TENNESSEE VALLEY AUTHORITY

NUCLEAR SAFETY REVIEW STAFF

SPECIAL PROGRAM MANAGEMENT REVIEW

NSRS REPORT NO. R-83-08-BLN

Subject: Review of the Cleaning and Flushing Program for Bellefonte Nuclear Plant Safety-Related Systems

Dates of Review: March 1 through March 16, 1983

Team Leader: _____ _____
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This report has been made possible by the dedicated effort of Charles M. Schnupp. Charlie did the planning for this review, participated actively in the review, and devoted many hours of his own time to accomplish the preparation of the final report. Charlie completed the final draft of this report on April 22 and died on April 23. His efforts both on this report as well as other contributions to the efforts of the Nuclear Safety Review Staff are greatly appreciated by the Tennessee Valley Authority.

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I. BACKGROUND

In November 1982, two Bellefonte (BLN) employees approached the Nuclear Safety Review Staff (NSRS) during a site visit and expressed safety concerns about activities associated with the preoperational cleaning and flushing of primary piping systems at BLN. In addition to the employee concerns, as a result of numerous problems encountered during flushing, on November 19, 1982, the site issued a "Stop Work Order" preventing continued flushing of safety-related systems until the site could perform an assessment of the problems encountered and formulate a corrective action program to prevent recurrence of these problems on future flushes. Based on the safety implication of the information furnished to NSRS and the site-generated Stop Work Order, NSRS decided to perform a review of the flushing program in effect at the BLN site.

II. SCOPE

The NSRS review was an overall evaluation of the administrative controls and implementation practices within the line organizations of the Office of Engineering Design and Construction (OEDC), the Division of Engineering Design (EN DES), the Division of Construction (CONST), and the Division of Nuclear Power (NUC PR) as applied to the flushing program at BLN. The review did not include an examination of Office of Quality Assurance (OQA) activities associated with the flushing operations. The criteria established in ANSI N45.2.1-1973 and endorsed by RG 1.37 was used as the primary basis for the program assessment. The review was limited to the flushing of primary safety-related systems in accordance with the BLN site-generated Construction Test Procedure BNP-CTP-6.1. The review of flushing of the primary systems was intended to be broad in scope with a depth commensurate with the degree NSRS perceived necessary to adequately access the adequacy of the program.

Seven general areas were examined during the review. These areas are identified below and the details of the review findings in each area are provided in section V.

A. Corrective Action Program

B. Regulatory Requirements versus the OEDC Program for Safety-Related Cleaning and Flushing Activities

C. Acceptance Criteria for Class "B" Safety-Related Systems

D. Inspection and Verification of System Cleanliness

E. Assessment of Actions Taken at BLN to Resolve Identified Program Problems

F. NUC PR Support of Safety-Related Cleaning and Flushing Activities

G. STCU Test Director Qualification and Training

III. MANAGEMENT SUMMARY

The review of the BLN cleaning and flushing program for safety-related piping systems was conducted by NSRS to provide an independent assessment of whether a satisfactory level of program controls have been established and implemented to ensure nuclear safety. The intent of the review was to determine whether adequately prepared and controlled procedures had been established to satisfy the TVA policy, the regulatory requirements, industry standards, and TVA commitments; whether the program was being adequately implemented, whether all persons involved in the program were aware of their responsiblities; and whether the personnel involved in the program were properly trained and qualified to accomplish their assignment.

Some positive aspects of the flushing and cleaning program were observed in the way of positive program improvements following the Stop Work Order imposed on the flushing program by the BLN site management. Some examples are:

- A new management supervisory position was established and filled in the Startup Test and Coordination Unit (STCU) whose primary responsibility was development, coordination, and implementation of the construction flushing program.

- Additional personnel from other site engineering units with experience in system installation and construction testing were transferred into the STCU flushing program.

- More emphasis was being placed on detailed construction test procedure packages for the accomplishment of individual system flushes.

- An improved technical review of the developed system construction test procedure packages was initiated to encompass additional site engineering units' comments and approvals.

The review also identified a significant number of deficiencies as described in section V of this report. These deficiencies were evaluated for root cause and on the basis of this evaluation a number of conclusions and NSRS positions are presented in section IV.

NSRS believes that a large number of the deficiencies and weaknesses identified during this review can be attributed to a breakdown in the OEDC corrective action program to compensate for problems experienced at other TVA facilities. This breakdown resulted in inadequate procedural details and controls established in the initial development of the cleaning and flushing program at the BLN site. The upper tier documents developed by EN DES did not incorporate all the requirements of applicable regulatory guides, industry standards, and TVA commitments for the site to use in the development of construction testing procedures. This was considered a significant program deficiency. As a consequence, CONST did not have the information readily available to initially formulate a program to satisfy all requirements and TVA commitments. CONST should not be expected to study and interpret

regulatory requirements, industry standards, and commitment documents. That responsibility had been assigned to and accepted by EN DES. In addition, BLN did not take advantage of "lessons" learned at other TVA construction sites during development and implementation of flushing programs. This is demonstrated by the poor quality of the initially approved site construction test procedure for flushing/cleaning. This lack of detail in the initial upper tier and site procedures coupled with the fact that flushing activities were performed by inexperienced construction site personnel contributed to the majority of the problems encountered and the lack of adequate test controls.

A procedure variance in the acceptance criteria for purge dam residual particle size was provided to CONST by EN DES without prior approval by NRC. Failure to gain approval of this variance could result in the reflushing of several systems. Therefore, it appears imperative that approval be obtained quickly or that an alternate method for flushing/cleaning safety-related systems to meet the present ANSI standard acceptance criteria be developed to minimize the rework. The method of verification of acceptable particle size for cleanliness was also questionable. Bypass stream sampling filter cartridges were being utilized instead of the more conservative practice of cleanliness verification by inline full flow strainers. The bypass stream sampling for accepted particle size being used at the time of this review had not been proven to be representative of the process flow and had led to confusion, doubt, and disagreements. The working relationship between the various engineering support units and the STCU unit responsible for the flushing/cleaning program and between the QC inspection organization and the STCU was not good. In addition, NUC PR and EN DES were not sufficiently involved in the flushing program and its implementation.

The examination of the seven functional areas identified in this report indicated that in the area of flushing/cleaning of safety-related systems, additional comprehensive program improvements are needed. Additional guidelines and procedures should be developed by EN DES and CONST to ensure compliance with regulatory guides, industry standards and TVA commitments. Key issues in regard to the approval of variances in the acceptance criteria and method of sampling should be resolved by EN DES, and clear and concise guidelines should be established for implementation by the CONST site. Although a breakdown appeared to exist between EN DES and CONST in the understanding of responsibilities for program definition, those personnel involved in the site program implementation at the supervision and working levels had a good understanding of their specific responsibilities as described in site documents. A formal program for the selection, training, and qualification of personnel involved in the flushing program should be prepared and implemented to ensure compliance with existing requirements and that expertise is developed and maintained for future flushing activities. NUC PR and EN DES should pursue a more active role in the flushing program to ensure compliance with regulatory guides and industry standards, and to minimize potential safety/operational difficulties during the preoperational and startup phases of the plant.

IV. CONCLUSIONS AND NSRS POSITIONS

The following paragraphs contain conclusions followed by NSRS positions to correct perceived weaknesses in the BLN site cleaning/flushing program of safety-related piping systems. Specific findings are presented in section V for each area evaluated.

A. R-83-08-BLN-01 - Review of Corrective Action Process in OEDC

EN DES and CONST investigated and documented the problems encountered in the CONST testing program at SNP. Corrective actions were specified to strengthen the testing program and prevent the same type of mistakes at other TVA facilities. However, these corrective actions were not properly implemented at BLN. In addition, problems exist with the local corrective action program at BLN, particularly in the disposition of Quality Control Investigation Reports (QCIRs). (See sections V.A and V.B for details.)

NSRS Position

The OEDC corrective action program should be reviewed to determine the root cause for the breakdown in program control which resulted in program deficiencies at BLN and corrective action taken to prevent reoccurrences.

B. R-83-08-BLN-02, Development of Cleaning/Flushing Program Control Procedures

The cleaning/flushing program of safety-related systems at the BLN site was governed by the requirements of nuclear Regulatory Guide (RG) 1.37 which endorsed ANSI N45.2.1-1973. A review of the EN DES-generated documents G-39 and N4M-891 revealed that not all the requirements of the ANSI standard had been incorporated into the EN DES-generated documents. As a result, the site-generated procedure BNP-CTP 6.1, the construction test packages, and the cleaning/flushing program developed from G-39 and N4M-891 did not meet the requirements of ANSI N45.2.1-1973. (See sections V.B and V.E for details.)

NSRS Position

EN DES should review RG 1.37 and ANSI N45.2.1-1973, other documents containing TVA commitments, and the details of this report and incorporate the programmatic requirements and applicable recommendations into G-39 and N4M-891 to ensure that responsibilities, technical requirements, documentation and records, training, and adequate program test controls are defined in G-39 and N4M-891. The BLN site should review the site-generated procedures, construction test package, and flushing program to ensure conformance to the EN DES-generated documents with specific emphasis on acceptance criteria and adequate details in each system test package for controlling the accomplishment of the activity and documenting the results.

C. Review of Site-Generated Procedure and Construction Test Package

1. R-83-08-BLN-03, EN DES Review of Site-Generated Construction Test Procedures

A review of the initial site-generated construction test procedure BNP-CTP 6.1 revealed that this procedure contained inadequate details and positive test controls for the development of an adequate flushing program to accomplish these activities affecting safety-related systems. Therefore, the original construction test procedure packages for individual system flushes did not contain sufficient details in regard to responsibilities, prerequisites, precautions, detailed procedural steps, and adequate documentation and test result records for accomplishment and verification of the activity being performed. (See sections V.A and V.B for details.)

NSRS Position

EN DES should review the site-generated construction test procedure and ensure conformance to ANSI standards, EN DES-generated documents, past TVA commitments, and past accepted program development and implementation at preceding TVA sites. Completed test packages for past flushing activities at BLN should also be reviewed to ensure that compliance with applicable requirements can be demonstrated.

2. R-83-08-BLN-04, Bellefonte Site Engineering Units and NUC PR Review of Site-Developed Construction Test Packages

The engineering units and NUC PR had not established guidelines within the units and sections to describe specific responsibilities for the review of construction test packages. A duplication of effort was evident within the various units which increased the possibility of overlooking key elements necessary for adequate test controls within the construction package. (See sections V.E.1, V.F.1.f and V.F.2.b for details.)

NSRS Position

Each individual unit or section responsible for reviewing construction test packages within CONST and NUC PR should develop criteria and guidelines establishing a systematic approach for reviewing the construction test packages.

D. R-83-08-BLN-05, Approval of the 1/8-Inch Variance for Acceptable Purge Dam Residual Particle Size

EN DES granted the site relaxation in the allowable size of purge dam material residual remaining in the piping systems from 1/32 inch to 1/8 inch. This variance had not received approval by either the ANSI standard committee or the NRC. Therefore, the acceptance criteria used by the site for determining the cleanliness of

safety-related systems on prior flushes did not satisfy the requirements of ANSI N45.2.1-1973. (See section V.C for details.)

NSRS Position

EN DES is pursuing approval for the variance from NRC. If NRC disapproves the variance, EN DES must evaluate the flushing program and determine the adequacy of the program for further flushing and the acceptability of systems previously flushed to the 1/8-inch acceptance criteria. If the variance is approved by NRC, an instruction should be prepared and implemented for classifying and measuring particulate materials and documenting the results to ensure that the 1/8-inch acceptance criteria is applied only to properly identified and measured purge dam materials.

E. R-83-08-BLN-06, Bypass Filter Versus Inspection of Inline Full Flow Strainers

NSRS review of the method of inspection for the determination of particle size to meet the acceptance criteria of ANSI N45.2.1 has indicated that EN DES had interpreted the ANSI stated method of sampling, "a 20 mesh or finer filter or the equivalent," to allow the use of bypass filters for this purpose. This method of sampling has led to confusion, doubt, and disagreements as to whether it was respresentative of the actual particles in the process flow. A recommendation had been made by the consultant contracted by EN DES to verify representative sampling by onsite testing. The inline full flow strainer will provide a representative indication of the degree of cleanliness of the systems. It had not been determined that the bypass filter method will provide this representative information. (See section V.D for details.)

NSRS Position

Verification of system cleanliness in regard to particle size should be accomplished by inspection of inline full flow filters installed throughout the system.

F. R-83-08-BLN-07, Construction Qualification, Certification, and Training Programs

An informal training program had been established within the STCU unit; however, a formal program in compliance with section 2.4 of ANSI N45.2.1 did not exist. The construction quality assurance training program plan excluded test directors and test data reviewers from training, qualification, or certification. As a result of this exception, the STCU program was not in compliance with the requirements of CONST-QAP 2.2 and BNP-QCP 10.29. The requirement for certification of STCU testing personnel was omitted from BNP-QCP 10.29 which was contradictory to ANSI N45.2.6 requirements. (See section V.G for details.)

NSRS Position

The applicable procedures should be revised and implemented to ensure that STCU test directors and personnel are selected, trained and qualified in accordance with the applicable requirements of ANSI N45.2.1 and ANSI N45.2.6.

G. R-83-08-BLN-08, NUC PR Involvement in the Flushing Program

NUC PR was not providing services under the direction of a test representative working directly with the STCU test director. (See sections V.A.1 and V.F for details.)

NSRS Position

NUC PR should provide a test representative to work directly with the STCU test directors to coordinate support and to represent NUC PR's interest in the acceptability of the cleanliness conditions of the safety-related systems prior to preoperational and startup testing activities.

H. NUC PR Chemical Unit Program Improvement

1. R-83-08-BLN-09, Chemical Unit Training

The Chemical Unit analysts had been trained to perform the analyses to support CONST's cleaning and flushing program; however, this training was informal and the training program had been delineated only in an unapproved draft engineering section instruction letter. Training records were not controlled as quality assurance documents. (See section V.F.1.a for details.)

NSRS Position

A formal comprehensive inplant training program satisfying the NUC PR requirements and the needs of all classifications of radiochemical/chemical laboratory analysts should be prepared and implemented.

2. R-83-08-BLN-10, Laboratory Quality Control

The laboratory quality control program is not sufficient to ensure that the results of analyses provided to CONST by NUC PR are correct and representative of system conditions. (See section V.F.1.c for details.)

NSRS Position

Specific sampling procedures should be prepared and the laboratory quality control program should be upgraded to comply with the requirements of section III of DPM N79E2.

3. R-83-08-BLN-11, Safety-Related Systems Water Chemistry Specifications and Logsheets

The water chemistry specifications, data logsheets, and corrective action levels for out-of-limit indications had not been prepared and implemented. (See section V.F.1.e for details.)

NSRS Position

Safety-related systems, water chemistry specifications, and respective data logsheets should be developed to provide a base for corrective action levels if adverse conditions are encountered during system layup and to use a base for comparing the flush accepted criteria for each system.

V. DETAILS

A. Corrective Action Program

Criteria XVI of Appendix B to 10CFR50 entitled "Corrective Action" states that "Measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the conditions is determined and corrective action taken to preclude repetitions. The identification of the significant condition adverse to quality, the cause of the condition, and the corrective action taken shall be documented and reported to appropriate levels of management."

1. Past Commitment to NRC for Construction Testing Program

In November 1980, during the SQN unit 2 reactor coolant system hydro test, problems were encountered of sufficient magnitude to cause NRC stop the test. Based on these problems, TVA conducted an investigation and determined that corrective actions were in order. On November 19, 1980, a meeting was conducted between NRC and TVA in Atlanta. TVA presented to NRC the results of the investigation and described the corrective action to be implemented to preclude this from happening at other TVA nuclear plants in the construction phase. The findings of the investigation as presented in reference 121 indicated the primary causes of the problems encountered during the hydro test were as follows:

- The procedures contained errors in valve position.
- There was insufficient independent verification of the procedures.

- There was insufficient coordination of the procedures with NUC PR who was involved in the operation of permanent equipment used in the test.

- There was improper control of the test. Persons participating in the test were not properly briefed.

- There was insufficient coordination with NUC PR as NUC PR personnel were not directed to use the detailed information in the test procedure.

- The test director was not correct in allowing the test to proceed without clearing all the requirements before proceeding to the next step.

- Lack of experience in directing tests set the stage for the test control problems.

As part of the corrective action program resulting from the problems encountered during the hydro test, TVA presented to NRC measures considered to be generic to all TVA nuclear units still under construction as follows:

- Procedures would be prepared by CONST.

- Procedures would be reviewed and approved by EN DES, NUC PR, and CONST QA Unit onsite.

- NUC PR would give special attention to operating equipment, equipment limitations, and boundary identification with other systems.

- Testing would be conducted by CONST with a CONST test director in charge.

- NUC PR would provide services under the direction of a test representative who would work directly with the test director.

- Each individual test procedure and each individual test results package would be reviewed for conformance to the QA program by the CONST Quality Assurance Unit.

- The CONST Quality Assurance Unit would continue to perform test observations and audits on a selected basis.

- EN DES would provide more detailed instructions, specifications, and requirements on the hydro testing.

In addition, TVA told NRC that the construction test program relative to cleaning and flushing would be reinforced similar to the hydro test program and stressed the following points:

- NUC PR (site) would be added to the review and approval cycle for the cleaning and flushing construction test procedures.

- NUC PR would provide services during testing such as water quality measurements, supplying of flushing water, and the operation of permanent equipment.

- During the testing the CONST test director would coordinate all NUC PR operations with the NUC PR test representative.

- The entire construction test program would be reviewed with involved personnel to explain the importance of quality, quality control, and quality assurance on the testing programs.

- Administrative procedures would be reviewed to assure strict adherence to test control requirements.

- Management and supervisory personnel would be instructed to explain the importance of rigorous test control and enforce strict test control in day-to-day activities at each site.

In conclusion, NRC was informed that TVA was committed to a program that produces the high quality imperative for nuclear safety.

Based on this commitment, an internal TVA committee comprised of CONST QA, NUC PR, EN DES, and CONST (various TVA sites) investigated the entire construction test program in accordance with the guidelines established in reference 122. The finding of this investigation was that a separate Construction Test Procedure Manual should be developed and implemented with the appropriate identified testing activities incorporated. Key points emphasized as a result of this investigation were as follows:

- As the existing procedures and instructions were converted into the test procedures format for incorporation into the Construction Test Procedure Manual, the existing procedures would be evaluated and expanded as necessary to ensure sufficient details.

- Construction Test Procedures would be reviewed and approved by CONST QA, EN DES, and NUC PR and the NSSS vendor should be requested to identify any construction test procedures which they wish to review and approve.

In the "Confirmation of Concurrence" letter of reference 120 from NRC to TVA dated November 20, 1980, preoperational and related construction tests were allowed to resume at SQN

based on the presentation to NRC with the following controls and understanding in regard to individual system flushing test packages:

- Cleaning and flushing procedures would be subject to a peer technical review before being approved by the Construction Engineer. The CONST QA Unit would review the entire test package for conformance with QA program requirements, and a review by NUC PR personnel would be performed.

- These additional controls would be applied to other TVA nuclear power plants.

Reference 118 dated November 25, 1980, "Sequoyah and All Nuclear Plants - QA Commitments to NRC during the November 19, 1980 Atlanta Meeting," was forwarded to all TVA construction sites, CONST QA, and CONST. For BLN, on September 18, 1981, a four-page Construction Test Procedure BNP-CTP-6.1 entitled "Flushing of Fluid Handling Systems," with a sample construction test package as an attachment, was approved by the Site Assistant Construction Engineer, Construction Engineer, CONST QAB, NUC PR, and EN DES for the flushing and cleaning program. This procedure did not meet the commitments to NRC in that sufficient details were not provided for the accomplishment of the flushing and cleaning of piping systems. An adequate review and guidance as to the required details for the procedure was not provided by EN DES/MEB personnel who had experience in the SQN and WBN flushing and chemical cleaning programs. Subsequent revisions to this procedure have resulted in additional details, precautions, and requirements for flushing of safety-related systems. Refer to section B of the details of this report for NSRS review of procedures and ANSI requirements.

On November 19, 1982, the BLN site issued Stop Work Order SW008 thereby discontinuing fluid flushes of safety-related systems due to the possiblity of imparing or affecting the overall integrity or end use of the system. This Stop Work Order was issued as a result of the number of overpressurizations of safety-related systems similar in nature to what had occurred at SQN and WBN prior to the evolution of TVA commitments to NRC to upgrade the construction testing program. An investigation was conducted by BLN into the overpressurization problems encountered. The causes as identified by the investigation were as follows:

- Lack of sufficient construction flushing experience and training in the Startup Testing and Coordination Unit.

- Inadequacy of details, review, and positive test control measures of individual flush test procedures.

These conclusions were supported by the evidence of human error elements during flushing overpressurization incidents coupled with a lack of planning of positive means to preclude overpressurization in the existing program.

A five-point corrective action plan was presented to NRC in the meeting of Novmeber 8, 1982, at the BLN site and consisted of the following:

- Define the minimum criteria to assure the Startup, Testing, and Coordination Unit (STCU) supervisor of the proper capability of construction flushing test directors, increase training and instruction of STCU personnel, and designate capable personnel as test directors.

- Review the construction testing requirements and commitments for cleaning and flushing to ensure incorporation in construction test procedures. Review and revision to include commitments made at other TVA projects as a result of system overpressurization instances and to include incorporation of positive test controls.

- Improve experience level in the STCU by transferring in from other construction engineering units personnel who have system installation or operation exper[illegible] and competence.

- Review existing procedures for incomplete safety-related system flushing activities to determine if their revision is required to bring them into conformance with the new BNP-CTP 6.1 revisions.

- Review past operational, flushing, or hydrostatic testing activities for possiblities of ovepressurization and determine if any additional such incidents may have occurred other than documented.

Based on the incidents and the related causes that occurred during the SQN and WBN plants' construction testing activities and the commitments made to NRC to preclude this from happening at the succeeding TVA plants, NSRS concluded that the appropriate corrective actions were not iniated by TVA for the development and implementation of the BLN flushing and cleaning program since many of the conditions that existed at SQN and WBN were not corrected prior to initiation of construction testing. Failure to adequately implement TVA commitments to NRC through meaningful corrective action led to similar testing problems at BLN. Examples of this condition are:

- Procedures were not developed in sufficient detail to allow inexperienced personnel to accomplish the assigned task.

- The review cycle of the initial BNP-CTP 6.1 procedure was inadequate in that sufficient guidance was not provided by EN DES/MEB in the development of this procedure based on past experience at other TVA plants.

- An adequate review was not performed by NUC PR in regard to operating equipment, equipment limitations, and operating equipment instructions.

- NUC PR was not providing services under the direction of a test representative working directly with the test director.

- Administrative procedures in regard to training, qualification, and certification did not include CONST STCU personnel and resulted in mistakes made by inexperienced personnel.

2. Quality Control Investigation Reports (QCIRs)

Quality Control Procedure BNP-QCP-10.4, R9, entitled "Control of Nonconformances" dated November 18, 1982, assigns the responsibility and defines actions for identification, segregation, disposition, and verification of corrective action for conditions adverse to quality (CAQs) that are documented in nonconforming condition reports (NCRs) and QCIRs. Paragraph 4.1 defines CAQ as "an all inclusive term used in reference to any of the following: failures, malfunctions, deficiencies, defective items, and nonconformances."

Paragraph 5.1 of "Responsibilities" states that "Engineering and Inspection Unit representatives initiate QCIRs and NCRs, ensure identification of nonconforming items, and verify completed corrective action." During interviews with site personnel, NSRS was informed that it had become standard practice at the site that only inspectors initiate QCIRs. In "closing out" a QCIR, paragraph 6.1.6 states "Upon completion of final disposition, a representative from the QCIR-originating organization:

- May close the QCIR if the final disposition of the QCIR is to initiate another controlling document, e.g., NCR, SMR.
- Verifies completion.

- Signs and dates the QCIR.

- Removes the QCIR identification tag if tagged, or QCIR marking if marked, and forwards the QCIR to QCRU for review, distribution, and filing.

NSRS obtained and reviewed approximately 30 QCIRs applicable to the flushing program of safety-related systems. From

this review of the QCIRs, it was noted that QCIRs originated by the QC inspectors were not always being closed out as complete by the QC organization therefore in direct conflict with paragraph 6.1.6 of BNP-QCP-10.4, R9. Examples are as follows:

- QCIR 30,538 - The NVFA flush procedure contained a requirement for a 40-mesh pump protection strainer. During the flush, the strainer was removed and a larger mesh (approximately 8 mesh) strainer was installed. The procedure did not reference this strainer or the installation of this strainer.

  The recommended disposition was "use as-is, the 8-mesh strainer was installed at the direction of the flush test director." This QCIR was closed out by the Startup Test and Coordination Unit and not the originating QC inspection unit.

- QCIR 30,923 - Described a condition found by the inspectors where in preparation for a NV system hydro, a relief valve was removed to enable a piping change. Found inside the pipe and stuck to the walls were large quantities of purge paper and evidence of the purge paper was found as far as could be seen using an inspection mirror. This portion of piping was flushed during the NVFA and was identified as a "dead leg" during the proof flush.

  The recommended disposition of this QCIR was "None" since it was identified that this portion of piping would be cleaned as an active flow path by flush procedure NVFC. The QCIR was closed out by STCU and not the originating QC inspection organization. Although this specific portion of piping was identified as a dead leg and would be flushed during a subsequent flush, a QCIR tag should have been affixed to this portion of pipe in accordance with the requirements of paragraph 6.1.1.4 of reference 23. Apparently the accumulation of purge dam paper was a result of the initial flush of NVFA. Closing out the QCIR lost the traceability to the condition that existed in this section of pipe. The QCIR should have remained open until the NVFC flush was accomplished and a reinspection of this pipe performed to ensure that all purge dam paper and residual was removed. Therefore, close out of this QCIR should have been accomplished by the originating QC inspection unit after the NVFC flush.

  In addition, in the recommended disposition of this QCIR by STCU it was stated that "Since the DESCRIPTION and APPARENT CASE of this QCIR is erroneous, the recommended disposition, as it pertains to flush activity

NVFA is "NONE." NSRS considers this resolution methodology for identified problems to be inappropriate to get to the root cause and ensure that the appropriate corrective action is taken to rectify the adverse condition.

From the review of these QCIRs and others, it appears that the STCU may not be taking the necessary corrective action to ensure that deficiencies cited against the flushing/cleaning program are properly resolved. The QCIRs indicate that there is a definite problem in the close out procedure in that BNP-QCP-10.4, R9, was not being followed.

B. Regulatory Requirements versus the Office of Engineering Design and Construction (OEDC) Program for Safety Related Cleaning and Flushing Activities

The applicable requirements for flushing of safety-related activities are defined in ANSI N45.2.1-1973, "Cleaning of Fluid Systems and Associated Conponents During Construction Phase of Nuclear Power Plants" and endorsed by RG 1.37, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water-Cooled Nuclear Power Plants." OEDC had committed to these requirements with no exceptions for the Bellefonte project via Table 17.1A-4A of Topical Report TVA-TR75-1A, "Quality Assurance Program Description of Design, Construction, and Operation."

EN DES/MEB was responsible for providing the upper tier documents within TVA to ensure that all the requirements of the regulations were satisfied during flushing activities (section 17.1A.11.3 of the Topical Report). In recognition of this responsibility EN DES/MEB had prepared the following documents for the BLN flushing/cleaning program:

- General Construction Specification (for All Nuclear Plants) No. G-39, "Cleaning During Fabrication of Fluid Handling Components"

- Construction Specification (for Bellefonte Nuclear Plant) No. N4M-891, "Chemical Cleaning Instructions for Piping Systems for Bellefonte Nuclear Plant"

To implement the requirements of the EN DES/MEB upper tier documents the BLN site construction personnel had developed Construction Test Procedure BNP-CTP-6.1, "Cleaning and Flushing of Systems" and the individual system construction test packages for specific flushing/cleaning activities.

It is very important that the upper tier documents provide a well-defined program that incorporates all regulatory requirements and TVA commitments as these documents define the flushing program to the site CONST organization. It should not be necessary for CONST to go back to the regulations to identify and interpret the requirements.

NSRS reviewed the two EN DES documents listed above, the site-generated BNP CTP-6.2, R2, and a CONST test procedure package NBFC (chemical addition and boron recovery system flush, reference 17) developed from BNP-CTP-6.1, R2, to determine if the key requirements applicable to flushing of safety-related systems had been properly identified. From this evaluation, NSRS concluded the following:

- The applicable regulatory requirements had not been properly identified in that they had been translated into EN DES documents G-39 and N4M-891 only in a general manner and in some cases without specific regard to strict compliance with RG 1.37/ANSI N45.2.1.

- The upper tier documents did not incorporate all the regulatory requirements and past TVA commitments to ensure that the initial development and implementation of an adequate flushing/ cleaning program would be accomplished at BLN.

- In certain cases, some requirements of the ANSI standards had been relaxed by EN DES.

Some specific examples of these conditions are as follows:

1. Section 1.3 of ANSI N45.2.1 entitled "Responsibilities," states that "The organizations responsible for the activities (flushing) shall be identified and the scope of their responsibility shall be documented."

   EN DES documents G-39 and N4M-891 had no specific responsiblities sections. NSRS recognizes that Section I, "General," of both documents defines the scope of responsibility for preparation of detailed requirements for system cleanliness to MEB in EN DES and that of preparation of detailed procedures for implementing the program to CONST at BLN. However, the details of the responsiblities are not well defined and understood by either organization. Discussions with the site CONST management personnel identified a problem in that CONST was of the opinion that they were to rely strictly on the EN DES interpretation of the requirements of ANSI N45.2.1 as incorporated in G-39 and N4M-891 to formulate their program. Therefore, to initially formulate and develop their flushing/cleaning program, CONST was relying on MEB to include all of the applicable requirements into the EN DES documents and were not aware that they were strictly committed to comply with the requirements of ANSI N45.2.1 with no exception. However, MEB personnel were of the opinion that all work was to be performed in accordance with all of the requirements of the documents specified in Section 2.1, "References," of G-39. EN DES believed that reference to ANSI N45.2.1 in G-39 was sufficient to inform CONST that they were responsible for ensuring that all requirements of that standard were implemented. This mis-

understanding had led to development of "general" specification documents by EN DES and little attempt by CONST to ensure that all of the applicable requirements were being met.

NSRS believes that the position taken by CONST is appropriate. EN DES should provide a totally adequate program. It seems unreasonable for EN DES to provide a program with general requirements and then require CONST to develop a program with more detailed requirements.

2. The OEDC documents delineating the requirements for the BLN flushing program did not contain sufficient detail.

   Section 2.2 of ANSI N45.2.1 entitled "Procedures and Instructions," states that "Cleaning procedures as well as procedures or work instructions for cleanliness control practices and inspections, examinations, or tests to verify cleanliness of items shall be prepared."

   The ANSI requirements for procedures and instructions that were not met and the consequences are discussed below:

   a. The EN DES documents were general in nature and did not meet the ANSI requirement for detailed cleaning-cleanliness control procedures. The expertise and the common element in OEDC for these activities is MEB who have had experience at other TVA sites and not in CONST where the personnel charged with implementing the program in detail were inexperienced with these activities. As a result, initially CTP.6.1 and test documents were very general and did not contain adequate controls to prevent adverse operational events and ensure good results and documentation during flushing activities. The EN DES documents did not relate potential problem areas that had been encountered during these activities at the other TVA facilities. The problem was further compounded by the fact that MEB was not intimately involved in the CONST program development, review and approval of the CONST implementing documents, or the actual implementation process.

   b. Section 2.5 of ANSI N45.2.1 entitled "Test Equipment," delineates some specific requirements to be implemented for the selection, calibration, and control of test equipment for these activities. The EN DES documents did not contain any guidance on the requirements for calibration and use of test equipment. As a result the CONST program for Measuring and Test Equipment (M&TE) were not referenced in the CONST implementing documents. Interviews with CONST STCU test directors indicated that two out of four were unfamiliar with the CONST requirement for calibration and control of M&TE for these activities.

c. Section 2.3 of ANSI N45.2.1 entitled "Results," states that "test results shall be documented in a suitable test report or data sheet and that each report should identify the item to which it applies and the procedure or instruction followed in performing the task." The EN DES documents gave no guidance as to a standard data report form. As a result, the CONST test packages contained insufficient recorded data to prove compliance with required acceptance criteria. Examples from the site-generated Construction Test Package NBFC (reference 17) are as follows:

- The procedure did not specify acceptance criteria other than by reference to G-39 and N4M-891 in the body of the procedure. Therefore, the acceptance of flushing activities was totally dependent upon the interpretation of the criteria by a MEU QC inspector who had been certified. Certification consisted of taking and passing a test with the grade of 70 percent or better on the requirements of G-39 and N4M-891. However, the results of the test were not discussed with the QC inspector and it was probable that his/her interpretation of the acceptance criteria could be in error and therefore the interpretation for final system cleanliness could be wrong. In addition, the criteria is somewhat complex and interpretation from inspector to inspector could vary.

- The acceptance criteria versus the results were not specified for review and approval before and after the flushing operations.

  It is not sound practice to invest all the time and effort necessary for preparation and performance of the activity without specific definition of the final acceptance criteria to eliminate any possible misunderstandings before the activity begins. The data packages would be more complete and useful if they contained the criteria for acceptance and the conditions that confirmed acceptability.

- Some of the analytical results of the initial and final flush water quality were included in the completed test package on an informal NUC PR document, "Chemical Laboratory Water Analysis," as attachment G to the Construction Test Package. However, review of these results revealed the following discrepancies:

  - Procedure page/step numbers did not correspond to actual procedure pages and step numbers or were left blank.

- All analyses were performed for grade A water (step 6F, page 10, as an example) requirements where class B cleanliness criteria should have been specified.

- Sulfide analyses required by section 3.2 of ANSI N45.2.1 were not performed.

- Organic analyses required by section 3.1.2 of ANSI N45.2.1 were not performed.

- A chemical analysis to determine the acceptability of input flush water was performed on February 6, 1983. The final path was flushed February 27, 1983. The test package contained no data sheets documenting that the input water had been analyzed after the February 6, 1983 analyses. The NSRS concern was that failure to check the input water frequently could lead to severe damage to safety-related systems as makeup to flush water supplies could cause rapid deterioration of water quality. This concern was discussed with the test director who performed the NBFC flush and he assured NSRS that the input water source was analyzed for acceptability before the beginning of each flush. However, the test package contained no results of these analyses.

d. No guidance for proper sampling of initial and final flush water was provided in the EN DES documents. Therefore, no guidance for sampling was included in the CONST procedure and test packages. The samples were obtained by CONST personnel who were not normally faimilar with the requirements of obtaining representative samples. In addition, NUC PR had no sampling procedures for BLN. As a result there was no assurance that the samples obtained on past flushes had been representative of actual conditions.

e. Methods used to determine chemical analytical results and particulate count were not included in the EN DES documents. Without a procedure, determination of composition and particulate size could vary between QC inspectors. At BLN, analyses were being performed by NUC PR personnel using procedures that were not approved for use on safety related systems. OEDC should not assume that the results of analyses for chemical contamination and particle size and composition is correct and consistent from plant to plant.

f. The EN DES documents did not prescribe detailed methods for layup of stainless steel systems. As a result, there were no provisions in the CONST documents to ensure that if systems were laid up wet that periodic and representative samples were obtained, analyzed, and the results documented to ensure that conditions did not deterioriate over a period of time. Neither CONST nor NUC PR had a sample schedule, limitations, corrective actions if limits were exceeded, or data sheets for trending changing system conditions. The lack of these controls could lead to deteriorating conditions and damage to safety-related systems.

g. EN DES documents contained no reference to the National Pollutant Discharge Elimination System (NPDES) permit which states in part III, paragraph A, that there shall be no discharge of metal cleaning wastes to any plant waste stream which discharges to waters of the United States. As a result, disposal of metal cleaning wastes were not addressed in the CONST documents. In addition, interviews with the test directors indicated that they were unaware of the existence of the NPDES permit and its requirements.

h. Section 2.4 of ANSI N45.2.1 entitled "Personal Qualifications," states that personnel who perform inspection, examination or testing activities required by this standard shall be qualified in accordance with the requirements of ANSI N45.2-6. Contrary to this requirement, the EN DES documents contained no guidance as to the qualifications of personnel performing flushing activities.

These activities were initially performed by unqualified and untrained personnel and the end result was equipment damage, operation difficulties, conflicts between organizations and prolonged flushing operations. Training and qualification of personnel involved in the CONST flushing program is discussed in more detail in section G of this report.

3. The water quality requirements as specified in the EN DES documents were not in strict compliance with those requirements specified in ANSI N45.2.1 as follows:

- Section 3.2 of ANSI N45.2.1 entitled "Water Quality Requirements specified that the water used for flushing activities shall have a sulfide content of less than 1 ppm. The sulfide content of flush water was not required to be determined by the EN DES or CONST documents. It should be noted that sulfur can cause rapid degradation of CSSC and that sulfuric acid is used to regenerate the demineralizers in the system supplying water for flushing activities. There is a potential for sulfur contamination in the flush water supply.

- Section 7.3 of Paragraph 7.0 entitled "Water Requirements" of G-39 allows the use of flush water with a conductivity of 0.25 umhos/cm or less in lieu of checking the other required parameters if onsite laboratory analysis is not available. This circumvents the requirements of the ANSI standard since this exception is not contained in that document.

In summary, the EN DES documents which should be the common element between flushing programs at different plants did not provide sufficient guidance to prevent BLN CONST personnel who were relatively inexperienced in flushing activities from making the same type of mistakes that occurred at other TVA facilities.

C. Acceptance Criteria for Class "B" Safety-Related Systems

ANSI N45.2.1-1973, Paragraph 3.1, "Cleanness Classifications," establishes the acceptance criteria for Class A, B, C, D, E levels of cleanness. Paragraph 3.1.2 states that "Piping and components in systems which are designed as requiring Class B cleanness (as identified by Construction Specification N4M-891), shall meet the following as outlined in paragraph 3.1.2.5, "There shall be no particles larger than 1/32 inch in any dimension, except fine hairline slivers of less than 1/32-inch thickness are permissible up to 1/16-inch long."

On July 22, 1982, EN DES issued Specification Revision Notice (SRN) SRN-N4M-891-2 applicable to Construction Specification N4M-891 and specifically addressed acceptable particle size. Paragraph 12.5 of the attachment to this SRN stated that "Class B acceptance criteria for these systems (Safety Injection, Decay Heat Removal, Reactor Building Spray, Fuel Pool Cooling and Cleaning, Waste Disposal, Chemical Addition and Boron Recovery, and Makeup and Purification Systems) shall be as defined in G-39 with the following variance: "Purge dam residual remaining on the pipe wall after flushing is acceptable, and paper and glue particles up to 1/8 inch in any dimension appearing on the strainer during proof flushing are acceptable. This variance in the acceptance criteria has not been verified (this statement concerning nonverification will be deleted when verification is complete)." This variance was allowed because on past primary system flushes with demineralized water, the acceptance criteria of ANSI Standard N45.2.1 of 1/32 inch for particulate size could not be obtained. It was determined that after flushing systems for over one year with demineralized water an end point had been reached on the size of purge dam particulates that have been observed. Certain systems had met the required 1/32- x 1/16-inch criteria at given time intervals but the cleanliness level achieved had been short lived and had continuously failed to pass the cleanliness inspection by site quality control (QC) inspection. SRN-N4M-891-4 was issued by EN DES on October 8, 1982, and was still applicable to Construction Specification N4M-891. This SRN

superceded the previously issued SRN-N4M-891-2, but still containing the acceptable 1/8 inch particle size for the Class B systems with additional instructions and procedures on cleaning the systems with purge dam residual paper with either acetic acid or demineralized water. Construction Specification N4M-891, R2, dated March 3, 1983, paragraph 12.0, was revised to incorporate SRN-N4M-891-4. Therefore, this variance allowing 1/8-inch particle size for purge dam paper and residual glue was applicable to BLN only.

1. Background for Variance in Acceptable Particle Size

Nonconformance report NCR 835 dated March 14, 1978, identified a problem in that on the decay heat removal system, waste disposal system, chemical addition and boron recovery system, spent fuel cooling and cleaning, reactor building spray, and the essential raw cooling water, butt welds on stainless steel piping systems were made using soluble paper purge blocks and tape which had not been approved by General Construction Specification G-29, 4.M.1.1(b). The resolution to this NCR 835 was to revise G-29 to allow use of "Dissolvo" purge paper and water soluble Elmer's School Glue. Nonconformance Report NCR 1725 dated January 1, 1982, identified that on stainless steel piping systems, glue used in the installation of purge dams had proven insoluble during flushing activities and minor glue residual remained in piping at purge dam locations.

The recommended disposition was for EN DES to analyze the glue residual discovered during the spent fuel cooling flush to determine if there are any harmful elements to stainless steel in systems that must meet Class B or C cleanliness criteria and evaluate the acceptability of leaving residual in these systems or identify methods to be used for residual removal with resulting modifications to appropriate construction specifications.

Although NCR 835 recommended the use of Dissolvo purge paper and the soluble Elmer's School Glue in lieu of the insoluble Elmer's Glue All, it was discovered that with purge dams located too close to the weld, even the soluble Elmer's School Glue became charred to the pipe due to the heat transmitted during the welding operation and a charred glue residual remained inside the pipe after flushing with demineralized water. This was demonstrated in the flushing of the spent fuel cooling system with demineralized water. One specific flow path could not meet the acceptance criteria of less than 1/32-by 1/16-inch particle size. However, it was reported that the particles were less than 1/8 inch. An additional system, namely, reactor building spray room B was flushed with demineralized water to meet the acceptance criteria of 1/32- by 1/16-inch particle size. Inspection of the piping interior after the flush showed some noncharred purge dam glue ridges in the pipe.

EN DES in conjunction with TVA Singleton Laboratory performed a study as recommended in NCR 1725 to determine if 1/8 inch purge dam residual would affect operations. The analysis was based on the assumption that glue particles up to 1/8 inch could be present in the operating system. Based on this assumption and the analysis performed, TVA responded on NCR 1725 to NRC on approximately September 18, 1982, with the following conclusions and disposition:

- The purge dams will not cause stress corrosion cracking of the pipe.
- Very little purge dam residual remains on the pipe wall after preoperational cleaning.
- The residual remaining will all disolve during plant operations.
- Solubilized purge dam material is not harmful to the system.
- Any particles that may break loose before dissolution is complete will not obstruct any piping or instrument lines.
- TVA will revise the acceptance criteria for proof flushing particulates to allow purge dam particulates up to 1/8 inch in any dimension.

In a meeting at the BLN site on January 24, 1983, between NRC and TVA, the problems associated with purge dam material were discussed. During this meeting, representatives of NRC indicated in reference 96 that they would not provide approval for TVA's proposed 1/8-inch purge dam particulate cleanliness criteria. Final approval for this change would have to come from the Nuclear Reactor Regulation (NRR) in Washington, D.C., since TVA had committed to the letter of the law of ANSI Standard N45.2.1 of 1973. In addition, NRC indicated that they would invalidate any system which has been proof flushed if they opened up a system and found debris which did not eet the 1/32-inch size criteria set forth in ANSI N45.2.1-1973. They further expressed the possibility of requiring BLN to open up systems after hot functional testing to check for debris.

In paragraph 4.2.2 of reference 96 in regard to the meeting between TVA and NRC, TVA apparently emphasized that "A definite criteria for how much flushing is enough flushing for this unique situation is not available. TVA further stated that "ANSI N45.2.1-1973 does not specify cleanliness of a system or component in terms of volumes of water used for proof flushing." NSRS contends that the ANSI standard addresses this unique situation in paragraph 3.0, "Criteria

for Cleaning." This paragraph states that "It is intended that systems that have been cleaned in accordance with this standard should require only water flushing or rinsing as a final cleaning step in preparing them for service. However, when more than normal water flushing and rinsing is required to produce the specified cleanliness, additional cleaning in accordance with this standard may be necessary."

At the time of this review, NCR 1725 had not been "closed out" by NRC and final approval for the variance to ANSI N45.2.1 for particulate size from 1/32 inch to 1/8 inch on purge dam particle size had not been obtained. Therefore, the site flushing of class B stainless steel systems was not in complete compliance with the requirements of ANSI N45.2.1-1973.

It appears that appropriate action was being taken by TVA to get NRC approval for acceptance of purge dam material up to 1/8 inch in size. However, it should be realized that approval of the request could be denied. If the request is denied, TVA could be required to reflush all systems that contain purge dam material particulates larger than 1/32 inch.

D. Inspection and Verification of System Cleanliness

ANSI N45.2.1-1973, Paragraph 3.1, "Cleanness Classification," states, "the degree of cleanness required is a function of the particular item under consideration. The assignment of a cleanness classification shall consider the susceptibility to corrosion of the material, the consequences of malfunction or failure at the time and the probability of contaminants contributing to or causing such malfunctions or failure. The class of cleanness required for any given application shall be specified in design drawings or specifications associated with the cleaning of items and the method of verification of cleanness shall be documented." For Class B systems, paragraph 3.1.2, step 5, states that "If flushing is the only practical means for determining system cleanness, the system shall be evaluated by examining a 20-mesh (ASTM E11-70, Specifications for Wire Cloth Sieves for Testing Purposes) or finer filter, or the equivalent, installed on the outlet of the cleaning circuit. The system shall be flushed at its normal design velocity (or other velocity if specified by procurement documents) until the screen shows no more than slight particle speckling and no more than slight rust staining. There shall be no particles larger than 1/32 inch in any dimension, except fine hairline slivers of less than 1/32-inch thickness are permissible up to 1/16-inch long. There shall be no evidence of organic contamination in the effluent water or on the filter." Paragraph 7.1, "Flushing and Cleaning Methods," step 7.2.1, states for water flushing: "If the intended level of cleanness has been maintained during erection of the plant, only water flushing will be required. Completion of flushing shall be determined by filter, turbidimetric, or chemical analysis."

EN DES prepared General Construction Specification G-39, R5, dated November 5, 1982, "Cleaning During Fabrication of Fluid Handling Components," Paragraph 8.5.3, "Use of Strainers and Filters," step 8.5.3.1, states, "An inline strainer, a sample line cartridge filter or equivalent shall be used to filter the flush water or sample during the flush to check for particulates. The strainer or filter shall be 20 mesh (ASTM E11-70, Specification for Wire Cloth Sieves for Testing Purposes) or finer for Class B cleanliness." Step 8.5.3.2 states, "Unless otherwise specified, sample apparatuses used to check for particulates shall draw samples from the bottom of the horizontal run of the process pipe. Pipe drains or sample connections where the sample would be drawn at the pipe wall shall be used. When cartridge filters are used, they shall be connected by a sample line directly to the process pipe. The cartridge filter shall be of a type that can be easily examined for particulates." Paragraph 8.5.3.3 states, "A minimum of 100 gallons or 1 percent of the system volume shall be sampled for particulates during each proof flush. The sample flow rate shall be a minimum of 15 gallons per minute unless the design flow rate is less. If the design flow rate is less than 15 gallons per minute, then the maximum sample flow rate shall be equal to the design flow rate."

The statement "If flushing is the only practical means for determining system cleanliness, the system shall be evaluated by examining a 20 mesh or finer filter, or the equivalent, installed on the outlet of the cleaning circuit" had been interpreted by EN DES to allow the use of bypass sampling and cartridge filters as long as the samples were reasonably representative of the process flow. Sheppard T. Powell Associates, consultant to EN DES, provided support to this interpretation; however, they recommend that TVA perform an onsite test to determine if the bypass sampling technique is reasonably representative of the process flow. This recommendation was brought forth in the meeting between TVA and NRC on January 24, 1983, on the purge dam flushing and nonconformance report NCR 1725.

NSRS interviews with BLN site Startup and Test Unit (STCU) test directors performing system flushes and quality control (QC) inspectors performing verification of system cleanliness on the recent NBFC, chemical addition and boron recovery system (partial system flush) provide the following scenario for the NBFCI flush path cleanliness verification:

- The flush path was initially lined up to perform a once-through flush to waste using demineralized water for the equivalent of 1-2 volumes until the water appeared clear. Adequate pump protection strainers were installed.

- The system was realigned to perform a recirculation flush with adequate inline and pump protection full flow strainers installed until Class B cleanliness level was obtained.

- At the test directors' discretion, based on inspection of a 20-mesh pump suction inline strainer, the flush path was ready for proof flushing and strainers were omitted with the exception of an 8-mesh strainer installed for pump protection.

- The flush path was put in the recirculation mode and the system recirculated with a minimum of one flush path volume. The sample bypass filter containing a 20-mesh screen was installed (permitted by N4M-891, R2, "Chemical Cleaning Instructions for Piping Systems for Bellefonte," paragraph 5.17) and was inspected for verification of system cleanliness.

- Based on the results of two consecutive bypass strainers meeting the 1/8-inch criteria for purge dam material and 1/32 inch on other particles, the flush path was "bought off" by the QC inspector as meeting the acceptance criteria and signed complete by the QC inspector on February 8, 1983.

Although not a practiced option on the part of the QC inspector to verify system cleanliness by inspection of the installed 8-mesh pump protection (larger strainer that the 20-mesh strainer used during cleaning recirculation) strainer, removal and subsequent inspection of the 8-mesh strainer contained both purge dam charred paper and metal fillings well above the size allowed for Class B cleanliness. Based on the inspection of the 8-mesh strainer, the QC inspector voided the acceptance of this flush path and the test director took the appropriate action and continued flushing the system in the recirculation mode until the system was finally accepted using the bypass filters thereby meeting Class B particle size on February 12, 1983.

Although the system eventually met the acceptance criteria as dictated by General Construction Specification G-39 and Construction Specification No. N4M-891, NSRS questions the method of verification of system cleanliness by use of the bypass filter screen as being representative of the actual particulates in the system piping. It was noted that the bypass filter screen (apparently installed on a one-inch line) used on this flush path was connected to a two-inch supply pipe to the suction of the pump used in the recirculation mode for cleaning. In this case, the bypass filter was not representative of the particles that were actually in the process pipe .

In the American Society for Testing and Materials (ASTM) 1978 Edition, Standard D-3370-76 covers the "Standard Practice for Sampling Water." Paragraph 4.0, "Significance," specifies key points for sampling, namely:

- The goal of sampling is to obtain for analysis a portion of the main body of water that is truly representative.

- The most critical factors necessary to achieve this are points of sampling, time of sampling, frequency of sampling, and maintenance of the sample prior to analysis.

- Homogenity is frequently lacking, necessitating multi-point sampling. If it is impractical to utilize a most-representative sampling point, it may be practical to determine and understand interrelations so that results obtained at a minimum number of points may be extrapolated.

- A totally representative sample should not be an absolute prerequisite to the selection of a sampling point. With adequate interpretation, a nonrepresentative sample can yield valuable data about trends and can indicate areas where more representative data would be available.

- Most samples collected from a single point in a system must be recognized as being nonrepresentative to some degree.

Paragraph 4.4 further defines the following general rule as being applicable to all sampling procedures:

- The samples must represent the condition at the point taken.

- The samples must be of sufficient volume and must be taken frequently enough to permit reproducibility of testing requisite for the desired objective.

NSRS contends that the use of bypass filters for measuring particulates to meet the acceptance criteria can be considered as a continuous sampling; however, paragraph 25 entitled "Frequency and Duration of Sampling, " step 25.1, states: "Sampling is essentially on a continuous basis. Intermittent operation is possible through the use of sample bypass equipment, although this is seldom used except in measuring a variable with a time relationship, such as rate of oxygen intake." Paragraph 27 entitled "Particulate Matter," step 27.1 states, "The water delivery system shall flow fast enough to keep the heavier particles in suspension, and the system volume shall be large enough to prevent undesirable filter action through restriction."

In the final report to the NRC for NCR 1725 dated September 28, 1982, in the "Corrective Action," TVA stated that "No other TVA nuclear plants are affected by this problem," namely, purge dam residual glue and paper. Since there was an apparent breakdown in controls for the installation of purge dams at BLN in that they were installed by a method which had not been approved by General Construction Specification G-29, section 4.1.1.(b), the method of handling and cleaning the stainless steel piping systems is unique to BLN.

In ANSI N45.2.1-1980 (not applicable to BLN), paragraph 2.8 reflects the intention of the present ANSI committee in that this paragraph dealing with "Rectification of Unacceptable Cleanness" states that "If indications of contamination in excess of specified limits are observed at the end of a cleaning operation or at any subsequent inspection for cleanness, the item shall be recleaned using an approved procedure. If such indications are

observed at the anticipated end of a cleaning operation, continued cleaning shall be performed to reduce the level to the specified limit. In some cases it may be necessary to determine the nature of the contamination in order to develop special procedures for its removal. In ANSI N45.2.1-1973 (applicable to BLN) words to this same effect are specified in Paragraph 3.0, "Criteria for Cleaning." This paragraph states that "It is intended that systems that have been cleaned in accordance with this standard should require only water flushing or rinsing as a final cleaning step in preparing them for service. However, where more than normal water flushing and rinsing is required to produce the specified cleanness, additional cleaning in accordance with this standard may be necessary.

Since the problem of the purge dam paper and residual glue is apparently unique to BLN and of such magnitude that the acceptance criteria of 1/32 inch cannot be met with normal flushing/recirculation with demineralized water and a change to 1/8-inch acceptance for purge dam particle size was permitted (not approved) by N4M-891 for the BLN site, then the most conservative method for verification of particle size should be used, namely, inspection of inline full flow filters or strainers.

E. Assessment of Actions Taken at BLN to Resolve Identified Program Problems

The primary objective of this portion of the review was to determine the action taken by the responsible STCU test personnel and the various site engineering units associated with flushing activities in the resolution of identified program deficiencies. To accomplish this, NSRS interviewed personnel from the STCU, Mechanical Engineering Unit (MEU), Electrical Engineering Unit (EEU), Instrumentation Unit (IU), Quality Control Inspectors (QC), and the Division of Nuclear Power (NUC PR).

Incorporated in this section of the report are the major areas investigated based on past identified problems, review of procedural updates to compensate for past problems, and the results of the interviews conducted with the responsible engineering units.

1. Review Process for CONST Test Procedures Used for Flushing Safety-Related Systems

BNP CTP 6.1, Revision 2 and Addendum 1, paragraph 6.23 defines the responsibilities for the review and approval of each individual construction test procedure flush package.

Paragraph 6.23 states that a review and concurrence of the following is required:

- Mechanical Engineering Unit - Shall review and sign concurrence with the procedure concerning technical requirements, configuration and temporary provisions.

- Instrumentation Engineering Unit/Electrical Engineering Unit - Shall review and sign concurrence with the procedures concerning technical requirements, configuration and temporary provisions.

- Mechanical QC Unit - Shall review and sign concurrence with the procedures for QC hold points.

Paragraph 6.23 continues to state that review and approval of the following or their designee is required:

- Responsible engineering unit supervisor.

- Responsible assistant construction engineer.

- Construction QA unit supervisor.

- NUC PR plant manager.

Based on the problems of overpressurization of system piping, dead-heading pumps, improper valve lineups, etc., Revision 2 to BNP CTP 6.1 required a more detailed review than in the past; however, NSRS concluded from the interviews with the responsible engineering units and NUC PR that:

- No established guidelines or written instructions or checklists had been developed and implemented within the responsible engineering units as to what criteria to review each individual construction test procedure package to. Only the IU had developed an internal checklist for reviewing the test packages.

- Duplication of the review effort was found in three separate engineering units in that MEU, CONST QA, and QC inspection were all reviewing the required valve lineups against the applicable construction test package Design Control Drawings (DCD) for each individual flush path. In addition, the STCU test director indicated that in general, a peer review of the valve lineups was being performed within the STCU unit as each test package was developed. This duplication of effort resulted in delay of final approval of the individual construction test procedure packages.

- Although NUC PR was responsible for performing valve lineups and operating "operational released" (OR) equipment during the flushing activities, no specific guidance as to technical requirements or operating equipment parameters was provided in NUC PR for what each section was to review the test package for. (For additional details see section F for NUC PR support.)

- All units interviewed expressed concern that their comments as a result of their review of the individual

test package were not being adequately considered and incorporated into the test package by the STCU.

2. Performance of System Valve Lineups

BNP CTP 6.1 R2, paragraph 5.6 of "Responsibilities" states "The Division of Nuclear Power (NUC PR) is responsible for performing required system valve lineups for flushing." Paragraph 6.2 states that "Permanent systems or portions of permanent systems to be cleaned or utilized to support cleaning will be placed under Operation Release and tagged in accordance with BNP CTP 9.1 "Initial Energization and Operation of Equipment."

ANSI Standard N45.2.1, paragraph 2.1 "Planning" subparagraph 5 states "Control of the installation operations so that piping and components which have already been installed are not subject to contamination when subsequent operations are performed" shall be considered in the initial planning stages. In paragraph 7.0 "Pre-Operational Cleaning" subparagraph 7.1 entitled "Preparations" states that "critical valves, controls, and switches shall be tagged to prevent inadvertent activiation during the cleaning operation." Initial valve lineups which include the "boundary valves" of the specific system flush are performed by NUC PR assistant unit operations (AUOs) and verified and signed complete by the QC inspector in accordance with the developed valve lineup sheets in the specific construction test procedure package. From interviews with STCU test directors and QC inspectors, NSRS concluded the following:

- Not all boundary valves for a specific system flush are tagged with NUC PR Hold Orders thereby preventing inadvertent operation during the flushing cleaning cycle.

- Valves that are included in the initial OR system boundary are tagged with NUC PR Hold Orders; however, these valves may be beyond the last valve "closed" for containment isolation of the flush path of the system.

- No guidelines or instructions exist in the individual construction test package to ensure that all boundary valves used as containment isolation of the flush water are tagged with NUC PR Hold Orders.

- The possibility exists that inadvertent operation of boundary valves not tagged with "Hold Orders" could result in flushing into a cleaned system since flushing/cleaning of a total system may be subdivided into multiple flush path loops.

For future chemical cleaning of carbon steel piping systems, complete isolation and containment of the chemicals used is imperative to prevent inadvertent transfer of the chemicals to an interface piping system.

3. Initial Operation of Permanent System Pumps

BNP CTP 6.2 R2, paragraph 6.15 states "Whenever permanent pumps are to be operated for flushing, operating specifications and limitations will be appropriately included in the individual procedures if not existent in approved operating instructions." Paragraph 6.12 states that "for planned usage or permanent pumps permanently designed automatic pump protection features shall be available, whether installed temporary or permanent. This includes protection from water pressure, temperatures, oil pressures, bearing temperature, etc."

For the initial operation of permanent plant equipment, the EEU is responsible for providing power and controls for the operation of required permanent electrical equipment during cleaning or flushing activities. The equipment is then placed under an Operational Release (OR), thereby ready for operation.

When a system pump is used for flushing, initial operation and checkout of the pump in regard to vibration level can only be accomplished during first pump operation with the system filled with water. QCIRs 19931, 21134 and 22830 all identified problems with excessive vibration levels during initial flushing operations. From interviews with the STCU supervisor and test directors, MEU personnel, and QC inspectors, NSRS concluded the following:

- The individiual test procedure packages did not identify the engineering unit responsible for checkout of pump vibrations during initial operation. Generally, all persons interviewed indicated that Babcock & Wilcox (B&W) was present during initial operation of system pumps to check vibration levels and that subsequent hot functional alignment after initial starting of the pump was either the responsibility of MEU or the QC inspector. No one accepted responsibility for vibration testing of equipment during initial startup.

- No guidelines or procedural steps were incorporated within the individual construction test package for verification and signoff of acceptable vibration pump levels. STCU test directors indicated the information on vibration levels was available in the vendor manuals in most cases; however this information was not incorporated or referenced in the construction test package.

- Although the precautions section of the test procedure flush package (NBFC) identified "high vibration" as a system condition to be observed during the flushing operation because it could be potentially harmful to either personnel or equipment, the limits for high vibration were not identified.

To ensure that permanent pumps are not damaged during initial operations in regard to vibration, responsibility for vibration testing during initial pump operation should be clearly defined, the construction test procedure package should incorporate procedural steps including hold points, excessive vibration limits, and provisions for verification and signoff by either the QC inspector or the engineering unit designated this responsibility.

4. Use of Butterfly Valves and Gate Valves for Throttling Purposes During System Flushing

QCIR No. 19880 identified a condition whereas "during the NVFA01 flush, a 6-inch gate valve was intended to be used in a temporary throttling configuration being 3/4 closed. The design function of the valve was to remain open during normal operation." In addition to the above QCIR, cases were related to NSRS whereby butterfly valves were used in a throttling configuration during system flushes. The National Valve and Manufacturing Company (NAVCO) technical literature identified in reference 104, states "for service where a valve is required to be either entirely open or closed and for lines conveying water or other liquids, the gate valve is used almost exclusively, except for high pressure in the smaller sizes, where globe valves are recommended." It further states that butterfly valves may be used in relatively low pressure services for shutoff or throttling replacing a gate or globe valve. The key to the use of butterfly valves for throttling as recommended by NAVCO is the identification of low pressure.

Electrical Design Guide DG-E18.1.7 entitled "Instrumentation and Controls - Control Valves," paragraph 1.0 General, states "this design guide describes the function, styles, sizing, selection and application of control valves used as final control elements in control loops." It further states "The control valve is usually the most costly element in a control loop; and it is the element most likely to cause process downtime in the event of malfunction."

Paragraph 4.0 "Valve Style Application," subparagraph 4.1 entitled "Globe Valves," states that "globe valves can be used for both off-on and throttling applications." Paragraph 4.2 entitled "Gate Valves" states that "because of poor throttling characteristics, gate valves are used chiefly in large size, off-on application." Paragraph 4.8 entitled "Butterfly Valves" states that "Butterfly valves

are used for low or moderate pressures, or on unusual applications involving large flows of high static pressure, but with limited pressure drops. The most common body design is the flangeless 'wafer' type and are rated for maximum pressure drop in the closed position and in the 60-degree open position. Butterfly valves are limited to low pressure drops and are prone to cavitation."

Based on interviews with STCU, MEU and QC inspectors NSRS concluded that:

- Both gate and butterfly valves have been used in past system flushes in throttling configuration. Although all were in agreement that this would not be considered "good industry practice," some systems might only have butterfly valves installed, namely KE (Essential Service/ Raw Cooling Water System), thereby requiring using the valve for throttling.

- In some instances, butterfly valves on the discharge of pumps were used in a temporary throttling configuration to prevent the pump from tripping on overpressurization. Permanent throttling was accomplished by going further into the system and using an installed globe valve thereby allowing the butterfly valve to be fully opened.

  Based on the fact that both the gate and butterfly valve can be damaged in a throttling configuration, NSRS recommends that:

  - EN DES/MEB investigate and develop the criteria, requirements and precautions for the use of throttling with butterfly and gate valves and incorporate this criteria into either the General Construction Specification No. G-39 or Construction Specifications No. N4M-891 "Chemical Cleaning Instructions for Piping Systems for Bellefonte Nuclear Plant."

  - Where it is unavoidable to use a gate valve or butterfly valve for throttling, the valve should be disassembled after the flush and inspected to ensure that no damage has been done to the valve internals.

5. <u>Overpressurization of Piping Systems and Dead Heading Pumps During Flushing Activities</u>

During the flushing of primary safety-related systems on approximately five different occasions, overpressurization/ underpressurization of piping and equipment and deadheading of pumps occurred for various reasons. These conditions were reported to NRC on NCRs 1781 and 1872 (overpressurization of core flood tank 1A), NCR 2042 (deadheading spent

fuel cooling pump), NCR 2080 (overpressurization of chemical addition and boron recovery), NCR 2089 (overpressurization of chemical addition and boron recovery), and NCR 2082 (collapse of sodium hydroxide storage tank). The causes for these conditions were determined as follows:

- NCRS 1871 and 1872 - Inadvertant start of Decay Heat Removal (DHR) pump by workers in the main control room accidently shorting ESFAS leads.

- NCR 2042 - Air supply control valve failed closed.

- NCR 2080 - Failure of personnel in charge to follow procedure

- NCR 2089 - Improper use of construction pump and failure to reverify valve lineup. Insufficient communication between personnel involved.

To accomplish this portion of the review, NSRS examined BNP-CTP 6.1 R2 and construction test procedure package NBFC (chemical addition and boron recovery flush) developed from revision 2 of BNP-CTP 6.1. The review of these documents revealed that provisions had been incorporated to decrease the probability and mitigate the results of overpressurization events.

F. Division of Nuclear Power (NUC PR) Support of Safety-Related Cleaning and Flushing Activities

Section 17.1A.11.13 of the Topical Report, TVA-TR75-1 R5, states that "NUC PR reviews and approves construction test procedure packages for cleaning and flushing prior to and following the activity." It states that, in addition, "NUC PR provides test support, operation assistance, and services as needed and assures that portions of tentatively transferred equipment or systems affected by the tests are maintained as stated in the test procedure." These requirements are further delineated in Interdivisional Quality Assurance Procedure ID-QAP 11.2, "Construction Test Control." This procedure establishes the general criteria for NUC PR review of Division of Construction (CONST) test procedure packages for cleaning and flushing activities. These criteria include review to assure that the tests will not create personnel safety hazards, increase potential for equipment damage, or interfere with NUC PR operation and maintenance activities.

The implementation of the requirements of the Topical Report and ID-QAP 11.2 were assessed during this review to determine (1) if administrative controls had been established to ensure that the chemical analyses performed by the Chemical Unit were performed by qualified personnel using approved procedures, (2) if the Operations Section responsibilities for supporting the cleaning

and flushing of the safety-related program were delineated in writing and understood by both NUC PR and CONST personnel involved in these activities, (3) if NUC PR was performing an effective review of CONST cleaning and flushing test packages, and (4) if NUC PR's involvement in the CONST activities associated with cleaning and flushing was sufficient to ensure that NUC PR will get clean systems when they are transferred from CONST. The evaluation consisted of a review of NUC PR documents and discussions with NUC PR Engineering and Operations Sections' personnel and CONST STCU test directors. For the purpose of this assesment, key areas were selected, evaluated, and are discussed below.

1. Engineering Section Chemical Unit Activities

a. Qualification and Training (Chemical and Radiochemical Laboratory Analysts)

This area was evaluated to determine if the laboratory personnel performing the chemical analyses in support of CONST cleaning and flushing activities were qualified and trained to the level required by the NUC PR Operational Quality Assurance Manual (N-OQAM)for the safety-related activities performed.

A review of a completed CONST test package for the NBFC system (reference 17) indicated that chemical analyses performed to determine the acceptability of input flush water to the systems and the analyses to generate the data necessary to determine that the flush met the final acceptance criteria (the determination was made by CONST) were performed by Radiochemical/Chemical Laboratory Analysts SE-4/SE-3. At the time these analyses were performed the laboratory analysts had not satisfied the NUC PR requirements as delineated in paragraph 1.4.5.2, section 6.1, part III of the NOQAM which states that "technicians in responsible positions shall have a minimum of two years of working experience in their speciality and a minimum of one year of related technical training." Section 6.1, part III of the NOQAM is NUC PR's implementing document to comply with the requirements of ANSI N18.1-1981.

From a review of BLN training records, it was determined that the analysts had been trained to perform the specific analyses to support CONST's cleaning and flushing program prior to performing those activities. However, this training was informal in that the program was delineated in a draft Engineering Section instruction letter (ESIL-C4.1) that had not been approved for use and the training records were not controlled as quality assurance documents. From interviews with NUC PR Engineering Section supervisory personnel, it was determined that the analyses performed to support the NBFC system flush had been performed independently

by the chemical laboratory analyst on shift, and the data sheets in the test package and the data had been transmitted to CONST for evaluation without benefit of review by a qualified individual. NSRS recommended to plant management that only personnel meeting the requirements of the NOQAM generally be allowed to perform safety-related analyses. If it is necessary, to use nonqualified personnel their safety-related activities should be supervised and reviewed by qualified personnel before the results of the analyses are released. The qualified personnel should be held accountable for the quality of the analyses.

Further review indicated that no formal program had been prepared and implemented at BLN for providing initial inplant training, retraining, and replacement training for radiochemical laboratory analysts. A formal comprehensive inplant training program satisfying the NUC PR requirements and needs of all classifications of radiochemical/chemical laboratory analysts should be prepared and implemented.

b. Chemical Analytical Procedures

Criterion V of Appendix B to 10CFR50 requires that activities affecting quality shall be prescribed by documented instructions of a type appropriate to the circumstances and shall be accomplished in accordance with those instructions. Part 13 of Standard Practice BLA 3.1 states that "although written instructions are not required for non-safety-related activities, it may at times be beneficial to prepare guidelines to describe operations, repairs, tests or analyses associated with non-safety-related equipment. They shall be called "Guidelines" to distinguish them from the instruction related to CSSC activities."

Contrary to the limitations of Part 13 of Standard Practice BLA 3.1, Technical Guidelines" were used to determine the chloride content and conductivity of initial and final flush water for the NBFC system flush which is a CSSC system. The NSRS position is that instructions used to perform analyses associated with CSSC should be PORC reviewed and approved by the plant superintendent and afforded formal change control.

c. Laboratory Quality Control

Section III of DPM N79E2, "Laboratory Quality Control Program," was issued initially in November 1981 and revised in June 1982. This section of the DPM included quality control requirements to be implemented that are applicable to the activities being evaluated.

Standard Practice BLG 3, which implements the requirements of DPM N71A1 at BLN, states that "implementation of DPMs shall be completed within 90 days of receipt by the plant unless a waiver has been requested for a delayed implementation schedule."

An evaluation was conducted to determine if the applicable requirements of section III of DPM N79E2 had been implemented into plant documents for the following representative type instruments used to conduct chemical analyses to support CONST cleaning and flushing activities:

- PH meters
- Spectrophotometers

The evaluation indicated that even though an instrument calibration program was depicted in Technical Instruction BLT1-CHEM-0410, "Chemical Laboratory Instrumentation Calibration Program, Unit 0," and the 2000 series of the BLN Technical Instructions, the program did not conform fully to the requirements of the DPM for a laboratory quality control program and no waiver had been requested by the plant staff. Examples of nonconformance (not all inclusive) are as follows:

- PH Meters - Table 3.1.2.A of the DPM required that PH meters be standardized with a buffer in the PH range close to that of the samples being tested for each sample or series of samples. BLT1-CHEM-0401 specified a calibration check five times per week. The calibration check procedures as detailed in BLT1-CHEM-2106, section 5.1, checked the response of the instrument over a PH range of 4 to 10 instead of the response of the instrument to a buffer solution with a PH close to that expected of the sample.

- Spectrophotometers - Table 3.1.2.A of the DPM requires that a calibration check for the spectrophotometers in use be performed by including a standard with each sample or series of samples to be analyzed. BLT1-CHEM-0401 does not require analysis of a standard along with each sample or series of samples.

- Section III of DPM N79E2 requires that the NUC PR radiochemical laboratories statistically evaluate the precision (reproducibility) of their test results by scheduling a fraction of the plant samples to be sampled and analyzed in duplicate. The data from duplicate analyses are to be used to construct quality control charts. The DPM further states that the laboratories will also be required

to prepare "spiked" samples on occasion. "Spiked" samples are defined as routine samples which are analyzed before and after the addition of an accurately known quantity of a given constituent.

Contrary to these DPM requirements, the BLN laboratory calibration program as delineated in BLT1-CHEM-0401 did not require duplicate samples, duplicate analyses, or periodic spiked samples.

The chemical laboratory was particpating in the interlaboratory crosscheck program with the Nuclear Central Office (NCO) and Power Operating Training Center (POTC). However, since the BLN laboratory had run no standards along with samples or series of samples or duplicate samples or analyses, NSRS considers the laboratory quality control program marginal for the activities being reviewed. Duplicate samples should be considered essential as no sample procedures had been prepared by NUC PR and sampling methods were not addressed in the construction test packages. There was essentially no assurance that the samples being obtained (samples for cleaning and flushing activities were usually taken by CONST personnel but occasionally by NUC PR personnel) were representative of the flush water being sampled. The laboratory quality control program should be upgraded to comply at least with the requirements of section III of DPM N79E2.

d. Chemical Unit Measurement and Test Equipment (M&TE)

Criterion XII of Appendix B to 10CFR50 requires that measures shall be established to assure that instruments used in activities affecting quality are properly controlled, calibrated, and adjusted at specified periods to maintain accuracy within necessary limits. NUC PR had implemented these requirements through part III, section 3.1 of the NOQAM. BLN had implemented the requirements of the NOQAM with Standard Practice BLE 2. Some requirements had been further delineated in Technical Instruction BLT1-CHEM-401 for Chemical Unit M&TE. This area was evaluated to determine if the Chemical Unit personnel were knowledgeable of M&TE requirements and if these requirements were properly implemented in accordance with BLE 2 and BLTI-CHEM-401.

NSRS determined that those supervisory personnel interviewed were knowledgeable of M&TE requirements. In addition, a review of the training records for General Employee Training (GET) Course 12, "Measuring and Test Equipment," indicated that all of the radiochemical/chemical laboratory analysts performing analyses for the CONST test package reviewed (reference 17) had received the M&TE training prior to performing these

activities. However, a review of attachment 2 to Engineering Section letter ESIL-A-3, "General Employee Training (GET)," indicated that this training course was not required for Radiochemical Laboratory Analysts (RCLAs) SE-3, -4, and -5 levels which appeared contrary to the requirements for the level of activities performed by these personnel. ESIL-A-3 should be revised to indicate that GET 12 is required for RCLAs SE-3, -4, and -5 levels.

There is a problem with the implementation of the Chemical Unit M&TE program in that the implementing document (Technical Instruction BLTI-CHEM-401) does not contain all of the requirements of Standard Practice BLE-2. Interviews with Chemical Unit supervisory personnel indicated that they were relying primarily on their technical instruction to implement the M&TE requirements for their program and were not strictly following the requirements of the standard practice which are more extensive. The technical instruction should be updated to include all of the requirements of the standard practice or the standard practice should be used to supplement the technical instruction. Either way, all of the requirements of the standard practice BLE-2 must be implemented.

e. Safety-Related Systems Water Chemistry Specifications

Section C.3 of RG 1.37 states that "The input water quality for final flushes of fluid systems and associated components should be at least equivalent to the quality of the operational system water." This area was evalulated to determine if water chemistry specifications had been established for the safety-related systems to provide for a basis of NUC PR review of the CONST test packages to ensure that the final flush acceptance criteria were compatible with the quality of the operational system water.

The evaluation determined that water chemistry specifications for safety-related systems had not been established by NUC PR in section I of DPM N79E2 or coalesced by the plant staff from applicable documents, such as the FSAR, draft technical specifications, and B&W specifications into a plant document. In addition, it was determined that log sheets for the results of analyses performed on safety-related systems had not been established. Without specifications and specified corrective actions when specifications are exceeded, the control of systems in wet layup and testing (which should follow cleaning and flushing activities) will not be afforded the attention deserved and damage to the safety-related system could occur. Anytime water is in a system it should be periodically sampled and

analyzed and the results reviewed for conformance to specifications. Currently, analyses results are being recorded in the laboratory journals. However, without log sheets it will be difficult for the Chemical Unit personnel to organize and evaluate data to determine adverse trends. Safety-related systems water chemistry specifications and respective log sheets should be developed to provide a base for corrective action levels if adverse conditions develop and with which to compare the final flush criteria in the CONST test packages as stated in section C.3 of RG 1.37.

f. Engineering Section Review of CONST Test Packages for Cleaning and Flushing Activities

Standard Practice BLA 7.9, "Review of Construction Test Procedures," specified the general criteria for review as stated by ID-QAP 11.2. This area was evaluated to determine if specific formal guidance had been provided to indicate which plant sections were to review the test packages and if their respective responsibilities were defined.

The evaluation determined that Standard Practice BLA 7.9 was very general and provided no specific guidance as to which plant sections were to review the test packages and what each section was to review them for. Even though the Chemical Unit had developed some informal guidelines for review, without formal specific guidance and controls a CONST test procedure package may not receive appropriate review as it may not be routed to the appropriate sections. Each section may duplicate the work of the other, or worse, the sections may overlook something important because their responsibilities for review are not specifically defined. In addition, there was expressed dissatisfaction with the reluctance of the CONST STCU to resolve the review comments. The criteria for review of the test packages should be clearly defined and the comments and concerns resolved before approval from NUC PR is granted.

2. Operations Section Activities

a. Operator Responsibilities

Assistant unit operators and 4th period student operators were providing support for CONST cleaning and flushing activities by operating equipment that had received an "Operation Release (OR)." This area was evaluated to determine if the operator's responsibilities had been defined in writing and were understood by both Operations Section personnel and CONST personnel involved in these activities.

The evaluation determined that the operators' responsiblities for these activities had been defined in a general manner in Standard Practice BLA 7.9 and more specifically in Standard Practice BLA 7.11.

The stated purpose of Standard Practice BLA 7.9 was to define organization functions and responsibilities and to establish divisional interface in support of the CONST test program. It was somewhat specific about the responsibilities of the CONST test director, but general about NUC PR responsibilities with the exception of those of the shift engineer relating to review and approval of CONST test package procedure changes.

The stated purpose of Standard Practice BLA 7.11 was to describe the responsibilities of NUC PR personnel for the operation of equipment during the period in which the equipment had been released for operation by CONST. The standard practice stated that following the receipt of an "OR," NUC PR personnel will operate the equipment described by the "OR" to support CONST testing activities. The standard practice implied that all "OR" equipment would be operated in accordance with approved instructions and established good review criteria to be used by Operations personnel to determine the adequacy of instructions. The intent of this standard practice was to ensure compliance with Criterion V of Appendix B to 10CFR50 which states, in part, that "activities affecting quality shall be prescribed by documented instructions and shall be accomplished in accordance with these instructions." If the existing operating instructions were considered insufficient for the activities to be performed, CONST was required to prepare "CONST Operating Instructions" to be used by the operators during the tests.

Interviews with Operations Section and STCU supervisory personnel and test directors indicated that these requirements were understood at those levels. If the requirements of Standard Practice 7.11 are understood by all levels of Operations Section personnel and properly implemented (including operation of equipment in accordance with approved instructions), NSRS believes that equipment can be properly operated by NUC PR personnel to support CONST cleaning and flushing activities.

b. <u>Operations Section Review of Construction Test Packages</u>

This area was evaluated to determine the degree of the Operations Section involvement in the review of CONST test packages associated with cleaning and flushing operations. The NUC PR documents delineating the responsibilities and providing instructions for these reviews are discussed in section F.1.f of this report.

The evaluation determined that the Operations Section usually reviews the CONST test package for cleaning and flushing operations. However, on occasion they have not had the opportunity to review the test packages (this is the exception rather than the rule). There were no written requirements that specify which sections will review the test packages and no written agreement between NUC PR and CONST that specifies how much lead time is needed to facilitate a good review. There had been occasions when CONST accelerated the process not allowing enough time for a thorough review by walking a test package through the review cycle. In addition, there was expressed dissatisfaction with the reluctance of the STCU to resolve the review comments.

In summary, administrative controls had not been established to ensure that the chemical analyses were performed by qualified personnel using approved procedures. A comprehensive quality control program had not been implemented and NUC PR had not prepared sampling procedures; however, NSRS is of the opinion that the results of the chemical analyses of the samples that were collected were probably correct. This opinion is based upon the following facts:

- The chemical laboratory personnel performing the analyses were trained to perform those specific analyses.
- The chemical laboratory personnel had received General Employee Training (GET) Course 12 on the proper use and control of M&TE.
- The instructions reviewed by NSRS (chloride and conductivity) used to perform the analyses were technically correct.
- A chemical laboratory instrumentation calibration program had been implemented.

The Operations Section responsibilities for supporting the CONST cleaning and flushing of safety-related systems were delineated in writing in Standard Practices BLA 7.9 and BLA 7.11.

NUC PR responsibilities for review criteria were very general and did not define which plant sections are to review the packages and the specific criteria for review by each section.

Interviews with Engineering Section personnel indicated that they did not get involved with the flushing and cleaning program other than reviewing of the test packages and providing support. The expressed reason was that they did not have the staff or time for more involvement. NSRS believes that NUC PR should become more involved in the flushing and cleaning activities to ensure that the systems are clean in accordance with requirements (RG 1.37-1973 and ANSI N45.2.1-1973) prior to system transfer and to satisfy the commitment made to NRC as indicated in reference 12 (see section IV.A.2 for additional details).

G. Startup, Testing, Coordination Unit Test Director Qualification and Training

Section 2.4 of ANSI N45.2.1-1973 entitled "Personnel Qualifications" requires that personnel who perform activities associated with cleaning of fluid systems during the construction phase of nuclear power plants shall be qualified in accordance with the requirements of ANSI N45.2.6. Table 17.1A-4A of the Topical Report TVA-TR75-1, R5, commits TVA to comply with the requirements of both ANSI N45.2.1-1973 and N45.2.6-1978 (with some exceptions).

These requirements have been delineated in the following Division of Construction procedures:

- CPNST-QAP-2.2, "Qualification/Certification of Inspection, Examination, and Testing Personnel"

- CONST Quality Assurance Training Program Plan

  Section III, "Training and Qualification, General Requirements"
  Section III.1, "Training, Qualification, and Certification Procedures for Inspection, Examination, and Testing Personnel"

- BNP-QCP-10.29, "Quality Assurance Training Program"

An evaluation was performed to determine if a formal documented program is in place at BNP to ensure control of the qualification, training, and certification of the STCU test directors involved in the flushing activities at that facility, and if in fact they were qualified and trained for that activity. The evaluation consisted of review of those documents listed above and extensive interview with the flushing unit supervisor and three out of six test directors in that unit. From the document review and interviews NSRS concluded the following:

1. There was no formal documented program in place at BNP for the qualification, training, and certification of test directors involved in flushing activities at BNP.

   Section 2.4 of ANSI N45.2.1 states that personnel who perform related activities (flushing) shall be qualified in accordance with the requirement of ANSI N45.2.6. Contrary to this requirement paragraph 2.1.A.3 of section IV of CONST Quality Assurance Training Program Plan states "Personnel who act as test directors and/or test data reviewers do not require training, qualification, or certification." This was in direct conflict with TVA's commitment as stated in the Topical Report and seemed unusual in light of the problems TVA had had in the past during CONST testing and flushing activities. As a result of this exception the STCU program was not in compliance with the requirements of

CONST QAP-2.2 and BNP-QCP-10.29 in that QAP 2.2 appeared to exclude STCU personnel and certification of the test directors was not being required in accordance with QCP-10.29. This was contrary to the requirements of section 2.4 of ANSI N45.2.6 which states that the qualification of personnel shall be certified in writing.

2. Based upon the interviews, NSRS concluded that the related experience and educational backgrounds of the flushing unit supervisor and three test directors met or exceeded the experience and educational requirements of ANSI N45.2.6 for the respective level of activities performed.

3. The STCU supervisor had established an informal training program. Even though not required by the CONST Quality Assurance Training Program Plan, the supervisor of the STCU had established the following qualification requirements for flush test directors:

   - An individual must have been employed in STCU for a minimum of three months unless transferred from another construction engineering unit prior to becoming a test director.

   - The employee must undergo a minimum of eight hours of classroom instruction on related subject matter.

   - The employee must have participated in a minimum of two flushing activities, played an active role in assisting a qualified test director, and demonstrated a high level of competence.

   - The employee must pass a comprehensive examination on cleaning and flushing.

In summary, the personnel interviewed had the experience level and training required by ANSI N45.2.6. However, there was essentially no assurance that the same is true for all personnel in the STCU who participate in these activities as the STCU informal program did not meet the requirements of ANSI N45.2.6. Without proper formal controls it is possible that an unqualified or untrained employee who does not meet the requirements of ANSI N45.2.6 could again become involved in safety-related activity as has happened in the past.

VI. LIST OF PERSONS CONTACTED

Name	Organization/Job Title	Attended Entrance Meeting	Contacted During Review	Attended Exit Meeting
J. T. Barnes	OQA			x
J. D. Bedford	STCU		x	x

Name	Organization/Job Title	Attended Entrance Meeting	Contacted During Review	Attended Exit Meeting
T. Bragg	NUC PR/Asst. Plant Supt.		x	
D. Branham	Electrical		x	
P. E. Border	OQAB			x
W. R. Brown	OEDC/Project Manager			x
C. Burke	NUC PR/Chem. Unit Supv.	x	x	x
L. Coots	NUC PR/Engr. Unit Supv.		x	
L. Cox	CONST/Project Manager			x
W. Conley	NUC PR/Asst. Oper. Supv.		x	
B. Domaingue	INST		x	
D. Drouhard	EN DES/MEB		x	
C. Fulwider	EN DES/BLP		x	x
F. E. Gilbert	CONST/Const. Engr.		x	x
R. Gypson	STCU		x	
F. Hanson	NUC PR/Chem Lab Supervisor		x	
F. Harwell	NUC PR		x	
B. Hubbard	STCU		x	
J. Hurford	ME		x	
H. C. Johnson	CONST/AQM		x	x
H. E. Johnson	EEU			x
S. R. Journey	STCU		x	x
C. Lester	NUC PR/Chem. Engr.		x	
B. Lewis	MEU		x	
B. Long	STCU		x	
P. Mann	CONST/Nuc Lic.	x	x	x
G. McChristian	NUC PR/Asst. Oper. Supv.		x	
C. Moore	QC/Group Leader		x	
M. Moore	QC Inspection		x	
J. Morris	QC Inspection		x	
J. R. Nerrod	STCU		x	
T. Newton	STCU/ACE	x	x	
J. R. Palatinus	EN DES/MEB		x	x
K. Parker	QC Inspection		x	
E. D. Rose	Proc. & Training		x	
D. Smith	NUC PR/Compliance	x	x	x
J. Spain	QC Inspection		x	
B. Thomas	Quality Manager	x		
J. Turner	PTU Exam.		x	
J. T. Walker	Asst. Quality Manager			x
D. A. Whitehead	NUC PR/Compliance			x
J. E. Wilkins	CONST/Asst. Manager			x
J. D. Wilcox	NRC Resident Inspector		x	
R. E. Young	OEDC/Proj. Engr.			x

VII. DOCUMENTS REVIEWED (REFERENCES)

1. 10 CFR 50 Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants"

2. TVA Topical Report TVA-TR751, Revision 5, dated July 1982, "Quality Assurance Program Description for Design, Construction and Operation"

3. General Construction Specification No. G39, Revision 5, dated November 5, 1982, "Cleaning During Fabrication of Fluid Handling Components"

4. ANSI/ASME N45.2.11973, "Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants"

5. ANSI/ASME N45.2.11980, "Cleaning of Fluid Systems and Associated Components for Nuclear Power Plants"

6. Regulatory Guide 1.37 dated March 16, 1973, "Quality Assurance Requirements for Cleaning of Fluid Systems and Associated Components of Water Cooled Nuclear Power Plants"

7. ANSI Standard N45.2.6, "Notification of Inspection, Examination and Testing Personnel for the Construction Phase of Nuclear Power Plants.

8. ANSI Standard N45.2, "Quality Assurance Program Requirements for Nuclear Power Plants"

9. ANSI Standard N45.2.9-1974, "Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants"

10. Construction Specification No. N4M-891, Revision 2, dated March 9, 1983, "Chemical Cleaning Instructions for Piping Systems for Bellefonte Nuclear Plant"

11. Specification Revision Notice (SRN) SRNN4M8912 dated July 22, 1982

12. Specification Revision Notice (SRN) SRNN4M8913 dated August 16, 1982

13. Specification Revision Notice (SRN) SRNN4M8914 dated October 8, 1982

14. BNPCTP 6.1, Revision 0, dated September 18, 1981, "Flushing of Fluid Handling Systems"

15. BNPCTP 6.2, Revision 1, dated June 8, 1982, "Cleaning and Flushing of Systems"

16. BNP-CTP 6.1, Revision 2, Addendum 1, dated December 29, 1982, "Cleaning and Flushing of Systems"

17. Construction Test Document for Cleanliness of Systems - NBFC -Revision 0 dated February 1, 1983

18. Construction Test Document for Cleanliness of Systems - NVFB -Revision 0 dated March 3, 1983 (not officially approved)

19. Construction Test Document for Cleanliness of Systems - NMFB -dated September 21, 1981

20. Construction Test Document for Cleanliness of Systems - NMFC -dated February 17, 1981

21. ID-QAP 11.2, Revision 0, dated March 9, 1981, "Construction Test Control"

22. QAP 11.1, Revision 0, dated June 30, 1982, "Construction Testing"

23. BNP-QCP-10.4, Revision 9, dated November 18, 1982, "Control of Nonconformances"

24. ASTM Designation D3370-76, "Standard Practice for Sampling Water"

25. BNP-CTP 4.4, Revision 0, Addendum No. 1, dated January 11, 1983, "Flushing and Pressure Testing of Instrument Tubing"

26. BNP-CTP 7.6, Revision 0, dated September 14, 1981, "Hydrostatic Testing"

27. BNP-CTP 9.1, Revision 0, dated June 8, 1982, "Initial Energization and Operation of Equipment"

28. BNP-QCP-6.11, Revision 1, dated July 2, 1982, "Clean Operations"

29. BNP-QCP-6.16, Revision 0, dated November 7, 1980, "Cleanliness Control During Piping System Installations"

30. BNP-QCP-7.9, Revision 10, Addendum No. 2, dated February 24, 1983, "Fitup and Cleanliness"

31. BNP-QCP-9.2, Revision 2, Addendum No. 1, dated February 24, 1983, "Transfer of Permanent Plant Equipment, Systems, or Structures to the Division of Nuclear Power"

32. BNP-QCP-9.5, Revision 0, dated December 17, 1982, "Construction Operating Instructions (COI)"

33. BNP-QCP-10.1, Revision 7, Addendum No. 1, dated February 1, 1983, "Preparation and Control of Quality Control Procedures (QCPs) and Construction Test Procedures (CTPs)"

34. BNP-QCP-10.7, Revision 5, dated September 21, 1982, "Quality Assurance Records"

35. BNP-QCP-10.11, Revision 9, dated September 9, 1982, "Calibration of Measuring and Test Equipment"

36. BNP-QCP-10.27, Revision 0, dated July 2, 1982, "Housekeeping"

37. BNP-QCP-10.28, Revision 1, dated December 10, 1982, "Handling Allegations"

38. BNP-QCP-10.32, Revision 2, Addendum 1, dated July 30, 1981, "Construction Engineer's Organization"

39. BNP-QCP-20.34, Revision 1, dated January 3, 1983, "Employee Concerns and Differing Opinions"

40. BNP-QCP-20.38, Revision 0, dated January 26, 1983, "Formal and Informal Responses to NRC Inspector Identified and TVA Reported Items"

41. Division of Nuclear Power Procedure No. N71A1 dated June 8, 1982

42. Division of Nuclear Power Procedure No. N79E2 dated April 9, 1982, "Water Quality Manual"

43. Division of Nuclear Power Procedure No. N79E2, Section II, Nuclear Plant Water Quality Manual, Analystical Chemistry Procedures

44. Division of Nuclear Power, Technical Instructions BLTI-CHEM-0004, "Laboratory Safety and Practices," Unit 0, dated July 11, 1979

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46. Division of Nuclear Power, Technical Instruction BLTI-CHEM-2102, Spec 70 and 88, Unit 0, dated August 12, 1980

47. Division of Nuclear Power, Technical Instructions BLTI-CHEM-2104, "HACH MODEL 18900 Ratio Turbidimeter," dated June 15, 1981

48. Division of Nuclear Power, Technical Instructions BLTI-CHEM-2106, "The L&N Model 7417 ph Meter," dated June 8, 1981

49. Division of Nuclear Power, Technical Instructions BLTI-CHEM-2606, "L&N Model 7073-17 Conductivity Monitoring Conductivity Meter," dated November 23, 1981

51. Division of Nuclear Power, Technical Instruction TI-CHEM-3003, "Disolved Chloride Analysis," dated October 10, 1979

52. Division of Nuclear Power, Technical Instruction BLTI-CHEM-3027, "Phosphate (Hydorchloric Acid Titration)," dated November 2, 1981

53. Division of Nuclear Power, Technical Instruction BLTI-SPPC-003, "Cleanliness Control of Components Equipment and Systems," dated October 4, 1982

54. ASTM Standard, Part 31, Designation D572-67 dated 1979

55. Division of Nuclear Power, Standard Practice BLG2, "Operational Quality Assurance Manual," Revision 2, dated January 27, 1983

56. Division of Nuclear Power, Standard Practice, BLE2, "Control of Measuring and Test Equipment," Revision 1, dated February 2, 1983

57. Division of Nuclear Power, Standard Practice BLE4.1, "Cleanliness Criteria and Chemical Cleaning Requirments," Revision 2, dated January 17, 1983

58. Division of Nuclear Power, Standard Practice BLE 7.1, "Water Quality Specifications," dated June 30, 1982

59. Division of Construction, QASP 3.12, Revision 0, dated May 7, 1982, "Employee Concerns and Differing Opinions"

60. Division of Construction, QASP 4.8, Revision 0, dated October 8, 1982, "Construction Test Activity

61. ID-QAP-2.2, Revision 4, dated June 1, 1982, "EN DES-NUC PR-CONST Interfaces and Responsibilities During and Following Transition from Design and Construction to Operation"

62. ID-QAP-11.2, Revision 0, dated March 9, 1981, "Construction Test Control"

63. ID-QAP-12.2, Revision 1, dated May 6, 1982, "Procurement, Calibration, and Management of Measuring and Test Equipment"

64. ID-QAP-17.1, Revision 2, dated September 30, 1982, "Transfer of Quality Assurance Records"

65. Interdivision Agreement Between Division of Construction and Division of Nuclear Power, CONST-NUC PR No. 1, Revision 4, "Procedure for Initial Operation, Testing, and Transfer of Equipment and Auxiliaries - All Nuclear Plants," dated September 20, 1979

66. Standard Operating Procedure, QCRU-SOP-004, "Quality Control and Records Unit, QA Records Filing Procedures," Revision 6, dated June 24, 1981

67. Standard Operating Procedure, QCRU-SOP-016, "Review of QA Records," Addendum 5, dated November 26, 1980

68. Standard Operating Procedure, STCU-SOP-904, "Construction Preoperational Test Scheduling," Revision 0, dated July 26, 1978

69. Standard Operating Procedure, STCU-SOP-905, "Initial Operation of Permanent Equipment," Revision 2, dated March 29, 1982

70. Standard Operating Procedure, STCU-SOP-906, "Transfer of Permanent Plant Equipment, Systems, or Structures to the Division of Nuclear Power," Revision 4, dated June 17, 1981

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72. Regulatory Guide 1.29, "Seismic Design Classification," Revision 3, dated September 1978

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76. Mechanical Design Standard, DS-M18.6.1, "Identification of Mechanical Safety-Related Systems and Components," Revision 1, dated September 21, 1981

77. Division of Engineering Design, Design Criteria N4-50-D744, "Design Criteria for Identification of Mechanical Safety-Related Systems and Components," Revision 0, dated November 30, 1977

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QCIR 30,583 - "NV Makeup and Purification System," February 15, 1983
QCIR 30,582 - "NV Makeup and Purification System," February 15, 1983
QCIR 30,581 - "NV Makeup and Purification System," February 15, 1983
QCIR 30,578 - "NBFC Chemical Adidtion and Boron Recovery," February 14, 1983
QCIR 31,167 - "NBFC Chemical Addition and Boron Recovery," March 4, 1983
QCIR 31,006 - "NBFC Chemical Addition and Boron Recovery, February 18, 1983
QCIR 29,600 - "NV Makeup and Purification System," January 20, 1983
QCIR 29,658 - "ND Decay Heat Removal System," January 20, 1983
QCIR 29,444 - "NS Containment Spray/Iodine Removal System, January 13, 1983
QCIR 27,761 - "NM Spent Fuel Cooling Systems, November 18, 1982
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QCIR 27,270 - "NBFB Chemical Addition and Boron Recovery," dated November 3, 1982
QCIR 27,198 - "NV Makeup and Purification System," dated November 1, 1982
QCIR 26,966 - "NM Spent Fuel Cooling System," dated October 26, 1982
QCIR 26,880 - "NM Spent Fuel Cooling System," dated October 25, 1982
QCIR 26,426 - "NM Spent Fuel Cooling System," dated October 14, 1982
QCIR 26,345 - "NBFA Chemical Addition and Boron Recovery, dated October 14, 1982
QCIR 26,279 - "NM Spent Fuel Cooling System," dated October 8, 1982
QCIR 26,191 - "NM Spent Fuel Cooling System," dated October 6, 1982
QCIR 25,049 - "NM Spent Fuel Cooling System," dated September 3, 1982
QCIR 23,987 - "NV, NM, NL Systems," dated August 6, 1982
QCIR 23,976 - "NM Spent Fuel Cooling System," dated August 6, 1982
QCIR 22,830 - "NV Makeup and Purification System," dated July 15, 1982
QCIR 22,820 - "NV Makeup and Purification System," dated July 14, 1982
QCIR 22,737 - "NV Makeup and Purification System," dated July 12, 1982
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80. Construction Specification G-29G, "Process Specification for Welding, Heat Treatment, Nondestructive Examination, and Allied Field Fabrication Operations - Process Specification 1.M.1.2(c)," dated July 15, 1981

81. Nonconformance Report (NCR) 835, "Purge Dam Blocks," dated March 14, 1978

82. NCR 1725, "Insoluble Glue Used for Purge Dams," dated January 28, 1982

83. Memorandum from TVA to NRC - Final Report dated September 28, 1982, "Insoluble Glue Used for Purge Dams in Stainless Steel Piping" (A27 820928 022)

84. Memorandum from C. A. Chandley, Chief, MEB, to J. A. Raulston, Chief, Nuclear Engineering Support Branch, "Insoluble Glue Used in Purge Dams," dated September 17, 1982 (MEB 820917 001)

85. Memorandum from R. M. Hodges, Bellefonte Design Project Manager, to L. S. Cox, Project Manager, BLN, dated September 21, 1982, "Insoluble Glue Used for Purge Dams" (MEB 820921 021)

86. Memorandum from J. A. Raulston, Chief, Nuclear Engineering Support Branch, to L. M. Mills, Manager, Nuclear Licensing Staff, "Insoluble Glue Used for Purge Dams," dated September 21, 1982 (NEB 820921 261)

87. Letter from TVA to NRC - Second Interim Report, "Insoluble Glue Used for Purge Dams," dated June 18, 1982 (A27 820618 027) (NEB 820621 628)

88. Memorandum from D. T. Drouhard to MEB Files, "Flushing of Stainless Steel Piping Systems Purge Dam and Trash Residual," dated May 24, 1982 (MEB 820525 017)

89. Memorandum from TVA to NRC - First Interim Report "Insoluble Glue Used for Purge Dams" dated April 22, 1982 (A27 820422 016)

90. Memorandum from John A. Raulston, Chief, Nuclear Engineering Support Branch, to L. M. Mills, Manager, Nuclear Licensing Staff, "Insoluble Glue Used for Purge Dams," dated April 20, 1982 (NEB 820420 272)

91. Memorandum from John A. Raulston, Chief, Nuclear Engineering Support Branch, to L. M. Mills, Manager, Nuclear Licensing Staff, "Insoluble Glue Used for Purge Dams - NCR 1725 - Supplemental Report No. 4 (Testing Results)," dated February 10, 1983 (NEB 830210 256)

92. Memorandum from H. G. Green, Director of Nuclear Power, to M. N. Sprouse, Manager of Engineering Design, "Autoclave Tests of Purge Dam Glue," dated February 17, 1983 (L29 830214 999) (DES 830218 033)

93. Letter from TVA to Steven D. Weinman, Codes and Standards Division, dated February 14, 1983 (MEB 830217 051)

94. Purge Dam Testing Package

Exhibit A - NCR 035 Rejection of Dissolvo Tape, Selection of Elmer's School Glue for Purge Dam Use
Exhibit B - NCR 1725
Exhibit C - Metallurgical analysis showing purge dams have no harmful effects on materials
Exhibit D - Telecon on July 12, 1982, with J. Hicks, Chairman of Ad Hoc Committee on Cleaning of Fluid Systems ANSI N45.2.1
Exhibit E - Nuclear System Analysis showing 1/8" purge dam particulate acceptance criteria is acceptable from a safety standpoint
Exhibit F - Results of Stirred Autoclave Tests
Exhibit G - NCR 1725 Final Report
Exhibit H - SME laboratory testing of side stream sampling proof flush effectiveness
Exhibit I - NASI N45.2.1
Exhibit J - Telecon on January 19, 1983, with J. Hicks for interpretation of ANSI N45.2.1, section 3.1.2, item 5

95. Memorandum from J. A. Raulston, Chief Nuclear Engineering Support Branch, to L. M. Mills, Manager, Nuclear Licensing Staff, dated April 6, 1983 (NEB 830406 273)

96. Memorandum from H. J. Green, Director of Nuclear Power, to M. N. Sprouse, Manager of Engineering Design, "January 24, 1983 Meeting with Nuclear Regulatory Commission (NRC)," dated March 15, 1983 (L29 830309 839)

97. NRC Routine Safety Inspection Report Nos. 50-438/82-33 and 50-439/82-33 dated February 7, 1983

98. Memorandum from Stanley D. Love, Nuclear Engineering, to Nuclear Engineering Support Branch Files, "Over/Underpressurization of Safety-Related System - Meeting Notes," dated December 9, 1982, NEB 821209 259

99. Letter from TVA to NRC dated December 28, 1982, "Overpressurized Systems During Flushing - First Interim Report - NCR 2089 A27 821228 012, NEB 821230 626

100. Memorandum from TVA to Babcock & Wilcox dated December 20, 1982, "Sodium Hydoxide (NaOH) storage Tank Colapse," NEB 821220 113, NCR 2082

101. NCR 2080 dated November 12, 1982, "Overpressurization of NB System NBFA," BLN 821116 108

102. NCR 2042 dated October 19, 1982, "Deadheading of Spent Fuel Cooling Waters Recirculation Pump," BLN 821028 100

103. NCR 1819 dated April 28, 1982, "Failure of BIF Valves," BLN 820430 113

104. NCR 1808 dated April 16, 1982, "Overpressurization of Piping and Valves in Makeup and Purification System (NV)," BLN 820420 118

105. Letter from Babcock & Wilcox to TVA dated May 21, 1982, "Decay Heat Pump Motor - NCR 1782," NEB 820610 883

106. NCR 1782 dated March 17, 1982, "Decay Heat Removal Pump Inadvertant Start," BLN 820319 113

107. NCR 1781 dated March 15, 1982, "Overpressurization of Core Flood Tank," BLN 820316 112

108. Memorandum from T. F. Neuton to Those listed dated July 23, 1982, "Interpretation of BNP-CTP 6.1 Regarding Cosmetic Changes," BLN 820728 046

109. CONST QA Audit Report BN-M-82-094 dated July 12, 1982, BQA 820713 001

110. Memorandum from J. T. Barnes, Supervisor CONST QA Unit, to F. E. Gilbert, CONST Engineer dated August 12, 1982, BQA 820812 001

111. Memorandum from F. E. Gilbert, CONST Engineer, to Lonnie S. Cox, Project Manager, dated December 12, 1982, "Stop Work Order SW007 - Resumption of Work," BLN 821216 046

112. Memorandum from J. A. McDonald to L. S. Cox, "Comments on NDFG 1 and 2 Package," dated December 17, 1982

113. Memorandum from J. R. Lyons, Chief, Systems Engineering Branch, to R. W. Dibeler, Chief, CONST Quality Assurance Branch, dated December 23, 1982, "Stop Work Order SW007," OQA 821223 401

114. Letter from NRC to TVA dated January 1, 1983, "Meeting Summary of December 29, 1982

115. Quality Alert Information from E. G. Beasley to Those listed dated November 30, 1982, "Construction Test Concerns of NRC to Bellefonte Nuclear Plant"

116. CONST Quality Assurance Audit BN-I-82-04 dated October 20, 1982, BQA 821022 004

117. Memorandum from L. S. Cox, Project Manager, to D. J. Cowser, Chief, Management System Staff, "BLN Project Summary Report December 31, 1982," dated January 27, 1983, BLN 830127 401

118. Memorandum from J. C. Killian, Assistant Manager of Construction, to Those listed dated November 26, 1980, "QA Commitments to NRC During November 19, 1980 Atlanta Meeting," DOC 801125 007

119. Letter from NRC to TVA dated November 10. 1980, "Confirmation of Action - Construction Testing Sequoyah Unit 2"

120. Letter from NRC to TVA dated November 20, 1980, "Confirmation of Concurrence Meeting on Sequoyah Construction Testing"

121. Draft dated November 18, 1980 by E. G. Beasley of commitments made in November 19 Atlanta NRC meeting

122. Draft CONST Test Program Review Guidelines dated November 21, 1980, SQN review group

123. Draft of revision to G-50 dated November 21, 1980

124. Letter from L. M. Mills to J. P. O'Rielly, NRC, outlining conditions of resuming test of SQN following receipt of NRC letter dated November 10, 1980

125. Copy of NUC PR's presentation to NRC during November 19, 1980 Atlanta meeting transmitted by Beasley's form 45D dated November 18, 1980

126. Results of CONST Test Program review held at SQN on November 22, 1980, with cover memorandum dated November 24, 1980 from D. M. Stack to G. G. Stack

TVA 64 (03-8-63)

UNITED STATES GOVERNMENT

Memorandum

TENNESSEE VALLEY AUTHORITY

TO : G. F. Dilworth, Assistant General Manager (Technical), E12D46 C-K

FROM : H. N. Culver, Director of Nuclear Safety Review Staff, 249A HBB-K

DATE : JUN 17 1983

SUBJECT: EMPLOYEE CONCERN REGARDING QUALITY ENGINEERING BRANCH (QEB) RECORDS - NUCLEAR SAFETY REVIEW STAFF (NSRS) REPORT NO. I-83-13-NPS

Attached is the report of an investigation of the concerns of , relating to QEB records. The investigation confirmed the validity of most of the concerns of relating to QEB records in Knoxville and also identified NSRS concerns for the records system at CONST and nuclear plantsites. The handling of records produced by vendors proving that equipment and materials have met contract specifications was determined to be inadequate. The report shows that TVA does not in all cases know that it has all the required QA documentation. In many cases in which TVA has control of the records, the exact location is unknown. Vendor QA data is required onsite at nuclear plants in a form that is easily retrievable. The report shows that in the case of SQN, which was chosen for tracing selected records to the ultimate use, all the records were not onsite; and much of what was onsite was incomplete and not easily retrievable. In addition, some records are not readable. The existing system also contains much duplicate effort while not providing assurance of a complete set of records.

We believe that organizational groups involved with the collection and flow of QEB records to NUC PR are more concerned with their individual group problems than with providing an effective service for the good of TVA. This has resulted in an inadequate system at the nuclear plants and has placed SQN, and possibly other plants, in violation of 10CFR50, Appendix B, Criterion VII requirements. It appears that a considerable coordinated effort will be required to solve the present condition and establish a mechansim to prevent its recurrence on future TVA purchases.

This investigation included only an examination of one portion of the total QA records generation and transmittal process. Not included, since it was outside the scope of this investigation, are those QA records generated and collected by EN DES and CONST which do not involve QEB.

The organizations involved in this investigation have exhibited a problem interfacing with each other effectively and to TVA's best interest. Therefore, it is recommended that a task force be created to report directly to the Assistant General Manager (Technical). The task force should be made up of representatives from OQA, NUC PR, CONST, QEB, MEDS, and ARMS with expertise in QA records requirements and ADP processes. The task force should be delegated responsibility to take the following actions:

~~ADMIN~~.

~~CONFIDENTIAL~~ RDS 9/6/85

G. F. Dilworth
JUN 17 1983

EMPLOYEE CONCERN REGARDING QUALITY ENGINEERING BRANCH (QEB) RECORDS - NUCLEAR SAFETY REVIEW STAFF (NSRS) REPORT NO. I-83-13-NPS

1. Examine findings of the NSRS report and take necessary steps to identify actions required by the line organizations (POWER, OEDC, OQA, and OGM) to:

   a. Develop an integrated records system for QA records that will satisfy the needs of NUC PR and OEDC.

   b. Correct implementation deficiencies identified in the existing system.

   c. Provide documentation records to each of the operating sites as required by the NRC requirements and committed by TVA.

   d. Clarify organizational responsibilities.

2. Report back to the OGM on the planned actions and schedule for completion of actions.

Original Signed By
H. N. Culver

H. N. Culver

RDS:KWW:HNC:LML
Attachment (GNS 840301 150)

GNS '84 0301 150

TENNESSEE VALLEY AUTHOIRTY

NUCLEAR SAFETY REVIEW STAFF

NSRS REPORT NO. I-83-13-NPS

SUBJECT: INVESTIGATION OF CONCERNS REGARDING QEB RECORDS

DATE OF
INVESTIGATION: MARCH 16 - MAY 6, 1983

INVESTIGATOR: Richard D. Smith — 6/17/83
R. D. SMITH — DATE

INVESTIGATOR: Richard D. Smith for — 6/17/83
R. W. TRAVIS — DATE

APPROVED BY: K.W. Whitt — 6/17/83
K. W. WHITT — DATE

MEDS, W5B63 C-K

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I. SUMMARY

As requested by the Assistant General Manager (Technical), the Nuclear Safety Review Staff (NSRS) investigated concerns regarding the inadequacy of QEB records. More specifically those records that are required by NRC to document that commodities requiring TVA source inspection for nuclear plants meet the design specifications. The concerns were that the record system did not meet either the NRC or ANSI requirements, that control and review for accuracy and completeness of the records were less than adequate, and that the documents were not receiving a second and third technical review for technical accuracy.

QEB is responsible for assuring TVA that vendors supplying equipment and materials provide those commodities in accordance with TVA's contract specifications through inspection of the vendor's QA program and the commodities manufactured. QEB is responsible for collecting the vendor QA documentation and providing it to the Division of Nuclear Power (NUC PR), the ultimate holder of the records. In order to fully determine the extent of the problems relating to the alleged concerns, this investigation included an examination of the system for handling QEB records from generation to ultimate storage. Sequoyah Nuclear Plant (SQN) was chosen as the ultimate location because it was the newest facility on line and, according to the TVA Topical Report, all quality assurance (QA) records were required to be onsite at the time of the investigation.

The investigation determined that the concerns were valid in varying degrees for all of the QEB units. It also became clear to the investigators that problems within QEB both affected and were affected by organizations other than QEB. In summary, the following problems were identified relating to QEB records.

The investigation determined that, with what NSRS considers minor variations, the written procedures provide for the collection, verification of accuracy and completion, and transfer of vendor QA records to NUC PR in a manner which is in compliance with NRC and ANSI requirements. However, with inadequate implementation of those procedures, particularly across organizational boundaries, the completed sets of QA records were not getting to NUC PR. Even if NUC PR were to receive a complete set of records for a given product, in their current form the records would not be in a condition that would allow easy retrieval of information. These deficiencies place TVA in violation of 10CFR50, Appendix B, Criterion VII requirements for SQN; and unless changes are made to correct the problems, both Wat's Bar Nuclear Plant (WBN) and Bellefonte Nuclear Plant (BLN) will be subject to the same violations.

At the time of this investigation, QEB did not know how many contracts for SQN were complete, and therefore, associated QA document records required to be onsite. They did not know with any degree of certainty whether or not QEB had all the vendor QA documentation required to support fulfillment of the contract specifications; they

thought they did but could not verify it. The only shipment of QA records to the Division of Construction (CONST) at SQN occurred in 1977 consisting of about 55 cubic feet. QEB estimates that it currently has over 500 cubic feet of completed contract records for all TVA nuclear plants stored in Knoxville and did not know how many cubic feet were in the regional offices awaiting shipment to Knoxville. SQN CONST placed the 1977 shipment of QEB records in filing cabinets separate from the filing cabinets used by CONST to store vendor QA documents received with equipment. Current CONST personnel did not know they were there until NSRS enquired about them. CONST had MEDS film its vendor QA records which were received with various vendor shipments, but these were incomplete when compared to the reviewed QEB records. CONST provided that film to SQN NUC PR. SQN NUC PR received the film and reportedly reviewed it for readability. However, according to a person in charge of CONST QA records, approximately 80 percent of the CONST-generated QA records for unit 1 are unreadable and the hard copy has been destroyed.

Regarding the second and third level of technical review, the investigation found that units other than the Electrical Unit were not performing them. Procedures require that the records be reviewed for accuracy and completeness by the unit supervisors. A third level of review is not required. NSRS believes this additional review is not necessarily required for all contracts but may well be beneficial on contracts with vendors having known or suspected problems.

The following report will show that the handling of approximately 700 million dollars of vendor QA records is inadequate and will require tens of man-years of effort to collect, verify for completeness and accuracy, and organize and store in an easily retrievable manner records for approximately 1800 completed contract purchases.

The present unacceptable condition of vendor QA records is attributed more to the lack of implementation of procedural requirements and intent rather than inadequacies in the procedures themselves. The prevention of future contract-required QA records arriving in the same unacceptable condition is related to divisions and branches involved in the collection and flow of vendor QA data working together to reach a common goal beneficial to TVA and not to their own best interest.

II. SCOPE

Concerns regarding QEB records were investigated using standard investigation techniques and MORT analysis.

III. FACTS

A. Function and Organization of QEB

QEB is charged with the responsibility to evaluate the quality control programs of vendors supplying commodities which require source inspection (at the vendor's plant). It is further charged

with the responsibility of assuring that the commodities purchased physically meet the contractural or purchase order specifications and to collect, maintain, and transmit to the user of the commodity documented proof that the commodity complies with the specifications. Quality of the commodities is verified by TVA regional inspectors located in eight regional offices throughout the United States, plus Knoxville, and commodities are not released from the vendor's plant until the inspector has documented evidence that the contract specifications have been met. The flow of those documents, both theoretically and in practice, are described in sections III.D and .E, respectively.

Under the direction of the Branch Chief, QEB oversees the manufacturing of commodities for TVA which require source inspection. A method of keeping track of the number of contracts and their value was established in the 1970s, and as of December 31, 1980, QEB was inspecting 1,824 contracts valued at over two billion dollars. Since then, through May 10, 1983, 994 contracts were added and none removed. Removal of a contract from this list required the contract to be complete and the file transmitted to the QEB Records Unit (NOTE: In March 1983 the personnel and functions of QEB Records Unit were transferred to MEDS. For convenience and because the units had not been officially renamed yet, the report will continue to refer to the QEB Records Unit.) or the site. Since no contract records have been sent to either location by QEB for several years, the number of active contracts and their dollar value may be greatly inflated. The branch chief estimated that at least 80 percent of their work was nuclear related, and the vendors added manufacturing, testing, and documentation cost associated with producing a quality product with the required traceability added 64 percent to the normal cost of the commodity. Guaranteed quality usually requires closer attention to product processing, sometimes requires more time per unit produced, and can in some cases add to the cost of initial production. However, an effective QA/QC program more than pays for itself through increased reliability and performance. Finding problems during manufactuirng is cost effective when compared to finding them at a later date.

Organizationally, QEB is divided into Field Operations (containing the eight regional offices) and Central Quality Control. Staff size, including clerical, for the Field Operations was 73 in 1980 and is currently at 39. For QEB Knoxville, including the Branch Chief's Staff and Central Quality Control, it was 33 in 1980 and is currently at 31. Central Quality Control is divided into five units each responsible for a commodity manufactured under their speciality. These units are titled: weldments, mechanical/nuclear (including NSSS), instrumentation, civil/architectural, and electrical (see attachment 1).

B. Concerns Regarding QEB Records

NSRS was requested by the Assistant General Manager (Technical) to investigate concerns regarding QEB records and to prepare a report documenting the investigation findings.

The concerns were that the records system probably did not meet NRC or ANSI requirements; that the vendor-generated QA documents that come to TVA through QEB were not being reviewed for accuracy or completeness or being adequately controlled. In support of these concerns, a room full of documents stored in the QEB Cedar Bluff office in deteriorating boxes stacked one on top of the other with only a contract number on the outside was described. The concerns further identified that records turned over to the QEB Records Unit by the unit supervisors were being indexed and reorganized by nontechnical clerical personnel; that vendor QA documents were not being reviewed a second and third time for technical accuracy and completeness by the other unit supervisors or the contract technical engineer; and that if documentation was found missing in a contract that had been closed out for several years, it might be difficult, if not impossible, to duplicate that document from a vendor's file because in some cases vendors have gone out of business.

C. Quality Assurance Record Requirements

The vendor-generated quality assurance records that a nuclear utility is required to accumulate and store are defined by a hierarchy of documents. The control and handling of these records is also described in the documents. These documents and their relative position in the hierarchy of control are listed below:

- 10CFR50, Appendix B, Criterion VII, "Control of Purchased Material, Equipment, and Services" and Criterion XVII, "Quality Assurance Records."

- Regulatory Guide 1.88, "Collection, Storage, and Maintenance of Nuclear Power Plant Quality Assurance Records."

- ANSI N45.2.9-1974, "Requirements for Collection, Storage, and Maintenance of Quality Assurance Records for Nuclear Power Plants."

- Topical Report TVA-TR75-1, "Quality Assurance Program Description for Design, Construction, and Operation.

- Interdivisional Quality Assurance Procedures (ID-QAP) Manual for Nuclear Power Plants.

  -- ID-QAP 17.1, "Transfer of Quality Assurance Records for Design and Construction"

  -- ID-QAP 17.2, "Quality Assurance Records for Design and Construction

1. Documents External to TVA

a. 10CFR50, Appendix B

Title 10, Part 50, Appendix B of the Code of Federal Regulations is the controlling document for all quality assurance activities for a nuclear power plant. 10CFR50, Appendix B, Criterion VII, requires, in part, that measures be established to assure that purchased material and equipment conform to the procurement documents. Also, these measures must provide, as appropriate, for objective evidence of quality furnished by the vendor. The documenting evidence that procurement requirements are met must be available at the plantsite prior to installation or use of the materials or equipment. This documenting evidence must be retained at the nuclear power plantsite and shall be sufficient to identify the specific requirements, such as codes, standards, or specifications met by the purchased material and equipment. This criterion has remained virtually unchanged since its issue in 1970.

Criterion XVII requires, in part, that sufficient records be maintained to furnish evidence that activities affecting quality were appropriately performed and that the applicant establish requirements concerning record retention, such as duration, location, and assigned responsibility.

b. Regulatory Guide (RG) 1.88

The regulatory guides provide methods acceptable to NRC in complying with the Commission's regulations. RG 1.88, revision 2, 1976, specifically gives guidance for Criterion XVII and states in Part C, "Regulatory Position," the following:

> The requirements and guidelines for collection, storage, and maintenance of nuclear power plant quality assurance records that are included in ANSI N45.2.9-1974 are acceptable to the NRC staff and provide an adequate basis for complying with the pertinent quality assurance requirements of Appendix B to 10CFR Part 50. . . .

This statement is unchanged from revision 0 issued in 1974. TVA was committed to the requirements of the regulatory guide with the following exceptions:

For Browns Ferry, OEDC will use one-hour filing cabinets for temporary record storage and OEDC will provide a two-hour rated vault for permanent record

storage. For Sequoyah and Watts Bar, only the exception that OEDC would provide two-hour filing cabinets for temporary record storage was taken. For Bellefonte, Hartsville, and Phipps Bend, the exception that OEDC would provide one-hour rated filing cabinets for temporary storage of records was taken.

c. ANSI N45.2.9

Since RG 1.88 endorses an ANSI standard, the standard becomes the controlling document. ANSI N45.2.9-1974 states, in part, that:

> This standard provides general requirements and guidelines for the collection, storage, and maintenance of quality assurance records associated with the design, manufacture, construction, and operation phase activities of nuclear power plants.

This standard delineates technical requirements; receipt of records methods; storage, preservation, and safekeeping methods; retrieval requirements; and disposition of records. It does not specify where the records are to be physically maintained. This standard was not intended to cover the generation of records. Also, it does not apply to activities covered by Section III, Divisions 1 and 2, and Section XI of the ASME Boiler and Pressure Vessel Code.

2. Documents Internal to TVA

Each organizational level within TVA had developed a document which described the handling of QA records at that level. The TVA Topical Report is the controlling TVA document and each lower level document must adhere to that control. The Topical Report may be expanded upon and explained, but all commitments made in the Topical Report must be satisfied. Most of the TVA controlling documents have been revised several times since the records being reviewed were initially created. The handling of the records, of course, must adhere only to the controls in effect at the time of their creation. Since the first procurement documents were written for SQN, the NRC regulations have been tightened considerably; but the basic requirement that QA records be maintained onsite in an easily retrievable manner remains unchanged.

a. TVA Topical Report

Topical Report TVA-TR75-1 presents the TVA Quality Assurance Program developed for the planning, design and construction, operation, and maintenance of TVA

nuclear plants. It is thus the highest level TVA document for controlling the activities being investigated. Revision 5 of this topical report dated July 1982 has been accepted by the NRC and, revision 6 submitted to NRC for approval and draft 1 of revision 7 remain essentially unchanged in the areas investigated. Section 17.1A.1.2.3, "EN DES Quality Engineering Branch," defines the organization and responsibilities of the Quality Engineering Branch. Section 17.1A.1.2.3 states, in part, "The Quality Engineering Branch (QEB) . . . is responsbile for determining that the manufacturers and suppliers of equipment and materials for the nuclear power plants fulfill the technical and quality requirements as defined in the procurement specifications." Section 17.1A.17.1 states, in part, "EN DES QEB is responsible for supplier QC records on those contracts in which QEB inspection is required. This responsibility is to see that such records are sent and incorporated into the MEDS system . . . ." Section 17.1A.17.2 states, in part, "Construction QA Procedure, 'Quality Assurance Records,' contains similar provisions for records generated or received at the site during the construction phase." Section 17.1A.17.3 states that "the transfer of OEDC QA Records to NUC PR is established in an Interdivisional Quality Assurance Procedure. The transfer system makes provisions so that OEDC QA records are readily retrievable by NUC PR at all times."

b. <u>Interdivisional Quality Assurance Procedures</u>

The ID-QAPs allocate responsibilities to the different divisions within TVA for the various quality assurance functions. ID-QAP 17.2, Section 1.0, "Objective and Scope," states:

> This procedure establishes the guidelines and identifies the interface responsibilities for controlling quality assurance records within O&DC.

Section 2.1.2.d under "Responsibilities, Division of Engineering Design," states:

> Furnishing CONST with evidence that purchased items conform to the procurement requirements (attachment 2).

Attachment 2 to ID-QAP 17.2 contains a listing of the "Records Required at the Site Prior to Installation or Use." This attachment references the "McAdoo Letter" which was a letter to J. D. McAdoo, Manager of Licensing

and Reliability, Westinghouse Electric Corporation, from C. K. Beck, Deputy Director of Regulation, U.S. AEC (now U.S. NRC) on May 11, 1971. The letter contained, as attachments, "Guidance for Criterion VII Regarding Certification Systems" and the "Westinghouse Implementation of AEC Criterion VII Guidance Regarding Certification Systems." The body of the letter itself contains the AEC criticism of the Westinghouse implementing document. There is no description of how Westinghouse modified its program to meet the AEC requirements. Attachment 2 of ID-QAP 17.2 describes how TVA is implementing the AEC guidelines. It does this by referencing the "McAdoo Letter" and adding some special requirements. Under Special Requirements it states that "for Code Material a Certified Mill Test Report on Certificate of Conformance and any required radiographs are required."

The Westinghouse certification system had three documents:

(1) a Quality Assurance Release
(2) a copy of the purchase order
(3) a copy of the equipment specifications

TVA meets parts 2 and 3 by stating these items are included in the procurement documents supplied to the construction site by the procuring organization. Part 1 was met by its being supplied by the vendor or by QEB. TVA did not go into the degree of detail in describing its system as Westinghouse did, it did not address the criticism that the AEC had of the Westinghouse description, nor did it have an NRC or AEC criticism or acceptance of its program. The Westinghouse three part system was acceptable in its bare form, but the detailed method of implementation of the system was not acceptable to NRC and the "McAdoo Letter" described what Westinghouse had to do to make it acceptable.

ID-QAP 17.1 describes the method of transferring records from EN DES and CONST to NUC PR. NUC PR is the ultimate user of the records being collected and generated and, therefore, must be in a position to use those records. The responsibilities of EN DES include receiving, storing, maintaining, indexing, and transferring to NUC PR supplier QA records (except receiving inspection reports) required by contract specifications. CONST responsibilities include receiving, storing, and maintaining supplier QA records. CONST also arranged for the transfer of QA records to NUC PR as required by the ID-QAP. These QA records, of course, include much more than vendor-supplied records.

NUC PR was required to accept the QA records from CONST and EN DES and maintain them. MEDS had the responsibility of coordinating microfilming and distributing EN DES and CONST QA records to NUC PR.

D. Implementation of Quality Assurance Record Requirements

After the responsibilities of the various organizations were defined by the ID-QAPs, each organization then had to have a means to implement the requirements allocated to it. OEDC used the Quality Assurance Program Requirements Manual for Design, Procurement, and Construction (PRM). Under this, each division issued procedures. EN DES used Engineering Procedures for this purpose and CONST used Quality Assurance Procedures and Construction Procedures.

PRM 17Q PR-1, "Program Responsibilities, R1, November 15, 1982 (R0 issued June 29, 1982), assigned responsibilities to EN DES and CONST. EN DES responsibilities included maintaining supplier QA records until turned over to MEDS and assuring that supplier records were identifiable and retrievable and in a system compatible with NUC PR and CONST requirements. CONST responsibilities included assurance that CONST and contractor records are identifiable and retrievable during the construction phase. CONST was also required to maintain supplier records until turned over to EN DES (MEDS).

PRM 17 QPD-1, "Management and Engineering Data Systems (MEDS)," R0, April 2, 1979, stated that MEDS was responsible for all phases of the records management function and ensuring that all records program activities were in accordance with industry codes and standards and Federal regulations. It also stated that documents which furnish evidence of quality of items and/or activities affecting quality or documents which have expected retrieval significance for any OEDC organization or for TVA, are sent to MEDS. No mention was made about distribution of microfilm.

1. Quality Engineering Branch

Activities of QEB in the area of vendor QA records were controlled by the following division-wide engineering procedures. EN DES-EP 5.4, "Release of QA Items From Suppliers' Shops to Construction Site," R6, April 1, 1982, and the branch-wide engineering procedures QEB-EP 24.11, "Inspection - General Instructions," R0, March 4, 1983; QEB-EP 24.37, "Produce Compliance Data and Quality Engineering Records and Disposal," R0, January 22, 1982; and QEB-EP 24.58, "Handling of Supplier Records," R1, September 1, 1982 (R0 issued February 9, 1979).

It should be noted that the issue dates for two of the three branch engineering procedures were in 1982 and 1983. Prior to 1982, there was very little in the way of a formal

program in effect for the Knoxville office of QEB. This was verified in conversation with the Supervisor, Field Operations and others within the QEB organization.

a. EN DES-EP 5.43

This EP described the method for setting up a contract file at the regional offices and the Knoxville office. It described the duties of the regional inspector and of the QEB personnel in Knoxville.

One duty of the TVA inspector was to verify that "performance test reports are accurate and complete and that document[illegible] evidence exists that the items conform to procurement requirements, including calibration of test tools and equipment." Also, the inspector "handles" supplier test reports and other data" as follows:

(1) Sends cable test reports, performance test reports, and other data that require QEB or technical engineer approval to Central QC Knoxville, as they are obtained.

(2) Requests the supplier to send data packages for structural and piping loose material and code data report forms for items which require ASME Code, Section III, N-symbol stamping to the jobsite with the shipment, unless otherwise specified by the contract.

(3) Handles other vessels, components, and equipment items in accordance with the contract requirements or as directed by the Chief, QEB.

(4) At the end of the contract or purchase order, sends the data files to Central QC, Knoxville, for microfilming unless otherwise specified by the contract or instructed by QEB.

b. QEB-EP 24.11

This EP was issued on March 4, 1983, and replaces the TVA Inspection Manual. The procedure is a general instruction on the practice of inplant inspection (source surveillance) by TVA. In section 7.3.7, "Final Reports," it is stated that, "Final reports are normally used to close out a contract file. The Central QC Staff reviews the file for completion after distribution of the final report."

c. QEB-EP 24.37

Under Section 1.0, "Purpose and Scope," it was stated that "this EP covers the indexing and preparation of Product Compliance Data and Quality Engineering Records produced and received by QEB." Under Section 2.0, "Policy," it was further stated that "the QEB is responsible for the storage of Product Compliance Data and Quality Engineering Records during the manufacturing stage of contracts set up for inspection." Included in these responsibilities was the orderly transfer of records from QEB to MEDS for transmittal to NUC PR.

In section 4.1, it was stated that the QC Unit Supervisor "accumulates Product Compliance Data and Quality Engineering Records by project; ensures that the data/records are complete and accurate." The QC Supervisor was also required to turn over records to the QEB Records Unit.

By this EP, MEDS microfilms the data packages and sends a copy of the microfilm to QEB and to the related plantsite.

d. QEB-EP 24.58

In Part 1, "Purpose and Scope," it was stated that "this EP outlines the methods that QEB uses in handling supplier records for TVA contracts requiring inspection by QEB. This EP applies to supplier records submitted to QEB to furnish proof of compliance with the requirements of the contract."

The EP also instructed the TVA inspector to prepare a detailed index identifying the number of packages or boxes, what records are contained in each package or box, and to what piece of equipment the records apply. The inspector was then instructed to send the records to Knoxville. The Knoxville unit supervisor was directed to receive, review, and check the records against the original records checklist. He was then instructed to further index the records, if necessary, and maintain them until turned over to the QEB Records Unit.

2. Division of Construction (CONST)

The CONST Quality Assurance Program for records is set forth in QAPP-17, "Quality Assurance Records," R5, June 30, 1982. Very little guidance is given in this policy statement concerning vendor-generated QA documentation. It does, however, state that QA records shall be identifiable

and traceable to the item or activity, they shall be retrievable, and they shall be maintained in a systematic and controlled manner.

At Sequoyah Nuclear Plant, SNP Construction Procedure No. P-8, "Quality Assurance Records," R16, February 18, 1983, described the manner in which QA records are prepared, reviewed, handled, classified, temporarily stored at the construction site, and transferred to NUC PR.

In Procedure P-8, Section 6.C.4, "QA Records Originated Offsite," it was stated that "QA records received at the site which were prepared by vendors or other TVA organizations shall be incorporated into the site contract file." This requirement was established in revision 13 dated November 11, 1977.

In Procedure P-8, Section 6.G, "Transferring Records to NUC PR," part 2, it was stated that the Quality Control and Records Unit (QCRU) will arrange for MEDS to microfilm all QA records with manual folder level indexing. Also, the microfilm was to be returned to QCRU for transfer to NUC PR.

Nonmicrofilmable QA records were to be transferred to NUC PR in hard copy. In section 6.G.4, it was stated that the transfer of QEB supplier radiographs will be made by EN DES.

3. <u>Management and Engineering Data Systems (MEDS)</u>

The operations of MEDS was described in their procedure book. In MP 13.01, "Backfile Documents - Processing," R0, March 25, 1981, it was stated that MEDS receives requests from user organizations to film backfile documents. MEDS then goes through the mechanics of filming, including a setting of priority using attachment 2 (this attachment was not available). After filming, MEDS distributes index and film to organizations requesting copies.

MP 12.07, "Processing Site-Originated Quality Assurance Records - Sequoyah and Watts Bar Nuclear Plants," R0, March 4, 1982, described the mechanics for bringing the records from the construction site listed to Knoxville to be filmed. One responsibility of the MEDS user representative was to deliver the index, all illegibles, and the applicable number of copies of microfilm to the site QCRU for transfer to NUC PR.

In MP 14.01, "Document Processing - Overview," R0, March 4, 1981, it stated that for documents processed in the MEDS online system, MEDS received documents from user organizations prepared in accordance with instructions in MEDS Handbook or related EPs, CEPs, and AIs.

E. Handling Practices for Vendor-Supplied QA Records

Discussions were held with members of QEB, MEDS, CONST, and NUC PR to ascertain actual practices in the flow path of vendor QA records from the vendor to the ultimate user of the commodity and ultimate holder of the offical records--NUC PR. The flow of records to SQN was chosen because it was the newest operational nuclear plant in the TVA system and the last unit had been in commercial operation greater than six months, thus required by the TVA Topical Report to have all QA records onsite at the time of this investigation. Areas covered in the investigation process included accumulation of records, review for accuracy and completeness, storage, indexing of contract files, and transmittal of the records. The actual review of randomly selected completed contracts is described in section III.F.

1. Quality Engineering Branch

As described in sections III.C. and .D above, the overall handling of vendor QA records has followed an evolutionary process. Members of the QEB organization stated that their files were the official files during the life of an active contract and until the file was transmitted to another group. The branch chief stated that the QEB files lose their offical status when the files are transmitted to MEDS for filming and the film has been reviewed by QEB. QEB personnel stated NUC PR had told them that NUC PR did not know what they wanted or needed in the way of QA records and that NUC PR did not want and could not physically store hard copies of QEB's records. Correspondence on this problem was generated in 1977. Ultimately some QEB contract files were shipped in 1977 in hard copy to SQN CONST, and each file included every document QEB had at the time. Apprently no effort was made to eliminate non-QA information or duplication.

The problem of what the required QA documents would consist of for any given commodity also presented a problem to QEB. Personnel stated that contract specifications, until very recently, were vague regarding the required vendor QA documentation. This vagueness was described as resulting in the regional inspectors having to negotiate with each vendor about what records the vendor was willing to supply. Therefore, documentation for like commodities varied from vendor to vendor and may only include a vendor certificate of compliance or may include as much as a data package, including certification of compliance, mill certifications, test reports, etc.

There was no practice of routinely transferring QEB records to CONST, and it appears that QEB records were transferred at only two time periods when they were running out of file space in QEB.

In about 1973 a van (one person recalled it being a 12-foot moving van) was filled with QEB records for BFN and transferred to BFN. In 1977 two shipments of hard copy records were transferred to SQN CONST by QEB after being filmed by MEDS. The QEB Branch Chief said CONST could not physically accept records before then. Other QEB personnel recalled that they were out of file space and needed to make room. They further recalled this was a hurry-up operation requiring overtime work, and the files were not reviewed for completeness.

One shipment of Mechanical/Nuclear Unit records to SQN CONST consisted of 27 boxes (presumed by NSRS to be 1-foot[3] per box because this was the most common size) containing 377 completed contracts. These contract files ranged in size from very small, 116 contracts contained in 3 boxes, to very large, 1 contract contained in 5 boxes. There was no documentation of transmittal produced for this shipment; however, SQN CONST had a copy of the index produced for the transfer with written-in file drawer locations.

Another shipment was made on October 19, 1977, from the design project manager to the SQN Project Manager. This shipment consisted of 28 boxes containing 348 contracts. As with the previous shipment, QEB stated all files were filmed by MEDS before shipment. Copies of the film were possessed by MEDS and QEB and NUC PR Central Office. Indexing for these films was manual, not in the MEDS data base, and included the contract number, vendor name, and a very general description of the commodity. SQN CONST had no record of this shipment but found the records associated with these transfers after the NSRS inquired about their disposition. It was believed by CONST that the first shipment was incorporated into the CONST files developed for the same contracts, but they later determined that the records were not incorporated.

A similar transfer was made to BLN in 1977. No record of any transfer of QEB records to WBN could be found. There was no recorded transfer of QEB records to SQN since 1977; however, both QEB and SQN CONST personnel remember that several boxes of contract files were sent by QEB to CONST in the 1979-80 time period and returned because CONST said they did not know what to do with them.

QEB maintains a card file on contracts requiring QEB source inspection issued since about 1965. On these cards such information is maintained as contract number, vendor, responsible unit supervisor, whether the contract is active or complete, and if the records file has been transferred. QEB also maintained a computerized data base on all active contracts from which completed contracts were removed after the contract has been completed for about three months.

There was no list other than the card file for completed contracts. QEB is presently developing such a list. As such, it would be extremely difficult to identify all completed contracts for a given plant. Only one unit supervisor, Instrumentation, maintained such a list. Comparing his list of contracts, which also contained disposition of record information, against the list of records sent to SQN in 1977 revealed several interesting points. Of the 248 completed contracts listed by the unit supervisor, only 172 or 69 percent have been sent to CONST. Of those contract files still in QEB's possession, some had been reopened, which was common practice to avoid issuing a new contract, but the records for the commodities produced under the contract first issuance remained as well. Within the six boxes of the Instrumentation Unit's records sent in 1977, one contract--76K52-820187-4--with Standard Pipe & Supply Company was shown on the QEB index sent with the records. This was not a contract on the Instrumentation Unit supervisor's list nor was it on the QEB list of filmed SQN records. SQN CONST could not find that contract with the other QEB records.

Comparing the list of filmed contracts for SQN against the QEB list of transferred contract files revealed that four contracts were not filmed, contrary to QEB's belief (73C55-83535-5, 74C56-83612-8, 73C35-83571-2, 74C57-85443). Another discrepancy found was that the contents of boxes 21 and 28 shipped on October 18, 1977, had identical contents.

Of the records sent by the Mechanical/Nuclear Unit in 1977, there are several discrepancies which appear to be typographical errors between the listed contract numbers on the hard copy sent to SQN and the filmed list. Of more significance, two boxes of records (boxes 1 and 2 standard components) believed to be shipped by the unit supervisor had not been filmed and could not be found by SQN CONST. An additional four contracts on the list of contracts sent were not on the list of filmed contracts (74C56-83612-8, 74C54-83635-6, 74C54-83635-8, 74P63-14703). These discrepancies were communicated to the QEB Branch Chief for his action.

The Chief, QEB, said they would like to turn over completed files to MEDS for their filming and distribution three months after a contract was completed. He further stated that MEDS could not keep up with the volume of QEB records. A completed contract to QEB meant all the components required on a contract had been shipped from the vendor's site and did not necessarily mean that TVA had all the paperwork. In the past it was QEB's responsibility to transfer their records to CONST and the branch chief delegated that responsibility to his unit supervisors. In the opinion of the Field Operations Supervisor, QEB does not have to maintain

their records in an indexed or easily retrievable manner. Indexing and organization for retrievability is required only when the records are transferred to MEDS.

With regard to radiographic (RT) film produced by the vendors during their tests, QEB stated they do not want to handle it because they don't have the storage facilities for those kind of records. The vendor was supposed to keep RT film until asked for or send it with the equipment. In general, QEB personnel were unclear as to the disposition of RT film and when, how, or if TVA received possession of it. Of the contracts reviewed by NSRS, the contract language regarding RT film was equally vague. It specifically stated that at the completion of the contract the film became the property of TVA, but did not specify how or if TVA would take possession.

a. Mechanical/Nuclear Unit

This unit consists of a unit supervisor and an SD and an SE responsible for all NSSS and mechanical contracts. For the NSSS contracts the vendor is responsible for collecting all QA records and turning them over to TVA at some predesignated time.

With the TVA direct contracts under this unit, the vendor QA records are (1) maintained by the vendor until told to release them, or (2) collected and maintained by the regional office until the Knoxville QEB office requests they be sent in, or (3) periodically sent by the regional office to Knoxville. Because of the vagueness in consensus standards and contract specifications regarding required QA documentation, the unit supervisor stated it was difficult to have any consistency in records. Skid-mounted equipment, for example, was described as having no governing consensus standard, and considerable negotiation by the regional inspector was required to establish what QA documents the vendor was willing to produce. In some cases this could result in an increase in the contract cost.

The unit supervisor stated he relied heavily upon the regional inspector and his ability to verify that the commodity met contract specifications and that the documentation was complete and accurate. Manpower within this unit was described as insufficient to adequately review the QA records as they arrive; spot checking is the best they could do. He stated that some one-of-a-kind records are maintained by the vendors until asked for, but was unable to specify how the TVA request for these records would come about.

The supervisor stated that approximately 200-300 active contracts were being administered by his unit. Furthermore, approximately 140 feet^3 of records on completed contracts for that unit were being stored in boxes in a two-hour fire-rated room at QEB. The boxes were stacked on top of each other with a contract number on the outside. It was estimated by the supervisor that approximately four man-years would be required to go through his completed files, review them, and put them in order.

With regard to the 1977 shipment of records to SQN, the supervisor recalls it was done very rapidly and that he personally took a van load down to SQN CONST. No emphasis was placed upon reviewing them for accuracy or putting the records in some logical order. They were indexed only to the contract or file level. A copy of the index was supplied to the investigators. The supervisor believed that the records were complete but could not be certain.

Records from his group were to be transferred when a contract was complete to the QEB Records Unit for filming and transmittal to CONST. He said that the Records Unit was not able to keep up with the records and the unit supervisors were told to hold on to their records.

b. Civil/Architectural Unit

This unit consists of a supervisor and two technical staff members responsible for administration of contracts for commodities which correspond to what their title implies. As with the Mechanical/Nuclear Unit, concensus standards and contract specification were described as vague in some areas regarding required vendor QA documentation. This results in negotiations with vendors regarding the QA documents they will supply.

For some contracts administered by this unit, bulk quantities of structural steel, piping, etc., the QA documentation and mill certifications were sent with the commodity to CONST at the site, and QEB did not receive a copy. For other vendor-produced commodities, QEB received the QA documentation from the regional inspector. If more than one copy was provided by the vendor, then a copy was sent to the site with the commodity.

For SQN, however, the unit supervisor stated that only QEB received the QA documentation; the site did not. This unit supervisor relies upon the regional inspector for assuring the QA documentation is correct. As

the contract information is received by this unit, it is filed until the the contract is complete. They were reviewed for completeness and turned over to the Records Unit when they could receive them. The supervisor stated that they were approaching 100 percent review of all files sent to the QEB Records Unit. However, he said the Records Unit had a backlog of records and none had been sent in about a year. Currently he estimated that his unit had between 100-200 $feet^3$ of completed file records in Knoxville and the regional offices had about 200-300 $feet^3$ to be shipped to QEB in Knoxville. He estimated three to four man-years of work would be required to review and index the files he currently has before sending them to the Records Unit. He said the Records Unit "unfortunately" is indexing the files they currently have and dosen't believe they have had sufficient guidance to do it properly.

He stated that he would like to review the film MEDS makes but that was the Record Unit's job.

This supervisor stated he sent some records, he could not remember which ones for sure, to SQN CONST in about 1979 or 1980 but they were returned. There was no record of transmittal found by QEB.

c. Weldments Unit

This unit, under the direction of a supervisor and one engineer, administered contracts involving the welding fabrication of large components. This unit was created out of both the Mechanical/Nuclear and Civil/Architectural Units and was not in existence in 1977.

With regard to QA records, this unit required one copy of the vendor data package to be shipped with the commodity and required the offical QEB copy to be maintained by the regional office. Approximately three months after the completion of a contract, the Weldments Unit Supervisor would request the records be sent from the region to Knoxville. Reviewing his unit's list of completed contracts for SQN revealed one completed for over a year that had not been called in.

Prior to a record shipment, the region was to index the file. According to the unit supervisor, additional indexing was performed in Knoxville by QEB and finally MEDS. He further stated intelligence was prepared for files describing the filing system to aid retrievability.

Reviewing the recently completed file on the Bellefonte containment, filling five cabinet drawings, transferred to the Records Unit; it took about three hours to track down the pedigree of a component for the polar crane using the combined talent of the person indexing the file, the unit supervisor, and by telephone the TVA resident inspector at the vendor's site.

d. Instrumentation Unit

This unit, under a supervisor and one engineer, administers contracts for instrumentation requiring source inspection. This was the only unit that maintained a working document listing all contracts handled by the unit including the disposition of the contracts' records.

Unlike the previous three units, the Instrumentation Unit contracts were described as more specific regarding the required QA documentation. This unit required the QA documentation to be sent to the site with the commodity and to QEB Knoxville as it was generated. The documentation was reviewed for completeness in Knoxville, but not technical accuracy. The regional inspector was relied upon to provide the technical review necessary to assure a quality product. The regional office also maintained files on the contracts and was considered the duplicate file for this unit.

This unit had some contracts previously completed that were reopened to purchase additional equipment. In those cases the documentation for the previously completed portion remained a part of the contract file.

The unit supervisor stated that the QEB Record Unit was unable to accept any records for the last two years so they had been building up in his files. He also stated that the Records Unit clerks, for the most part, do the contract indexing.

e. Electrical Unit

This unit, under a supervisor and two engineers, administers contracts requiring source inspection under their purview. According to the unit supervisor, like the Instrumentation Unit contracts, the specifications in contracts regarding QA records are adequate.

Regarding QA records, this unit supervisor required the regional inspector to review them for completeness and accuracy. When satisfied, the regional inspector would send eight copies to QEB Knoxville where they

were reviewed again for completeness and accuracy. When satisfied, the Electrical Unit Supervisor would then send seven copies of the QA records to the technical engineer for review, approval, and distribution.

This unit supervisor expressed concern regarding the transfer of his records to the Records Unit. He felt they were not capable of adequately handling them. He further stated he had never sent any records to the Records Unit and was reluctant to do so, but in about 1979, seven feet^3 of SQN and seven feet^3 of WBN records were taken from him and sent to the Records Unit.

QEB had recognized that a problem existed with their records and a number of actions and program changes had begun. The inspection load of the regional offices had decreased and those personnel were being used to review files for completeness. A recent procedural change to procurement specifications will require future vendors to supply a list of QA documents they will provide to show compliance with the contract specifications. QEB was also developing a list of all contracts they had handled since 1965, including the disposition of the contract and location of the contract file. A data base for QEB records had been developed and was in the testing and evaluation stages.

2. MEDS

A discussion was held with the MEDS Branch Chief regarding the role of MEDS in QEB records. He stated that once the records were filmed and indexed (for either computer aided or manual retrieval) by MEDS, they became the official documents. He said that for QEB and CONST QA records, MEDS performs the filming and QEB and CONST were responsible for distribution of the film to NUC PR. He stated that considerable effort had been expended in developing a data base for QA records which could be queried on the document level. This system would include both QEB and CONST records. When asked if NUC PR would have access to this, he stated that POWER in Chattanooga had a MEDS terminal and could use it if they wanted to, but their experience had been that NUC PR did not want MEDS material because it was not in a form that NUC PR could use. He also expressed the position that MEDS was for OEDC not POWER, and MEDS would not put the records in a form NUC PR would like. The branch chief stated that the new data base would be used on currently produced QA records and older QA records would be added as time permitted, probably taking several years.

With regard to a question on duplication of records, a task force was identified by the branch chief which was reviewing records produced by OEDC and specifying on a specific basis which groups of records were to be retained and which

were to be discarded. Copies of the task force reports for SQN CONST and QEB were reviewed and no effort to reduce duplication between the two sets of records could be found. The task force that reviewed CONST records did not have a representative from NUC PR, the division that would receive the retained CONST records. NUC PR did review the task force report and determined there were records scheduled for destruction that NUC PR wanted to retain. NUC PR requested that they be included in the transfers and they were.

Interviews were held with the QEB MEDS representative. The representative stated that MEDS would index completed contract files to the package level. In doing so MEDS would look for any obvious errors and, if found, would send the file back to QEB for correction. A rough estimate of the MEDS workload in QEB for all QEB-inspected contracts was made by the representative as follows:

a.	Completed contracts in QEB Records Unit	150 ft^3
b.	Completed contracts in QEB Materials Engineer possession	520 ft^3
c.	Open contracts in Materials Engineer possession	345 ft^3

The MEDS representative assumed one cubic foot of files would fill a 2300 image roll of film, and two cubic feet of records per week could be made camera ready by the three MEDS clerical persons in the Records Unit. Using these assumptions, 19 person-years for MEDS Records Unit personnel alone could be expended on currently completed records. This does not include the files held by the regional offices that are not duplicates of QEB Knoxville file material or records found in QEB files previously sent to the TVA records center which require filming.

Discussions with QEB Records Unit clerks revealed that they had been expected to index and organize completed contracts without sufficient guidance. They stated that they were just expected to know how to index. Consequently, they did the best they could. One clerical person attempted to document a procedure for indexing. This was the only guidance, described by them, they had to work with.

3. <u>Division of Construction - Sequoyah Nuclear Plant</u>

In addition to CONST-generated QA records involving CONST activities at SQN, large quantities of vendor-generated and TVA-related QA documentation is accumulated. Vendor-generated documentation includes that which is provided as a part of contracts requiring QEB source inspection. CONST personnel interviewed indicated that they believed their records were complete and QEB records only duplicated what

they had. Personnel recalled that several boxes of QEB records arrived one day (in the 1979-1980 time period), and they did not know what to do with them. Personnel recalled glancing through the records and saw duplication of those records CONST had already. They indicated it would be a large effort to try to incorporate the two sets of records, and since they saw no value in doing so, chose not to. CONST ultimately sent the records back to QEB in Knoxville.

Questions about records shipped to them in 1977 from QEB produced some consternation because those currently involved with CONST QA records were not involved in the 1977 records transfer. Documentation was produced which indicated the QEB undocumented shipment of records by the Mechanical/ Nuclear Unit Supervisor in 1977 had been received and persumed incorporated into the CONST files. This was arrived at by CONST from the fact that file drawer numbers were written next to each box on the index supplied by QEB. CONST was informed that based upon the NSRS review of the film of CONST QA records, it did not appear that QEB records had been incorporated into the CONST files. No record could be found of the formal October 1977 shipment from Pierce to Stack. NSRS provided CONST with a copy of the transmittal and index. A few days later, CONST informed NSRS that QEB records shipped in 1977 were found still in file cabinets in another building. Reviewing what was found against the indexes, CONST determined that two boxes were missing. NSRS informed QEB of this discrepancy for their action.

A large portion of the CONST QA records had been filmed (over 200 rolls of film) and the film given to NUC PR at SQN. CONST stated they did not have a machine to review the film produced by MEDS and, therefore, did not know if the film was complete or readable. CONST just gave the film to NUC PR. CONST informed NSRS, based upon their use of the film at SQN NUC PR, that about 80 percent of the film for SQN unit 1 CONST records was illegible and the original records had been destroyed.

In a discussion with the CONST Material Inspection Group (MIG) Supervisor, he stated that each piece supplied under a contract requiring source inspection is inspected against contract specifications, including the presence of required vendor and QEB documentation. If the vendor documentation or QEB release for shipment form is not present, the commodity is rejected unless QEB verbally authorized its acceptance by telephone.

The CONST QA records clerk stated that vendors sometimes put manufacturing and test data in equipment manuals supplied. These manuals were given, according to CONST, to SQN NUC PR in hard copy; they were not filmed.

With regard to vendor radiographic (RT) film, CONST stated they had not seen any film come onsite in years. CONST stated they recieved about two boxes of Chicago Bridge and Iron RT film for the containment from QEB and it was not indexed.

4. Division of Nuclear Power - Sequoyah Nuclear Plant

In discussions with SQN NUC PR personnel, they stated that they received QA records on film from CONST and document control had custody of it. The filmed records received admittedly were not reviewed for accuracy or completeness by any of the QA or engineering groups. They were reviewed only for readability by document control. Personnel at SQN NUC PR stated they did not know what should be in the QA records they receive. They further stated that they had a difficult time finding anything in them and generally CONST personnel were requested to go through the film to find something for NUC PR. A manual index in loose-leaf form was provided with the film. The indexing level was generally on the folder level, i.e., contract number only. The largest contract observed by NSRS was contained on 13 rolls of film generally indexed to the contract number and some other unidentified lower-tiered number.

Film was stored by document control in two locations--the vault and in the document control file area in the administration building. The offical files were considered to be the film and any unfilmable hard copies from the records filmed and any other hard copy records were considered to be duplication. Test records not found in any other file system at QEB CONST or NUC PR were found in what was considered the duplicate hard copy file at SQN.

Vendor manuals transferred by CONST to NUC PR are considered by SQN NUC PR to be for information only. The offical vendor manual was supplied by the NUC PR Central Office.

Vendor RT film received by document control was sent to the U. S. Government Record Center in East Point, GA. Records, generally by system or component, were maintained by document control specifying what RT film had been sent to storage. The list was quite small and included only main coolant components.

Construction produced RT film was stored in the NUC PR and CONST vaults.

F. Randomly Selected Contract File Flow

Methodology

After studying the operations of QEB, it was decided that since NUC PR was the ultimate user of vendor-generated QA records, a

verification of records actually under the control of NUC PR would be performed. In order to do this, SQN was selected as the NUC PR facility on which to perform the record check.

First, contract file records were selected at the QEB office in Knoxville for review. The contracts were selected to be representative of each section in QEB. Fifteen contracts were selected in total. After their review in Knoxville, the files for the same contracts were reviewed in SQN NUC PR and were then reviewed in SQN CONST. A comparison of each contract file was made to ensure that the information required to be generated and transmitted by the vendor was actually going through TVA's prescribed routing to NUC PR. In general, contract files were found in varying degrees of completeness with no general organizational style and with portions of files in multiple locations. More complete files were found in the possession of QEB Knoxville, but again in multiple locations. Specifically within QEB completed files were found in hard copy in the possesion of the unit supervisors, in a two-hour fire-rated room, in the QEB Records Unit files, in the Chicago Regional Office files held by the QEB Records Unit and segregated from the Knoxville QEB files, and in microfilm in the QEB Records Unit. Portions of the same completed contract were found both in hard copy and in microfilm, which had been made in 1977, in the QEB Records Unit.

At SQN CONST the hard copy files previously tranferred by QEB were found stored in hard copy in a location different than where CONST maintained their vendor QA records. All but about six file cabinets of CONST vendor QA records had been microfilmed and given to NUC PR.

NUC PR had CONST film on file and had hard copy files for vendor contracts which NUC PR believed to be duplicate records. NSRS determined, however, that NUC PR's hard copy file, in fact, had information not found in any other file.

Most, but not all, of the files in QEB's possession appeared complete. Microfilmed files at NUC PR and, therefore, CONST were incomplete. Had the QEB files in CONST's possession been incorporated into the CONST files, NUC PR would have what would appear to be complete files for most of the contracts reviewed. This would exclude, of course, those contracts where QEB only shipped portions of the completed contract file.

None of the files in the various locations followed a set style of organization. Some were found in reverse chronological order, some by items produced, some by category of information (correspondence, tests, etc.), some with a combination of the above styles, and some in no logical order.

Each file contained what was considered to be superfluous information, such as multiple copies of contracts and attachments and multiple copies of correspondence and irrelevant correspondence.

Microfilmed files contained the same multiplicities and also included machine copies of test patterns, envelopes, and blank pages. No information was found in any contract file reviewed that the file had ever been reviewed for completeness and no index was found adequate enough to allow someone looking for information to find it without going through the complete file. In fact, the retrieval of specific information from one large file that had been indexed to a greater extent than most required three hours of coordinated effort by the Knoxville QEB indexer, the unit supervisor, and the site inspector via telephone.

The following is a listing of the contracts reviewed. Additional information can be found in the review summary for each contract in attachment 2.

NSSS/Mechanical Section

1. Atmospheric Relief Valves - 92697
2. Auxiliary Control Air Dryers - 83630-1
3. Auxiliary Control Air Dryers, Dewpoint Alarm - 83630-2
4. Vertical Turbine Pumping Units - 92609
5. Steam Generator Safety Valves - 92696

Civil Structural

6. Ice Condenser Seals - 82064
7. Ice Condenser Hinge Blocks - 823844
8. Aluminum and Stainless Steel Honeycombed Cushions - 820345
9. Missile Doors for Air Conditioning Enclosure - 87262
10. Reactor Supports - 75018

Instrumentation

11. Spare Diesel Generator and Exciter, Voltage Regulator - 825204
12. Level Switches - 83530-1

Electrical

13. 6900-Volt Switchgear and Transformers - 54495
14. 480-Volt Switchgear and Transformer - 54523

Weldments

15. Accumulators, Pumps, CVCS - 826301

Also, the Bellefonte containment contract (weldments) was reviewed in the Knoxville QEB office, specifically for retrievability of data.

IV. ANALYSIS

During the investigation of QEB records, it became apparent that the investigation must include to some extent activities of groups involved with the records both before and after QEB. It was believed that the ultimate disposition of vendor-supplied quality records and their usability to TVA needed to be addressed in total before a proper evaluation and corrective action, if necessary, could be specified. Along these lines the analysis has been broken down into four subsections addressing: (1) the availability of complete records at SQN, (2) the usability of records received by NUC PR, (3) the ability of TVA's record system to satisfy NRC requirements, and (4) the safety significance of QA records.

Although this report centers almost entirely upon the flow of records to and at SQN, there is no indication that these findings would not also apply to other TVA nuclear facilities.

A. Availability of Complete Records at SQN

Reviewing NRC regulations contained in 10CFR50, Appendix B, and TVA's Topical Report implementing those regulations, it becomes very clear that all QA documentation confirming that materials and equipment at SQN met purchase specifications should now be onsite. The regulations and TVA's implementation specifically state onsite--not the central office, not the vendor's plant, but onsite.

From discussions with QEB personnel and in reviewing their records, it was established that SQN did not have all the records required. The only shipment of QEB records was made in 1977 and QEB still had several hundred cubic feet of records for SQN and other nuclear plants in Knoxville and an undetermined amount in the regional offices. For the most part, QEB did not know how many completed contracts it had for SQN. QEB pointed out that the sites did not want the records in hard copy because they did not have room for them. Both QEB and NUC PR stated that NUC PR did not know what records they wanted.

Each organization--QEB, CONST, MEDS--appeared very protective of their own records and needs. QEB had their records in a form they wanted and believed their records were the official TVA vendor QA records. With regard to form, there were five separate units within QEB and records were maintained in five different styles and levels of completeness. CONST, likewise, believed their records were more complete than QEB's and were in a form usable to them. CONST viewed QEB records as duplicates and unnecessary. Therefore, QEB records were either stored in separate file cabinets or returned to QEB and not incorporated into CONST files as their procedure required. MEDS was unwilling to put records in a form NUC PR could use because they were OEDC's records management group, not POWER's. They, therefore, arranged to film records as supplied and index the film on a file level

depending on how the file was arranged by the group having it filmed. NUC PR on the receiving end of these records was taking whatever anyone wanted to give them and hoped no one would ask for the records again. Not knowing what NUC PR wanted, both QEB and CONST took the conservative approach and filmed everything they had in a contract file, including multiple copies of the contract and attachments. This was magnified by MEDS filming machine copied test patterns and blank pages because they were in the file. The results of this mass filming was a considerable amount of duplication between QEB and CONST.

CONST had no capability of reviewing film produced by MEDS and just forwarded the film to NUC PR. CONST stated that through their use of the film in NUC PR possession, they estimate that 80 percent of the CONST-generated QA records are unreadable and the hard copy has been destroyed.

Since QEB did not review the files for completeness prior to shipment in 1977, no one in QEB knows for sure whether or not the records were complete. Errors were found in the 1977 documentation by NSRS which showed that QEB did not review what they thought they were sending SQN CONST either at the time of shipment or after the reported hectic time of assembling and transmitting those records. It appeared from discussions with QEB, CONST, MEDS, and SQN NUC PR that each was unaware of the others required input or the needs of the records recipient. It appears that the general attitude was that the QA records are required to be stored onsite; therefore, send the records and don't worry about their usable value to the recipient.

Considering TVA's assignment of responsibilities, both EN DES and CONST are responsible for providing documentation of the satisfactory design and construction of a nuclear power plant to the user (NUC PR). Included in this documentation are drawings, maintenance manuals, quality records, etc.

If the sources of quality records associated with a piece of equipment were identified they would fall into three general areas. Those associated with quality in manufacturing, installation, and maintenance. Two thirds of these records are to be supplied by EN DES and CONST. With those QA records and the QA records produced during maintenance, NUC PR is required and should be able to retrieve records showing the pedigree of a piece of equipment in a reasonable length of time.

During the investigation QEB stated that NUC PR would not specify what they wanted for QA records. It can be effectively argued that NUC PR should not have to specify what is needed. Based upon the regulatory requirements, the onsite required QA documentation is to show that a piece of equipment meets the contract specifications. EN DES prepares the specifications, inspects the manufacturing process, and collects the documentation proving to TVA's satisfaction that the specifications have

been met. It follows then, that EN DES should be in the best position to decide what records are needed to prove the contract specifications have been met, not NUC PR. A similar argument could be developed for CONST.

The monetary value placed upon these vendor-produced QA documents is large. The QEB Branch Chief placed an additional 64 percent on the cost of the manufacturing process to produce a commodity acceptable for a nuclear power plant. After the TVA regional inspector assures himself that a commodity does, in fact, meet the contract specifications and releases that commodity for shipment to a site, the only archival proof TVA will have that shows proper quality will be the QA documentation on that commodity. Therefore, the justification that the additional 64 percent was well spent, preventing the possible shutdown as a unit or the replacement of equipment, rests upon the documentation QEB collects and its usability by the ultimate record holder. Considering the two billion dollars in contracts QEB was inspecting in 1980, the value of the QA documents collected by QEB was about 780 million dollars, most of which was nuclear related. Most QEB personnel did not know whether or not the required documentation was available and retrievable. They all believed it was, but most did not have a method of verifying that belief. In the specific case of RT film, QEB did not know nor did the reviewed contracts show where that film was located. For the most part, it was believed to be at the vendor's facility.

Returning to why the records were not in the possession of SQN NUC PR, the investigators determined that each responsible organization had an explanation. QEB pointed out that MEDS could not handle the quanity of records QEB had. CONST pointed out they had no room for the QEB hard copy records and believed them to be only duplicates of what they already had. MEDS pointed out that filming old records was a low priority and they would not put them in a form usable to the site. There certainly was validity in each position, but it was evident also, that each was concerned more with their own problems than with what was required by TVA. Each was aware of the problem of getting records to the sites, but there was no identified effort toward solving the problem and providing the site with OEDC QA records as required and committed by TVA.

Another aspect of this whole process involves manpower and whether or not it was adequate to perform the assigned tasks. Sufficient time was not spent in this area to provide a complete evaluation; however, some observations are worth noting. Both the Instrumentation and Electrical Units administer contracts that are relatively small in size. The degree to which these contract files were organized and their relative appearance of completeness indicated that their manpower was adequate. On the other hand, contracts administered by the Mechanical/Nuclear and Civil/Architectural Units were in some cases very massive in size and complexity. These two units had the added problem of

less specific specifications. Both factors required additional work over what the Instrumentation and Electrical Units would be expected to experience. Yet the number of personnel in each of the units were basically the same. Both the Mechanical and Civil Units expressed difficulty keeping up with contracts regarding whether or not the paperwork was completed. It is not known if this was by personal preference, not related to workload, or out of necessity. In either case, no information was offered which indicated that either unit felt it was under staffed. Similarly, no mechanism was described as being used by the branch chief that evaluated the unit supervisors' work with regard to how well the paperwork was handled. Such an evaluation might be appropriate since paperwork is a very important part of QEB's final product. The Weldments Unit did not maintain running files for their contracts; the regional office did. Periodically, about three months after the contract was complete, files were called in from the regional offices. The one file it had on Bellefonte containment was very large and appeared complete, but was extremely difficult for someone not entirely familiar with it to use. The inadequate indexing and descriptive intelligence on the file information may or may not be related to staff size.

Although problems with QEB's records appeared well known by all within QEB, little effort appeared to be expended at identifying and solving the problem of providing the sites complete and usable QA records. Efforts were started and described during this investigation to put QEB records in order, but none were described to improve the flow of records to NUC PR or their usability to them. Even if QEB's records were in order, and if CONST followed its demonstrated practices, the QEB records would either be stored in separate filing cabinets or sent back to QEB. With NUC PR receiving only CONST records, the records were incomplete and could not be used to prove that contract specifications for equipment had been met. Furthermore, the need for CONST personnel to find information for NUC PR in microfilmed records indicates that the records are not usable to NUC PR.

Assuming the regional inspectors were performing their function, and there was no reason to suspect otherwise, at the time equipment was shipped by the vendor, QA documentation existed. Therefore, between the records stored by NUC PR SQN, CONST SQN, and QEB records at SQN, Knoxville and the regional offices and records passed by the vendor or subvendors, the QA records should exist. The data at the vendor's facility becomes important in those cases where TVA does not have all the required QA data. Of the contracts reviewed 4 out of 16 appeared incomplete, lacking test data and therefore fell into that category (87226, 83630-2, 824204, 83530-1).

Efforts were started by QEB during this investigation to develop an index of all contracts requiring QEB source inspection since 1965 and including, among other things, records disposition.

Efforts were made to develop the program for a data base for QEB records. It was described as being capable of retrieving information on a document level and would include such things as heat numbers and serial numbers. This system is not operational yet, and only has some test data in it. Supposedly, it will also have CONST QA records entered into it. This type of system was needed badly; however, it is not yet the solution to the problem and if it is not handled properly, will add to the problem. The program was developed without input from the QEB unit supervisors and without NUC PR input. Granted the program was developed under a task force with NUC PR representation, but that representative stated he had no input. It appears that at present it will be just a QEB tool. With regard to NUC PR access to the data base, the only MEDS terminal in POWER is in the Central Office. The sites do not have a terminal. Furthermore, NUC PR, according to MEDS, does not want MEDS film; therefore, this system, unless accepted by NUC PR and in a form they can use, will not satisfy the 10CFR50, Appendix B, Criterion VII requirement. In addition, the use of this system will be for current data and old data will be added only as time permits. If one considers that most of the equipment for a nuclear power plant has already been purchased and delivered, the data base will have limited value to NUC PR.

Recent procedure changes for QEB require vendors to supply a list of documents that will provide proof that the commodity satisfies the contract specifications. This should help eliminate the problem of negotiating with the vendor and certainly provide a checklist for the materials engineers to check for contract documentation completeness.

The changes in the program and actions described above, while necessary and well intended, only address symptoms. They do not address the overall TVA problem of collecting and collating in a retrievable manner information from several divisions and transmitting that information to NUC PR. In order for the QA records system to work effectively, the overall problem must be addressed and solved. This will require a cooperative effort from TVA top management in POWER, OEDC, and OQA.

B. <u>Usability of Records by NUC PR</u>

NUC PR is the ultimate recipient of all QA records generated during the procurement and construction of the nuclear power plant. As such, they must be able to use the records once they are turned over to them. To ensure their usability, the records must be retrievable; and to enhance retrievability, the records should be edited down to only the essential records and indexed in a manner that is understandable.

ANSI N45.2.9-1974 states that the storage system for QA records will provide for the accurate retrieval of information without undue delay. The standard also requires an indexing system

that indicates where the records are to be stored. ID-QAP 17.1 requires that QEB provide document-level indexing for engineered equipment and folder-level indexing where appropriate.

Retrievability without undue delay is difficult to define. Some NUC PR employees claim that the information they have been requested to find in the past has been found in a few hours at most. Others were skeptical that certain types of data, especially mill certifications, could be located after CONST left the site.

The contract files at NUC PR SQN are indexed to what is called the folder level. At times the folder is the entire file. Many files were poorly organized. Also, there are many documents in the files that are not required. Examples were film of envelopes and machine copied test patterns. Still, for small contracts, the retrieval of information, if in fact the information is present, would not be difficult. But for large contracts, the low level of indexing, the poor organization, and lack of editing would present a real problem in retrievability.

Still, a fair level of near-term retrievability could be expected as long as the people responsible for the orginal collection of the records are available for consultation, either in EN DES or CONCT. The overall lack of uniformity in the entire area of vendor-generated QA records makes the long term usability of these records suspect.

The Bellefonte containment contract which was reviewed in Knoxville is a good example of the complications that might arise. This was a very large file--several drawers full. Since it was on a later plant, the file was in better order and better indexed that those at SQN. The piece of data that was requested was located by QEB but only after consulting with the inspector at the regional office who set up the file. As time passes and the records are transferred, the availability of finding data for a contract such as this will probably be greatly reduced. With the decreasing QEB workload and normal attrition, some of the regional inspectors may be going to other jobs. This problem was encountered in the NSRS review of SQN CONST during this investigation. Personnel responsible for collecting and storing records were no longer onsite.

The overall usability of the QA records found at SQN is highly suspect for the reasons stated above.

C. <u>Ability of the TVA System to Meet the NRC and ANSI Requirements</u>

Since RG 1.88 endorses ANSI N45.2.9-1974, this section will only address the ANSI standard. TVA implements the standard through the Topical Report, the ID-QAPs, and lower level procedures. Generally, each level of control adequately proceduralizes the requirements of the higher tier controlling document for the

specific area for which the controlled organization has jurisdiction. TVA's procedures, with some interpretation and if implemented, should meet the requirement of the ANSI standard.

In actual practice they are not completely implemented and a problem is encountered when different divisions interface. Not all required QA records were given to NUC PR by EN DES. Even though every organization believed they were doing their job, the intent of getting all QA records in the control of the ultimate user was not being met. There was no overall check of the controlling function. Managers may have reviewed the work performed by personnel under them, but no one manager reviewed the overall TVA QA records control.

D. Safety Significance

A logical concern after reviewing the previous portions of this report would be the safety significance of a poor set of QA records. In reviewing the QEB records, the paper trails of quality for specific pieces of equipment, and in discussions with personnel involved in the paper trail, it is difficult to state unequivocally that there is or is not a safety problem. To place some perspective on this question, it is best to briefly review the process by the vendor and the line organization for assuring a quality product.

The first level of quality is supplied by the vendor in its QA program. That program is reviewed by QEB to assure that the vendor can produce a commodity with the quality desired by TVA. Therefore, before a piece of equipment is offered to TVA, it has gone through the vendor's QA program and the vendor believes it meets TVA's specifications.

Next, the TVA regional inspector physically inspects the commodity and the documentation or data attesting to its quality. Therefore, at the time of shipment, both the vendor and the TVA QEB regional inspector are satisfied that the equipment meets the contract specifications.

A third review is performed by CONST MIG when the commodity arrives at the site. There the MIG assures itself that all the equipment is accounted for, that it meets the contract specifications, that QEB has authorized its shipment, and that any vendor data to be sent with the equipment is accounted for.

The equipment, therefore, has three levels of inspection by the time it is accepted at a plantsite.

The QEB unit supervisors in Knoxville are required to further inspect the records to assure they are accurate and complete.

Examining the inspection process it becomes apparent that the QEB regional inspector is the key to assuring that the vendor meets the contract specifications. With the exception of the

vendor, and in some cases the MIG, the regional inspector is the only one in the QEB organization that can physically inspect the commodity against the vendor QA documentation and the TVA specifications. All other QEB evaluations for a commodity will involve a backup check of what was previously done by the vendor or the regional inspector by making a comparison between QA documentation and contract specifications. Such a backup check could detect such deficiencies as using the wrong materials in construction, a deficiency which should have been detected in previous inspections. The same would also hold true for a technical engineer's review of QA data. In the case of nondestructive tests performed by the vendor, the regional inspector is the only one in TVA that can physically observe those tests and the only one in TVA who, in most cases, ever reviews RT film. All other TVA reviews will be of the paperwork certifying that a test was performed and that the vendor and regional inspector recorded the pass/fail test results. Therefore, all TVA reviewing, in the QEB chain of paperwork, beyond the regional inspectors will only involve a recommendation of documentation previously examined by the regional inspector.

For example, the 480-volt shutdown boards for SQN went through the normal review process--vendor QA, regional inspector, and MIG. The paperwork went through a secondary and tertiary review by the QEB Electrical Unit and technical engineer. The shutdown boards were accepted, but during installation, TVA determined that the welds in the shutdown board had every defect possible. No amount of paperwork review could find that kind of defect. The probability appears very small of finding a defect in a commodity through a paperwork review. At best the review might have established that the initial reviews were not made or that certain portions of inspections were incomplete.

Quality assurance records can be of significant safety importance in a number of situations. When generic safety problems are identified with a given vendor, either due to material problems, process problems, or function performance problems, it is extremely important for the utility to determine if the identified problem exists at the operating plant. This requires both the existence of the records and the retrievability of the records. In the absence of adequate documents, it could be necessary to either shut down and replace or require some degree of verification. Records are also important in evaluating causes of failure of a component or system. Examination of QA records may provide key information to determine the cause of failure or to identify corrective action. In their present form, QEB-generated QA records may not be sufficient for the above purposes.

V. CONCLUSIONS

A. Vendor-supplied QA records obtained by QEB for SQN have not been completely turned over to NUC PR and there does not appear to be any plans to do so in the near future. This places TVA in

violation of 10CFR50, Appendix B, Criterion VII, and Topical Report requirements. Although this report examined the flow of records to and at SQN, there is no basis to believe that this conclusion would not also apply to other TVA nuclear facilities.

B. There is no overall OEDC effort to provide NUC PR a complete QA file integrating both CONST and QEB records in a usable form. This is in violation with TVA QAP PRM 17QPR-1.

C. The level of effort being expended to assure that more than 700 million dollars worth of QA records are properly assembled and accounted for is less than adequate.

D. The retrieval of information from vendor QA records at SQN by NUC PR is considered to be inadequate due to the poor organization, lack of completeness, low level of indexing, and lack of editing. Retrieval depends upon use of individuals located away from the site that are not readily controlled by NUC PR.

D. There is no coordinated TVA effort to assure the adequacy of identification, collection, collation, indexing, and distribution of vendor QA records.

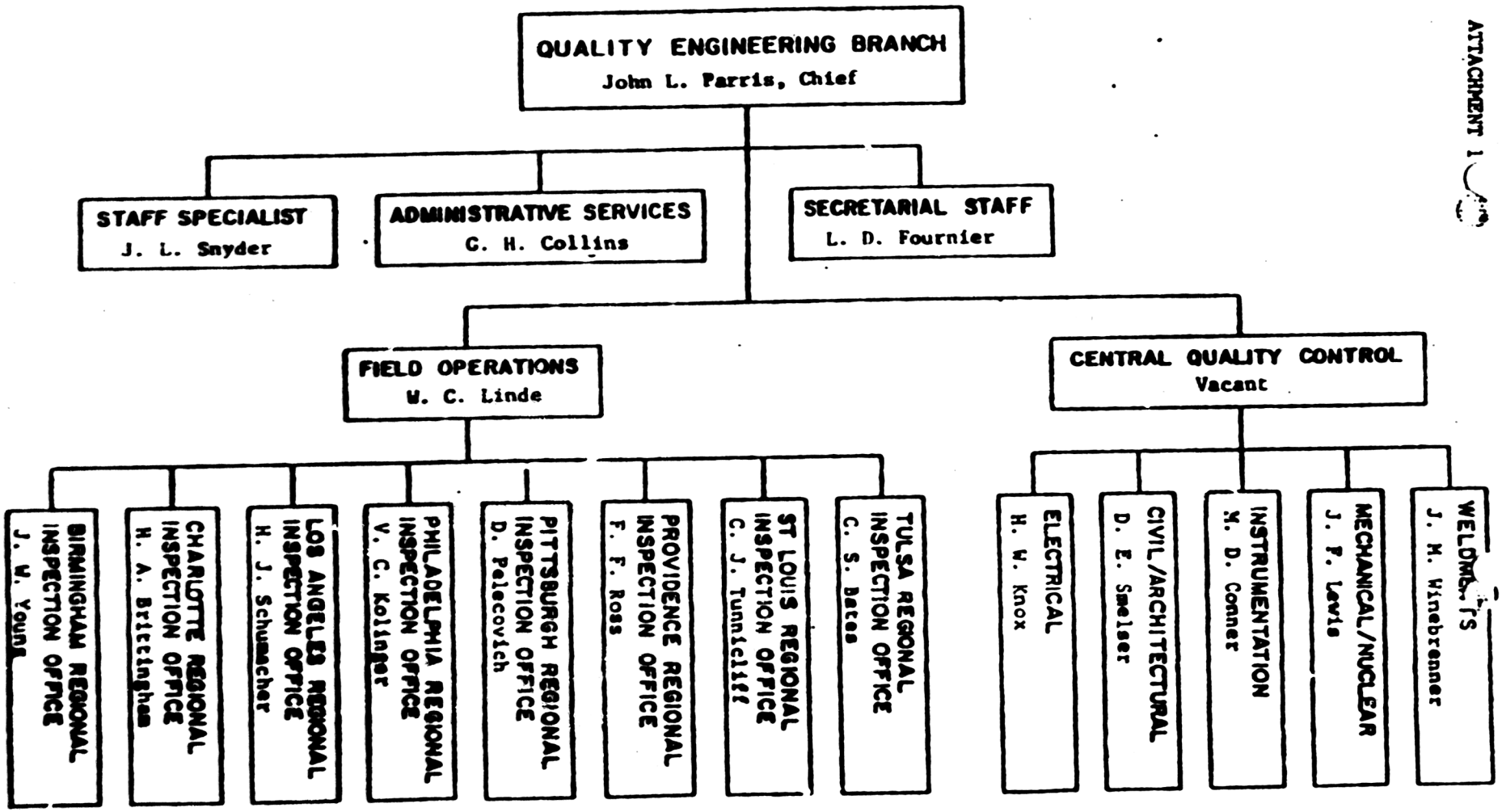
F. TVA would meet the requirements of NRC regulations and ANSI standards if the current requirements and intent of documented procedures were followed; however, their implementation, particularly at the interface point between various TVA organizations, is less than adequate. This results in a records system that meets neither the intent nor letter of the regulations. Mere implementation of the procedures in their present form without regard to intent and an overall control of their implementation by an organization capable of easily crossing organizational boundaries would not solve the problem.

VI. JUDGMENT OF NEEDS

A. A coordinated OEDC/POWER/OQA effort is required to assure practical and consistent implementation of TVA policy regarding the identification, collection, collation, indexing, and transfer of vendor QA records in a form usable to NUC PR. This effort should begin at the office manager level with a commitment of how, when, and in what form the records transfer should occur; and the effort should be continued by individuals knowledgeable of vendor QA records and ADP processes. This continuing effort should be coordinated by an organization with the authority and capability to easily cross organizational boundaries.

B. A coordinated effort is needed by OEDC and NUC PR to assemble and transmit in a usable form contract files for all currently completed contracts and purchase orders on a plant-specific basis. This should include all QEB and CONST records previously submitted to NUC PR.

ATTACHMENT 1



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