

ENCLOSURE 1

WATTS BAR NUCLEAR PLANT

INSTRUMENT LINES

Corrective Action Program Plan

Revision 0

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WATTS BAR NUCLEAR PLANT

INSTRUMENT LINES

CORRECTIVE ACTION PROGRAM PLAN

REVISION 0

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INSTRUMENT LINES
CORRECTIVE ACTION PROGRAM PLAN

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INSTRUMENT LINES
CORRECTIVE ACTION PROGRAM PLAN

1.0 INTRODUCTION

An overall review of instrumentation-related issues was initiated in 1985 as a result of employee concerns and conditions adverse to quality (CAQ) documents. This review originated on October 25, 1985 with the formation of the Watts Bar Nuclear Plant (WBN) Instrument Project (IP). The IP was chartered to evaluate past and present issues, develop corrective actions, recurrence controls, and to ensure that these actions are properly implemented (Reference 1). The Employee Concerns Special Program and CAQs associated with this CAP are listed in Attachment 1, Sections 1.0 and 2.1.

The WBN Instrument Line (IL) Corrective Action Program Plan (CAP) addresses the major technical issues managed by the IP related to instrument line functional and structural problems. The functional issue is related to the adequacy of instrument sense line slope. The structural issues are related to:

- Thermal effects on instrument lines
- Pipe and tube bending devices
- Compression fittings
- Installation discrepancies

The root causes of the issues identified in this CAP are categorized below. These root causes represent a collective assessment from all technical issues.

- Nuclear Engineering (NE) design requirements were not clearly stated and in certain cases were incomplete.
- NE discipline interface responsibilities in certain cases were not clearly defined.
- Nuclear Construction (NC) site implementing procedures did not include certain installation and documentation requirements.
- Nuclear Quality Assurance (NQA) site implementing procedures did not include certain inspection requirements. Also, Quality Control (QC) inspector training was determined to be inadequate.

2.0 OBJECTIVE

The objective of this CAP is to assure that the subject instrument lines and their support installations are functionally and structurally

adequate and comply with WBN licensing requirements and applicable design criteria. Revisions will be made, as required, to the design criteria and to the Final Safety Analysis Report (FSAR) to assure compatibility of the design criteria with the FSAR commitments. Licensing commitment changes will be proposed only when technically justified.

3.0 SCOPE

The scope of the functional issue (scope) includes sense lines associated with instruments that perform a safety-related function. The scope for the structural issues includes Seismic Category I and I(L) instrument lines and their associated supports that are analytically decoupled from the process lines. The term instrument line includes the following line types: instrument sense, control air, instrument signal, sampling, and radiation monitoring.

Note that the structural qualification of the portion of the instrument lines and their associated supports that are analytically coupled to the process piping are included in the Hanger and Analysis Update Program (HAAUP) CAP scope.

4.0 PROGRAM DESCRIPTION

The overall instrument line functional and structural qualification issues are addressed in a four-phase program as follows:

Phase I IP - Identification of Technical Issues

Phase II IP - Resolution of Technical Issues

Phase III Implementation Plan

Phase IV Installation, Modification, and Inspection

Each program phase is described in detail in the following subsections. A flowchart and fragnet for the CAP are illustrated in Attachments 2 and 3, respectively. In addition, recurrence control actions are described and a licensing assessment is presented.

4.1 Program Phases and Evaluations

4.1.1 Phase I - IP - Identification of Technical Issues

The IP reviewed and organized CAQs and employee concerns into work breakdown structure of the technical issues for review and resolution.

The IP defined and implemented corrective actions and recurrence controls for all of the technical issues discussed in Section 1.0. By June 1986, the IP's assessment of progress indicated the major technical issues were either complete or the implementation program was progressing

satisfactorily. Thus, a transition plan was initiated to phase out the IP and transfer responsibilities for completion of outstanding items to the Watts Bar Engineering Project (WBEP) and the WBN Site Director. This transition was accomplished on December 24, 1986 (Reference 2).

4.1.2 Phase II - IP - Resolution of Technical Issues

4.1.2.1 Instrument Sense Line Slope

A number of sense lines were found that did not conform to the minimum slope requirements specified on design output drawings. WBN documented these conditions in NCR 6172 R1 (Reference 3).

TVA issued Engineering Change Notice (ECN) 5944 to implement corrective action for NCR 6172 R1. This ECN provided the following actions:

- Design output requirements were strengthened and clarified.
- The sense lines that would be reevaluated to the enhanced design output requirements were identified. This scope included sense lines associated with instruments that perform reactor trip actuation, engineering safeguards feature actuation, post-accident monitoring, automatic actuation of features required to perform a primary safety function, and selected instruments that are particularly sensitive to the effects of entrapped air in their sense lines.

4.1.2.2 Thermal Effects on Instrument Lines

It was determined that instrument lines and associated supports were not designed to consider the effects of thermal expansion. WBN documented this condition in Significant Condition Report (SCR) WBNEEB8572 R1 (Reference 4).

A review of operating modes for the Seismic Category I and I(L) instrument lines indicated that portions of the Sampling and Radiation Monitoring systems will operate above temperatures for which thermal effects might be important. These lines

were field sketched to identify material, line configuration, and support type. The lines were analyzed for seismic and thermal effects. Detailed line isometric drawings will be prepared showing required line configuration, support type and material. The resulting corrective actions will be implemented under ECN 6097.

4.1.2.3 Pipe and Tube Bending Devices

It was determined that site implementing procedures used to qualify pipe and tube bending devices were not rigorously executed and the qualification records were not always maintained. WBN documented this condition in SCR 6276-S.

WBN established a sampling program which considered 200 randomly selected bends from an estimated total population of approximately 15,000 bends. The following attributes were evaluated: wall thickness reduction, ovality, acceptable bend contour, and surface condition. These samples were evaluated and found to be acceptable.

The bender qualification records have been updated to acknowledge the results of this bend sample program. Since all corrective actions are completed, including recurrence control, this technical issue is closed (References 5 and 6), pending review of results against current design criteria.

4.1.2.4 Compression Fittings

It was determined that various compression fitting installations were not in accordance with the fitting manufacturer's installation requirements. WBN documented this condition in NCR 6278 (Reference 7). ✓

A sample inspection of 107 compression fittings used on instrument lines was performed and 60 discrepancies were identified. The discrepant installations were categorized as follows: tubing cuts were not deburred, tubing was not bottomed out inside the fittings, nuts were not properly tightened, and ferrules were either judged to be unidentifiable, missing, or reversed. Also, certain discrepant fitting installations included parts supplied by different manufacturers. ✓
skt
2/23

WBN performed a vibration and pressure test program for the identified discrepant compression fitting installations. This program included testing of the effect on flow rate due to the presence of tubing burrs; testing of the integrity of fittings;

with various installation deficiencies by tensile pullout and vibration tests and seismic tests. The results of these tests showed that for the instances where tube ends were not deburred, tubes were not bottomed out or nuts were not properly tightened, fitting performance would still be satisfactory. Also, normal operation vibration testing did not result in leaks in any of the samples tested and seismic testing only produced very slight leakage (undetectable on the pressure gauges) in 2 of the 47 samples. The seismic tests were conservative and represented a severe test of fitting integrity.

For fittings with missing, reversed, or unidentified ferrules, it was determined that:

- Missing ferrules will cause a definite leak during hydrostatic testing.
- Reversed ferrules will leak if they are "CPI" fittings.
- Reversed ferrules will not leak if they are reversed "Hi-Seal" ferrules.

WBN has determined that for these three particular types of questionable ferrule installations, unacceptable installations will be detected during hydrostatic testing due to leakage. If the fittings are used in lines that are not hydrotested, there will be no driving force to create any significant leakage.

Overall, TVA has determined that it is acceptable to use these type fittings with the exception of fittings on lines which are not subject to pressure tests but could see radioactive service. Lines that have been successfully pressure tested are acceptable since lack of leakage is sufficient assurance that they will provide satisfactory service (Reference 8). For those fittings seeing radioactive service in lines not pressure tested (i.e., drains), leak tightness of the drain lines will be confirmed prior to unit criticality.

4.1.2.5 Installation Discrepancies

NCR W-334-P documents a condition in which some instrument line support documentation was determined to be lost or incorrect. It was determined that this condition could apply to all Seismic Category I and I(L) instrument line supports.

A random sample of 60 instrument line supports was selected for a detailed evaluation to determine the quality of the as-built condition. These supports were sketched (including the supported instrument line spans adjacent to both sides of the support) and analyzed.

The evaluation of the as-built conditions resulted in a determination that the instrument lines would comply with existing design basis requirements provided all attachment clamps and bolts were properly installed.

The remaining corrective action requires a walkdown of all instrument line supports to assure that the proper clamps are used and their installation is in accordance with established engineering requirements (References 9 and 10).

4.1.3 Instrumentation Stop Work Order (SWO) and Development of the Engineering Requirements Specification

On January 12, 1987, at the direction of the Manager of Nuclear Power, SWO Number DNQA-WBN-87-01 was issued (Reference 11 and 12) prohibiting physical construction, fabrication, and installation activities of instrument lines. The SWO was instituted in response to unresolved quality-related issues identified by the IP and would remain in effect until appropriate actions were being taken to resolve identified issues.

As a result of the IP findings and prior to the issuance of the SWO, WBN was preparing an Engineering Requirements Specification (ERS) to fully respond to the technical issues raised during the IP. WBEP issued ER-WBN-EEB-001, "Instrument and Instrument Line Installation and Inspection," on January 28, 1987. The development of the ERS was expedited to obtain a release of the SWO. The ERS provided justification for a partial SWO release which occurred on February 6, 1987. The full release of the SWO was authorized on January 26, 1988.

The CAQ process was used to document the technical differences between the requirements specified in the ERS and previously stated requirements shown on design drawings (see Attachment 1, Section 2.2.). The resolution of these differences provides a documented evaluation of the technical adequacy of instrumentation systems which were installed prior to the issuance of the ERS.

4.1.4 Phase III - Implementation Plan

Following the completion of Phases I and II and the issuance of the ERS, the technical issues identified in Section 4.1.2 and the current corrective action program for resolving them are described below.

4.1.4.1 Instrument Sense Line Slope

The instrument sense lines identified by the IP (Section 4.1.2.1) will be evaluated and reworked to meet the engineering requirements specified in the ERS. The slope requirements specified in the ERS are based on design input found in Design Criteria WB-DC-30-16, "Instrument Sensing Lines - Slope and Separations."

Slope is required to allow for the natural migration of air in a liquid-filled sense line and condensate in a gas-filled sense line. Failure to install the sense lines to accomplish the desired self venting or draining could contribute to instrument output signal errors due to a static head shift and/or noise unless specific maintenance techniques are employed to ensure that entrapped air or condensate are purged from the sense lines.

This corrective action will assure that the subject sense lines meet the functional and structural requirements specified in the ERS. This program is defined in the NE disposition memorandum to NCR 6172 R1 (Reference 13).

The root causes of this issue were unclear design output requirements and inadequate installation requirements and techniques (Reference 14).

The action required to prevent recurrence was the implementation of the ERS. The ERS established design output requirements and the basis for the preparation of installation, inspection, and documentation procedures and instructions by the implementing organizations. Also, training was provided to the appropriate personnel before their involvement in installations and inspection activities (Reference 14).

4.1.4.2 Thermal Effects on Instrument Lines

The corrective action described in Section 4.1.2.2 will be completed under ECN 6097 and will comply with the requirements specified in the ERS. As discussed in Section 4.1.4.5, the existing analyses will be reconciled with the updated HAAUP design criteria.

4.1.4.3 Pipe and Tube Bending Devices

The corrective action described in Section 4.1.2.3 will be reviewed to requirements specified in current design criteria.

4.1.4.4 Compression Fittings

Instrument lines designated as Seismic Category I or I(L) will be pressure tested in accordance with appropriate piping code requirements as specified in site implementing procedures. For instrument lines not subjected to pressure test requirements (i.e., instrument drain lines) which could contain radioactive fluids, the compression fitting leak tightness of the drain lines will be confirmed prior to unit criticality. Compression fitting rework, if required, will be performed in accordance with requirements specified in the ERS and associated site implementing procedures.

The root causes of this issue were inadequate procedural control of installation and inspection and inadequately trained construction craftsmen (Reference 8).

The action required to prevent recurrence consisted of revisions to appropriate site implementing procedures. These procedures are now in accordance with requirements specified in Construction Specification G-29. These procedures also ensure training and certification will be provided to appropriate personnel before their involvement in installation and inspection activities (Reference 8).

4.1.4.5 Installation Discrepancies

Those portions of instrument lines which are analytically coupled to the process piping are qualified under HAAUP.

The instrument lines listed under NCR 6172 R1 will be analyzed in accordance with the enhanced piping analysis design criteria (WB-DC-40-31.7). The associated pipe supports will be evaluated in accordance with the updated pipe support design criteria (WB-DC-40-31.9) using engineered support designs. The documentation will comply with the applicable piping analysis, pipe support design and Nuclear Engineering Procedures.

The existing qualification of radiation monitoring and sampling system lines with operating temperatures greater than the temperature cut off limits as specified in the analysis design criteria will be reconciled with the updated design input and design criteria requirements by using a

critical case evaluation approach as described for alternately analyzed ASME piping in the Hanger and Analysis Update Program (HAAUP) CAP.

The NE calculations SD3-017 and SD3-023 for the resolution of NCR W-334-P (Reference 15) which documents the acceptability of the remaining instrument lines will be reviewed for compliance with updated design input and design criteria requirements. The instrument line walkdown, which assures that the clamps are properly installed, will be completed.

4.1.5 Phase IV - Installation, Modification, and Inspection

NC and NQA site implementation procedures have been developed or revised to reflect engineering requirements specified in ER-WBN-EEB-001 (R2). The procedures will be used to control installation and inspection activities to complete construction activities identified in Phase II and III.

4.2 Recurrence Control

Recurrence control measures that address the root causes have been developed. These consist of the following:

- ° NE design requirements were not clearly stated and in certain cases were incomplete.
 - WBEP initiated the preparation of an ERS to fully respond to technical issues raised during the IP. WBN issued ERS ER-WBN-EEB-001, "Instrument and Instrument Line Installation and Inspection." The ERS provides a concise, comprehensive source of engineering requirements for the design, installation, inspection, and maintenance of instruments and instrument lines.
- ° NE discipline interface responsibilities in certain cases were not clearly identified.
 - WBEP procedures have been issued to identify and assign NE discipline scope of responsibilities, in order to achieve proper interface.
- ° NC site implementing procedures did not include certain installation and documentation requirements.
 - Requirements have been established to incorporate the requirements of the ERS in the applicable site implementing procedures.
- ° NQA site implementing procedures did not include certain inspection requirements. Also, Quality Control (QC) inspector training was determined to be inadequate.

- Requirements have been established to incorporate the requirements of the ERS in the applicable site implementing procedures.
- Programs have been implemented to provide training for appropriate personnel on new/revised site implementing procedures.

4.3 Licensing Assessment

Design Basis Documents which provide design input requirements to technical issues addressed in this CAP are reviewed for conformance to the Final Safety Analysis Report (FSAR). Technically justified changes to the licensing commitments will be proposed where required and the FSAR will be revised accordingly.

The design basis documents used to provide design input requirements will be maintained consistent with current licensing requirements.

5.0 PROGRAM INTERFACES

A number of the other WBN CAPs interface with the IL, either in a program or production manner. The programmatic interfaces involve the methodology or program of one CAP being contingent upon the results of another CAP. The production interfaces involve one CAP impacting the scope or boundary of another CAP, but not impacting the program methodology. Table 1 summarizes such interfaces between IL and other WBN CAPs.

6.0 PROGRAM IMPLEMENTATION

The corrective action programs identified in the IL CAP will primarily involve NE, NC, and NQA. The general responsibilities of each organization are defined below.

- NE is responsible for the preparation and maintenance of design basis documents, identification of corrective action programs, preparation and issuance of design output documents, and overall coordination of the completion of this CAP including the final report.
- NC is responsible for initiating or revising site implementing procedures, providing required training, and performing plant modifications and rework.
- NQA is responsible for initiating or revising site implementing procedures, providing required training, and performing QC inspection activities.

7.0 PROGRAM DOCUMENTATION

QA-related documents initiated or revised as part of corrective action activities identified in this CAP are retrievable from TVA's Records and Information Management System (RIMS). Design output drawing status is retrievable from TVA's Drawing Management System (DMS) and distributed and controlled through TVA's Engineering Records Control Services (ERCS).

QA-related work plans generated by NC are retrievable from the WBN Document Control Unit (DCU).

Inspection documentation generated by NOA is retrievable from TVA's Document Control Records Management Unit (DCRMU).

QA-related documents affected by the implementation of corrective actions defined in this CAP include:

- Design drawings to implement modifications
- Design basis documents
- Watts Bar Engineering Procedures
- Supporting calculations for resolving technical issues
- ERS
- Site-specific implementing procedures
- CAQ related documents
- Installation work plans
- Inspection documentation
- Documented closure of IP open items

The IL CAP final report will be issued upon completion of the CAP activities.

8.0 CONCLUSION

The Instrument Line Corrective Action Program identifies the major technical issues and provides corrective actions necessary to assure that the instrument lines and their supports are functionally and structurally adequate and comply with WBN licensing and design basis requirements. Technically justified changes to the licensing commitments will be proposed where required and the FSAR will be revised accordingly.

9.0 REFERENCES

1. Memorandum from E. R. Ennis and W. R. Brown to Those listed dated October 25, 1985, "WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - INSTRUMENTATION PROJECT," (FO1 851029 604).
2. Memorandum from G. W. Curtis to Those listed dated December 24, 1986, "WATTS BAR NUCLEAR PLANT - UNITS 1 AND 2 - DISTRIBUTION OF INSTRUMENT PROJECT FINAL REPORT AND TRANSITION PLAN," (B26 861224 002).

3. Memorandum from D. M. Lake to H. B. Bounds dated February 11, 1987, "WATTS BAR NUCLEAR PLANT - ASME SIGNIFICANT NONCONFORMANCE REPORT 6172 R1," (B26 870211 005)
4. Significant Condition Report SCRWBNEEB8572 R1 (B43 860303 929).
5. Memorandum from M. Lee Rayfield to G. Wadewitz dated July 8, 1986, "WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - SIGNIFICANT CONDITION REPORT 6276-S R0," (B26 860708 001).
6. Memorandum from J. C. Standifer to G. Wadewitz dated February 4, 1986, "WATTS BAR NUCLEAR PLANT - ASME SIGNIFICANT NONCONFORMANCE REPORT (NCR) NO. 6276R2 - FINAL RESPONSE," (B45 860204 251).
7. Memorandum from M. L. Rayfield to D. M. Lake dated August 11, 1986, "WATTS BAR NUCLEAR PLANT - SIGNIFICANT CONDITION REPORT (SCR) 6278-S R1," (B26 860811 014).
8. TVA letter to the U.S. Nuclear Regulatory Commission dated July 30, 1986, "WATTS BAR NUCLEAR PLANT - UNITS 1 AND 2 - QUESTIONABLE COMPRESSION FITTINGS ON INSTRUMENTATION TUBING - WBRD-50-390/85-43, WBRD-50-391/85-42 - FINAL REPORT," (L44 860730 816).
9. Memorandum from J. C. Standifer to G. Wadewitz dated April 9, 1986, "WATTS BAR NUCLEAR PLANT UNIT 1 - ASME SIGNIFICANT NONCONFORMANCE REPORT W-334-P," (B26 860409 007).
10. Memorandum from Kanti Gandhi to D. M. Lake dated September 17, 1986, "WATTS BAR NUCLEAR PLANT UNIT 1 - ASME SIGNIFICANT NONCONFORMANCE REPORT W334-P," (B26 860917 052).
11. Memorandum from S. A. White to R. C. Parker, R. A. Pedde, and George Toto dated January 11, 1987, "STOP WORK ORDERS AND RELATED ACTIVITIES," (A02 870109 028).
12. Memorandum from H. C. Johnson to R. A. Pedde and George Toto dated January 12, 1987, "STOP WORK ORDER NO. DNQA-WBN-87-01 - CAQR NO. WBP871162," (T19 870112 803).
13. Memorandum from H. B. Bounds to D. M. Lake and R. C. Miles dated February 20, 1987, "WATTS BAR NUCLEAR PLANT - ASME SIGNIFICANT NONCONFORMANCE REPORT (NCR) 6172 R1 AND 6359 R0 - INSTRUMENT SENSE LINE SLOPE DISCREPANCIES," (B26 870220 022).
14. TVA letter to the U. S. Nuclear Regulatory Commission dated October 30, 1987, "WATTS BAR NUCLEAR PLANT (WBN) UNITS 1 AND 2 - INADEQUATE SLOPE ON INSTRUMENT SENSE LINES - WBRD-50-390/85-50, WBRD-50-391/85-49 - REVISED FINAL REPORT," (L44 871030 804).
15. NE Calculations SD3-017 (B41 850815 862) and SD3-023 (B41 860227 801)

16. TVA Letter to the U.S. Nuclear Regulatory Commission dated March 24, 1986, "WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - LACK OF THERMAL QUALIFICATION FOR THE RADIATION SAMPLING AND THE RADIATION MONITORING SYSTEMS PIPING - WBRD-50-390/86-13, WBRD-50-391/86-11 - FINAL REPORT," (L44 860324 806).
17. TVA Letter to the U.S. Nuclear Regulatory Commission dated April 23, 1986, "WATTS BAR NUCLEAR PLANT UNITS 1 AND 2 - TUBE BENDING PROCESS DEFICIENCIES WBRD-50-390/85-46, WBRD-50-391/85-46 - FINAL REPORT," (L44 860423 807).
18. TVA Letter to the U.S. Nuclear Regulatory Commission dated July 24, 1986, "WATTS BAR NUCLEAR PLANT (WBN) - UNIT 1 - DISCREPANCIES IDENTIFIED FROM WALKDOWN OF INSTRUMENT LINES WBRD-50-390/86-29 - FINAL REPORT," (L44 860722 801).

TABLE 1 - Interface Between IL and Other WBN
Corrective Action Programs

| | OTHER WBN PROGRAM | TYPE OF INTERFACE WITH IL | |
|----|--|---------------------------|--------------|
| | | PROGRAMMATIC | PRODUCTION |
| 1 | Cable Issues | | |
| 2 | Cable Tray | | |
| 3 | Electrical Conduit and Conduit Support | | |
| 4 | Containment Isolation | | |
| 5 | Design Baseline and Verification Program (DBVP) | Input | |
| 6 | Electrical Issues | | |
| 7 | Equipment Seismic Qualification | | Input |
| 8 | Fire Protection | | |
| 9 | Heat Code Traceability | | |
| 10 | HVAC Duct and Duct Supports | | |
| 11 | Replacement Items Program (Piece Parts) | | |
| 12 | Prestart Test Program | | |
| 13 | QA/QC Records | | |
| 14 | Q-List | | |
| 15 | Seismic Analysis | Input | |
| 16 | Vendor Information | | |
| 17 | Welding | | Input |
| 18 | Hanger and Analysis Update | Input | Input/Output |

Input = IL input is affected by this WBN program.

Output = Output from IL has an effect on this WBN program.

Attachment 1

BASIS FOR CORRECTIVE ACTION PROGRAM

RELATED DOCUMENTS

1.0 Employee Concerns

The IP staff reviewed and addressed 29 employee concerns which were grouped in the Instrument Line Installation subcategory. The results are documented under the Employee Concerns Special Program Report No. 17300. Listed below are the corrective action tracking documents (CATD) numbers with their associated issues.

| <u>CATD NO.</u> | <u>DESCRIPTION OF ISSUE</u> |
|-----------------------|---|
| 17300-WBN-01, -02, 03 | Inadequate sense line slope installations. |
| 17300-WBN-08 | Various compression fitting installations were not in accordance with the fitting manufacturer's installation requirements. |
| 17300-WBN-12, -13 | Site implementing procedures used to qualify pipe and tube bending devices were rigorously executed and the qualification records were not always maintained. |
| 17300-WBN-14, -15 | Some instrument line support documentation was determined to be lost or incorrect. |

Attachment 1

BASIS FOR CORRECTIVE ACTION PROGRAM

2.0 Conditions Adverse to Quality (CAQ)

2.1 The CAQs listed below were within the IP scope and overall closure is part of the IL CAP.

| <u>CAQ NO.</u> | <u>DESCRIPTION OF ISSUE</u> |
|--|---|
| NCR 6172 R1 50.55(e), WBRD-50-390/85-50 | A number of instrument sense lines were found that did not conform to the minimum slope requirements specified on design output drawings. |
| NCR 6293 | Class G drain headers have been supported and documented without specific engineering requirements to address free-end spans. |
| NCR 6467 50.55(e), WBRD-50-390/85-15 | Various control air supports were incorrectly interchanged beyond the scope of the design output requirements. |
| NCR 6218 50.55(e), WBRD-50-390/85-35 | Design information was not adequate, in certain cases, to allow Construction to properly install instrument lines which require flexibility. |
| SCR WBNEEB 8572 50.55(e), WBRD-50-390/86-13 | Instrument lines and associated supports were not designed to consider the effects of thermal expansion. |
| NCR 6416 | Hex head bolts on support clamps with head markings. |
| NCR 6422 50.55(e), WBRD-50-390/85-62 | Clamps were found which used slotted head machine screws instead of hex head cap screws. |
| NCR 6592 | Instrument line span tables did not consider the effects of additional weight due to line insulation. |
| NCR 6276 50.55(e), WBRD-50-390/85-46 | Site implementing procedures used to qualify pipe and tube bending devices were not rigorously executed and the qualification records were not always maintained. |
| NCR 6278 50.55(e), WBRD-50-390/85-43 | Various compression fitting installations were not in accordance with the fitting manufacturer's installation requirements. |

Attachment 1

BASIS FOR CORRECTIVE ACTION PROGRAM

| <u>CAQ NO.</u> | <u>DESCRIPTION OF ISSUE</u> |
|--|--|
| NCR W-334-P 50.55(e), WBRD-50-390/86-29 | Some instrument line support documentation was determined to be lost or incorrect. |
| NCR 6599 50.55(e), WBRD-50-390/86-33 | Concentrated loads were not adequately considered for determination of maximum line spans. |
| NCR 6597 50.55(e), WBRD-50-390/86-22 | Certain instrument lines were supported contrary to design output requirements. |
| NCR 6637 | Certain clamps were not properly torqued. |
| NCR 6598 | "Unistrut" clamps were used without engineering approval. |
| WBNCB8684 50.55(e), WBRD-50-390/87-01 | Control valve support drawing did not meet the seismic qualification requirements of the valve. |
| WBNCB8576 50.55(e), WBRD-50-390/86-28 | The design drawing which provides typical routing of sampling system line attaching to the containment did not accurately reflect design input requirements. |

Attachment 1

BASIS FOR CORRECTIVE ACTION PROGRAM

- 2.2 The CAQs listed below were initiated to document technical differences between the requirements specified in the Engineering Requirements Specification (ERS) and pre-ERS requirements shown on design drawings. Refer to Section 4.1.4.

| <u>CAQ NO.</u> | <u>DESCRIPTION OF ISSUE</u> |
|----------------|--|
| SCRWBNCEB8702 | Instrument lines which attach to local panels have not been evaluated for differential seismic movements. |
| SCRWBNCEB8703 | Instrument lines which attach to local panels have not been evaluated for differential seismic movements. |
| PIRWBNCEB8707 | Thermal movement of non-seismic piping has not been considered in the installation of attached instrument lines. |
| PIRWBNCEB86105 | Instrument lines which span between two seismic zones have not been evaluated for adequate flexibility. |
| PIRWBNCEB86106 | Instrument lines which span between two seismic zones have not been evaluated for adequate flexibility. |
| PIRWBNCEB8710 | Field routed instrument lines which are heat traced may not be supported to allow thermal growth and to avoid the support from becoming a heat sink. |
| PIRWBNCEB8711 | Field routed instrument lines which are heat traced may not be supported to allow thermal growth and to avoid the support from becoming a heat sink. |
| PIRWBNCEB8708 | Duct movements were not considered in the installation of attached instrument lines. |
| PIRWBNCEB8709 | Duct movements were not considered in the installation of attached instrument lines. |
| PIRWBNNEB8672 | TVA Class G designation for certain capillary and sense lines may not assure adequate quality assurance. |

BASIS FOR CORRECTIVE ACTION PROGRAM

| <u>CAQ NO.</u> | <u>DESCRIPTION OF ISSUE</u> |
|----------------|--|
| PIRWBNNEB8678 | QA requirements for instruments designated as Seismic Category I(L) are not consistent with the QA requirements for the associated Seismic Category I piping classification. |
| PIRWBNNEB8679 | QA requirements for instruments designated as Seismic Category I(L) are not consistent with the QA requirements for the associated Seismic Category I piping classification. |
| PIRWBNEEB8713 | Due to the issuance of Design Criteria WB-DC-30-16, sense line installations may not meet design requirements. |
| PIRWBNEEB8714 | Due to the issuance of Design Criteria WB-DC-30-16, sense line installations may not meet design requirements. |
| PIRWBNEEB8710 | Manual valves which are installed between the root valve and panel isolation valve have not been QC inspected for proper flow orientation. |
| PIRWBNEEB8711 | Manual valves which are installed between the root valve and panel isolation valve have not been QC inspected for proper flow orientation. |
| SCRWBNEEB8712 | RCS Crud Sample Station have been installed without approved mounting details. |
| CAQR WBP871049 | Due to the issuance of Design Criteria WB-DC-30-17, capillary system installation may not meet design requirements. |
| PIRWBWBP87170 | Due to the issuance of Design Criteria WB-DC-30-18, condensate chamber installations may not meet design requirements. |

BASIS FOR CORRECTIVE ACTION PROGRAM

- 2.3 The following document references contain additional licensing commitments and overall closure is part of the IL CAP.

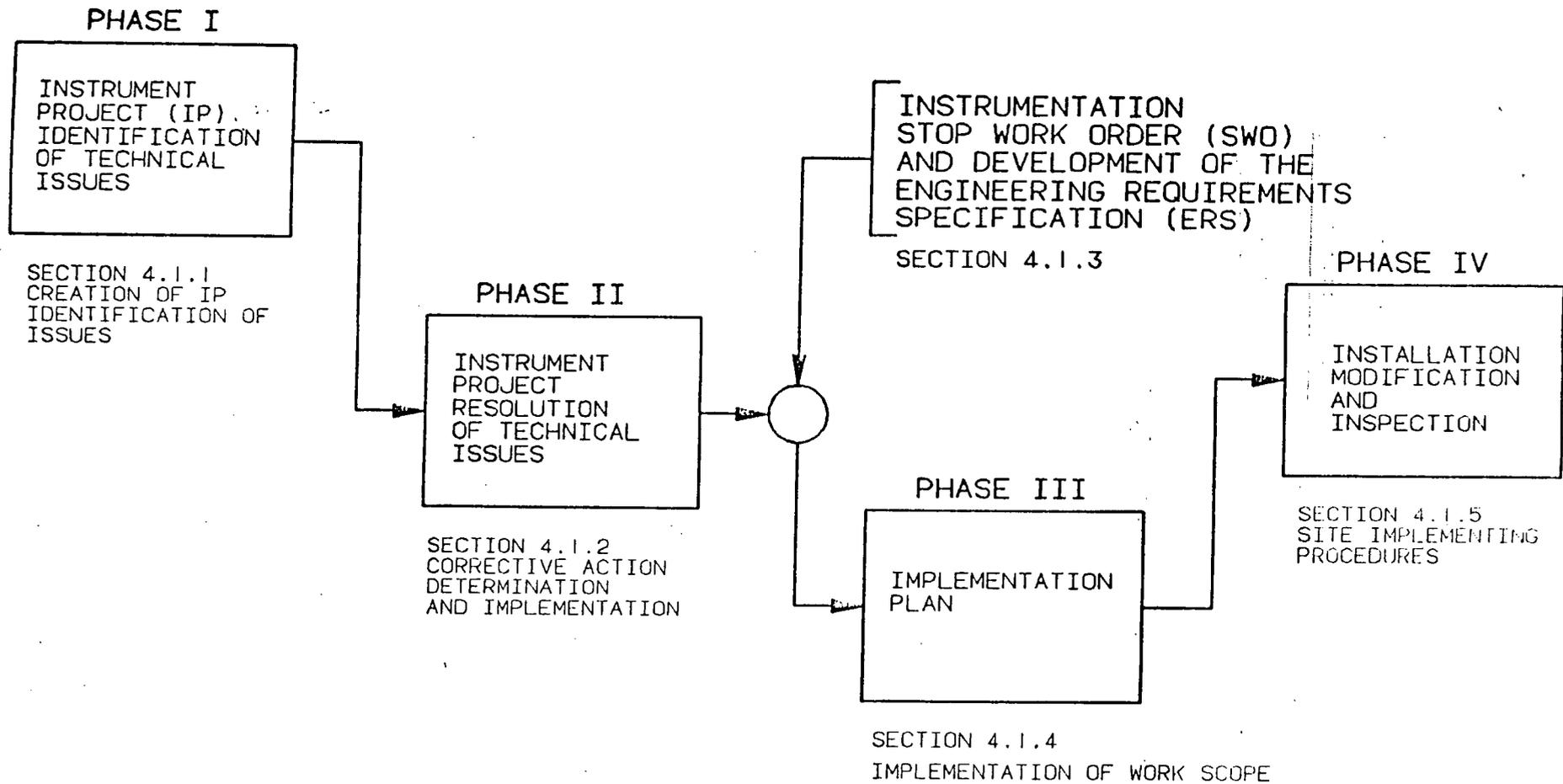
DOCUMENT REFERENCE NO.

NCO-86-0276-016

NCO-87-0193-001

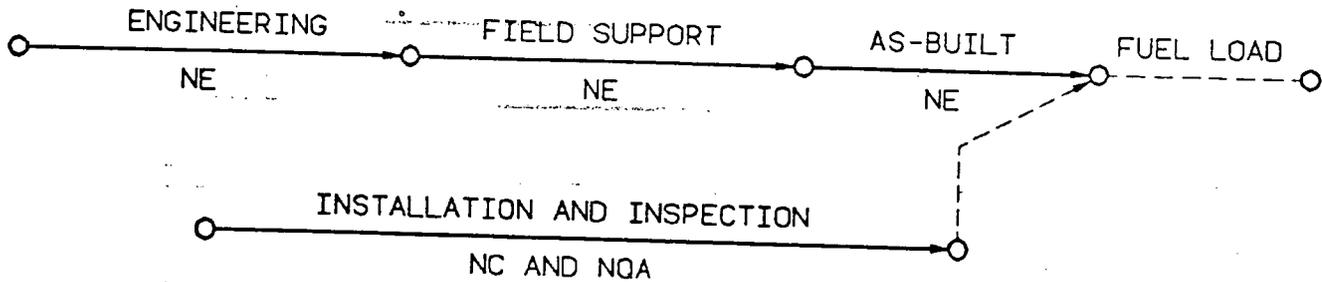
NCO-87-0193-003

ATTACHMENT 2
INSTRUMENT LINE CAP
FLOWCHART OF CORRECTIVE ACTION PROGRAM

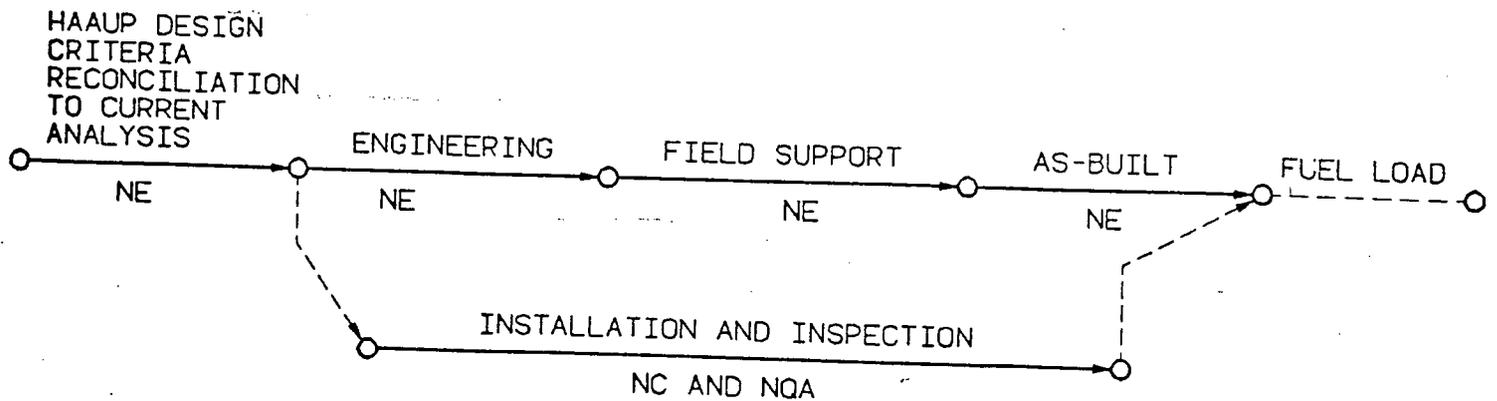


ATTACHMENT 3 FRAGNET INSTRUMENT LINE CORRECTIVE ACTION PROGRAM PLAN

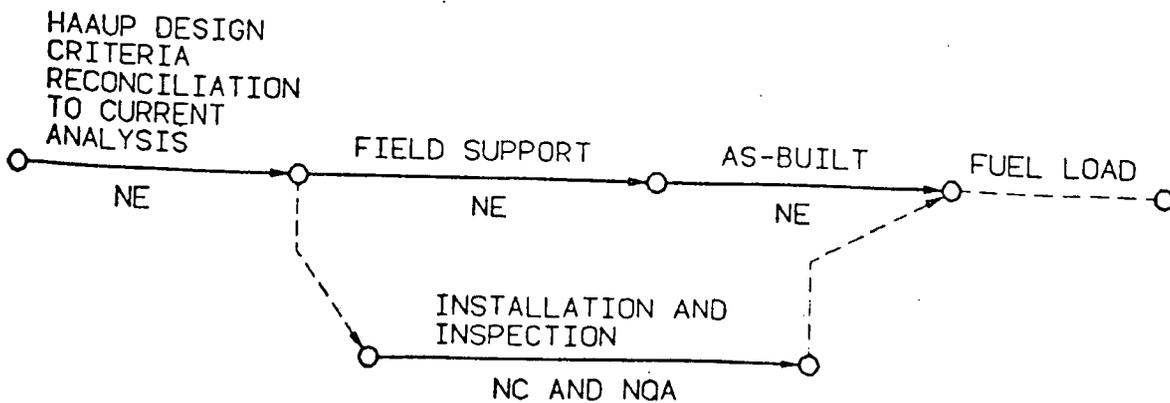
INSTRUMENT SENSING LINE SLOPE (REF. SECTION 4.1.4.1)



INSTRUMENT LINE THERMAL ANALYSIS (REF. SECTION 4.1.4.2)



INSTRUMENT LINE INSTALLATION DISCREPANCIES (REF. SECTION 4.1.4.5)



NOTE: PIPE AND TUBE BENDING DEVICES (SECTION 4.1.4.3) AND COMPRESSION FITTING (SECTION 4.1.4.4) ISSUES ARE DESIGN COMPLETE AND FRAGNET SCHEDULES ARE NOT REQUIRED.

ENCLOSURE 2

For the Watts Bar Nuclear Plant, TVA commits to:

- The resolution of these differences provides a documented evaluation of the technical adequacy of instrumentation systems which were installed before issuance of the engineering requirements specifications (ERS) (reference the Instrument Lines Correction Action Program (CAP), section 4.1.3).
- Instrument sense lines identified by the instrument project will be evaluated and reworked to meet the engineering requirements specified in the ERS (reference section 4.1.4.1 of the Instrument Lines CAP).
- The corrective action for thermal effects on instrument lines will be completed under Engineering Change Notice 6097 and will comply with the requirements specified in the ERS.
- Instrument lines designated as Seismic Category I or I(L) will be pressure tested in accordance with appropriate piping code requirements as specified in site implementing procedures (reference section 4.1.4.4 of the Instrument Lines CAP).
- The existing analyses will be reconciled with the updated Hanger Analysis and Update Program design criteria (reference section 4.1.4.5 of the Instrument Lines CAP)
- The corrective action to Significant Condition Report 6276-S will be reviewed to requirements specified in current design criteria (reference section 4.1.2.3 of the Instrument Lines CAP).