Walkdowns with Power Stores personnel of Level D storage areas for conduit and fittings revealed scattered surface oxidation (rust) on some conduit with more noticeable rusting at the threaded area. Approximately 1 to 2 percent of the conduit bodies were judged not acceptable for installations, assuming the entire length would be installed. The storage area and placement of material were in compliance with the requirements of Level D storage.

Discussion with cognizant QA personnel indicated receipt inspection was performed per the requirements of AI-11 and surveillance activities were in accordance with the frequencies specified in Surveillance Instruction Letter (SIL)-181. Level D storage areas were subject to surveillance activities. No quality problems with conduit or fittings had been identified.

BLN

Receipt is performed per BNP-QCP-1.1 and contains provisions to inspect for damaged or unacceptable material and addresses the proper disposition of that material. The checklist utilized by quality control personnel documents the material's acceptability.

The storage levels for conduit and conduit fittings are assigned Level D and Level C, respectively, and meet or exceed those required by ANSI 45.2.2.

Storage of permanent plant items is controlled by BNP-QCP-1.2, and is consistent with ANSI requirements. Inspections are performed and controls are in place to correct deficiencies . No programmatic deficiencies were identified during this evaluation.

BNP-QCP-10.12 controls the issue of permanent material. The section titled "Electrical Cable and Conduit," paragraph 6.8, does not address conduit. Paragraph 6.10.3.1 does not require excess material which is being returned to the warehouse to be inspected for damage, only that it is the correct material.

Although BNP-QCP-3.32 requires a visual check during cable pulling operations, it is not clear as to whether or not this check would detect burrs, sharp edges, etc., which would damage the cable. BNP-QCP-3.34 and BNP-QCP-3.2 do not provide precautions to the installer or instruct inspection personnel to visually inspect the conduit and fittings for defects or damage during cable pulling activities.

e. Conduits were not installed in accordance with as-designed drawings with respect to junction box/conduit interface.

<u>WBN</u>

Review of Employee Response Team (ERT) Investigation Report IN-85-008-004, revealed that ERT discovered that the conduit identifier was incorrectly given for the concern. The conduit at junction box 27, was thought to be 2IN430, which was a 2"Ø conduit. ERT identified the conduit at junction box 27, as 2RM430 and the size was 1-1/2"Ø.

ERT's report also indicated inspections were conducted on June 17, and October 1, 1985, in response to the above concern. Electrical quality control inspectors inspected the conduit at junction box 27 using Quality Control Procedure WBN QCP-3.03, Revision 18, and the conduit and junction boxes were found to be acceptable.

Review of Conduit and Grounding drawing 45W874-3, Revision 7, confirmed that the conduit located at junction box 27, was identified as "1-1/2I-2RM430."

f. Improper spare conduit fire barrier plugs were installed.

WBN

Discussions with DNE's fire protection section engineers determined TVA uses a recessed or square head metal fireplug for sealing spare conduits (Crouse Hinds type PLG or approved equal).

Review of Crouse Hinds catalog 7F-5, revealed type PLG conduit plugs were standard metal plugs with zinc electroplated finish and were in compliance with the National Electric Code.

Discussions with DNC electrical engineers revealed temporary plastic caps were often used to seal conduit while pouring concrete or for keeping other debris out of conduit during construction. However, those caps were removed before equipment transfer and permanent plugs were installed.

A walk through of the Auxiliary Building revealed several spare conduit wall sleeves with permanent metal square head type plugs.

g. Conduit overfill occurred because of the use of reducing bushings and undersized wall sleeves.

WBN

Discussions with EEU engineers revealed there were no specific requirements restricting the use of reducing bushings. Reducing bushings inside diameters are the same as the smaller joining conduit and are acceptable for use.

Review of G.C.S.G-40, revealed that reducing bushings were allowed to be used to mate up conduit provided the maximum conduit fill and pull tension were not exceeded.

The use of reducing bushings was determined not to be a problem. The problem causing installation difficulties was contributed to conduit overfill. Reference Construction Category cable pulling issue in Report No. 10900 titled "Cable."

Review of Watts Bar Quality Control Procedure WBN QCP-3.05, Revision 10, revealed cable pull packages defining the requirements are supplied to the craft before cable pulls and specified the maximum allowable pull tension. This procedure requires the Electrical Quality Control (EQC) inspector to verify that specified pull tensions were met.

Review of Electrical Design Standard DS-E13.1.4 revealed that the design calculations were generated based on the conduit size. Based on the size specified, the routing program was then utilized to determine the percentage of conduit fill.

No undersized wall sleeves were noted during the concern evaluation.

h. Flex conduit couplings were not properly torqued and conduit may not be completely screwed together.

This area of concern was deemed to be potentially generic to all active nuclear plants. Site-specific findings follow.

WBN

Review of the Division of Nuclear Power's Modifications and Additions Instructions, MAI-13, "Installation of Conduit and Junction Boxes," revealed torquing requirements in Section 4.6.8, to be used for Modifications work.

Review of DNC's Watts Bar Quality Control Procedure WBN QCP-3.03, Revision 18, revealed the electrical quality control inspector was responsible for verifying conduit couplings were properly torqued. Tables were given with torque values cross referenced to various conduit/coupling sizes for S/S Sevrviflex type couplings only and did not address other manufacturer's (such as Thomas & Betts) requirements.

Review of NCR 6437, revealed several known and documented occurrences of loose conduit fittings. The apparent cause was unknown and the NCR was determined to be nonsignificant. The correction method was to retighten the conduit according to applicable procedures.

Discussions with DNC electrical engineers revealed that flex conduits were often damaged after installation and inspection by personnel stepping on, or otherwise abusing the conduit.

A general walk through of Accumulator Room 4, in the Reactor Building, found conduit installed in vulnerable locations and one loose flex coupling was found at a local junction box.

A review of Watts Bar Quality Control Procedure WBN QCP-1.36, "Storage and Housekeeping," revealed Watts Bar had requirements for verifying loose flex couplings during DNC periodic housekeeping inspection tours. The criteria contained in the procedure instructed housekeeping to observe flexible conduits during inspection tours to ensure they were not detached from fittings because of construction activities.

Review of Watts Bar quality Control Procedures WBN QCP-1.52, Revision 6, "Preventative Maintenance," revealed the following statement:

> "In the course of performing maintenance activities, if other associated or surrounding items are identified (or suspect) as being deficient or damaged, responsible Quality Control inspector shall identify the items on a deficiency report and forward to the Preventative Maintenance Unit for disposition."

BFN

Discussions with cognizant DNE electrical engineering personnel revealed no known problem had been identified with the tightening requirements of flexible conduit couplings.

Discussions with cognizant Modifications and Additions personnel revealed no problems had been encountered during flexible conduit coupling installation inspection.

A review of site procedure MAI-27 showed flexible conduit couplings received the proper torquing where applicable, and verification of acceptable installation for QA systems by Quality Control personnel. No deficiencies were noted in this area.

It was noted that SCR BFN EEB 8632 had been generated to document deficiencies in General Construction Specification G-3, pertaining to the installation of flexible conduit. The as-constructed configuration of offsets, lengths and thermal/seismic movement allowances of flexible conduit had not been evaluated to verify their ability to perform their safety function. Objective evidence was not available to indicate that floor mounted 10CFR 50.49 equipment was installed using the minimum length criteria which would ensure sufficient movement of these devices. A review of the proposed course of action for flexible conduit qualification does not address qualification of flexible conduit for floor mounted equipment below 6'-0" above the floor, classified as 10CFR 50.49 equipment, that was installed prior to the issue of G.C.S.G-40, R0, dated August 6, 1975.

SQN

A review of MAI-6, Revision 6, revealed installation of conduit and conduit systems were performed per the National Electric Code and flexible metal conduits were installed per specific instructions, which adequately addresses the tightening requirements of the flexible conduit coupling. Verification by QA personnel was required.

Discussions with cognizant Modifications and Additions electrical supervision personnel revealed no problems have been encountered during flex conduit coupling installation inspections.

As a result of the NRC review of Element Report CO19201-SQN, Revision 6 entitled, "Conduit", additional evaluation was deemed necessary to determine the adequacy of the implementation of the requirements of M&AI-6, Revision 6 in regard to the tightening requirements of flexible conduit couplings.

During an NRC Safety System Outage Modification Inspection performed during December of 1986 and January of 1987, several flexible conduit connections were determined to be loose or improperly installed and are to be considered as findings or observations contained in Inspection Reports 50-327, 328/86-68.

Since the established program for flexible conduit installations (M&AI-6, Revision 6) requires torquing of the flexible conduit coupling per the manufacturer's instructions and verification was performed by QA/QC personnel, the implementation of the established program was questioned.

During re-evaluation of this issue by the WBNP-ECTG on February 26, 1987, it was noted that SQ-CAR-87013 had been issued and indicated that the requirements of M&AI-6 Section 3.2.6.4 had not been followed, in that the manufacturer's instructions had not been utilized during the installation of Thomas & Betts flexible conduit assemblies. The specific violation noted, resulted from failure to torque the flexible conduit coupling per the manufacturers instructions.

As a result of the NRC observations and the issuance of SQ-CAR-87013 the credibility of the established program is questioned. Past installation practices are suspect of being deficient related to all supplier's/ manufacturer's instructions where torquing instructions are required (Reference G.C.S.-40) and an investigation must be made to identify and correct these deficiencies. Since the established program requires the preparer of the Work Plan or Work Release/Maintenance Request to specify the installation criteria, the manufacturer's instructions should be made available to the preparer for inclusion into the appropriate work control documentation. Training of the appropriate personnel (craft, engineering, and inspection) should be given to ensure the appropriate manufacturer's instructions are followed during the installation and inspection activities associated with flexible conduit assemblies. |R2

A review of Special Maintenance Instructions SMI-0-317-33, Revision 1, dated August 11, 1986 entitled "Walkdown Procedure for Identifying Flexible Conduit Connections in Violation of General Construction Specification Number G-40" was performed and conversations with Central Staff DNE personnel were conducted to determine if the tightening requirements for flexible conduit assemblies were verified during the walkdown activity. The results of the review

and conversations indicated the primary purpose of the walkdown (SMI) was to assure that installed flexible conduits have adequate lengths for thermal and seismic movement for installed Class 1E equipment and devices on the 10 CFR 50.49 list in response to the generic implications raised for the WBN NCR-6529. The preparer of the SMI established the requirements of the instruction primarily as directed by the W. S. Raughley memorandum, dated May 14, 1986, titled, "Electrical Issues-Flexible Conduit." The following comments and conclusions are submitted:

a. The W. S. Raughley memorandum, dated May 14, 1986 does not fully address the generic implication of the WBN-NCR 6529. Instructions were not prescribed to identify and resolve flexible conduit minimum bend radius violations nor to ensure other aspects of flexible conduit assemblies (such as torquing per the manufacturer's instructions) were adequate. Additionally, 10 CFR 50.49 floor mounted equipment at a point less than 6 feet above the floor is not addressed. (Reference C019201-SQN, Pg. 6 of 11, para K)

b. Even though the Policy memorandum discussed above did not address the minimum bend radius of the flexible conduit assembly, the preparer of the SMI defined a deficiency as any condition found that is outside the limitations defined in Attachment 1 (Reference paragraph 3.3) and directions were given to the walkdown personnel to document these deficiencies (Reference paragraph 5.3.1.a). Contrary to the above requirements, the flexible conduit assemblies were not inspected for minimum bend radius violations per Table 3.2.6-1 of Attachment 1. Additionally, the walkdown program did include 10 CFR 50.49 equipment less than 6 feet above the floor

which was evaluated for thermal/seismic movement considerations even though this issue was not addressed in the above mentioned Raughley memorandum.

c. The walkdown performed did not include the verification of torquing of the flexible conduit couplings per the manufacturer's instructions.

Conclusions

The W. S. Raughley memorandum, dated May 14, 1986 does not fully address the acceptability or prescribe the necessary instructions for all active TVA nuclear sites to follow which would ensure past flexible conduit installations are in compliance with or meet the intent of General Construction Specification G-40, Revision 9, SRN 11. Implementation of the Policy memorandum at each site would only partially address the generic implication of WBN NCR-6529.

The findings noted above related to the tightening of flexible conduit couplings indicated G.C.S.G-40 should be revised to include specific torque values as required per the applicable manufacturer in order to assure this information is available to the constructing organization.

The specific CAR (SQ-CAR-87013) should be re-evaluated for significance and generic applicability based primarily on the uncertainty and lack of clearly established requirements related to this issue as contained in G.C.S.G-40 which is utilized at all active TVA nuclear sites. The disposition of this CAR should include steps to identify the manufacturers, determine which require torquing of the connectors, and provide verification that past installations meet those requirements. The ARPR should include the necessary procedure revisions

(including those involved in maintenance activities), training of appropriate personnel, and verification that all future work activities are performed in accordance with those instructions.

BLN

Site procedures BNP-QCP-3.2, R12, BNP-QCP-3.32, R5, and BNP-QCP-3.34, R3, were reviewed for installation criteria for electrical conduit. It was determined that G.C.S.G-40, Revision 9, SRN 11, installation requirements related to the torquing of flexible conduit couplings per the manufacturer's supplied instructions was not incorporated into the site procedures. Verification of tightness was required to assure that removal of the coupling will require a tool. BLN-NCR 4936, Revision 0 was generated to address or take exception to those requirements specified in G.C.S.G-40 SRN-11.

Follow-up Action Discussion

A follow-up review for generic applicability of SCR BFN EEB 8632 on the installation of flexible conduit determined the following chronological actions:

(1) On August 26, 1980, a request was made by the Nuclear Safety Review Staff (NSRS) for DNE to evaluate the applicability of the proposed criteria in SRN-G-40-2 to past installations (reference attachment "C"). This criteria added allowances for thermal considerations.

(2) On December 17, 1985, WBN NCR 6529 RO was initiated by WBN to document flexible unit 1 conduits which were not installed to compensate for any thermal considerations. This NCR was revised to include documentation showing the minimum bend radius for several flex conduits had been violated. NCR WBN 6569 RO was

initiated on January 13, 1986 to document similar deficiencies that existed in unit 2. The DNE response to NCR 6529 stated the majority of WBN flex conduit design was issued before 1980.

(3) On January 2, 1986 a memorandum was issued by DNE to respective DNE Electrical Project Engineers instructing them to investigate generic applicability of the deficiencies documented on WBN NCR 6529 RO at SQN, BFN, and BLN. A response was received from the SQN Project Engineer stating that the condition had been forwarded to ONP for evaluation. No responses from the BFN and BLN project engineers were found.

(4) On June 27, 1986, SCR BFN EEB 8632 was initiated to document that units 1, 2, and 3 at BFN lacked guidance for installing flexible conduit offsets, lengths, and thermal/seismic movement allowances which created uncertainty as to whether installed flexible conduits could perform their safety function. This SCR was deemed non-generic to other sites with the qualification that other sites would generate applicable NCRs.

(5) NRC issued unresolved Item No. 391/85-53-02 as a result of the "Resident's August/September 1985 Inspection Report" to document that flexible conduits were identified as having "very sharp bend radii" at connections to several valves at WBN. TVA responded to this item by stating that the condition will be resolved with the disposition of NCRs 6529 and 6569. The unresolved item was later upgraded to Violation 390/86-02.

(6) NCRs 6529 and 6569 were deemed significant and reportable conditions.

(7) WBN, SQN, BLN, and BFN were affected by untimely inadequate design output documents and/or correction methods specified by DNE.

i. Covers were left off of conduits and pull boxes allowing dirt and other debris to enter.

This area of the concern was deemed to be potentially generic to all active nuclear plants. Site-specific findings follow.

WBN

A review of DNE G.C.S.G-40 revealed that the procedure specifically states that conduit must be cleaned after installation as follows:

> "After a conduit run is completed, it shall be cleaned out and inspected. Compressed air shall be used in blowing out any accumulation of trapped liquids."

A review of the DNC site quality control procedure WBN-QCP-3.05, Revision 25, revealed that the responsible quality control inspector is required to verify conduit was cleaned either by a wire brush or swab equal to the inner diameter of the conduit or was blown out using compressed air before cable pulling. There was no requirement for verifying the conduit covers were installed.

A review of the Division of Nuclear Power Administrative Instruction, AI-6.5, Revision 7, issued May 2, 1985, revealed that during the walkdown associated with transfer of equipment from construction to operations, the responsible operations section (Preop, Maintenance, etc.) was assigned responsibility for review of equipment condition for acceptability.

During a walkdown of the WBN unit 2 Pipe Chase, near the boron injection tank located on elevation 713, the evaluator observed conduit containing cigarette butts, dirt, and small rocks inside. The cable inside did not appear to be damaged.

BFN

A review of MAI-27, Revision 1, determined the procedure does not address the installation of conduit or pull box covers to prevent dirt and debris from entering the conduit for the initial installations of the conduit where the cable installation activity may be prolonged. The conduit is required to be cleaned before cable pulling activities commence.

SQN

A review of site procedure MAI-6, Revision 6, determined the requirements do not address the installation of conduit or pull box covers to prevent dirt and debris from entering the conduit between cable pull activities or for the initial installations of conduits.

Discussions with cognizant Modifications and Additions engineering and craft supervision indicated recognition of the need for procedural clarification in regard to covering all openings in the conduit run by either permanent or temporary means.

BLN

Site procedure BNP-QCP-3.2, R12, "Conduit Systems," governs the installation of conduit and junction boxes and instructions were not included for covering all conduit openings with either permanent or temporary covers after conduit installations. BNP-QCP-3.34, R3, "Electrical Cable Installation," includes an inspection for verifying that conduit and junction box covers are installed after cable installations. BNP-QCP-3.32., R5, "Raceway and Electrical Hanger Verification," requires all covers and gaskets for boxes and conduits to be installed prior to transfer from construction to operations.

j. Conduits were not properly sealed to prevent water from entering.

WBN

Review of NSRS Report I-85-465-WBN determined that the concern was factual regarding the entrance of water into conduits in the tunnel between Reactor Building 2 and the cooling tower. During an inspection, it was revealed that water entered from unsealed conduits at junction boxes 5317, 5318 and panel 2-L-344. The effect on the cables inside the conduit was referred to DNE for evaluation. DNE determined that the moisture inside the conduits would not adversely affect safety-related cables. DNE also stated the cables would be functionally tested before tentative transfer.

A review of work documents showed Work Release 26242 required corrective action consisting of blowing out conduits 2-PLC-138, 1-PLC-139, 2-PLC-60F and 2PLC-610 with compressed air and sealing conduits at junction boxes 5317, 5318, and cover panel 2-L-344 (open because of a temporary condition) with protective covering to prevent water from entering.

Discussion with the electrical quality control supervisor revealed Work Release 26242 was revised to enable inspection of conduit work. The sealing of the junction boxes was delayed due to material shortages, and would be completed later.

A review of the inspection documentation revealed the work was complete and acceptable.

A walkdown of conduits and junction boxes with an electrical foreman revealed that the conduit work was complete. Sealing work had not been performed and Panel 2-L-344 was still open.

An additional walkdown conducted on May 5, 1987, revealed that permanent shelter and protection had been provided to prevent water from entering the conduit system. The cover on panel 2-L-344 was observed to be permanently installed.

k. Conduit was installed and subsequently removed and reworked. (Note: This concern was specific to BLN and non-generic to other active sites. Ref. Concern No. BNP-QCP-10.35-8-18.)

A review of the BLN report shows this concern was received as a result of the exit interview held with the employee at Bellefonte Nuclear Plant. The employee provided information describing the area of his concern. The BLN report lists the following information received from the employee:

> "The concerned employee could not understand why some conduit he installed was subsequently removed and reworked. This conduit is located in the Decontamination Room on elevation 629 of the Auxiliary Building".

The review of the BLN report for the site investigation on the concern provided no definitive information as to which conduit was in question or why it was reworked. The report stated the CI believed that the work was related to DNE Engineering Change Notice (ECN) 1951, issued in November, 1983.

A discussion was held with DNC Electrical Engineering unit personnel to determine specifically which conduit was involved in the concern. It was learned that a number of changes have taken place in the decontamination room. Conduit has been added and deleted as a result of ECN 1951. No individual was aware of an occurrence where a particular conduit was installed, removed, and subsequently reinstalled without modification.

ECN 1951 and all referenced DNE drawings were reviewed to identify the design changes made in the Decontamination Room. A review of drawing number 5AW0816-R1, Revisions 21 and 22, revealed that conduit previously installed in the Decontamination Room had been removed, but was reinstalled to a revised configuration.

1. Undersized conduit penetrations were being used creating the potential for conduit overfill. (Note: This concern was specific to BLN and non-generic to other active sites.)

   A review of the QTC files determined the perceived problem to be that 1-1/2"Ø conduit penetrations are being used in a 2"Ø conduit system creating the potential for conduit overfill.

   Discussions with cognizant engineering personnel, familiar with the event, identified the conduit penetrations in question. Eight penetrations were identified in the 627 feet elevation floor slab of the Intake Pumping Station. All eight conduit penetrations are detailed on DNE Drawing 9KW0810-RU-09, and are identified as 1-1/2" Ø sleeves as a result of Field Change Request (FCR) E-3677. The DNE drawing confirmed the conduit size is 2" Ø.

   A review of the BLN <u>Conduit/Cable Program</u> revealed the changes submitted to DNE on FCR E-3677 were possibly not taken into consideration when inputs were made to the cable routing program. This may have allowed cables to be installed that exceed the maximum allowable fill as specified in Electrical Design Standard DS-E13.1.4, Revision 1.

   Discussions with the DNE site electrical representative revealed that design calculations have been performed in response to this investigation and the results show that the maximum allowable cable fill has not been exceeded for any of the eight conduit penetrations. Additionally, the cable routing program is being updated to reflect the proper size conduit.

4.1.2.2 <u>Conclusion</u>

The conclusions to the evaluations performed on the nineteen employee concerns, grouped in the issue of Conduit, are shown below. Unless otherwise noted, the conclusions will be site-specific to WBN.

a. Fish tape, pulling hooks, and other cable pulling devices in conduit were not removed between cable pulls. NOTE: The cleanliness aspect of the related concerns was attributed to conduit cover installation deficiencies and will be addressed in paragraph i of this report.

Based on the findings, the concern is factual. Fish tape and other pulling devices were left in conduit for future cable pulls as a common practice. This was evaluated to pose no adverse condition or problem. This conclusion is in agreement with the DNC response to this issue. The integrity of the installed cables is verified by the appropriate functional or operational tests. Since no problem existed, this aspect of the concern was not investigated at other sites. Additionally, concerns which implied that fish tape could not be removed was deemed to be a result of overcrowding. This issue of overcrowding is discussed in the Construction Category Report number 10900 titled "Cable" in the cable pulling issue and in Subcategory Report EN-23801. |R2

b. Conduits had accumulated bends more than 360 degrees between cable pulling points.

<u>WBN</u>

The findings confirm this concern was factual. Applicable design, installation, and inspection procedures had not previously addressed requirements which restricted excessive conduit bends. Findings show procedures have incorporated the necessary requirements to ensure conduit bends are addressed. Past installations are being evaluated under NCR 6347 by DNE for corrective action through testing conducted at the TVA Central Laboratory using maximum sidewall pressure calculations.

BFN

Sufficient precautions presently exists in the site procedure MAI-27, Revision 1, dated July 16, 1986, to prohibit an excess of 360° of bends between pull points. This procedure is considered inadequate because independent QA/QC verification of the criteria is not required. A procedure revision request was generated to correct this deficiency. Past installations are pending evaluation by DNE as noted above.

SQN

Site procedure SNP MAI-6 does not contain a requirement prohibiting the installation of conduit exceeding a 360° accumulation of bends or a QA/QC verification of this criteria. Installations will be evaluated by DNE (See WBN discussion above).

BLN

Although BLN had early requirements for prohibiting accumulated bends exceeding 360°, NCR 4254 will document the acceptability of installations prior to January 1, 1984. This was the effective date of the formal Quality Assurance/Engineering Organization split. The NCR will require a verification of conformance to this requirement through walkdowns.

Any deficiencies will be dispositioned and documented by NCR 4254, ensuring allowable cable sidewall pressures have not been exceeded as a result of excessive conduit bends.

c. Conduit congestion and major rework occurred partly because TVA compromised specification and accepted "off-scale" equipment.

WBN

The fact that congestion and rework exists does not present an adverse condition. The conduit was installed, in some cases before piping design was complete, and subsequent conflicts with other features required relocation of conduits. This is expected in the installation process and is recognized as an acceptable risk. No instances of congestion or rework caused by compromising specifications were discovered. Therefore, the conclusion reached during evaluation of Employee Concern IN-85-663-008 was that the concern was not factual and therefore was deemed non-generic. The above discussion does indicate that the issue of congestion was factual but it does not pose a safety concern (Ref. EC EX-85-052-002).

d. Conduits issued to the craft were of poor quality and/or made of inferior materials.

WBN

The findings determined this to be a factual concern. WBN has experienced problems with poor quality conduit supplied by vendors. A review of the receipt inspection process revealed no specific or special procedural requirements to inspect for defective conduit.

BFN

A review of the site procedures for the receipt and storage of materials showed adequate criteria was provided. No defects were noted in the field walkdown. The installation procedures required an inspection for defective conduit to prevent damage to the cable during pulling operations. Discussions with site power services personnel indicated no quality problems had been identified with conduit material.

SQN

A review of the site procedure AI-11, R 37, determined it to have inadequate guidelines to establish acceptable material criteria for

BNP-QCP-10.12 requires clarification for specific conduit and conduit fittings inspection requirements at the time of issue to inspect for defects. Additionally, these inspection requirements should apply when returning issued material to the warehouse.

BNP-QCP-3.32 and BNP-QCP-3.2 should be revised to provide precautions to the installer and inspection personnel to visually inspect conduit and fittings for burrs, sharp edges, flattened threads or other irregularities to prevent cable damage during pulling operations.

e. Conduits were not installed in accordance with as-designed drawings with respect to junction box/conduit interface.

WBN

Investigation showed this concern to be not factual. The ERT investigation report revealed the concerned individual was referring to a particular conduit which was perceived as an improper installation. Evaluation of the specific conduit, using DNE drawings and the site installation procedure, indicated that there was a misunderstanding by the employee of the conduit identifier number, and the installation was acceptable. No problem was identified and therefore this issue was deemed non-generic.

f. Improper spare conduit fire barrier plugs were installed.

WBN

Based on the findings, this concern was not factual. The proper fire barrier plugs are specified by DNE and were observed in the field. Temporary plastic caps were used during construction, but were removed before transfer to operations. No problems were identified and therefore this issue was deemed non-generic.

g. Conduit overfill occurred because of the use of reducing bushings and undersized wall sleeves.

WBN

Based on the findings, the use of reducing bushings was factual, but was acceptable since it posed no threat to pulled cable as long as requirements in applicable Design Standards and procedures for conduit fill and maximum pulling tension were met. Note: Conduit overfill for all active TVA sites is addressed in the Construction Category report 10900 titled "Cable."

h. Flex conduit couplings were not properly torqued and conduit may not be completely screwed together.

WBN

The findings determined this concern to be factual. Site procedures were adequate to ensure acceptable installations of stainless steel flexible conduit couplings. The established program included a requirement for the Preventative Maintenance Unit to identify deficient or damaged components. The investigation revealed a problem with loose flex coupling fittings caused from abuse. Documentation revealed instances of loose conduit fittings but these appeared to be isolated occurrences. It was noted, however (determined from the SQN evaluation) that the torquing of the flexible conduit coupling was limited to the Serviflex type and did not include other manufacturer's torquing requirements such as Thomas & Betts. |R2

BFN

The site implementing procedure adequately addressed the proper tightening of flexible conduit couplings, and verification was performed by QA/QC personnel. Discussions with cognizant personnel revealed no problems had been encountered in this area. It should be noted that construction activity at this operating plant was minimal.

The investigation concluded a deficiency existed in the area of 10 CFR 50.49 devices. The documentation to substantiate that minimum flex conduit length criteria for movement of these devices was considered prior to August 6, 1975, was not available. SCR BFNNEB 8632 was initiated to document this condition and was deemed non-generic with the qualification that each site would generate NCR's as required. |R2

A review of the proposed course of action (W. S. Raughley memo dated 5/14/86) required to address this deficiency revealed flex conduit connected to floor mounted equipment up to 6 feet above the floor is not addressed.

Additionally, WBN NCR 6529 related to this issue was determined to be generically applicable. Based on the uncertainty of the availability of manufacturer's instructions related to torquing flexible conduit couplings (determined from the SQN evaluation), SQ-CAR-87013 was also determined to be generically applicable. Both CAQ's relate to flex conduit installation deficiencies similar to BFNNEB-8632.

SQN

The site implementing procedure adequately addressed the proper tightening of flexible conduit couplings and verification was performed by QA/QC personnel. During investigation of the implementation aspect of the program as a result of NRC comments, it was discovered that the manufacturer's instructions were not effectively utilized during the installation process and resulted in SQ-CAR-87013. The failure to follow the manufacturer instructions was attributed to the lack of knowledge of those instructions and is considered to be a breakdown in the DNE output document G.C.S. G-40 in that the manufacturer's torque values were not included. Since the availability of this information was inadequate, implementation of the established program at BFN and other active TVA nuclear sites is questioned.

Corporate DNE should address all flexible conduit issues in light of the requirements contained in G.C.S. G-40 and provide complete and necessary directions to be utilized at all active TVA sites to evaluate the adequacy of existing installations.

BLN

Although the site procedures require flex conduit couplings to be "tight," torquing of the couplings per manufacturer's instructions is not required. The site procedure is considered inadequate in this regard. |R2

BLN-NCR 4936 Revision 0 was generated to address or take exception to SRN-11 to G.C.S. G-40 and relates to various aspects of flexible conduit installation configurations. The disposition of this NCR should be consistent with the policy memorandum from Raughley to those listed dated May 14, 1986 with the cited deficiencies corrected. |R2

Followup Action Conclusions

Conclusions to the followup action for generic applicability of SCR BFN EEB 8632 on the installation of flexible conduit follows:

(1) TVA was advised that thermal/seismic considerations for flexible conduit required evaluation for prior installations in a memorandum from NSRS to DNE (reference attachment C) in 1980. WBN NCR 6529 RO was initiated in 1985 only after the NRC site resident issued an unresolved item report on flexible conduits. The resulting evaluation determined a significant and reportable condition for both WBN units, and resulted in an NRC violation.

(2) The following determination for generic applicability at other nuclear plants was apparently haphazard. DNC referred the condition to DNE, which initiated quick response to DNE electrical project engineers for SQN, BFN, and BLN to investigate applicability. The only response to this memorandum was from the SQN project engineer stating this condition had been forwarded to ONP for evaluation. Approximately six months later BFN initiated SCR BFN EEB 8632 to document the condition.

(3) Correction methods specified by DNE were inadequate to provide assurance that existing installations meet the intent of G.C.S.G-40 and therefore, require re-evaluation at all active nuclear sites.

i. Covers were left off conduits and pull boxes allowing dirt and other debris to enter.

WBN

The concern was determined to be factual. A problem did exist with debris in conduits when field observations were conducted, but no damage to cables was observed. A review of the procedures show adequate precaution was required to ensure conduits are clean after installation and before cable pulling, but the inspection of conduit cover installation was not specifically addressed in the site procedure.

BFN

A review of the site procedure determined sufficient controls were not established to prevent dirt and debris from entering the conduit through openings in conduits, junction boxes, etc., while covers were removed.

SQN

A review of the site procedures concluded the requirements do not address the installation of conduit or pull box covers to prevent dirt and debris from entering the conduit.

BLN

Site procedures effectively provide control methods for preventing dirt and debris from entering conduit immediately prior to and after cable installation, and during raceway verification at the time of transfer. The procedures do not address the time span between initial conduit installation and cable pulling activities when referring to covering the conduit system openings.

j. Conduits were not properly sealed to prevent water from entering.

Based on the findings, the concern was factual. Water was found to enter conduits but DNE determined the moisture did not adversely effect safety-related cables. Action had been taken to correct water entry. This issue was considered specific to WBN and no generic implications were noted.

k. Conduit was installed and subsequently removed and reworked. (Note: This concern was specific to BLN and no generic implications were noted.)

This concern was concluded to be not factual. The specific conduit the individual was concerned with could not be identified, but investigation indicates the conduit was associated with ECN 1951. The rework of the conduit in the Decontamination Room was a result of necessary design changes. No deficiencies were discovered as a result of this evaluation.

1. Undersized conduit penetrations are being used, creating the potential for conduit overfill.

   The employee concern was factual and specific (non-generic) to BLN. DNE did allow the use of 1-1/2"Ø conduit penetrations in a 2"Ø conduit system.

   The change submitted to DNE was correctly reflected on issued drawings, but the possibility existed that the information was not taken into consideration when inputs were made to the cable routing program. This could have resulted in the conduit penetrations having cables installed exceeding the maximum allowable fill. Calculations performed as a result of this investigation show that the maximum allowable fill had not been exceeded and the cable routing program was being updated to reflect the proper size conduit.

4.2 Findings on Cable Trays

4.2.1 Site-Specific - WBN

Discussion

Three WBN-specific concerns addressing cable tray penetration installation and identification were evaluated. The findings are discussed below as two issues.

a. Cable tray wall penetrations were not properly installed because the fire barriers have gaps greater than 1/8 inch between board pieces and penetrations through walls and floors are stuffed with cotton.

   A review of WBN-QCP-3.04 and WBN-QCP-1.55 revealed that TVA once had a requirement for no more than 1/4 inch gap between pieces of fireproofing board. Later revisions dropped the requirements and now state fiber board should be placed "snugly" around the cables and cable tray, and ceramic fiber should be placed in voids and cracks which are present between the boards, cables, and cable trays.

A review of the 45W883 series drawings revealed the installation instructions for fire stops did not require a minimum gap between fiber board (Kaowool) pieces. The boards were required to follow the contour of the cables and the voids were to be packed with Kaowool fiber stuffing.

A review of the IEEE standard revealed the completed fire barrier must be able to withstand the effects of the most severe fire that may occur in the adjacent area. No requirements were given which specifically related to the spacing of fireproofing board pieces.

Discussions with DNE Fire Protection Section Engineers, revealed that TVA uses a recognized test laboratory, Factory Mutual, to test worst case-fire conditions for cable tray firestops to develop the basis for installation requirements on TVA drawings 45W883 series.

Review of applicable TVA contract for the purchase of firestop materials revealed that Kaowool fiber was suitable for continuous exposure to 2300°F. This temperature exceeded that of the Kaowool fiber board which was suitable for application to 2100°F.

The review of IEEE standards, site procedures, and installation drawings revealed criteria for firestops and fireproofing seals was adequately addressed. The material specifications for fiber-type insulation, fireproofing insulation board and bulk ceramic fiber fireproofing insulation was in conformance with material procurement contracts. Random observations during walkdowns with a civil quality control inspector and discussions with engineers in the DNQA Civil Quality Control Unit, DNE Fire Protection Section, Modifications Section, and the DNC Electrical Equipment Unit confirmed the installation criteria and material were properly applied. No evidence of cotton being used was found in plant walkdowns or in discussions with personnel. The word "cotton" was used as a slang term when referring to the ceramic fiber insulation, apparently because of the similarity of the texture of the materials. The site procedural review revealed that WBNP-QCP-3.7 Revision 0 had |R2

requirements for no more than 1/4-inch gaps between firestop insulation board pieces. Later revisions changed the requirement and stated fire board should be placed "snugly" around the firestop penetrations, and that ceramic fiber (Kaowool) should be placed in the voids and cracks which exist between fireproofing boards, cables and cable trays. This review determined the findings and conclusions of the QTC report on this issue were consistent with this evaluation.

b. Cable tray wall penetrations were not identified by name or number.

A plant tour with the Civil Quality Control inspector revealed cable tray markings with adhesive backing were on each cable tray section observed. Some damage from construction was noted to the markings, but the markings were identifiable.

Review of Inspection Test 35 documentation for O-CTP-290-34 revealed that the penetration identification was in place at the time of inspection. Field observation verified the installation.

Designated penetration numbers appeared to be clearly stenciled on the wall for cable trays.

Review of the nuclear power operations surveillance instructions, SI-7.24 through 7.30, revealed that cable tray penetrations were identified by assigned block numbers and are listed in a table along with other location information.

Conclusions

a. Concern: Cable tray wall penetrations were not properly installed because the fire barriers have gaps between board pieces greater than 1/8 inch and penetrations through walls and floors are stuffed with cotton.

This concern was not factual and was deemed non-generic. TVA does not have a current requirement for no more than an 1/4 inch gap between fire board pieces. A review of the applicable standards, and discussions with electrical engineers showed the gap requirements were adequately addressed. Field Observations verified the installations are installed as required and no "cotton" is stuffed in wall and floor penetrations.

b. Concern: Cable tray wall penetrations were not identified by name or number.

This concern was not factual and was deemed non-generic. A review of the inspection documentation showed cable tray penetration numbers were recorded. Field observations verified wall penetrations were marked. In addition, Nuclear Power Operations stenciled cable tray penetration numbers to the wall after transfer from construction.

4.3 Findings on Conduits Fittings

4.3.1 Generic

Discussion

As a result of the investigation into the WBN-specific concern, this issue was deemed potentially generic to all active TVA nuclear sites. The non-magnetic fittings, perceived by the concerned individual to be aluminum, were determined to be zinc. Zinc is a metal which would contribute to hydrogen build-up inside containment during a Loss Of Coolant Accident (LOCA) or other DBEs resulting in Containment Sray. Zinc can react with borated water to form hydrogen. General Construction Specification G-40 did not identify the need to control amounts of zinc coated or cast zinc materials within containment.

Conclusion

Zinc coated or die cast zinc materials may be found at other TVA plants. Zinc inventories inside containment are required for hydrogen contribution evaluation by DNE. The lack of clarity in G.C.S.G-40 in identifying the need to control amounts of zinc makes this issue potentially generic to other TVA sites.

A further review of generic applicability exempted the BFN site since the containment atmosphere is inerted with nitrogen and no boric acid spray system is utilized during a LOCA or Design Basis Event. Therefore, no chemical reaction would take place creating additional hydrogen inside containment.

4.3.2 Site-Specific

Discussion

The findings will be discussed specific to the TVA site investigated.

WBN

The perceived problem was that Erickson type fittings, discovered to be non-magnetic and thought to be aluminum, were undesirable in the Reactor Building. This was because the fittings would react with Boron spray and increase the hydrogen concentration inside containment in the event of a LOCA or other DBEs (high energy line break inside containment) requiring containment spray.

A review of the QTC files determined no additional information was available for this concern.

G.C.S.G-40 referenced IEEE Standard 690-1984, which identified that both zinc and aluminum would react with boric acid to form hydrogen.

Review of G.C.S.G-40 revealed that the materials used for conduit systems must meet the requirements of an approved, recognized standard and must be compatible with the environment and configuration in which they are located. No clear statement was given to restrict the use of zinc coated or die cast zinc materials inside containment.

Review of DNE Engineering Procedure 5.01 revealed the originating section was responsible for specifying any special materials or exclusion of materials for purchased equipment.

Discussions with DNE procurement engineers revealed that the purchase of conduit fittings originated onsite by DNC.

Discussions with an electrical foreman revealed that the non-magnetic fittings (thought to be aluminum) were once issued to the craft who then referred them to the Electrical Engineering Unit (EEU) for approval.

Discussions with EEU engineers revealed that Erickson type fittings suspected of being aluminum were referred to DNE by memorandum from the Electrical Quality Control Unit (EQC) for evaluation. EQC could not provide a copy of the DNE's memorandum for review.

Discussions with EQC inspectors revealed DNE had evaluated the fittings, talked to the manufacturer and related that the material was not aluminum. EQC had samples of the fittings left over in a box, but could not provide documentation stating the fittings were not aluminum.

Discussions with a TVA metalurgist from Office of Nuclear Power (ONP) Technical Services revealed that non-magnetic samples obtained from EQC were die cast zinc.

A review of DNE's WBN calculation number WBNSSG4-002 revealed that the calculated amount of hydrogen produced from the corrosion of aluminum and zinc following a DBE was based on the guidelines of NRC Regulatory Guide 1.7, Revision 2, by using current inventories of aluminum and zinc coatings in containment as of March 7, 1984. The inventory data used assumed TVA had a total of 752,180 square feet of surface area containing zinc coatings.

Discussions with DNE NEB Chemical Analysis supervisor revealed WBNSSG4-002 established a reasonable estimate of time prior to plant operation of the hydrogen recombiners, hydrogen igniters, or as a last resort purge containment in the event of a DBE to decrease hydrogen build up and pressure. The methodology used was based on the conservative assumption that all reactive metals inside containment would be totally consumed. For this reason, additional amounts of zinc would not adversely effect the calculation results unless large quantities were introduced.

SQN

Discussions with SQN DNE Electrical Engineers (EE) site procurement personnel revealed that TVA Standard Procurement Specification for Rigid Steel Conduit (zinc coated) Number 21.001, dated February 2, 1981, was utilized for procurement of conduits and accessories such as couplings, elbows, and fittings. The requirements of this specification ensure mild

steel construction with galvanized (zinc) coatings and complies with the requirements of Underwriters Laboratories, Inc., Standard UL 6 and the American National Standards Institute (ANSI) C80.1. Further discussion and review of applicable purchase requisitions revealed that fittings such as elbows were procured as non-QA and not subject to the requirements of TVA Specification 21.001. Since these and similar fittings are commercial grade materials manufactured to industry standards (including die cast zinc), the potential exists for non-coated zinc materials (reactive metals), to have been procured and installed inside the containment which have not been inventoried.

Discussions with site DNE chemical engineering personnel revealed an inventory was performed in October, 1985, and had been included in the calculation package for reactive metals. This update of inventory was performed by a review of applicable Engineering Change Notices (ECNs) issued since 1979, to determine if any aluminum or zinc materials had been specified to be installed inside containment. Updates to the calculation package will be performed in this manner on at least a yearly basis. In addition, this review assumed all fittings were zinc coated similar to the conduit run and did not include non-coated (zinc) materials.

Discussions with DNE-EE conduit and grounding personnel indicated no controls had been established by G.C.S.G-40 relating to the introduction of zinc coated or die cast zinc materials into containment.

BLN

Discussions with Electrical Engineering procurement personnel revealed that the only permanent electrical materials procured by DNC site personnel are those allowed by G.C.S.G-40. This material is procured from DNE approved Indefinite Quantity Term (IQT) contracts. No aluminum electrical materials are procured by DNE for use at BLN.

A review of the IQT contract used by DNC site personnel to procure miscellaneous electrical materials concluded the contract did not exclude items made from aluminum or zinc.

A review of the site procedure for installing conduit, QCP-BNP-3.2, "Conduit Systems," determined no constraints were placed on the use of aluminum, zinc coated, or die cast zinc materials inside containment.

Conclusion

The concern that non-magnetic fittings were undesirable in the Reactor Building and would react with boron to increase the hydrogen concentration inside containment is factual. The employee perceived the Erickson type fittings were aluminum but investigation showed the fittings to be die cast zinc.

Investigation determined that die cast zinc can react with borated water to form hydrogen. The boron spray is used in the containment after a LOCA, or Design Basis Event. The amount of hydrogen build-up in containment is calculated to prevent adverse effects. The methodology used to calculate hydrogen build-up was to assume that all metals reactive to boron would be totally consumed.

The potential exists at WBN, SQN, and BLN for die cast zinc materials to have been received and installed within the containment without being included in the appropriate DNE calculations for hydrogen build up.

Lack of controls and inspection requirements in the upper-tier procedure and procurement contracts for controlling the use of die cast zinc materials resulted in the deficiency.

Steps should be taken to ensure accurate inventories are established for the current active plant configurations. Controls should be established to ensure future updates to reactive metal inventories if die cast zinc or aluminum are installed. Calculation packages for each affected site should recognize/include die cast zinc materials as required.

G.C.S.G-40 should be revised to establish control of reactive metals inside containment.

TVA Procurement Specification Number 21.001 should be utilized for all procurements of conduits and conduit fittings (where possible). All procurements of conduit, fittings, and accessories should be performed in accordance with the DNE established guidelines requiring a QA approved vendor and the appropriate certificate of conformance.

5.0 COLLECTIVE SIGNIFICANCE

5.1 Significance of Each Issue

5.1.1 Conduit

The 12 perceived problem areas in this issue were evaluated and five areas were identified which present a problem requiring corrective action. These five areas were determined to be potentially generic to other sites.

Weaknesses were identified in the DNE Electrical Design Organization, which resulted in inappropriate installation criteria and correction methods being issued. Deficiencies were present in the design output document related to excessive conduit bends, flexible conduit installations and the perceived problem associated with the use of reducing bushings (actually determined to be a result of cable overcrowding). Therefore, these deficiencies were propagated throughout work control procedures utilized by the construction forces. This condition resulted in post construction walkdowns, reinspections, engineering evaluations and laboratory tests, all of which contribute to the potential for plant rework.

As related to the issue of poor quality conduit and materials, the DNE had recognized the necessity of procurring this material from QA approved suppliers requiring the appropriate quality assurance as early as March 31, 1978 and did convey this information to the DNC. However, the Division of Construction (DNC) and DNE were ineffective in establishing adequate procedures and instructions to ensure that the quality of conduit materials were verified at the time of procurement, receipt, and/or installations.

Since the "activity" of receipt is a quality assuring function and adds credibility to all permanent plant items, site controlling procedures should have contained appropriate guidelines to identify or describe what condition or examinations were to be utilized to detect and disposition over, short, substitute, damaged or defective (OSSD or D) items in the case of non-QA procurements (if this type of procurement is approved by DNE related to conduit material). Three of the four active TVA nuclear sites were identified to have weaknesses in this area. Additionally it was noted that inspections or examinations performed at the time of issue were not always implemented to the same degree when items were returned to the warehouse storage facility. Some actions were identified and suggested which would ensure that only acceptable items were placed in warehouse storage and subsquently issued for installations. |R2

The remaining problem area also reflected deficiencies in the ONP and DNC established procedures related to the protection of permanent plant items such as conduit and associated hardware. The overall conduit installation procedures at each active TVA site did not contain sufficient instructions to ensure the cleanliness of the completed conduit system by placing either permanent or temporary covers on all openings. Good industrial practices such as this type of protection of equipment etc., should have been a part of all established programs, utilized by all parties involved, and reasonably monitored to ensure the proper attention was given.

It is significant to note that TVA had effectively addressed 7 of the issues raised by employee concerns or the concerns were not factual and produced no negative findings.

The technical adequacy of each active TVA nuclear site related to the five problem areas is discussed below.

All active TVA sites were affected by the indeterminate status of installed cables resulting in deficiencies relating (in-part) to excessive conduit bend violation and cable overcrowding within the conduit run. These deficiencies contribute to the potential of exceeding the allowable cable sidewall pressures during installation activities. DNE is presently evaluating these and other similar cable problems to determine each site's reliability or suitability for service. Further discussion related to cable overcrowding is contained in the Construction Cable Report 10900.

The adequacy of flexible conduit installations was also indeterminate and requires a re-evaluation by DNE to determine each active site's reliability or suitability for service. Consideration must be given to all aspects of the installation process to ensure the intent of the established requirements are met. Evaluation of this issue is underway by DNE at SQN and will likely establish the baseline evaluation program for use at other active sites.

Suitability for service was not compromised by the deficiencies identified pertaining to poor quality or defective conduit materials nor poor work practices associated with conduit cleanliness. Since conduit itself provides mechanical protection to the cables inside, the quality of material would only contribute to difficulties encountered during the installation process (i.e., threads do not meet the requirements of UL-6 and/or require chasing or cleaning during the installation process). The presence of burrs, sharp edges, dirt and debris have the potential to damage the cables during the installation process. However, the completed cable systems are subjected to a minimum of functional and/or preoperational testing. Additionally, high potential (HI-POT) or megger tests are performed on selected cables and provide added assurance that the cables will perform their intended function. |R2

5.1.2 Cable Trays

No collective significance is applicable to this issue. TVA had properly addressed the requirements and the installations were acceptable.

5.1.3 Conduit Fittings

The problem identified in the investigation of this concern resulted from reactive metal fittings being installed inside containment without being included in DNE calculations. The reactive metals, like die cast zinc, are assumed to be totally consumed during a LOCA or other DBE requiring containment spray, whereas coated fittings would only have surface reaction.

This problem resulted from unclear requirements stated in the design output document G.C.S. C-40, specifying reactive metal controls, and inadequate DNE procurement specifications to control the receipt of reactive metals. These deficiencies affected three of the four active sites. This resulted from the lack of establishment of an effective program to control the inventory of reactive metals inside containment which may in turn result in more hydrogen being produced inside containment than was anticipated during or after a borated water spray.

5.2 Collective Significance of the Subcategory

5.2.1 Generic

The technical inadequacies discussed in this report indicate predominately that deficiencies existed in the design output documents and when these deficiencies were identified, inadequate or incomplete correction methods were specified by DNE.

The established program did not effectively control the retroactivity of newly established requirements nor was it effective to ensure that all affected plants were made aware of problems identified. This deficiency indicates that inadequate coordination and communication of the Design and Construction efforts was present. The events occurring in the subsequent generic review of applicable NCR's indicated a lack of clear responsibility assignment for conducting generic applicability reviews. Failure to follow-up to ensure the evaluation had been performed and documented also shows this lack of responsibility. The generic applicability review should be the originating organization's responsibility for their area of involvement. The determination of how widespread the nonconformance is within the organization, and the coordination, follow-up, and documentation of the applicability to other sites should be forwarded to a central single organization. This should also include the review for generic applicability for NRC items, I.E. Bulletins, and 10 CFR 50 Part 21 Notifications. It is collectively significant to note that the employee and the constructing organization were effective in the application of the properly established requirements supplied by DNE. The quality or suitability-for-service (given the established requirements) was hampered by the inadequate design criteria and existing programmatic deficiencies. Checks and balances were non-existent or ineffective to ensure that the proper responses (to those identified deficiencies) were received from each site and that they adequately addressed the issue. |R2

Since 3 of the 4 active TVA nuclear sites experienced some weaknesses (either in the procurement, receipt or installation/practices or inspections) to detect or prevent damaged or defective conduit or components, a need to strengthen the design output document is believed to be warranted. The design output document should require an inspection or examination to detect such items as burrs, sharp edges, etc., to prevent damage to the cables during pulling activities. Similarly, all active nuclear sites displayed weaknesses in their attentiveness to good industrial practice related to the protection of permanent plant equipment and indicates the need for strengthening or establishing either a design requirement or corporate division level policy to address this problem. |R2

As related to the introduction of uncontrolled die cast zinc (reactive metals) inside containment at WBN, SQN, and BLN, it is significant to note that more hydrogen may be produced during a design basis event than was anticipated. DNE was ineffective in establishing adequate controls for such materials and evaluation is required to determine the impact on post accident plant operation.

5.2.2 Site-Specific

No site-specific significance was determined for the subcategory.

6.0 CAUSE

6.1 Conduit

Negative findings and causes are concluded for the following areas:

a. Conduits had accumulated bends more than 360° between cable pull points.

DNE G.C.S.G-40 contained no requirements restricting excessive bends. As a result, installation procedures at SQN and WBN sites lacked criteria to satisfy this requirement.

b. Conduits issued to the craft were damaged and made of inferior materials.

Site procedures generally lacked specific guidance to check for damage or defects in conduit, either at the time of receipt, issue, or installation. The procurement of conduit previously lacked controls to ensure delivery of QA conduit and fittings and subsequent procurements were inconsistant in the application of QA requirements.

c. Flex conduit couplings were not properly torqued and conduit may not be completely screwed together.

The cause of the follow-up action to evaluate the retroactivity of the thermal and seismic considerations for flexible conduits was a failure to properly evaluate past installations when the criteria was initially incorporated into the G-Spec. The generic applicability review was inadequate because there was no clear designation of an organization responsible to coordinate, follow-up, and document generic reviews for adverse conditions and may be attributed (in part) to inadequate coordination and communication of the Construction and Design efforts. Additionally, inadequate corrective measures specified by DNF resulted in a "piecemeal" approach to the resolution of the flex conduit issue.

d. Covers were left off conduits and pull boxes allowing dirt and other debris to enter.

This problem was caused by the site procedures which lacked sufficient detail to require protection from dirt and debris entering conduits by installing temporary or permanent covers on conduit openings.

e. Undersized conduit penetrations are being used, creating the potential for conduit overfill.

The field change to use undersize conduit penetrations was not taken into consideration when updating the cable routing program. DNE performed calculations to ensure the maximum cable overfill had not been exceeded and is updating the cable routing program to reflect the proper size conduit. This finding was caused by DNE's failure to update the cable routing program as a result of a field change to conduit penetration size. The DNE cable routing program was deemed inadequate for controlling conduit fill because no automatic method for indicating percentage fill was incorporated into the routing program. This deficiency is discussed at length in the Construction Category Report 10900 titled, "Cable."

6.2 Cable Tray

Non-Applicable

6.3 Conduit Fittings

The cause of this finding was the lack of requirements in G.C.S.G-40 for specifying controls for reactive metals for conduit fittings. Procurement specifications were not adequate to control reactive conduit fittings. Specifications allowed the contract supplier to provide die cast zinc fittings as well as galvanized fittings. Inventory methods to establish and maintain quantities of reactive metals inside containment were not accurate.

7.0 CORRECTIVE ACTION

7.1 Corrective Action Already Taken

a. Conduits had accumulated bends of more than 360° between cable pull points.

WBN site NCR 6347 documented instances of accumulated bends more than 360°.

WBN site procedure QCP-3.03, and DNE Design Standards DS-E13.1.4 and DG-E13.1.1 have incorporated requirements to restrict the accumulation of bends more than 360 degrees

BLN site NCR 4254 required a verification of previously accepted conduit for conformance to the excessive bend criteria.

BLN site standards, operating procedures, and quality control procedures previously incorporated restrictions to limit excessive conduit bends.

b. Conduits issued to the craft were damaged and were made of inferior materials.

Conduit material contracts presently require limited quality assurance requirements and suppliers with an approved QA program.

c. Flex conduit couplings were not properly torqued and conduit may not be completely screwed together.

WBN NCR 6437 documented several cases of loose fittings and corrective action was completed.

BLN-NCR 4936 took exception to flex conduit installation criteria.

SQ-CAR-87013 documented known violations related to torquing flex conduit couplings.

d. Conduits were not properly sealed to prevent water from entering.

WBN initiated Work Release 26242 to require corrective action to prevent water from entering the conduit.

e. Undersized conduit penetrations are being used creating the potential for conduit overfill.

DNE BLN has performed calculations for maximum allowable fill and is updating the cable routing programs to reflect the proper size conduit.

7.2 Corrective Action from CATD's

a. Finding: Conduits had accumulated bends more than 360° between cable pull points.

Requested Corrective Action:

DNE to complete evaluation of side-wall pressure testing being conducted at Central Laboratory and establish disposition of previously installed conduit at WBN, BFN, SQN, and BLN violating the 360° bend requirement. (CATD-19200-NPS-01)

Response:

TVA's Cental Laboratory test results on cable sidewall bearing pressure concluded that allowed pressures were 4 to 5 times higher than previous manufacturer's limits. Calculations for SQN and WBN and test results concluded that cable pulling practices in the worst case conduit configurations for SQN and WBN would not result in sidewall pressures that cause damage to the cable insulation. These test results were consistent with the ERPI Report No. EL-3333. An independent third party, David A. Silvers & Associates, Inc., has concluded that the TVA testing is a reasonable basis for increased sidewall pressure values. Specification Revision Notice SRN-G-38-11 has been issued to raise the sidewall bearing pressure limits based on this testing and conclusions of the third party review. R2

Response (con't):

General Construction Specifications G-40 has also been revised to limit the total sum of all bends in a conduit run to 360° between pull points.

The testing and analysis results have been submitted to the NRC. TVA is continuing resolution with the NRC on this issue; if any additional corrective action, either short-term or long-term, is required as a result, then the CAP will be revised accordingly. Calculations for cable sidewall bearing pressure for BFN and BLN remain to be completed.

Requested corrective action:

SQN to respond to DNE's evaluation of cable side wall pressure violations and perform the required actions in order to address the potential violation of excessive conduit bends related to past installations. (CATD-19201-SQN-05)

Response:

SQEP-ELEC #2 is presently performing a field walkdown to identify conduits with multiple bends between pull points which would cause excessive sidewall pressure per special maintenance instruction SMI-0-317-32, dated June 20, 1986. All violations found that have potential safety impact after complete evaluation will be documented in accordance with SQA 118. Work Requests (WRs) will be written to rework the configuration of the conduit systems and install new cables. R2

Requested Corrective Action:

ONP - SQN to revise SNP MAI-6 to incorporate a requirement to prohibit the installation of conduit exceeding 360° accumulation of bends between cable pull points and to require a QA/QC verification. (CATD-19201-SQN-04)

Response:

Memorandum was sent from D. W. Wilson, Project Engineer, Sequoyah Engineering Project to R. W. Olson, Modifications Manager, October 21, 1986 (RIMS B25 861021 040) requesting that M&AI-6 be revised to include the information above.

b. Finding: Conduits issued to the craft were made of inferior materials.

Requested Corrective Action:

ONP - SQN to revise AI-11 to establish specific guidelines for acceptable conduit and conduit fitting material inspection requirements at receipt and actions to be taken in case defective material is procured. (CATD-19201-SQN-01)

Response:

Memorandum was sent from D. W. Wilson, Project Engineer, Sequoyah Engineering Project to Z. M. Kabir, Manager, Site Services, October 21, 1986 (RIMS B25 86102 039) requesting that administrative instruction AI-11 be revised to include specific guidelines for receipt of non-QA/non-CSSC items with emphases placed on the quality of conduit material and accessories.

Requested Corrective Action:

DNC BLN to revise BNP-QCP-1.1 to assign responsibility for assignment of proper storage levels of material, revise BNP-QCP-10.12 to require specific inspection requirements for material defects, revise BNP-QCP-3.32 and 3.2 to provide precautions to installer and inspection personnel to visually inspect conduit and fittings for burrs, sharp edges, flattened threads or other irregularities to prevent damage to the cable during pulling operations. (CATD-19200-BLN-01) R2

Response:

BNP-QCP-1.1, "Receiving Inspection," will be revised to add conduit to Attachment B. BNP-QCP-10.12, "Material Issue Control," will be revised to require inspection and documentation of returned conduit and fittings. BNP-QCP-3.34, "Electrical Cable Installation" shall be revised to add a prerequisite inspection for burrs and sharp edges on accessible condulet fittings. Revisions to the above procedures will be accomplished by September 1, 1987. We believe that these procedural changes will sufficiently address the concern. R2

Requested corrective action:

SQN to initiate craft training for conduit installation with emphasis on G.C.S.G-40 requirements and requirements for identifying damaged or defective conduit or fittings at point of installation. (CATD-19201-SQN-06)

Response:

DNC Modifications will review the requirements of M&AI-6 with emphasis of G-40 to all DNC electricians.

Requested corrective action:

WBN was requested to revise the receipt inspection procedure WBN-QCP 1.06 to detect defective conduit materials. (CATD 19200-WBN-03)

Response - 1. Issue revision request to QCP 1.06 to define physical damage at receipt inspection which include inspection of threaded items for burrs and thread damage. Revision Request 87-160 was initiated to accomplish this task.

2. Train receipt inspection personnel to revision and place special emphasis on thread damage inspection.

Requested corrective action:

Corporate DNE was requested to revise design output documents (G.C.S.G-40 and/or TVA Specification 21.001) to re-emphasize the QA requirements for conduit and associated hardware. (CATD 19200-NPS-06)

Response - TVA-DNE Standard Specification SS-21.001 will be revised to remove the section which allows the waiver of and and/or all of the inspections, tests, or tests reports. A Specification Revision Notice to General Construction Specification G-40 will be issued to require that rigid conduit and accessories comply with TVA-DNE Standard Specification SS-21.001. An investigation will be initiated to determine the current industry practice in imposing QA requirements in conduit procurements. Based on the results of this investigation, a determination will be made as to whether SS-21.001 needs to be further upgraded and whether previous guidance such as that given in the memorandum from J. C. Killiam to D. B. Weaver dated March 9, 1978 (DOC 780310 002), be revised or complied with. R2

c. Finding: Floor mounted 10 CFR 50.49 equipment with flex conduit connected less than six feet above the floor is not addressed for minimum length criteria.

Requested Corrective Action:

DNE to revise NCR BFN EEB 8632 installation guidelines to fully address the flexible conduit connected to 10 CFR 50.49 equipment less than six feet above the floor for minimum length criteria. (CATD 19200-NPS-02)

Response:

General Construction Specification G-40 issued in 1975 established requirements for installing electrical conduit systems and conduit boxes for the SQN and all future nuclear plants.

Revision 9 of G-40 imposed the requirements within the specification on future modifications at BFN. Specification Revision Notice SRN-G-40-12 was issued to impose the requirements of G-40 on all work at BFN effective June 20, 1986.

A memorandum to Those listed from W. S. Raughley, dated May 14, 1986, provided guidance to each Electrical Lead Engineer to determine the adequacy of flexible conduit lengths for thermal and seismic movements for installed Class 1E equipment and devices on the 10 CFR 50.49 lists. As a minimum each nuclear plant will be evaluated using this guidance and CAQs will be dispositioned accordingly. R2

In addition for BFN, since minimum lengths of flexible conduit were not specified by General Construction Specification G-3, calculations will be performed to determine acceptable lengths of flexible conduit for floor mounted equipment below six feet above the floor level. Using this data, a random sample of 10 CFR 50.49 devices will be inspected to determine acceptability. NCR BFNEEB8632 will be revised to incorporate these required actions and will be tracked in TROI until completion.

Specification Revision Notice SRN-G-40-11, which was effective on July 1, 1986, specifies flexible conduit length in respect to thermal and seismic movement for installation on all classes of equipment and components. Reference: SRN-G-40-11 (B43860522902)

Requested Corrective Action:

SQN was requested to resolve the flexible conduit installation deficiency described in the policy memorandum from W. S. Raughley to Those listed dated May 14, 1986 and include 10 CFR 50.49 floor mounted equipment in this evaluation. (CATD-19201-SQN-02)

Response:

SQEP-ELEC number 2 is presently performing a field walkdown of flexible conduit installations according to special maintenance instruction SMI-0-317-33 dated August 11, 1986. Work Requests (WRs) will be written to correct any discrepancies found.

Requested Corrective Action:

DNE corporate was requested to re-evaluate the correction methods specified in the W. S. Raughley memorandum dated May 14, 1986 and establish accurate requirements for all sites to follow to ensure that existing flexible conduit installations meet the intent of G.C.S.G-40 SRN-11. (CATD 19201-NPS-01)

Response:

R2

DNE will reevaluate the instructions given in the W. S. Raughley memorandum to determine acceptability of all Class 1E flexible conduit installations. This evaluation will include all generic implications of WBN NCR 6529. From this evaluation, a total plan will be developed to resolve this issue.

TVA will initiate CAQR's if unacceptable conditions are determined to exist.

Requested Corrective Action:

SQN was requested to address the procedure violation noted during the performance of Special Maintenance Instruction (SMI-0-317-33 R1). (CATD 19201-SQN-08)

Response:

During the performance of SMI-0-317-33, Revision 1, the bend radius requirement was inadvertently omitted. After further study, we have decided to eliminate this requirement from the procedure. Flexible metal conduit provides only mechanical protection for cables and no failures have to date been attributed to bend radius violations. Also, in general, the

seismicity of the equipment does not depend on the bend radius of the flex conduit as long as there is adequate movement (which we have assured) and the flex conduit does not exceed 6'0". Based on the above, we conclude that this work is not a restart item. After plant restart, a flex bend radius sampling (according to MIL STD 105D) will be performed. Estimated completion date for this activity is October 1987.

d. Finding: Flex conduit couplings were not properly torqued.

Requested Corrective Action:

DNC BLN to revise the applicable site installation/inspection procedures to require torquing of flex conduit couplings to manufacturer's instructions. (CATD-19200-BLN-03)

Response:

BLN-DNC has never interpreted General Construction Specification G-40 as requiring a specific torque value application for conduit flex couplings. We understand that G-40 may be revised to add this requirement. When this revision is issued, we will implement the requirement into our site procedures. R2

Requested Corrective Action:

DNE corporate was requested to revise G.C.S.G-40 to include the required specific torque values to be used during the installation of flexible conduit assemblies. (CATD 19201-NPS-02)

Response:

G-40 or appropriate engineering requirement specifications will be revised to add a table of maximum and minimum torque values for each flexible conduit fitting in each size used by TVA. DNE will establish values for future installation requirements and backfit as required. SCR W-577-R was written on March 3, 1987 and will assure that proper corrective action is taken.

Requested Corrective Action:

SQN was requested to re-evaluate the significance and generic applicability determination of SQ-CAR-87013. (CATD 19201-SQN-07)

Response:

CAR-87013 has been reevaluated by Electrical Modifications and QA and we concur that this is a nonsignificant condition. We do feel that this CAR should have been sent out to all active TVA nuclear sites for generic applicability and have requested the Quality Systems Branch to initiate.

Engineering has determined the liquid tight flexible connector manufacturers, by brand name, that have furnished connectors for SQN.

Technical information on torquing requirements were obtained. This research indicated that the manufacturers recommend adherence to UL 514B requirements for torquing because the connectors are UL approved per those tests.

G-40 or appropriate engineering requirement specifications will be revised to add a table of torque valves (as shown in UL 514B) for flexible conduit fittings to be used for future installations. Regarding current installations, no corrective action will be required based on the plant's maintenance history. The lack of torque values has not been shown to be a significant problem. We conclude that this work is not a restart item Estimate design completion date for this activity is October 1987. R2

M&AI-6 will be revised to incorporate changes to G-40. Affected site personnel will be trained on the site procedure revisions.

e. Finding: Covers were left off conduits and pull boxes allowing dirt and other debris to enter.

Requested Corrective Action:

DNC WBN to revise WBN-QCP-3.05 to include a requirement for verifying conduit and pull box covers are installed to protect installed cable/conduit from dirt and other debris. (CATD-19200-WBN-01)

Response:

Revise WBN-QCP-3.05 to include an inspection requirement to verify that condulet and pull box covers are installed to protect installed conduit from dirt and other debris. QCP-3.05 will be revised by March 20, 1987.

Requested Corrective Action:

BFN ONP to revise MAI-27 to address the installation of conduit and pull box covers to protect installed cable/conduit from dirt and other debris. (CATD-19200-BFN-01)

Response:

MAI-27 will be revised to address the installation of condulet and pull box covers to protect installed conduit from dirt and other debris.

Requested Corrective Action:

SQN ONP to revise MAI-6 to address the installation of conduit and pull box covers to protect installed cable/conduit from dirt and other debris. (CATD-19201-SQN-03)

Response:

Memorandum was sent from D. W. Wilson, Project Engineer, Sequoyah Engineering Project to R. W. Olson, Modifications Manager, October 21, 1986 (RIMS B25 861021 040) requesting that M&AI-6 be revised to include information in 6 above. R2

Requested Corrective Action

DNC BLN to revise BNP-QCP-3.2 to address the installation of conduit and pull box covers to protect installed cable/conduit from dirt and other debris. (CATD-19200-BLN-02)

Response

BNP-QCP-3.34, "Electrical Cable Installation," paragraph 6.3.1.1 states "The EQC Inspector verifies that the raceway is cleaned out immediately before the cable being installed in the raceway." BNP-QCP-3.32 "Raceway and Electrical Hanger Verification," paragraph 6.2.1.6 requires another verification by the EQC Inspector that all covers and gaskets for associated boxes and fittings are installed. BNP-QCP-10.27 "Housekeeping" will be revised by July 15, 1987 to include condulet and box covers. We believe that these procedural requirements, as stated, sufficiently address the concern.

f. Finding: Die cast zinc materials were not included in inventories for reactive metals inside containment.

Requested Corrective Action:

DNE to revise G.C.S.G-40 to establish control of reactive metals inside containment. (CATD-19200-NPS-03)

Response:

General Construction Specification G-40 shall be revised to indicate that die cast zinc conduit fittings shall not be used inside the Reactor Building primary containments which have a spray system that would cause a reaction to produce excessive hydrogen. (Aluminum conduit, conduit fittings or components are not allowed according to G-40 section 3.2.4.3.f.)

Note: BFN is exempt from this corporate change to G.C.S.-G-40 since the containment atmosphere is inerted with nitrogen and no borated water spray is utilized during or after accident conditions.

Requested Corrective Action:

SQN to revise G.C.S.-G-40 section 2.3 to establish control of zinc materials inside containment (including notification to the chemical analysis engineering personnel for update of the design basis calculation for hydrogen build-up). (CATD 19203-SQN-02) R2

Response:

1. Determine if a CAQ exists.

2. Revise G-40 to indicate that zinc conduit fittings or components shall not be used in the Reactor Building (aluminum conduit, conduit fitting or components are not allowed according to G-40 section 3.2.4.3.f). Control of notification to the chemical analysis engineering personnel for update of design basis calculations for hydrogen build-up will be addressed in CATD C019203-SQN-1.

Requested Corrective Action:

SQN to utilize TVA standard procurement specification for rigid steel conduit (zinc dated) number 21.001, dated February 2, 1981 for all conduit and accessories. (CATD 19203-SQN-03)

Response:

Revise G-40 to prohibit the use of die-cast zinc conduit bodies inside primary containment. The revision to G-40 will be made as corrective action to CATD No. C019203-SQN-2 and will wholly resolved this CATD No. C019203-SQN-3.

Requested Corrective Action:

DNE Chemical Analysis Section to incorporate die cast zinc fittings into inventories for future updates of calculations included in WBN SSG4-002. (CATD-19200-WBN-02)

Response:

DNE currently updates and revises the hydrogen generation calculations periodically to reflect changes in the light metal inventories existing inside containment at each of the sites that use a boric acid containment spray following a LOCA. However, no current procedure exists that sets specific guidelines for when or under what conditions those updates are generated.

NEB is currently writing a section (APS-7) procedure to describe how updates of the design basis hydrogen generation calculations are determined by establishing inventory guidelines for all light metals added to containment. The inventory must also define whether the component was replacement of an existing light metal component or a new item. The section procedure which will not impact any procurement procedure, will include all plants with boric acid spray, and should be complete by the end of February 1987. In addition, by the end of March, NEB will have coordinated with each discipline and construction how the inventory updates will be provided to NEB. If, after the section procedure is complete, a project procedure is needed, one will be issued by the first of June 1987.

R2

The last WBN update of the hydrogen generation calculations was completed in February 1986 based on inventory on March 1984. Current WBN calculations should not be impacted significantly unless there have been major modifications in the containment light metal inventories since March 1984. Minor additions will have little impact on the calculations, and these calculations will be periodically updated. The WBN calculation will be updated within six months (August 31, 1987) after issue of APS-7. This update will use the latest inventory, including die cast zinc fittings addressed in memorandum (B26 860617 003).

Requested Corrective Action:

DNE Chemical Analysis Section to incorporate die cast zinc fittings into inventories for future updates of calculations included in package B45851028551 for SQN. (CATD-19203-SQN-01)

Response:

1. Determine if a CAQ exists.

2. Prepare a procedure that ensures an accurate update of inventories of light metals which can be included in the appropriate design basis calculations of hydrogen build-up inside containment. Obtain a conservative estimate and revise O.E. cal SQN SSG 4.003 to document that the existing zinc fitting do not constitute a problem with hydrogen build-up that is adverse to quality.

   A discussion with the knowledgeable people concerning O.E. cal SQN SSG 4.003 has concluded that additional hydrogen caused by the use of the zinc fittings is very small and is not a major concern.

Requested Corrective Action

DNE to evaluate necessary corrective action required to address the potential die cast zinc fittings inside containment at BLN. (CATD-19200-BLN-04) R2

Response

The total inventory of source materials such as aluminum and zinc (which produce hydrogen in chemical reaction with the containment LOCA atomosphere) for the containment is documented in the Bellefonte FSAR Chapter 6, Section 6.2.5 (Table 6.2.5-3) and DNE Calculation "Volume Percent of Hydrogen in Containment Following a Loss of Coolant Accident (LOCA)," (NEB 831227 201). The source materials have been inventoried several times in the past and will be periodically inventoried in the future by DNE's NEB Nuclear Waste and Process Engineering Section. Conduit fittings, including zinc fittings, will be included in the inventory process. The inventories are provided to NEB by the various diciplines after a request for inventory is initiated by NEB. The inventory will include a distinction between coated and solid cast zinc fittings. FSAR Table 6.2.5-3 is revised after each calculation to reflect the latest calculation results.

g. Finding: Evaluations for new or revised requirements/criteria to Construction Specifications were inadequate.

Requested Corrective Action:

DNE to clearly list in Construction Specification Revision Blocks all new or revised requirements/criteria contained in the new revision. Include a positive statement if the criteria is required to be retroactive or not, and refer to documentation containing the reasoning for this evaluation. (CATD-19200-NPS-04)

Response:

Existing procedures governing construction specifications provide for new or revised requirements of a revision to be identified in a revision log and (except for general rewrite) by margin lines at the revised parts. Retroactivity is governed by establishing effective dates which have been coordinated with the affected organizations. This is also in existing procedures(NEP-5.1, sections 4.4, 4.6, 5.3 and attachment 3, pages 2, 3, 5, 8A and 8B). Documentation containing the reasoning for effective dates is normally not available for reference and such reference is not needed for implementation. However, to ensure consistent understanding, NEP-5.1 will be revised to require a positive statement on whether or not a specific construction specification revision is retroactive and documentation of the basis for the determination. R2

h. Finding: Generic reviews for applicability of adverse conditions are inadequate.

Requested Corrective Action:

ONP to assign responsibility to a single organization for coordination, follow-up, and documentation of adverse conditions for all sites, including generic review for applicability of NRC items. (CATD-19200-NPS-05)

Response:

NQAM, Part I, Section 2.16, R2, states specific requirements for conducting reviews of CAQs which may potentially affect an organization. These requirements also apply to CAQs identified by external agencies such as the NRC. The process for generic reviews defined in the corrective action procedure give clear lines of responsibility and accountability, and meet the: (a) Sequoyah startup commitment which is identified in the U2 forced outage report as activity 200050404 and in Volume 1, Revision 1, of the Corporate Nuclear Performance Plan as commitment Item 6 (Corporate Commitment Tracking System Control Number NCO-86-0156-037); (b) INPO commitment which is identified as finding 2.9A-2; (c) An internal audit commitment which is identified as NCO-CAR-86-017R. The following is a summary of the generic review process as defined in NQAM, Part I, Section 2.16; (1) The organization responsible for establishing the Corrective Action Plan reviews the CAQ to determine if a review for potential generic implications is required, (2) This review is approved by the reviewers supervisor, (3) The CAQ is sent to DNE-EA (Knoxville) if DNE is the responsible organization or to DNSL (Chattanooga) for all CAQs. (4) DNE-EA or DNSL reviews the CAQ to determine if it is potentially generic. Those CAQs determined to be potentially generic are sent to the potentially affected organization. A response is due back within 30 calendar days. An action item is entered into and tracked in TROI by DNE-EA or DNSL. (5) CAQs determined not to be potentially generic receive a justification. (6) When a response is received, DNE-EA or DNSL closes the action item in TROI, and forwards the response to the CAQ coordinator of the originating organization. (7) The organization responsible for developing the corrective action plan considers any possible generic implication of the CAQ within their organization such as division or site. Thus, not limiting the corrective action plan to merely addressing the specific CAQ that was identified. R2

The process described above provides for substantial standardization and centralization of the generic review process. All generic reviews will be tracked in a single tracking system and only two organizations are responsible for the coordination of this program.

i. Finding: Undersized conduit penetrations and reducing bushings create the potential for conduit overfill.

Requested Corrective Action:

Corrective action will be supplied by Construction Category Report No. 10900 titled "Cable" in the cable pulling issue (related to conduit overfill).

8.0 ATTACHMENTS

8.1 Attachment A, Subcategory Summary Table

8.2 Attachment B, List of Evaluators

8.3 Attachment C, Memorandum from Culver to Spouse dated August 26, 1980

8.4 Attachment D, List of Concerns by Issue

ATTACHMENT A
TENNESSEE VALLEY AUTHORITY
OFFICE OF NUCLEAR POWER
EMPLOYEE CONCERN PROGRAM SYSTEM (ECPS)
LIST OF EMPLOYEE CONCERN INFORMATION

CATEGORY: CO CONSTRUCTION-PROCESS SUBCATEGORY: 192 CONDUIT & TRAY

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 2	REPORT SAF BF	APPL RELATED BL	SQ	WB	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REFERENCE SECTION # CATEGORY - CO SUBCATEGORY - 192
EX-85-052-00201 T50172	CO	19200	N	WBN	1	N	N	N	Y		QTC	CONDUIT PLACEMENT IS DISORDERLY THROUGHOUT THE PLANT. CONSTRUCTION DEPT. CONCERN. CI HAS NO ADDITIONAL INFORMATION. FOLLOW UP NOT REQUIRED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1 4.1.2.2
					2	NA	NA	NA	NA				
EX-85-066-00201 T50183	CO	19200	N	WBN	1	Y	Y	Y	Y		QTC	THERE ARE NOT ENOUGH CONDUILETTS IN CONDUIT RUNS. AUXILIARY AND REACTOR BUILDINGS. CONSTRUCTION DEPT. CONCERN. CI HAS NO ADDITIONAL INFORMATION.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1 4.1.2.2
					2	SR	SR	SR	SR				
EX-85-092-00101 T50232	CO	19200	N	WBN	1	N	N	N	Y		QTC	CONDUIT WORK IS VERY POOR IN UNIT 2. THIS IS A GENERIC CONCERN. CI DOESN'T HAVE ANY DETAILS OR SPECIFICS TO PROVIDE. CONSTRUCTION DEPT. CONCERN. NO FOLLOW-UP REQUIRED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1 4.1.2.2
					2	NA	NA	NA	SR				
EX-85-162-00101 T50206	CO	19200	N	WBN	1	Y	Y	Y	Y		QTC	CONDUIT LINES ARE POORLY DESIGNED AND ENGINEERED. MANY ARE TOO CLUTTERED AND BEND RADIUS IS TOO TIGHT ON MANY. CONSTRUCTION DEPT. CONCERN. CI HAS NO ADDITIONAL INFORMATION. - GENERIC CONCERN -	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1 4.1.2.2
					2	SR	SR	SR	SR				

CONCERNS ARE GROUPED BY FIRST 3 DIGITS OF SUBCATEGORY NUMBER.

5756T

CATEGORY: CO CONSTRUCTION-PROCESS SUBCATEGORY: 192 CONDUIT & TRAY

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 2	REPORT SAF BF	APPL RELATED BL	SQ	WB	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REFERENCE SECTION # CATEGORY - CO SUBCATEGORY - 192
IN-85-008-00401 T50251	CO	19200	N	WBN	1	N	N	N	Y	IN-85-008-004	QTC	UNIT 2, REACTOR BUILDING, ELEV. 751', AZ. 300 DEGREES, JUNCTION BOX 27 MANY HAVE AN IMPROPERLY INSTALLED CONDUIT. DETAILS KNOWN TO QTC, WITHHELD DUE TO CONFIDENTIALITY. NO FURTHER INFORMATION MAY BE RELEASED. CONSTRUCTION DEPARTMENT CONCERN. CI HAS NO FURTHER INFORMATION.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1 4.1.2.2
					2	NA	NA	NA	SR				
IN-85-138-00101 T50039	CO	19200	N	WBN	1	Y	Y	Y	Y		QTC	DURING CABLE PULLS, FISH TAPE, MUD, DIRT (WATER) IS LEFT IN THE CONDUIT. PULLING HOOKS GET JAMMED AND ARE LEFT IN CONDUIT. QC & CRAFT SUPERVISOR ARE INVOLVED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: 4.1.2.1.j, 4.1.2.2.j
					2	SR	SR	SR	SR				
IN-85-181-00201 T50258	CO	19200	S	WBN	1	N	N	N	Y		QTC	THE FIRE BARRIER PUT ON THE CABLE TRAYS IS REQUIRED TO HAVE NO MORE THAN 1/8" GAP BETWEEN THE PIECES; HOWEVER, NUMEROUS INSTANCES HAVE BEEN DISCOVERED WHERE THE GAP WAS UP TO 1/2". CONSTRUCTION DEPARTMENT CONCERN. CI HAS NO FURTHER INFORMATION.	EVALUATION PROCESS: SECTION 3.2.2 FINDINGS: SECTION 4.2.1, 4.2.2
					2	NA	NA	NA	SR				
02	OP	30602	S	WBN	1	N	N	N	Y				
					2	NA	NA	NA	SR				

CONCERNS ARE GROUPED BY FIRST 3 DIGITS OF SUBCATEGORY NUMBER.

CATEGORY: CO CONSTRUCTION-PROCESS SUBCATEGORY: 192 CONDUIT & TRAY

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 2	REPORT SAF BF	RELATED BL	SQ	APPL WB	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REFERENCE SECTION # CATEGORY - CO SUBCATEGORY - 192
IN-85-186-00401 T50017	CO	19200	N	WBN	1	N	N	N	Y	IN-85-186-004	QTC	FIREPROOFING BOARDS IN ELECTRICAL PANELS ARE GENERALLY OVER OR UNDER-SIZED AND IMPROPERLY INSTALLED. NEED TO CHECK AT RANDOM THE GAP BETWEEN THE WIRE AND BOARD. ELECTRICAL PENETRATIONS GOING THRU FLOOR AND WALLS ARE STUFFED WITH COTTON. (NO SPECIFIC LOCATION AVAILABLE).	EVALUATION PROCESS: SECTION 3.2.2 FINDINGS: SECTION 4.2.1, 4.2.2
					2	NA	NA	NA	SR				
IN-85-201-00101 T50156	CO	19200		WBN	1	N	N	N	Y		QTC	WHEN RUNNING CONDUIT THROUGH WALL OR FLOOR SLEEVES IN UNITS 1 AND 2, CRAFT HAS REDUCED SIZE OF CONDUIT USING A REDUCING BUSHING IN LIEU OF USING A LIEU OF USING A NIPPLE ON THE SLEEVE AND USING A FITTING. THIS PRACTICE HAS MADE CABLE PULLS DIFFICULT AND TIME CONSUMING. CONSTRUCTION DEPT. CONCERN. CI HAD NO ADDITIONAL DETAILS/SPECIFICS. NO FOLLOW UP REQUIRED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.h, 4.1.2.2.h
					2	NA	NA	NA	SR				

CONCERNS ARE GROUPED BY FIRST 3 DIGITS OF SUBCATEGORY NUMBER.

CATEGORY: CO CONSTRUCTION-PROCESS SUBCATEGORY: 192 CONDUIT & TRAY

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 2	REPORT SAF BF	APPL RELATED BL	SQ	WB	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REFERENCE SECTION # CATEGORY - CO SUBCATEGORY - 192
IN-85-201-00301 T50157	CO	19200	N	WBN	1 2	Y SR	Y SR	Y SR	Y SR		QTC	TOO MANY BENDS IN 1" CONDUIT RUN IN UNIT 1 REVERSE OSMOSIS ROOM ELEV. 757' AT 4-V. THERE WERE NO FITTINGS USED TO RUN THIS CONDUIT MAKING IT EXTREMELY DIFFICULT AND TIME CONSUMING TO PULL CABLE THROUGH THIS CONDUIT. CI STATED THAT FITTINGS IN LIEU OF BENDS SHOULD HAVE BEEN USED TO FACILITATE CABLE PULLS. CONSTR. DEPT. CONCERN. NO FOLLOW UP REQUIRED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.c, 4.1.2.2.c
IN-85-341-00101 T50189	CO	19200	N	WBN	1 2	Y SR	Y SR	Y SR	Y SR		QTC	FLEXIBLE STAINLESS STEEL CONDUIT FROM VARIOUS EQUIPMENT AND PENETRATIONS INSIDE THE CONTAINMENT IS NOT TORQUED ENOUGH AT THE FLEX AND FITTING ATTACHMENT POINTS. QC ACCEPTED THE WORK. STAINLESS STEEL FLEXIBLE CONDUIT CAN BE PULLED APART AFTER BEING ACCEPTED BY QC. ALL PENETRATIONS AND ELECTRICAL EQUIPMENT INSIDE CONTAINMENT. UNIT 1 & 2 ARE AFFECTED. CONSTRUCTION CONCERN. CI HAS NO ADDITIONAL INFORMATION.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.i, 4.1.2.2.i

CONCERNS ARE GROUPED BY FIRST 3 DIGITS OF SUBCATEGORY NUMBER.

CATEGORY: CO CONSTRUCTION-PROCESS SUBCATEGORY: 192 CONDUIT & TRAY

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 2	REPORT SAF BF	APPL RELATED BL	SQ	WB	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REFERENCE SECTION # CATEGORY - CO SUBCATEGORY - 192
IN-85-374-00201 T50015	CO	19200	N	WBN	1 2	N NA	Y SR	Y SR	Y SR		QTC	APPROX. 500 ERICKSON CONNECTORS/ FITTINGS FOR CONDUIT HAD BEEN INSTALLED AND DISCOVERED TO BE ALUMINUM AND NOT MAGNETIC. THESE ARE IN PROCESS OF BEING REMOVED SINCE ERICKSON CONNECTORS ARE NOT REQUISTIONED OUT TO THE CRAFT, HOW CAN THEY BE IDENTIFIED AND REMOVED WITH CONFIDENCE THAT ALL HAVE BEEN REPLACED? WBNP #2	EVALUATION PROCESS: SECTION 3.2.3 FINDINGS: SECTION 4.3.1, 4.3.2
IN-85-512-00201 T50046	CO	19200	N	WBN	1 2	Y SR	Y SR	Y SR	Y SR		QTC	UNIT 2 CONDUIT FITTINGS RECENTLY ISSUED TO THE FIELD (TRADE NAME "ERICKSONS") ARE OF INFERIOR MATERIAL (SIMILAR TO PEWTER). INFERIORITY IS PARTICULARLY EVIDENT IN THE INTERNAL THREADED AREA, WHERE THREADS ARE ROUGH AND FLATTENED. PER DIRECTION OF FOREMAN (NAME KNOWN) CRAFT (DISCIPLINE KNOWN) ARE REQUIRED TO UNDERCUT EXTERNAL THREADS ON CONDUIT TO ALLOW USE. EXPRESSED ON 3/4", 1" AND 1 1/2" SIZES. NO FURTHER SPECIFICS ARE AVAILABLE.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.e, 4.1.2.2.e

CONCERNS ARE GROUPED BY FIRST 3 DIGITS OF SUBCATEGORY NUMBER.

CATEGORY: CO CONSTRUCTION-PROCESS SUBCATEGORY: 192 CONDUIT & TRAY

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 2	REPORT SAF BF	APPL RELATED BL	SQ	WB	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REFERENCE SECTION # CATEGORY - CO SUBCATEGORY - 192
IN-85-512-00301 T50046	CO	19200	N	WBN	1	Y	Y	Y	Y		QTC	CONDUIT RECENTLY ISSUED TO FIELD FOR USE ON UNIT 2 EXHIBIT A NUMBER OF PIECES WITH RIDGES AND BURNS IN THE INSIDE DIAMETER. THE POTENTIAL EXISTS FOR WIRES TO BE DAMAGED, IF CRAFT PERSONNEL HAD NOT NOTED THESE DI REPANCIES. NO SPECIFIC SIZES OR LO IONS ARE AVAILABLE.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.e, 4.1.2.2.e
					2	SR	SR	SR	SR				
IN-85-663-00801 T50238	CO	19200	N	WBN	1	N	N	N	Y		QTC	TVA COMPROMISED ITS SPECIFICATIONS AND ACCEPTED "OFF SCALE" MATERIALS. BECAUSE OF THIS, COMPONENTS WILL NOT FIT WHERE THEY MUST BE INSTALLED. THIS MEANS THAT GOOD HARDWARE MUST BE RIPPED OUT TO MAKE ROOM. EXAMPLE: EXTENSIVE ELECTRICAL WORK DONE IN RB 1 IN LATE 1984 & EARLY 1985. CI HAS NO FURTHER INFORMATION. CONSTRUCTION DEPARTMENT CONCERN. NO FOLLOW UP REQUIRED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.e, 4.1.2.2.e
					2	NA	NA	NA	SR				

CONCERNS ARE GROUPED BY FIRST 3 DIGITS OF SUBCATEGORY NUMBER.

CATEGORY: CO CONSTRUCTION-PROCESS SUBCATEGORY: 192 CONDUIT & TRAY

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 2	REPORT SAF BF	APPL RELATED BL	SQ	WB	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REFERENCE SECTION # CATEGORY - CO SUBCATEGORY - 192
IN-85-856-00401 T50094	CO	19200	N	WBN	1 2	Y SR	Y SR	Y SR	Y SR		QTC	CONDUIT HAS AS MANY AS FIVE 90 BENDS IN SOME INSTANCES AND CABLE CANNOT BE PULLED. (NAMES KNOWN TO QTC AND RELEASE OF THIS INFORMATION WOULD JEOPARDIZE CI'S CONFIDENTIALITY). NO MORE DETAILS AVAILABLE. NO FOLLOW UP REQUIRED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.c, 4.1.2.2.c
IN-86-119-00101 T50122	CO	19200	N	WBN	1 2	N NA	N NA	N NA	Y SR	1-85-465-WBN	QTC	IN TUNNEL BETWEEN REACTOR BLDG #2 AND COOLING TOWER, 6-8 CONDUITS (JUNCTIONS BOXES AND COUPLINGS) GUSHES WATER WHENEVER IT RAINS. CABLES HAVE ALREADY BEEN PULLED THROUGH THE CONDUITS. MANHOLE TO TUNNEL IS LOCATED BETWEEN THE 2 TANKS LOCATED IN FRONT OF REACTOR BLDG #2. CONSTRUCTION DEPT. CONCERN. CI HAS NO ADDITIONAL INFORMATION.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.k, 4.1.2.2.k

CONCERNS ARE GROUPED BY FIRST 3 DIGITS OF SUBCATEGORY NUMBER.

CATEGORY: CO CONSTRUCTION-PROCESS SUBCATEGORY: 192 CONDUIT & TRAY

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 2	REPORT SAF BF	RELATED BL	APPL SQ	WB	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REFERENCE SECTION # CATEGORY - CO SUBCATEGORY - 192
IN-86-262-00401 T50148	CO	19200	S	WBN	1	N	N	N	Y		QTC	ELEV. 729' (ABOVE MACHINE SHOP) THERE ARE FOUR OR FIVE 5" TO 6" CONDUITS STILL HAVING THE FISH TAPE IN THEM. THE CONDUIT IS SO FULL THE FISH TAPE CANNOT BE REMOVED. CONSTRUCTION DEPT. CONCERN. CI HAS NO FURTHER INFORMATION. NO FOLLOWUP REQUIRED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.a, 4.1.2.2.a
					2	NA	NA	NA	SR				
02	EN	23801	S	WBN	1	Y	Y	Y	Y				
					2	SR	SR	SR	SR				
IN-86-276-00101 T50146	CO	19200	N	WBN	1	N	N	N	Y		QTC	SPARE CONDUITS REQUIRING FIRE BARRIER PLUGS MAY NOT HAVE THE PROPER PLUGS INSTALLED. DETAILS KNOWN TO QTC, WITHHELD DUE TO CONFIDENTIALITY. CONST. DEPT. CONCERN. CI HAS NO FURTHER INFORMATION. NO FOLLOWUP REQUIRED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.g, 4.1.2.2.g
					2	NA	NA	NA	SR				

CONCERNS ARE GROUPED BY FIRST 3 DIGITS OF SUBCATEGORY NUMBER.

CATEGORY: CO CONSTRUCTION-PROCESS SUBCATEGORY: 192 CONDUIT & TRAY

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 REPORT 2 SAF BF	BL	SQ	WB	APPL RELATED	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REFERENCE SECTION # CATEGORY - CO SUBCATEGORY - 192
OW-85-007-00801 T50224	CO	15100	S	WBN	1 N 2 NA	Y SR	N NA	Y SR			QTC	WATTS BAR HAS TOO MANY INSTANCES OF UNCRAFTSMAN-LIKE ELECTRICAL WORK, INCLUDING POORLY BENT AND INCOMPLETELY SCREWED TOGETHER CONDUIT (AUXILIARY BLDG), AND CABLES DAMAGED DUE TO SLAG FROM WELDING OPERATIONS OVERHEAD (TURBINE BLDG, ELEV. 729'). NO SPECIFIC LOCATIONS OR UNIT NUMBERS KNOWN. CONSTRUCTION DEPT. CONCERN. CI HAS NO FURTHER INFORMATION. NO FOLLOW UP REQUIRED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.i, 4.1.2.2.i
02	CO	19200	S	WBN	1 Y 2 SR	Y SR	Y SR	Y SR					
QCP10.35-8-18 01	CO	19200	N	BLN	1 N 2 NA	Y NA	N NA	N NA			OECP	CI COULDN'T UNDERSTAND WHY SOME CONDUIT HE INSTALLED WAS SUB-SEQUENTLY REMOVED AND REWORKED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.L, 4.1.2.2.L
WI-85-100-02201 T50212	CO	19200	N	WBN	1 N 2 NA	N NA	N NA	Y SR			QTC	WALL PENETRATIONS OF CABLE TRAYS ARE NOT IDENTIFIED BY NAME OR NUMBER AT WBNP. CI HAS NO FURTHER INFORMATION. ANONYMOUS CONCERN VIA LETTER.	EVALUATION PROCESS: SECTION 3.2.2 FINDINGS: SECTION 4.2.1.4

CONCERNS ARE GROUPED BY FIRST 3 DIGITS OF SUBCATEGORY NUMBER.

CATEGORY: CO CONSTRUCTION-PROCESS SUBCATEGORY: 192 CONDUIT & TRAY

CONCERN NUMBER	CAT	SUB CAT	SHRD	PLT LOC	1 2	REPORT APPL SAF RELATED BF	BL	SQ	WB	HISTORICAL REPORT	CONCERN ORIGIN	CONCERN DESCRIPTION	REFERENCE SECTION # CATEGORY - CO SUBCATEGORY - 192
XX-85-094-00301 T50150	CO	19200	N	BLN	1	N	Y	N	N		NS	BELLEFONTE: THE ORIGINAL DESIGN REQUIRED 1 1/2" FLOOR PENETRATIONS WHICH WAS LATER REVISED TO 2" FLOOR PENETRATIONS. THE DESIGN DEPARTMENT IS ROUTING CABLE THROUGH AN ALREADY INSTALLED 1 1/2" THAT IS DESIGNED FOR A 2" FLOOR PENETRATION WHICH CREATES A POTENTIAL FOR OVERCROWDING. CONSTRUCTION DEPT. CONCERN. CI HAS NO FURTHER INFORMATION. NO FOLLOW UP REQUIRED.	EVALUATION PROCESS: SECTION 3.2.1 FINDINGS: SECTION 4.1.2.1.h, 4.1.2.2.h
					2	NA	SR	NA	NA				

CONCERNS ARE GROUPED BY FIRST 3 DIGITS OF SUBCATEGORY NUMBER.

ATTACHMENT B

List of Evaluators:

WBN

R. Brown
H. W. Loftis

SQN

H. W. Loftis

BFN

H. W. Loftis

BLN

G. Lyles
H. W. Loftis

UNITED STATES GOVERNMENT

ATTACHMENT C

GNS '80 0826 050

Memorandum

TENNESSEE VALLEY AUTHORITY

TO : M. N. Sprouse, Manager of Engineering Design, W11A9 C-K

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

DATE : August 26, 1980

SUBJECT: ALL NUCLEAR PLANTS - INSTALLATION OF FLEXIBLE HOSE AND CONDUIT

The NSRS has reviewed General Construction Specifications C-43 (CEB), C-40 (EEB), and SKN-C-40-2. These specifications address the installation of flexible hose and flexible conduit. However, since these procedures have only recently been revised to include detailed installation information, the NSRS is concerned that flexhose and conduit installed prior to these revisions may not be acceptable when evaluated against the present criteria. Please clarify your intent as to the applicability of the flexible hose and conduit portions of these revised construction specifications to existing installations and a justification for not backfitting the requirements. Please inform the NSRS of your efforts in this area by September 30, 1980. Our contact for this matter is Martha Martin, extension 6860.

H. N. Culver

AUG 27 1980
ENGINEERING DESIGN MANAGER'S OFFICE

MSM:KRW

cc: J. R. Calhoun, 1750 CST2-C
MEDS, E4B37 C-K
H. H. Null, E7B24 C-K

DES '80 0827 037

8/28/80 - RMP:MPG

cc: R. O. Barnett, W9D224 C-K - Please coordinate with EEB and reply to HNC for my signature by 9/30.--HNS

D. B. Bowen, 6204 MTB-K
R. W. Cantrell, 204 GB-K (2)
F. W. Chandler, W8C126 C-K
R. A. Costner, W11D190 C-K
G. F. Dilworth, W10C126 C-K
R. M. Hodges, W7C126 C-K
H. C. Russell, W5C126 C-K
J. P. Vineyard, W6D224 C-K

xc: MEDS, E4B37 C-K

800905E0131

CEB '80 0904 010

(1)

CIVIL ENGINEERING BRANCH
AUG 29 1980

9/4/80 - ROD:KW

cc: C. A. Chandley, W10D224 C-K

xc: MEDS, E4B37 C-K

ATTACHMENT D

List of Concerns by Issue

Issue	Concerns
1.2.1 Conduit	EX-85-052-002
	EX-85-066-002
	EX-85-092-001
	EX-85-162-001
	IN-85-008-004
	IN-85-138-001
	IN-85-201-001
	IN-85-201-003
	IN-85-341-001
	XX-85-094-003 (Specific to BLN)
	IN-85-512-003
	IN-85-663-008
	IN-85-856-004
	IN-86-119-001
	IN-86-262-004
	IN-86-276-001
	OW-85-007-008
	IN-85-512-002
	BNP QCP 10.35-8-18 (Specific to BLN)
1.2.2 Cable Trays	IN-85-181-002
	WI-85-100-002
	IN-85-186-004
1.2.3 Conduit Fittings	IN-85-374-002