TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
6N 38A Lookout Place

March 20, 1986

Mr. Harold R. Denton, Director
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

Dear Mr. Denton:

In the Matter of the Application of	)	Docket Nos. 50-390
Tennessee Valley Authority	)	50-391

Pursuant to the commitment made in Chairman Dean's January 9, 1986 letter and during the Commission meeting on March 11, 1986, I am responding to your January 3, 1986 letter by providing the Tennessee Valley Authority's (TVA) corporate position with respect to whether or not, in light of the conclusion stated in the, "NSRS Perceptions of Watts Bar Status," (NSRS Perceptions), the 10 CFR Part 50, Appendix B requirements are being met at the Watts Bar facility. As requested in your January 3, 1986 letter, information is provided on an item-by-item basis in the enclosure to this letter that supports the TVA position and addresses: (1) each issue identified in the NSRS Perceptions; (2) the programs/procedures in place to address each such issue; and (3) the corrective action(s) planned or taken in response to each such issue.

On the basis of a review of the issues identified in the NSRS Perceptions, as reflected in the enclosure, I find that there has been no pervasive breakdown of the quality assurance (QA) program; that problems have been identified; and that TVA has remedied or will remedy all identified design/construction deficiencies and noncompliances, and that accordingly, the overall QA program is in compliance with 10 CFR Part 50, Appendix B. At the same time, it should be noted that my mission as the Manager of the Office of Nuclear Power is to enhance the management and management controls of all TVA nuclear power program activities, including those for QA.

Although the enclosure shows that a broad range of corrective actions is already in place at Watts Bar, I and my newly appointed QA Manager, Richard B. Kelly, will be undertaking further examination of QA program effectiveness in the nuclear power program in general and at Watts Bar in particular. If that further examination reveals design/construction deficiencies, noncompliances, and/or programmatic weaknesses, rest assured that timely corrective action will be taken, including work stoppage if that is appropriate. It should be noted that the technical review of the issues in enclosure 1 will continue as part of that examination. While positive findings have been made concerning the issues identified in the NSRS Perceptions and the adequacy of the overall QA program, I recognize that the major thrust of those Perceptions is directed toward the ineffectiveness of corrective actions, and management implementation of those actions, to prevent

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Mr. Harold R. Denton, Director March 20, 1986

the recurrence of design/construction deficiencies and noncompliances. I intend to continue the examination of QA activities within the nuclear power program, including those at Watts Bar, and will focus particularly in that programmatic area. Aggressive action to remedy any weaknesses found will be taken. This subject is specifically addressed in Section VI.D of Volume I (Revised) of TVA's Nuclear Performance Plan which was submitted to NRC on March 11, 1986.

Please feel free to contact me or Richard L. Gridley of my staff if you have any questions or need for further information concerning this response.

Very truly yours,

S A White

S. A. White
Manager of Nuclear Power

Sworn to and subscribed to before me
this 20th day of March 1986

Susan C Parker
Notary Public

My Commission Expires 2/7/90

Enclosure
cc (Enclosure):

Mr. James Taylor, Director
Office of Inspection and Enforcement
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555

U.S. Nuclear Regulatory Commission
Region II
Attention: Dr. J. Nelson Grace, Regional Administrator
101 Marietta Street, NW, Suite 2900
Atlanta, Georgia 30323

ENCLOSURE

WATTS BAR NUCLEAR PLANT
APPENDIX B, QUALITY ASSURANCE
RESPONSE TO H. R. DENTON'S JANUARY 3, 1986 REQUEST

NSRS Perception:

o AS-CONSTRUCTED WELDING PROGRAM IS INDETERMINATE

Corporate Position:

An integrated system of corporate level specifications, procedures, and guidelines exists to assure that all regulatory commitments, applicable code requirements, and design criteria are met. These requirements are implemented in site construction procedures and quality control instructions. Among the other elements which assure control of the welding program are weld rod control, training, certification and assignment of welders, and weld inspections.

In 1974 and 1975, site implementing procedures were in effect and the ASME Nuclear Code Manual was formally accepted. Authorization for an ASME NA and NPT stamp was issued in 1976. The total welding program has been reviewed by both internal and external organizations and determined to be in compliance with 10CFR50, Appendix B.

The welder training, qualification, and certification program at WBN was initiated in 1973, and all welders were trained and certified to applicable code (AWS D1.1 or ASME Section IX) requirements. The program has been planned and executed utilizing standardized qualification tests administered to welders to accomplish field activities. Welders were qualified to tests which maximize the limits of their qualification. This resulted in the welder, welding foreman, and welding inspector having to familiarize themselves with only 12 to 15 tests in order to recognize a welder's limits of qualification. This practice has proven extremely successful in preventing welders from exceeding the limits of his/her qualification or being assigned work for which they were unqualified. Several concerns have been expressed on the welder renewal qualification process at WBN. These concerns have been identified in a nonconformance report addressing program discrepancies. Welding process controls assure that only certified welders are assigned welding tasks, that the welding is performed in accordance with qualified welding procedures, and that all welding procedures are approved by welding engineers.

Welding inspections are conducted, evaluated, and documented by inspectors certified in accordance with ASNT-TC-1A requirements, regardless of the construction unit in which they are assigned. In the late 1976, a central training organization for all TVA NDE technicians at nuclear plants was established at Hartsville for radiography, ultrasonic, liquid penetrant, and magnetic particle inspection. This organization was under the control of a NDE Level III and part of the OC Quality Assurance Staff. In mid-1977, this organization was expanded to include training for all welding inspectors. Training and certification were being performed for all NDE technicians and welding inspectors. In early 1982, training responsibility was transferred to the OC Welding Engineering Staff and the training organization was relocated to WBN. In summary, the inspection training program has been reviewed by both external and internal audit organizations, and results indicate that the program meets applicable code requirements and licensing commitments.

Potential problem areas have been identified by the employee concern program and specific actions are being taken to evaluate and correct these areas as necessary. A welding project has been established to evaluate, in a phased approach, the adequacy of the welding program and to initiate any necessary corrective actions or improvements. The various activities and tasks include a review of commitments to NRC, verification that TVA welding programs reflect licensing commitments, identification and categorization of welding-related quality indicators, evaluation of quality indicators including employee concerns on the welding program, and correction of identified deficiencies. Also, a contractor (U.S. Department of Energy) is performing an independent evaluation of the TVA Watts Bar welding program and is assessing the program to assure compliance with the requirements of the FSAR.

Specific examples of these problem areas are:

- Concerns have been expressed on weld rod issue and accountability; each concern is being evaluated to determine if corrective action is necessary. The quality assurance program controls welding filler materials from initial procurement to receipt, storage, issue, and use in the fabrication and erection process. A complete review of all certified material test reports for all welding material received at WBN indicated no discrepancies.

- Concerns have been expressed concerning fit-up inspections on structural welding. Inspections, including fit-up inspections for structural welding in accordance with ANSI N45.2.5-1974 and AISC (AWS D1.1) are specified by the design engineer on the design drawing for each feature. Inspections applied are dependent upon the scope and nature of the work and the importance of the feature to safety. These inspections are performed and documented by certified QC inspection personnel. Not all fit-up inspections on structural welding are required to be performed and documented by certified QC inspection personnel. Inspections not made by QC inspectors are those made by a welder and/or foreman as part of the inprocess good workmanship activities. This process is surveilled by QC inspectors and documented on daily and weekly surveillance reports.

- Previous NCRs have identified problems with final weld quality of supports and miscellaneous steel. Sample programs were conducted by OE to determine the structural integrity of the final weld product as a disposition for these NCRs. In all cases, the final weld quality was found to be capable of meeting its intended design function.

NSRS Perception:

o ELECTRICAL CABLE PRESENT QUALIFICATION CONDITION IS INDETERMINATE

Corporate Position:

TVA has had in place since the early 1970s procedural controls as required by 10CFR50, Appendix B, governing the installation of electrical cabling systems. These procedural controls have consisted of design procedures, installation, inspection, and test procedures. Covered within the basic procedural control system are procedures which govern the specific actions to be taken in the event a nonconforming condition is identified, as well as measures required for corrective actions to prevent recurrence.

The TVA Nuclear Safety Review Staff (NSRS) has raised a concern that, due to poor installation practices, many electrical cables may have been damaged during installation. Further, the NSRS is concerned that, due to the installation practices used, the cable's ability to remain functional in a harsh environment is no longer known and, as a result of this situation, the present qualifications of Class 1E cables is in question.

Nonconformances were identified against our cable installation program relating to minimum bending radii. These have been investigated, corrective actions defined, and required rework has been completed. Additional nonconformances have been recently identified relating to cable sidewall pressure, cable pulling forces, and cable minimum bending radii. All significant nonconformances have been evaluated for reportability under the requirements defined by 10CFR50.55(e).

TVA has evaluated these concerns. Specific changes to the installation practices and evaluation program of already installed cables are discussed below. Preliminary results of the evaluation program indicate that the cables have not been damaged during installation.

Cable Sidewall Bearing Pressure (SWP)

Cable pulling practices and maximum permitted pulling tension restrictions are specified in TVA General Construction Specification No. G-38, "Installing Insulated Cables Rated Up to 15,000 Volts." Maximum cable pulling tension is limited by conductor strength and sidewall bearing pressure (SWP). SWP was not addressed in G-38 until revision 6, effective on September 15, 1985.

To evaluate the cables already installed in conduits and determine the impact of including SWP in the cable pull tension limitation, an evaluation program was initiated in August 1985. This program surveyed WBN to determine 82 of the worst conduit sections, with respect to cable pulling. Using analytical methods and field data, SWP, which the Class 1E cable was subjected to, was determined. Concurrent with this evaluation, a survey of the cable manufacturers on new SWP limits was made. Based on SWP limits obtained from cable manufacturers, cables in 12 conduits exceeded published SWP limits.

The major cable manufacturers which had already done extensive testing, revised the SWP value upwards by a factor 2-3 times previous limits. The test results of the EPRI report No. EL-3333, "Maximum Safe Pulling Lengths for Solid Dietectric Insulated Cables," indicated realistic SWP limits for cables similiar to those at WBN to be 4-5 times higher than previous limits.

Review of the projected SWP, to which the cables were subjected, against realistic SWP limits, indicates none of the cables were installed exceeding SWP. However, maximum allowable pulling tension for cables contained in one conduit was calculated to have been exceeded. This condition is being evaluated to determine adequacy. A test program will be initiated to demonstrate the validity of the higher SWP limits for all the purchased cable, rather than rely on EPRI generic test results or results from other cable manufacturers.

Distribution of Cable Pulling Forces

WBN cable installation document G-38, since 1978, has specifically required pulling tension to be monitored for all pulls in conduits, including hand pulls. This is primarily done by use of a pulling link or dynamometer on the main pulling line. The link is selected such that its breaking strength is equal to or less than 80 percent of the sum of the conductor strength limit of each conductor in the pull.

NSRS concern is that the tension of individual conductor is not monitored, only the total tensions. Monitoring tensions on the lead line assumes total tension divides proportially between each cable.

TVA practice of monitoring total tension rather than individual tension, does assure individual conductor strength limits are not exceeded, and is consistent with IEEE 690-1984, "Standard for the Design and Installation of Cable Systems for Class 1E Circuits In Nuclear Power Generating Stations." In fact, TVA practice is more conservative, since we take 80 percent rather than 100 percent of individual conductor strength. Besides industry experience, acceptability of this practice was demonstrated in a recent cable pull in which the total pulling tension in a multi-cable pull was 3750 lbs. Several cables in the pull had a conductor-strength limit of 65 lbs. If the tensions had not been distributed proportionally, the smaller cables would have snapped. These cables did not break or elongate.

Bending Radius

A cable's bending radius is restricted to prevent immediate or in some cases, long-term insulation failure. Two bending radius limits are specified by cable manufacturers: (1) training radius, (R_{Tmin}) when the cable is not under tension and will be left in its final position, and (2) pulling radius (R_{Pmin}), when the cable is under tension. Some manufacturers give the same value for R_{Pmin} as R_{Tmin}, others give a value of R_{Pmin} larger than R_{Tmin}. The use of this larger value of R_{Pmin}, by some manufacturers, is intended to address SWP at maximum conductor strength conditions. As of October 18, 1983, Specification Revision Notice, SRN-G-38-2, has requied consideration of both R_{Tmin} and R_{Pmin}. Prior to SRN-G-38-2, G-38 required R_{Pmin} in conduits.

NSRS concerns are (1) the use of R_{Tmin} for cable loop when the last portion of cable is trained into condulets. Cable is considered under a slight tension rather than no tension, (2) R_{Tmin} for multiple conductor control cable is calculated on the basis of individual insulated/jacketed conductor diameter instead of the overall cable O.D.

TVA practice of the use of R_{Tmin} under slight tension is justified and does not damage the cable. ICEA specifies cable drum diameter as a function of cable diameter. In some cases, the drum inside diameter may be less than R_{Tmin}. Reeling cables on the reel is done under a slight tension. This shows that TVA's interpretation of the use of R_{Tmin}, in this area, is consistent with the cable manufacturer's intent. Furthermore, it should be recognized that with the exception of shielded power and control cables, or coaxial/triaxial cable, the R_{Tmin} is to prevent long-term insulation damage rather than immediate damage. A cable insulation, when bent, is under elongation stress. Unaged cable insulation can easily accommodate these stresses without cracking. Only after long-term aging or radiation or during thermal expansion will these cable insulations possibly crack or fail under excessively smaller bends than R_{Tmin}.

The Office of Engineering concurs with NSRS concern that R_{Tmin} should be based on overall cable diameter rather than individual conductor diameter for jacketed unshielded multiple conductor cables. As discussed above, because R_{Tmin} is intended to prevent long-term failure of the cable, cables as installed are not damaged. A survey has been started of new R_{Tmin} based on overall cable O.D., against installed Class 1E cables in condulets at WBN. Since the jacket is removed once inside panels or termination cabinets, use of individual diameter to calculate R_{Tmin} is appropriate and not in dispute with NSRS. Preliminary results of the survey indicate that very few cables are impacted.

Stop work order No. SW-24 was initiated July 9, 1985, because of lack of G-38 requirements for calculating sidewall pressure for cables in conduits. G-38 was subsequently revised to include this requirement. The Office of Engineering documented the rationale for the adequacy of G-38 R6 by memorandum dated November 5, 1985. Based on this rationale, a recommendation was made to lift the stop work order by memorandum from the project manager to the construction project manager dated November 20, 1985.

To further minimize the potential for cable damage, ongoing cable installation requirements were established in TVA General Construction Specification No. G-38, Revision 7, "Installing Insulated Cables Rated Up to 15,000 Volts" (issued December 19, 1985) in conjunction with TVA General Construction Specification No. G-40, Revision 9, "Installing Electrical Conduit Systems and Conduit Boxes" (issued December 19, 1985). These latest revisions of G-38 and G-40 were effective Janaury 15, 1986, or sooner upon implementation of nuclear plant procedures.

NSRS Perception:

o INSTRUMENT LINE INADEQUACIES

Corporate Position:

Design, installation, and inspection requirements were developed and implemented at WBN to control and assure the quality of the fabrication and installation of instruments and instrument sensing lines. Design requirements were established and specified through design output documents. These requirements were incorporated into site programs and procedures.

Over time, as problems were identified (in requirements, programs, or implementation), corrections, adjustments, and improvements have been specified and implemented.

Problems have been recently identified through the normal nonconformance handling system and the employee concern program.

An instrument project has been established to focus the necessary resources on the problems and provide coordination and guidance toward achieving effective overall resolutions, the needed actions to prevent recurrence, and desired program enhancements.

Specific examples of these problem areas are:

- Instrument sensing lines were found with slope less than required by design drawings. Comprehensive actions are underway to identify, evaluate, and correct these problems, as necessary.

- Compression fittings have been installed improperly. Laboratory tests have demonstrated that installed fittings in pressure-tested systems are acceptable as is without rework. Minor inspections of unpressurized lines will be conducted to ensure acceptable fitting installations.

- The instrument line pipe/tube bending equipment qualification program had been improperly implemented for unit 1. Two-hundred bends have been randomly sampled to determine their existing quality. These have been evaluated by OE. OE has determined that the resultant quality is acceptable.

In conclusion, these problems precipitated a management decision to suspend further instrumentation installation actvities until such time as it is firmly established that the requirements and programs in place will provide, with a high level of confidence, the desired quality in these installations.

NSRS Perception:

- CONSTRUCTION PROCESSES, IN GENERAL, ARE LOOSELY CONTROLLED

Corporate Position:

During the life of the WBN construction project, instructions have been in effect to provide control of drawings and documents, nonconforming items; quality assurance records; design changes and configuration; calibration; site procurement; and all other activities within the scope of 10CFR50, Appendix B. Since early construction in 1973 at WBN, control of work processes has evolved from generalized guidance of activities, to initial establishment of construction procedures in 1974, then to a detailed control scheme consisting of more than 135 quality control procedures. In the mid-70s, a work release program was established to provide interdisciplinary authorization of activities such as welding of temporary attachments to permanent features and concrete removal. After 1981, work was issued to the craft forces by means of an overall work control program consisting of a work package system for untransferred features and a workplan system for features which had been previously transferred to operations.

The workplan system has provided close control of all work on transferred features. The work package system was initially very rigid and provided tight control of all work activities. Problems were experienced by extensive use of punch lists and expanded scope of the work release program. Nonconformance reports have been written where appropriate to identify, correct, and obtain the necessary corrective action. All work releases are being reviewed to determine if the work was properly reinspected and redocumented.

In order to correct the problems and strengthen our work control program, the following improvements are being made (QCI-1.60):

- Establishing the workplan as the single method of directing field work.

- Narrowing the scope of the work release so that it is used only as a tool to obtain authorization from disciplines with responsiblity for features which might be adversely affected by the work being authorized.

- Including a clear requirement for records accountability review in the workplan and establishing accountability for its completion prior to starting work.

- Placing authority for workplan scheduling with the Project Control Unit instead of craft supervision.

- Establishing firm requirements for planning of all field work activities by the assigned foreman and engineer prior to commencement of work.

In addition to the above, we are providing the following information concerning the specific examples of OE hold points and inspections that were identified in the NSRS perception as not being adequate to ensure design requirements were met.

(1) Qualification Tests of Concrete at the Batch Plant Instead of at the Point of Installation

TVA General Construction Specification G-2 provisions are such that concrete quality control will not be significantly affected by testing at the batch plant rather than at the point of installation. G-2 requires that all sampling conform to ASTM C 172 and limits the placing slump to 2 inches less than applicable maximum slump.

Since working slump is approximately 1 inch less than the maximum, the average slump loss is limited to approximately 1 inch. Retempering is not permited. Tests indicate that air losss will be limited if slump loss is limited and that strength will increase.

(2) Installation Notes That Allow Too Much Flexibility and Are Changed To Accept As-Built Conditions

TVA's general construction specifications give general installation requirements applicable to all TVA construction; however, all the requirements necessary for the safe and efficient construction of a specific project cannot always be included in the general specifications. In some cases, the needs of a specific project require less flexibility, and in other cases require more flexibility than the general specifications allow. Necessary changes or additions to the general construction specifications to allow more construction flexibility are reviewed and approved by OE. It should be noted that most general design drawing changes of this nature involve additional guidance and not exceptions to the general construction specifications. These changes and additions are documented on applicable design drawings, often as general installation notes such as the 47A050 hanger series. They are coordinated by interface review with other OE organizations as appropriate. TVA's field change request program allows OC and the Office of Nuclear Power (ONP) to request field changes on design drawings. These changes may be to facilitate construction and, if generic in nature, may require a revision to the applicable general notes. Each change is reviewed for applicability and technical adequacy in accordance with OE procedures before approval and revision of the drawings.

In summary, installation notes are changed to allow increased flexibility when requested by OC or ONP and when OE design review allows. OE, OC, and ONP procedures provide sufficient control to assure that adequate design and construction is maintained.

(3) No specified Torque on Seismic Category I Supports Using Unistrut With Bolted Connections

TVA has specified appropriate torque requirements for the tightening of Unistrut bolted connections on seismic Category I supports to ensure that installed condition meets all design requirements. The allowable design capacities of Unistrut clamps are based on tests conducted by TVA. Drawing 47A050-1J3 specifies tightening requirements that meet or exceed the conditions used in the tests.

TVA's corrective actions on NCRs WBNSWP8230 and WBNCEB8501 document that the inplace condition of Unistrut clamps installed prior to issuance of appropriate tightening requirements have been investigated and found to be adequate. NCR WBNSWP8230 was written because bolt tightening requirements had not been provided to the OC for miscellaneous steel structures, including bolts for Unistrut clamps. NCR WBNCEB8501 was written because the bolt tightening requirements for Unistrut clamps did not match the tightening requirements used in the tests conducted to establish the capacities of the clamps. The corrective actions for the NCRs included design evaluations of design loads versus structural capacities of randomly sampled Unistrut clamps. Field investigations were conducted to determine the inplace torque of the sampled Unistrut clamps, and additional testing of Unistrut clamps was conducted to establish the relationship between bolt tightness and structural capacity. All types of clamps used to support safety-related systems on Unistruts were evaluated in the resolution of the NCRs and found to be adequately installed. TVA's resolution of these NCRs and this problem were discussed in a meeting with NRC Region II personnel in Atlanta on June 13, 1985. Detailed documentation to support TVA's findings were provided at this meeting.

In conclusion, the hold points and inspections that are being implemented are adequate to ensure design requirements, are met for the examples cited, and are in accordance with the requirements and intent of 10CFR50, Appendix B.

NSRS Perception:

o RECORDS ARE OF POOR QUALITY

Corporate Position:

All quality assurance records receive a quality review before transfer to ONP. Documents which are to be microfilmed receive reviews for microfilmability and legibility before and after microfilming. If there is any doubt about the legibility of any document it is retained in hard copy. Microfilm is obtained from the best available copy.

Records of poor quality at WBN for the most part can be traced to vendor-supplied records. Vendor records are sometimes furnished to TVA from copies which are of poor quality. Records, such as certified material test reports, vendor drawings, and other vendor supplied documents, lose some degree of quality each time that they are reproduced. Concerns on vendor records and the retrievability of certain instrumentation support records have been formally identified, and corrective actions are in process for resolution of these concerns.

Specific concerns have been identified regarding records for instrument seismic supports and concrete repair. It is true that instrumentation supports for unit 1 did not have unique identification numbers. These supports, which are "typicals" rather than "engineered" or designed for specific applications, were fabricated in "batches" or "lots" for efficiency since many identical supports were used. This system allowed for shop fabrication and for fabrication in advance of need. This activity was performed under procedural control using a "Support Fabrication Operation Sheet." Required hold points provided for inspection of material, welds, and dimensions. The supports fabricated were identified by affixing the "FOS No." The presence of this identifier was also a required inspection. This system provides retrievability of fabrication records.

Upon completion of fabrication of supports, the supports were stored in the fabrication shop until needed for the installation of an instrument line. Installation of the supports and the required anchor bolts was accomplished using procedural controls and an "Support Installation Operation Sheet." This process control operation sheet provided for anchor bolt testing, weld inspection, verification of FOS numbers on supports used (for traceability), inspection of span, inspection of bolting and hardware, inspection of quantity and size of lines (for loading), and inspection of line slope. The Installation Operation Sheet Identifier was based on the instrument line identification number allowing traceability to related documentation, such as welding operation sheets for the line itself, and referenced all FOS numbers under which supports were fabricated. This system precludes the need for unique identifiers for the supports but ensures inspection and retrievability of records. It is also true that under this system records cannot be readily retrieved by inquiry based on a single support. Under this system, to retrieve records, the instrument line must first be identified, then the subassembly, then the installation and fabrication operation sheets. However, problems have been identified and are being evaluated in accordance with the corrective action program on NCR W334P. A revised system which provides unique support identification is being implemented for unit 2.

With respect to concrete records, it should be noted that concrete repair is not a configuration change. At WBN, concrete repair is performed per the requirements of a construction specification G-34. Pour cards are used to document repairs in accordance with WBN Quality Control procedures. Locations of repairs are tied down by plant coordinates. Cosmetic repairs (architectural treatment) involving patching and dressing of concrete surfaces are done in accordance with construction specification G-2.

NSRS Perception:

- LACK OF INDEPENDENCE OF QA/QC PERSONNEL (CONST.), (LATER DEFINED AS "QUALITY ASSURANCE PROBLEM AREAS" BY NSRS)

Corporate Position:

Since 1983, the Quality Manager's Organization (QMO) has been an independent organization. QC personnel are administratively and technically independent of any other WBN organization. The QC inspector, the QC supervisor, and the quality manager are independent of other organizations, reporting only to the construction project manager. Additionally, inspectors are encouraged to report problem areas detected that are outside of their assigned inspections. There have been instances where there were disagreements between construction site engineering and QC on judgments or interpretations of acceptance criteria. OE has the responsibility for interpreting and revising design drawings and specifications which are the bases for the construction acceptance criteria. The inspector is subject to controls regarding his decisionmaking freedom. For example, QC procedures have acceptance criteria that the inspector must follow to verify conformance. The inspector provides an independent look at a project but he does so using established acceptance criteria.

ONP QA/QC personnel are sufficiently independent of line organizations in that they report to the Director of Quality Assurance offsite, who works directly for the Manager of Nuclear Power.

The perceived problem of ONP QA/QC inability to designate hold points originates from the NQAM and plant instruction listing of suggested hold points. This list of hold points differs from the hold points established by OC during the construction of WBN. There are currently open DQA/QAB audit deviations at both Browns Ferry and Bellefonte concerning this difference between programs. These deviations are being evaluated for applicability to the WBN Power QC Inspection Program.

Inspection acceptance criteria is specified in plant instructions and in the individual workplans and maintenance requests. There have been cases of ONP instructions not providing inspection acceptance criteria. These were identified and corrected. The training program for ONP QC inspectors involves training and certification in four to seven disciplines. It is recognized that each inspector is not an expert in each discipline, but the training is adequate to perform the required hold point inspections.

In conclusion, program clarifications regarding the equivalence of the operations and construction QC inspections, and increased specialization in the inspection disciplines are being evaluated to enhance the ONP QC inspection program. Inspectors have sufficient independence and authority to implement procedures, report results, and identify problem areas as required by 10CFR50 Appendix B.

NSRS Perception:

o Q LIST NOT IN GOOD SHAPE AND IS INCONSISTENT WITH CSSC LIST

Corporate Position:

Chapter 17 of the WBN FSAR describes the criteria for defining critical structures, systems, and components (CSSC). There has been an evolution of TVA lists that identify these safety-related components. The engineering and operating organizations have had different listings, Q-list and CSSC List, respectively. Specific problems were identified with CSSC items being left off the Q-list and the CSSC-Q-list as well as the identification of components with a secondary safety function. The CSSC-Q-list is a CSSC subsort of the Q-list. A review of portions of the CSSC-Q-list was performed by ONP plant quality assurance (PQA) and all discrepancies documented on a corrective action report and nonconformance report which was subsequently reported to NRC under 10 CFR 50.55(e).

In conclusion, the problems are identified and are being dispositioned in accordance with the corrective action program as required by 10CFR50, Appendix B. TVA is reviewing in detail six additional systems to ensure that the identified problems with the CSSC-Q-list were isolated and not generic. In addition, enhancements are being developed to make the list easier to use in determining QA program requirements. To eliminate possible confusion, the CSSC-Q-list was eliminated and only the Q-list is used.

NSRS Perception:

o MATERIAL TRACEABILITY VERY POOR, ESPECIALLY SEISMIC CATEGORY I (PIPING, HVAC, CONDUIT, CABLE TRAYS, INSTRUMENTATION LINES, ETC.)

Corporate Position:

TVA's program of structural material traceability at WBN places primary emphasis on the procurement and use of qualified material that meets design requirements. The procurement process is initiated by the design engineer who, referring to design criteria and standards, documents the requirements for the material and indicates them on the drawings and conveys them to the procurement engineer who defines them in the procurement specifications. Selective inspections and testing at the vendor's facility and upon receipt of the material verify the acceptability of the material to meet specification requirements. Dependent upon the design requirements of the material, the material is then traced to either warehouse storage or, in some cases, the material is traced to installation. Where traceability to installation is required, the material and traceability are controlled as needed from warehouse storage and during fabrication and installation through site Quality Control Instructions and Procedures. Inprocess inspections and testing during fabrication and installation verify that the material is acceptable and that it meets design requirements as defined on the drawings and in design documentation.

Traceability of the materials to installation is not required for all materials. The requirement for identification and tracking of the material to installation is determined based on the safety-related nature of the material and other factors. ANSI N45.2-1971, section 1.2 allows the plant owner to determine the extent to which the standard applies dependent upon the importance of the item. The primary emphasis of ANSI N45.2, section 9 is to ensure the usage of only correct and accepted items. It requires that the item be capable of being related to an applicable drawing, specification, or other technical document.

TVA implements control of materials initially through the definition of requirements for the materials, parts, and components on the design drawings and in design documentation. These documents define specific quality requirements for the material relating to industry standards to be met and documentation that must be provided with the material. WBN Construction Specification N3G-881 entitled, "Identification of Structures, Systems, and Components Covered by the Watts Bar Nuclear Plant Quality Assurance Program," identifies the following two quality levels.

Quality Level I materials require: (a) certified material/mill test reports (CMTRs), (b) traceability, and (c) inspection documentation. It further requires that the traceability of the material is to be from mill heat number to installation. Some examples of this type of quality level are the steel containment vessel and the reactor coolant system supports.

Quality Level II materials require: (a) material certificates of compliance or traceability from mill heat number to segregated warehouse storage and (b) inspection documentation. It further requires that structural steel materials, except structural tubing, require traceability from the mill heat number to the project segregated warehouse storage. Only material from this storage is utilized for level II items. It further notes that structural tubing requires only certificates of compliance.

Several areas have been identified and evaluated in the past regarding material traceability for supports and ASME bolts. As early as 1974, a determination was made by OE that, while not a commitment, ASME Code Section III, subsection NF could be used as the basis for traceability of material for component supports. Subsection NF fully supports TVA's traceability requirements for Quality Level II structural materials used in supports. TVA's bolting program has been established to comply with Criterion VIII of 10CFR50, Appendix B.

Thus, it can be seen that the design process requires the design engineer to assess the various aspects of the design, determine the quality requirements of the material, and determine whether full traceability to installation is required. This meets the requirements of 10CFR50, Appendix B, Criterion VIII, and ANSI N45.2.

Also, concerns have been raised with respect to response to 10CFR Part 21 Notifications. In case of notification of defects under 10CFR Part 21, TVA has and will effectively respond to these notifications. Appropriate evaluations have been and will be made to identify potentially defective material reported under 10 CFR Part 21. The result of not having each item identified to its installed location can result in a large sample that must be evaluated and can require significantly more time to accomplish. However, traceability to installation is an economic decision to be made by the owner, and the safety of the plant is not degraded when traceability is implemented as defined in Construction Specification N3G-881.

In conclusion, TVA's material control program meets the requirements of 10CFR50, Appendix B, Criterion VIII and ANSI N45.2, section 9.

NSRS Perception:

- FIELD CONFIGURATION OF CABLES/SUPPORTS HAS LOST ACCUMULATED LOADING CONTROLS ON EMBEDDED PLATES

Corporate Position:

TVA's program for control of attachments to embedded plates for WBN is detailed in TVA Project Construction Specification No. N3C-928 for Locating Attachments on Embedded Plates. This specification provides limitations and restrictions on the spacing between attachments to the embedded plates (pipe supports, cable tray supports, etc.). It also provides the mechanism for evaluation of embedded plates if the required spacings or edge distances cannot be met.

N3C-928 requires a field change request (FCR) to be written if the spacing or edge distance requirement of the specification is not met. The specification requires a sketch to be included with the FCR unless the embedded plate is visually approved by representatives of the OE. The procedure for handling of the visual approval process is given in Civil Engineering Branch-Engineering Procedure 21.46. The procedure requires the onsite visual examination and approval to be documented on the FCR form.

Embedded plates with welded stud anchors were specified on OE drawings for two purposes: (1) to provide anchorage for known specific supports or structures, and (2) to provide anchorage for anticipated unidentified supports and field routed piping, conduit, and instrumentation supports. Designs were developed for embedded plates for specific supports identified in the early design stages (e.g., cable tray supports). However, the majority of the embedded plates were designed and installed for intended later use by supports that were unidentified at that time. Many embedded plate details were duplicated from SQN drawings.

While specific loadings were not available for most embedded plates, engineers provided embedded plates which would be expected to provide adequate capacity for any future unidentified supports. The selection of the specific embedded plate size and thickness and the welded stud size, length, and spacing were based mainly on historical usage and engineering judgement. However, some calculations are available for SQN which determine embedded plate dimensions and details needed to envelop loads provided by mechanical support designers.

Embedded plates of the size and configuration used at WBN can accomodate supports with a variety of load magnitudes and locations. Therefore, visual approval of minor load additions is within the scope of the original design.

In 1982, a problem was identified and a nonconformance report was written for multiple attachments to embedded plates (NCR WBNCEB8203). The NCR identified that closely spaced multiple attachments were being made to embedded plates without a design review. Large singular attachments shown as attached to embedded plates (cable trays and engineered pipe supports) were generally reviewed through the interdisciplinary review process; however, the designer could have been unaware that additional unidentified and field routed supports were being closely installed to the support being reviewed.

The corrective action for the NCR utilized a sampling program. A sample of embedded plates was selected which had significantly loaded multiple attachments. The sample results were acceptable and no additional corrective action was required for existing installations.

The sample results did indicate the potential for a continuing problem since many additional supports remained to be installed. Therefore, controls were implemented to assure design review of attachments to embedded plates and prevent the recurrence of this problem.

TVA Project Construction Specification N3C-928 was issued and implemented in early 1983. The specification provided minimum spacings between a new attachment and an existing attachment.

The spacing limitation assures that a welded stud does not receive significant load from more than one attachment. A limitation of edge distance is also provided to assure that the attachment is located within the outside row of welded studs on the plate.

If the limitations on spacing or edge distance cannot be met, an FCR is required. For the original issue of the specification, the field was required to provide a sketch of all attachments located in a specified radius of the new attachment. The FCR was then submitted to OE for evaluation.

Experience with the evaluation of the FCRs on embedded plates showed that more than 95 percent of the FCRs were acceptable. This occurred primarily because most of the attachments causing the violation of the spacing were typical lightly loaded supports.

Based on the accumulated experience and since the rejection rate was so small and the preparation of a sketch for each of the FCRs was very labor intensive, the specification was revised to allow OE engineers/designers to visually examine the embedded plate to determine if a sketch and detailed evaluation were required.

The procedures for the OE handling of the visual approval program were originally included in EN DES-EP 4.03, Appendix 4, and are currently included in CEB-EP 21.46. This procedure provides the methods for documenting the visual approval and provides some examples of supports that could be accepted by visual examination. This method of evaluation is acceptable since the engineers performing the visual examination are experienced in the analysis of the embedded plates and a review of the approval is performed by an equally qualified individual.

A review of the work done to date indicates approximately 75 percent of embedded plate FCRs are visually approved. Of the remaining 25 percent that are submitted for detailed evaluation, only 3 percent have been rejected. This indicates that the OE personnel in the field are conservative in their visual approval of attachments to embedded plates.

In order to resolve WBN Employee Concern (IN-85-033-001) with NSRS and QTC, OE agreed to perform additional sampling. A sample of 60 embedded plates was analyzed. Each plate in the sample had been visually approved at least three times and had never been submitted for detailed evaluation. Detailed calculations were performed for each of the embedded plates in the sample.

Final analyses and evaluation of the sample results did not identify any attachments that should have been visually rejected. However, some discrepancies in the documentation were identified and enhancements to the visual approval program are required. The sampling program for visually approved FCRs has verified that the inplace installations are acceptable; therefore, the visual approval process has been effective and is in compliance with 10CFR50, Appendix B.

A sampling program was initiated to investigate WBN Employee Concern (IN-85-031-001) regarding the adequacy of embedded plate design calculations, which is separate from the visually approved program. This sampling program has been completed and confirms that inplace installations are acceptable. However, certain deficiencies have been identified which will require a reexamination of our embedded plate program. The significance of these deficiencies will be evaluated as required by 10CFR50, Appendix B on SCR WBN CEB 8623.

NSRS Perception:

- NONCONFORMANCE REPORTING DOES NOT ADDRESS CORRECTIVE ACTION ASPECTS APPROPRIATELY

Corporate Position:

TVA's corporate program for addressing corrective actions is described in the Topical Report, defined in the Nuclear Quality Assurance Manual, and implemented in office and site level procedures.

OE has had in place since the early 1970s procedural controls as required by 10CFR50, Appendix B, governing the identification, documentation, evaluation, and resolution of conditions adverse to quality (CAQ). This program requires that corrective actions be determined and documented on quality assurance records that remain open until the OE corrective actions are implemented. It also requires that for significant conditions adverse to quality that the cause of the condition will be determined and corrective actions taken to preclude repetition and that the corrective actions taken be documented and reported to appropriate levels of management. The OE program currently provides for Problem Identification Report (PIR) and Significant Condition Report (SCR) forms as the QA documentation of the CAQ description. These forms document the problem and the corrective action of the CAQ, and the SCR form describes the root cause and corrective actions taken to preclude repetition for all significant CAQs. SCRs cannot be closed until all portions of the form and all OE corrective action is complete. Enhancements to the procedures and their subsequent implementation have been made where needed improvements in the program have been noted. These enhancements have generally been in the areas of improving timeliness and providing better interfaces between organizations.

CAQ reviews by OE with regard to potential generic implications of the CAQ to other plants were performed by QA engineers until late 1982. The responsibility for these generic reviews was transferred to the line organizations when the OE QA Branch was transferred to what was then the Office of Quality Assurance. This responsibility was incorporated into formal engineering procedures in mid-1982. These procedures include indication of the need for potential generic implication assessment on the CAQ document and establishment of a formal process to request an evaluation from other affected organizations. However, the SQN containment pressure transmitter issue identified in March 1985 indicated that still further strengthening of procedures and overall program implementation was required. Applicable OE procedures were revised in August 1985 to establish more rigid requirements and timeframes for the initiation and completion of CAQ generic implication reviews. Also, OE-wide training for all personnel involved in TVA's nuclear program was accomplished in October 1985 utilizing a standard training film and procedure review to ensure consistency in the training effort. A preliminary review by NRC in December 1985 of OE's revised program in this area was generally favorable. In addition, further revisions to OE procedures are being developed to require potential generic implications reviews by OE of CAQs prepared by OC and ONP that are submitted to OE for dispositioning. The above actions will serve to improve OE's performance in the area of potential generic implications reviews of CAQs.

Improvements in both program definition and implementation have been made to correct identified weaknesses. These improvements, along with an increased management involvement, will continue to enhance OE's performance in the identification, documentation, evaluation, and resolution of conditions adverse to quality. The effects of these improvements are being monitored to ensure continued improvement in OE's performance.

OC has had in their quality assurance program since the early 1970s procedural controls as required by 10CFR50, Appendix B, governing the identification, documentation, evaluation, and resolution of conditions adverse to quality (CAQs). The present program requires for significant CAQs (i.e. nonconformances, 50.55(e) items, and NRC noncompliances) and all audit/surveillance deviations that the root cause and action required to prevent recurrence (ARPR) are addressed to comply with Criterion 16 of 10CFR50, Appendix B.

As the program evolved from the early 1970s, numerous changes have taken place to OC's QA program to better define and handle significant conditions, generic applicability, root cause, and ARPR. The present OC quality assurance program stipulates that the designated quality reviewer assigned by the OC quality manager review the documents discussed above and determine generic implications at the project. The OC Quality Assurance Branch (Knoxville) determines generic implications for OC and issues quality bulletins to document generic applicability to other OC projects. With each of the above documents (audit deviations, significant CAQs, etc.), the root cause and ARPR are determined by the unit responsible for correcting the CAQ or additional support is requested where needed from another organization (e.g., OE).

Specific guidelines are contained in OC's higher-tier and site procedures discussing the requirements and responsibilities for the determination of root cause and ARPR. The OC program specifically requires review to determine the actual root causes of these deviations rather than the superficial, immediate, or apparent causes. Actions required to prevent recurrence are then tailored to address the actual root causes.

In addition, OC is presently using a significant condition (SCR), as is OE and ONP, to document the CAQ description, as well as describing the root cause and actions taken to preclude repetition for all significant CAQs. SCRs cannot be closed until all actions stipulated by the document are closed.

The ONP plant staff has in place procedural controls as required by 10CFR50, Appendix B, for the identification, documentation, evaluation, and resolution of conditions adverse to quality (CAQ). These procedures require that significant CAQs be reviewed with respect to the root cause evaluation, generic implications, corrective action to correct generic deficiencies, and corrective action to preclude repetition. For conditions resulting from a deficiency originating outside plant staff control, the originating organization was requested to coordinate and perform the investigation and reviews required by CAQs as described above. The plant staff identified nonconforming conditions discovered on tentatively transferred features by initiating an OC nonconforming condition report form (NCR). NCRs were then transmitted to OC for processing in accordance with OC procedures. Prior to December 1985, approximately 300 Watts Bar NCR's had been initiated by the plant staff. These NCR's predominately identified design or construction deficiencies. Therefore, the adequacy of generic corrective action taken for these NCR's would be similar to that taken for all those initiated by OE and OC.

Deviations have at times identified weaknesses in elements of TVA's corrective action programs or the effectiveness of their implementation. However, as weaknesses or deviations are identified, either within TVA or by external sources, corrective actions or improvements are developed and implemented. Several changes are currently underway to strengthen TVA's current corrective action systems, such as:

1. Biweekly meetings on quality are being held by the site OC organization to discuss means of more effectively addressing and implementing corrective actions.

2. Monthly meetings of top management in TVA's quality assurance organizations have been held to discuss issues of interdivisional and general concern.

3. OE is in the process of making changes to Office of Engineering Procedure OEP-17 to require assessment of potential generic implications and follow-up review of OC and site ONP NCRs/SCRs submitted to OE for dispositioning. The OC program includes provisions in Quality Assurance Procedure QAP 16.7 for identification and notification of potential generic conditions to various OC projects and sites.

4. Task teams are currently evaluating tracking, trending, and a uniform corrective action system to enhance corporate activities.

   a. Many of the numerous programs used in the past to track conditions adverse to quality (CAQs) are being replaced by a single corporate tracking system, and the necessary ADP development work is well under way.

   b. A corporate CAQ trending program is currently being developed to provide for identification of generic problems and adverse trends. Standardized coding has been developed and programming is in progress.

   c. The Division of Quality Assurance has established a task force to develop a standardized corrective action program with standardized definitions and forms. This task force will also investigate ways to improve the review of CAQs for generic applicability.

In conclusion, TVA has a documented program which complies with the requirements of Criterion XVI of 10CFR50, Appendix B.

NSRS Perception:

- DESIGN CONTROL IS NOT INITIALLY SPECIFIED UP FRONT NOR IS FINAL CONFIGURATION FEEDBACK GIVEN BACK TO DESIGN--MARGINS OF SAFETY ARE INDETERMINATE

Corporate Position:

An engineering design control program, which meets the requirements of 10CFR50, Appendix B, has been in place since the initiation of design for the Watts Bar Nuclear Plant (WBN). To further enhance this program, on June 28, 1985, the Office of Engineering (OE) began implementation of a revised procedure system. TVA requested Gilbert/Commonwealth (G/C) to perform a review of the design control program for the Sequoyah Nuclear Plant (SQN) under this revised system. The G/C review is applicable to WBN because the revised procedure system is common to all of TVA's nuclear plants. The review was intended to provide an overall assessment of the completeness of the program and its understanding and implementation by engineering personnel. They determined that the current design control program was adequate and well understood by engineering personnel. G/C is currently performing a similar review of the SQN design control program in effect from the receipt of an operating license until the new system was implemented. A report of the results of this review is expected to be available near the end of February 1986.

Final configuration feedback is given to OE which confirms that the plant structures, systems, etc., have been constructed in compliance with specified design requirements. The Office of Construction (OC) indicates incomplete work and temporary field conditions on marked drawings and provides this information to OE. OE reviews these drawings for plant operation, nuclear safety, and licensability. This review is intended to ensure that the plant configuration at licensing meets design requirements.

The TVA design control program ensures compliance with codes and standards as required by 10CFR50, Appendix B for Watts Bar Nuclear Plant. This program has been updated, strengthened, and refined based on reviews and experience since inception and continues to comply with 10CFR50, Appendix B.