

TENNESSEE VALLEY AUTHORITY

Nuclear Power

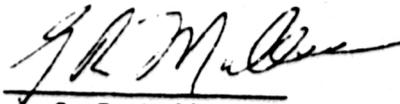
**REVIEW OF THE INTEGRATION OF ENGINEERING ASSURANCE
FUNCTIONS INTO NUCLEAR QUALITY ASSURANCE,
NUCLEAR ENGINEERING, AND
NUCLEAR LICENSING AND REGULATORY AFFAIRS
PART 1**

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Prepared by

Nuclear Manager's Review Group (NMRG)



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REVIEW OF THE INTEGRATION OF ENGINEERING ASSURANCE (EA)
FUNCTIONS INTO NUCLEAR QUALITY ASSURANCE (NQA),
NUCLEAR ENGINEERING (NE), AND
NUCLEAR LICENSING AND REGULATORY AFFAIRS (NLRA)
PART 1

EXECUTIVE SUMMARY

This was the first of a series of three assessments performed by the Nuclear Manager's Review Group (NMRG) of the effectiveness of the integration of EA functions into NQA, NE, and NLRA. The overall review is being performed at intervals of about three months, six months, and one year following the EA-related reorganization.

Part 1 assessed two subject areas:

1. The integration of the functions previously performed by EA into NQA, NE, and NLRA.
2. New initiatives by NE and NQA to monitor the performance of engineering work.

The results of the assessment are discussed below according to subject areas.

Integration of the Functions Previously Performed by Engineering Assurance

The functions previously performed by EA had been adequately integrated into NQA, NE, and NLRA.

- The degree of oversight of engineering products performed by NQA audits and monitoring activities was judged to be equal to or greater than that of the EA audits and surveillances. This was based on a quantitative comparison of NQA and EA products. For instance, NQA had conducted 33 monitors since June 1989. This compared to the EA performance record of approximately 10 formal surveillances per year. NQA had completed 14 of the 17 EA audits planned for fiscal year 1989 and had integrated the remaining EA audits into their audit plans.
- The primary EA activities for verifying the adequacy of the engineering products were being effectively performed by NQA in auditing and monitoring. A review of two design control related audits, one from NQA and one from EA, noted that the NQA audit contained more direction and guidance to the auditors. In addition, a comparison of 7 EA surveillances to 13 NQA monitors revealed that the NQA monitoring reports contained a higher level of detail.
- NLRA was effectively performing coordination of the generic implications review for NE Condition Adverse to Quality Reports (CAQRs). NLRA had worked off the backlog of 40 generic reviews of CAQRs previously assigned to EA.

Although the functions previously assigned to EA were adequately integrated, two areas for performance improvement were found.

- The training of personnel was incomplete. There were several personnel who had not received training on the revised organization due to deficiencies in identifying training needs and accomplishing them.
- The revision of procedures to reflect the new functional responsibilities was incomplete. In some cases, interim changes had resulted in procedures which did not accurately reflect the new organizational responsibilities.

NMRC conducted an evaluation to determine if these findings were new or if they had previously existed. It was noted that several EA audits and Nuclear Regulatory Commission (NRC) inspections identified training concerns similar to the NMRC findings since 1985. In addition, similar procedural concerns were identified by EA from 1987 through 1989. Therefore, it was concluded that these training and procedure findings were longstanding and not the result of the reorganization.

The adequacy of the observed performance was strongly influenced by the experience of previous EA personnel who had been transferred into the new organization. However, it is considered essential that the concerns noted above be corrected promptly to benefit new personnel and minimize future performance deficiencies.

New Initiatives by Nuclear Engineering and Nuclear Quality Assurance

As part of the overall reorganization, NE and NQA were taking additional measures to monitor the performance of engineering work. Areas for potential performance improvements were observed as follows:

- NE placed additional controls on the existing in-line review process to improve its effectiveness. In-line reviews, conducted by engineering specialists, are designed to assess and correct in-process engineering work. Those controls are detailed in Procedures Method (PM) 89-03. NMRC observed that the requirements of PM 89-03 were not always met. For example, an in-line review was performed by engineering personnel who were not on the list of authorized personnel.
- NE had initiated the performance of off-line technical reviews by engineering personnel. Off-line reviews, performed by teams of discipline central staff engineers, evaluate completed engineering work packages for effectiveness of the design process. The first such review was recently completed at Browns Ferry Nuclear Plant (BFN). Based upon the flexibility in the governing procedure, PM 89-04, NMRC observed that the off-line review process should be monitored to ensure that the program goals/objectives are achieved.
- NQA and NE planned to issue a new performance monitoring report starting in November 1989. This report will be based on three newly developed performance indicators (PIs). PIs are quantitative measurements of engineering performance. It was observed that not all the data needed was available to support two new PIs which will be included in the new report. (These new indicators are an addition to those previously used by EA.)

I. INTRODUCTION

A. Background

In a reorganization on June 16, 1989, the functions previously performed by EA were integrated into NQA, NE, and NLRA. To assess the effectiveness of the integration of the EA functions, NHRG will conduct reviews at three months, six months, and one year following the reorganization. This report provides the results of the first assessment.

B. Team Structure

Eleven personnel participated in all or part of this review. The team members were:

| <u>TEAM MEMBER</u> | <u>POSITION/ORGANIZATION</u> |
|---------------------------------|--|
| J. E. Carignan (Review Manager) | Manager, Reviews Department |
| B. M. Gore (Team Leader) | Senior Nuclear Evaluator |
| R. D. Greer | Principal Nuclear Evaluator |
| V. D. McAdams | Principal Nuclear Evaluator |
| <u>Part-time</u> | |
| E. W. Whitaker | Principal Nuclear Evaluator |
| J. J. Loud | Senior Nuclear Evaluator |
| A. G. Debbage | Nuclear Evaluator |
| P. E. Fairfax | Nuclear Evaluator |
| T. P. Prince | Acting Manager, WBN Site Training Support |
| R. H. Page | Senior QC Engineer - Contractor |
| C. F. Springer | Senior QA Engineer - Contractor |
| R. R. Stevenson | Senior Supervisor - Contractor |

C. Methodology

This assessment focused on two areas: (1) the integration of previous EA functions into NQA, NE, and NLRA, and (2) the new initiatives by NE and NQA to monitor the performance of engineering work. A list of functions previously performed by EA was compiled from a review of engineering procedures/instructions and the Tracking and Reporting of Open Items list. New engineering monitoring initiatives were compiled from the correspondence between the NRC and TVA. These new initiatives included conducting in-line and off-line reviews of engineering products and developing PIs to monitor the effectiveness of engineering work.

Document reviews and interviews were used to confirm the transfer of the EA functions into other organizations, as well as the establishment of the new initiatives. Due to the short interval between the reorganization and this assessment, there had not yet been extensive work performed by the new organizations. However, where possible, audits and monitors performed after the reorganization were compared to those performed by EA for similarity in scope, purpose, and method.

Daily debriefs were held with responsible managers to keep them informed of the concerns identified during the assessment. In addition, exits were conducted at the corporate offices in Knoxville and Chattanooga, and at each of the three sites. At each of the exit meetings, all deficiencies noted during the review were presented and discussed. This report includes those examples necessary to support the findings and observations noted.

D. Schedule

Preparation for the assessment began on August 28, 1989. The assessment was conducted between September 11, 1989, and October 6, 1989. The assessment locations included the NE corporate offices in Knoxville, the NQA and MLRA corporate offices in Chattanooga, BFN, Sequoyah Nuclear Plant (SQN), and the Watts Bar Nuclear Plant (WBN) sites.

II. INTEGRATION OF THE FUNCTIONS PREVIOUSLY PERFORMED BY ENGINEERING ASSURANCE

Prior to the transition, the major functions being performed by EA included: audits, surveillances, training, maintenance of procedures, and generic implication review of CAQRs.

A. Overall Assessment

The functions previously performed by EA had been adequately integrated into NQA, NE, and NLRA.

- The degree of oversight of engineering products performed by NQA audits and monitoring activities was judged to be equal to or greater than that of the EA audits and surveillances. This was based on a quantitative comparison of NQA and EA products. For instance, NQA had conducted 33 monitors since June 1989. This compared to the EA performance record of approximately 10 formal surveillances per year. NQA had completed 14 of the 17 EA audits planned for fiscal year 1989 and had integrated the remaining EA audits into their audit plans. These quantifications are not a precise comparison because the scope and subject matter differed. However, there was sufficient comparison to validate the conclusion.
- The primary EA activities for verifying the adequacy of the engineering products were being effectively performed by NQA in auditing and monitoring. A review of two design control related audits (NQA technical audit, WBA 89923, and an EA audit, BFT89901) noted that both were similar in content and level of detail. However, the NQA audit plan contained more direction and guidance to the auditors. In addition, a comparison of 7 EA surveillances to 13 NQA monitors revealed that the EA reports were typically a one to two paragraph summary while the NQA monitoring reports contained a higher degree of detail. The typical NQA report contained the following sections: subject, references, results, personnel contacted, list of attributes, and tracking and trending codes.
- NLRA was effectively performing coordination of the generic implications review for NE CAQRs. NLRA had worked off the backlog of 40 generic reviews of CAQRs previously assigned to EA.

Additionally, EA functions had been accepted by the responsible organizations. However, some performance improvements were identified in the areas of training and procedures.

It should be noted that the adequacy of performance was strongly influenced by the experience of previous EA personnel who had been transferred into the new organizations. However, it is considered essential that the concerns noted in training/procedures be corrected promptly to benefit new personnel and minimize future performance problems.

B. Findings

This section of the report discusses two findings in the areas of training and procedures related to the functions previously performed by EA. These findings are areas of concern which, if not corrected, could have an adverse impact on the overall effectiveness of the reorganization.

1. Training of personnel was incomplete.

Training concerns were noted in the maintenance of training matrices/records and establishing implementing instructions. (Training matrices are documents used to assign and track training requirements.)

Listed below is a summary of supporting information by functional area.

a. Nuclear Quality Assurance

- Five of the nine training matrices reviewed at the corporate office were not complete. Matrices for three auditors were unavailable.
- No training matrix or records existed for the auditors performing procured engineering services audits in accordance with Quality Methods Procedure (QMP) 108, "General Indoctrination and Training."

b. Nuclear Engineering

- Individual training records were incomplete.
- Some organizations did not have implementing instructions or matrices as required by Nuclear Engineering Procedure (NEP) 2.1.
- Interviews with personnel in the civil and mechanical engineering disciplines indicated a low awareness of the applicable PMs.

c. Sites - BFN/SQN/WBN

- At BFN, training for 10 out of 10 selected personnel ranging from engineers through managers was not complete.
- At SQN, Individual Training Records (ITRs) were not maintained as required by NEP 1.2. For example, two of 15 ITRs were missing in the contract engineering area.
- All sites had training matrices that were either incomplete, not up-to-date, or had not been developed for applicable personnel.

- NMRG review of monitor QWB-M-89-0697, "Fire Protection Corrective Action Program," noted that the evaluator had not completed indoctrination training as required by QMP 102.3, "Training and Qualification of Surveillance (Monitoring) Personnel." In addition, the deficiencies identified in the monitor report were not appropriately dispositioned.

Note: When this deficiency was brought to management's attention, a Problem Reporting Document (PRD) WBQ890448P was issued on the qualification concern, and the monitor report was appropriately revised.

Discussion:

NMRG conducted an evaluation to determine if these training concerns were new or if they had previously existed. The evaluation found that reviews and audits had previously identified these concerns since 1985. For example:

- NRC violation [Reference: letter from TVA to the NRC dated April 22, 1988 (L44 880422 802)] for failure to document individual training records and incorrect training matrices

Note: This document identified that training deficiencies existed since 1985.

- EA audit, CHE 88801 dated April 14, 1988, documented a lack of required training records for non-certified auditors. [CAQR, CHE880019801 R0, (L84 880404 289)]
- EA audit SQE89905, conducted in April 17-27, 1989 (B05 890523 004), identified a lack of documented training for engineers.

Therefore, it was concluded that there was a prior history of training deficiencies similar to those found during this review. While the deficiencies described in section B.1.a, b, and c above were incomplete training for the new functional responsibilities, the training problem was not the result of the reorganization. In view of the longstanding nature of the training deficiencies, the Manager of NMRG promptly brought this matter to the attention of the responsible vice presidents.

2. Some procedures had not been revised to reflect new functional responsibilities, and some other administrative deficiencies existed.

a. Nuclear Quality Assurance

- Some procedures requiring revision to incorporate the KA transition had not been completed. For example, QMP 118.1 for TVA internal audit system plan and scheduling had not been revised.

- Materials and Procurement Quality (M&PQ) had not revised nor scheduled revisions to applicable procedures.
 - Entering corrections on in-process NQA records was not in accordance with the guidelines of Standard 5.9.80, "Quality Assurance Records." This was identified to the responsible manager who subsequently took corrective action by providing training to personnel.
- b. Nuclear Engineering
- An interim order, which was a temporary change to the NEPs to reflect new NE functions, was inaccurate. For example: (1) Under NEP 1.4, NE was responsible for doing audits which had been transferred to NQA, (2) NEP 2.5 referred to a Knoxville organization for reviewing nuclear experience reports, but the organization no longer existed, and (3) NEP 4.4 referred to NE as controlling procured engineering services which was a M&PQ function.
- c. Sites - BFN/SQN/WBN
- Six of 15 NE procedures sampled at BFN had not been revised to reflect transferred EA functions. For example: Browns Ferry Engineering Project Instruction (PI) 87-54 Audit/Surveillance Instruction had not been revised.
 - Some NE procedures at SQN, such as Sequoyah Engineering Procedure (SQEP)40 for EA monitoring, were not revised.
 - Some site procedures at WBN, such as Watts Bar Engineering Project (WBEP) 3.02, "Training," had not been revised to reflect the EA functions.
 - The NQA overall transition plan was not up-to-date, and the BFN site transition plan did not include all the EA functions. For example, EA responsibility for the overall review of the walkdown effort on masonry walls (PI 86-40) was not included.

Discussion:

WMRG conducted an evaluation to determine if these procedure concerns were new or if they had previously existed. The evaluation found that reviews and audits had previously identified these concerns since 1987. For example:

- EA audit BFE 87801 conducted November 16-20, 1987 (B05 871218 005), noted procedural errors within the Division of Nuclear Engineering.

- EA audit BFE 88901 conducted October through November 1988 (BOS 881202 003), revealed project instructions that contained outdated information.
- EA audit SQE 88901 conducted October 11-17, 1989 (BOS 881206 005), identified project instructions that provided inaccurate or unclear functional responsibilities.
- A joint EA/QA audit CHK 89902 (BOS 890517 001 dated May 1, 1989) noted that procedures and instructions needed to be updated.

It was therefore concluded that there was a prior history of deficiencies in maintaining procedures correct and up-to-date. The deficiencies described in sections 2.a, b, and c above were the result of insufficient attention to detail in revising the procedures to reflect the new organizational responsibilities. In view of the longstanding nature of the procedure deficiencies, the Manager of NHRC promptly brought this matter to the attention of the responsible vice presidents.

III. NEW INITIATIVES TO MONITOR THE PERFORMANCE OF ENGINEERING WORK

As part of the overall effort to ensure the success of the transition and the future effectiveness of the performance of engineering work, TVA initiated additional monitoring of NE activities for critical deliverables and products. This monitoring included: in-line reviews, off-line reviews, and additional performance indicators (PIs).

In-line reviews, conducted by engineering specialists, are designed to assess and correct in-process engineering work. Off-line reviews performed by teams of discipline central staff engineers, evaluate completed engineering work packages for effectiveness of the design process.

PIs are quantitative measurements of engineering performance. PIs are designed to address the overall effectiveness of the engineering process.

A. Overall Assessment

The establishment of the new initiatives was just getting underway. Some additional attention was needed to certain aspects of these initiatives to ensure timely and effective implementation. The areas for potential improvement are discussed below as observations.

B. Observations

This section of the report discusses three observations which relate to the new initiatives. These observations are areas of concern of lesser significance than findings which if not corrected could impact the effectiveness of performance in the stated area.

1. The requirements of PM 89-03 (NE) for in-line reviews were not always met.

- An in-line review performed on BFN pipe hangers and stress analysis (BFN-CEB-89-05) contained the names of six specialists performing the review who were not on the approved civil discipline specialist list. When NMRC brought this matter to the attention of the responsible manager, he stated that the personnel were qualified and that they would be added to the list.
- Interview data from the electrical discipline indicated in-line reviews were being performed at the completion of the product instead of during the process as indicated by PM 89-03 (NE).
- A WUN memorandum dated September 28, 1989 (T19 890928 926), noted that some critical deliverables had not been identified for the in-line review process.
- Interviews with specialists indicated unclear understanding of the in-line review process. Additionally, interviews with site engineering management indicated that there were revisions to the procedure being made to improve the in-line review process.

2. The off-line review program, which was just getting underway, needed to be monitored by management to ensure that the goals and objectives are met.

This observation was made in view of the flexible nature of instruction PM 89-04 (NE), "Off-line Technical Review and Performance Indicators," and the associated planning. There were no goals for the number of products to be reviewed during each review.

A written schedule for the off-line reviews had not been prepared for all the sites. During the NMEC review, it was noted that the first off-line review at BFN had just been completed but the report had not been issued.

3. Actions to implement the new performance indicators were not complete.

The EA transition was made effective June 16, 1989, and functions were transferred to NE/NQA/NLRA. As part of the effort to measure the effectiveness of the reorganization and engineering work, TVA agreed to monitor PIs. (TVA to NRC letter L44 890613 802 dated June 13, 1989.) As a result of subsequent discussions with the NRC, the PIs were refined and TVA committed to develop three PIs that were both quantitative and measurable. (NRC to TVA letter AO2 890627 019 dated June 13, 1989, and TVA to NRC letter L44 890824 801 dated August 24, 1989.)

Interviews with NQA personnel indicated that the data needed for two of the three PIs may not be available for the first monthly report scheduled for November. The two PIs are (1) number of field changes (i.e., F-DCNs) per engineering modification package issued after July 1, 1989 that are initiated because of inadequate design work, and (2) percent (%) of 10 CFR 50.59 evaluations prepared by NE after July 1, 1989, that are rejected by the Plant Operations Review Committee because of inadequate engineering work.