-52-02						X									X			390/88-01
NOV 391/85-42-02						X									X			390/88-01
Welding Concerns Letter				X														Mtg With NRC
390/85-56, 391/85-45	X				X													
NOV 390/85-56-01,391/85-45-01					X													390, 391/89-04
390/85-62,391/85-51	X			X	X													
URI 390/85-62-01,391/85-51-01					X													390, 391/ 89-04
1986																		
390/85-63, 391/85-52	X				X													390/86-24
NOV 390/85-63-03					X	X												390/86-24
NOV 391/85-52-01					X	X												390/86-24
390/86-24	X					X									X			
NOV 390, 391/86-24-01						X									X			390/91-18
NOV 390, 391/86-24-02						X									X			390/91-15
URI 390, 391/86-24-03						X												390/86-24
URI 390, 391/86-24-04							X											390, 391/87-01
390, 391/86-09		X			X			X						X	X			
URI 390, 391/86-09-01					X													390/89-04
URI 390, 391/86-09-02								X										390/88-04
390/86-12, 391/86-13	X											X	X				X	
NOV 390/86-12-10												X						390/89-04
URI 390/86-12-02												X	X				X	390/87-17
URI 391/86-13-02												X	X				X	390/87-17
390, 391/86-16	X											X					X	
IFI 390/86-16-03												X						390/86-16
IFI 391/86-16-02												X						390/86-16
390,391/86-18	X					X											X	
NOV 390/86-18-01						X											X	Welding Portion Complete
IFI 390/86-18-04						X												390/90-04
1987																		
390,391/86-20	X										X		X				X	
390,391/86-25	X			X		X												

NRC INSPECTIONS
WELDING RELATED

	RESIDENT INSPECTION	REGION II INSPECTION	NRR TEAM INSPECTION	EMPLOYEE CONCERNS	WELDER QUAL	WELD INSPECTION	QC QUALIFICATION	RADIOGRAPHY	ULTRASONICS	LP/MT EXAMS	EG & G	WELDING PROCEDURE	STRUCTURAL WELDING	PIPE WELDING	HVAC WELDING	VENDOR WELDING	PIPE SUPPORTS	CLOSURE REPORT
IFI 390/86-25-08						X											X	390/86-25; 390/89-04
390/86-17		X				X		X		X	X	X	X					
NOV 390/86-17-01											X	X						390, 391/90-16
NOV 390/86-17-02											X							390, 391/89-04
NOV 390/86-17-03						X									X			390, 391/89-04
URI 390/86-17-04						X							X					390, 391/90-04; 90-16
URI 390/86-17-05									X		X							390, 391/90-16
URI 390/86-17-06								X										390/87-10
URI 390/86-17-07						X					X							390, 391/89-04
URI 390/86-17-08								X			X							390, 391/89-04
URI 390/86-17-09										X						X		390/87-17
URI 390/86-17-10								X								X		390, 391/90-18
URI 390/86-17-11												X						390/86-17
URI 390/86-17-12												X						390, 391/90-16
IFI 390/86-17-13						X							X					390, 391/89-04
IFI 390/86-17-14						X					X							390, 391/89-04
IFI 390/86-17-15						X					X							390, 391/89-04
IFI 390/86-17-16												X						390/88-02
IFI 390/86-17-17											X							390/88-02
IFI 390/86-17-18						X											X	390, 391/88-04
IFI 390/86-17-19						X												390, 391/89-04
390,391/86-21	X					X					X		X				X	
NOV 391/86-21-01						X	X											390/91-18
URI 390/86-21-05						X					X		X					390, 391/89-04
URI 390/86-21-06						X							X					390/89-05
URI 391/86-21-03						X							X					390/87-11
390/86-26			X			X		X	X	X	X							
IFI 390/86-26-01										X								390, 391/88-04
IFI 390/86-26-02								X										390/88-02
IFI 390/86-26-03										X								390, 391/89-04
IFI 390/86-26-04									X									390/87-17
IFI 390/86-26-05										X								390/88-02
IFI 390/86-26-06						X												390/88-02
IFI 390/86-26-07								X										390/88-02
390,391/87-01	X					X					X						X	
390,391/87-03	X												X					
390, 391/87-05	X																X	
URI 390, 391/87-05-03																	X	390/89-04
390, 391/87-07	X			X													X	
390/87-09			X			X		X	X	X	X							
390, 391/87-10														X			X	
URI 390/87-10-04														X				390/90-04
1988																		
390, 391/87-19		X						X				X		X				
NOV 390/87-19-01												X		X				390/89-04
NOV 391/87-19-03												X		X				Unit 2
URI 390/87-19-02								X										390/89-04

NRC INSPECTIONS
WELDING RELATED

	RESIDENT INSPECTION	REGION II INSPECTION	NRR TEAM INSPECTION	EMPLOYEE CONCERNS	WELDER QUAL	WELD INSPECTION	QC QUALIFICATION	RADIOGRAPHY	ULTRASONICS	LP/MT EXAMS	EG & G	WELDING PROCEDURE	STRUCTURAL WELDING	PIPE WELDING	HVAC WELDING	VENDOR WELDING	PIPE SUPPORTS	CLOSURE REPORT
URI 391/87-19-04								X										390/88-06
390,391/88-04	X					X		X		X								
URI 390/88-04-01						X												390/90-16,390-90-24
390,391/88-05	X													X			X	
URI 390, 391/89-05-02														X				390, 391/90-24
1989																		
390,391/89-04			X		X	X		X				X	X				X	
IFI 390/89-04-03													X					390/90-27
390/89-200			X			X		X		X						X		
390/89-200-24						X										X		390/91-26
390/89-200-25								X								X		390/90-200
NOV 390/89-200-41						X												Hydro Reqd
1990																		
390, 391/89-20	X																	
URI 390/89-20-04						X				X								390/90-06
390,391/90-05			X			X									X			
URI 390/90-05-01						X									X			390, 391/90-24
390,391/90-04			X		X	X		X									X	
390/90-06	X					X		X										
390,391/90-16		X					X		X	X		X						
390,391/90-18		X				X	X	X	X	X							X	
URI 390/90-18-01								X										390/92-20
390,391/90-20	X			X					X				X					
URI 390/90-20-03									X									390/91-05
390/90-15		X				X	X	X	X					X		X		
NOV 390/90-15-02								X						X				NRC Reviewing (LOP)
URI 390/90-15-05								X										390/90-14
URI 390/90-15-04									X									390/90-30
390, 391/90-22	X					X											X	
URI 390/90-22-07						X											X	390/90-24
390,391/90-24	X																	
NOV 390/90-24-02					X	X						X						TVA Working (Box Anchors)
390,391/90-27	X																	
URI 390/90-27-02														X				TVA Reviewing N-5s
1991																		
390/90-28		X						X						X			X	
URI 390/90-28-01						X											X	TVA Working (HAAUP)
390,391/91-05		X				X		X	X		X			X				
390,391/91-18	X							X						X			X	
IFI 390/91-18-04								X										Review in Process (RT)
390,391/91-23	X					X		X						X				
IFI 390/91-23-01								X										390, 391/91-32
IFI 390/91-23-02								X							X			390, 391/91-32
URI 390/91-23-03								X										390, 391/91-32
NOV 390/91-23-04								X										390, 391/91-32
1992																		
390/91-32		X						X						X				
NOV 390/91-32-01								X										390/92-20
NOV 390/91-32-02								X										390/92-20
390/92-20		X			X									X				
390, 391/92-28		X					X			X				X				

ENCLOSURE 3
CONSTRUCTION DEFICIENCY REPORTS
WELDING RELATED

	EMPLOYEE CONCERNS	WELDER QUAL	WELD INSPECTION	QC QUALIFICATION	RADIOGRAPHY	ULTRASONICS	LP/MT EXAMS	EG & G	WELDING PROCEDURE	STRUCTURAL WELDING	PIPE WELDING	HVAC WELDING	VENDOR WELDING	PIPING SUPPORTS				CLOSURE REPORT
390/80-02														X				390/83-18
390/80-12-06											X		X					390/82-17
391/80-09-06											X		X					391/82-14
390/80-111											X							390/83-42
391/80-111											X							In Hold Status
390/80-51														X				390/83-15
391/80-51														X				390/83-15
390/81-04-01														X				390/83-15
391/81-04-01														X				391/83-11
390/81-25										X								390/82-06
390/81-31			X															390/84-40
391/81-30			X															391/84-38
390/81-39														X				390/82-06
391/81-38														X				390/82-06
390/81-70			X															390/83-27
391/81-66			X															In Hold Status
390/81-79							X				X							390/82-17
390/81-80			X								X							390/82-06
390/81-82														X				390/83-05
391/82-76														X				390/83-05
390/82-87														X				390/83-05
391/82-83														X				390/83-05
390/82-104														X				390/83-18 & 29
390/83-11																		390/83-48
391/83-10																		391/83-37
391/83-47																		390/84-15
390/83-59																		390/84-25
390/84-17																		390/89-04
391/84-17			X								X			X				In Hold Status
390/85-32		X																390/90-04
391/85-31		X																390/90-04
391/85-38			X															In Hold Status
391/86-26		X	X						X					X				390/91-14
390/86-36										X								390/90-20
390/86-65										X								390/89-04
391/86-58										X								390/89-04
390/86-66					X													390/90-04
391/86-60					X													In Hold Status
390/87-08			X															390/89-04
391/87-08			X															In Hold Status
390/87-09												X						390/90-24
390/89-05													X					390/89-25
391/91-01					X						X							In Hold Status
390/91-22										X								Due 6/29/93
391/91-22										X								In Hold Status
390/91-28			X										X					Due 12/23/92
391/91-28			X										X					In Hold Status
390/91-35													X					Due 12/16/93
391/91-35													X					In Hold Status

ENCLOSURE 1

RESPONSE TO NRC

REQUEST FOR ADDITIONAL INFORMATION

ON CHAPTER 14 AMENDMENT 69

QUESTIONS

PARTS 1 and 2