

TVA EMPLOYEE CONCERN  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REPORT TYPE: Bellefonte Nuclear Plant Element

REVISION NUMBER: 1

TITLE : Review of Nuclear Safety Review Staff Startup  
Items at Bellefonte

REASON FOR REVISION:

To incorporate TAS/SRP comments

SUMMARY STATEMENT: The 18 items in this report were identified by the Nuclear Safety Review Staff (NSRS) and were assigned to the Employee Concerns Task Group (ECTG) for verification and closure. The verification activities are described in this report.

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**EXECUTIVE SUMMARY  
BLN-NSRS-1**

Review of Nuclear Safety Review Staff (NSRS) Open Items Requiring Resolution at Bellefonte Nuclear Plant (BLN) prior to fuel load.

NSRS conducted reviews of activities at Bellefonte Nuclear Plant (BLN) during its span of overview responsibility from 1979 to 1986. NSRS items remaining open in 1987 have been examined by the Employee Concerns Task Group (ECTG).

ECTG examined the status of open NSRS issues including those identified specifically for BLN as well as other sites' issues which could have generic applicability at BLN. In all, a total of 86 issues were considered applicable to BLN including 18 requiring resolution prior to fuel load. The status of these startup issues is the subject of this BLN-NSRS-1 report. The remaining 68 issues are considered non-fuel load items and are addressed in report BLN-NSRS-2.

The 18 issues discussed in this report are comprised of 10 closed items and 8 open items. Some associated activities or areas related to the closed items may in fact still be incomplete. However, these NSRS items are considered closed because ECTG, through the evaluation process, determined that sufficient resources have been committed to the issues to ensure their satisfactory completion and closure. This confidence is derived from interviews with cognizant TVA personnel and reviews of applicable documentation.

The status of the 18 NSRS fuel load issues for BLN is as follows:

|        |                |  |
|--------|----------------|--|
| Closed | R-80-05-SQN-4B | Configuration Control  |
| Open   | R-81-22-BLN-01 | Incomplete Documentation of Pipe Break Evaluation                        |
| Open   | R-81-22-BLN-02 | Inadequate Justification of Exceptions to Regulatory Guidance            |
| Closed | R-84-17-NPS-10 | Commercial Grade Items With QA Level I and II Designations               |
| Closed | R-84-17-NPS-11 | Quality Verification for Commercial Grade Items                          |
| Closed | R-84-17-NPS-12 | Receipt Inspection of QA Level I and II Items by Field Quality Engineers |
| Closed | R-84-19-WBN-01 | Clear Identification of Purposes and Uses of All Controlled Documents    |
| Closed | R-84-19-WBN-06 | Instantaneous Trip Settings of the Breakers for Motor Operated Valves    |

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|--------|---------------------|--|
| Open   | R-84-19-WBN-07      | Development of Criteria for Cable Tray Fill Level and QA Inspection                                  |
| Open   | R-84-22-BLN-02      | Adequate Design Margin for Decay Heat Removal Isolation Valve Opening                                |
| Closed | R-84-25-BLN-01      | Resolution of Conflict between the FSAR and Design Criteria of Main Steam System Design Basis        |
| Closed | R-84-25-BLN-02      | Design Modifications to Provide Redundancy in the Isolation of Steam Lines as Required by NUREG-0138 |
| Open   | I-84-34-SQN-03      | Availability of the Material Certification and Requirements for Heat Number Sort Printout Entries    |
| Open   | I-85-06-WBN-01      | The Adequacy of the Dispositions for Identified Cable Bend Radius Problems                           |
| Open   | I-85-06-WBN-02      | The Adequacy of the Program for Cable Pulling Activities   |
| Open   | I-85-06-WBN-03      | Voltage Drop and Short Circuit Current Determination and Verification                                |
| Closed | R-85-08-OE/NUC PR-1 | Inadequate OE Environment Qualification Procedure for Equipment Qualification by Similarity          |
| Closed | R-85-08-OE/NUC PR-2 | Inadequate OE and NUC PR Procedure for Initiating and Processing NCR-FE/ERs                          |

TENNESSEE VALLEY AUTHORITY  
BROWNS FERRY NUCLEAR PLANT  
EMPLOYEE CONCERNS TASK GROUP  
OTHER SITES  
CEG

Subcategory: Bellefonte Nuclear Plant - NSRS Classical Items

Element: Review of Nuclear Safety Review Staff  
Startup Items At Bellefonte

Report Number: BLN-NSRS-1

|             |                          |                |
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TVA EMPLOYEE CONCERNS  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REVISION NUMBER: 1

PAGE 2 OF 14

Review of Nuclear Safety Review Staff (NSRS) Open Items Requiring Resolution  
at Bellefonte Nuclear Plant (BLN) prior to fuel load.

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I. INTRODUCTION

NSRS conducted reviews of activities at Bellefonte Nuclear Plant (BLN) during its span of overview responsibility from 1979 to 1986. NSRS items remaining open in 1987 have been examined by the Employee Concerns Task Group (ECTG).

ECTG examined the status of open NSRS issues including those identified specifically for BLN as well as other sites' issues which could have generic applicability at BLN. In all, a total of 86 issues were considered applicable to BLN including 18 requiring resolution prior to fuel load. The status of these fuel load issues is the subject of this BLN-NSRS-1 report, with the status of the 68 non-fuel load issues to be addressed in a subsequent report, BLN-NSRS-2.

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The status of the 18 NSRS fuel load issues for BLN is as follows:

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|        |                |  |
|--------|----------------|--|
| Closed | R-80-05-SQN-4B | Configuration Control  |
| Open   | R-81-22-BLN-01 | Incomplete Documentation of Pipe Break Evaluation                        |
| Open   | R-81-22-BLN-02 | Inadequate Justification of Exceptions to Regulatory Guidance            |
| Closed | R-84-17-NPS-10 | Commercial Grade Items With QA Level I and II Designations               |
| Closed | R-84-17-NPS-11 | Quality Verification for Commercial Grade Items                          |
| Closed | R-84-17-NPS-12 | Receipt Inspection of QA Level I and II Items by Field Quality Engineers |
| Closed | R-84-19-WBN-01 | Clear Identification of Purposes and Uses of All Controlled Documents    |
| Closed | R-84-19-WBN-06 | Instantaneous Trip Settings of the Breakers for Motor Operated Valves    |

TVA EMPLOYEE CONCERNS  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REVISION NUMBER: 1

PAGE 3 OF 14

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| Open   | R-84-19-WBN-07      | Development of Criteria for Cable Tray Fill Level and QA Inspection                                  |
| Open   | R-84-22-BLN-02      | Adequate Design Margin for Decay Heat Removal Isolation Valve Opening                                |
| Closed | R-84-25-BLN-01      | Resolution of Conflict between the FSAR and Design Criteria of Main Steam System Design Basis        |
| Closed | R-84-25-BLN-02      | Design Modifications to Provide Redundancy in the Isolation of Steam Lines as Required by NUREG-0138 |
| Open   | I-84-34-SQN-03      | Availability of the Material Certification and Requirements for Heat Number Sort Printout Entries    |
| Open   | I-85-06-WBN-01      | The Adequacy of the Dispositions for Identified Cable Bend Radius Problems                           |
| Open   | I-85-06-WBN-02      | The Adequacy of the Program for Cable Pulling Activities   |
| Open   | I-85-06-WBN-03      | Voltage Drop and Short Circuit Current Determination and Verification                                |
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II. Verification of NSRS Restart Items

(Closed) R-80-05-SQN-04B, Configuration Control

In the original review dated June 1980, NSRS concluded from electrical deficiencies it found that configuration control was inadequate at SQN and made the following recommendations:

Establish Critical Systems, Structures, Components (CSSC) configuration control

Verify through walkdown of several CSSC systems that physical configuration agrees with CSSC configuration control drawings

Correct any deficiencies, and walkdown additional systems if significant problems have been found

The configuration control issue was considered by ECTG to be potentially applicable to all sites.

The original NSRS report details were reviewed, as were later BLN configuration control evaluations conducted by the Institute of Nuclear Power Operation (INPO, 1984) and NRC (1985 Systematic Assessment of Licensee Performance). Additionally, BLN quality control procedures related to the issue were reviewed and discussions were held with the BLN document control and electrical/instrumentation supervisors.

BLN quality control procedure BNP-QCP-9.3, R-13 "Configuration Drawing Control" covers the development of the System Configuration Control Drawing List (SCCDL), the operation of the Drawing Control Center (DCC), the certification of as-constructed drawings, the updating of the Drawing Management System (DMS), and the approval of plant configuration for fuel loading. Procedure BNP-QCP-9.4, R-8 "Work Plans" applies to completion and modification work on plant equipment, systems, and structures.

The 1984 INPO report identified a drawing control weakness; the 1985 NRC Systematic Assessment of Licensee Performance (SALP) report did not identify deficiencies with drawing control or onsite design activities. The BLN document control and electrical/instrumentation supervisors both indicated confidence in the control of configuration based on the following:

- Work plans do not get closed until the drawings are changed per the work plan.
- Temporary alterations control forms are used to control configuration documentation.
- Terminations cards are used extensively.
- Temporary installation or omissions documents are used.
- Drawings are marked up and checked before transfer to nuclear power.

Based on the interviews and documentation review, ECTG concludes that the NSRS issue is being addressed adequately at BLN. This issue is closed.

(Open) R-81-22-BLN-01, Incomplete Documentation of Pipe Break Evaluation

This routine NSRS review covered the analysis of postulated high energy pipe ruptures outside containment at BLN. NSRS concluded that the pipe break evaluation appeared to be adequate to meet regulatory requirements and commitments. However, NSRS found the design basis for features which actively mitigate the consequences of pipe breaks was not adequately documented in the pipe break evaluation to ensure that future design changes do not invalidate the pipe break evaluation. ANSI N45.2.11, section 3.1, requires that design bases be documented.

NSRS recommended that DNE document the basis for concluding that a particular pipe break analysis results in acceptable consequences in order to facilitate evaluation of future design changes. All design features that are specifically provided to actively mitigate the consequences of a pipe break should be identified with respective design criteria.

In a response of August 9, 1985, (FOI 850809 701) DNE stated that the BLN system descriptions, when issued, would address the NSRS concern in an appropriate way. DNE stated that the pipe rupture specific design criteria, which are the working documents and which control the work had already been updated to reflect the NSRS concern. CEB Report 77-10 "Evaluation of the Effects of Postulated Pipe Ruptures Outside Containment" would be revised to reflect updated documentation.

ECTG reviewed the revised CEB Report 77-10, but could not specifically verify that all issues were completely covered. An independent verification that report CEB 77-10, revision 1, adequately resolves NSRS issue R-81-22-BLN-01 is required. CATD R-81-22-BLN-01 was issued. This item remains open.

(Open) R-81-22-BLN-02, Inadequate Justification of Exceptions to Regulatory Guidance

This NSRS issue stated that the BLN Final Safety Analysis Report (FSAR), section 3.6. commits TVA to document and justify less conservative criteria than those given in standard review plan sections 3.6.1 and 3.6.2. Contrary to the above, the BLN pipe break evaluation used 1 percent of the plant operating life to define the "short term" that moderate energy piping may contain high energy fluids, whereas NRC defined "short term" as 2 percent of the time that the system operates as a moderate energy system.

NSRS recommended that DNE provide justification of the above exception to regulatory guidance.

In their response (EDC 820405 013), DNE stated they would incorporate the justification for the 1-percent rule in CEB Report 77-10 and would modify wording to avoid further misunderstanding, particularly in the area of design classification.

In a followup response of August 9, 1985, (FOI 850809 701) DNE stated that the BLN system descriptions, when issued, would address the NSRS concern in an appropriate way. DNE stated that the pipe rupture specific design criteria, which are the working documents and which control the work, had already been updated to reflect the NSRS concern. CEB Report 77-10 "Evaluation of the Effects of Postulated Pipe Ruptures Outside Containment" would be revised to reflect updated documentation.

ECTG reviewed the revised CEB Report 77-10, but could not specifically verify that all issues were completely covered. An independent verification that report CEB 77-10, revision 1, adequately resolves NSRS issue R-81-22-BLN-02 is required. CATD R-81-22-BLN-01, noted above also includes this issue. This item remains open.



TVA EMPLOYEE CONCERNS  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REVISION NUMBER: 1

PAGE 6 OF 14

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(Closed) R-84-17-NPS-10, Commercial Grade Items with QA Levels I and II Designations

In the original report NSRS found that commercial grade items were being purchased with little or no QA requirements or from vendors or manufacturers without TVA approved QA programs and classified as QA Level I and II. That practice was contradictory to the purpose of having QA Level I and II items with considerable QA documentation attesting to the items suitability for fulfilling an intended function. NSRS recommended that items purchased with no QA requirements or no requirements for material certification (COC, CMTR) or from vendors or manufacturers without TVA-approved QA programs should not be purchased with a QA Level I and II designation for use in nuclear power installations.

In response to identified problems of the type cited by NSRS, TVA has established an on-going program for assuring proper control over purchased material and items. The specific program for evaluating items purchased with no QA requirements or no requirements for material certification, or from vendors or manufacturers without TVA-approved QA programs is described in NQAM, Part I, Section 2.7.2, "Dedication of Commercial Grade Items,"

ECTG reviewed details of the original report, applicable procedures, and related documentation. Interviews concerning the issue were conducted with the quality assurance and procedures supervisors.

ECTG's review of the NSRS issue at BLN did not identify examples of the degradation of quality and/or qualified equipment from the installation of commercial grade parts. The site procedure, QCP 10.55 "Control of Replacement Items" addresses adequately the use of commercial grade parts and components in quality equipment.

Based on the ECTG review, this issue is closed at Bellefonte.

(Closed) R-84-17-NPS-11, Quality Verification for Commercial Grade Items

In the original report NSRS stated that the use of commercial grade items as basic components places the responsibility for assuring that the items will function as intended under all conditions solely upon TVA. The QA program within TVA, at the time of the NSRS review, was not capable of providing that assurance because it did not include a receipt inspection program or audit of the vendor's QA program for commercial grade items. NSRS recommended that NUC PR establish a receipt inspection program which includes mechanisms such as audit of vendor's QA program, verification of certificate of conformance, etc., for replacement commercial grade items that will be dedicated as basic components or parts thereof, that would provide documented assurance that the items will function as intended.

In response to identified problems of the type cited by NSRS, TVA has established an on-going program for assuring that received items satisfy requirements. The receipt inspection program is described in NQAM Part I Section 2.7.2, Revision 1, "Dedication of Commercial Grade Items", and in BLN site procedure BNP-QCP-10.55, "Control of Replacement Items".

TVA EMPLOYEE CONCERNS  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REVISION NUMBER: 1

PAGE 7 OF 14

ECTG verified that the BLN site procedure provides for verification of certificate of conformance and other documentation for commercial grade items that will be dedicated as basic components for Quality Level I and II equipment. Additionally, a review of other ECTG investigation reports concerning receipt inspection, as well as discussion with the DNQA Quality Engineering supervisor did not identify instances of inadequate receipt inspections at BLN.

Based on the above ECTG review, this NSRS item is closed at BLN.

(Closed) R-84-17-NPS-12, Receipt Inspection of QA Level I and II Items  
By Field Quality Engineers

The NSRS report found that TVA did not require use of qualified inspectors for receipt inspections concerning commercial grade items to be dedicated as basic components in quality equipment. NSRS recommended that receipt inspections be performed by Field Quality Engineers or other inspectors qualified to ANSI N45.2.6.

TVA's requirements for qualified inspectors are now provided in the Nuclear Quality Assurance Manual, Part III, Section 2.2, Revision 1, "Receipt, Inspection, Handling, and Storage of Materials, Components, and Spare Parts". QC inspectors for parts for Quality Level I and II items are qualified to TVA procedures consistent with ANSI N45.2.6.

ECTG reviewed the original NSRS report, the NQAM requirements, and ECTG report 801.04 "Procurement". Additionally, a discussion of the issue was conducted with the DNQA Quality Engineering supervisor. Based on this review activity, ECTG determined that the NSRS recommendations for use of qualified inspectors are being implemented satisfactorily at BLN. This issue is closed.

(Closed) R-84-19-WBN-01, Clear Identification of Purposes and Uses of  
All Controlled Documents

In the original report, NSRS identified instances at WBN where logic and control drawings did not agree with electrical drawings and termination lists. Following review for generic applicability, this NSRS item was assigned by ECTG to all sites for review and correction as needed.

ECTG reviewed the original report and responses to it. Additionally, several other reviews concerning BLN design control and drawing control were evaluated as follows for their assessment of the BLN controls. The latest NRC Systematic Assessment of Licensee Performance (SALP) for BLN covering the period March 1984 through May 1985 did not identify deficiencies in the site design activities or drawing control system. TVA Nuclear Quality Assurance Audit QBL-A-87-0009 found the drawing files in the plant well maintained and in order. The Institute for Nuclear Power Operation (INPO) Report June 5, 1984 did not cite deficiencies but did recommend improvements be made in the control of drawings during construction and in control of permanent plant records.

TVA EMPLOYEE CONCERNS  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REVISION NUMBER: 1

PAGE 8 OF 14

Nonconformance report NCR BLN QAB 8101 was issued to address the NSRS finding. The NCR was closed July 5, 1983 (BLP 830705 019) following correction of discrepancies. BLN stated that the errors in logic were of a random nature and did not indicate a generic problem. The Office of Engineering (OE) responded to NSRS October 1, 1984 (QMS 5840928 201) that the issue was considered closed at Bellefonte.

Based on the history of logic/control drawings and electrical drawings at BFN, WBN, and SQN, and the stages of construction at these plants compared to BLN, ECTG determined that BLN does not share their problem. This NSRS issue is closed for BLN.

(Closed) R-84-19-WBN-06, Instantaneous Trip Settings of the Breakers for Motor-Operated Valves (MOVs)

The original NSRS report for WBN stated that instantaneous trip settings for motor-operated valve breakers were not in accordance with Engineering Design (EN DES) criteria and vendor recommendations. NSRS recommended that instantaneous trip breakers be set in agreement with the National Electric Code (NEC), and that WBN documentation reflect the proper values. ECTG's generic review of the NSRS item assigned the item to all sites for evaluation.

This issue has been addressed in BLN ECTG Element Report 237.2(D) titled "Electrical Protection Design." The findings in 237.2(D) indicate that problems still may exist with the setting of the instantaneous adjustable circuit breakers, the design basis and criteria for their application, and the level of conformance with NEC. CATDs were issued to identify the specific deficiencies and TVA has committed to resolve each as indicated in Corrective Action Plans (CAP). | R1

The planned corrective actions were determined to adequately address the deficiencies and upon closure of CATDs 23702-BLN-01 through -04, this issue will be resolved. Based on the fact that acceptable corrective action is underway and is tracked by CATDs, this NSRS item is considered closed at BLN. All corrective action has been scheduled for completion before fuel load.

(Open) R-84-19-WBN-07, Development of Criteria for Cable Tray Fill Level and QC Inspection

In the original review at WBN, NSRS concluded that criteria should be developed for field use to control actual cable tray fill levels and to provide a basis for Quality Control (QC) inspection. ECTG's generic review of the item found it potentially applicable to all sites including BLN.

ECTG Report CO-10900 "Cable" examined the cable tray fill issue and assigned CATD 10900-NPS-5. The corrective action plan (CAP) for the CATD is for each site to evaluate any existing overflow conditions and correct as needed. Closure of the ECTG CATD 10900-NPS-5 will close NSRS item R-84-19-WBN-07. At this time the issue remains open.

TVA EMPLOYEE CONCERNS  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REVISION NUMBER: 1

PAGE 9 OF 14

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(Open) R-84-22-BLN-02, Adequate Design Margin for Decay Heat Removal Isolation Valve Opening.

The NSRS performed a review of the Decay Heat Removal System (DHRS) at Bellefonte Nuclear Plant (BLN) in 1984. This review was restricted to a functional review of the system. One of the reviewed areas concerned adequacy of the design margin for the DHR Isolation Valve opening.

FSAR Figure 5.2.2-3 indicates that the DHR section isolation valves must be open when the reactor coolant temperature falls below 305°F to ensure adequate low temperature reactor vessel overpressure protection. Bellefonte General Operating Instruction BLGOI-IC also requires the operator to open the DHR isolation valves at 305°F. The DHR pump equipment specification, B&W document number 08.1130000007-07, lists the maximum liquid temperature of the pump suction as 305°F. Thus it appears that there is no margin in the design for instrument error and operator action.

NSRS recommended that additional temperature margin be incorporated into the DHRS design and be documented in the DHRS design basis.

The Bellefonte response to the subject NSRS report concerning the design of the Decay Heat Removal System (Memorandum from W. R. Brown Jr., to K. W. Whitt dated May 28, 1985, RIMS B45 850528 251) states the following:

The DHR pump equipment specification (B&W document number 08-1130000004-07) also lists a design temperature to 350°F for the pump. The 305°F maximum temperature is the normally expected worse condition at the DHR pump suction. The 350°F design temperature will allow a 45°F temperature margin for instrument error and operator action at the DHR pump suction when the DHR isolation valves are opened.

NSRS evaluated the DNE response and determined their concerns to be unresolved (Q01 850828 050). ECTG's review did not resolve the technical differences between the DNE response and NSRS rejection. An independent evaluation of the DNE and NSRS positions should be accomplished to assure this NSRS issue has been resolved. CATD R-84-22-BLN-02 was issued. This item remains open.

(Closed) R-84-25-BLN-01, Conflict between FSAR and TVA Internal Design Criteria

NSRS concluded that TVA had not met the requirements of 10CFR50.34; "Technical Information - Final Safety Analysis Report," inasmuch as the design bases for the main steam system which have been implemented were not accurately described by the BLN FSAR. Specifically, TVA did not consider failure of the main steam isolation valves to be credible, as stated in the design criteria for the main steam system, since the valves have redundant closure signals. However, the BLN FSAR did consider single failures of MSIVs. Therefore, the FSAR conflicted with TVA's internal design criteria.

NSRS recommended that TVA resolve the conflict between the FSAR and the design criteria and document the resolution in the design criteria or FSAR as appropriate.

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TVA EMPLOYEE CONCERNS  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REVISION NUMBER: 1

PAGE 10 OF 14

The Office of Engineering responded (B45 850517 263) with an explanation that the FSAR accurately reflected the bounding conditions for steam line breaks and that the assumptions used in the analyses were clearly stated. However, OE stated that the FSAR may not adequately reflect TVA's design basis for the Steam Generator isolation system.

The NSRS R-84-25-BLN findings and implementation status of the recommendations were investigated by ECTG and reported in ECTG Report 30711 "Nuclear Power Site Program/Procedures." ECTG found acceptable the OE response (B45 850517 263). DNE committed [ECTG Corrective Action Plan 30711, R2] to provide clarification to the FSAR as discussed in the memorandum noted above, before fuel load for BLN.

Based on the above resolution and tracking of the item under CAP 30711, this NSRS item is closed.

(Closed) R-84-25-BLN-02, Main Steam System Design Does Not Meet Regulatory Requirements

NSRS concluded that the present main steam system design did not meet regulatory requirements in the following area. NUREG-0138, issue 1, allows credit for the turbine stop valves in preventing a two-steam-generator blowdown after a steam line break and the failure of an MSIV. However, the design arrangement at BLN is such that in the event of a break, as postulated in NUREG-0138, the closure of the turbine stop valves will not terminate the two steam generator blowdown since the steam lines are cross-connected by a 42-inch diameter header upstream of the stop valves. Furthermore, the NRC in FSAR question 430.67 asked TVA to provide additional information in the FSAR concerning all flow paths between the MSIVs and the TSVs. In TVA's response to this request, the 42-inch-diameter crosstie header between the main steam lines was omitted. NSRS concluded that the answer to FSAR question 430.67 was not complete.

NSRS recommended that design modifications be made to provide redundancy in the isolation of steam lines as required by NUREG-0138 or that conservative analysis of a two-steam-generator blowdown event be completed which shows that the consequences are acceptable. Additionally NSRS recommended that the response to FSAR question 430.67 be amended to more accurately reflect the design of BLN.

The NSRS R-84-25-BLN findings and implementation status of the recommendations were investigated by ECTG and reported in ECTG Report 30711 "Nuclear Power Site Program/Procedures." DNE committed [ECTG CAP 30711-NPS-01] to provide FSAR clarifications, and ECTG Report 30711 concluded that corrective action was adequate to resolve the NSRS issue.

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TVA EMPLOYEE CONCERNS  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REVISION NUMBER: 1

PAGE 11 OF 14

Based on the above resolutions, and tracking of the item under CAP 30711-NPS-01, this NSRS item is closed at BLN.

(Open) I-84-34-SQN-03, Availability of the Material Certification and Requirements for Heat Number Sort Printout Entries

In the original review, NSRS stated that there appeared to be inconsistencies in the compilation of required material certification and some ambiguity in the program established to control it. Specifically, NSRS could not conclude with certainty that the SQN Heat Number Sort Printout included only material with acceptable certification. NSRS recommended that a history of the Heat Number Sort be reconstructed to establish the program's purposes, controls, designed functions, actual functions, and data quality. Following review by ECTG for generic applicability, this NSRS item was also assigned to other sites including BLN. |R1

The ECTG Report MC-40703, "Material Control, Procedural Control, Heat Code," dated September 26, 1986 examined the SQN status of this issue. The issue status at Bellefonte will be reported in ECTG subcategory report MC-40700, "Procedural Control". The evaluation report is not complete at this time.

Completion of the ECTG 40700 evaluation and subsequent corrective action if necessary will close this item. At this time, the issue remains open.

(Open) I-85-06-WBN-01, The Adequacy of the Dispositions for Identified Cable Bend Radius Problems

In the original review at Watts Bar, NSRS investigators determined that there was not sufficient manufacturers' documentation/ justification/test data nor OE engineering basis to substantiate the final dispositions documented for NCRs or establishment of cable bend values for multiconductor cables. The available information, as well as the acceptance criteria for sampling used to justify the as-installed conditions, lacked engineering support. The report stated that OC was permitted by OE to bend the cables permanently to a radius of one-half of values which in 1981 were recognized to be an industry standard for minimum values to which a cable can be permanently bent. Although OE and OC's final disposition accepted the installed condition of these cables at WBN based on "OE/OC developed" values, NSRS questioned the validity of these values. Following review for generic applicability, ECTG also initiated review of this issue at other sites including BLN.

ECTG's evaluation of the cable bend radius problem is reported in construction category report 10900. ECTG findings included those of the NSRS report. CATD 10900-NPS-1 was issued to correct identified problems.

TVA EMPLOYEE CONCERNS  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REVISION NUMBER: 1

PAGE 12 OF 14

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Acceptable closures of ECTG CATD 10900-NPS-1 will close the NSRS issue. At this time the issue remains open.

(Open) I-85-06-WBN-02, The Adequacy of the Program for Cable Pulling Activities

In the original review, NSRS concluded that OE and OC's cable pulling programs were inadequate and in violation of the accepted industry standards and practices. The report stated that Construction Specification G-38 had not defined the method for calculating maximum allowable tension for multicable pulls nor had it finally established the method of pulling multicables utilizing a break link. Also, the industry considered the side wall pressure as a limiting factor for cable pulling activities. Failure to ensure that maximum allowable tension, as well as sidewall pressure, was not exceeded in any cable pulling operation increased the potential for cable damage (insulation degradation). NSRS recommended that the construction specifications G-38 and G-40 be revised to incorporate resolutions to the identified problems. Final adequacy of the present cable installation should then be evaluated per the applicable acceptance criteria. |R1

ECTG considered this issue potentially applicable at all sites. The ECTG Construction Evaluation Group identified cable problems in report CO-10900 "Cable". CATD 10900-NPS-01 addresses the corporate problem of cable installation deficiencies. |R1

Cable installation deficiencies at BLN are addressed in Problem Identification Report (PIR) BLN EEB 8518. This PIR concerns effects of cable tension and sidewall pressure.

CATD I-85-06-WBN-02 has been issued pending completion and closure of PIRBLNEEB8518. The NSRS issue remains open.

(Open) I-85-06-WBN-03, Voltage Drop and Short Circuit Current Determination

In NSRS report number I-85-06-WBN-3, the NSRS recommended that OE perform short circuit and voltage drop calculations for the Voltage Level 3 power circuits to ensure the adequacy of the size of the installed cable to perform its intended functions. ECTG's generic review of the open issue found it potentially applicable to BLN.

NSRS noted that voltage drop calculations, when done, were based on the design projected estimated length and not the installed length. Since cable length is the controlling factor in determining acceptable voltage drop, NSRS recommended the calculations be performed based on actual installed length to ensure operability of equipment under worst conditions.

This issue was examined in ECTG Bellefonte Report 239.0(D), Revision 1, which summarized current status of the issue as follows: |R1

TVA identified the problem of inaccurate cable lengths by a significant condition report (SCR). SCR BLNEEB8548 (12/24/85, App. A, 5.j) indicates designers failed to recognize that the computer routed lengths and the construction lengths could be different enough to modify the electrical calculation's results. The recommended corrective action of the SCR is to revise existing calculations using actual cable lengths or cut lengths, whichever is greater, to ensure that voltage to safety-related components is adequate...

The effect of inaccurate cable lengths on electrical calculations has been recognized and the actual cable lengths are being incorporated as required. This effort will be completed under the current BLN calculation program discussed in BLN Element Report 205.1. TVA has revised procedure BLEP-01 to require as-built actual cable lengths to be used in voltage drop calculations.

Based on a documentation review, ECTG determined that measurements of actual installed lengths had been completed at BLN with two exceptions. CATD I-85-06-WBN-03 was issued to track completion of the measurements. Completion of the BLN calculation program is tracked by ECTG CATDs 20501-BLN-01 through -05. This item remains open.

(Closed) R-85-08-OE/NUC PR-01, Inadequate OE Environment Qualification Procedure for Equipment Qualification by Similarity

NSRS stated in report R-85-08-OE/NUC PR that the OE procedure for environmental qualification of SQN electrical equipment allowed qualification by "similarity" but contained no definite criteria defining what constituted a "similar" item. NSRS recommended that these criteria be established and incorporated into the TVA procedures governing environmental qualification of electrical equipment, and that the criteria be used to re-evaluate the qualification status of electrical equipment previously qualified by similarity. ECTG's review of this item found it potentially applicable to BLN.

EQ requirements, including those for qualifying by similarity, are included in Office of Engineering discipline interface document NEB-DI-125.01 "Program Requirements for Environmental Qualification of Electrical Equipment in Harsh Environment."

Based on the provisions of current procedures, this issue is closed for BLN.

(Closed) R-85-08-OE/NUC PR-2, Inadequate OE and NUC PR Procedures for Initiating and Processing NCR-FE/ERs

NSRS concluded that the OE and ONP procedures for processing nonconforming conditions reports (NCRs), failure evaluations (FEs), and engineering reports (ERs) were inadequate for assuring their timely initiation and processing. NSRS recommended in-depth review of TVA's program and possible changes to provide for effective interface between participating TVA organizations, establishment of centralized tracking, and significant reduction in the time required for processing and dispositioning.



TVA EMPLOYEE CONCERNS  
SPECIAL PROGRAM

REPORT NUMBER: BLN-NSRS-1

REVISION NUMBER: 1

PAGE 14 OF 14

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ECTG reviewed the NSRS report, NQAM requirements, and the corrective action program implementation at the BLN site. A new Conditions Adverse to Quality (CAQ) program with centralized tracking and specific time requirements was to be implemented at all sites by March 30, 1987.

ECTG verified that the CAQ program is established in the Nuclear Quality Assurance Manual (NQAM), Part I, Section 2.16, Revision 2. At BLN, CAQ procedures are in place and overall site training has been completed. There is a commitment to timeliness in the CAQ report initiation and processing. The Tracking and Reporting of Open Items (TROI) computer system has been selected as the single corporate system for tracking CAQs. The CAQ timeliness will be tracked by TROI and overdue items tagged for management attention. Auditing data concerning the new program's adequacy was not available at the time of the ECTG verification activities because of the program's recent implementation. Based on the CAQ program initiation including commitments, documentation, training, tracking, and reporting/auditing provisions, the NSRS item is closed.

Attachments

ECTG CATD R-81-22-BLN-01

ECTG CATD R-84-22-BLN-02

ECTG CATD I-85-06-WBN-02

ECTG CATD I-85-06-WBN-03

ECTG Corrective  
Action Tracking Document  
(CATD)

INITIATION                      Applicable ECTG Report No.:      BLN-NSRS-1

1. Immediate Corrective Action Required:     Yes     No
2. Stop Work Recommended:     Yes     No
3. CATD No. R-81-22-BLN-01                      4. INITIATION DATE 7/24/87
5. RESPONSIBLE ORGANIZATION: BLN Site Director
6. PROBLEM DESCRIPTION:     QR     NQR    R-81-22-BLN-01 & 02

An independent verification that report CEB 77-10, revision 1 adequately resolves NSRS concerns R-81-22-BLN-01 and 02 is required. NSRS was disbanded prior to acceptance of the DNE closure request (B41 851022 002) attached.

- |    |  |   |
|----|--|---|
|    |  | <input checked="" type="checkbox"/> ATTACHMENTS |
| 7. | PREPARED BY: NAME <u>W. J. Karsner</u>               | DATE: <u>7/24/87</u>                            |
| 8. | CONCURRENCE: CEG-H <u>[Signature]</u>                | DATE: <u>8/12/87</u>                            |
| 9. | APPROVAL: ECTG PROGRAM MGR. <u>R. R. [Signature]</u> | DATE: <u>8/13/87</u>                            |

CORRECTIVE ACTION

10. PROPOSED CORRECTIVE ACTION PLAN: \_\_\_\_\_  
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| 11. | PROPOSED BY: DIRECTOR/MGR: _____ | DATE: _____                          |
| 12. | CONCURRENCE: CEG-H: _____        | DATE: _____                          |
|     | ECTG PROGRAM MANAGER _____       | DATE: _____                          |

VERIFICATION AND CLOSEOUT

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

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| _____<br>SIGNATURE | _____<br>TITLE | _____<br>DATE |
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UNITED STATES GOVERNMENT

## Memorandum

TENNESSEE VALLEY AUTHORITY

B41 '85 1022 002

TO : K. W. Whitt, Director of Nuclear Safety Review Staff, E3 A8 C-K

FROM : R. W. Cantrell, Manager of Engineering, W12 A12 C-K

DATE : OCT 22 1985

SUBJECT: BELLEFONTE NUCLEAR PLANT - NSRS REPORTS R-81-22-BLN AND R-84-25-BLN -  
POSTULATED PIPE RUPTURE OUTSIDE CONTAINMENT

- References:
1. NSRS Report R-81-22-BLN dated November 4, 1981  
(GNS 811105 051)
  2. NSRS Report R-84-25-BLN dated October 17, 1984  
(GNS 841017 052)
  3. Your memorandum to me dated April 25, 1985  
(Q01 850425 052)
  4. N. A. Poe's memorandum to Bellefonte Engineering Project  
Files dated April 18, 1985 (B21 850419 004)

The documentation update to resolve the recommendations of the subject NSRS reports has been completed as of October 1, 1985. The report CEB-77-10 has been updated and issued as revision 1.

Since the original NSRS concerns have been addressed, it is requested that these NSRS items be closed.

Original Signed By  
Robert G. Marston  
R. W. Cantrell

ROB:NAP:DCG

cc: RIMS, SL 26 C-K

R. O. Barnett, W9 D224 C-K (2)

E. G. Beasley, W12 C61 C-K

Project Manager's Office, 9-167 SB-K

J. C. Standifer, 9-113 SB-K

This was prepared principally by N. A. Poe, extension 3143.

W9 C177 C-K

ECTG Corrective  
Action Tracking Document  
(CATD)

INITIATION

Applicable ECTG Report No.: BLN-NSRS-1

1. Immediate Corrective Action Required:  Yes  No  
2. Stop Work Recommended:  Yes  No  
3. CATD No. R-84-22-BLN-02 4. INITIATION DATE 7/24/87  
5. RESPONSIBLE ORGANIZATION: BLN Site Director  
6. PROBLEM DESCRIPTION:  QR  NQR R-84-22-BLN-02

NSRS (Q01 850828 050) evaluated DNE response (B45 850528 251) to  
report NSRS R-84-22-BLN and determined their concerns to be  
unresolved.

- ATTACHMENTS
7. PREPARED BY: NAME W S Karsman DATE: 7/24/87  
8. CONCURRENCE: CEG-H Bill Dabney DATE: 8/12/87  
9. APPROVAL: ECTG PROGRAM MGR. R. R. White for DATE: 8/13/87

CORRECTIVE ACTION

10. PROPOSED CORRECTIVE ACTION PLAN: \_\_\_\_\_  
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- ATTACHMENTS
11. PROPOSED BY: DIRECTOR/MGR: \_\_\_\_\_ DATE: \_\_\_\_\_  
12. CONCURRENCE: CEG-H: \_\_\_\_\_ DATE: \_\_\_\_\_  
ECTG PROGRAM MANAGER \_\_\_\_\_ DATE: \_\_\_\_\_

VERIFICATION AND CLOSEOUT

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

\_\_\_\_\_  
SIGNATURE TITLE DATE

FACT SHEET

R-84-22-BLN-02 Adequate Design Margin for Decay Heat Removal Isolation Valve Opening.

The NSRS performed a review of the Decay Heat Removal System (DHRS) at Bellefonte Nuclear Plant (BLN) in 1984. This review was restricted to a functional review of the system. One of the areas reviewed was for adequate Design Margin for DHR Isolation Valve opening.

FSAR Figure 5.2.2-3 indicates that the DHR section isolation valves must be open when the reactor coolant temperature falls below 305°F to ensure adequate low temperature reactor vessel overpressure protection. Bellefonte General Operating Instruction BLGOI-IC also requires the operator to open the DHR isolation valves at 305°F. The DHR pump equipment specification, B&W document number 08.1130000007-07 list the maximum liquid temperature of the pump suction as 305°F. Thus it appears that there is no margin in the design for instrument error and operator action.

NSRS recommended that additional temperature margin be incorporated into the DHRS design and be documented in the DHRS design basis.

Bellefonte response to the subject NSRS report concerning the design of the Decay Heat Removal System (Memorandum from W. R. Brown Jr., to K. W. Whitt dated May 28, 1985, RIMS B45 850528 251) states the following:

The DHR pump equipment specification (B&W document number 08-1130000004-07) also lists a design temperature to 350°F for the pump. The 305°F maximum temperature is the normally expected worse condition at the DHR pump suction. The 350°F design temperature will allow a 45°F temperature margin for instrument error and operator action at the DHR pump suction when the DHR isolation valves are opened.

NSRS evaluated the DNE response and determined their concerns to be unresolved (Q01 850828 050).

5149T

ECTG Corrective  
Action Tracking Document  
(CATD)

INITIATION

Applicable ECTG Report No.: NSRS-BLN-1

1. Immediate Corrective Action Required:  Yes  No  
2. Stop Work Recommended:  Yes  No  
3. CATD No. I-85-06-WBN-02 4. INITIATION DATE 07-23-87  
5. RESPONSIBLE ORGANIZATION: Site Director, Bellefonte Nuclear Plant  
6. PROBLEM DESCRIPTION:  QR  NQR Cable installation deficiencies at BLN are addressed in problem identification report (PIR) BLN EEB 8518. This PIR concerns effects of cable tension and sidewall pressure. This CATD has been issued pending completion and closure of PIR BLN EEB 8518. BLN contact for additional details - Lynn Colvin
7. PREPARED BY: NAME K. R. Gass K.R. Gass  ATTACHMENTS DATE: 07-23-87  
8. CONCURRENCE: CEG-H W. [Signature] DATE: 8/12/87  
9. APPROVAL: ECTG PROGRAM MGR. R. [Signature] DATE: 8/13/87

CORRECTIVE ACTION

10. PROPOSED CORRECTIVE ACTION PLAN: \_\_\_\_\_  
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11. PROPOSED BY: DIRECTOR/MGR: \_\_\_\_\_ DATE: \_\_\_\_\_  
12. CONCURRENCE: CEG-H: \_\_\_\_\_ DATE: \_\_\_\_\_  
ECTG PROGRAM MANAGER \_\_\_\_\_ DATE: \_\_\_\_\_

VERIFICATION AND CLOSEOUT

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

\_\_\_\_\_  
SIGNATURE TITLE DATE

(Open) I-85-06-WBN-02, The Adequacy of the Program for Cable Pulling Activities

In the July 1985 report, NSRS concluded that OE and OC's cable pulling programs were inadequate and in violation of the accepted industry standards and practices. The report stated that Construction Specification G-38 had not defined the method for calculating maximum allowable tension for multicable pulls nor had it finally established the method of pulling multicables utilizing a break link. Also, the industry considered the side wall pressure as a limiting factor for cable pulling activities. Failure to ensure that maximum allowable tension, as well as sidewall pressure, was not exceeded in any cable pulling operation increased the potential for cable damage (insulation degradation). NSRS recommended that the construction specifications G-38 and G-40 be revised to incorporate resolutions to the identified problems. Final adequacy of the present cable installation should then be evaluated per the revised acceptance criteria.

ECTG considered this issue potentially applicable at all sites. The ECTG Construction Evaluation Group identified cable problems in report CO-10900 "Cable". CATD 10900-NPS-01 addresses the corporate problem of cable installation deficiencies.

Cable installation deficiencies at BLN are addressed in Problem Identification Report (PIR) BLN EEB 8518. This PIR concerns effects of cable tension and sidewall pressure.

CATD I-85-06-WBN-02 has been issued pending completion and closure of PIRBLNEEB8518. The NSRS issue remains open.

ECTG Corrective  
Action Tracking Document  
(CATD)

INITIATION

Applicable ECTG Report No.: NSRS-BLN-1

1. Immediate Corrective Action Required:  Yes  No
2. Stop Work Recommended:  Yes  No
3. CATD No. I-85-06-WBN-03
4. INITIATION DATE 07-23-87
5. RESPONSIBLE ORGANIZATION: Site Director, Bellefonte Nuclear Plant
6. PROBLEM DESCRIPTION:  QR  NQR NSRS Report I-85-06-WBN-03  
identified problems with voltage drop and short circuit current  
determination. ECTG determined that measurements of actual  
installed lengths had been completed at BLN with two exceptions.  
This CATD is issued to track completion.  
BLN contact for additional details - Lynn Colvin

ATTACHMENTS

7. PREPARED BY: NAME K. R. Gass K.R. Gass DATE: 07-23-87
8. CONCURRENCE: CEG-H W. Schrage DATE: 8/12/87
9. APPROVAL: ECTG PROGRAM MGR. R. R. [Signature] fo DATE: 8/13/87

CORRECTIVE ACTION

10. PROPOSED CORRECTIVE ACTION PLAN: \_\_\_\_\_  
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ATTACHMENTS

11. PROPOSED BY: DIRECTOR/MGR: \_\_\_\_\_ DATE: \_\_\_\_\_
12. CONCURRENCE: CEG-H: \_\_\_\_\_ DATE: \_\_\_\_\_  
ECTG PROGRAM MANAGER \_\_\_\_\_ DATE: \_\_\_\_\_

VERIFICATION AND CLOSEOUT

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

\_\_\_\_\_  
SIGNATURE

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TITLE

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DATE



FACT SHEET

(Open) I-85-06-WBN-03, Voltage Drop and Short Circuit Current Determination

In NSRS report number I-85-06-WBN-3, the NSRS recommended that OE perform short circuit and voltage drop calculations for the Voltage Level 3 power circuits to ensure the adequacy of the size of the installed cable to perform its intended functions. ECTG's generic review of the open issue found it potentially applicable to BLN.

NSRS noted that voltage drop calculations, when done, were based on the design projected estimated length and not the installed length. Since cable length is the controlling factor in determining acceptable voltage drop, NSRS recommended the calculations be performed based on actual installed length to ensure operability of equipment under worst conditions.

This issue was examined in ECTG Dellefonte Report 239.0(D), Revision 1, which summarized current status of the issue as follows:

TVA identified the problem of inaccurate cable lengths by a significant condition report (SCR). SCR BLNEEB8548 (12/24/85, App. A, 5.j) indicates designers failed to recognize that the computer-routed lengths and the construction lengths could be different enough to modify the electrical calculation's results. The recommended corrective action of the SCR is to revise existing calculations using actual cable lengths or cut lengths, whichever is greater, to ensure that voltage to safety-related components is adequate...

The effect of inaccurate cable lengths on electrical calculations has been recognized and the actual cable lengths are being incorporated as required. This effort will be completed under the current BLN calculation program discussed in BLN Element Report 205.1. TVA has revised procedure BLEP-01 to require as-built actual cable lengths to be used in voltage drop calculations.

Based on a documentation review, ECTG determined that measurements of actual installed lengths had been completed at BLN with two exceptions. CATD I-85-06-WBN-03 was issued to track completion of the measurements. Completion of the BLN calculation program is tracked by ECTG CATDs 20501-BLN-01 through -05. This item remains open.

Enclosure 3