

The following findings were identified:

- (a) The FCR records did not contain sufficient information to audit the following items: Review for impact on other documents; squad-check of the FCR to affected organizations particularly NEB for SAR impact review; coordination with the contract engineer; NCR determination; and review to ensure all documents affected by the FCR are revised prior to closure of the FCR.

With the exception of FCR's M-2284 and M-2312 which reference DCR's for seismic analysis, none of the FCR's included documentation to allow an audit to confirm that all aspects of the requested change, particularly seismic reanalysis, had been requested much less been performed prior to closeout of the FCR. Consequently, it is difficult if not impossible to assess whether or not these determinations have been made. As a result, the potential exists for FCR's to not get an adequate and/or complete review by EN DES. The safety significance of this situation is that the potential exists for changes that could adversely affect the safe operation of the plant to be made and approved under the FCR program. In addition, there is no ready mechanism to ensure all modifications and document revisions are complete prior to transfer to POWER.

- (b) FCR's M2334 and M-2450, which involved the rerouting of one-inch service air and demineralized water lines to avoid field interferences, were approved on May 8, 1981. The affected drawings 3RW0472-00-01 and -05 were issued on May 4, 1981 after being revised by ECN S1. A statement that reanalysis was not required is contained in the revisions block along with the FCR numbers. Note 11 on drawing 3RW0472-00-01 states that all piping is to be supported by the field and is support category "A4" and "A6" as defined in BLP EP 44.76.

A review of the piping involved revealed that it is supported using "A4" supports. Per the definition of "A4" supports contained in section 2.4 of BLP-EP 44.76

CONST applies analysis guidelines for these supports. Consequently, the note "Reanalysis not required" is not appropriate in this situation since CONST, not EN DES, must make that determination. In addition, section 5.0 of BLP-EP 44.76 requires that a DCR be prepared by EN DES for modifications to existing seismic analysis and be sent to the BLP field engineer for incorporating into the seismic analyses. Contrary to this requirement there is no record of DCR's being prepared or sent to the field for these FCR's.

This results in the potential for modifications to be made to EN DES approved routing of piping without the reevaluation of the seismic analysis to determine the potential impact of the modifications. It is possible under such a situation for piping routing to change such that the seismic analysis is invalidated.

b. R-81-14-OEDC(BLN)-27, Evaluating and Processing Engineering Change Notices (ECN)

- (1) An ID-QAP has not been written to delineate the organizational responsibilities as required by Criterion I of Appendix B to 10CFR50. This could result in inadequate organizational interface control and inadequate definition of responsibilities to control changes to safety-related equipment.
- (2) The ECN processing program described in EP 4.02 does not provide sufficient control over the processing of changes to the design to assure that the full safety consequences of changes are considered prior to physically changing or issuing revised drawings. Examples of the above are as follows:
  - (a) The criteria in figure 2.0 of EP 4.02 for determining when TPE branch approval of an ECN is required was not consistently being followed. ECN's 778, 782, 872, 764, 970, 973, 771, 773, 920, 1006, etc., involve changes to safety-related systems. Yet, contrary to the guidance in figure 2.0, none of these ECN's were sent to the TPE branches for approval.
  - (b) From the ECN coversheet, one could not 1) determine whether or not some determinations have been made as required, 2) identify other documents other than drawings requiring revisions as a result of the ECN, and/or 3)

review the basis for answering the questions in the lower right hand corner of the ECN coversheet. This situation has the following implications.

- The potential existed for drawings to get revised without supporting documentation (i.e, design criteria, seismic analyses, separations criteria, vendor manuals, etc.) being revised to reflect changes. Consequently, changes may not have been properly evaluated for safety significance under the present system.
- The ECN coversheet did not reference other documents which were generated or revised in support of or as a result of a change. Consequently, in the future, retrieval of all documentation that supports an engineering change would be a difficult if not impossible task. Also, the evaluation of decisions required to answer the questions on the ECN coversheet cannot be made unless the basis for the answers to these questions are documented and referenced on the ECN coversheet.

c. R-81-14-OEDC(BLN)-28, Revision of Drawings by the ECN S1 Change Program

EP 4.02 contains conditions for utilizing ECN S1 changes to design drawings. ECN S1 changes are allowed when, for example, the change is minor and involves only one branch, one design group, one drawing, or only related drawings. A minor revision is defined as one which does not impact CONST's construction schedule or EN DES' workload estimates for the project. Examples of when ECN S1 changes are disallowed include revision to the SAR document or drawings, doubt about whether another group should be notified, the revised drawing(s) require squadchecking, or the revised drawings require signout by a branch outside the preparing branch.

Even changes determined by EN DES to be minor can impact CONST by necessitating correction of QA records and documentation. The ECN S1 process also did not provide for a method to track CONST work.

- (1) Contrary to the conditions stated in EP 4.02, an excessive number of drawings were revised by violating these conditions. Examples identified included.

- (a) Revised drawings which require squadchecking or signout by a branch outside the preparing branch are not to be revised by S1 ECN's. However, DCD's and FCLD's were commonly revised with S1's and virtually every DCD and FCLD for BLN has been so revised.
  - (b) DCD No. 3GW0653 KE-03, R5, S1, removed status monitoring from three valves which ECN-898 added. This violates criteria 3.6.3.a, b, and e of EP 4.02.
  - (c) DCD No. 3GW0653-KE-05, R4, S1, added valve Nos. VGDC-641-B, VGDC-640-A, which violates criteria a and b of EP 4.02.
  - (d) DCD No. 3AW0678-NB-02, R3, S1, added radiation monitor elements 917,918 and associated lines and valves to drawings.
  - (e) FCLD No. 2GW0900-VK-S, R1, S1, was used to make general revisions to this drawing as described in the title of the drawing. The drawing was in revision 3 at the time of the review, which made it difficult to determine the exact nature of the changes made. Since other S1's are described as minor changes in the title blocks, it appeared that the S1 change was inappropriately made.
  - (f) DCD No. 3BW0617-NC-01, R5, S1, changes pressurizer spray line from discharge of pump 1A2 to 1A1. This is not a minor design change.
- (2) EP 4.02 on ECN S1 changes contains a conflict in that section 3.6.2.d allows the addition of a UNID code to a FCLD which section 3.6.3.e disallows it.
- (3) The potential safety significance is not a condition for allowing or disallowing an ECN S1 change. Conditions such as "make the change if it is minor" or "do not make the change if it results in a revision to the SAR document or drawings" are not acceptable substitutes for a determination of safety significance (i.e., is the health and safety of the public endangered if the proposed change is made to the plant).

The existing stated conditions in EP 4.02 do not ensure that safety significance will be evaluated.

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

The hierarchy of procedures within EN DES is generally regulatory requirements (or commitments) to ID-QAP's to EP's. In the case of CCN's an EP had not been written to ensure that the following items would be considered:

- review for impact on other documents
- squadchecking the CCN to affected organizations
- NCR determinations
- coordination with the contract engineer
- confirmation that a safety-related system is not affected

In addition, documentation of CCN's was inadequate to demonstrate that the items listed above were considered.

e. R-81-14-OEDC(BLN)-30, ECN Closures

An ECN closure sheet is issued by EN DES when all drawings affected by the ECN have been revised and issued. This is CONST's notification that EN DES design work is complete and field implementation of work may proceed. NSRS reviewed ECN status and found that: Three ECN's written in 1977 have not been closed, four ECN's written in 1978 have not been closed, and fourteen ECN's written in 1979 have not been closed.

NSRS concludes that good engineering practice is not demonstrated by these situations.

4. Configuration Control

Criterion VI of Appendix B to 10CFR50 requires that measures be established to control the issuance of documents including drawings, and changes to them, which prescribe activities affecting quality. Criterion VI continues by stating that these measures shall assure that documents, including changes, are reviewed for adequacy and approved for release by authorized personnel and are distributed to and used at the location where the prescribed activity is performed. 10CFR50.57 discusses the issuance of an operating license and states applicable contingencies. One of these requires that construction of the facility has been substantially completed, in conformity with the construction permit and the application as amended, the provisions of the Act, and the rules and regulations of the Commission. Relative to this, an established and implemented configuration control program is essential to:

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- Confirm that the construction of the facility has been substantially completed.
- Compare the facilities' physical configuration to that described in the FSAR and engineering drawings.
- Confirm that engineering calculations (e.g., seismic analysis, electrical load analysis, etc.) will be validated by analyses reflecting as-constructed configurations.
- Document the final as-built configuration.

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. BLN FSAR sections 17.1A.6.1 and 17.1A.6.2 state EN DES responsibilities regarding tabulation of significant drawing information.

OEDC has established program requirements to meet the above commitments and applicable regulatory requirements in ID-QAP-6.1, "Configuration Controls." This procedure defines the interfaces and responsibilities of EN DES and CONST as they relate to the control of as-constructed drawings from the time of first system transfer until licensing of the last unit.

ID-QAP-6.1, section 2.3.2, states the DIS printout capability for items, such as ECN basis, as-designed basis, and as-constructed basis. The DIS information provides the capability to obtain a list of the latest revision of as-constructed drawings for any system on a given date.

DIS input responsibilities are as follows: EN DES inputs the basic drawing information such as drawing numbers, revision levels, ECN numbers, etc.; CONST inputs the status codes to indicate how the facility is built relative to the as-designed configuration.

EN DES had implemented this responsibility by issuance of EP's 4.16 and 4.19. These procedures explained in detail the EN DES actions necessary to implement the configuration control program. 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 configuration control program that had been established was adequate to meet regulatory requirements and commitments with certain exceptions. The program will ensure control, status, and distribution of "as-constructed" drawings. Personnel contacted were well aware of their responsibilities. Weaknesses observed in the configuration control program were as follows:

a. R-81-14-OEDC(BLN)-31, Drawing Information System (DIS)

ID-QAP-6.1 states that construction status shall be maintained for all drawings required to perform work or to verify equipment configuration. Vendor drawings required to perform work or to verify equipment configuration are submitted to EN DES either within the vendor manuals or separately for review and approval. These drawings included instrument tabulations, termination instructions, cable routing, internal wiring diagrams, and parts lists; and documenting their "as-constructed" status is necessary to have a valid configuration control program. The vendor drawings submitted separately are incorporated into the DIS following EN DES review and approval. This sequence for handling vendor drawings was confirmed on a limited basis.

The problem identified by NSRS is that drawings submitted within the vendor manuals were not incorporated into the DIS. This creates a situation where drawings required to perform work or to verify equipment configuration are not listed on the DIS; therefore, the documentation of the "as-constructed" configuration of some vendor equipment was not complete. This situation was confirmed by reviewing vendor manuals for radiation monitors (contract 821696) and seismic monitoring equipment (contract 823700). Drawings submitted in the manuals and required to perform work or to verify equipment configuration were not incorporated into the DIS.

Relative to this concern, EP 5.14, "Vendor Documents - Handling and Disposition," does not instruct EN DES personnel to identify drawings which are only submitted as part of vendor manuals and to review them for applicable input into the DIS list.

b. BLN Drawing Control

ID-QAP-6.1 assigns responsibility to prepare and revise the SCCDL to the NUC PR Plant Superintendent; the CONST Project Manager reviews and accepts the SCCDL and notifies EN DES when reproducible are needed to place specified drawings under configuration control. In two memoranda from BLP to BLN (BLP 810520 047 and BLP 810605 012), BLP had taken a position that the motor control center single line diagrams will not be revised to correctly reflect the as-designed configuration until just prior to plant startup. This creates a situation acknowledged by management where design drawings issued to the site fail to reflect the as-designed configuration.

The lack of up-to-date, as-designed configuration for the motor control center single line diagrams involved the following complications:

- (1) CONST forces must interpret the EN DES as-designed drawing conflicts to determine the required configuration EN DES intended to achieve.
- (2) ID-QAP-6.1 requires that the list of configuration control drawings include those needed for operation and maintenance. This requirement could not be satisfied without up-to-date, as-designed motor control center single line diagrams.

This weakness had been corrected by BLP in a memorandum from R. M. Hodges to W. R. Dahnke dated June 23, 1981 (BLP 810623 133). In this memorandum, EN DES agreed to update and place under configuration control the motor control center single line diagrams. Therefore, no further corrective action is required.

## 5. Quality Assurance

A summary of the basic requirements for establishment and execution of a quality assurance program for nuclear power plants is given in section V.A.2 of the report. The following paragraphs discuss the quality assuring or auditing function in EN DES.

Criterion XVIII of Appendix B to 10CFR50 requires that a comprehensive system of audits be carried out to verify compliance with all aspects of the quality assurance program and to determine effectiveness of the program. The OEDC PRM commits to the use of ANSI N45.2.12, "Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants," draft 3, R4, dated February 1974, as a means of implementing this requirement. The PRM also states that TVA has elected to conform to the provisions of the issued edition (1977) of this standard. BLN FSAR section 17.1A.18.2 briefly describes how the EN DES audit program will be implemented.

Responsibility for establishment and execution of QA programs has been delegated by the Manager, OEDC, to the Managers of EN DES and CONST for their respective divisions. The OEDC QA Manager has the responsibility of establishing basic QA policies and requirements, providing guidance, and overseeing the division programs. Within EN DES, the Chief, Quality Assurance Branch, directs the development and maintenance of the QA program, to include audit functions internal to EN DES and external audits for vendors. These audit programs are defined in EN DES EP's 1.29 and 5.34, respectively. NSRS had previously reviewed the external audit and surveillance function to a certain degree (Investigation Report No. 1-80-14-NPS - GNS 810202 003). Because of this and the time constraints for performance of the current review, efforts were concentrated on the internal audit function.

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Other functions performed by QAB, such as NCR review and followup and trend analysis are discussed in section V.B.6 of this report.

The internal audit function is controlled by EP 1.29, "Internal EN DES Quality Assurance Audit Program." It provides directives and guidance for audit preparation, conduct, documentation, followup, etc. Review of the procedure and comparison to commitments and requirements resulted in minor comments. These comments were discussed with the Supervisor, Quality Assurance Audit Section. The provisions of the EP are implemented through an audit schedule prepared at the beginning of the year and approved by the Chief, QAB, and Manager of EN DES.

NSRS reviewed the various documents listed in section VII.B.5 of the report. Supporting records such as auditor's notes and correspondence to and from the audited organizations were reviewed for each of the audit reports listed. These were discussed with QAB personnel as required to clarify or confirm the reviewer's observations.

During the review, it was noted that the Manager of EN DES had issued a policy statement on QA. This was issued January 16, 1981 (QAS 81G116 002) in response to an OEDC QA audit finding. It was also observed that the Chief, QAB, had issued a memorandum to all branch employees on September 19, 1980 defining branch goals for the coming fiscal year. NSRS believes the issuance of documents such as these is a positive step.

The EN DES quality assuring function was reorganized in September 1980. This was a result of concerns by OEDC QA and the NRC regarding independence and authority of QAB to identify and pursue resolutions to problems. (See NRC report 50-438,439/80-13 and OEDC QA audit report M79-12) During the review, it was observed that positive changes have been made, but it was felt that the internal audit function was still in a transient stage. For this reason, NSRS believes it's necessary to describe the historical problems observed as well as the current status and future plans of QAB. This approach is necessary to provide the desired perspective on achievements gained thus far relative to changes needed for QAB to become a fully effective audit group.

Review of the various documents listed in section VII.B.5 and discussions with EN DES, QAB and other personnel resulted in the following observations:

a. Problems Prior to Reorganization

- (1) Audit plans/checklist, per se, were not used. In most cases copies of EP's or other procedures were highlighted, denoting what was to be checked. This does not meet the requirements of ANSI N45.2.12 or the commitment of BLN FSAR section 17.1A.18.2.1. The referenced FSAR section commits to use of checklists which are reviewed and approved by quality assurance management.
- (2) Very little technical input was observed in most audits. This observation was confirmed by interviews with various EN DES personnel. There were three notable exceptions, and on one occasion, QEB was informed by management that the subject was not within their purview (78-7). This instance, noted by OEDC QA in audit report M79-12, deficiency 6, was the focal point of NRC concerns documented in the inspection report referenced earlier.
- (3) Maintenance of audit support records did not meet the provisions of paragraph 5.2 of ANSI N45.2.12 and N45.2.9. As noted earlier, individual audit plans or checklists were not utilized. In most audit packages reviewed, supporting documentation was present, but these were being stored in non fire-rated cabinets. Only the audit report and official correspondence were in MEDS. In an extreme case, 79-15, only the audit notification, audit report, and a 45D were found in the audit package maintained by QAB.
- (4) Responses to audit findings were often late, that is, not within the 30 days specified by EP 2.19 (e.g. 80-01, 80-02, and 80-04).
- (5) Manpower resources appeared to be insufficient. Two auditors, and at times only one, were assigned to accomplish the internal audit function. Additional staff was added in late 1980 and early 1981.

b. Observations Regarding More Recent Audits

Review of more recent audits and discussions with QAB personnel indicate that most of the weaknesses observed were being rectified. For example, written checklists are now being utilized. For the audits reviewed, checklists were first observed for audits 80-13, conducted February 9 through March 4, 1981 and 80-14, conducted March 2-6, 1981. EP 1.29 was revised to provide for approved checklists April 6, 1981 (revision 3).

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More technically oriented audits are planned. Experts from within EN DES will be used to assist in auditing groups other than those in which the experts work. Also, the Chief, QAB, had requested that situation studies be performed in selected potential problem areas. These would be conducted in addition to the routine, programmatic audits.

The following weaknesses or problems still existed at the time of the review:

(1) R-81-14-OEDC(BLN)-32, Audit Records

Audit support records were not being maintained per ANSI N45.2.9 as discussed in paragraph a.(3).

(2) R-8-14-OEDC(BLN)-33, Staffing

Although additional auditors have been added recently, more appear to be required to accomplish the internal audit function in a meaningful fashion. This is due in part to the need for increased scope and depth of its internal audits, as recognized by QAB.

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

Apparently no single procedure exists which delineates responsibilities of the groups and persons within QAB. NSRS feels that a single-source document defining responsibilities is essential in outlining who does what. This allows, for example, more effective interfacing with other branches and groups. Such a procedure was being developed at the time of the review, but had not been finalized or approved.

In summary, NSRS concludes that the internal audit function in EN DES prior to establishment of QAB was largely ineffective. In that improvements in certain areas have occurred only in the three or four months prior to the review, it was too early to say whether the present program is fully adequate. However, recent activities indicate that a viable, effective audit function can be achieved if the present direction is maintained. An evaluation of this function should be performed again in a few months.

## 6. Corrective Action

### a. Background and Program Description

Criterion XV of Appendix B to 10CFR50 requires that measures be established to control materials, parts, or

components which do not conform to requirements in order to prevent their inadvertent use or installation. It further requires the nonconforming items be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures. Criterion XVI of Appendix B further requires that conditions adverse to quality be promptly identified and corrected. In the case of significant conditions, it requires that the causes be determined and corrective action taken to preclude repetition. It further requires that the significant conditions, the causes and corrective actions taken be documented and reported to management. Sections 16 and 17 of ANSI N45.2-1971, "Quality Assurance Program Requirements for Nuclear Power Plants," utilize basically the same language as the referenced criteria of Appendix B. This standard, endorsed by Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)," is committed to by the OEDC PRM. The PRM also commits to use of ANSI N45.2.11-1974, "Quality Assurance Requirements for the Design Of Nuclear Power Plants," and ANSI N45.2.13-1976, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants." Section 9 of each of these standards requires establishment of measures to control the identification and handling of deficiencies, with emphasis on significant ones. Additionally, sections 17.1A.15 and 17.1A.16 of the BLN FSAR give brief descriptions of the programs for effecting corrective action.

An extension of the EN DES corrective action program encompassed in the review involved reporting of problems and defects to the NRC. 10CFR21 requires that suppliers, contractors, owners, or operators of nuclear plants report certain type problems to the NRC. Likewise, 10CFR50.55(e) requires certain problems to be reported for plants which have construction permits. Review of items for reportability and actual reporting is handled by NEB/NLS of EN DES for all of OEDC.

OEDC QA has established basic guidelines and instructions for implementation of programs to implement Criterion XVI of Appendix B by issuance of OEDC QAI 4, "Determining, Reporting, and Correcting Conditions Adverse to Quality." It has also provided for independent review of nonconformances, audit findings, and formal appraisal findings for significance and reportability through procedures MO-QAP 3.2 and MO-QAP 3.4.

EN DES has established a system for effecting corrective action to include identifying, evaluating, correcting, reporting, documenting, and tracking

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conditions adverse to quality. This program consists of EP's 1.15, 1.26, 2.02, 2.07, 2.10, and 2.11. It should be noted that there is no intermediate tier of procedures/programs in EN DES as was found for CONST, where QAPP's and QAP's are used to further define requirements and to provide guidelines for their implementation by the sites. EP 1.26 controls the generation and handling of NCR's within EN DES. The NCR form is used to document all conditions adverse to quality. EP 1.26 also provides for handling/disposition of NCR's coming to EN DES from the construction sites or vendors and suppliers. EP 2.02 provides for the evaluation and determination of reportability of deficiencies under the requirements of 10CFR21 and 50.55(e). EP 2.07 describes a system for control and tracking of commitments to the NRC. EP's 2.10 and 2.11 provide for handling of responses to NRC IEB's and inspection reports, respectively. Finally, EP 1.15 provides for a review of occurrences reported to the NRC for operating plants to determine if problems might be applicable to plants under design and construction.

NCR's are reviewed for significance within the originating branch. Additionally, they are reviewed by EN DES QAB and OEDC QA and may be upgraded to significant by either of those groups. If an NCR is determined to be significant at any point in its processing/review, a copy is immediately taken to NEB/NLS of EN DES. As noted earlier, this group handles reviews for reportability and the reporting function for all of OEDC. Significant NCR's are also reviewed by QAB to assess adequacy of actions taken to prevent recurrence. For those NCR's originated within EN DES, QAB also verifies completion of all associated corrective actions.

### b. Details of Review

The documents listed in section VII.B.6 of this report define the EN DES program, or are products of the program, for corrective action and attendant functions, such as trending and reporting. These were reviewed and discussed, and procedural/program requirements were compared to the aforementioned requirements and commitments. Interviews were conducted to determine individuals' awareness of procedures and responsibilities. All persons contacted in this regard were familiar with procedures and understood their responsibilities except as noted later. The handling of NCR's was reviewed for certain groups in EN DES, but this implementation review was limited due to time constraints. The following paragraphs further describe the review process and provide conclusions and findings in the area:

**(1) Problem Identification and Evaluation**

Per EP 1.26, the NCR form is the form used in EN DES to identify and record all conditions adverse to quality. It is also the only form used to report to management all significant conditions. It further requires that each branch or project maintain a file or log of NCR's initiated by the branch or project or requiring their action.

The logs of NCR's maintained by the individual groups were reviewed in CEB, EEB, NEB, BLP, and QAB. In all cases, the means of review, disposition, and other handling of NCR's initiated within the groups were compared to the provisions of EP 1.26 by review of a sampling of NCR's for each group. Documents reviewed demonstrated general compliance with EP 1.26 with an isolated exception noted below.

For BLP, the handling of NCR's from BLN was also reviewed by review of a large number of NCR's from BLN. Documents reviewed confirmed that reviews for significance were being performed, and in fact NCR's had been upgraded to significant by BLP on occasion. It was noted that a large number of NCR's had been referred to the branches for dispositioning, which one might expect in that the original designs came from those groups. Weaknesses in the program observed are discussed in detail below.

During the review of QAB functions, the role of review of corrective actions and actions to preclude recurrence for significant NCR's was included. Also, the function of review of corrective action for EN DES originated NCR's to assure completion prior to closure was reviewed. Review of QAB records revealed that the role of independent review for significance was being performed and that several had been upgraded in the past. These activities appeared to be in accordance with procedures.

Regarding the logs of NCR's maintained by the various groups, it was observed that they varied considerably in sophistication and extent of information entered, and thus the amount of information provided as to status and nature of each NCR. The simplest log observed was that of CEB which was merely a log of the NCR numbers by project. This group was in the process of developing a more detailed logging system which would provide status and significance as well as other information.

Specific weaknesses or problem areas observed were as follows:

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

In reviewing the logs of BLP-generated NCR's, it was noted that relatively few have been generated within that group. For example, in 1979 a total of seven were written. In 1980 13 were written, and through May 8, 1981 a total of 16 had been generated in this calendar year. It was also noted that a high percentage of those written had been deemed significant. For example, of the 16 generated through May 8, 1981, 12 had been significant. These numbers, in conjunction with information obtained during interviews by various team members, indicates an apparent misunderstanding of the requirements of EP 1.26 regarding documentation of problems and then determining whether a true "nonconformance" exists. Paragraph 3.0, Policy, of EN DES EP 1.26 states, in part, "The EN DES Nonconformance Report (NCR) form (Attachment No. 1) is the form used by EN DES to identify and record all conditions adverse to quality." Paragraphs 5.1.3 through 5.1.5 require that anyone in EN DES identifying a potential nonconformance immediately record the condition on an NCR form and submit it to his supervisor. Paragraphs 5.1.6 and 5.1.7a provide for supervisor review and determination as to whether a nonconformance exists. If no nonconformance is found to exist, means of documenting the reasons why are provided.

It should be noted that a similar observation on use of the NCR was made by QAB in paragraph 4 of audit report SS-81-4 dated May 12, 1981 regarding other branches and projects.

NSRS believes EN DES management should evaluate this matter to assure that all employees understand the requirements of EP 1.26 regarding documentation of potential problems and to assure compliance with those requirements.

(b) R-81-14-OEDC(BLN)-36, NCR Resultant Document Changes

The procedures in EP 1.26 for dispositioning NCR's sent to EN DES (BLP) from the sites do not specify when drawing or other document changes are required or when they should be

considered. Frequently, NCR's are dispositioned "use as is" when a component or structure has not been constructed per drawing. It was found that there is no consistency in the correspondence back to the site (BLN) in stating whether a drawing or other change will be or should be made. NSRS believes procedures should be revised to require consideration of whether a drawing or other document change is needed. Also, a statement should be required, pro or con, in dispositioning correspondence as to whether a drawing or other change is required, and if so, who is responsible. Examples of site NCR's wherein dispositioning correspondence did not define whether drawing changes were needed included 1247 and 1409.

(c) CEB NCR WBNCEB 8101 "Voided"

During the review of CEB NCR files, it was observed that NCR WBN CEB 8101, initiated January 6, 1981 had not been processed per EP 1.26. CEB had concluded that no nonconformance existed, but the NCR had not been distributed as required by step 5.1.7a of EP 1.26 as of June 24, 1981. The file copy had been marked "voided." This appeared to be an isolated case and probably was not handled appropriately due to oversight. The reviewer feels that the more sophisticated tracking system being developed by CEB will help preclude such apparent oversights; therefore, no written response is requested on this matter.

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

Revision 2 of QAI-4 dated April 22, 1981 contained a new definition, including examples of significant conditions adverse to quality. At the conclusion of the review, step 1.2 of EP 1.26 still contained the old definition given in QAI-4. EP-1.26 should be revised to agree with QAI-4.

(2) Notification and Reporting

As discussed in paragraph a., EP 1.26 provides for timely notification of management of significant conditions adverse to quality. Also, significant NCR's and audit findings are transmitted to NEB/NLS for review for reportability to NRC under provisions of 10CFR50.55(e) and 10CFR21. Documents reviewed

indicated that significant items were being forwarded to NEB in a timely fashion and that reviews for reportability were being performed as required by EP 2.02.

The NEB worksheets used in determination of reportability of problems per 10CFR50.55(e) and 10CFR21 were reviewed and discussed. It was observed that, per these worksheets, problems in design produced by EN DES would never be reportable under the provisions of 10CFR21, although the same problem might be reported under 10CFR50.55(e). Discussions with NEB/NLS personnel revealed the reviewer's understanding to be correct. In that no procurement document is involved between EN DES and POWER, a key stipulation of Part 21, it generally does not apply to EN DES products. This interpretation had been supported by TVA's OGC. The reviewer had no further questions on this matter. The worksheets for 10CFR21 and 50.55(e) appeared to implement the requirements of the referenced regulations effectively.

(3) R-81-14-OEDC(BLN)-38, Tracking Systems

In addition to the NCR tracking systems used by the branches and projects, NEB/NLS maintains tracking systems for items identified by the NRC, items reported to the NRC, and commitments made to the NRC or other regulatory bodies. These are discussed in the following paragraphs.

NEB/NLS issues a monthly status report of open NRC-OIE items of nonconformances and noncompliances impacting OEDC. This is intended to be an aid to those affected in planning of work and resolution of the items. NLS coordinates preparation of written responses to OIE reports as well as reports per 10CFR50.55(e). Recently, more emphasis was placed on the quality and content of reports, normally prepared by the affected organization (NEB 810318 268).

Increased emphasis has also been recently placed on control and tracking of commitments made to the NRC. Memoranda from M. N. Sprouse to Those Listed, QAS 810212 001, QAS 810312 001, and NEB 810306 298, provide for assessment of adequacy of the program and provide for more stringent controls in making commitments and assuring they are met. EP 2.07, which covers this area, was undergoing revision at the time of the review. The program appeared capable of handling future

commitments, such as in plant SAR's, would be adequately identified and tracked. The program initiated by M. N. Sprouse's memorandum QAS 810312 00' was an investigative one, where by sampling specific areas, an assessment would be made on past performance in meeting written commitments. These results should be evaluated closely by management. If the results do not conclusively demonstrate a good record, a program to assure that previous commitments have been or will be met should be instituted. Otherwise, TVA will continue to be subject to citations by the NRC for failure to meet commitments.

#### (4) Trend Analysis/Generic Reviews

Trending analysis of conditions adverse to quality in EN DES is the responsibility of the Quality Engineering Section of QAB. This was originally the responsibility of OEDC QA but was transferred to the divisions on January 1, 1978 by memorandum from G. H. Kimmons (EDC 770830 003). As a part of the review, a briefing was obtained from QAB on the status of their trending effort and the types of products available at that time. At the time of the review, all previous NCR's for all projects had been entered into the data base. Various types of printouts were available, such as all NCR's by project, by root cause, all projects, etc. Samples of these printouts were observed and discussed. It was noted that QAB had conducted briefings for the EN DES groups to familiarize them with capabilities of the trending program. Although much effort had been devoted, the trending program was not fully functional at the time of the review.

QAB engineers assigned to the projects for NCR reviews and other functions observe the NCR's for trends. Examples of trends noted by this process were discussed. This process was being documented by a new procedure, QAB-EP 26.11, "Identification and Investigation of Potential Generic Conditions Adverse to Quality." This procedure was in draft form as of mid-June, but approval was imminent. The procedure will formalize QAB efforts in assuring that potentially generic problems are investigated by applicable branches and/or projects.

Problems observed in the trend analysis area were as follows:

(a) R-81-14-OEDC(BLN)-39, Trend Analysis Program not Functional

As noted earlier, considerable effort had been expended by QAB on the NCR trending function; however, the program had not evolved to the point of producing meaningful, useable output. Although semiannual reports have been submitted to management, these have been of a status nature and have given no detailed information resulting from analyses (e.g., QAS 810105 001).

BLN FSAR section 17.1A.15.1, submitted in 1977, states that periodic reports containing summarized data on trends, as well as graphical displays of quantitative trends as a function of time, are submitted to management. Contrary to this commitment, no reports of such a nature have been submitted. In fact, the program was not capable of sorting NCR's on a time function at the time of the review.

Related to the above are the statements in BLN FSAR sections 17.1A.1.5.3 and 17.1A.15.1 that OEDC QA does the trending and reporting. As noted earlier, this function was transferred to the divisions January 1, 1978, but the FSAR had not been updated.

7. Training and Qualifications of Personnel

The development of the NRC requirements and the OEDC Manager's program for QA training and qualification of personnel has been presented in Section V.A.1.a of this report. The EN DES program for training and qualification of engineers, designers, draftsmen and QA auditors is contained in the following paragraphs.

AI 320.01, R2, "EN DES Policy and Guidelines for Employee Training and Development Activities" covers policy, definitions, administrative responsibilities, and budgeting activities for the EN DES employee training and development program. EP 1.16, R2, "QA Training Program" had been developed to assign responsibilities and provide a methodology for establishment of an EN DES QA training program. EP 1.30, R2, "Qualification Requirements for Personnel Assigned Quality Assurance Activities," establishes qualification requirements for personnel in the EN DES engineers, designers, draftsman, and support personnel and assigns responsibility to ensure that the requirements are met.

The documents listed above and in Section VII.B.7 of this report constitute the EN DES program for the training and qualification of EN DES personnel. These documents were reviewed and compared against the requirements of ANSI N45.2-1971 and N45.2.6-1973, and personnel were interviewed to arrive at the following conclusions/findings:

a. EN DES QA Training

Qualification requirements had been established for engineers and designers performing quality related functions, however, EN DES had not implemented a QA training program to ensure that those qualification requirements would be met. For details see Section V.A.4.d of this report.

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

OEDC management had made a distinction between "technical" training and "QA" training. QA training was interpereted as being required by the NRC requirements and includes QA requirements indoctrinations plus training in 10CFR50 Appendix B, ANSI N45-2, the applicable EP's, SAR's, codes, and standards in the employee's area of responsibility. "Technical" training was that training that is needed to ensure that the employee's knowledge and skill level is adequate to perform the activity correctly and is not required by the NRC regulations.

The review of the technical training program for engineers and designers indicated that responsibility for this training was assigned to the group heads of the branches. It was their responsibility to identify the training needs, and to provide on-the-job and special intergroup training. If training was required that could not be provided by the branch or group, a training support group had been established to assist in providing the training. An engineering procedure, EP 1.30, had been established which assigned responsibilities, established training priorities, and provided the mechanism for obtaining training support.

A review of the technical training being conducted indicated that EEB, CEB, and NEB had been performing training as determined to be necessary by the group heads. Other branches such as BLP had not developed training programs, but relied on on-the-job training.

In addition to the training being conducted in-house, provisions had been established for obtaining training from outside TVA. Discussions with individuals indicated that budget restrictions imposed during the

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past year had an effect on technical training. TVA personnel travel funds for training other than Priority I (Operational) had been restricted. Priority I training was permitted with the approval of the EN DES Division Manager.

Although EN DES management had assigned responsibility for training and provided mechanisms for obtaining outside training, they had not established training requirements to ensure that technical training programs would be implemented in the branches.

NSRS concludes that the policy being put into effect where a distinction is made between "technical" and "QA" training is consistent with the practices of the nuclear industry and practices accepted by the NRC. NSRS also concludes that the technical training program is adequate to meet NRC requirements, however, NSRS believes that additional management emphasis is needed to ensure that uniform technical training programs are implemented by the EN DES branches.

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

A written, approved program for the training of QAB auditors had not been established by EN DES. EN DES had assigned the responsibility for determining that auditors were qualified to a well qualified individual who either provided or obtained the training that he determined was necessary to meet the qualification requirements designated in ID-QAP 18.1. Although review of auditor qualification records indicated that the requirements of ID-QAP 18.1 were being met, formal training requirements had not been established or approved by QAB management above the M-5 level. NSRS concludes that the program for qualifying QA auditors is adequate to meet the NRC requirements and ID-QAP 18.1, however, it is personnel dependent and subject to program breakdown if experienced key individuals were to no longer have responsibilities for the program.

## 8. Records and Document Control

Criterion VI of Appendix B of 10CFR50 requires that programs be established to control the issuance of documents, and changes to them, which prescribe activities affecting quality. Criterion XVII of Appendix B requires that records which furnish evidence of activities affecting quality be maintained. The OEDC PRM commits to the use of ANSI N45.2.9-1974, "Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants." This standard is endorsed by Regulatory Guide 1.88, R2, October 1976. Per the PRM, the OEDC program will conform to ANSI N45.2.9-1974 with the exception that one hour fire-rated filing cabinets will be provided for temporary storage of records as opposed to the two hour fire rating specified in the 1977 edition or four hour rating specified in the 1974 edition. Additionally, BLN FSAR sections 17.1A.6 and 17.1A.17 define certain basic commitments to be implemented by the EN DES records and document control program.

OEDC QA has established program guidelines for meeting the referenced commitments and regulatory requirements via ID-QAP 17.2, "Quality Assurance Records for Design and Construction," and ID-QAP 17.1, "Transfer of Quality Assurance Records." EN DES and CONST have the responsibility for establishing programs to control origination, identification, accumulation, maintenance, storage, and other processing of QA records within each division. The requirements and commitments referenced above are implemented in EN DES by provision of instructions for generation and control of records and documents in EP's and AI's. A central system, MEDS, has been established for receipt, storage, preservation, and retrieval of records. The MEDS system operation is described in the MEDS Handbook and MEDS procedures (MP).

The procedures and other documents listed in section VII.B.8 of the report were reviewed, discussed, and compared to the provisions of the requirements and commitments discussed earlier. Brief tours were conducted in the TIC and MEDS (fourth floor-East Tower) to observe and discuss the manner in which documents were being processed and stored. With the exception of storage conditions for certain types of documents, discussed in more detail later in this paragraph, activities observed appeared to be in conformance with procedures and other requirements. Due to time constraints, only a limited review was performed for document control within the branches and projects as part of the review of other functional areas. Based on the review performed, it is concluded that the EN DES program for records and document control is adequate to meet requirements and commitments with certain exceptions, which are noted below. Personnel

interviewed were aware of their responsibilities and were familiar with procedures involved. Except for requirements for storage of one-of-a-kind QA records, personnel also displayed familiarity with basic requirements in this area.

Specific problems or weaknesses observed during the review were as follows:

a. R-81-14-OEDC(BLN)-42, Storage of Codes and Standards

Per ID-QAP 17.2, MEDS is responsible for archival maintenance of OEDC QA records. One of the types of records specified by ANSI N45.2.9-1974, Appendix A, to be retained as lifetime records are codes and standards used in design of the nuclear plants. During the tour of the TIC, it was noted that the copies of these codes and standards were being stored on open shelves, thus without fire protection as required by N45.2.9. In that many of these documents were one of a kind and no other controlling system equivalent to N45.2.9 provisions existed for control of duplicate copies which did exist, it was concluded that the requirements of N45.2.9 were not being met. This finding is similar in nature to deficiency No. 1 in OEDC QA audit M81-2, but the actual documents involved are different.

b. R-81-14-OEDC(BLN)-42, Storage of Backfile Documents

During the tour of MEDS facilities, it was noted that "backfile" documents (predating the establishment of MEDS) were being stored on open shelves in the camera room awaiting processing. Discussions revealed that these could be one-of-a-kind documents. At times, documents might be stored in this manner for several weeks before filming. Storage of documents in transit to and from the originators appeared adequate. As of the conclusion of the review, MEDS personnel had been unable to ascertain whether the documents involved were duplicates. NSRS concludes that the nature of these "backfile" documents should be established; and if they are one of a kind, more stringent protection must be afforded in accordance with ANSI N45.2.9.

Discussions revealed that documents are also at times stored in remote locations such as the old Gilman Paint Store on Walnut Street. Such facilities, along with the new MEDS quarters in the Union Building, should be checked by OEDC to assure that environmental, fire, and other provisions of ANSI N45.2.9 are met for any QA records involved.

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

The MEDS Handbook contains instructions for QA

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activities involving processing and storage of QA records. It was revised and reissued January 1, 1981 without review and approval signatures or initials on the cover sheet. Discussions with MEDS personnel revealed that the review and approval cycle had apparently not been documented. In that the Handbook is a formal, written procedure, the review and approval requirements of EN DES-EP 1.28, paragraph 3, and Criterion V of Appendix B to 10CFR50 do not appear to be met in this instance.

### d. R-81-14-OEDC(BLN)-44, Revision of a General Construction Specification

During the review it was observed that two Specification Revision Notices (SRN's) to General Construction Specification G-53, "Certification, Identification, Storage, and Tightening Requirements for Bolting Material," had not been incorporated into G-53 within 90 days as required by EP 3.04. SRN-G-53-1 to revision 1 was issued May 8, 1979, and SRN-G-53-2 was issued on revision 1 June 5, 1979. Revision 1 was the current issue of this specification on file as of June 18, 1981.

This represents noncompliance with Criterion V of Appendix B to 10CFR50 and is identical to an infraction issued by NRC on Hartsville in November 1978. In that corrective measures dealt with this identical problem, NSRS concludes that corrective action was ineffective. Note that this would probably be viewed as a repeat item of noncompliance if cited by NRC.

## 9. Procurement

The regulatory requirements that the procurement program must satisfy are:

10CFR50, Appendix B, Criterion IV, "Procurement Document Control," and Criterion VII, "Control of Purchased Material, Equipment, and Services."

In addition TVA has committed to Regulatory Guide 1.123 which endorses ANSI N45.2.13-1976, "Quality Assurance Requirements for Control of Procurement of Items and Services for Nuclear Power Plants," per Table 17.1A-4 of the TVA QA Topical Report, TVA-TR-75-1A. The TVA program for procurement is also described in BLN FSAR, Chapter 17, Section 17.1A.7, "Control of Purchased Material, Equipment, and Services," and 17.1A.4, "Procurement Document Control."

The procurement of most permanent materials and all major components for TVA nuclear plants is the responsibility of EN DES. PURCH administrators all procurements, but the

technical and quality requirements of procurements are obtained from or established by the organization initiating the procurement. The Manager of OEDC has delegated the responsibility for quality assurance in design and procurement to the Manager of Engineering Design.

The program review by NSRS covered the relevant EP's, especially Nos. 1.28, 5.01, and 5.33 and compared them to the above requirements and commitments. The review also included reading related EN DES QA internal and vendor audit reports and was coordinated with a review of the PURCH program which was being conducted by NSRS concurrently with the OEDC review. See NSRS Report No. R-81-15-PURCH(BLN) (GNS 810729 050).

Implementation of the EN DES program for procurement was checked by interviews with involved personnel in BLP and the branches and by review of selected contract files, internal and vendor audit reports, and the FCR and NCR files. For a list of documents examined, see section VII.B.9.

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

Criterion VII to 10CFR50, Appendix B, requires measures which include provisions, as appropriate, for source evaluation and selection and objective evidence of quality furnished by the contractor or subcontractor.

A TVA commitment in BLN FSAR Chapter 17 is 17.1A.7.1, "When a prospective contractor has had no previous contracts with TVA, a review is made of his experience, capability, manufacturing facilities, QA program and previous performance."

ANSI N45.2.13, section 4.2, has a similar requirement to review the records of previous procurement actions in evaluating the supplier's history.

In fact, neither EN DES nor PURCH had a comprehensive program to determine whether a prospective contractor has had previous contracts with TVA. EN DES QAB maintained for its own use a record of QA contractors which they had evaluated or audited, but this record did not cover previous non-QA contracts TVA may have had, nor was it intended for evaluation factors other than the supplier's QA program.

NSRS concluded that the commitment in FSAR Chapter 17 is needed to fully comply with Criterion VII of Appendix B and that the implied comprehensive vendor history program is a good business practice which would enhance quality and safety, but TVA did not have such a program.

NSRS recommends that TVA set up a vendor history program to record and retrieve both QA and non-QA contract data. If PURCH provides the service, OEDC may be in the role of a user but still needs to modify their procedure for bid evaluations to include such use. See NSRS Report No. R-81-15-PURCH(BLN) (GNS 810729 050) for NSRS' recommendation to PURCH.

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

Criterion V to 10CFR50, Appendix B, requires that activities affecting quality be prescribed by documented instructions, procedures, or drawings of a type appropriate to the circumstances and that they be accomplished in accordance with these instructions, procedures, or drawings. Instructions, procedures, or drawings are to include appropriate quantitative or qualitative acceptance criteria for determining that important activities have been satisfactorily accomplished.

BLN FSAR, section 17.1A.7, asserts that when a prospective contractor has had no previous contracts with TVA, a review is made of his experience, manufacturing facilities, etc.

The EN DES procedure EP 5.01 offers the following in response to the above and to ANSI N45.2.13, section 5.2:

"11. Prepares a bid evaluation in coordination with the requesting organization when required; makes sure the following items are considered as required:" (A list of 18 items follows, including "Ability to meet schedule, bidder's personnel qualifications, etc.")

"12. At its option, if an apparent qualified low bidder has not been previously evaluated by EN DES, requests an informal plant capability survey by QEB-QCG."

Based on the presence of "as required" and "at its option" phrases, NSRS concluded that the procedure did not actually impose an evaluation requirement on the contract engineering branch. Further, the list of items to be considered was not adequate to form a detailed procedure. For example, determining "bidder's personnel qualifications" might require an onsite review done according to preplanned procedures, as would some of the other topics listed.

NSRS recommends that specific requirements for bid evaluation be incorporated in the procedure, including

the conditions under which optional methods of evaluation are to be used and how to perform evaluations using each of the 18 listed considerations.

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

Criterion IV to 10CFR50, Appendix B, requires that measures be established to assure that applicable regulatory requirements, design bases, and other requirements which are necessary to assure adequate quality are suitably included or referenced in the documents for procurement of material, equipment, and services.

ANSI N45.2.12, section 3.3, states that a review of the procurement documents shall be made to assure that documents transmitted to the prospective suppliers for bid or contract purposes include appropriate provisions to assure items or services meet the specified requirements. In addition it states that such reviews shall be performed prior to release and contract award and shall assure that the documents are complete and contain the applicable requirements specified in section 3.2 of this standard.

BLN FSAR, section 17.1A.4, states that TVA procurement documents for each component for which this plan is applicable are prepared by procurement group personnel in the responsible EN DES branches and are reviewed by the cognizant engineer and, where required, by other engineers having specialized technical qualifications to see that they meet all technical and quality assurance requirements.

EN DES EP 1.28, which contained statements of policy, basically conformed to the above requirements and commitments.

Contrary to the above, EP 5.01, section 3.0, step 18, stated:

"When no PR form is on file or if the requisitioned items are not identical to those on PR, coordinate a review with the requesting organization."

This interface review requirement ignored the need for special expertise review as acknowledged in the FSAR and EP 1.28. Such special expertise may not be embodied in the requisitioning group or the group furnishing the PR.

For example, EEB has special expertise on motors, transformers, and controls which may be on MEB or NEB requisitions and CEB has special expertise on seismic

requirements which may appear in EEB requisitions. Also, interface requirements, such as for field inspection by QEB, were not provided.

NSRS concludes that the implementing procedure, EP 5.01, did not fully implement the requirements and commitments and was in conflict with EP 1.28. It was also noted that the reference list in EP 5.01 did not include EP 1.28, which served as a higher tier QA procedure for the requisition review function. NSRS recommends that EP 5.01 be amended to require squadchecks or equal for complete requisitions, just as EP 1.28 did. Further, EP 1.28 and EP 5.33 should be referenced by EP 5.01 for additional guidance to the user.

d. R-81-14-OEDC(BLN)-4<sup>R</sup>, Contracts Were Not Receiving Required QA Review

Criterion IV to 10CFR50, Appendix B, requires that measures be established to assure that applicable regulatory requirements, etc., are suitably included or referenced in the documents for procurement of material, equipment, and services.

ANSI N45.2.13 listed purchase orders and contracts in the definition of procurement documents (section 1.3). Further, section 3.3 requires a review of the procurement documents to assure documents "transmitted to the prospective suppliers for bid or contract purposes included adequate provisions. . ." and 10CFR50, Appendix B, Criterion V, requires that activities affecting quality be accomplished in accordance with documented procedures.

TVA had stated its policy conforming partially to these requirements in EP 1.28. Section 2.0, SCOPE, said in part, "This EP applies to. . . distribution. . . of . . . requisitions (including specifications). . . . These documents are QA records." Section 3.0, POLICY, stated, "All design documents which prescribe activities affecting design and product quality shall be . . . distributed to and used at the location where the prescribed activity is being performed."

However, work done by TVA contractors was done in accordance, not with requisitions, but with contracts which were generated by PURCH. This fact was not recognized in the listing of EP 1.28, section 2.0, and the policy section 3.0 was not fully carried out because the distinction between a requisition and a contract was not dealt with. The EP was more limited than ANSI N45.2.13 which included contracts in the definition of procurement documents and hence in the review cycle.

NSRS Report No. R-81-15-PURCH(BLN) has discussed the inadequacy of PURCH reviews of invitations to bid and requests for quotation. It appeared that tight QA controls over procurement documents ended with the signing of the requisition.

NSRS concluded that TVA was not complying with ANSI N45.2.13 in that contracts were not receiving prescribed reviews and that procedures for such review did not exist.

NSRS recommends that TVA develop a procedure whereby actual contracts, not just requisitions, are reviewed in accordance with ANSI N45.2.13 before work is done using them.

No findings or recommendations were generated as a result of the implementation review. NSRS concluded that the program, as it existed, was implemented adequately. People were familiar with their responsibilities in the procurement area.

10. ASME Section III QA Program

a. Background

The functions, assignments, and responsibilities of EN DES in complying with the ASME requirements of NA-3600 and NA-8250 as the holder of an "N" certificate of authorization are detailed in applicable NCM sections as described in V.10.b below. Implementation of these requirements are further detailed in EN DES-EP's identified in section VII.B.10 of this report for the applicable review areas described below (for additional background information see V.A.2.b).

b. Review Area

The following functional review areas and applicable NCM sections were compared against companion code requirements and to the EN DES implementation documents, illustrated in paragraph VII.B.10, for proper translation and adequacy:

<u>Applicable NCM Sections</u>	<u>Functional Areas of Review</u>
1.1	Policy
1.7, 1.8	OEDC QA Program for ASME Section III Components
1.3, 1.4	Organization

1.9	Personnel Indoctrination and Training
2.1	Design Control
2.2, 2.3	Instructions, Procedures, and Drawing Controls
3.1, 3.3, 3.4, 3.5	Procurement Activity Controls
3.7	Identification and Control of Materials and Items
4.2, 5.1, 8.1	Control of Manufacturing and Installation Processes
6.1	Examination, Tests, and Inspection Controls
11.1	Audits
10.2, 11.1	Corrective Action
9.1, 9.2	Records and Data Reports

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

From the review conducted, NSRS concludes that the written program involving EN DES is well defined. Specific concerns identified by NSRS were of minor deficient or enhancement nature except for one which may require an EN DES reevaluation of some CSM code-related responsibilities. These concerns are described below.

(1) Inadequate Maintenance of NCM Content

NCM section 1.7, R9, paragraph 2.2.2 specified that when documents described in the section of the NCM are changed, the Codes, Standards, and Materials Section of EN DES is responsible for having corresponding changes made to the NCM.

Contrary to this requirement, the following changes have transpired without appropriate changes being made to the NCM:

- (a) ID-QAP-4.2 which defines Purchasing's responsibilities and procedures for controlling the awarding and changing of contracts was revised on March 27, 1980 without changing its companion document in the NCM (section 3.2).
- (b) BNP-QCP-10.32 which describes the construction engineer's organization and duties of the various personnel at BLN was revised on April 13, 1981 without a similar change being made to NCM, section 1.5. The change made indicated the separation of project engineering from quality control engineering which actually was implemented at BLN January 1, 1981.

This item is considered part of the composite concern discussed in paragraph V.A.2.b.(3)(b).

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

NCM, section 1.4, paragraph 2.3.6.b details the basis in which the CSM section of NEB may fulfill its responsibility in recommending to the Chief Nuclear Engineer and the Manager, OEDC, that they sign the certification statement in the code data report forms N-5 and N-3, respectively. One such basis, item 5 under 2.3.6.b, is reviewing with QA audit findings of OEDC QA, EN DES QAB, and CONST QAB related to code activities.

CSM considers the accomplishment of this responsibility is met by participating with OEDC QA on pre-ASME survey audits and reviewing OEDC, CONST, and EN DES audit findings as part of CSM's semi-annual accompanying visit with the authorized nuclear inspector's supervisor as he performs his ANSI N626 audit at each project and Knoxville.

NSRS does not consider an adequate review of audit reports can be made on a semi-annual basis. The review must be ongoing for trending of audit findings to detect potential code mis-interpretation or implementation problems which may affect the quality achieving activities at the projects. NSRS considers revision of the OEDC QA, EN DES QAB, and CONST QAB audit report distribution lists to reflect report transmittal to CSM for all findings contained therein related to code activities appropriate.

NSRS further considers revision of NCR forms to be similarly designated also appropriate. Both items are considered enhancement items.

(3) R-81-14-OEDC(BLN)-50, Incorrect References Made in BLN Construction Specification

NSRS review of code-related design controls resulted in discovery of the following two conflicts requiring resolution:

- (a) Construction specification N4M-870 provides requirements for TVA field fabrication, installation, examination, testing, and stamping of ASME Section III piping systems at Bellefonte. Revision 1 to this specification issued June 6, 1979 (ESS 790531 202) required installation of these systems to be in accordance with TVA certified design specifications BNP-DS-1935-2856-02, BNP-DS-1935-2857-02, and BNP-DS-1935-2858-02. The last two digits indicates the revision level of the design specification. Therefore, for the documents presented, the revision level is two. NSRS could not locate revision 2 and later discovered the revision had never been issued; in fact, during the review revision 1 was officially entered into MEDS (May 22, 1981).

Revision of these design documents is required.

- (b) EN DES prescribed construction and design specifications lock in a code edition commitment for Section IX, "Welding Qualifications," of the Code to that of 1974.

Committing to a specific edition for welder/welding operator qualifications is contrary to the preamble of section IX which states any requalifications or new qualifications shall be made in accordance with the test requirements of the current edition. NSRS review of the edition being used at Bellefonte for this activity was found to be the 1977 edition. All applicable documents containing this commitment should have the entry deleted.

(4) R-81-14-OEDC(BLN)-51, Waiving Source Inspections

NCM 3.5, paragraph 2.2.4.a allows the TVA inspector authority to release for shipment material, parts, appurtenances, and components of

standard manufacture without source inspection. A similar statement of this provision in EN DES-EP 5.43 was found to be in conflict with other TVA and NRC requirements by EN DES QAB in April 1980 (EN DES Internal Audit 80-4 - Finding No. 2 - QAS 800423 802). This statement allows TVA inspectors the authority to waive contract prescribed mandatory hold points without first receiving approval from the technical engineer or processing a revision to the document. This is contrary to the requirements of NCM, section 2.2, paragraph 2.2.7.a, which requires revisions to design documents be processed in the same manner as the original issues..

NSRS considers the corrective action taken by QEB in their response to this deficiency (QAM 810415 002) to be adequate and should be similarly reflected in this NCM section.

#### 11. Special Process Controls

Criterion IX of Appendix B to 10CFR50 requires that program measures be established to assure that special processes are controlled and accomplished by qualified personnel using qualified procedures in accordance with applicable codes, standards, specifications, criteria, and other special requirements. TVA has documented these measures in its QA program for BLN in FSAR, section 17.1A.9. Specific EN DES responsibilities to satisfy the program requirements are detailed in Table 3 of the OEDC PRM.

Special processes are those manufacturing and installation activities that are used to alter the properties or characteristics or shape of the material or component; to inspect the resultant change from the altering process to ensure conformance to expected product requirements; or to preserve those required material or component properties or characteristics. These processes include welding, heat treating, nondestructive examination, cad welding, concrete and pipe protective coatings, cleaning and surface preparation, forming and bending, plating and electrical insulation impregnation as related to manufacturing, construction, and testing operations. The results of any of these processes is highly dependent upon the control of the process or the skill of the operators, or both, since the resultant required qualities cannot be readily determined by inspection or testing of the product.

The NSRS review of EN DES responsibilities associated with special process controls was limited to the NEB Codes, Standards, and Materials Sections' development of G-29 process specifications and the assignment of welding and NDE

procedures to support the construction effort at BLN. EN DES special process activities related to purchase requisition provisions and QEB vendor surveillance were not reviewed.

In general, the EN DES program for ASME section III related work appeared to be well defined. Similarly, documents reviewed at BLN and in Knoxville indicated design information detailing the requirements for manufacturing, installation, inspection, and testing in accordance with ASME section III and the NCM were adequately provided. However, accuracy of information provided in EN DES originated welding and NDE assignment sheets has been found by BLN engineering personnel to be questionable. This information is required to be provided the project by NCM, section 5.1, paragraph 2.2.4. The information is then entered directly into the BLN process control system (APC cards). Since transmittal of these spread sheets, over 150 FCR's have been generated by BLN and approved by EN DES detailing inaccurate material and component thicknesses or wrong types of materials or components that are to be installed for a particular system.

EN DES has taken action to help resolve this problem by ranging material thicknesses to cover a variety of sizes of materials or components which could be encountered for the type of weld to be made per ASME code class. NSRS considers this action appropriate and will follow this activity as part of its construction review effort.

As noted above, for safety-related systems within the scope of the NCM (ASME Section III), EN DES provides the welding and NDE assignments to be entered on the shop travelers or APC cards. For work other than ASME section III, the site welding engineering unit makes the assignment. NSRS review of support documents necessary to make these assignments found them to be numerous and the requirements general (e.g., all welding and inspection is to be in accordance with G-19C). This presents a problem for welding engineering units who must not only review G-29 requirements but also all general notes for a specific TVA drawings series, all applicable TVA approved vendor drawings and specifications, all issued project design memorandums, and in cases, all outside concerns such as those reflected in regulatory bulletin/circular/notices and other sources of information before they can assign welding and NDE procedures to specific welds. With so many documents and option-oriented welding and NDE language contained therein, there is no real assurance that an item installed was fabricated in accordance with all specified requirements.

NSRS considers this problem as one of several related to the way G-29 is formatted and used. NSRS considers the following actions appropriate:

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

NSRS review of G-29 (M and C) found that a general revision of the documents is required in order to:

- (1) Pare down its current size by incorporating the numerous addenda found throughout the manual and implementing them into their basic documents. For example, the number of addenda found for selected process specifications in G-29M were: P.S.1.M.1.2(b)-15; P.S.2.M.1.1(b)-5; P.S.3.M.2.1(c)-6; P.S.3.M.3.2(b)5; P.S.3.M.5.1(d)-11; and 4.M.1.1(g)-7.
- (2) Categorize or group general welding requirements for non-Code ASME III structures, systems, or components in order of safety significance for easy access by CONST personnel making welding and NDE assignments. Establishment of minimum fabrication requirements would in effect yield greater assurance that a particular item was built to the minimum specifications used in establishing design documents. (See discussion previous to item (a) above.)
- (3) Revise and compartmentalize or index the individual processes to show applicable requirements for vintage or class of plants. The processes presently cover too large a time span to cover effectively all codes of record and standards that have been committed to. Now with the advent of STRIDE, the documents are becoming even more bulky to handle these situations.

In addition, whenever restrictive requirements are imposed to satisfy a specific project oriented concern, the change is made across the board and all plants thereafter are held accountable, e.g., P.S.4.M.1.1(g), paragraph 3.1.10.3, ". . . marking shall be removed within three inches of weld preps before welding." Indexing or classifying would resolve the problem for plant applicability.

- (4) Eliminate conflicts found in the G-29M index which tabulates welding procedures to qualification and process requirements and conflicts found in process specification to code and standard requirements. For example:

(a) Index Conflicts

\*DWP SM-11-B-2A - The qualified thickness range specified by the index is 3/16 inch to 4 inches. The DWP references

another applicable process GT-SM-11-0-2 which has a thickness range qualification of 3/16 inch to 1-5/8 inch. Deletion of GT-SM-11-0-2 or appropriate ranging needs to be identified.

- DWP SM-48-B-1 - The qualification preheat for the process was 250 degrees Fahrenheit. The index indicates 350 degrees Fahrenheit.
- DWP SM-88-B-1, -1A, -1B, -1C, -4, - The qualified thickness range specified by the index is 3/16 inch to 1-1/4 inches. The PQR indicates the range to be 3/16 inch to 2-1/4 inches.
- DWP GM-11-0-1 - The qualified thickness range specified by the index is 3/16 inch to .55 inch. The PQR indicates the range to be 3/16 inch to 1 inch.

(b) Process Specification Conflicts

- P.S.1.M.2.2(b)
  - Paragraph 3.0 does not include the ASME provision that if the welder fails his performance qualification test as a result of a radiographic examination, the retest shall be by radiographic examination method. See also paragraph V.C.13.d.(1)(b).
  - GT-7-F-1-L, GT-7-F-0-1, etc. Performance qualification tests and paragraph 5.0 utilize the F7 filler metal classification which was deleted in the 1974 section IX edition of the ASME code. Though retention of the F7 classification is preferable to its deletion because of its unique segregating of austenitic stainless steels from carbon steels, consistency with codes and standards should be emphasized. Resolution is required.
- P.S.1.M.3.1(f)
  - Paragraph 5.3.3 provides the maximum permissible moisture content allowed through atmospheric exposure of low hydrogen electrodes. The values presented are based on AWS criteria and are not consistent with the values provided in

ASME Section III, Table 7 for SFA 5.5 electrodes. AWS AS committee meeting minutes dated April 29, 1981 approved a change to AWS D1.1, paragraph 4.5.2.2 criteria, applicable only to structural welding, which would make the AWS values consistent with ASME.

NOTE:

Paragraph 5.3.3, electrode nomenclature, is not representative of moisture control restrictions for all low hydrogen electrodes. For example, when E70XX electrodes are specified this also indicates that EY010 and EY011 electrodes are also applicable. This type of identification should not be used since EXX10 and EXX11 type electrodes are designed to have moisture levels of 3 to 7 percent and excessive drying may substantially affect their operation (see A.1.7.3 of SFA 5.5, ASME Section II). This nomenclature should actually be reflective of EXX15, EXX16, and EXX18 electrodes.

•P.S.2.M.1.1(b)

-Paragraph 34.1 does not contain the maximum cooling rate provision for P-7 materials heated above 1200 degrees Fahrenheit (less than 100 degrees Fahrenheit per hour) as specified by ASME NB-4623(b) and note 8 to ANSI B31.7 (1969), Table 1-731.3.1.

-Table 1 specifies temperature ranges for postweld heat treatment (PWHT) in excess of ASME Table NB-4622.1-1 and ANSI B31.7 (1969), Table 1-731.3.1 for P-4 and P-7 material types.

-The process specification does not provide exemptions to mandatory PWHT, yet construction sites have incorporated such criteria (See BNP-QCP-8.2).

•P.S.3.M.5.1(d)

-Subarticle T-930(c), Article 9, section V, of the ASME code specifies the written implementing procedure for visual examination inspection shall contain or reference

a report of what was used to demonstrate that the examination procedure was adequate. No such provision is present in this procedure.

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

ASME Section III, Article NA-4320, details specific responsibilities for the quality assurance organization of the Certification of Authorization holder. Among these responsibilities, the QA unit is to review written procedures and monitor all activities concerned with the control of operations. One such operation is the control of the fabrication process. NA-4451 establishes the measures to be used for assuring welding is controlled in accordance with the rules of ASME Section III and is accomplished by qualified personnel using qualified procedures.

G-29M which provided the welding procedure specifications related to ASME code welding and other code related fabrication process specifications, does not receive a specific QA review for conformance to OEDC QA and ASME requirements. Instead, the controlling document (EN DES-EP 3.13) for the preparation, review, and approval of EN DES process specifications for welding, bending, forming, heat treatment, and non-destructive examination receives the QA review. This practice, to date, has been accepted as meeting the appropriate ASME requirements by ASME survey teams and ANI representatives.

NSRS does not consider QA review and approval of the controlling document alone appropriate, nor does it meet the intent of the QA organization's responsibilities detailed by the code. Further, the EP only provides general guidance in the preparation of process specifications for other than welding and does not detail the methods required for qualification of procedure or materials, nor allows CONST review privileges prior to inclusion into G-29M.

Therefore, as previously stated, QA review is required for all procedures used in the control of the fabrication process. QA review only of the preparatory document does not satisfy this requirement. For this reason in particular, QA approval of the source document is required.

C. Division of Construction

1. Management Controls

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

2. Construction Process

Construction processes are all those process activities associated with the elements of material, design, fabrication, examination, testing, inspection, and certification of structures, systems, and components. As used in this management review however, construction processes have been limited to those activities related to the fabrication, erecting, inspection, and testing of nuclear power plant components. In addition, activities associated with completed system transfer from CONST to NUC PR for preoperational testing and subsequent operation were included. Specific details for material, design, certification, and special process controls are discussed in subsequent section V.C paragraphs.

Criterion IV through XV of Appendix B to 10CFR50 contain the NRC regulations pertaining to construction processes which must be satisfied by all applicants for a construction permit. These measures have been further clarified and amplified in the ANSI N45.2 series of standards issued by the American National Standards Institute.

These standards have been endorsed in total or in part by NRC regulatory guides and have been committed to by TVA as detailed in the commitment section of the OEDC PRM.

The TVA QA program for implementation of these and other QA requirements for BLN have been documented in chapter 17.0 of the BLN FSAR. Policy, responsibilities, requirements, and additional commitments for implementation of the QA program involving construction processes are delineated throughout the OEDC PRM. These requirements are further detailed in the CONST QA Program Manual.

Bellefonte site implementation of these construction process requirements is accomplished through a series of QCP's. These QCP's are supplemented by FCP's and SOP's on an as-needed basis. Neither FCP's nor SOP's are formally reviewed and approved by the CONST project QA organization.

Authority for performance of construction process activities has been delegated by the Manager of CONST to the CONST Project Manager. Under the project manager are the general construction superintendent, responsible for construction and craft activities needed to build the plant; and the construction engineer, responsible for project engineering,

## V.C.2

approval of construction methods as to quality, and ensuring that work was done in accordance with applicable specifications and design documents through QC inspection. The construction engineer's organization therefore is the sole entity that assures management that quality-achieving requirements documented in TVA programs and procedures have been incorporated into the final plant product through examination of the manufacturing and installation activities performed by the craft. The CONST QA organization, which is independent to the construction project manager's organization, assures management that quality control administration has been achieved through surveillance of management controls and documentation review of the quality-achieving activities performed.

To verify construction process program adequacy, NSRS reviewed BLN QCP's, FCP's, and SOP's which constituted the program implementation documentation against the requirements in the upper tier documents previously identified. Inspection process control and other records were also reviewed. (See section VII.C.2 for a complete list of documents reviewed.)

Based on evaluation of the written information obtained and from the information acquired during interviews with site and corporate management, including discussions held with employees at all levels within CONST, NSRS concludes that the CONST written program for construction processes is well defined but lacks depth in providing necessary guidance to the projects as to initial work planning and procedure preparation, maintenance, and traceability of requirements. These concerns and other findings are discussed separately below.

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

Initial work control is defined for the purposes of this report as those initial measures that take place at the construction project involving work planning, fabrication, erection, and testing to the point where the first QC hold point is reached or a problem requiring a QCIR, NCR, or FCR for resolution is encountered. This definition was derived from similar planning measure wording defined in ANSI Standards N45.2.4-1972, N45.2.5-1974, and N45.2.8-1974. These standards also require, in addition to planning, that installation, inspection and testing, and operations be defined, responsibilities assigned, measures to preserve quality employed, and procedures and instructions written. In addition, all documents and drawings to be employed during the activities are to be reviewed prior to their use.

NSRS review of work control and planning measures described in Bellefonte QCP's and from discussions held with persons at all organizational levels within the construction project, indicates the program was incomplete. Presently, detailed initial planning measures are only taken to satisfy PC-III scheduling requirements. This process is not carried through to providing craft with detailed drawings, procedures, etc., to perform their assignments. This inconsistency, in effect, caused the lack of initial planning deficiencies involving concrete pours and hanger interferences identified in paragraph V.C.2.d.(2) and (3), respectively.

With the exception of initial work control, NSRS found a formal, documented, and coherent work control and planning program established. The formal controls for this program commence when a QCIR, NCR, FCR, and/or WR is issued to resolve problems identified either through a QC hold point or from the fabrication of installation process. This control is carried on through the final resolution of the problem.

The lack of a complete, coherent and formally documented control and planning program for initial work on the project appears to constitute a breach in TVA's commitment to meet the requirements of ANSI N45.2.4-1972, N45.2.5-1974, and N45.2.8-1974.

CONST should consider revising its control and planning program at BLN to be consistent with CONST CEP 5.04, "Work Packages," used at other TVA construction sites.

b. R-81-14-OEDC(BLN)-55, Inadequacies in BLN Quality Control Procedures

Criterion V of Appendix B to 10CFR50 requires that activities affecting quality are to be prescribed by documented instructions, procedures, or drawings and be accomplished in accordance with these instructions, procedures, or drawings.

The implementing process for complying with these requirements at BLN is through the use of QCP's. BNP-QCP-18.1, "Preparation of Quality Control Procedures," defines a QCP as a detailed instruction which provides control and/or measures the characteristic of an activity and the acceptance criteria and documentation requirements associated with the activity." To determine the degree of compliance with these requirements, NSRS performed an assessment of content and implementation of the QCP's. A number of problems were identified by NSRS and are discussed below.

(1) Periodic Revisions to QCP's Required

BNP-QCP- 10.1 identifies that minor revisions to QCP's may be made by addenda, errata, or through individual page changes as appropriate. BNP-QCP-10.1 does not specify or require that addenda, errata, or individual page changes made be incorporated into the base QCP should their number exceed a certain given amount or within some given timeframe. Therefore, when the inspector identifies that inspection was conducted in accordance with a certain QCP and revision without specifying additional addenda, errata, or individual page changes, the validity of the quality control inspection documentation is considered questionable as to traceability of the process used. Refer to paragraph V.C.8.b and V.C.12.c.(3) for further details.

(2) Matrix Control of Documents Referenced In QCP's Needed

Paragraph V.C.8.c of this report identified that QCP's contain references to additional QCP's and other documents. These references are made either for information purposes or for performances of some required action. The references are identified both in the procedures reference section and within the QCP text. Typically these references do not have revision numbers associated with them. Therefore, it is difficult, if not impossible, to assess the impact on the overall program that a change would have to a particular QCP.

(3) Use of Uncontrolled Copies of QCP's

During the course of the review, it was observed that craft management down through assistant craft superintendent had uncontrolled copies of QCP's. This creates the situation for work to be performed with out-of-date QCP's. Refer to paragraph V.C.8.d for further details.

(4) FCR Tracking Problems

BNP-QCP-10.2, "Drawing Control," section 6.3, discusses the processing of FCR's. Section 6.3 requires that the FCR be given formal approval by the appropriate design project organization (DPO) prior to it being sent to the QCRU for assignment of a document control number. Consequently, if an

FCR is disapproved by the DPO it does not have to be sent to QCRU for retention purposes. This results in no official record tracking of FCR's rejected verbally by the DPO and thereby removes the historical references that other possible options had been considered. In addition, EN DES EP-4.03, section 3.1.2.f, requires that the telephone log for verbally approving FCR's contain, among other things, the FCR number. With the requirement previously imposed by the QCP, this requirement cannot be administratively complied with verbatim. The net result is, that in order to process any FCR, either QCP-10.2 or EN DES EP-4.03 must be violated.

The existence of the above situation is an example of failure to communicate and coordinate effectively between EN DES and CONST. The significance of the situation is:

- (a) FCR's that were not verbally approved are not tracked and stored in the QCRU.
- (b) There is no officially recognized mechanism for the DPO to cross-reference between their verbal approval log and FCR number.

Consequently, it is difficult for the DPO to ensure that they have received all FCR's that they had earlier verbally approved denoting formal review and approval. Therefore, it is conceivable that a verbally approved FCR could be worked in the field without it every being formally reviewed and approved by the DPO.

NOTE: Section 6.4 of BNP-QCP-10.2 covers B&W field approval by B&W prior to being sent to QCRU for number assignment. Thus, within sections 6.3 and 6.4 of QCP 10.2 there appears to be a contradiction over the numbering of FCR's.

(5) Lack of Detailed Inspections Checklists

Criterion XVIII of 10CFR, Appendix B; CONST QAPP 17; and section 17.1a.17 of the BLN FSAR all contain essentially identical requirements concerning inspection records.

These references require that, as a minimum, inspection and test records shall contain the following:

- (a) type of observation
- (b) evidence of completing and verifying inspection
- (c) date and results of inspection
- (d) information related to nonconformances
- (e) inspector's name
- (f) acceptability of the results

A review of the QCP's indicated that approximately 12 of 65 inspection related QCP's (18.5 percent) do not contain detailed checklists or test results forms. These QCP's are 2.1, 3.1, 3.2, 3.3, 3.7, 3.9, 3.13 (except electrical penetrations), 3.16, 3.29, 3.30, and 6.1.

The only record kept for the majority of the inspections required in the QCP's listed above is an ECM&D verification card. This card typically contains items (a), (d), (e), and (f) of the listed requirements. However, the inspectors are not required to document exactly what inspections were performed and what the results were.

In addition to satisfying criteria (a) through (f) above, NSRS believes checklists provide for the following:

- a "memory jogger" aid for the inspector
- a detailed record of what was checked and rejected
- a means of verifying that all possible non-conformances are covered by QCIR's
- a means for management to ensure that a quality inspection has been performed

(6) Inadequate QCP Coverage for Safety-Related Activities

During the course of the OEDC management review, NSRS discovered three circumstances where safety-related activities were not being conducted under the purview of the BLN QA program. The circumstances discovered were as follows:

(a) Lack of ECM&D Program Controls

The ECM&D program is a group of computer programs utilized by CONST to supply design information, to provide configuration control

information, to track completion status of construction activities, and to generate the QA record cards to be completed by inspectors. All of these activities are considered by NSRS as activities affecting quality. However, neither the ECM&D program nor how to apply its output are specifically discussed in BLN QCP's. Without QCP controls in effect for these two elements, ECM&D users may modify programs, card output, etc., leading to a breakdown in controlling traceability of work instructions and inspections, inaccurate QA record information, and to inaccurate configuration control information. Any and all of the conditions could produce products with less than required quality features.

(b) Lack of Vendor Manual Requirement Implementation

As part of the NSRS receipt inspection review, controls related to vendor manual receipt, maintenance, and incorporation of requirements was reviewed. Vendor manuals which are normally received from EN DES, were found being effectively controlled by QCP 10.2 as to storage and retrievability. However, requirements contained within the vendor manuals were found consistently not being translated into BLN instructions or procedures. For example:

- 1.1 General Atomic's equipment manual, E-115-915 concerning liquid radiation monitors lists general inspection requirements and special handling instructions which do not appear in QCP's, SOP's or FCP's.
- 1.2 Ingersoll-Rand, "XLE Instructions and Parts List" for the essential air compressors details special rigging and lifting instructions which do not appear in BLN procedures.

NSRS considers that by not incorporating these requirements into receipt, storage, maintenance, handling, etc., instructions and checklists could result in equipment damage, reduced useful life of components and/or voided warranties. CONST should take necessary action to resolve this issue.

(c) Lack of QA Controls Over Quality-Performing SOP's and FCP's

Criterion VI of Appendix B to 10CFR50 requires that measures shall be established to control the issuance of documents, such as instructions, procedures, or drawings, including changes thereto, which prescribe all activities affecting quality. Contrary to this requirement, SOP's and FCP's in use at BLN are used, in varying degrees, by the CEO to define the details and therefore the quality of how tasks, such as automatic process control (APC), records and document control, inspections., etc., are to be performed. FCP's likewise are being used in varying degrees to detail how fabrication, rigging, handling, and erection of large components/structures, such as reactor pressure vessel, steam generators, turbines, diesel generators, etc., are to be accomplished. All of these activities are considered safety-related and need to be under the purview of the QA program if the applicability requirements of ANSI N45.2 apply.

Presently, QA does perform a review of SOP's in accordance with guidance provided in QASP 5.6. This review, however, is only to assure that the SOP does not control QA activities in conflict with or in lieu of the established requirements of upper tier QA program documents. NSRS considers this review adequate if the information provided by the SOP/FCP is supplemental and does not adversely affect the work. The actual work should be conducted by QA controlled quality control procedures. Contrary to this, as previously stated, quality work is being performed directly in accordance with the SOP's/FCP's.

BLN/CONST needs to establish formal controls to govern the development, review, approval, issuance, distribution, revision, training, and use of SOP's and FCP's if they are to be used to perform quality-related work.

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

NSRS review of AISC (AWS) code activities discovered a disparity existed in the CONST interpretation of

preparing the weld surface for visual weld inspection. For category I structures all structural welds are ground smooth prior to QC inspection. In noncategory I structures these same types of structural welds do not have to be ground smooth for visual inspection. Structural welds of this type lend themselves only to visual examination or at best liquid penetrant (PT) testing. Consequently, the degree of confidence an inspector perceives of a welder's performance in achieving good fusion with sufficient weld filler metal deposition in the root pass area of the weld is extremely limited. In essence, the acceptability of the weld in this area is left to the welder, unless the inspector requests a hold point or chooses to surveil a particular weld in process.

In the latter case described above, a visual inspection of the unground weld provides not only information to satisfy visual examination acceptability, but also is an excellent indicator of the effort, pride, skill, and workmanship the welder had in performance of his work, i.e., a signature of the welder's work. Thus introduction of the requirement to grind welds smooth becomes the means whereby faulty workmanship caused by one or a combination of less than adequate effort, pride, and skill can go undetected by masking of defects which could have been detected in the unground weld. Consequently, a safety question may exist in the structural weld inspection methods being used at BLN such that faulty welds could go undetected.

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

During the review a number of interface problems were discovered among the various BLN construction project organizational units. These interface problems have caused several safety and installation problems and consequently have adversely affected both quality and employee morale. Specific problem areas discovered are discussed in the following paragraphs.

(1) Pipe Neckdown Not Identified as Safety Problem

During onsite inspection, an NSRS reviewer observed that a two-inch diameter Chemical Addition and Boron Recovery System line at hanger ONB-1133 had been visibly necked down as a result of lug welding. According to the craftsman who had installed the lugs and hanger, the lugs had been installed and cut out a number of times in an attempt to meet a 1/16-inch lug to support gap requirement stated on the drawing. This situation

was further compounded in that an unusually large amount of weld filler metal had to be deposited in order to comply with the corrective action specified for recently encountered problems involving acute and obtuse angle welds. (Note: There is no requirement to document how many times a weld may be cut out and remade prior to inspection. QC is only called to make their inspection when the craft is convinced that the work is ready for inspection.) An NCR was subsequently issued as a result of this observation.

NSRS believes that a prime factor for the cause of this condition was problems between the engineering units. MEU had finished with the pipe when it was properly located, MEU was concerned only with getting the hanger installed per design requirements, and WEU was only concerned with the welding aspect of the job and not necessarily the effects of welding. No one had been given overall responsibility for coordinating the various efforts related to the job.

## (2) Omissions During Concrete Pours

Since concrete work began in early 1975 to the present, problems have been encountered with omitting and/or mislocating embeds, conduit, rebar, piping, sleeves, etc. The NCR record shows that the adverse trend in this areas still persists today. During the review, NSRS discovered that one of the primary causes of this situation is the diffusion of responsibility for a concrete pour. Responsibilities were assigned as follows:

- CEU is responsible per BNP-QCP-2.1 for rebar embedments and concrete framework,
- EEU is responsible per BNP-QCP-3.1 for embedded conduit and grounding,
- MTU is responsible per BNP-QCP-5.3 for concrete placement, and
- MEU is responsible per BNP-QCP-6.1 for embedded pipe.

After inspection of the pour area, each organization is to sign, date, and insert their respective QCP revision number on the Concrete Pour Card (attachment A to BNP-QCP-5.3). However, there is not a cross-reference from the pour card and the

QCP's to the applicable drawings used. In addition, a signed pour card is all that MTU is looking for to initiate the pour since the signatures signify that all aspects for that discipline are correct for the pour. The NCR's since 1975 indicate that this system is not an effective way to ensure that a pour should be made. CONST should investigate an alternate method to ensure that required activities have occurred prior to the pour and that all records are traceable to the documents used at the time of the pour.

(3) Lack of Area Planning

NSRS observations of field hanger installation activities indicates that interface control problems between engineering units is causing hanger installation concerns. For example, it was observed that conduit and other non-piping hangers and components had been installed in such a way as to not allow subsequent installation of piping hangers per design. This constitutes a failure by the CEO to effectively identify the work with critical location requirements and then plan the installation of other components and structures so as not to cause interference problems with piping hangers and other components within the critical location area.

In addition, MEU was experiencing difficulty with MEU wherein, piping was not being installed per design. MEU subsequently issued FCR's for the mislocated piping but failed to revise the hanger drawings when the FCR's were approved.

Overall, NSRS considers this item indicates that work planning and control required by section 2.1 of ANSI N45.2.4, ANS N45.2.5, and ANSI N45.2.8 to be less than adequate.

(4) Lack of Craft Input on QCP's, FCP's, and SOP's

BNP-QCP-10.1, "Preparation of Quality Control Procedures," does not contain provisions for the construction superintendent's organization to provide input into the QCP's with respect to constructability. A review of SOP's revealed that the CSO does not have input to these documents either. The existence of such a practice has the potential to adversely affect the end product quality by causing low morale, imposing upon the craft unattainable acceptance criteria, and

disallowing craft awareness of what the final product will be inspected against. From this discussion, it should not be construed that NSRS is proposing that the craft supervision be given "veto rights" on inspection acceptance criteria. Quite the contrary, NSRS believes that craft review of these documents for technical adequacy is necessary since the craft possess, and are continuously acquiring, knowledge and experience of construction and fabrication principles which should be utilized to improve the overall process.

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

TVA has not expanded the scope of NRC IE Bulletin 79-14 (IEB 79-14), "Seismic Analyses for As-Built Safety Related Piping Systems," issued July 2, 1979, to include instrument lines; conduit; cable tray; or heating, ventilating, and air conditioning ducts.

The NRC in IEB 79-14 identified that existing mechanisms to ensure that the seismic analysis of a pipe and the as-built configuration of a pipe are compatible. That is, the NRC found that the as-built configuration did not conform to the configuration that the analyst input to the seismic qualification program. Although IEB 79-14 only addresses piping supports, NSRS is concerned that other supports may also have as-built configurations which do not support the assumptions made in the seismic analysis.

In response to IEB 79-14 on SQN, TVA has developed a massive undertaking to ensure that as-constructed piping and hanger configurations satisfy the seismic analyses for the piping. At BLN the effort to ensure compliance with IEB 79-14 involves 130 QC and engineering persons in the HEU and approximately 450 craftsmen (steam fitters) 30 of which strictly coordinate the paperwork on hangers. Seismic support for instrument lines, conduit, cable trays, and HVAC ducts are fewer in number than piping supports due to differences in total linear feet of each involved and the use of ganged supports for cable trays. No special program commensurate with that for piping has evolved or been called for by TVA to ensure that the as-constructed hangers on conduit, cable trays, instrument lines, and HVAC ducts were handled as part of the routine programs in EEU, IEU, and MEU, respectively. HEU only handles seismic supports on piping.

A review of the program governing hanger installations in the nonpiping areas revealed that a similar situation exists for these type hangers as did for the piping hangers prior to the programmatic revelations brought on by IEB 79-14. Two specific examples demonstrate the point that seismic hangers on conduit, cable trays, instrument lines, and HVAC duct do not receive the same attention as piping hangers.

#### (1) Instrument Hangers

Seismic instrument hangers are designed by CONST per the requirements of the 5GE0925-10 drawing series and QCP 4.3. Conformance to these requirements should ensure a seismically qualified design. The hangers consist of bolted assemblies with the exception that "Unistrut" may be welded to a mounting bracket. These welds are required to meet ASME quality assurance (NF) requirements.

QCP 4.3 also requires that instrument hangers be assigned a unique identification number according to a specific format. However, this requirement is not being consistently implemented. For example, drawing IIGA-09-36R0 shows several hangers with the same hanger number.

In addition to requirement specifications, QCP 4.3 contains the criteria to be used for inspection of tubing hangers. The inspector is instructed to complete a verification sheet (checklist) for each hanger installation he inspects. This checklist was found to be adequate; however, since hanger numbers are not unique, some hangers having duplicate numbering may be overlooked in the inspection process. It appeared likely that the as-built configuration of the hanger may not support the seismic analysis.

NSRS considers a need exists to verify the installation of these type hangers similar to that specified in the IEB 79-14 program for pipe hangers.

#### (2) Cable Tray Seismic Supports

Recently, NCR 1478 was written to document the fact that horizontal and vertical tolerances of  $\pm 2$  inches and  $\pm 4$  inches, respectively, had been used in these special instances where interferences occur. These tolerance windows had been previously approved by the electrical and civil design projects on December 3, 1976 and continuously used up until the present. Now, the

design projects are stating, that unless the 1/16 inch criteria required by AISC and as referenced by notes on the typical support drawings are adhered to for tolerance relief on interferences, the seismic analysis may no longer be valid. This disparity between present and past seismic analysis criteria raises similar doubt about the validity of the seismic analyses performed for cable trays, conduits, instrument lines, and HVAC ducts.

The reviewers did not investigate this area in the depth necessary to conclude whether other supports and hangers are adequate or inadequate. No specific examples of an as-built configuration which differs from the analyzed configuration were identified. Further work by NSRS will be required to establish a firm conclusion as to whether a real safety problem exists in this area. However, NSRS recommends that CONST and EN DES investigate this area as an enhancement item pending the outcome of further NSRS review.

### 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. This standard is endorsed by Regulatory Guide 1.64, R2, June 1976. Per the OEDC PRM, the BNP program will conform to ANSI N45.2.11-1974 with no exceptions. BNP 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.

OEDC has established program requirements for CONST responsibilities to meet the above commitments and applicable regulatory requirements in ID-QAP 2.2, "EN DES - NUC PR - CONST Interfaces and Responsibilities During and Following Transition from Design and Construction to Operation," ID-QAP 1.3, "Work Control," and ID-QAP 3.2, "Processing of Construction Change Notifications (CCN's)." These procedures define the interface and responsibilities of EN DES and CONST as they related to the control of design changes. CONST has implemented this responsibility by issuance of BNP-QCP 9.4, BNP-QCP 10.34, and BNP-QCP 10.2. Procedures for specific instruction for construction project section implementation were delineated in CEO-SOP 1003, MEU-SOP 2005, MEU-SOP 609, and STCU-SOP 907. These procedures explain the CONST activities necessary to implement the design change control program.

The program established by CONST for control of design changes and modification work were reviewed to ensure adequacy and implementation. Based on this review, we concluded that the design change program established by CONST was adequate. Certain weaknesses were identified as follows: the work control program which is utilized to modify structures, systems, and components following tentative transfer; and the CCN program utilized to modify nonsafety related structures, systems, and components prior to tentative transfer of the structures, systems, or components.

a. R-81-14-OEDC(BLN)-59, Work Plans

The OWIL contained construction exceptions identified at the time of system or subsystem tentative transfer and amended by completed and newly identified items after tentative transfer. Completion of the OWIL identified work (with the exception of preoperational test activities) was accomplished by work plans.

Certain weaknesses were identified in the work plan program which are considered by NSRS to be enhancement type observations. We feel that correction of these weaknesses will make the program more useful as a management control tool.

- (1) The work plan (WP) form included a determination of "will this WP complete this item?" If the response was "no," the form did not include a statement of "scope of work remaining."
- (2) The form did not include provisions for a specific list of Functional Configuration Control (FCC) drawings revised by the modification work.
- (3) Neither the work plan nor the FCC drawing revision scheme included provisions for the generation of an FCR, if required, during the performance of the modification work.
- (4) The work plan program did not include a requirement for a "fire hazard evaluation" regarding the modification work that is to be performed.

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b. R-81-14-OEDC(BLN)-60, Construction Change Notifications

ID-QAP 3.2 defines the responsibilities and processing of CCN's. The ID-QAP also states that CCN's are site-initiated engineering changes that affect EN DES approved drawings or documents on nonsafety-related systems, components, or structures. The procedure continues by stating that CCN's are not permitted on

systems, components, or structures following tentative transfer of the system, component or structure.

EN DES responsibilities included the identification of all safety-related/QA items/features/systems, etc., prior to beginning implementation of CCN procedures. The identification and listing of safety-related/QA items is implied by the ID-QAP by referencing construction specification No. N4G-889 and general design criteria No. N4-50-D744. Site procedures BNP-QCP 10.34 and CEO-SOP 1003 define responsibilities for site personnel for handling CCN's.

The weakness identified by NSRS is that the site procedures fail to address the mechanism for determining what systems, components, or structures are safety related and seismically qualified. This weakness could have resulted in a QA audit deficiency (refer to audit No. BN-G-81-06). The deficiency involved the fact that several CCN's were written to document work accomplished on seismically qualified systems.

4. Configuration Control

Criterion VI of Appendix B to 10CFR50 requires that measures be established to control the issuance of documents, including drawings, and changes to them, which prescribe activities affecting quality. Criterion VI continues by stating that these measures shall assure that documents, including changes, are reviewed for adequacy and approved for release by authorized personnel and are distributed to and used at the location where the prescribed activity is performed. 10CFR50.57 discusses the issuance of an operating license and states applicable contingencies. One of these requires that construction of the facility has been substantially completed, in conformity with the construction permit and the application as amended, the provisions of the Act, and the rules and regulations of the Commission. Relative to this, an established and implemented configuration control program is essential to:

- Confirm that the construction of the facility has been substantially completed.
- Compare the facilities' physical configuration to that described in the FSAR and engineering drawings.
- Confirm that engineering calculations (e.g., seismic analysis, electrical load analysis, etc.) will be validated by analyses reflecting as-constructed configurations.

- Document the final as-built configuration.

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. BLN FSAR sections 17.1A.6.1 and 17.1A.6.2 state EN DES responsibilities regarding tabulation of significant drawing information.

OEDC has established program requirements to meet the above commitments and applicable regulatory requirements in ID-QAI 6.1, "Configuration Control." This procedure defines the interfaces and responsibilities of EN DES and CONST as they relate to the control of as-constructed drawings from the time of first system transfer until licensing of the last unit.

ID-QAP 6.1, section 2.3.2, states that the DIS printout capability for items such as ECN basis, as-designed basis, and as-constructed basis. The DIS information provides the capability to obtain a list of the latest revision of as-constructed drawings for any system on a given date.

DIS input responsibilities are as follows:

EN DES inputs the basic drawing information, such as drawing numbers, revision levels, ECN numbers, etc.

CONST inputs the status codes to indicate how the facility is built relative to the as-designed configuration.

CONST has implemented this responsibility by issuance of BNP-QCP 9.3, BNP-QCP 9.4, and BNP-QCP 10.2. Procedures for specific instructions for section implementation were delineated in O&CEU-SOP 102, OEU-SOP 504, STCU-SOP 901, and STCU-SOP 902. These procedures explain in detail the CONST actions necessary to implement the configuration control program.

The evaluation of configuration control included an assessment of the program establishment, adequacy, and implementation to ensure control, status, and distribution of as-constructed drawings. This review also included a review to ensure implementation of a program capable of documenting the as-constructed status of the plant at any given time.

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

Based on this review, it was concluded that the configuration control program that has been established by

CONST is adequate to meet regulatory requirements and commitments with two exceptions. Personnel contacted were well aware of their responsibilities.

The weaknesses observed in the program were as follows:

a. R-81-04-OEDC(BLN)-61, Drawing Information System (DIS)

Presently, the DIS printout does not provide the capability to obtain a list of the latest revision of as-constructed drawings for any given system on a given date as required by ID-QAP 6.1. This is due to a lack of as-constructed status input by the responsible engineering units.

The responsibility for this input was defined in BNP-QCP 9.3 and involves the monthly receipt of the DIS update by the DCC. Copies of the DIS were forwarded to each engineering unit supervisor for review, identification, and documentation of the appropriate system as-constructed status for drawings within their discipline.

This lack of DIS input is illustrated by the fact that the ECN Master Status Report (generated by STCU) dated April 30, 1981 listed 299 complete ECN's. A DIS sort by ECN's completed, dated June 1, 1981, listed only nine complete ECN's. In addition two of these nine ECN's were not documented as being accomplished on the ECN Master Status Report.

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

ANSI N45.2, section 18, states that records which identify the as-built conditions of items in the nuclear facility shall be maintained for the life of the items.

The TVA program for such records included the System Configuration Control Drawing List (SCCDL) and the Drawing Information System (DIS), as described in ID-QAP 6.1.

However, the documents used to install electrical cables, "Cable Installation Slips," were generated by CONST with the aid of computer programs from EN DES' electronic file. Refer to paragraph V.B.2.i. Their use was prescribed by BLN-QCP 3.4 which did not provide for their inclusion in the configuration control program. Further, the rather broad definition of a drawing provided in QCP 10.2, which is "any document received from EN DES" was still not inclusive of the cable installation slips, because they were generated by CONST electronically.

Actually, the schematic drawings without the cable installation slips were not adequate to show the "as-built" configuration of the plant or to build and maintain it. The raceways used for cable routing, the conductor size (in some cases), the cable contract and mark letters, and cable length were not shown on the schematic drawings but were on cable installation slips.

NSRS concluded that the cable installation slips were necessary to build and maintain the plant, and as such, should be considered drawings and subject to configuration control along with the associated schematic drawings.

NSRS recommends that the procedures for cable installation slips be amended to ensure that they receive appropriate configuration control similar to the drawings they supplement and amplify.

## 5. Quality Assurance

A summary of the basic requirements for establishment and execution of a quality assurance program for nuclear power plants is given in section V.A.2 of the report. The following paragraphs describe the quality assuring or auditing function in CONST.

Criterion XVIII of Appendix B to 10CFR50 requires that a comprehensive system of audits be carried out to verify compliance with all aspects of the quality assurance program and to determine effectiveness of the program. The OEDC PRM commits to the use of ANSI N45.2.12, "Requirements for Auditing of Quality Assurance Programs for Nuclear Power Plants," draft 3, revision 4, dated February 1974, as a means of implementing this requirement. The PRM also states that TVA has elected to conform to the provisions of the issued edition (1977) of this standard. BLN FSAR section 17.1A.18.3 briefly describes how the CONST audit program will be implemented.

Responsibility for establishment and execution of QA programs has been delegated by the Manager, OEDC, to the Managers of EN DES and CONST for their respective divisions. The OEDC QA Manager has the responsibility of establishing basic QA policies and requirements, providing guidance, and overseeing the division programs. Within CONST, the Chief, Quality Assurance Branch, directs the development and maintenance of the QA program to include an audit function of all nuclear construction projects. CONST QAB has issued various documents, such as QAPP's, QAP's, and QASP's to define requirements and functions of the QA units at each nuclear project. These procedures are listed in section VII.C.5 of this report. This review by NSRS concentrated on

the audit functions of BLN QAU and certain review functions. The QAU role in trend analysis of conditions adverse to quality is discussed in section V.C.6 of this report.

a. CONST QAU Audit Program

The BLN QAU audit program is defined by CONST QASP 7.1, "Auditing Construction Activities." It is implemented by development of projected three-month schedules every month by the QAU supervisor. This schedule is generally followed but can be adjusted, if needed, depending on site activities.

NSRS reviewed the policy statements, procedures, audit reports, and supporting records, audit schedules, and memoranda listed in paragraph VII.C.5 of this report.

These were discussed with QAU personnel, and as appropriate, with certain BLN project personnel. The audit program implemented, as evidenced by documents reviewed and discussions with QAU personnel, was compared to the provisions of CONST QASP 7.1, ANSI N45.2.12, and BLN FSAR section 17.1A.18.3. Personnel interviewed were aware of their responsibilities and familiar with procedures involved. They also appeared to have a good understanding of the QAU role in assuring adequacy of the program and its implementation.

Based upon the review conducted, it was concluded that the audit program, to include planning, conduct, reporting, and followup, was well defined. Overall, the scope and depth of audits appeared to be adequate to meet requirements and commitments. Specific weaknesses observed in the written program and its implementation were as follows:

(1) R-81-14-OEDC(BLN)-63, Audit Records

Paragraph 5.1 of ANSI N45.2.12 (1974 and 1977 versions) requires that audit records be collected, stored, and maintained in accordance with ANSI N45.2.9. Paragraph 5.2 of the 1974 version committed to defines audit records to include ". . . individual audit plans, audit reports, written replies, the record of completion of corrective actions, and documents associated with the conduct of audits which support audit findings and corrective actions as appropriate."

Contrary to the above, it was observed that only the audit reports and formal responses are maintained per ANSI N45.2.9. Other records, such as audit plans/checklists and supporting records, are retained by the QAU, but they are not stored in

fire-rated cabinets nor are duplicate copies maintained as an option as required by ANSI N45.2.9.

Associated with this matter is the fact that audit reports, when reviewed alone, frequently do not give a perspective as to the extent or seriousness of a problem found. For example, audit BN-G-79-15, deficiency No. 2, noted that three QCIR's had been found dispositioned improperly. The report does not state how many QCIR's were audited. The audit plan/checklist notes revealed that only eight QCIR's were reviewed during the audit.

Although this number and the individual QCIR's reviewed were not selected by random sampling, the total number reviewed and the manner in which they were selected is useful knowledge in assessing the extent of the problem. In other words, the perspective regarding percentage of items reviewed found to contain problems is not available in many cases without use of the audit plan/checklist or other supporting records.

(2) R-81-14-OEDC(BLN)-64, Records of Corrective Action

The audited organization is not normally requested to respond in writing to findings for which proposed corrective action is agreed upon and a date established for its completion at the conclusion of the audit. Unless documentation of corrective action taken is required by the audited organization's procedures, it would not necessarily be accomplished. A prime example of this would be retraining of personnel in administrative matters, which may not require documentation by associated QCP's. This situation apparently existed for BN-G-80-11, deficiency No. 1. Another instance, BN-G-80-09, deficiency No. 1, involved performance of a review of certain NCR's. This review was apparently not documented by CEO, in that no documentation could be produced upon request by the reviewer. Although completion of corrective actions must be verified by QA, the potential exists for lack of documentation of corrective action by the audited organization. NSRS feels this should be evaluated further in that ANSI N45.2.12 may not be met in such cases.

(3) R-81-14-OEDC(BLN)-65, Closeout of Deficiencies

ANSI N45.2.12, section 4.5.2, and QASP 7.1, paragraph N of attachment F, require confirmation of

completion of corrective action, and adequacy of it, prior to closure of findings. Two isolated instances were observed wherein closure was apparently made without having confirmed that corrective action, as previously agreed to, had been completed. (BN-G-80-09, deficiency No. 1, and BN-G-80-11, deficiency No. 1)

In the first case, the deficiency was closed based on verbal confirmation that a requested review had been completed. For BN-G-80-11, deficiency No. 1, two corrective actions were requested and agreed upon at the conclusion of the audit:

indoctrination/training of all engineering/inspection personnel on QCP's 10.28 and 10.33 and documentation of the training per QCP 10.29, and verification that other QCP's which affect all engineering units are entered in the training program. On April 9, 1981, the Project Manager, Bellefonte, issued a memorandum to all CONST employees (BLN 810409 034) discussing the QA program and BNP-QCP's 10.4, 10.26, 10.28, and 10.33, and 10.35 in particular. The thrust of the memorandum was to inform employees of their responsibilities in identifying and handling problems, to include NCR's, QCIR's, handling of allegations, employee concerns, and differing opinions, stop work procedures, etc. The referenced deficiency was closed April 30, 1981 based on issuance of the memorandum alone. The NSRS review disclosed that the memorandum was being distributed to new employees during their indoctrination, but not all employees read it or kept a copy. Each engineering unit has a separate SOP to cover training. In certain cases, the SOP's were revised to cover the QCP's as required by the audit deficiency, but not in all cases. For examples, QCP 10.28 had not been incorporated into EEU-SOP-209, "Quality Assurance Training Program." In summary, it appears that the deficiency was closed without confirmation of completion of corrective actions previously agreed to, or verification of adequacy of actual corrective action taken. This is contrary to ANSI N45.2.12 and QASP 7.1.

#### (4) Timeliness of Corrective Actions

A review of the QAU audit status log, which gives a status of previously identified audit deficiencies, revealed that certain deficiencies were still open even though the established dates for completion of corrective actions had expired. Examples included BN-C-79-06, deficiency No. 1 and

BN-E-79-12, deficiency No. 2. These examples are encompassed by deficiencies 1 and 2 of OEDC QA's management audit M81-5. This audit was initiated May 18, 1981. In that this problem was identified by OEDC QA and corrective action had been initiated, no further followup is planned by NSRS.

b. Procedure Review Function

The site QAU is charged with the responsibility of reviewing site generated procedures, such as QCP's, per QASP 4.2 and site SOP's per QASP 4.6. The BLN QAU implements this responsibility through BLN-QAU-SOP-4.2.1, "Procedure Review, Approval, and Control." QAU's function for QCP's includes review and approval. The QAU supervisor's initials are placed on the cover sheet of each QCP revision denoting completion of his review and approval. For SOP's his function is one of review only. Accomplishment of the review and its results are documented via memoranda to QAU files. Also, if applicable, comments are forwarded to the CEO by memorandum from the QAU supervisor. Several memoranda to files and to the CEO were reviewed. Based on this review and discussions with QAU personnel, it was concluded that this function was being conducted per procedures.

6. Corrective Action

a. Background and Program Description

Criterion XV of Appendix B to 10CFR50 requires that measures be established to control materials, parts, or components which do not conform to requirements in order to prevent their inadvertent use or installation. It further requires the nonconforming items be reviewed and accepted, rejected, repaired, or reworked in accordance with documented procedures. Criterion XVI of Appendix B further requires that conditions adverse to quality be promptly identified and corrected. In the case of significant conditions, it requires that the causes be determined and corrective action taken to preclude repetition. It further requires that the significant conditions, the causes, and corrective actions taken be documented and reported to management. Sections 16 and 17 of ANSI N45.2-1971, "Quality Assurance Program Requirements for Nuclear Power Plants," utilize basically the same language as the referenced criteria of Appendix B. This standard, endorsed by Regulatory Guide 1.28, "Quality Assurance Program Requirements (Design and Construction)," is committed to by the OEDC PRM. Additionally, sections 17.1A.15 and 17.1A.16 of the BLN FSAR give brief descriptions of the programs for effecting corrective action.

## V.C.6

An extension of the CONST corrective action program encompassed in the review involved reporting of problems and defects to the NRC. 10CFR21 requires that suppliers, contractors, owners, or operators of nuclear plants report certain type problems to the NRC. Likewise, 10CFR50.55(e) requires certain problems to be reported for plants which have construction permits. Review of items for reportability and actual reporting is handled by NEB/NLS of EN DES for all of OEDC. This is addressed in more detail in the EN DES section of this report.

OEDC QA has established basic guidelines and instructions for implementation of programs to implement Criterion XVI of Appendix B by issuance of OEDC QAI 4, "Determining, Reporting, and Correcting Conditions Adverse to Quality." It has also provided for independent review of nonconformances, audit findings, and formal appraisal findings for significance and reportability through procedures MO-QAP 3.2 and MO-QAP 3.4.

CONST has established guidelines and requirements for implementing a system for identifying, evaluating, correcting, reporting, documenting, tracking, and trending conditions adverse to quality by issuance of division quality assurance program policy statements and QAP's. The BLN program is derived from these higher tier documents and is composed of site QCP's and engineering unit SOP's. Anyone at the site who observes a nonconforming item or activity is obligated to bring this to the attention of an engineering unit representative, who is responsible for documenting the problem as a QCIR, and possibly an NCR, and then pursuing the matter until resolution and closeout. The QCRU at BLN maintains logs of QCIR and NCR numbers in bound notebooks, controlling the issuance of individual numbers. The QCIR is used to document essentially all problems found by the crafts and engineering unit (inspection/engineering) personnel. Unless the problem can be resolved onsite and is not significant, an NCR is written also. Essentially all NCR's are transmitted to EN DES BLP for dispositioning. The BLP role in dispositioning NCR's from BLN is discussed in detail in the EN DES section of this report (V.B.6).

A review is performed by CEO to determine significance of each NCR. Additionally, all NCR's sent to BLP for dispositioning are reviewed by BLP to determine if any require upgrading to significant. Nonsignificant NCR's, and CONST QA audit deficiencies are also independently reviewed by OEDC QA to assure proper significance determinations have been made. If an NCR is determined to be significant at any point in its

processing/review, a copy is immediately taken to NEB/NLS of EN DES. As noted earlier, this group handles reviews for reportability and the reporting function for all of OEDC. Significant NCR's are also reviewed by QAU to assess adequacy of actions taken to prevent recurrence.

The BLN QAU, in addition to audit function responsibilities in this area, had developed QAU SOP's which are used to perform related activities. These include review of NCR's and trending of NCR's, QCIR's, audit findings, and 10CFR50.55(e) reports to the NRC. Certain types of conditions adverse to quality are tracked by the QAU and also the CEO QA commitments engineering staff.

For conditions adverse to quality which might affect the end use of an item or safe operation of the plant, authority to stop work is given to any employee observing such conditions by CONST-QAP 1.2. Disposition of stop work conditions requires approval of QAU. Implementation of stop work actions by QAU is through CONST-QASP 7.4 and BNP-QCP 10.33, the latter of which covers all employees.

NSRS concludes that the CONST corrective section program is adequate to meet requirements and commitments except as noted in the following paragraphs.

b. Details of Review

The documents listed in section VII.C.6 of this report define the CONST and BLN program, or are products of the program, for corrective action and attendant functions, such as trending and reporting. These were reviewed and discussed and procedural/program requirements compared to the aforementioned requirements and commitments. Interviews were conducted to determine individuals' awareness 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 conclusions and findings in the area.

(1) Problem Identification and Evaluation

QCIR's are initiated and processed per BNP-QCP 10.26; NCR's are handled per BNP-QCP 10.4. The QCRU logs for QCIR's and NCR's were reviewed. It was noted that maintenance of the logs was per procedure. Approximately 30 QCIR's were selected for more

detailed review to determine whether they were being processed per procedure, reviews for significance were being conducted, NCR's were being generated if appropriate, etc. No problems were noted in this portion of the review. It was noted that as of June 11, 1981 the number of QCIR's written since initiation of the QCIR system in January 1978 was over 10,000. An average of about 800 per month had been generated in 1981. A rather small portion of those generated in 1981, about five percent, had been upgraded to NCR's. Due to time constraints, this percentage and possible implications were not evaluated by the reviewer.

Approximately 200 NCR's were reviewed at BLN and BLP to determine whether they were being processed in accordance with BNP-QCP-10.4. Processing by site personnel appeared to be in conformance with BNP-QCP-10.4, in that supervisory reviews were documented, QCIR's were being referenced, reviews for document completeness were being performed by QCRU, NCR's requiring disposition by EN DES were being sent to BLP, etc.

During this portion of the review, the following procedural/program weaknesses were noted:

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

Revision 2 of QAI-4, dated April 27, 1981, provided a new definition of significance relative to various types of conditions adverse to quality. At the conclusion of the review, CONST-QAP 15.1, BNP-QCP 10.4, and BNP-QCP 10.26 still contained the definition of significance provided by the earlier version of QAI-4.

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

Step 5.D of revision 2 of QAI-4 requires that conditions adverse to quality determined to be nonsignificant be reviewed by the appropriate QA organization or another organization independent of the reporting one, and where deemed necessary, upgraded to significant. QCIR's, which may represent conditions adverse to quality per QAI-4, step 4.A, do not receive an independent review for the purpose stated above at BLN. They are initiated by, and all reviews and approvals of them are performed within the engineering units of the CEO, up through an ACE. An independent review of QCIR's by QAU was provided

for by BNP-QCP 10.26 at one time, but this requirement was deleted by addendum No. 1 to revision 3, July 21, 1980. The failure to provide an independent review of QCIR's represents a failure to follow procedural requirements, contrary to ANSI N45.2, section 6, and its base requirement, 10CFR50, Appendix B, Criterion V.

## (2) Notification and Reporting

The program reviewed was found to contain provisions for notification of management, both site and corporate, of problems in a manner consistent with their importance. As noted previously, nonconformances requiring disposition by EN DES were being forwarded to BLP.

Significant NCR's or audit findings by CONST QA or OEDC QA are required to be related to NEB/ NLS in an expeditious manner for review for reportability.

It was noted that CONST QA had developed a system for notification of the various projects of problems on a given facility which might be applicable to other projects. This is the Program Information Notice (PIN) system defined by CONST-QASP 7.3 and memoranda from R. W. Dibeler to all nuclear projects (CQA 800514 001) and to R. T. Hathcote (CQA 800718 001). The PIN system was created in response to NRC concern for the need for a vehicle to provide potentially generic information to the various projects.

### 1.1 R-81-14-OEDC(BLN)-68, Scope of PIN System

Review of the PIN index revealed that the majority of items previously disseminated involved NRC findings, such as noncompliances and TVA responses to them. NSRS believes that the PIN system can be more useful by expanding the types of subjects to be covered. An example would be OEDC QA audit findings which might relate to other projects.

## (3) Tracking Systems

In addition to the logs and other systems for tracking QCIR's and NCR's, tracking systems for externally identified problems were being maintained by CEO and QAU. The CEO QA Commitments Engineering Staff tracks the status of NRC audit

findings at BLN, including noncompliance and unresolved items via an NRC audit log. A similar log is used to track formal responses required to address NRC audit findings. Items which have been reported per 10CFR50.55(e) are tracked to help assure timeliness of reports. It was noted that responses required by NRC IEB's are individually requested by NEB/NLS, and no tracking system is maintained by CEO for these items.

The BLN QAU maintains a log entitled "Followup Action Log for NRC Responses" which identifies items, such as 50.55(e) reports, IEB's, and NRC audit findings, which required formal responses. It is also used to assure timeliness of responses for which the site is responsible.

A brief review of these tracking systems was performed, although time constraints did not allow extended evaluations. The review and discussions did reveal, however, a certain amount of duplication of effort by CEO and QAU.

(4) Trend Analysis

CONST QA had developed a program for trend analysis of conditions adverse to quality, as defined by QASP 7.2. The Quality Assurance Engineering Unit of the CONST QA staff coordinates the program. It is implemented by the QAU at each project. BLN QAU had issued QAU-SOP 7.2-1 to amplify upon QASP 7.2 and define in more detail the administration of the program at BLN. Three separate reports are generated by the trending effort. The "Quality Trend Analysis Report," produced semiannually, covers QCIR's and NCR's. The "Quality Trend Analysis Report of Audit Items," submitted quarterly, covers audit findings by CONST QA, OEDC QA, and ANI audits, and ASME surveys/audits. The third report, "Quality Trend Analysis Report of Significant and Reportable Items," also submitted quarterly, covers significant audit deficiencies, significant NCR's, items reported to NRC under 10CFR21 or 50.55(e), and NRC noncompliances. Two or more of each type of the three reports, listed in section VII.C.6 of the report, were reviewed and discussed. Discussions with QAU personnel revealed that considerable manpower is used in the trending effort, most of it coming in the form of overtime.

These observations were made in this area:

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

Discussions with project management personnel revealed various opinions regarding the usefulness of trend analysis products. Some felt it was helpful and useful, but the project manager felt that the process of encoding was too subjective, resulting in a questionable product regarding accuracy.

The reviewer noted that the encoding process, or translation of information on QCIR's, NCR's or other documents into cause and other codes could be made less subjective by placing more emphasis on accuracy and completeness in entering information on the QCIR and NCR forms themselves. BNP-QCP-10.4, addendum No. 2 to revision 8, dated March 3, 1981, requires the cause of a nonconformance to be entered on the NCR form only if it has been determined to be significant. BNP-QCP-10.26, addendum No. 1 to revision 3, dated July 21, 1980, requires information regarding the nature and extent of a problem to be entered on the QCIR form, but does not specifically require that a cause be entered. In that the relevant procedures do not require details regarding causes of problems to be documented, this creates problems at times for QAU in determining proper cause codes. Project management correctly observed that, at times, the cause of problems are not known when the QCIR and NCR forms are generated; however, to assure accuracy in encoding, procedures should require entering causal information onto the forms prior to closure.

(b) R-81-14-OEDC(BLN)-70, Incorporation of Experience Into Training

Review of trend analysis and site training programs revealed that there is apparently no formal mechanism for incorporating adverse experiences or trends revealed into the training program. No routine evaluation of trends is performed by those in charge of training. For QC personnel, training is essentially the responsibility of the unit head, thus no uniform training would result unless directed by management. Certain craft

and QC personnel are trained in QCP's and significant changes to them, thus if changes were made to QCP's because of adverse experiences, training might be accomplished.

NSRS believes trend analysis results can provide a useful management tool if factored into the project training program.

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

During the review it was noted that numerous NCR's had been written on problems, such as mislocation and/or omission of embedments, rebars, conduit, sleeves, etc.; concrete forming problems; and rebar cutting and bending problems. Specifically, over two dozen NCR's of this nature were noted to have been written from February 1975 (No. 45) through June 1977 (No. 504). Also, a review of NCR's generated in 1981 revealed that a high number of the same types of problems are still occurring. Examples include NCR Nos. 1400, 1438, 1441, 1444, and 1462. For approximately 50 percent of the NCR's noted, action taken to prevent recurrence entered on the form was "none." NSRS concludes that, for at least the type of problems discussed above, the corrective action system implemented was ineffective in identifying and taking action on a continuing problem. In that each NCR was categorized as nonsignificant, procedures did not require action to prevent recurrence; however, failure to identify a continued problem as significant appears to be ineffective from a management control and cost effectiveness standpoint.

7. Training and Qualifications of Personnel

The development of the NRC requirements and the OEDC Managers program for QA training and qualification of personnel has been presented in Section V.A.1.a of this report. The CONST program for the training and qualification of QA auditors, engineers, QC inspectors, craft foremen, and craftsmen is contained in the following paragraphs. Training and qualifications of NDE inspectors and welders is contained in paragraph V.C.13 of this report.