



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 AND 2
SAFETY EVALUATION REPORT FOR EMPLOYEE CONCERNS
ELEMENT REPORT MC-40703-SQN
"HEAT CODE AS RELATED TO MATERIAL CONTROL"

I. SUBJECT

Category: Materials Control (40000)
Subcategory: Procedural Control
Element: "Heat Code as Related to Material Control" (40703)

The basis for element report MC-40703-SQN, Revision 2, dated May 12, 1987 is employee concerns IN-85-545-X07, WI-85-008-002, XX-85-027-X02, EX-85-023-001 and IN-85-660-001. Three of the concerns, IN-85-545-X07, WI-85-008-002, and XX-85-027-X02, related to a lack of credibility of methods used during construction to be certain that properly certified materials have been installed during construction. The other two concerns, EX-85-023-001 and IN-85-660-001, related to a lack of credibility of methods used during plant modification performed after the plant was placed in operation.

II. SUMMARY OF ISSUES

The following issues were defined by TVA:

A. Construction

The perceived problem, as derived from concerns IN-85-545-X07, WI-85-008-002 and XX-85-027-X02 is that there is a lack of credibility of methods used in the Construction Program, Heat Number Sort Printout (HNSP) for verification of properly certified Pressure Boundary Materials, at installation.

B. Nuclear Power

The perceived problem as derived from concerns EX-85-023-001 and IN-85-660-001 is that there is a lack of credibility of methods used in the Nuclear Power Program, Power Storeroom Requisition (Form TVA-575), for verification of properly Certified Pressure Boundary Material at installation.

III. EVALUATION

A. TVA's Review Summary

TVA designated an Employee Concern Task Group on July 1, 1986 to investigate these concerns. The results of this investigation were documented in TVA Element Report No. MC-40703-SQN. This report identified more than 200 possible discrepancies between Sequoyah Units 1 and 2 on safety-related piping (98 at Unit 1 and 110 at Unit 2).

The following corrective actions have been implemented to correct the existing problems identified by the ECTG Report and to preclude their recurrence:

1. PIRSQNNEB8638 will ensure the clear definition of the applicable code edition and addenda of ANSI B31.7 used in the fabrication, erection, installation, and use of Nuclear Class Piping components, in the upper-tier documents. (CATD No. 40703-SQN-01-R2 and CATD No. 40703-SQN-03-RO.)
2. CAQR SQP870627 will ensure that all Nuclear Class I, II, and III (TVA Class A, B, and C/D) pressure-retaining piping components will be examined and their suitability for use verified and documented in accordance with the applicable requirements, or replaced. (CATD No. 40703-SQN-02-RO, CATD No. 40703-SQN-06-RO and CATD No. 40703-SQN-07-RO.)
3. CAR-86-064 will ensure that site procedures contain the necessary detailed instruction to provide for the receipt, storage, and installation of Nuclear Class Piping Components in compliance with the applicable code requirements. (CATD No. 40703-SQN-04-RO.)
4. CAR-84-064 will ensure that inspectors will receive the required training to ensure that Nuclear Class Piping Component material identification verification is performed and documented, in accordance with the applicable code requirements, throughout their receipt, storage, and installation at SQN. (CATD No. 40703-SQN-05-RO.)
5. SCRSQNMEB8614 R1 and ECN L6784 will ensure that TVA design drawings contain clear and consistent identification of where (location) and how (e.g., double automatic valve, specially bored fitting) the piping classification changes, as stated in the FSAR, are effected. (CATD No. 40703-SQN-08-RO.)
6. PIRSQNMEB8793 will ensure that either the FSAR or the design drawing contain a clear definition of the boundary between the primary coolant loops and their branch lines. (CATD No. 40703-SQN-09-RO.)

TVA (Division of Nuclear Engineering) then assembled a new investigative unit, the Heat Code Traceability Task Group (HCTTG) to evaluate and resolve the issues raised by the ECTG. The results of this investigation were documented in TVA's report B25870225-036. This report (B25870225-036) reduced the 208 original discrepancies to a total of 7 items of noncompliance.

The investigations led to the issuance of three Corrective Action Reports (CARs)--SQ-CAR-86-052, SQ-CAR-86-055, and SQ-CAR-86-064--which document the proposed applicable corrective actions to the discrepancies and program deficiencies.

As a result of disagreements between members of the ECTG and the HCTTG regarding the proposed TVA corrective actions to resolve the employee concerns, independent experts assessed the issues. The report documenting the findings of consultants Kelly and Landers was issued on April 21, 1987. This report partially stated:

The current, as-analyzed stress values of TVA Class A small bore piping have been reviewed. The nodal points which exceeded 60 percent of either code allowable stress or actual allowable stress were tabulated. There were approximately 2600 nodal points used for the small bore piping analysis of TVA Class A piping. Two and one-half percent of the nodal points had stress ratios which were not capable of meeting the 40-percent reduction on the code allowable stress. Similarly, 1.2 percent of the nodal points had stress ratios which were not capable of meeting the 40-percent reduction on the actual allowable stress.

The report also partially concluded:

In summary, the material control problem is limited to small bore piping. This report demonstrates that there is no technical difference in Class A and Class B piping components. In conclusion, the engineering evaluations demonstrate that the installed small bore pipe and fittings comply with ANSI B31.7c Code requirements when the 40 percent allowable stress reduction factor is used in lieu of NDE. Thus, plant safety is assured.

This reduction in allowable stress refers to paragraph 1-724 in ANSI B31.7c - 1971 which states in part:

Unless otherwise required by the Design Specification, and provided all other applicable requirements of this division (1-274) are met, the non-destructive examination requirements of this division do not apply to:

1. Non-pressure-retaining material:
2. Seamless pipe and tube, seamless forged socket welding fittings, and seamless wrought butt welding fittings 2-inch nominal pipe size and smaller provided that:
 - a. The pipe, tube and fittings are made of P number 1 or P number 8 materials that meet all requirements of one or more of the standard materials specifications listed in Tables 1-724 and A-1.
 - b. the design stress intensity values (S_m) of Table A-1 used in the design analysis are multiplied by a factor of 0.60.

NOTE: The major difference between the small-bore pipe material requirements of Class A, B and C materials is the application of non-destructive testing to Class A materials.

The three previously mentioned Corrective Action Reports (SQ-CAR-86-052, 86-055, and 86-064) document the result and corrective actions associated with the various discrepancies noted in the three (ECTG, HCTTG, and consultants Kelly and Landers) reviews performed at Sequoyah.

TVA also performed additional reviews in this area in order to verify the accuracy of the employee concerns and to assess the possible effect on the safety of the Sequoyah plant. These reviews were performed by Bechtel Structural Integrity Associates, and Aptech Engineering. The highlights of these reviews are summarized below.

Bechtel Audit

The purpose of this audit was:

To verify, by examination of objective evidence, compliance with those aspects of the TVA Quality Assurance Program associated with materials. Audit to address program applied both during the construction phase and the operation phase.

This audit concluded that TVA had generally complied with the connected quality programs and applicable implementing procedures for material control for both construction and operations. The exceptions to this compliance were 5 Audit Findings (2 for construction, 3 for operations) and 6 Audit Observations (5 for construction, 1 for operations).

With regard to programmatic deficiencies, the Bechtel audit did state:

The findings of this audit do not reveal a deficiency in programmatic controls. However, there were instances of implementation errors (i.e., incompletely recorded heat numbers, heat numbers recorded on items or documentation partially illegible, etc.) which can create traceability questions requiring laborious and costly research and investigation efforts.

Structural Integrity Associates (SIA) Evaluation

The three tasks assigned to SIA by TVA for its investigation were:

1. Survey the available documentation and industry personnel involved in the construction of other light water reactors built during the same time frame as Sequoyah to determine the codes and standards invoked for design and construction of those plants and to present the methods used by other utilities for materials control and maintenance of traceability during plant construction.
2. Obtain a knowledgeable, independent interpretation of the traceability requirements of the various construction codes along with an historical background of traceability and marking requirements.
3. By survey of the available data bases, determine whether any component service failure has ever been attributed to improperly documented material or resulting from a traceability flaw.

This report summarized:

...that materials traceability, although not a code requirement, has been important to plant owners. Traceability of materials has generally been maintained to a high degree although not 100%.

Even though a small fraction of material of questionable or incomplete pedigree is known to have been installed and placed in service, no failures attributable to such material have been reported. The methods used by TVA in the design, procurement, and construction of piping systems for the Sequoyah units appear to have been typical of the day. The heat code traceability questions raised by the Nuclear Safety Review Staff report are not unique. Those questions relative to Sequoyah do not appear to present an unresolved issue.

Aptech Report

This report encompassed a review of nuclear material manufacturers programs, policies, and practices, as well as nondestructive examination versus nuclear classes. This report concluded:

For absolute and unquestionable traceability, the procurement document, the heat code number, and the manufacturer must be known. Also, if any NDE was performed by someone other than the manufacturer, a separate document was generated showing the NDE method performed and the identity of the material.

The rejection rate of NDE performed on small bore fittings manufactured by forging or machining was less than one percent.

Even today, there are no markings put on small seamless piping products to indicate the class unless the purchasing document actually requires this to be done. All manufacturers that were contacted have marked the NDE performed on the material since 1980. Prior to that time, some did and some did not. We believe that NAVCO and the material manufacturers procedures and QA programs met the NAVCO requirements of both ANSI B31.7 and ASME III.

B. NRC Staff Review Summary

The NRC staff conducted a special team inspection at Sequoyah on June 22-26 and July 20-24, 1987. The objective of the inspection was to determine the accuracy of the information contained in the element report and to determine the adequacy of TVA's conclusions and corrective actions. At the conclusion of the inspection effort the NRC staff concluded that in general, TVA performed an extensive review of the heat code traceability issue. The information contained in the element reports was found to accurately scope and review the identified issues. However, several inadequacies were identified during the NRC team reviews of supporting engineering calculations which were identified as follows:

- (1) The review of the supporting pipe calculations identified that TVA has not performed minimum wall calculations for pipe schedules other than schedule 160. TVA needs to perform those calculations to ascertain that a pressure problem is not present.

- (2) The acceptance of 2-1/2 percent of nodal points for small-bore piping, based upon the use of actual material properties and thicknesses, is not acceptable. TVA needs to review those nodal points again and upgrade them, either by performing the additional NDE, or by adding more supports to reduce the loads, or by replacing the piping.
- (3) TVA Design Criteria for Detailed Analysis of Category I Piping Systems, SQN-DC-V-13.3, Rev. 3 provides the loading conditions and stress limits for Category I piping systems in Table 3.1-1. Footnote 3 of this table states that the allowable stress levels are given in ANSI B31.1-1967. TVA's calculations of the allowable stresses for small-bore piping used ASME Section III, Appendix I allowables which do not meet the criteria in SQN-DC-V-13.3.

Since the time of this NRC inspection, TVA has satisfactorily addressed these three issues by reviewing the piping calculations and upgrading the piping where required.

IV. CONCLUSIONS

The NRC staff believes that TVA has adequately addressed the employee concerns identified in TVA Employee Concern element report MC-40703, "Heat Code as Related to Material Control." The three issues stated above in the small-bore piping area have been satisfactorily addressed by TVA.

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 AND 2
SAFETY EVALUATION REPORT FOR EMPLOYEE CONCERNS
ELEMENT REPORT MC-40705-SQN "QUALITY RECEIVING UNIT"

I. Subject

Category: Materials Control (40000)

Subcategory: Procedural Control (40700)

Element: Quality Receiving Unit (40705)

Employee Concern: XX-85-027-X02

The basis for Element Report MC-40705-SQN, Revision 1, dated October 31, 1986, is Sequoyah Employee Concern XX-85-027-X02 which states:

"Material inspectors were not allowed to validate heat numbers of structural steel received onsite as required by procedure [;] heat No. 7438383 is an example."

This concern was evaluated by TVA as potentially nuclear safety-related, and only relevant to Sequoyah.

II. Summary of Issue

The issue defined by TVA is that the concerned individual (CI) who had been a quality control (QC) inspector felt that during the construction period, there was impedance in the inspection process with regard to heat number validation of structural steel. The Element Report addresses the impedance issue, but does indicate other areas of concern which resulted from or paralleled this concern (and other concerns by this CI). A harassment issue regarding the CI is being handled by the TVA Inspector General Office by concern number HI-85-005-001. Heat number programmatic traceability problems are being addressed by concern number MC-40703-SQN.

III. Evaluation

Although seemingly extraneous information appears in the text of the Element Report, the thrust of the report is the interviews with QC inspectors by the Employee Concerns Task Group (ECTG). The NRC staff discussed the details of the report with the ECTG investigators and supervision on January 15, 1987. Some of the seemingly extraneous information was an attempt to point out oddities in the Employee Response Team (QTC) Report (XX-85-027-X02) in the concern area, and with other information pointing out the margins between the impedance concern and the heat number issue of Element Report MC-40703-SQN.

The ECTG investigators interviewed at least ten QC inspectors on possible impedance during performance of heat number validation. This interview methodology is considered by the NRC staff to be the primary means relevant information was obtained regarding the concern. The parametric boundaries of the questions asked by the ECTG of the interviewees should have discerned any impedance problems on the part of the QC inspectors. The ECTG (and the report) indicated that no inspector had problems validating heat numbers. As stated by the ECTG, the QC inspectors' only difficulty was with the procedures involved in the validation process which is not mentioned in the subject Element Report but was stated by the ECTG to be programmatically addressed in MC-40703-SQN. During the discussion with the ECTG on January 15, 1986, ECTG supervision indicated that they would probably change Element Report MC-40705-SQN to point out the procedural problems and the fact that these problems are addressed in MC-40703-SQN.

IV. Conclusion

The NRC staff believes that TVA investigation of the concern was adequate and their resolution of the concern as described in Element Report MC-40705, Revision 1, is acceptable. Although the difficult language of the report and side issues identified in the report required some clarification between the NRC and the ECTG and required a working knowledge of the applicable inspection process, the results of the interviews (the ECTG with the TVA QC inspectors) support acceptance of the report. Any additional clarification of the report by the ECTG should only aid in the readability of the report and not affect its conclusions.

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 AND 2
SAFETY EVALUATION REPORT FOR EMPLOYEE CONCERNS
ELEMENT REPORT OP 30101 "KEROTEST VALVE LEAKAGE AND CORROSION"

I. Subject

Category: Operations (30000)

Subcategory: Mechanical Equipment Reliability/Design (30100)

Element: Kerotest Valve Leakage and Corrosion (30101)

Employee Concerns: IN-86-285-001
IN-85-594-001
XX-85-090-002
XX-85-090-001
EX-85-085-003

This basis for Element Report OP 301.01, dated November 13, 1986, are the following employee concerns:

Concern IN-86-285-001: Watts Bar Units 1 and 2. Globe valves (kerotest) were received from vendor in a corroded condition due to vendor's hydro of valve and inadequate drying. These valves leaked after installation. A generic NCR was written to correct this problem, but the full implementation of the NCR disposition is questionable. Examples of the systems with these valves are: CVCS, SI, RHR, and RC. Construction Department concern. CI has no further information.

Concern IN-85-594-001: 3/4" kerotest valves (possibly globe); 30 valves inspected with 90% reject-rate; bearings were missing/busted/frozen. These valves were installed throughout the site (Units 1 and 2) and all may not have been identified as evidence of an NCR, hold tags, or further investigations was not known. (Names/details known to QTC).

Concern XX-85-090-002: Sequoyah Units 1 and 2. Per CI TVA used globe valves (kerotest) extensively in both plants, Watts Bar and Bellefonte and had leakage and corrosion problems. CI questions the usage of these valves at Sequoyah - the sister plant - for leakage and corrosion problems. The systems to be checked as examples are CVCS, Safety Injection, RHR and Reactor Coolant, etc. CI has no further information. NUC Power Concern."

Concern XX-85-090-001: Bellefonte all units. The globe valves (kerotest) need to be checked for corrosion and leakage due to vendors hydro and inadequate drying. Examples of the systems are: CVCS, SI, RHR, and RC. CI stated that this problem has existed for six years. Construction Department concern. CI has no further information.

Concern EX-85-085-003: Kerotest valves are extremely poor. They seldom seat properly. Construction Department concern. CI has no additional information.

II. Summary of Issue

All five of these concerns describe a kerotest valve leakage and corrosion problem in the construction installation process at Watts Bar with generic application to Sequoyah and Bellefonte.

III. Evaluation

A problem with kerotest valves at Watts Bar was identified and documented in Division of Construction NCR 2501R dated 10/20/80. The final report on this problem was issued by the TVA Chief Nuclear Engineer on 4/27/81. That report identified several hundred 3/4", 1", and 2" kerotest valves with leakage and corrosion problems.

The root cause for this leakage and corrosion problem was traced to a factory hydro test of a valve batch where kerotest allowed the packing to become water saturated and did not remove the wet packing/dry out the valve after the test. Since the valves were sometimes factory tested years before the commencement of operational maintenance, substantial opportunity for corrosion of the valve internals was present.

On the other hand, while some of the kerotest valves were installed in safety-related systems such as CVCS, SIs, RHR, UHI, CCS, and RCS, the operation of these isolation, root, vent, and throttle valves is not required for the safety shutdown of the plant during a loss of coolant accident. TVA does not consider these valves to perform a safety function, but believes that the corrosion problem could result in a maintenance problem during the life of the plant. As a result, TVA has instituted a maintenance program to dismantle, inspect, and replace parts (mainly bearings and diaphragms) as required for those valves installed at Watts Bar.

The generic application of this problem at Sequoyah was studied as a response to the commitment made in NCR 2501. The final report on this study was issued by the TVA Sequoyah and Watts Bar Design Project Manager on 9/10/81. That report stated that the kerotest valves' safety function would not be compromised by problems developing from water saturated stem packing.

Westinghouse provided approximately 1500 kerotest valves to Sequoyah and specified packing replacement after hydrostatic testing. Another 500 valves were provided by NAVCO under a spec that did not specify packing replacement. It is unknown how many of the NAVCO contract valves did not have the water saturated packing removed before shipment from the factory. A mechanical maintenance inspection of one kerotest valve in the Sequoyah warehouse in 1986 revealed some corrosion on the stem and bearing, leading one to conclude that some unknown number of kerotest valves installed at Sequoyah may have some corrosion in the valve internals.

There are two models of kerotest globe valves used at Sequoyah; a "packless" with a diaphragm (packing is used as a backup) and a more typical packing valve. Both were hydro tested in the factory the same way - with the packing as the external leakpath by the stem. A search of all maintenance requests filed at Sequoyah since the plant went into operation, indicated that only one kerotest valve had experienced failure due to leakage or corrosion problems out of approximately 2000 kerotest valves installed (.05%). In addition, the March 1987 search of NPRDS (an INPO nationwide data base for operating nuclear plants) revealed only 8 kerotest valves had experienced failure due to corrosion out of 191 failures reported over the past 10 years. Since the NPRDS data base has 3191 kerotest valves listed (out of 110,301 total valves), national failure rate of kerotest valves due to the corrosion was 0.25%. Based on this statistical data, TVA concluded that the problem Watts Bar has had with kerotest valves is not generic to Sequoyah, and further investigation is unwarranted.

IV. Conclusion

The NRC staff believes that the TVA investigation of these concerns was adequate and their resolution of these concerns as described in the Element Report 30101 is acceptable for restart.

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 & 2
SAFETY EVALUATION REPORT FOR EMPLOYEE CONCERNS
ELEMENT REPORT OP 30102
"DIESEL GENERATOR RELIABILITY PROBLEMS"

I. Subject

Category: OPERATIONS (30000)

Subcategory: MECHANICAL EQUIPMENT RELIABILITY/ DESIGN (30100)

Element: DIESEL GENERATOR RELIABILITY PROBLEMS (30102)

Concern: XX-85-122-008
 XX-85-122-009
 XX-85-122-010
 IN-85-323-001
 WI-85-100-003
 MAS-85-001

The basis for Element Report OP 30102 - SQN, Rev. 4, dated January 7, 1987, are the following employee concerns.

The following concerns are considered generic:

IN-85-323-001: "Continuous starting/stopping of Diesel Generators (due to testing) is detrimental to engine parts. Test program requires increased number of tests after a certain number of failures. CI feels that increased frequency is contrary to vendor recommendations. CI could not provide specific test numbers. No additional information available. NUC Power concern units 1 & 2.

WI-85-100-003: "Diesel Generators have reliability problems. CI stated that correction requires reliability program, a reduction in the number of starts, attention to testing, preventive maintenance upgrading, and more interaction with INPO, other utilities and vendors to establish resolution to problems. CI has no further information. Anonymous concern via letter.

The following two concerns apply to other plants:

XX-85-122-009, XX-85-122-010 are Browns Ferry and Bellefonte concerns that are exactly the same as Concern XX-85-122-008 for Sequoyah and the generic WI-85-100-003.

The following two concerns are Sequoyah specific:

XX-85-122-008: "Diesel Generators have reliability problems. CI stated that correction requires reliability program, a reduction in the number of starts, attention to testing, preventive maintenance

upgrading, and more interaction with INPO, other utilities and vendors to establish resolution to problems. CI has no further information. Anonymous concern VIA letter.

MAS-85-001: "D/G AC lube oil pump tripped because of possible gasket material in pump."

II. Summary of Issue

Concerns IN-85-323-001 and WI-85-100-003 address the continuous starting and stopping required by test programs for the Emergency Diesel Generators. The concerns attribute reliability problems with the Diesel Generators to excessive starts and stops, a need to upgrade preventive maintenance, and not enough interaction with outside organizations. Sequoyah specific concern XX-85-122-008 is almost identical to WI-85-100-003. An additional Sequoyah specific concern MAS-85-001 identifies a potential problem of gasket material in the Diesel Generator AC lube oil pump.

Concern XX-85-122-009 and XX-85-122-010 are Browns Ferry and Bellefonte concerns that are identical to Sequoyah specific concern XX-85-122-008 and generic concern WI-85-100-003.

III. Evaluation

TVA evaluators reviewed applicable NRC Regulatory Guides, NUREGs, and NRC/TVA correspondence back to the time of licensing. TVA evaluators identified that numerous NRC documents dating back as far as Generic issue B-56 in 1977 identified diesel generator reliability as an item of concern. Evaluators reviewed the recommendations from NUREG/CR-0660, "Enhancement of On Site Diesel Generator Reliability," and the comments TVA provided at the request of the NRC. Concerns about no load/light load operations were addressed by separate correspondence between TVA and NRC. As recommended, TVA installed air dryers for the air start system and heavy duty turbocharger drive gear assemblies. Formal training was given to maintenance and other related personnel. Evaluators performed a walkdown of the diesel generator buildings and found housekeeping and oil leaks to be a problem. Dust control around diesel generator electrical equipment was identified in NUREG/CR-0660 as important. TVA initiated corrective action to clean the diesel generator electrical panels and preventive maintenance to maintain overall cleanliness in the diesel generator building.

TVA evaluators reviewed the reliability history of the Sequoyah Emergency Diesel Generators since March 5, 1980, and for the last 100 starts. Reviews were conducted of EPRI report NP-4264, "Failure related to Surveillance Testing of Standby Equipment," and NUREG/CR-4557 which presents an overview of information provided by various groups associated with Diesel Generators at Nuclear Power plants as well as comments on Generic letter 84-15. Reviewers noted that surveillance testing was considered a factor in diesel generator failures by both reports and a potential contributor to reducing reliability and lifespan of the diesel generator sets.

TVA evaluators reviewed responses from ASME, EPRI, INPO, and other industry groups which stressed maintenance and analysis over increased testing to improve reliability. Vendor responses were reviewed and particular attention was paid to the Morrison-Knudsen/GM response which recommended a reduction in fast starts, use of prelube and prewarm, the elimination of running unloaded, and improved maintenance.

TVA evaluators concluded that TVA programs included 1) vendor recommendations for use of prelube and prewarm; 2) the elimination of running unloaded; 3) corrective maintenance on cleanliness in the diesel generator building and initiation of preventive maintenance to maintain cleanliness; and 4) submission of a technical specification change (# 107) to reduce the number of starts required by the surveillance instructions. Concerns IN-85-323-001, WI-85-100-003, and XX-85-122-008 were evaluated as being valid with the exception of interaction with outside organizations. Concern MAS-85-001 was evaluated as not valid because of a lack of supporting findings on lube oil pump failures due to gasket material.

TVA evaluated the root cause as lack of a formal DG trending analysis program and related follow-up and lack of adequate continuing housekeeping on the diesel generators.

IV. Conclusion

The NRC staff believes that the TVA investigation of the concern was adequate, and their resolution of the concern as described in Element Report OP 30102 is acceptable for restart.

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 AND 2 SAFETY
EVALUATION REPORT FOR EMPLOYEE CONCERN ELEMENT
REPORT OP 30107 "GENERAL PAINT CONCERN REACTOR BUILDING"

I. Subject

Category: Operations (30000)

Subcategory: Mechanical Equipment Reliability/Design (30100)

Element: General Paint Concern Reactor Building (30107)

Employee Concern: XX-85-087-001

The basis for Element Report 30107-SQN, Rev. 2, dated November 18, 1986, is Sequoyah employee concern XX-85-087-001 which states:

Sequoyah Units 1 and 2: Containment paint coatings (#295 and #305) are not properly maintained. The integrity of the coatings is being eroded and questionable. CI is concerned that the paint will curl and pop-up and clog the drains in case of an accident (LOCA) when the temperature and pressure builds up in the reactor. Paint specifications and standards are not followed, especially in recoating of 305. NUC Power concern. CI has no further information.

This concern was evaluated by TVA as potentially safety-related.

II. Summary of Issue

The issue defined by TVA concerns the integrity and maintenance of containment paint coatings and the potential safety implications should deficiencies in these areas exist. TVA also evaluated the adequacy of coatings applicator and inspector qualification.

III. Evaluation

TVA evaluators reviewed maintenance records, plant procedures, design documents, and requirements and commitments for the coating system. General inspections of the containment coatings were conducted for both units. Coating applicators and inspectors were interviewed to ascertain work practices and the extent of their knowledge and training pursuant to coating requirements. TVA found that concrete coatings were adhering well with some exceptions where significant mechanical damage coupled with water seepage had caused delamination of the topcoat. Inspection of the steel containment liner found areas of topcoat delamination and areas where total film thicknesses were exceeded. A lack of inspection and testing detail in the maintenance instruction for application and repair of containment coatings was found to be a contributing factor to these deficiencies. Additionally, TVA noted that only limited corrective maintenance of containment coatings had been performed in the past due to the lack of an upper tier document that defines a formalized program of periodic inspection and maintenance. Although deficiencies in containment coatings were identified, TVA concluded from review of design documents that no impact on safety existed.

Regarding coating applicator and inspector qualification, TVA concluded that programs in place were adequate. It was noted, however, that the applicator qualification program lacked procedural control.

TVA concluded that the issue presented by employee concern XX-85-087-00, regarding maintenance of containment coatings at SQN was valid. TVA has defined an extensive corrective action program, including field repair of defective containment coatings and programmatic changes, to address identified deficiencies.

IV. Conclusion

The NRC staff believes that the TVA investigation of the concern was adequate, and their resolution of the concern as described in Element Report OP 30107 is acceptable for restart.

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 AND 2
SAFETY EVALUATION REPORT FOR EMPLOYEE CONCERNS
ELEMENT REPORT OP 30115 "HARDWARE NOT PROPERLY IDENTIFIED"

I. Subject

Category: Operations (30000)

Subcategory: Mechanical Equipment Reliability and Design (30100)

Element: Hardware Not Properly Identified (30115)

Concern: XX-85-102-005

The basis for Element Report 30115 - SQN, Rev. 1, dated December 12, 1986, is Browns Ferry Employee Concern XX-85-102-005 which states:

Hardware is not properly identified in the field. A person needs a drawing to identify it.

This concern was evaluated by TVA as not safety-related and potentially applicable to Sequoyah (generic).

II. Summary of Issue

TVA perceived the issue to be incorrect or missing equipment identification tags at Sequoyah.

III. Evaluation

The TVA evaluator reviewed the Sequoyah Special Maintenance Instruction (SMI) for system walkdowns to determine actions underway to identify problems with equipment tags. Additionally, an interim report by the Office of Nuclear Power Configuration Management Survey Team and the results of evaluations at the Watts Bar and Browns Ferry sites were reviewed. Since several hundred missing tags for the systems or portions of systems being walked down have been identified, the concern is considered valid. Corrective Action Tracking Document (CATD) OP 30115-SQN-01 was written to track the corrective action items below:

Complete prior to restart, tagging deficiencies identified and classified as "Restart" by TVA's DB&V Program. Corrections prior to restart will be limited to components identified by the main control flow and control drawings, and corrected under the DB&V Program.

Initiate a long term corrective action plan to reflect the unique identification of mechanical, electrical, and I&C components on the necessary drawings to allow the components to be reflected in procedures and identified in the field.

The Element Report also states that CATD OP 30115-NPS-01 was written to the corporate configuration manager's office to address the resolution of data base and drawing discrepancies.

IV. Conclusion

The NRC staff believes that TVA's investigation of the concern was adequate, and their resolution of the concern as described in Element Report OP 30115 is acceptable for restart.

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 & 2
SAFETY EVALUATION REPORT FOR EMPLOYEE CONCERNS
ELEMENT REPORT OP 30201 "POSSIBLE LACK OF WATERTIGHT CONDUIT AND CONNECTION"

I. Subject

Category: Operations (30000)

Subcategory: Electrical and Communications (30200)

Element: Possible Lack of Watertight Conduit and Connection (30201)

Concerns: MAS-85-002
MRS-85-005
TAK-85-001

The basis for Element Report OP 30201-SQN, Rev. 3 dated January 8, 1987, are the following employee concerns:

TAK-85-001: Guidelines for use of RAYCHEM (coating) on Class 1E work are unclear and instructions not consistent.

MAS-85-002: Adequacy of RAYCHEM on 2-FCV-43-77.

MRS-85-005: 2-FSV-43-77 did not have the proper RAYCHEM application.

II. Summary of Issue

Concerns TAK-85-001, MAS-85-002 and MRS-85-005 identified that splices using RAYCHEM kits may be inadequate at Sequoyah and the procedures at Sequoyah controlling splices may be inadequate.

III. Evaluation

The TVA investigations concluded that TAK-85-001 was a valid concern. Interviews substantiated that Modification and Addition Instruction (M&AI) 7, "Cable Termination, Splicing, and Repairing of Damaged Cable," is unclear when trying to specify the correct application of heat shrink insulation on a splice.

The TVA investigation concluded that MRS-85-005 and MAS-85-002 were valid concerns. Subsequent Work Requests (WRs) have corrected the identified problems.

TVA performed visual inspection of a representative sample of RAYCHEM installations and found evidence of another deficient application on an environmentally qualified motor operator.

The TVA investigation found instances where material requisition forms were not being attached to work packages as required by Sequoyah procedures. This created a situation where the specific RAYCHEM kit used could not be identified.

The TVA investigation identified a potential for similar problems as those identified in NRC Information Notice (IEN) 86-53, "Improper Installation of Heat Shrinkable Tubing, dated June 26, 1986, existing at Sequoyah. The evaluation process of IEN 86-53 needs to continue and required corrective action finalized.

The TVA corrective action plan is to identify and correct deficient splices on Environmentally Qualified (EQ) Equipment and Class 1E splices at containment penetrations prior to restart. TVA has provided a justification for not identifying and correcting splices on the balance of Class 1E equipment until after restart. This is in accordance with Sequoyah Standard Practice (SQA) 191, Rev. 2, "Evaluation of Operational Readiness Prior to Plant Startup," which indicates that Post-restart action has been identified, responsibility assigned, scheduled, and placed in an appropriate management tracking system.

IV. Conclusion

The NRC staff believes that the TVA investigation of the concern was adequate, and their resolution of the concern as described in Element Report OP 30201 is acceptable for restart.

SEQUOYAH NUCLEAR POWER PLANT, UNITS 1 AND 2
SAFETY EVALUATION REPORT FOR EMPLOYEE CONCERNS
ELEMENT REPORT OP-30202
"FIVE PERCENT LOW VOLTAGE PROBLEMS"

I. Subject

Category: Operations (30000)

Subcategory: Cable and Conduit (30200)

Element: Five Percent Low Voltage Problems (30202)

Employee Concerns: XX-85-122-004
XX-85-122-005
MAS-86-004

The basis for Element Report OP 30202-SQN, Rev. 3, dated December 8, 1986, are the following employee concerns:

"XX-85-122-004 - Sequoyah - a 5 percent voltage drop at each plant causes problems by cycling diesel generators unnecessarily (which degrades reliability) and causes too many plant shutdowns. TVA compensates by operating buses at higher than normal voltage ratings, anticipating voltage reductions, stressing equipment and components unnecessarily, and reducing component life and reliability. CI stated that there was inadequate voltage regulations for buses. CI has no further information. Anonymous concern via letter."

XX-85-122-005 - Browns Ferry - is worried identical to the above concern but specifically for Browns Ferry and was transmitted as generic to other plants.

MAS-86-004 - Sequoyah - Potential equipment damage as a result of station over voltage.

II. Summary of Issue

This element report evaluates the concern of five percent low voltage starting of the emergency diesel generators and of compensating for the five percent low voltage by operating the safety-related buses at higher than normal voltage levels. The concern of diesel generator starts is alleged to cause unnecessary plant shutdowns and place undue stress and wear on the diesel generators thereby reducing their reliability. The concern of higher than normal voltage supplied to safety-related equipment is alleged to have overstressed and reduced the life and reliability of plant equipment.

The scope of this report was limited to evaluation of alleged diesel generator starts, plant shutdowns due to five percent low voltage, and the presence of higher than normal voltages on the safety-related 6.9-kV and 480 volts shutdown boards. The issue of diesel generator reliability is addressed in element report 30102 "DG Reliability."

III. Evaluation

The TVA evaluator reviewed the K Forms to determine the areas of concern. Documents were reviewed to determine the requirements, archived copies of weekly Sequoyah Nuclear Plant Surveillance Instruction, SI-3 were reviewed to determine the past voltage conditions, and interviews were held with cognizant individuals in SQN division of power system operations, operations, the operations procedures group, SQN design services (DNE), plant modifications group, and with a former supervisor of SQN electrical maintenance.

The issue of cycling DGs unnecessarily due to undervoltage conditions was considered not valid because no evidence of such starts could be located in the LER history. The issue of TVA compensating for 5 percent voltage drops by operating buses at higher than normal voltage ratings could not be verified. Ample evidence existed to demonstrate that shutdown boards have been operated at low and high voltages (based on ANSI C84.1 and TVA requirements). Anticipation could not be demonstrated, but inadequate requirements and procedures allowed the adverse voltage conditions to develop and be sustained in some cases. The concern of high voltage on buses was found to be valid.

The issue of overstressing and degrading the reliability of equipment was found to be valid.

The issue of inadequate bus voltage regulation was found to be valid because of the excessive voltage swings on the start buses and the shutdown boards when they are connected to either the grid or to the SQN turbine generators.

The issue of potential equipment damage as a result of station bus overvoltage at SQN was found to be valid because of numerous instances of voltage on both the 6.9-kV and 480 volt shutdown boards in excess of the maximum limit recommended in ANSI C84.1. These repeated excessive voltages have the potential for degradation of energized electric motors and other equipment through the mechanism of overheating and eventual insulation breakdown.

As a result of this report a Significant Condition Report (SCR) EEB86147 RO was initiated on November 21, 1986, to address these conditions. At present, TVA has identified which class 1E AC electrical equipment is susceptible to overvoltage and has revised SI-3 to reflect the requirements of ANSI C84.1.

IV. Conclusion

The NRC staff believes that the TVA investigation of the concerns was adequate, and their resolution of the concerns as described in Element Report OP 30202 is acceptable for restart.