

IV. CONCLUSIONS AND RECOMMENDATIONS

The following paragraphs contain the conclusions followed by recommendations if applicable. An E or R in parentheses has been placed at the end of each recommendation. The (R) indicates that NSRS has concluded the recommendation is based on a regulatory requirement or a commitment. The (E) indicates NSRS has determined that the recommendation has no regulatory basis. It is considered an enhancement and based on subjective judgment.

A. OEDC

1. Management Controls

a. R-81-14-OEDC(BLN)-1, Quality Goals and Objectives

OEDC management had not developed or implemented a program which would put management attention on achieving specific, realistic quality goals and objectives.

Recommendation

OEDC management should establish a program for attaining specific quality goals. The program should include: OEDC management's specific quality goals, objectives and expectations; an implementation plan for achievement; accurate quality measurement systems; management feedback networks; and uniform personnel accountability policies. Refer to paragraph V.A.1.a for details. (E)

2. Quality Assurance

a. Audit and Overview Program

(1) Establishing Requirements and Providing Guidance

NSRS did not find an aggressive effort to define and maintain the definition of requirements and commitments which the OEDC QA program is to meet. Specific examples of failure to fulfill this role include:

(a) R-81-14-OEDC(BLN)-2, Codes and Standards

Earlier this year, when it was found that tables 1 and 2 of the PRM were out of date, they were deleted rather than updated. These tables were designed to provide a composite listing of the codes and standards to which TVA nuclear plants are designed and built.

Recommendation

Tables 1 and 2 of the PRM should be updated and reissued such that guidance comes from

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top management rather than decisions being left to the lower levels of the organization. Refer to paragraph V.A.2.a.(1)(a) for details. (R)

(b) R-81-14-OEDC(BLN)-3, Regulatory Guides/Standards

Contrary to the PRM and EN DES-EP 2.08, commitment sheets have not been developed for recent RG's or industry standards other than the ANSI N45.2 series.

Recommendation

Management should develop and issue commitment sheets for relevant guides and standards in accordance with referenced procedures. Refer to paragraph V.A.2.a.(1)(b) for details. (R)

(c) R-81-14-OEDC(BLN)-4, Periodic Reviews of QA Manuals

Periodic reviews of the PRM had not been conducted as required. Procedures covering the MOM and IPM did not require periodic review of those manuals.

Recommendation

Revise MO-QAP's 2.1, 2.2, and 2.3 to require periodic reviews of the manuals to assure continued conformance with requirements and commitments. Additionally, these periodic reviews should be implemented. Refer to paragraph V.A.2.a.(1)(c) for details. (R)

(d) R-81-14-OEDC(BLN)-5, Temporary Storage of QA Records

OEDC QA had not defined requirements for temporary storage of QA records. Rather, this was left to the organizations responsible for such records.

Recommendation

ID-QAP 17.2, or other appropriate documents, should be revised to specify the requirements of ANSI N45.2.9 for temporary storage of QA records. Additionally, management should assure that records are stored as required. Refer to paragraphs V.A.2.a.(1)(d) and V.A.2.b.(2)(b).4 for details. (R)

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(e) R-81-14-OEDC(BLN)-6, Safety Analysis Reports

Section 17.1A of the BLN FSAR, which provides a description of the OEDC QA program for that facility, was found to be out of date and inaccurate in many respects.

Recommendation

Expedite the submittal of a revised Topical Report on QA for BLN to NRC and assure that it accurately describes the current QA program. Refer to paragraph V.A.2.a.(1)(e) for details. (R)

(f) R-81-14-OEDC(BLN)-7, Quality Requirements Section Resources

Based on the status of requirements definition which existed and on consideration of other routine functions performed by this group, it did not appear that the section was sufficiently staffed to fulfill its obligations in a timely manner.

Recommendation

Management should increase the manpower resources applied to this function. Refer to paragraph V.A.2.a.(1)(f) for details. (E)

(2) Audit/Overview Functions

The audit function appeared to have been conducted in appreciable depth and, overall, appeared adequate to satisfy requirements and commitments. The following problems were noted:

(a) R-81-14-OEDC(BLN)-8, Compliance Section Resources

Based on the scope and depth planned for the audit function and on other routine tasks performed by this group, NSRS concluded that additional staffing would be required in order for all tasks to be accomplished in a meaningful fashion.

Recommendation

Management should increase the manpower resources to be applied to the audit/overview role. Refer to paragraph V.A.2.a.(2)(a) for details. (E)

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(b) R-81-14-OEDC(BLN)-9, Audit Support Records

Audit support records were not being stored and protected as required by ANSI N45.2.12 and ANSI N45.2.9.

Recommendation

Management should make provisions for storage of audit support records in accordance with requirements, either by use of fire-rated cabinets or by alternate means. Refer to paragraph V.A.2.a.(2)(b) for details. (R)

b. ASME Section III QA Program

(1) R-81-14-OEDC(BLN)-10, Revision of the NCM OEDC Policy Statement Required

The NCM OEDC policy statement as presently written contains directives which are not representative of the practices being employed by OEDC.

Recommendation

OEDC should either comply with the present wording of the NCM OEDC policy statement and committed ASME Code edition requirements or should evaluate revising the statement to reflect:

- (a) That the NCM is maintained to the latest edition and addenda issued to the ASME Code.
- (b) That the NCM may be used directly if its section details are specific enough to eliminate a duplication effort.
- (c) The intended degree to which the NCM is to govern when compared with PRM and ID-QAP requirements.

Refer to paragraphs V.A.2.b.(2)(a) and V.C.12.b.(1) for details. (R)

(2) R-81-14-OEDC(BLN)-11, Inadequate Fulfillment of Certain ASME QA Program Requirements

Responsibilities detailed by the NCM for OEDC QA and EN DES-NEB were found not being complied with.

Recommendation

- (a) The OEDC QA Manager's office needs to reevaluate its ASME QA program responsibilities

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involving the establishment of minimum training, record retention requirements, and the auditing of EN DES and CONST Code activities.

- (b) NEB needs to reevaluate its NCM maintenance responsibilities to ensure that when documents described in the NCM are changed, corresponding changes are also made to the NCM.

Refer to paragraphs V.A.2.b.(2)(b) and V.B.10.b.(1) for details. (R)

(3) R-81-14-OEDC(BLN)-12, Establishment of ASME QA Program Measures to Control Forming, Bending, and Aligning Processes

Process provisions to control the quality of items manufactured at the projects with respect to forming, bending, and aligning have not been included in the ASME QA program as required by ASME requirements.

Recommendation

Specific program measures used to control the forming, bending, and aligning processes at TVA construction sites holding ASME Certificates of Authorization should be incorporated into the NCM. These measures should be similar in nature to those specified for welding, heat treating, and nondestructive examination. Refer to paragraph V.A.2.b.(2)(c) for details. (R)

3. Interface Controls

The area of interface controls appeared to be generally adequate to meet regulatory requirements and commitments with several exceptions as noted below.

a. R-81-14-OEDC(BLN)-13, Inadequacies of the ID-QAP's

There were several quality affecting interdivisional activities which were not adequately controlled by procedure. These activities included design changes, control of vendor manuals, constructability reviews, and operating procedure review.

Recommendation

OEDC should upgrade ID-QAP's to define organizational responsibilities and provide instructions for management's control over the following interdivisional quality-related activities.

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- (1) design changes
- (2) control of vendor manuals
- (3) design review from the constructability and operability standpoint
- (4) review of plant operating procedures by EN DES

Refer to paragraph V.A.3.a.(1) for details. (R)

b. R-81-14-OEDC(BLN)-14, DIS Implementation Concerns

The DIS was not being fully implemented due to the inability of EN DES and CONST to reach agreement on who was to supply certain inputs.

Recommendation

OEDC should establish EN DES and CONST interface responsibilities on DIS inputs and provide assurance that those responsibilities will be carried out. Refer to paragraph V.A.3.a.(2) for details. (R)

c. Extension of IQT Contracts

PURCH has the responsibility for resolving this concern. Refer to section IV.C of the PURCH report, R-81-15-PURCH(BLN)-03 (GNS 810908 051), for details. OEDC, however, needs to be aware of the outcome of this concern. Refer to paragraph V.A.3.a.(4) for details. (E)

Other interface concerns are discussed in detail in other report sections. Refer to the following sections. Deletion of Codes and Standards - V.A.2.a.(1)(a); Drawing Revisions for NCR's - V.B.6.b.(1)(b); Safety-Related Systems List - V.B.2.d; Vendor History - V.B.9.a; and NSSS Review of Design Criteria - V.B.2.e.

4. Training and Qualifications of Personnel

a. R-81-14-OEDC(BLN)-15, QA Auditor Training

A written approved program for the training of OEDC QA auditors had not been established.

Recommendation

OEDC QA should develop an administrative procedure delineating QA training requirements and provisions for management approval of the QA auditor training program. Refer to paragraph V.A.4.b for details. (E)

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b. R-81-14-OEDC(BLN)-16, QA Training Audits by OEDC

OEDC training audits appeared to be fairly comprehensive; however, resolution of deficiency No. 6, Audit Report M78-05 had been slow.

Recommendation

OEDC should effect timely resolution and keep NSRS informed to permit review of the training program it establishes. Refer to paragraph V.A.4.d for details.
(R)

B. Division of Engineering Design

1. Management Controls

For conclusions and recommendations in this area, see paragraph IV.A.1. of this report.

2. Design Process Controls

The area of design process controls was found to be inadequate to meet regulatory requirements as follows.

a. R-81-14-OEDC(BLN)-17, Program and Implementation Inadequacies of Engineering Procedures

The procedures that existed in EN DES during the review were not adequate to meet regulatory requirements, contained conflicting information, contained insufficient guidance to assure management that a quality design is obtained, and were not consistently implemented.

Recommendation

EN DES should undertake a major review of the EP's to: correct conflicting statements, inconsistencies, and overlaps, and provide further guidance to designers and reviewers. Refer to paragraph V.B.2.a for details.
(R)

b. R-81-14-OEDC(BLN)-18, Failure to Establish Detailed QA Policy

Detailed QA policy statements for the 18 criteria of Appendix B to 10CFR50 have not been established for EN DES.

Recommendation

EN DES should establish detailed QA policy statements. These statements should be placed in a central higher tier document similar to CONST QA Program Manual. Refer to paragraph V.B.2.b for details. (R)

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c. R-81-14-OEDC(BLN)-19, Management Responsibilities Not Clearly Defined

Responsibilities were not clearly, concisely defined in an EN DES document. A number of different documents all contained portions of these duties; however, the responsibilities were not well defined in a usable manner.

Recommendation

EN DES should place all management responsibilities dealing with the design, review, procurement, and quality assurance functions for nuclear power plants in a single source reference. Refer to paragraph V.B.2.c for details. (R)

d. R-81-14-OEDC(BLN)-20, Lack of Control of S-R Systems List

There did not appear to be one comprehensive, controlling list of safety-related systems and components covered by the QA program.

Recommendation

EN DES should establish a comprehensive, controlled list of all safety-related systems and components covered by the QA program and should establish provisions to ensure that this listing be kept up to date. Refer to paragraph V.B.2.d. for details. (R)

e. R-81-14-OEDC(BLN)-21, Lack of NSSS Vendor Review of Design Criteria

EN DES had not required nor implemented review of design criteria by the NSSS vendor for those safety systems which have major NSSS interfaces.

Recommendation

EN DES should revise the review program to require NSSS vendor review of design criteria. Refer to paragraph V.B.2.e for details. (R)

f. R-81-14-OEDC(BLN)-22, Lack of Review of Revisions to Design Criteria

EP 3.01 did not require that revisions to DIM's be given a review by the affected organizations.

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Recommendation

EN DES should revise EP 3.01 to require that all affected organizations review and approve DIM's. Refer to paragraph V.B.2.f. for details. (R)

g. R-81-14-OEDC(BLN)-23, Documentation of System Design Bases

There did not appear to be a viable method of documenting the design bases of safety-related systems over the plant life. Design criteria were not required to be updated to reflect changes at an operating plant, and FSAR descriptions were found to be incomplete and inadequate.

Recommendation

NSRS recommends that EN DES devise and implement a method of documenting the complete and up-to-date design bases for each safety-related system for the life of the nuclear plant. Refer to paragraph V.B.2.g for details.(R)

h. R-81-14-OEDC(BLN)-24, Lack of Verification of Structural Steel Loadings

EN DES had not established a program to verify the actual loadings on structural steel, such as in the reactor building at BLN.

Recommendation

EN DES should institute a program to verify that actual as-constructed structural steel loadings in safety-related buildings are within allowable tolerances. Refer to paragraph V.B.2.h for details. (R)

i. R-81-14-OEDC(BLN)-25, Lack of Approved Procedures for Certain Computer Programs

EN DES did not have approved QA procedures for the generation, control, and use of computer programs used for cable routing and termination.

Recommendation

EN DES should provide QA procedures for the cable routing and termination program including their generation, verification, and use. Refer to paragraph V.B.2.i for details. (R)

3. Design Changes

NSRS concluded that the design change program contained program and implementation deficiencies. The deficiencies

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resulted from failure to implement regulatory requirements and commitments and could lead to problems involving nuclear safety. Specific concerns identified in the design change program were as follows:

a. R-81-14-OEDC(BLN)-26, Inadequate Evaluation and Processing of Field Change Requests (FCR's)

The EN DES FCR process for control of design changes contained serious program and implementation deficiencies in the following areas.

- (1) The program failed to contain written procedures for delineation of organizational responsibilities and interface requirements for FCR processing.
- (2) EN DES approval was given prior to revision of all affected drawings and completion of an analysis to verify acceptance of design changes.
- (3) FCR's were not being processed within 30 days as specified by procedure.
- (4) Records of FCR reviews were not sufficient to demonstrate that the reviews had been performed.

Recommendation

The ID-QAP's should be expanded to cover FCR responsibilities. EN DES should review and revise EP's to ensure that the reviews called for can be done in the time provided and that adequate documentation of those reviews will be made. Tighter control of the implementation of FCR procedures is needed. Refer to paragraph V.B.3.a for details. (R)

b. R-81-14-OEDC(BLN)-27, Inadequate Evaluation and Processing of Engineering Change Notices (ECN's)

The EN DES ECN program for control of design changes contained program deficiencies in the following areas:

- (1) A written procedure for delineation of organizational responsibilities and interface requirements for ECN processing was not provided.
- (2) The ECN program did not require that the full safety consequences of changes be considered.
- (3) Records of ECN reviews were not sufficient to demonstrate the extent of the reviews.

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Recommendation

EN DES should review the program for ECN's, then revise procedures and train personnel to ensure that, as a minimum: responsibilities are defined, reviews are documented, and safety consequences of changes are evaluated. Refer to paragraph V.B.3.b for details. (R)

c. R-81-14-OEDC(BLN)-28, ECN S1, Change Program Deficiencies

The following deficiencies were identified in the ECN S1 program and its implementation.

- (1) EP 4.01 was not being followed and the system was being used to circumvent the formal ECN design change program.
- (2) EP 4.01 did not require that potential safety significance of the design change be determined.

Recommendation

The ECN S1 design change method should be discontinued at BLN because of the abuse of the procedure and the stage of construction. Refer to paragraph V.B.3.c for details. (R)

d. R-81-14-OEDC(BLN)-29, Inadequate Evaluation and Processing of Construction Change Notices (CCN's)

The EN DES CCN program contained deficiencies in the following areas:

- (1) Written procedures were not established delineating responsibilities and instructions for evaluation and processing of CCN's.
- (2) Records of CCN's were not sufficient to demonstrate that CCN reviews complied with QA programs.

Recommendation

Written procedures should be established to provide guidance for evaluation and processing of CCN's and address provisions to ensure that auditing of associated documentation is possible. Refer to paragraph V.B.3.d. for details. (R)

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e. R-81-14-OEDC(BLN)-30, Failure to Complete ECN's in a Timely Manner

EN DES design work had not been completed in a timely manner for an excessive number of ECN's.

Recommendation

EN DES should establish a program that provides for management review and approval of situations that result in cases where ECN's cannot be closed within a specified amount of time. Refer to paragraph V.B.3.e. for details. (E)

4. Configuration Control

NSRS concluded that the configuration control program that had been established was adequate to meet regulatory requirements and commitments with the following exception:

R-81-14-OEDC(BLN)-31, Failure to Input Complete Vendor Information Into the DIS

EN DES implementing procedures failed to fully enforce the ID-QAP requirement for inputting vendor drawing information into the DIS, so that some drawings which were a part of manuals were not entered into DIS.

Recommendation

EN DES should review and revise established written procedures to ensure that all vendor drawings used to perform work or to verify equipment configuration are included in the DIS. Refer to paragraph V.B.4.a for details. (R)

5. Quality Assurance

The EN DES internal audit function prior to reorganization in 1980 was largely ineffective. Significant progress has been made since the creation of QAB in increasing the effectiveness of the audit program.

EN DES QAB should continue to upgrade the audit program stressing (1) use of detailed, approved checklists, (2) inclusion of more technical depth in audits, and (3) assurance that staff resources are sufficient to carry out the program planned. In spite of the progress that has been made, the following problems still exist.

a. R-81-14-OEDC(BLN)-32, Inadequate Storage of Audit Support Records

Storage of audit support records was not in accordance with the requirements of ANSI N45.2.12 and ANSI N45.2.9 in that they were stored in non-fire-rated cabinets.

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Recommendation

Provisions should be made for protection of the records as required by the referenced standards. Refer to paragraph V.B.5.b.(1) for details. (R)

b. R-18-14-OEDC(BLN)-33, Staffing

More auditors are needed to increase scope and depth of audits.

Recommendation

EN DES should obtain additional auditors. Refer to paragraph V.B.5.b.(2) for details. (E)

c. R-81-14-OEDC(BLN)-34, Documentation of Responsibilities

No single procedure existed which delineated the responsibilities of the groups and individuals within QAB.

Recommendation

Define group and individual responsibilities within QAB in a single document to maximize interfacing within QAB and with other organizations. Refer to paragraph V.B.5.b.(3) for details. (E)

6. Corrective Action

The program for identification, evaluation, tracking, reporting, trending, and resolution of conditions adverse to quality appeared adequate to meet requirements and commitments with the exception of the following items:

a. R-81-14-OEDC(BLN)-35, Generation of NCR's

Based on the number and type of NCR's generated by BLP, it appears that there is a misunderstanding of the requirements of EP-1.26. The EP requires documentation of problems and then determination of whether a true nonconformance exists, and if so, its significance.

Recommendation

Management should take measures necessary to assure the requirements of EP-1.26 are understood and followed by all EN DES employees. Refer to paragraph V.B.6.b.(1)(a) for details. (E)

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b. R-81-14-OEDC(BLN)-36, Document Changes Resulting From NCR's

The procedures in EP 1.26 for dispositioning NCR's from the sites did not specify when drawing or other document changes are required or when they should be considered.

Recommendation

EP 1.26 should be revised to require consideration of whether document changes are required as a result of NCR's. Also, a statement should be required, pro or con, in dispositioning correspondence as to whether document changes are needed, and if so, who is responsible. Refer to paragraph V.B.6.b.(1)(b) for details. (E)

c. R-81-14-OEDC(BLN)-37, Definition of Significance

EP 1.26 contained an outdated definition of significance regarding conditions adverse to quality.

Recommendation

EP 1.26 should be revised to incorporate the definition of significance contained in the latest revision of QAI-4. Refer to paragraph V.B.6.b.(1)(d) for details. (E)

d. R-81-14-OEDC(BLN)-38, Commitments Tracking System

Increased emphasis had been placed on control and tracking of commitments made by TVA to the NRC. An investigation of the performance record in meeting previous commitments, on a sampling basis, had been initiated.

Recommendation

The results of the investigation should be evaluated very closely by management. Unless the results demonstrate a good record in meeting previous commitments, such as in plant SAR's, a program which will assure that they have been or will be met should be initiated. Refer to paragraph V.B.6.b.(3) for details. (E)

e. R-81-14-OEDC(BLN)-39, Trend Analysis Program Not Functional

As of the conclusion of the review, the EN DES trend analysis program was not yet functioning in accordance with FSAR commitments.

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Recommendation

Management should expedite implementation of the trend analysis program to fulfill commitments and provide a useful management tool. Additionally, the BLN FSAR description of who performs this trending function should be updated. Refer to paragraph V.B.6.b.(4)(a) for details. (R)

7. Training and Qualifications of Personnel

a. EN DES QA Training for Engineers and Designers

EN DES had not established nor fully implemented a QA training program for engineers and designers. This item was identified in paragraph IV.A.4.b.

b. R-81-14-OEDC(BLN)-40, EN DES Technical Training Programs for Engineers and Designers

Technical training requirements have not been established by EN DES to ensure that technical training will be conducted in the branches.

Recommendation

EN DES should evaluate technical training being conducted in the branches and should establish requirements at the division level to ensure technical training will be conducted in the EN DES branches. Refer to paragraph V.B.7.b for details. (E)

c. R-81-14-OEDC(BLN)-41, QAB Auditor Training

A written approval program for the training of auditors had not been established.

Recommendation

QAB should develop an administrative procedure delineating QA training requirements and provisions for management approval of QA auditor training programs. Refer to paragraph V.B.7.c for details. (E)

8. Records and Document Control

The EN DES program for records and document control appeared adequate to meet requirements and commitments with the following exceptions:

a. R-81-14-OEDC(BLN)-42, Improper Storage of QA Records

Codes and standards to which TVA plants are designed and constructed were stored in open shelves in the TIC, contrary to ANSI N45.2.9. Additionally, "Backfile"

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documents, which may be one-of-a-kind records, were being similarly stored in MEDS.

Recommendation

Provide protective or alternate storage location measures as required by ANSI N45.2.9 for the records discussed above. Additionally, assure that records stored in other temporary or permanent locations are adequately protected. Refer to paragraphs V.B.8.a and .b for details. (R)

b. R-81-14-OEDC(BLN)-43, MEDS Handbook Approval Documentation

The review and approval cycle for the MEDS Handbook had not been documented, contrary to EP 1.28 and Criterion V of Appendix B to 10CFR50.

Recommendation

Document the review and approval cycle for the Handbook, preferably in or on the document itself. Refer to paragraph V.B.8.c for details. (R)

c. R-81-14-OEDC(BLN)-44, General Construction Specification Not Revised Per Procedure

Two specification revision notices had not been incorporated into G-53 within 90 days as required by EP 3.04.

Recommendation

Revise G-53 as required and assure that other specification revision notices have been incorporated into the appropriate General Construction Specifications within the time frame of EP 3.04. Refer to paragraph V.B.8.d for details. (R)

9. Procurement

A program for procurement was in place and was adequately implemented. The program appeared to meet regulatory requirements and TVA commitments adequately except as follows:

a. R-81-14-OEDC(BLN)-45, Lack of Vendor History Program

Neither EN DES nor PURCH had a comprehensive program to determine whether a prospective contractor had previous TVA contracts, in spite of a commitment in the FSAR to use such information.

Recommendation

NSRS recommends that TVA set up a program to record and retrieve information on its past contracts, both QA and

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non-QA, for the benefit of bid evaluators. Refer to paragraph V.B.9.a for details. (R)

b. R-81-14-OEDC(BLN)-46, Inadequate Bid Evaluation Procedure

The EN DES procedure for evaluating bids, EP 5.01, uses "as required" and "at its option" phrases to avoid making specific requirements and does not furnish detailed guidance for bid evaluation.

Recommendation

NSRS recommends specific and detailed instructions be provided and, also, the conditions under which optional methods of evaluation should be used. Refer to paragraph V.B.9.b for details. (R)

c. R-81-14-OEDC(BLN)-47, Inadequate Requirements for Purchase Requisition Review

EP 5.01 did not impose sufficient review requirements on requisitions to ensure the functions of interface review and special expertise review are accomplished.

Recommendation

NSRS recommends EP 5.01 be changed to require these reviews in those cases where they apply. Refer to paragraph V.B.9.c for details. (R)

d. R-81-14-OEDC(BLN)-48, Contracts Were Not Receiving Required QA Review

EN DES reviews of procurement documents do not extend beyond the requisition, in spite of the fact that the requisition is only an input document to PURCH. The actual work by TVA contractors is done to contracts, which typically begin as invitations to bid generated by PURCH, and are not required by EP's to be reviewed by EN DES.

Recommendation

NSRS recommends that OEDC develop a procedure whereby actual contracts, not just requisitions, are reviewed before work is done using them. Refer to paragraph V.B.9.d for details. (E)

IV.B.10

10. ASME Section III QA Program

a. Inadequate Maintenance of NCM Content

NEB-CSM has not adequately maintained the CSM as required. For further details on conclusions and recommendations, see IV.A.2.b.(2).

b. R-81-14-OEDC(BLN)-49, CSM Review of QA Code-Related Audit Findings

CSM does not perform an ongoing review of OEDC QA, EN DES QAB, and CONST QAB audit findings to detect potential Code-related concerns involving implementation or interpretation problems.

Recommendation

OEDC QA, EN DES QAB, and CONST QAB audit report distribution lists should be revised to reflect report transmittals to CSM are required when findings related to Code activities are contained therein. A similar revision should also be considered to NCR forms. Refer to paragraph V.B.10.b.(2) for details. (E)

c. R-81-14-OEDC(BLN)-50, Incorrect References Made In BLN Construction Specification

References contained within BLN construction specification N4M-870 assigned an improper revision level to design specifications detailing the complete basis for construction of ASME Code Class 1, 2, and 3 piping systems and made a Code edition commitment for ASME Section IX which should not have been made.

Recommendation

(1) Construction Specification N4M-870 should be revised to:

(a) Indicate the proper revision level of Design Specifications BNP-DS-1935-2856, -2857, and -2858.

(b) Delete its Section IX commitment to the 1974 edition of ASME Code.

(2) Review and revise all other documents which may contain the stated conflicts.

Refer to paragraph V.B.10.b.(3) for details. (R)

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c. R-81-14-OEDC(BLN)-51, Waiving Source Inspection

The NCM presently allows TVA inspectors the authority to release for shipment TVA procured materials, parts, appurtenances, and components from vendor facilities without providing a source inspection as required by contract provisions.

Recommendation

Apply the corrective action taken in response to EN DES internal audit 80-4, finding No. 2, to NCM section 3.5. Refer to paragraph V.B.10.b.(4) for details. (E)

11. Special Process Controls

a. R-81-14-OEDC(BLN)-52, General Review and Revision of G-29 Required

G-29 had grown to be too all encompassing to be used effectively to perform fabrication, welding, and examination operations.

Recommendation

A general review and revision of G-29 is considered necessary to:

- (1) Pare down the size of G-29M by incorporating the numerous addenda throughout.
- (2) Categorize general welding requirements in G-29C for structures, systems, or components for easy access by CONST.
- (3) Eliminate conflicts found between the G-29M general index to corresponding welding procedures and process specification to code and standard requirements.
- (4) Revise and compartmentalize or index individual G-29M processes to show applicable requirements for vintage or class of plant.

Refer to paragraph V.B.11.a for details. (E)

b. R-81-14-OEDC(BLN)-53, QA Approval Required for G-29M

G-29M fabrication process procedures are not reviewed by a QA organization for conformance to ASME Code requirements as required by ASME Section III.

Recommendation

OEDC should evaluate which QA organization it considers best suited to concur in either the entire G-29M manual

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or each individual process specification prior to use and they should then do those reviews. Refer to paragraph V.B.11.b for details. (R)

C. Division of Construction

1. Management Controls

For conclusions and recommendations in this area see, paragraph IV.A.1 of this report.

2. Construction Processes

The area of construction processes appeared adequate to meet regulatory requirements except as designated below. In addition, several areas were identified for which enhancements may improve management's control in the area.

a. R-81-14-OEDC(BLN)54, Lack of Initial Work Control Planning

BLN CONST had not established a comprehensive and written program to plan and control construction activities up to a QC holdpoint or a major problem.

Recommendation

BLN CONST should establish an administrative control program to ensure that construction activities are adequately planned and controlled, similar to CONST CEP 5.04, "Work Packages," in use at other sites. Refer to paragraph V.C.2.a for details. (R)

b. R-81-14-OEDC(BLN)-55, Inadequacies in BLN QCP's

Several program and implementation inadequacies were identified in the QCP's as follows: minor changes were not required to be incorporated into the QCP's within a specific time period, a matrix of documents referenced in QCP's was not provided, uncontrolled copies of QCP's were in use, there was a problem with the tracking of FCR's, inspection checklists were not required, and some safety-related activities were not covered in a QCP.

Recommendation

BLN CONST should review and revise the QCP's and indoctrinate personnel to ensure that, at a minimum, the above described inadequacies are corrected. Refer to paragraph V.C.2.b for details. Also refer to paragraphs V.C.8.b, V.C.8.c and V.C.8.d for related concerns. (R)

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c. R-81-14-OEDC(BLN)-56, Potential for Undetected Faulty Structural Steel Welds

There is a potential for faulty structural steel welds on Category I structures to go undetected. This is caused by the current practice of grinding welds smooth prior to weld inspection. This practice could mask weld defects and prevents inspection of the weld in the most informative condition.

Recommendation

BLN CONST should review the current practice of grinding welds smooth and should establish inspection requirements to ensure that welds are inspected in the most informative condition. Refer to paragraph V.C.2.c for details. (E)

d. R-81-14-OEDC(BLN)-57, Inadequate Interfacing Between BLN Organizational Units

A number of specific problems were identified during the review including a necked-down pipe that was not in conformance, concrete pours with various omissions, and hanger installations with interferences. These problems, as well as the lack of the construction superintendent's organization input to QCP's, FCP's, and SOP's, indicate interface problems between organizational units.

Recommendation

CONST should take the following steps to correct the above problems.

- (1) An engineering unit should be given overall responsibility to assure that all aspects of a job are correctly completed.
- (2) A more complete checklist for concrete pours should be developed and implemented before pours begin.
- (3) The use of area planners should be considered to reduce hanger interferences with field routed components.
- (4) The construction superintendent's organization should be given the opportunity to supply input to the QCP's, FCP's, and SOP's.

Refer to paragraph V.C.2.d for details. (E)

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- e. R-81-14-OEDC(BLN)-58, Need for Seismic Analysis of Hangers and Supports on Systems Other Than Piping

IEB 79-14 pointed out that existing configuration controls on seismic pipe hangers were ineffective. The generic aspects of IEB 79-14 appeared to have been overlooked in that only hangers and supports for piping systems were receiving special attention. Additional review will be required by NSRS to determine whether as-constructed seismic analysis is being accomplished on systems such as cable trays and electrical conduits. Refer to paragraph V.C.2.e for details.

3. Design Changes

The programs established by CONST for control of design changes and modification work were reviewed to ensure adequacy and implementation. Based on this review, NSRS concluded that the design change program established by CONST is adequate with certain weaknesses identified as follows:

- a. R-81-14-OEDC(BLN)-59, Need to Supply Additional Information in Work Plan Package

The typical work plan package did not contain the following types of information:

- (1) Explanation of any remaining work required to complete an item.
- (2) Specific list of the FCC drawings revised.
- (3) Provisions for the generation of an FCR, if required.
- (4) Generation of a "fire hazard evaluation" for the modification work.

Recommendation

CONST should incorporate the above information into the work plan forms. Refer to paragraph V.C.3.a for details.
(E)

- b. R-81-14-OEDC(BLN)-60, Failure to Provide Guidance to Determine Safety-Related and Seismically Qualified Equipment During CCN Processing

The site procedures fail to address the mechanism for determining what systems and structures are excluded (i.e., safety related, seismically qualified systems, components, or structures) from the CCN process.

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Recommendation

CONST should establish and implement a mechanism for identifying safety related/seismically qualified equipment to be excluded from the CCN change process. Corrective action should also include issuing a FCR or NCR, as required, to replace CCN's written to change safety-related/seismically qualified systems, components, or structures. Refer to paragraph V.C.3.b for details. (R)

4. Configuration Control

NSRS concluded that the configuration control program that has been established by CONST is adequate to meet regulatory requirements and commitments with two exceptions.

- a. R-81-14-OEDC(BLN)-61, Lack of DIS Capability to Provide List of Latest Revision of As-Constructed Drawings

The responsible engineering units at BLN are not providing DIS input as required by BLN procedure. As a result, the list of latest revisions of as-constructed drawings is not being provided.

Recommendation

Implement the requirements of site procedures to ensure that the DIS provides the plant as-constructed configuration. Refer to paragraph V.C.4.a for details. (R)

- b. R-81-14-OEDC(BLN)-62, Inadequate Document Control for Electrical Cable Installation Slips

Cable installation slips were not included in procedures for configuration control even though they carry information necessary to build and maintain the plant.

Recommendation

CONST should amend the procedures for cable installation slips to ensure that they receive configuration control as required by ID-QAP 6.1 similar to the drawings they supplement and amplify. Refer to paragraph V.C.4 b for details. (R)

5. Quality Assurance

The written audit program for BLN appeared to be well defined. The scope and depth of audits appeared to adequately meet requirements and commitments. Specific problems observed in the program and its implementation were as follows:

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a. R-81-14-OEDC(BLN)-63, Inadequate Storage of QA Audit Records

Audit support records were not being stored in accordance with the requirements of ANSI N45.2.12 and ANSI N45.2.9 in that they were stored in non-fire-rated cabinets.

Recommendation

Provisions should be made for protection of the records as required by the referenced standards. Refer to paragraph V.C.5.a.(1) for details. (R)

b. R-81-14-OEDC(BLN)-64, Documentation of Corrective Actions Taken

The audited organization is not requested by QAU to respond in writing to all audit findings. Unless the audited organization's procedures require documentation of corrective action actually taken, the documentation may not be accomplished.

Recommendation

Evaluate this matter to assure that documentation of corrective actions taken in response to audit findings will always be accomplished. Refer to paragraph V.C.5.a.(2) for details. (R)

c. R-81-14-OEDC(BLN)-65, Improper Closeout of Deficiencies

Two instances were observed where audit deficiencies were apparently closed without having confirmed that corrective actions, as previously agreed to, had been completed.

Recommendation

Reemphasize the necessity for assuring that adequate corrective action has been completed prior to closure of audit deficiencies. Refer to paragraph V.C.5.a.(3) for details. (R)

The QAU role in review of site standard operating procedures and quality control procedures appears to have been fulfilled as required by the program.

6. Corrective Action

The CONST and BLN corrective action program is adequate to meet requirements and commitments except for the following items:

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a. R-81-14-OEDC(BLN)-66, Definition of Significance

CONST and BLN procedures dealing with conditions adverse to quality contain an outdated definition of significance.

Recommendation

CONST-QAP 15.1 and BNP-QCP's 10.4 and 10.26 should be revised to utilize the definition of significance, including examples, provided in the latest revision of QAI-4. Refer to paragraph V.C.6.b.(1)(a) for details. (E)

b. R-81-14-OEDC(BLN)-67, Independent Review of QCIR's

QCIR's generated at BLN do not receive an independent review as required by QAI-4.

Recommendation

Revise procedures to provide for an independent review of QCIR's as required by QAI-4. Refer to paragraph V.C.6.b.(1)(b) for details. (R)

c. R-81-14-OEDC(BLN)-68, Program Information Notices System (PIN)

Information previously disseminated by the PIN system consisted primarily of NRC-related items, such as NRC findings and TVA responses. Other sources of information, such as OEDC QA audit findings, were not being disseminated.

Recommendation

The usefulness of the PIN system should be increased by using it to disseminate potentially generic information from other sources, such as OEDC QA findings. Refer to paragraph V.C.6.b.(2) for details. (E)

d. R-81-14-OEDC(BLN)-69, Input Data for Trend Analysis Program

Project management at BLN felt that the trend analysis program products were of questionable value in that the encoding process was subjective.

Recommendation

The BNP-QCP's governing generation of QCIR's and NCR's should be revised to emphasize recording information as to the cause of problems. At present, this information is required only for significant NCR's. Refer to paragraph V.C.6.b.(4)(a) for details. (E)

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e. R-81-14-OEDC(BLN)-70, Incorporation of Experience into Training

BLN apparently has no formal mechanism for incorporating adverse experiences or trends revealed into the site training program.

Recommendation

Trend analysis results should be factored into the site training program, thereby providing a more useful management tool. Refer to paragraph V.C.6.b.(4)(b) for details. (E)

f. R-81-14-OEDC(BLN)-71, Identification of Generic Problems

The corrective action system did not appear to be effective in identifying and acting upon continual problems of a similar nature when those problems were individually categorized as nonsignificant.

Recommendation

Management should evaluate the corrective action system to assure it is capable of identifying and correcting continual problems. Refer to paragraph V.C.6.b.(4)(c) for details. (E)

7. Training and Qualifications of Personnel

The CONST and BLN training and qualification program is adequate to meet requirements and commitments except for the following items.

a. R-81-14-OEDC(BLN)-72, Craft Supervision QA Training

Evaluations to determine the effectiveness of craft supervision QA training were not being performed as recommended in BNP-QCP-10.30.

Recommendation

CONST should establish requirements as opposed to recommended actions for the evaluation of the effectiveness of QA training. Refer to paragraph V.C.7.a for details. (E)

b. R-81-14-OEDC(BLN)-73, Craftsman QA Training

A program was not established to train journeyman craftsman involved in quality-related work in QCP's and the details of other aspects of the QA program.

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Recommendation

CONST should develop a written program which assigns responsibilities and specific training and retraining requirements for journeyman craftsman QA training. Refer to paragraph V.C.7.b for details. See also V.C.13.d.(3). (R)

c. R-81-14-OEDC(BLN)-74, Apprentice Training

Administrative controls had not been established at BLN to ensure that the apprentice program will be carried out under management's control.

Recommendation

CONST should establish administrative procedures delineating training requirements, specific responsibilities, and how the program is to function. Refer to paragraph V.C.7.c for details. (E)

d. R-81-14-OEDC(BLN)-75, Craft Skills

CONST management had not established a program to ensure that craftsmen obtained from the union hall possess the required skills of the craft. This does not apply to craftsmen performing special processes such as welding.

Recommendation

CONST should develop a program to assure management that journeyman craftsmen who perform quality-related activities obtained from the union halls do possess the required skills. Refer to paragraph V.C.7.d for details. (E)

8. Records and Document Control

The BLN records and document control program was sufficient to meet requirements and commitments with the following exceptions.

a. R-81-14-OEDC(BLN)-76, Records Vault Fire Suppression System

The weekly checklist for the records vault Halon system did not provide a minimum acceptable cylinder pressure. Also, the cylinder pressure gauge was not graduated in increments suitable for the permissible temperature range.

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Recommendation

The checklist should be revised to provide for determination of cylinder pressure and its acceptability. Also, adequacy of the cylinder pressure gauge should be evaluated. Refer to paragraph V.C.8.a for details. (R)

b. R-81-14-OEDC(BLN)-77, Revisions to QCP's and SOP's

There was no requirement for incorporating addenda and errata into QCP's and SOP's within a certain time-frame. Also, in that these changes are "pen-and-ink" type, there was no assurance that users would be aware of changes made in this manner.

Recommendation

A time limit should be established within which changes per errata and addenda are physically incorporated into the QCP's and SOP's by revision of the base document. Refer to paragraph V.C.8.b for details. (E)

c. R-81-14-OEDC(BLN)-78, Lack of Reference Revision Levels in QCP's

The majority of QCP's reviewed contained references but did not specify revision levels of the references in either the references section or text of the QCP. The impact of a change to a QCP or reference on other procedures is difficult to assess under this program.

Recommendation

A matrix listing each QCP and the references contained in it should be developed such that changes in one document can be readily assessed in terms of impact on other documents. Refer to paragraph V.C.8.c for details. (E)

d. R-81-14-OEDC(BLN)-79, Use of Uncontrolled Copies of QCP's

Craft foremen possessed, and apparently used, QCP's which were uncontrolled, thus potentially out of date. This creates the potential for the worker's and foreman's initial inspections of work to be ineffective and for the product not to meet the revised QCP inspection requirements.

Recommendation

In that the crafts need to be aware of inspection requirements of QCP's which their work must meet,

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controlled copies of QCP's should be made available for the crafts and their use of them assured. Refer to paragraph V.C.8.d for details. (E)

e. R-81-14-OEDC(BLN)-80, Controls Over and Use of SOP's and FCP's

No formal controls for generation and use of SOP's and FCP's were identified during the review. These procedures prescribe activities affecting quality; thus, controls are required.

Recommendation

Management should evaluate the use of SOP's and FCP's. If they prescribe activities affecting quality and such instruction are not contained in QCP's or higher tier documents, formal control systems for their development, use, and maintenance should be instituted. Refer to paragraph V.C.8.e for details. (R)

9. Procurement

A program for procurement was in place and was adequately implemented. Those people involved with the program had an adequate understanding of their responsibilities. No specific adverse findings or recommendations resulted from review of this program.

10. Equipment and Facilities Control

The area of equipment and facilities control appears adequate to meet regulatory requirements with the exceptions listed below. NSRS noted that the warehouse operation appeared to be well run.

a. R-18-14-OEDC(BLN)-81, Post-Installation Equipment Protection

The area of equipment and facilities controls appeared to meet regulatory requirements with the exception that there was no requirement for conducting inspections to determine if adequate protective measures were required or had been implemented before adjacent construction activities were begun.

Recommendation

CONST should devise and implement inspection requirements to ensure adequate protection of installed equipment from adjacent construction activities. Refer to paragraph V.C.10.a for details. (R)

11. Scheduling of Construction Activities

NSRS concludes that the program for scheduling activities is adequate to ensure that tasks and resources will be effectively scheduled. Additional review will be required by NSRS to determine if schedule pressure is sufficient to contribute to poor quality work. Refer to paragraph V.C.11 for details.

12. ASME Section III QA Program

a. Inadequate Implementation of NCM OEDC Requirements

Specific controls detailed in the NCM OEDC policy statements were found not implemented by CONST. For further details on conclusions and recommendations see IV.A.2.b.(1).

b. R-81-14-OEDC(BLN)-82, Segregation of Rod Shack Nonconforming Weld Filler Materials

Nonconforming weld filler materials stored in BLN rod shacks issued for pickup by the weld test shop were not adequately controlled or identified.

Recommendation

Instructions should be provided in the NCM and BLN QCP's to control and identify nonconforming materials to be maintained within rod issue control centers to prevent their inadvertent use. Refer to paragraph V.C.12.b.(2) for details. (R)

c. R-81-14-OEDC(BLN)-83, Inadequate Traceability Controls of Fabrication/Examination Processes

APC cards and BLN QCP's do not provide all reference document information to which the process used conforms.

Recommendation

Identify on APC cards the applicable addenda of the BLN QCP used and the particular G-29 process specification, including revisions and addenda. Refer to paragraph V.C.12.b.(3) for details. (R)

d. R-81-14-OEDC(BLN)-84, Definition of Periodic Calibration Check/Surveillance Interval Frequencies

Monthly calibration checks of welding rod oven thermometers were found performed in excess of a month's equivalent of 31 days.

Recommendation

Since BLN interprets "monthly" contrary to standard technical specification guidance, definition of the terms "weekly," "monthly," etc., should be provided. Refer to paragraph V.C.12.b.(4) for details. (E)

e. R-81-14-OEDC(BLN)-85, Record File Indexing Conflict

BLN's record storage control system is indexed contrary to the guidance provided in NCM section 9.1.

Recommendation

BLN should evaluate conversion from their 31-category system to the 4-category system discussed in NCM section 9.1. Should BLN desire exemption from this requirement, it should be documented in the NCM section. Refer to paragraph V.C.12.b.(5) for details. (R)

13. Special Process Controlsa. R-81-14-OEDC(BLN)-86, Revision to Welder Certification Retest Criteria

The present two-hour wait period criteria imposed on welders who fail to meet requirements of a performance qualification test and are supposed to be utilizing this time for additional practice or training before making another certification attempt, is considered an ineffective retraining control.

Recommendation

P.S. 1.M.2.2.(b) should be revised to require more positive controls in ensuring welders have received additional training or practice prior to subsequent retest attempts following the failure of a welder to meet the requirements of a performance qualification test. Such a control would be to provide for a maximum number of retest attempts which a welder can make before a predetermined mandatory wait period for additional training or practice is imposed. Positive proof that the welder had undergone the additional training or practice should be submitted to the weld test shop supervisor prior to the retest attempt being made. Refer to paragraph V.C.13.d.(1) for details. (E)

b. R-81-14-OEDC(BLN)-87, Inadequate Welder Recertification Controls

BLN's filler metal requisition system for verifying a welder has used a particular process for recertification is considered questionable.

Recommendation

A positive means of verifying welder usage of a process, such as observation and documentation by welding inspection, should be instituted at BLN. Refer to paragraph V.C.13.d.(2) for details. (E)

c. R-81-14-OEDC(BLN)-88, Inadequate QA/QC Training Provided to Welders

Welders are relying on the welding inspectors to provide them with the necessary QA/QC information to perform their activity correctly.

Recommendation

An ongoing training session/discussion should be instituted to continuously emphasize to the craft their role in meeting QA/QC requirements and that the inspector is only assuring that these requirements are being met. This training session/discussion should be accomplished by craft supervision prior to performance of each production job. Refer to paragraph V.C.13.d.(3) for details. (E)

d. R-81-14-OEDC(BLN)-89, Inadequate Maintenance of NDE Certification Records

Qualification summaries detailing the examiners' educational/work time experience and eye examinations were either missing, not maintained, or not being updated.

Recommendation

BLN should evaluate measures to ensure qualification records for its NDE examiners are maintained complete and current. Refer to paragraph V.C.13.e.(1) for details. (R)

V. DETAILS

Prior to the review, NSRS held a briefing on April 15, 1981 for OEDC management to apprise them of the intent and scope of the management review. Subsequent to that briefing, field work was conducted during the weeks of May 4 and 11 at the OEDC offices in Knoxville and May 26, June 8, and June 15 at the BLN construction site. Additional field work was conducted at the OEDC Knoxville offices subsequent to the scheduled field work, terminating on July 16.

During the course of the review, NSRS conducted several meetings to keep OEDC management apprised of our findings. Meetings were held on May 15 and July 17 at the Knoxville offices and June 12 and 19 at the BLN construction site.

Prior to beginning the review, an in-office review was conducted of the programs for controlling activities in the functional areas described in the following paragraphs. The TVA written programs were reviewed and compared against the applicable regulatory requirements, commitments, and good operating practice.

The field portion of the review was conducted to discuss the programs with persons at all organizational levels to determine whether they were aware of their responsibilities and to determine whether the programs were being implemented. Program implementation was also determined by review of records and observation of activities. The most effective method is observation, however, the use of this method during the review was extremely limited. It was used to some extent in the review of the construction processes and facility controls. All other methods described above were used to varying degrees.

The details of the functional area review and resulting findings are described in the following paragraphs.

A. OEDC

1. Management Controls

The OEDC quality assurance program for BLN, which is described in chapter 17 of the FSAR, had been established to meet the 10CFR50, Appendix B requirements. The management control programs that were established to meet these requirements were reviewed during this review as discussed in the various functional areas of the review. In addition to reviewing these management control programs, NSRS conducted interviews with managers at all levels of the organization to determine whether special management control programs had been established and directed toward improving regulatory performance or reducing the numbers of adverse quality indicators. Specifically, the reviewers attempted to ascertain whether:

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- specific quality goals and objectives had been established.
- implementation plans had been developed to achieve the goals and objectives.
- a mechanism had been established to evaluate and measure goal and objective attainment.
- a feedback mechanism had been established to apprise management of goal attainment.
- personnel accountability policies had been established for attainment of quality goals.

Managers were also interviewed to ascertain whether:

- they had a clear understanding of their responsibilities.
- they perceived their authority to be sufficient to carry out their responsibilities.
- they perceived their resources adequate to carry out their responsibilities.
- they have established adequate mechanisms to ensure that information is transmitted to and from subordinates on a timely basis.
- they have established mechanisms to ensure themselves that subordinates are performing their assigned functions in a quality manner.

It should be noted that very little guidance has been provided in the standards and NRC requirements on "how to manage" design and construction activities; therefore, NSRS's acceptance criteria for this area is based on what NSRS believes to be accepted practices and sound principles of management of quality. (See Appendix B Management Evaluation Tree).

The following findings include the combined results of the review for the OEDC management staff, the Division of Construction, and the Division of Engineering Design:

a. R-81-14-OEDC(BLN)-1, Quality Goals and Objectives

OEDC management had not developed or implemented a written program consisting of specific quality oriented goals, management's expectation for achievement, implementation plans for achievement, mechanisms to evaluate and measure goal attainment, and a feedback mechanism to apprise management of goal attainment and uniform personnel accountability policies for goal attainment.

There was evidence that quality goals were established at the M-7 level and below; however, it was not apparent that these goals were attainable or commensurate with the expectations of OEDC management. For example, CONST had verbally established the goal of "zero defects" while the BLN craft management had established the goal of decreasing the number of QCIR's.

Feedback networks (trending programs) had been or were being established by EN DES and CONST, however, instructions had not been issued delineating how management expected them to be used. The EN DES trending program had not yet been fully implemented and there was doubt in the minds of BLN CONST management as to the viability of the trend reports issued by the QAU. (See paragraphs V.B.6.b(4)(a) and V.C.6.b(4)(a).

NSRS concludes that based on the results contained in this report, recent NRC evaluations of TVA's QA programs, and TVA's regulatory and quality performance records that additional OEDC management attention should be concentrated on establishment of a program which would systematically put management attention toward the attainment of quality goals. The program should include: OEDC management's goals, objectives, and expectations; an implementation plan for achievements of the goals and objectives; accurate quality measurement systems; management feedback networks; and uniform personnel accountability policies. NSRS cautions that care must be exercised in establishment of such a program to avoid encouraging employees not to report conditions adverse to quality.

b. EN DES and CONST Resources

Managers indicated that obtaining qualified personnel from outside of TVA, particularly in the engineering and quality control areas, was a problem. The consensus of personnel interviewed indicated the problem was due to the difficulty in obtaining qualified manpower from the nuclear industry under TVA's present rate structure as opposed to specific TVA budget restrictions. OEDC management had resorted to alternate measures to assist in resolving the problem in the short term, such as the

use of overtime, establishing priorities, and hiring of job shoppers.

c. Management Responsibilities and Authorities

Managers were generally aware of their responsibilities and in all cases except one felt that they had sufficient authority to carry out their responsibilities. The one exception felt that a manager's authority was undermined by "too many disinterested groups" within TVA becoming involved in the decision making process.

2. Quality Assurance

a. Audit/Overview Program

Criterion II of Appendix B to 10CFR50 requires the owners of nuclear power plants to establish at the earliest practical time, consistent with the schedule for design, construction, and operation of plants, a QA program which complies with the requirements of Appendix B. Criterion I of Appendix B requires the authority and duties of persons and organizations performing activities affecting the safety-related functions of structures, systems, and components to be clearly established and delineated in writing. These activities include both the performing function of attaining quality objectives and the QA functions. The QA functions are those of (a) assuring that an appropriate QA program is established and effectively executed and (b) verifying, such as by checking, auditing, and inspection, that activities affecting the safety-related functions have been correctly performed. The persons and organizations performing QA functions shall have sufficient authority and organizational freedom to identify quality problems; to initiate, recommend, or provide solutions; and to verify implementation of solutions. Such persons and organizations performing quality assurance functions shall report to a management level such that this required authority and organizational freedom, including sufficient independence from cost and schedule when opposed to safety conditions, are provided.

As directed by the Manager of OEDC in his QA policy statement OEDC-QPM-6-79, the Managers of EN DES and CONST have been assigned the responsibility of organizing and directing the QA programs for their respective division. The OEDC QA manager has the responsibility of establishing basic QA program policies and requirements, providing guidance, and overseeing the divisions' programs. These OEDC QA responsibilities were the focus of this facet of the review.

The NSRS review consisted of a review of the documents listed in section VII.A.2 of the report and discussions with OEDC QA personnel. The procedures were compared to base requirements, such as 10CFR50, Appendix B, Criterion I, II, and XVIII and ANSI N45.2.12-1974, "Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants." The procedures were discussed as required to assure the reviewer's understanding of them was correct and to provide comments on them. Additionally, documents such as audit reports and associated records were reviewed to ascertain the status and adequacy of implementation of selected procedures.

The following paragraphs further define the review process, describe methods used by OEDC QA to accomplish its major functions, and discuss problems and weaknesses observed.

(1) Establishing Requirements and Providing Guidance

The prime vehicle for establishing requirements by OEDC QA is the OEDC PRM. Its contents include policy statements, quality administrative instructions, and definitions of commitments to the industry and regulatory standards, such as NRC regulatory guides and associated ANSI standards. Also, it contains in table 3 a listing of responsibilities within OEDC for development and execution of the various portions of the QA program.

The TVA IPM is also maintained by OEDC QA. It contains interdivisional quality assurance procedures (ID-QAP) for selected functions affecting the quality of nuclear plants. These procedures delineate the authorities and responsibilities of the organizations involved in the functions covered. The IPM also contains interdivisional agreements, which are management agreements on selected activities.

The OEDC QA Manager is a member of the TVA Quality Assurance Steering Committee. This committee was chartered to assure uniform interpretation and application of the quality assurance policies of TVA and requirements established by regulations, codes, and standards. The committee includes representation from OEDC, POWER, CONST, EN DES, NUC PR, and other TVA divisions. Minutes of meetings held on October 26, 1979; December 21, 1979; and September 23, 1980 were reviewed. It does not appear that meetings are being held at least every six months as stated in the charter. Based on review of the minutes and discussions

concerning the functions of the committee, positive impacts by it relative to its stated purposes were not readily evident.

Based on the review of documents referenced and discussions with OEDC QA personnel, NSRS concludes that a more aggressive effort is needed to define, and maintain the definition, of requirements and commitments which the OEDC QA program is to meet. Specific problems and weaknesses which led to this conclusion are as follows:

(a) R-81-14-OEDC(BLN)-2, Codes and Standards

Tables 1 and 2 of the PRM were designed to provide a composite listing of the codes and standards to which the plants are designed and constructed (see MEB 780915 381). Earlier this year when it was found that the tables were out of date (OEDC QA audit report M81-03) they were deleted rather than updated.

Without such guidance, the decisions as to which codes and standards apply to a give plant appear to be left to the divisions by default. This does not conform to the requirements of the PRM, which states that such decisions are the responsibility of OEDC QA (OEDC-QPM-6-79).

It should be noted that these codes and standards are required to be identified and retained per ANSI N45.2.9.

(b) R-81-14-OEDC(BLN)-3, Regulatory Guides/ Standards

The commitments section of the PRM, which presently covers the OEDC commitment to the ANSI N45.2 series and their accompanying RG's states that ". . . work will continue on developing current commitment sheets for all other quality-related standards and as they are issued they will be included in or referenced in a future revision of the PRM." This statement was made in January 1978. No activity regarding review of other standards is evident--certainly no standards other than the N45.2 series are addressed in that section of the PRM.

EN DES EP 2.08 also discusses generation of RG conformance sheets. It states that newly issued RG's should be reviewed and OEDC conformance established within 45 days of

issuance. The review of a controlled set of RG's within EN DES indicated again that no conformance sheets have been developed for RG's and revisions issued after January 1978.

(c) R-81-14-OEDC(BLN)-4, TVA/OEDC QA Manual Reviews

Page two of the Introduction and Scope of the PRM contains a requirement for review of the manual every six months. As noted in an OEDC QA audit earlier this year, this was not being accomplished.

The Manager's Office QA Manual and Inter-divisional QA Manual, both of which are maintained by OEDC QA, do not contain provisions for periodic review to assure continued conformance with requirements, guidance, etc. Additionally, MO-QAP's 2.1, 2.2, and 2.3, which deal with maintenance of the PRM, MOM, and IPM, do not address the issue of periodic review.

(d) R-81-14-OEDC(BLN)-5, Temporary Storage of QA Records

As discussed in other sections of the report, the review disclosed that temporary storage of QA records was not being accomplished in accordance with ANSI N45.2.9-1974 as committed. The records involved certain of those maintained by OEDC QA, EN DES QAB, BLN QAU, MEDS, and the OEDC TIC. ID-QAP 17.2, which should provide requirements for OEDC and the divisions in this area, does not specify that temporary storage conditions must meet ANSI N45.2.9 provisions. Rather, it permits each organization responsible for temporary storage of records to specify the type of storage facility to be used (step 2.2.6). This does not conform to revision 7 of PRM table 3, page 27, which states that OEDC QA will establish requirements for maintenance of QA records.

(e) R-81-14-OEDC(BLN)-6, Safety Analysis Reports

Page 30 of Table 3 of the PRM states that OEDC QA will coordinate and approve the OEDC QA program description for inclusion in the SAR. During the review, numerous examples of incorrect and out-of-date information contained in section 17.1A of the BLN FSAR were observed. Several of these examples are discussed

throughout this report. Review of previous memoranda on the status of SAR's (e.g., MEB 790131 363 and MEB 790524 361) and discussions with OEDC and EN DES personnel revealed that SAR's are believed to be licensing documents only. As such, they are required to obtain construction permits, but updating is not necessary (FSAR) until a year or 18 months before the plant is ready for an operating license. NSRS concurs that NRC licensing personnel have historically not reviewed contents of SAR's for some timeframe following the construction permit issuance. However, the fact that NRC-OIE inspectors use the SAR as an inspection tool does not appear to be recognized by the OEDC/EN DES position. In actuality, inspectors view the SAR as a written commitment.

It is noted that a proposed rule change to 10CFR50.54, issued July 2, 1981, would require updating of QA program descriptions in SAR's if implemented.

Discussions revealed that the TVA Topical Report (TVA-TR75-1) was being revised to include QA program descriptions for all plants under design and construction. A brief review of a draft of revision 5 revealed that many of the inaccuracies would be eliminated by the Topical.

(f) R-81-14-OEDC(BLN)-7, Quality Requirements Section Resources

At the time of this review, the Quality Requirements Section staffing consisted of the supervisor and one other individual. A second staff engineer was assigned to the section, but was working on other matters for the QA Manager. Based on the specific problems discussed in items (a) through (e) above and consideration of other routine functions performed by this group, NSRS concludes it is not appropriately staffed to fulfill its obligations in a timely manner. Functions other than those described in paragraphs (a) through (e) are delineated in MO-QAP-1.1. They include such tasks as review of EN DES and CONST procedures, coordination of division interfacing procedures, advising audit teams in QA program requirements, and providing policy inputs to the QA Manager.

(2) Audit/Overview Functions

The OEDC QA audit program is defined by MO-QAP-3.1. Joint audits are conducted with POWER per ID-QAP 18.2. Other functions of the OEDC QA staff relative to its overview role are delineated in the MOM procedures, specifically MO-QAP's 1.1 and 3.1 through 3.4.

Assessment of the OEDC QA audit function included a review of the audit reports listed in section VII.A.2.a and associated correspondence and supporting records maintained by OEDC QA. Previous and future audit schedules and memoranda regarding scope and depth of audits were also reviewed. These documents were discussed and compared to the governing procedures and to commitments given in the BLN FSAR and ANSI N45.2.12. Based on these reviews and discussions, NSRS concludes that the audit function had been conducted in appreciable depth by experienced auditors.

During the review it was observed that on several occasions, findings believed to be significant by the audit teams were downgraded to nonsignificant by the QA Manager (example, M79-12, deficiency 6). In many cases observed, there was no explanation for the downgrading documented. MO-QAP 3.1 was revised September 24, 1980 (revision 2) to provide for recommendation as to significance of findings by the auditor(s) and for final determination by the QA Manager. If the manager disagrees with the auditor(s) recommendation, the reasons must be documented. NSRS concurs with this approach.

It was noted that the scope of OEDC audits has been reduced in 1981. For example, the original 1981 audit schedule for the construction sites included plans to audit the areas of procurement document control; instructions, procedures, and drawings; nonconforming items; corrective action; and quality assurance records. Audits in these areas were deemphasized per memorandum from E. G. Beasley to S. Duhan on March 24, 1981 (QAM 810324 001). Audits are still planned in these areas, but less time will be spent than previously. This decrease in emphasis is part of an attempt to reduce the overlap in division and OEDC QA audits (see QAM 810417 012). The primary emphasis for future audits will be 10CFR50, Appendix B, Criteria I (organization), II (program), and XVIII (audits). Theoretically, the status and adequacy of the divisions' program can be established in the fashion discussed above. NSRS is concerned, however,

that no further reduction be made in the scope or depth of OEDC QA audits. An assessment of program adequacy based solely on criteria I, II, and XVIII could be performed by document review alone and the value of such an effort would be questionable. Additionally, previous audits by OEDC QA have produced adverse, and at times, significant findings in other areas. NSRS thus finds it difficult to conclude that too many audits have been conducted when such audits produce adverse findings.

The following specific weaknesses or problems were noted in the audit/overview area:

(a) R-81-14-OEDC(BLN)-8, Compliance Section Resources

Regarding the audit/overview function and OEDC QA resources to carry it out, NSRS believes the Compliance Section is understaffed. When the audit function is considered along with the other routine functions, such as NCR reviews and review of NRC responses and the number of open audit findings to be followed up, we do not feel that adequate attention can be given all these duties with the present staff. This statement is made with the knowledge that assistance will be obtained from the divisions for selected audits. It should be noted that the number of auditors on the OEDC QA staff has decreased in the past year. Any decrease in manpower requirements due to decreased audit depths would appear to have been offset by increases in workload in other areas.

(b) R-81-14-OEDC(BLN)-9, Audit Support: Records

Draft 3, Revision 4, of N45.2.12 to which the PRM commits, and the issued 1977 edition, require retention of audit "support" records, such as plans and documents which support audit findings per ANSI N45.2.9. OEDC QA audit plans have been entered into MEDS, but supporting documents, such as handwritten notes, were kept in three-ring binders on open shelves until the audits are closed, then put in storage. This appears to be contrary to N45.2.9, which requires that such records be afforded fire protection.

A practical need can also be cited for such supporting records in that the extent of

exact nature of a problem, and at times the perspective, is lacking without the supporting records. For example, audit report M81-2, deficiency No. 1, discusses problems with storage of records in the TIC, but the exact identification of those records cannot be ascertained from the report alone.

The review resulted in a finding that retention of audit records per N45.2.12 is a problem throughout OEDC, including EN DES QAB and the BLN QA Unit.

It was noted that the more recent audit reports by OEDC QA have included an "Audit Performance Record" as an appendix to the report. This record appears to give a detailed accounting of what was reviewed, who was interviewed, etc. Evaluation of this tool by OEDC may show that it would suffice in documenting the same information contained in other audit "support" records.

In summary, NSRS concludes that, although the specific problems presented in the preceding paragraphs require resolution, it is felt that progress has been made in the operation of this group since its reorganization. Considerable effort had been expended on the Topical Report and certain other documents. Auditors appeared free to express their findings candidly and this is healthy.

b. ASME Section III QA Program

(1) Background

TVA has committed to the rules of safety established by ASME governing the design, fabrication, and inspection during construction of its nuclear power plants commencing with Watts Bar. The basis for committing to these rules was to afford reasonably certain protection for the lives of TVA personnel, its contractors and property and to provide a margin of assurance that nuclear plant items placed into service would not deteriorate appreciably when subjected to mechanical and thermal stresses resulting from cyclic operation. The latter basis was aimed at assuring the nuclear plant item a reasonably long safe period of usefulness under the service conditions described without the deteriorating effects of radiation, corrosion, erosion, or instability of the material being accounted for.

10CFR50.55a ties the effective date of the ASME Section III, "Nuclear Power Plant Components," edition and addenda applicable to Class 1

components that are part of the reactor coolant pressure boundary to the docket date of application or the date of contract order, whichever is later. Therefore, the code of record committed to by TVA for Bellefonte, (Construction Specification N4M-870 of November 8, 1977) which applies to the installation of piping assemblies, parts, components, and appurtenances for principal piping systems, and for the stamping of piping systems is the 1974 edition, including addenda up to and including summer of 1974 unless otherwise specified by applicable design specifications.

The quality assurance requirements of ASME Boiler and Pressure Vessel Code Section III, Division 1, are contained in NA-4000 which gives the QA requirements for all code activities with the exception of materials, Division 2 concrete containment, and Code Class 3 components. The QA requirements for materials are contained in NA-3700. The QA requirements for Division 2 concrete containment and Code Class 3 components are contained in CA-4000 and NA-8122, respectively.

NSRS review of the quality assurance program established by OEDC to ensure compliance with the requirements of the Code was limited to the activities of design and procurement, fabrication and installation of Classes 1, 2, 3, and MC materials, component supports, components, parts, and appurtenances. ANI and containment structure activities were not reviewed.

The review entailed a detailed comparison of the established program, documented by the OEDC Quality Assurance Manual for ASME Section III Nuclear Power Plant Components (NCM) as required by NA-4140, to the 1974 edition of the Code plus addenda through the summer of 1974 and to OEDC QA, EN DES, CONST, and Bellefonte implementing documents for consistency of or absence of the stated requirements. In order to perform the review effectively, 17 functional areas were set up for the comparison as noted below:

1. Policy
2. OEDC QA Program for ASME Section III Components
3. Organization
4. Personnel Indoctrination and Training
5. Design Control
6. Instructions, Procedures, and Drawing Controls
7. Procurement Activity Controls
8. Control of Purchased Materials, Items, and Services

9. Identification and Control of Materials and Items
10. Control of Manufacturing and Installation Processes
11. Examinations, Tests, and Inspection Controls
12. Examination and Process Status
13. Nonconforming Materials or Items
14. Calibration of Measurement and Test Equipment
15. Audits
16. Corrective Action
17. Records and Data Reports

Each of the above functional areas were then portioned out to the organization(s) affected by or requiring action by the NCM or Code. This functional apportionment will be described in each organizational review area subsection entitled "ASME Section III QA Program."

(2) Review Areas/Findings

The following functional review areas and applicable NCM sections were compared against companion Code requirements and to the OEDC implementation documents illustrated in paragraph VII.A.2.b for proper translation and adequacy:

<u>Applicable NCM Sections</u>	<u>Functional Areas of Review</u>
1.1	Policy
All	OEDC QA Program for ASME Section III Components
1.3	Organization
1.9	Personnel Indoctrination and Training
11.1	Audits
10.2, 11.1	Corrective Action

Actual implementation of these requirements by observation, review of events, review of records, and/or discussions with personnel was conducted by NSRS reviewers as part of their functional and regulatory review area assignments. Only those concerns which together reflect an ASME QA programmatic concern are discussed here. Individual concerns requiring specific attention will be discussed in this report's applicable functional review area sections.

From the review conducted, NSRS concludes that the written program involving OEDC QA is well defined. However, the responsiveness of OEDC QA to these stated requirements is considered inadequate with

achieve minimum compliance. Specific concerns/ conflicts discovered during the review are discussed below.

(a) R-81-14-OEDC(BLN)-10, Revision of the NCM OEDC Policy Statement Required

The NCM OEDC policy statement presented in section 1.0 does not reflect, as written, the true practice which is being followed in maintaining the manual to Code QA requirements.

Bellefonte, as previously stated in the background, is committed to the 1974 edition of the Code, including addenda through the summer of 1974. This edition requires certain administrative duties of the certificate holder that later editions of the Code have deleted. Since the NCM is maintained to the latest edition and addenda to the Code, a fact not reflected in the policy statement, those duties required by the committed 1974 edition have been deleted. These duties include:

1. Attaching to the QA Manual the quality control system checklist normally provided for only Class 3 component construction (NA-8123.1).
2. Maintaining a written description of the procedures to be used for control of quality and examinations, showing in detail the implementation of the Code QA requirements (NA-4420).

The NCM OEDC policy statement should be revised to document this current edition and addenda practice and include an exception section to the QA Manual (NCM) to detail those committed QA requirements from earlier code editions which have been revised or deleted by later editions per construction project. See also paragraph V.C.12.b.(1) for additional details.

(b) R-81-14-OEDC(BLN)-11, Inadequate Fulfillment of Certain ASME QA Program Requirements

NSRS review of the NCM responsibility statements for the Owner, Designer, Manufacturer, and Installer showed the following responsibilities not being fulfilled by the OEDC QA

Manager's office as required by NCM section 1.3, paragraph 2.3.2. See also paragraph V.B.10.b.(1) for additional details.

1. Paragraph 2.3.2.a.1 requires the OEDC QA Manager to ensure that approved QA/QC procedures are scheduled to be available prior to initiation of the activities they cover.

Contrary to this requirement, as seen in paragraph V.C.12.b.(1), QCP's were not developed from the NCM to meet OEDC policy requirements to qualify/requalify welding process specifications, implementation of the Automatic Process Control System, and processing of Code Data Reports and application of Code symbols to nuclear components and parts.

NSRS considers resolution of V.C.12.b.(1) should resolve this matter.

2. Paragraph 2.3.2.b requires the OEDC QA Manager to audit the quality-related activities of the N Certificate Holder (EN DES) and the NA and NPT Certificate Holder (CONST).

Contrary to this requirement, NSRS review of the OEDC QA audits performed for 1979, 1980, and those scheduled for 1981 do not reflect any intention on the part of OEDC QA to audit all the quality-related activities described in the NCM for EN DES or CONST. These audit activities are being left up to the respective divisions' QA groups with OEDC reviewing the audit plans for program coverage completeness. Resolution of this discrepancy is required.

3. Paragraph 2.3.2.d (and 2.2.1 of NCM section 1.9) requires the OEDC QA Manager to establish the requirements for the indoctrination and training (I&T) of TVA personnel engaged in quality-related activities as necessary to assure suitable proficiency is achieved, maintained, and documented.

Contrary to this requirement OEDC QA has not established any set of minimum I&T requirements which are to be used as the

cornerstones for the I&T programs to be established by the divisions. Instead, OEDC QA has left the development and program establishment up to the divisions, leaving a gap as to what minimum amount of training is required. Because of this lack of guidance, OEDC QA has left an audit finding on EN DES' inadequate QA training program open since 1978 without providing or requiring resolution (OEDC QA Management Audit M78-5, deficiency No. 6).

The disparity in what training programs have (had) been established between EN DES and CONST is indicative of why a minimum set of requirements for I&T is required. OEDC QA should compile a matrix of the minimum orientation, procedural and process awareness requirements necessary for engineers, auditors, inspectors, specialists, etc., to perform their assigned tasks in a proficient and quality manner. Documentation of these requirements in the ID-QAP's should be considered. (See also paragraph V.B.7 on a similar discussion involving regulatory matters.)

4. Paragraph 2.3.2.e requires the OEDC QA Manager to establish the requirements for the maintenance of QA records.

Contrary to this requirement, OEDC QA has not established overall OEDC quality assurance records maintenance requirements. NSRS review of ID-QAP 17.2, considered by NSRS to be an acceptable vehicle to provide these necessary requirements, found the procedure to only contain guidelines as to how division-level procedures should handle records. When the divisions have developed their procedures, OEDC QA will then approve them.

In addition, the examples presented in ID-QAP 17.2 for the minimum records retention period of nonpermanent records are in conflict with present code requirements. The examples presented (attachments 3, 4, and 5) are based on the requirements of ANSI N45.2.9-1974 which specifically exempts itself from ASME Section III

requirements and contains retention periods contrary to NCA-4134.17 of the latest edition to the Code (ASME Section III 1980 edition including addenda through summer of 1981), to which the NCM is supposed to be maintained.

OEDC QA should revise ID-QAP 17.2 to be consistent with the applicable Code edition being utilized (see paragraph (a) discussion previously) and delete the term "guidelines." The procedure should only specify the minimum requirements necessary to satisfy both regulatory and Code commitments.

(c) R-81-14-OEDC(BLN)-12, Establishment of ASME QA Program Measures to Control Forming, Bending, and Aligning Processes

NA-8120 and NA-4112 of the Code require the holders of ASME Certificates of Authorization to establish a QA program for the control of quality of the specific items they propose to manufacture or perform. NA-4450, "Control of Fabrication Process," specifies measures are to be established to assure that processes are controlled in accordance with the rules of Section III, Division 1, and accomplished by qualified personnel using approved procedures.

Bellefonte and other Code-built projects have been/are performing manufacturing activities in accordance with qualified G-29M process specifications [P.S. 4.M.2.1(d)] as implemented through their own internal quality control procedures. No program provision for this process has been established in the NCM.

OEDC should develop a program procedure to cover this activity and incorporate it into the NCM as soon as possible.

3. Interface Controls

This section discusses the results of the management review which involve interfaces between the divisions reviewed (EN DES, CONST, OEDC Staff, PURCH) and between TVA and vendors. The concerns noted result from a review of the ID-QAP's and a compilation of problems and concerns noted in other sections of the report. These areas are identified separately because resolution may involve coordination between divisions.

Criterion III of Appendix B to 10CFR50 requires that design interfaces be identified and controlled. ANSI N45.2.11 amplifies this requirement. TVA's program to comply with this requirement is contained in the BLN FSAR Chapter 17, the ID-QAP's, and the OEDC PRM. Chapter 17 of the FSAR identifies interfaces between TVA and Babcock and Wilcox, the NSSS vendor, in table 17.1A-3. The OEDC PRM, Table 3, assigns responsibilities for meeting the various elements of the 18 criteria of Appendix B to 10CFR50 to the various divisions and offices within TVA. The ID-QAP's constitute the primary program for interface controls and contain guidance on how the various divisions are to interface in a number of specific areas.

The NSRS review of interface controls consisted of compiling the results of the reviews in other functional areas and the PURCH review, R-81-15-PURCH(BLN), and analyzing these results for interface problems. Additionally, the ID-QAP's were reviewed for adequacy and consistency. As a part of the review of these functional areas, the OEDC PRM, Chapter 17 of the BLN FSAR, and the ID-QAP's were reviewed. The results of this compilation and analysis were divided into two main areas--TVA internal interfaces and external interfaces. These results are listed below.

a. Internal Interfaces

The review resulted in several concerns regarding interfaces between TVA divisions. These concerns are discussed below.

(1) R-81-14-OEDC(BLN)-13, Inadequacies of the ID-QAP's

The review of the ID-QAP's revealed several areas which were not addressed in these procedures. These areas are listed below.

- (a) Design Changes Not Covered - There was no ID-QAP which covered the interfacing between EN DES and CONST necessary to coordinate design changes (i.e., ECN's and FCR's).

CONST personnel complained about the slowness of the FCR process, but have no formal agreement with EN DES. The FCR numbering problem detailed in section V.C.2.b(4) could also be resolved in an ID-QAP.

- (b) CCN's Not Adequately Covered - ID-QAP 3.2, "Processing of Construction Change Notices" did not require that EN DES should review CCN's to ensure that safety-related changes

were not made. This procedure should also provide a reference to the procedure to follow if safety-related changes were made by the CCN process. Refer to report section V.B.3.d for details of a closely related concern.

- (c) Control of Vendor Manuals - There was no ID-QAP which controlled the distribution, approval, and maintenance of vendor manuals. EN DES, CONST, and NUC PR all have responsibilities in this area, but no ID-QAP existed to define and control the interfaces.
- (d) Constructability and Operability Reviews - ANSI N45.2.11 requires constructability and operability inputs into the design. However, there was no formal program established to provide these inputs. An ID-QAP would be needed to define such a program if CONST and NUC PR provided reviews for operability and constructability. Although no safety deficiencies were uncovered in the review, NSRS feels that good engineering practice necessitates such a review. There were several areas where a constructability review could have minimized problems, such as pipe support clearances, pipe fitup gap clearances, and cable tray support variances. NSRS also feels that a definite economic advantage exists in minimizing these problem areas.
- (e) Review of Operating Procedures - EN DES had recently been given the responsibility to review plant operating procedures. Procedures for SQN were reviewed by EN DES; however, this program was not formally implemented by an ID-QAP.

(2) R-81-14-OEDC(BLN)-14, DIS Implementation Concern

The DIS is a reference base for coding the as-constructed status of drawings for BLN. The intent of the program is to provide the capability to identify the configuration of a given system, unit, or plant at any given time. To establish the configuration, specific data must be entered into the DIS. In a memorandum from Roy H. Dunham dated July 7, 1978 the necessary data input is listed and EN DES recommendations for who inputs what information is presented. The CONST response is dated August 7, 1978 with disagreement regarding

who will input unit number and system code(s). Memoranda discussing this situation have been sent between EN DES and CONST, with the last being dated December 31, 1980 from EN DES. The DIS program continues to suffer from the inability of the divisions to agree who is responsible for some specific DIS inputs.

(3) **Interface Problems Discussed in Other Report Sections**

Several of the findings discussed in other sections of this report involve interdivisional interfaces. These problems are briefly discussed below to emphasize that some coordination between divisions may be required in resolving these concerns.

- (a) Deletion of Tables 1 and 2 of the PRM - The deletion of these tables resulted in EN DES and CONST being responsible for defining commitments to codes and standards rather than OEDC QA providing guidance. Refer to paragraph V.A.2.a.(1)(a) for details.
- (b) Drawing Revision for "Use-As-Is" NCR's - Drawings were not being effectively revised when NCR's were dispositioned use-as-is, nor did NCR's indicate if drawing revisions were necessary. Refer to paragraph V.B.6.b.(1)(b) for details.
- (c) Safety-Related Systems List - A comprehensive list of safety-related structures, systems, and components had not been transmitted to CONST for use in determining the applicability of using the CCN process for field changes. Refer to paragraph V.B.2.d for details.

(4) **EN DES/PURCH Interface Concerns**

A management review of PURCH was undertaken in conjunction with the review of OEDC. There is a major interface between EN DES and PURCH which was evaluated in these reviews. The concerns which were identified are discussed below and are also discussed in the management review report on the Division of Purchasing, R-81-15-PURCH(BLN) (GNS 810908 051).

(a) **Extension of IQT and BPA Contracts**

Extension of IQT and BPA contracts with QA requirements require approval by QAB when an

extension is sought. This approval was not being consistently sought by PURCH nor was EN DES consistently reviewing and approving extensions. A review of selected IQT extensions (77KA1-543351, 78K71-543371, and 79KA1-589860) revealed no documentation that QA approval was obtained before extension of the agreements. This item is numbered R-81-15-PURCH(BLN)-03 in the referenced PURCH report.

(b) Evaluation of Vendor Performance History

The BLN FSAR Chapter 17, section 17.1A.7.1, states that the determination of a manufacturer's qualification is normally based on the vendor's performance on previous TVA contracts. There did not appear to be a master history file of vendor performance within TVA. EN DES QAB retained some data but this was utilized for scheduling of QA audits. NSRS considers that PURCH is best suited to provide vendor history information for use in evaluating past performance but that EN DES needs to also be aware of vendor histories. This will require some coordination between divisions, and EN DES should work with PURCH to resolve this concern. This is item R-81-15-PURCH(BLN)-05 in the PURCH report and is also discussed in paragraph V.B.9.a of this report.

b. External Interfaces

The interface between TVA and the NSSS vendor was reviewed for adequacy and adherence to regulatory requirements. The following concern was identified in this area.

B&W, the NSSS vendor for BLN, was not performing reviews of TVA design criteria which interface with systems in the scope of supply. Additionally, the contract with B&W did not require them to do so. NSRS is concerned that the possibility exists for incompatibilities between the TVA and B&W designs. Refer to report section V.B.2.e for details.

4. Training and Qualifications of Personnel

Criterion II of Appendix B to 10CFR50, requires that a QA program be established and that the program shall provide that personnel performing quality related activities be trained and indoctrinated, as necessary, to assure that their proficiency is achieved and maintained. The description of the QA program for design and construction is contained in chapter 17.1A.2.1.2 of the BLN FSAR.

To satisfy this requirement, OEDC management has established training policy and requirements for the division in the OEDC PRM. The PRM commits TVA to RG 1.28 which endorses ANSI N45.2-1971, "Quality Assurance Program Requirements for Nuclear Power Plants." This document utilizes essentially the same generalized language as does Appendix B to 10CFR50, the BLN FSAR, and the 1977 version of ANSI N45.2. The PRM also commits TVA in part to RG 1.58 which endorses ANSI N45.2.6-1973, "Qualifications of Inspection, Examination, and Testing Personnel for the Construction Phase of Nuclear Power Plants."

OEDC-QPM-3-76, RO, delineates the policy, objectives, and responsibilities for QA training within OEDC. This document assigns the responsibility to the OEDC QA manager for formulating and issuing QA training policy requirements to the division. The OEDC QA manager is also assigned responsibility to ensure that these requirements are met. Specific training responsibilities for the OEDC QA manager are further delineated in OEDC Manager's Office (MO) QAP 1.1. OEDC-QPM-6-79, RO, "OEDC Quality Assurance Program for Nuclear Power Plants - Policy Statement," also contains OEDC's commitment to training. OEDC, in conjunction with POWER, has established an interdivisional procedure ID-QAP 18.1, "Qualification, Certification, and Recertification of Quality Assurance Audit Personnel." This document conforms to the guidance of ANSI N45.2.23, "Qualification of Quality Assurance Program Audit Personnel for Nuclear Facilities," however, TVA is not officially committed to that document in the PRM.

The documents listed above and in section VII.A.4 of this report constitute the OEDC manager's office program for ensuring that personnel are adequately trained and qualified to fulfill their responsibilities. These documents were reviewed and compared against the requirements of ANSI N45.2-1971. In addition, discussions were conducted with personnel to verify their awareness of their responsibilities of procedures and responsibilities. All persons contacted in this regard were familiar with procedures and understood their responsibilities. The following paragraphs describe the review process and provide findings and conclusions in the area.

a. Policy

Documents clearly define OEDC training policy, objectives, and responsibilities. This policy appears to be in conformance with the NRC requirements.

b. R-81-14-OEDC(BLN)-15, OEDC QA Auditor Training

A written approved program for the training of auditors had not been established by OEDC QA. The responsibility for determining whether auditors met the qualification

requirements had been assigned to a well-qualified individual who was designated as the "auditor examiner." The auditor examiner was responsible for developing and implementing training for the auditors and training appeared to be adequate; however, management involvement in establishing training requirements or approval of training was not evident above the M-5 level.

NSRS concludes that the program for qualifying QA auditors is adequate to meet NRC requirements and ID-QAP 18.1. The program is very dependent upon a key individual and the departure of this person for any reason could result in program breakdown.

c. Evaluation of QA Training

MO-QAP 1.2, RO and MO-QAP 1.3, RO, was established by the OEDC manager's office to implement the OEDC QA manager's responsibilities of providing management's overview to the division's QA training programs and of providing policy requirements for QA training to the divisions as delineated in OEDC-QPM-3-76..

During the review, NSRS learned that OEDC QA had not performed the evaluations of EN DES QA training due to the transformation that was taking place with the program subsequent to the OEDC audit (report 78-05) which had labeled the program as "deficient."

Reportedly, evaluations of the CONST QA training programs had been conducted by OEDC QA; however, OEDC QA management was not satisfied with the quality of the evaluations, therefore, the reports were not issued. During this period, however, QA audits of training were conducted by the BLN CONST QAU.

Subsequent to the field work of the review, MO-QAP 1.2 and MO-QAP 1.3 were deleted. Discussions with the OEDC QA Manager indicated that overview of QA training would be handled through the routine audit programs and that the responsibility of providing QA program policy requirements to the divisions to ensure that regulatory requirements are met rests with the OEDC QA Staff as delineated in MO-QAP 1.1.

NSRS concludes that this approach is satisfactory to meet regulatory requirements; however, we are concerned with the practice of eliminating requirements after it is determined that the requirements have not been met.

d. R-81-14-OEDC(BLN)-16, QA Training Audits by OEDC

In July 1978 OEDC QA identified (Audit Report M78-5, deficiency No. 6) a significant deficiency (later reclassified as nonsignificant) involving the adequacy of QA training in EN DES. As a result of this deficiency, the existing QA training program was abandoned and measures were initiated to establish a new QA training program in EN DES. The development and implementation of the new program had been slow. In fact, very little had been done to resolve the deficiency until late 1980 and 1981; and, at the time of this review, EN DES had not fully implemented a QA training program. EN DES had established a procedure, EP 1.16, that, if followed, would ensure that a QA training program would be established. In addition, initial QA training indoctrination for new employees was being conducted. NSRS was informed that the actual training program could not be established until a qualified person was obtained for program development.

Subsequent to the field work, NSRS learned that the audit deficiency has been upgraded to "significant" and a QA training requirements matrix had been established for the EN DES branches.

NSRS concludes that the untimely resolution of the item could be interpreted as failure to take corrective action as required by Criterion XVI, of 10CFR50, Appendix B, and TVA's program to implement these requirements. In addition, failure to fully implement a QA training program for EN DES appears contrary to the requirements of ANSI N45.2-1971, section 2.0.

B. Division of Engineering Design1. Management Controls

For details in this area see V.A.1 of this report.

2. Design Process Controls

Criterion III of Appendix B to 10CFR50 requires that measures be established to assure that regulatory requirements are incorporated into the design, to identify and control design interfaces, to verify the adequacy of design, and to control design changes. In this report, the design process is defined as the process of identifying and implementing the required design inputs and the process of verifying that these inputs have been correctly translated into design output, such as drawings, specifications, and requisitions. For those Criterion III activities not identified for review

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discussion in this subsection, such as verifying the adequacy of design and controlling design changes, will be discussed along with other more specialized reviews of the design process input-output network in subsequent section V.B paragraphs.

The OEDC PRM commits TVA to the use of ANSI N45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants." This standard is endorsed by Regulatory Guide 1.64, R2, June 1976, which makes some modifications to this standard to upgrade it to NRC requirements. BLN is fully committed to ANSI N45.2.11-1974. The BLN FSAR in section 17.1A.3 describes the QA program for implementing requirements in general terms and commits to certain basic practices to be followed in the design of BLN.

OEDC QA has established ID-QAP's which implement QA requirements which necessitate close coordination between divisions. OEDC QA program policy is contained in a memorandum from G. H. Kimmons to Division Managers, Project Managers, and Branch Chiefs, OEDC-QPM-6-79. This memorandum defines the objective of OEDC Quality Assurance program and assigns the responsibility of carrying out these objectives to the Manager of Engineering Design, the Manager of Construction, and the OEDC QA Manager.

The EN DES program for implementing QA requirements is defined in EN DES EP's and branch-level EP's. These procedures contain guidance on accomplishing QA functions and are used by the designers in their daily activities.

NSRS reviewed the design process controls program consisting of the following elements.

BLN FSAR Chapter 17; OEDC Program Requirements Manual; IPM, Section 3; EN DES EP's, Sections I, II, III, IV, and V; EN DES Design Guides and Standards; BLP Engineering Procedures; CEB Engineering Procedures; EEB Engineering Procedures; MEB Engineering Procedures; NEB Engineering Procedures

A more detailed listing of the documents reviewed is given in section VII.B.2 of this report.

The procedures listed were reviewed and compared to the requirements and commitments previously referenced. Interviews were held with a number of EN DES personnel and design records were reviewed to strengthen the reviewer's understanding of the design process control program and to judge the effectiveness of the program. A detailed listing of the persons interviewed is contained in section VI of this report. The review also included an examination of the

degree of implementation of the EP's. This was accomplished by comparison of the records reviewed and the statements made to the requirements of the EP's.

a. R-81-14-OEDC(BLN)-,17 Program and Implementation Inadequacies of the EP's

NSRS had some significant concerns with the program that had been developed and implemented to ensure that basic design parameters, preliminary engineering and design, and general design criteria are developed and incorporated into the final design. An area where NSRS felt that a significant weakness existed was the area of engineering procedures. These concerns have been broken down into four areas: failure to implement 10CFR50, Appendix B, and ANSI N45.2.11 requirements; lack of a logical system of procedures; insufficient guidance to ensure quality; and failure to implement EP requirements. These areas of concern are detailed below.

(1) The EP's are not adequate to implement the requirements of 10CFR50, Appendix B, and ANSI N45.2.11. The more salient problems found are listed below.

(a) Criterion III of Appendix B requires that interface reviews be performed for documents affecting quality which affect more than one organization and that these reviews be documented. Table 17.1A.3 of the BLN FSAR identified interface between TVA and B&W, the NSSS vendor for BLN. However, the design criteria for systems which are assigned B&W interface review by FSAR table 17.1A-3, were not required by EP 3.01, "Design Criteria Documents - Preparation, Review, and Approval," to be reviewed by B&W nor has B&W reviewed and documented its review of these documents. Refer to paragraph V.B.2.e for further details.

(b) ANSI N45.2.11 requires that independent reviewers check design documents for compliance in a number of specific areas listed in section 6.3.1 of that standard.

Contrary to the stated requirement EP 4.25, "Design Review and Interface Coordination of Detailed Construction and Procurement Drawings," did not require that these areas be reviewed but stated that they are for guidance.

- (c) ANSI N45.2.11, section 3.2, requires that a specific list of design inputs be identified, documented, and their selection reviewed and approved. Contrary to this requirement, EP 3.01 (design criteria), did not require that this list of design inputs be considered and no documentation was found that these inputs had indeed been considered. Furthermore, some of the personnel interviewed were not aware of this requirement in ANSI N45.2.11.
- (2) The EP's do not constitute a logical procedure system as evidenced by several contradictions and overlaps contained within the EP's. The following examples were discovered during the management review.
- (a) EP 1.28 (quality documents), stated that squadchecking is used for design review but EP 4.04 (squadchecks) stated that squadchecks are used for interface reviews.
 - (b) EP 3.10 (design verification methods) and EP 4.25 (design review of detailed drawings) overlapped since they both contained guidance on design review and verification. EP's 3.09 (design criteria diagrams) and 1.28 (quality documents) also covered some of this same material.
 - (c) EP 4.25 (design review of detailed drawings) stated that it applies only to detailed construction and procurement drawings, but it is referenced by EP 3.09 (design criteria diagrams) on design criteria diagrams which are not construction nor procurement drawings.
 - (d) EP 1.28 (quality documents) did not specifically mention review of functional control logic diagrams (FCLD's) even though these drawings are basic design documents affecting quality.
 - (e) EP 4.25 (design review of detailed drawings) was confusing concerning the concept of further review, describing it in section 3.0 as a formal procedure and implying in section 4.5 that it may be an informal review.
 - (f) EP 5.33 (procurement QA) did not reference EP 4.25 (design review) for the performance of design reviews for procurement documents.

- (g) EP 5.20 (procurement requests) referenced EP 5.05 (quality documents), which has been superseded.
 - (h) EP 1.28 stated in section 5.1 that certain minimum identifying information shall be present on each design document and that if existing procedures did not require this minimum information, the information shall be provided anyway. This appeared to be an endorsement to violate Criterion V of Appendix B to 10CFR50 in that the procedures are required to be modified to include the minimum required information by Criterion V. This EP, however, did not direct the procedure to be changed.
 - (i) EP 3.10 (design verification methods) stated that preoperational tests verify that components, systems, and plant performance meet all requirements. These tests, however, are not this encompassing since such items as isolation of pipe break flows are not verified.
- (3) The EP's did not contain sufficient guidance to ensure management that a quality design is obtained. Areas where the EP's appear to need further guidance are listed below.
- (a) There was no EP which covered the design inputs and the review process for FCLD's for BLN. There was an EEB EP for FCLD's but this procedure only covered format, numbering, and symbols to be used.
 - (b) Several basic terms were not defined in the EP's, such as "shall," "should," "HOLD," "detailed construction drawing," "detailed procurement drawing," "document," and "drawing."
 - (c) The EP's did not contain guidance on the method to be followed to resolve conflicts between groups or branches when issuing quality-related drawings or documents.
 - (d) EP's 4.04 (squadchecks) and 4.25 (design review) required that originating organizations determine to whom to squadcheck documents and to resolve any resulting comments. Since a schedule is often required to be met, these requirements result in a conflict of interest for the originating organization. Furthermore,

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no basis is given in these EP's for determining to whom the squadcheck should be sent. OEDC QA has also recognized that no basis is given for determining required interface coordination in audit JA8100-03, finding 0-1.

- (e) EP 4.02 (ECN's) did not require consideration of safety significance in determining whether an S1 ECN is allowable. Refer to paragraph V.B.3.c of this report for further details.
- (f) There was no EP which provides guidance on handling of CCN's. ID-QAP 3.2 covered this area but did not contain guidance on the areas that EN DES should consider during their review of a CCN. CCN's need to be reviewed by EN DES for determining if an NCR or FCR was needed. Refer to paragraph V.B.3.d of this report for further details.
- (g) EP 2.07 (commitment control) described a system to track required responses to NRC but did not describe a program to control what codes, standards, etc., TVA commits to implement. Thus, TVA has committed to conflicting standards (e.g., the ASME B&PV Code and ACI 318 both contain requirements on hydrostatic testing of pipes which conflict.)
- (h) EP 2.13 (fuel load safety evaluation) only covered OWIL items needed prior to fuel load. There was not an EP which gave guidance on the safety evaluation for other OWIL items that may need to be completed before such milestones as hot functional testing, criticality, etc.)
- (i) EP 4.03 (FCR's) did not contain guidance on the procedure to follow if an FCR is disapproved. Also no guidance was given on what method of interface coordination should be used for FCR's that affect other organizations.
- (j) EP 2.12 (10CFR21) does not provide the preparer of purchase requisitions sufficient guidance to determine if 10CFR21 requirements apply to the eventual contractor in that no information is contained as to what constitutes a "basic component." Additionally, EP 5.01 (purchase requisitions) does not contain a text reference to EP 2.12 for determining 10CFR21 applicability.

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- (k) EP 3.01 (design criteria) did not require that affected organizations review DIM's. Refer to paragraph V.B.2.f of this report for further details.
- (4) The EP's were not consistently implemented in EN DES.
 - (a) The EP 3.10 (design verification methods) requirement for auditability of the design review process was not being met in that records were not kept of the areas that the checker verified. Furthermore, other EP's which specified design review processes did not require that such records be generated or kept. The signature of the checker on the document or drawing is not adequate to ensure auditability.
 - (b) EP 4.02 (ECN's) requirements on disallowing S1 ECN's were not being implemented. Refer to report paragraph V.B.3.c for details.
 - (c) EP 4.03 (FCR's) requirements on FCR's were not being consistently implemented. Refer to paragraph V.B.3.a of this report for details.
 - (d) EP 4.02 (ECN's) requirements concerning processing of ECN's were not being consistently implemented. Refer to paragraph V.B.3.b of this report for details.
 - (e) An EP 3.02 (design criteria) requirement on the retention of coordination logs during the squadcheck process was not being implemented. This EP required that the coordination logs of the squadcheck copies of a draft design criteria be sent to ESS for retention.
 - (f) The EP 2.08 (regulatory guides) requirement for updating regulatory guide commitment sheets was not being implemented. This EP required that the commitment sheets be updated within 45 days of issuance of the RG. These commitment sheets had not been updated since 1978.
 - (g) The EP 3.01 (design criteria) requirement for "detailed" design criteria for systems performing primary safety functions was not being consistently implemented. Design criteria Nos. N4-CF-D740, N4-KC-D740, N4-NR-D740, and N4ND-D740 did not indicate that they were

detailed criteria. NSRS feels that the criteria listed were generally adequate, but just needed to be properly titled.

NSRS concludes that the concerns listed above and the examples listed in support of these concerns constitute documentation of serious program deficiencies in the engineering procedures. NSRS recommends that a major effort be applied to the engineering procedures to satisfy these concerns. NSRS also noted that within the last six months a number of NCR's had been written indicating problems within the design process program. Many of these NCR's dealt with failures to implement design requirements which indicated that the design and review processes were not effective. Refer to V.B.2.d for NCR details.

The failure to consistently implement the EP's appeared to be due to a combination of factors as follows: lack of formal procedural training, the large volume of procedures, and inadequacies within the procedures.

NSRS recommends that a major review of the EP's be undertaken to a) correct conflicting statements, inconsistencies, and overlaps, and b) provide further guidance to designers and reviewers as indicated in sections V.B.2.a(3), V.B.2.e, and V.B.2.f. Also see section V.B.2.b for an additional recommended change to the EP's.

b. R-81-14-OEDC(BLN)-18, Failure to Establish Detailed QA Policy

Criterion II of Appendix B to 10CFR50 requires that a quality assurance program be established and include written policy statements. Contrary to the above, EN DES had not established detailed quality assurance policies in sufficient detail to ensure quality. A broad commitment to QA and its objectives is contained in a memorandum from M. N. Sprouse dated January 16, 1981 (QAS 8101116 002). However, implementing policies had not been consistently established. Examples of implementing policies which in the opinion of the reviewers needed to be established are: (a) a policy that the EP's be followed by EN DES organizations, and (b) a policy for periodic review of the adequacy of the EP's. In general, there were no policy statements which implement, clarify, and expand on all of the 18 criteria of Appendix B to 10CFR50 applicable to EN DES. The reviewers noted that CONST had established such policy statements in their QA Program Manual. Furthermore, several EP's appear to be misplaced policy statements.

For example, EP 1.28, "Control of Documents Affecting Quality, and EP 3.10, "Design Verification Methods and Performance of Design Verifications," both contain policy statements in the body of the EP. Some of the EP's contained a policy section, but these sections were not complete. Some AI's also contained policy statements. The number of documents containing such statements resulted in difficulty in determining EN DES policy.

The reviewers also noted that a central higher tier document had not been established in EN DES. Such a document, similar to CONST's QA Program Manual, would contain division-level policies and the relationships of the EP's to 10CFR50, Appendix B criteria. This would then constitute a more logical procedure system in which the EP's implement requirements of higher tier documents such as the PRM and 10CFR50.

NSRS recommends that EN DES establish QA policy statements for the criteria of Appendix B to 10CFR50 and that these statements be placed in a central higher tier document. Policy statements in the EP's should be placed in this document.

c. R-81-14-OEDC(BLN)-19, Management Responsibilities

Criterion I of Appendix B to 10CFR50 and ANSI N45.2.11-1974 require that the quality assurance program define responsibilities. During this review, NSRS reviewed management responsibilities to ascertain that these responsibilities were clearly delineated. There were several documents which contained responsibilities in EN DES, including engineering procedures, functional organizational charts delineating interfaces in general, FSAR chapter 17, and branch delineations. A clearly defined, usable responsibility matrix was not found. Furthermore, the number of documents containing responsibilities made the task of determining who has responsibility in an area difficult.

The lack of clearly defined responsibilities may lead to quality deficiencies. For example, an organization must determine the appropriate interface review for documents it generates or receives. This determination could not be easily made since no responsibility matrix or clear definition of responsibilities existed. Thus, management is relying on personnel to be aware of these responsibilities through experience and has not established a program to ensure appropriate review.

NSRS feels that this is a significant deficiency since it violates ANSI N45.2.11 and could result in poor interface reviews. NSRS recommends that all management responsibilities dealing with the design, review, or quality assurance functions for nuclear power plants be placed in a single source reference.

d. R-81-14-OEDC(BLN)-20, Listing of Structures, Systems, and Components Covered by the Quality Assurance Program

Criterion II of Appendix B to 10CFR50 requires that structures, systems, and components covered by the quality assurance program be identified. ANSI N45.2.11 also requires identification of items and services to which the standard applies. During this review, NSRS found several lists which appeared to be in response to the requirements above. These lists were: FSAR Table 17.1A-3, FSAR Table 3.2.2-4, design criteria N4-50-D744, design criteria N4-50-D754, and construction specification N4G-889. Appendix D summarizes the comparison of these lists with the various design criteria and the critical systems, structures, and components list generated by NUC PR. The NUC PR list's purpose is not to identify QA-related items and was included for information only.

Appendix D shows that none of the lists appears to be complete. Construction specification N4G-889 appeared to be the most complete listing but it contained a disqualifying statement to the effect that the provided listing is only for convenience and is not intended to satisfy the 10CFR50, Appendix B requirement. The FSAR tables were not nearly as complete as the construction specification listings. Many systems with safety-related features were not listed in either table. These listings were not adequate to fulfill the regulatory requirement due to the number of omissions. The other tabulations shown in Appendix D were not intended to be complete listings, but were shown for completeness. It was noted that design criteria N4-50-D744 appeared to be used as input for the listing in construction specification N4G-889.

Design Standard DS-M18.6, "Identification of Mechanical Safety-Related Systems and Components," provides some guidance in determining if an item is safety-related but does not address the problem of conflicting lists nor of items which are not classified as mechanical. The PRM assigns EN DES the responsibility of identifying the structures, systems, and components covered by the QA program; however, this responsibility had not been delegated to lower tier organizations (e.g., TPE branches).

During the process of interviewing EN DES personnel, several people were asked what list they used to determine if an item was covered by the QA program. This question was answered by several of the lists shown. Some individuals indicated that one should use the design criteria for the particular system to determine if the QA program applies. Thus, there was no consistently used list or one list that was generally recognized as governing.

NSRS feels that a significant deficiency exists in that no comprehensive listing of the items covered in the BLN QA program is utilized or existed. There have been a number of NCR's written which identify instances where items were inadvertently placed outside of the scope of the BLN QA program. Recent examples are the following:

- (1) NCR BLNBLP8015, "Main Feedwater and Containment Isolation Valve Miscategorization"
- (2) NCR BLNBLP8010, "Automatic Closure of Borated Water Storage Tank Isolation Valves"
- (3) NCR BLNBLP8111, "Nonseismic Heating and Cooling Coils"
- (4) NCR 1411, "Temperature Switches in Auxiliary Power Systems"
- (5) NCR BNP-7, "Purchase Requests Issued Without IEEE Qualifications Specified"

NSRS recommends that a comprehensive, controlling list for BLN be generated and designated as the controlling list of all safety-related systems and components covered by the QA program, and that this listing be kept up to date.

e. R-81-14-OEDC(BLN)-21, Design Criteria Review by NSSS Vendor

Criterion III of Appendix B to 10CFR50 requires that design interfaces be controlled. ANSI N45.2.11-1974 elaborates on this requirement in section 5 of that standard requiring identification, assignment of responsibilities, establishment of communication lines, and documentation for the interface review process. EP 3.01 stated that certain systems, review by the NSSS vendor is required. However, this EP further stated in footnote 7 that the NSSS vendor may decline to review the

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design criteria unless contractually obligated. Thus, EP 3.01 does not actually require review by the NSSS vendor nor did the contract with B&W (contract No. 71C62-54114-2).

Several design criteria were reviewed for documentation of NSSS review. The design criteria reviewed were: N4-NB-D740, N4-KC-D740, and N4-ND-D740. These criteria did not indicate that they had been reviewed by the NSSS vendor. Interviews with personnel familiar with the NSSS contract and its administration confirmed that B&W had not reviewed the design criteria.

NSRS feels that this is a serious breakdown in the QA program in that interface reviews were not being performed as required by Appendix B of 10CFR50.

f. R-81-14-OEDC(BLN)-22, Revisions to Design Criteria

ANSI N45.2.11 discusses requirements that are necessary for the control of design changes. EP 3.01 outlined the procedure to follow in making changes to design criteria by issuing DIM's. This ANSI standard in section 6.2 requires that design changes receive design review commensurate with the review given the original design. EP 3.01 did not require the DIM's be reviewed in the same manner or to a commensurate degree with the original design, in that DIM's were not required to be squadchecked to affected organizations. Only the preparing branch and the design project were required to concur. Concurrence of other organizations which may be affected by the change was not required. For DIM's which are prepared by the design project, no concurrence was required of organizations outside the design project. Thus, a major change could be affected without the concurrence of any of the TPE or SPED branches. Finally, EP 3.01 required that an NCR be generated for design changes to correct a significant error to an issued design criteria, however, it did not include a step in the procedure for determining if an NCR was required.

There were two major shortcomings in the DIM process specified in EP 3.01. These were that a safety review of the change was not required and that an interface review was not required. NSRS believes that these are serious deficiencies in the QA program.

A review of volumes 2, 3, and 4 of the BLN design criteria manual was undertaken to investigate review of the DIM's that were not yet incorporated into design criteria. The DIM's were reviewed to determine if

safety related changes had been made without the concurrence of the NEB systems analysis No. 1 (SA No. 1) section. This section was given the responsibility of assuring overall plant safety in section 17.1A.1.6.3 of the BLN FSAR. Of the DIM's reviewed, DIM N4-SM-D740-3 contained safety-related requirements. This DIM did not contain the initials of personnel in the SA No. 1 section. Although this particular DIM apparently was being reissued only for formal issue, the controlled copy should indicate that the SA No. 1 section concurred in its issue. The DIM's were not reviewed by NSRS for coordination with other affected groups.

NSRS believes that serious deficiencies were present in the procedure governing changes to design criteria in that the requirements of Appendix B to 10CFR50 were not being met.

g. R-81-14-OEDC(BLN)-23, Documentation of System Design Bases

ANSI N45.2.11, section 6.2, requires that design changes be given the same review as the original design. ANSI N18.7 references N45.2.11 for modifications to operating plants. Thus, the requirements in ANSI N45.2.11 are effective for the life of the plant.

Design criteria documented the design bases for safety systems but they were not life of plant documents. EP 3.01 described the steps necessary to deactivate a design criteria. Thus, these documents were not required to be updated to reflect the design of safety systems at an operating nuclear plant.

The FSAR also contained design information concerning safety systems. The FSAR, however, lacked the detailed design descriptions that are contained in the design criteria. For example, a comparison was made between the FSAR descriptions in chapter 9 of the BLN FSAR and design criteria for component cooling water (N4-KC-D740) and essential raw cooling water (N4-KE-D740). The FSAR lacked descriptions of the following safety-related functions.

- (1) the bypass line around the CCS heat exchanger for minimum CSS temperature control
- (2) the use of low CSS surge tank level to isolate the common CCS header
- (3) the bypass lines around the 3B coolers to prevent flashing post-LOCA

- (4) isolation of ERCW to nonessential equipment as described in paragraphs 4.2.7 and 4.2.9 of the ERCW design criteria.

Thus, the FSAR did not contain complete descriptions of the design basis and safety functions performed by the component cooling water and essential raw cooling water systems. Since the FSAR descriptions appeared to be incomplete and the design criteria were not required to be updated, there did not appear to be any document which adequately described the design of these safety systems for the life of the plant. Design changes after a plant has been placed in operation may not have received the same review as the original design since the design is not adequately documented.

NSRS recommends that EN DES devise and implement a method of documenting the complete and up-to-date design basis for each safety-related system for the life of the nuclear plant. EN DES has recently started a program of developing system descriptions as described in an EN DES memorandum dated March 10, 1981 (NEB 810310 263). These documents may satisfy the need for an updated design basis after plant operation. At this time, however, not enough information is known about these system descriptions to make a judgment on their adequacy for fulfilling the need outlined above. The need for this new document, however, is not clear since in the opinion of the reviewers, the design criteria were generally adequate.

b. R-18-14-OEDC(BLN)-24, Lack of Verification of Actual Loadings on Building Steel

During the review it was noted that the design practice was to identify all of the known floor loadings (i.e., large mechanical and electrical components) and add to this some amount of loading margin to compensate for other loadings (i.e., transient loads, temporary loads, etc.) to derive a loading to be used in the design of a building and/or floor. Various design, upset, and faulted conditions were then postulated to finalize the loading to be used in the design. Based on this loading, structural members were sized and design configurations and joint details were finalized. The drawings were then produced, material procured, and finally the structure was built. Supports for cable trays, conduits, instrument lines, piping, and/or HVAC duct are often massive structural members which are attached to the building structural steel. These supports generally were not considered in the loadings of the structural steel except under the loading margin. Observations in the BLN-1 and -2 reactor buildings revealed that a

large number of these supports were welded to the structural steel. A review of the EP's (EN DES and design project's), and QCP's did not reveal any requirement to document and confirm that the final as-constructed loadings on building structural steel were within design allowables. Consequently, the potential exists for structural steel members to be overloaded during design basis conditions.

i. R-81-14-OEDC(BLN)-25, Lack of QA Approved Procedures for Generation, Control, and Use of Certain Computer Programs

Criterion III of Appendix B to 10CFR50 requires that appropriate quality standards are specified and included in design documents and that deviations from such standards are controlled. Criterion V requires that activities affecting quality be prescribed by documented instructions or procedures, and Criterion VI requires control of documents, including review for adequacy and approval.

The OEDC PRM commits to the use of ANSI N45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants." This standard is endorsed by Regulatory Guide 1.64, R2, June 1976. ANSI N45.2.11 states in section 4.1 that document control procedures shall provide for identification of the proper documents to be used in design and for ascertaining that proper documents are accessible and are in fact being used.

EN DES had two categories of computer programs used to produce design documents--"engineering-type" or "business-type". EN DES-AI 102 assigned responsibility for "engineering-type" computer programs to CEB. EN DES-AI 103 assigned specific responsibility for cable routing and computer-assisted piping design to the Project Control Staff (PCS) along with scheduling programs. EP 3.23 was provided to describe how EN DES verifies, documents, and revises engineering computer software that is used in the analysis of a safety-related item (according to its scope statement). Its title, however, was "EN DES Computer Programs Requiring Quality Assurance - Verifying, Documenting, and Revising." This EP covered the programs CEB was responsible for. There was no EP that provided for the work done by PCS.

The EN DES programs for cable routing and termination produced output files which were electronically copied to provide input to CONST programs, which in turn produced documents conveying the design information to the users. These documents included termination slips

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and routing slips and were used to do actual construction. EN DES ensured the validity of their electronic file by reviewing a hard copy printout and maintaining it as a QA record.

NSRS reviewed input and output documents and procedures for BLP use of computers in cable routing, termination, jumpers, and instrument tabulation. The BLP coordinators for these functions were interviewed to determine their understanding and awareness of the EP's covering their work (see section VII.B.2 for a list of documents reviewed). The files of routing and termination verification sheets were examined; and some instrument tabs, which were numbered like drawings and available from TIC as drawings, were examined. Computer-assisted piping design was not examined.

NSRS observed that the termination and routing verification sheets were signed and maintained in file cabinets in accordance with procedures, and the instrument tabulations were treated as drawings; i.e., the instrument engineers reviewed the output and assigned drawing numbers to the hard copy, and subsequently the tabulations fell under drawing control procedures. It was further noted that the engineers and coordinators involved with these systems were adequately aware of their responsibilities and of the program as it affected them. However, there was only limited knowledge of the computer software, the revision level of the software, the names of persons involved in programming and file maintenance, and the exact function of others in the chain of work. Therefore, PCS personnel and procedures were relied on heavily for these tasks.

NSRS concluded that the work of producing, verifying, and maintaining software for cable routing and termination was a design function and that those programs were "Programs Requiring Quality Assurance," to quote the title of EP 3.23. (This EP had a broader title than its actual scope, and a similar procedure was required for the cable routing and termination program, which did not fall under EP 3.23 or CEB.)

NSRS recommends that adequate QA procedures be provided for the cable routing and termination programs' generation, verification, and use.

3. Design Changes

Criterion III of Appendix B to 10CFR50 requires that measures be established to ensure control of design changes commensurate with those applied to the original design. The OEDC PRM

commits to the use of ANSI N45.2.11-1974, "Quality Assurance Requirements for the Design of Nuclear Power Plants." This standard is endorsed by Regulatory Guide 1.64, R2, June 1976. Per the PRM, the BNP program will conform to ANSI N45.2.11-1974 with no exceptions. BLN FSAR, section 17.1A.3.3.4, states that design changes are controlled by written procedures and by the same procedures which control the original design.

Interdivisional procedures address only one specific area of design changes. The one procedure written is ID-QAP-3.2, "Processing of Construction Change Notification (CCN's)." CCN's are utilized by CONST to obtain EN DES review and drawing revision and are issued for changes made to nonsafety related systems, components, or structures. EN DES has established program requirements to meet the above commitments and applicable regulatory requirements by issuance of EP's 4.02, 4.03, and 4.18. These procedures outline the EN DES actions for handling ECN's, FCR's and design change requests. Procedures for specific instructions for branch and BLP implementation were delineated in EEB-EP 22.10, BLP-EP 44.04, and BLP-EP 44.05.

The above procedures were reviewed and compared to the regulatory requirements and commitments. Program implementation was also reviewed.

Based on this review, NSRS concluded that the design change program contained program and implementation deficiencies. The deficiencies resulted from failure to implement regulatory requirements and commitments and could lead to problems involving nuclear safety. Specific concerns identified in the design change program were as follows:

a. R-81-14-OEDC(BLN)-26, Evaluating and Processing Field Change Requests (FCR's)

(1) The hierarchy of procedures within EN DES is generally regulatory requirements (or commitments) to ID-QAP's to EP's. In the case of FCR's, an ID-QAP had not been written to delineate the organizational responsibilities as required by Criteria I of Appendix B to 10CFR50. This situation could lead to:

- Lack of adequate organizational interface control during the processing of FCR's, and
- Lack of written responsibilities to ensure appropriate control for changes to safety related structures, systems, and components.

- (2) Criterion V of Appendix B to 10CFR50 states, "Activities affecting quality shall be prescribed by documented instruction, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings shall include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished." EP 4.03, "Field Change Requests," section 3.1, requires that all documents affected by the FCR be revised either within 30 days from the receipt of satisfactory information or as altered by a written agreement and that the project manager sign and date the FCR after completion of the work associated with the FCR.

Contrary to these requirements, FCR's were not being processed as required by EP 4.03, section 3.1. Areas of concern are:

- (a) Final approval signifying that the change had been completed by EN DES was given prior to (1) revision of all affected drawings and (2) completion of an analysis to verify acceptability of the change.

Examples include:

- FCR M2284 (BLN 801218 600) dated December 8, 1980 was signed by the design project manager on May 13, 1981 implying that all affected documents were revised. However, the seismic analysis for this FCR was scheduled to begin May 4, 1981 and end November 9, 1981. Consequently, the FCR was signed complete prior to revision of all affected documents.
 - FCR M2312 (BLN 801218 593) dated December 16, 1980 was signed as complete on May 13, 1981. However, the seismic analysis for this FCR was scheduled to begin May 21, 1981 and end November 9, 1981. Consequently, the FCR was signed as complete prior to revision of all affected documents.
- (b) EN DES was not processing FCR's within the 30 days specified in EP 4.03. This was also

identified as a problem during a March 1981 QAB audit of BLP (QAS 810403 014), finding No. 3.

(3) EP 4.03 contains several requirements for specific types of reviews of the FCR prior to approval. The more important of these requirements are:

- Section 3.1.10, "(Responsible engineer) Checks whether changes might be required to documents other than those listed on the FCR."
- Section 3.1.11, "(Responsible engineer) Uses squadcheck. . . to ensure that each FCR-affected document is revised as necessary. . . IMPORTANT: If a primary or secondary nuclear safety function is (or may be) affected, the responsible engineer requests . . . NEB to review the FCR for possible impact on the SAR."
- Section 3.1.12, "(Responsible engineer) Coordinates through the contract engineer. . . for any change that could affect vendor documents."
- Section 3.1.13, "(Responsible engineer) As necessary, prepares a Nonconformance Report (NCR) for any safety-related FCR. . . ."
- Section 3.1.14, "(Responsible engineer) Ensures that all documents, . . . , affected by the FCR are revised"

Contrary to regulatory requirements, FCR documentation did not demonstrate that items described above had been considered and/or were accomplished during the EN DES processing of FCR's.

During the course of this review, approximately 75 FCR's were screened for potential problems in the areas in question. Of these 75 FCR's, the following nine FCR's were reviewed in detail for review and processing within BLP.

0-1168	M-2231	M-2334
0-1173	M-2284	M-2450
0-1206	M-2312	0-2474