

December 17, 1986

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TO: John D. Dingell  
Chairman  
Committee on Energy  
and Commerce

Morris K. Udall  
Chairman  
Committee on Interior  
and Insular Affairs

FROM: Bruce Chafin *BC*  
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Subject: Staff Review of NRC Response to Quality Assurance  
Breakdown within TVA's Nuclear Program

On December 19, 1985 NRC Commissioner Asselstine was briefed by the Tennessee Valley Authority's (TVA's) Nuclear Safety Review Staff (NSRS). [The NSRS, since abolished, had been established after the Three Mile Island accident to conduct oversight of TVA's nuclear program.] During the December 19 briefing, a chart was presented indicating that there had been a major QA breakdown at the Watts Bar nuclear plant. Specifically, the chart indicated substantial deficiencies with respect to compliance with the NRC's quality assurance requirements specified in 10 CFR 50, Appendix B.

On January 3, 1986, NRC requested that TVA state its corporate position, as opposed to that of the NSRS, with respect to adherence to the NRC's quality assurance requirements at the Watts Bar facility.

On March 20, 1986, TVA's Manager of Nuclear Power responded to the NRC. He said:

On the basis of a review of the issues identified in the NSRS perceptions [presented to Commissioner Asselstine on December 19], as reflected in the enclosure [to this letter], 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.

TVA's March 20 letter and its attachment contain statements that appear to be false by commission and omission and that are, in addition, material to the Commission's regulatory process.

The attachment to this memorandum contains a chronology of events and comments on TVA's March 20 submittal to the NRC.

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EXHIBIT 6  
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December 16, 1986

COMPLIANCE WITH 10 CFR 50, APPENDIX B

CHRONOLOGY

December 19, 1985. NSRS staff presented to Commissioner Asselstine a briefing that encompassed various matters including non-compliance with Appendix B requirements at Watts Bar. A briefing chart, entitled NSRS PERCEPTIONS OF WATTS BAR STATUS, listed the following as "major issues":

"As-constructed Welding Program is Indeterminate ...  
Electrical Cable Present Qualification is Indeterminate ...  
Instrument Line Inadequacies [involving slope, fittings,  
bending induced stresses on conduit, and hydrostatic  
testing] ... Construction Processes, in General, are Loosely  
Controlled ... Records are of Poor Quality ... Lack of  
Independence of QA/QC Personnel (CONST) ... Q List not in  
Good Shape and is Inconsistent with CSSC List ... Material  
Traceability is Very Poor Especially Seismic Cat 1 (Piping,  
HVAC, Conduit, Trays, Instrumentation, Etc.) ... Field  
Configuration of Cables, Supports Has (sic) Lost Accumulated  
Loading Controls on Embedded Plates ... Nonconformance  
Reporting Does Not Address Corrective Actions  
Appropriately."

The NSRS chart showed as the "Bottom Line":

"Design Control is Not Initially Specified Up Front Nor is  
Final Configuration Feedback Given Back to Design -- Margins  
of Safety are Indeterminate ... 10 CFR 50 Appendix B  
Requirements are not Being Met."

January 3, 1986. NRC requested that TVA:

".... furnish under oath or affirmation, TVA's corporate  
position with respect to whether or not 10 CFR Part 50,  
Appendix B requirements are being met at the Watts Bar  
facility."

This position was to be provided no later than January 9, 1986.  
The NRC also requested TVA to provide within 30 days information  
on an item-by-item basis to support its corporate position with  
respect to the allegedly non-complying items specified in the  
NSRS briefing to Commissioner Asselstine on December 19, 1986.

On or about January 9, 1986. NRC extended the deadline for TVA's  
submittal of its response to the January 3 NRC letter.



January 20, 1986. James Lieberman, in a Note to Files, described a January 17 telephone conversation initiated by Dick Denise who sought Lieberman's "views as to the meaning of Appendix B." Lieberman stated that he told Denise that Appendix B would be violated if it were violated in one or more of its aspects even if the deficiencies were later identified and corrected. He said he explained also that, "Appendix B is a layered approach, some layers may be missed but others met such that there is no breakdown in the overall QA program." Lieberman said that TVA would have to answer the question as to whether it complied with Appendix B. He told Denise, "The line between missing individual criteria and a [QA] breakdown is one of judgement and experience that I could not comment on in a specific case. But obviously no plant has ever been built without an Appendix B violation."  
[Underline not in original.]

February 3, 1986. NSRS members, Messers Sauer, Smith and Washer sent a memorandum to NSRS Director Kermit Whitt which contained a proposed NSRS position paper on compliance with Appendix B at Watts Bar. The memorandum was intended to provide information to elaborate upon and to substantiate the summary chart on Appendix B issues presented to Commissioner Asselstine on December 19, 1985. The authors of this memorandum believe they were directed to prepare it for use as input to TVA's response, then in preparation, to NRC's January 3 request for information on the Appendix B issue.

February 14, 1986. J.A. Kirkebo sent to L.D. Nace a memorandum entitled SYSTEMATIC ANALYSIS OF IDENTIFIED ISSUES/CONCERNS AT TVA. This analysis led to the following findings: (1) Lack of management direction, control, involvement, and program monitoring, (2) lack of quality assurance overview, (3) inadequacy of problem evaluation, (4) lack of timeliness and/or responsiveness to identified problems, (5) unclear or fragmented management responsibilities and authority, (6) procedure noncompliance and poor attitude toward requirements, quality and compliance, (7) inadequacy of preventive action and failure to identify root cause of problems, (8) procedure inadequacy, (9) training program ineffectiveness, (10) lack of communications and feedback, including plant-plant interfaces, (11) inadequacy of supervision, indifference, and apparent lack of accountability, (12) lack of planning, (13) lack of change and design control, (14) maintenance problem, (15) lack of understanding of regulatory requirements, and (16) lack of followup and/or problem tracking.

March 10, 1986. On this date, TVA submitted to the Commission its Nuclear Performance Plan. The Plan on page 20 includes the following statements:

TVA has reviewed the problems which have developed in its nuclear program during recent years in order to identify the causes of these problems. As a result of this review, TVA has formed judgments regarding the root causes of the problems in its nuclear program. In order to confirm this judgement (sic), TVA assembled a team of senior, experienced industry advisors to analyze more than 800 documents which contained criticisms of TVA's nuclear activities and to identify any adverse trends and their root causes. In general, the results of this analysis agreed with judgments formed by TVA regarding the source of the problems in TVA's nuclear program.

The TVA Performance plan did not present specifics of deficiencies described in the report on the analysis of the 800 documents. This analysis is described in the above noted February 14, 1986 memorandum from J.A. Kirkebo to L.D. Nace. The 800 documents (and others referenced therein) in their totality indicated a widespread QA breakdown at TVA.

March 20, 1986. TVA responded to the NRC's January 3 request for TVA's corporate position regarding compliance with Appendix B. The Manager of Nuclear Power, Steven White, informed the NRC:

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<sup>1</sup> 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. [The underlined segment, which was not underlined in the original, was not included in a June 5 letter of clarification from Mr. White to the NRC. See June 5, 1986 entry.]

An enclosure attached to Mr. White's cover letter outlined TVA's position as to why the specific deficiencies listed on the TVA briefing chart had either never actually represented non-compliance with Appendix B or were the subject of corrective actions which would remedy the problems. The enclosure had one

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<sup>1</sup> There appears to be no regulatory basis for the statement that there has been no "pervasive breakdown of the quality assurance program." The NRC's January 3 letter did not ask TVA to state whether there had been a "pervasive QA breakdown." It is unclear whether it is TVA's position that the absence per se of a "pervasive QA breakdown" means that the overall QA program is in compliance with Appendix B. If so, it is unclear what standard TVA applied in reaching a conclusion that a "pervasive QA breakdown" had not occurred.



section for each of 11 items specified in the NSRS briefing chart. The 11 items in the enclosure are discussed below beginning on page 10.

TVA's March 20 letter and enclosure contained statements that were contradicted by findings described in pre-existing NSRS reports and in the analysis and backup documents referred to in the report accompanying the February 14, 1986 memorandum from J.A. Kirkebo to L.D. Nace entitled SYSTEMATIC ANALYSIS OF IDENTIFIED ISSUES/CONCERNS AT TVA.

May 16, 1986. NRC informed TVA that the NRC was not prepared to accept TVA's March 20 response on Appendix B.

May 30, 1986. TVA's former contractor, the Quality Technology Company (QTC), submitted to the TVA Board a report on the TVA findings which included 73 pages of discussion of Appendix B findings. The QTC report described widespread non-compliance with Appendix B. The situation, described by QTC, bore little resemblance to the situation implied by Mr. White in his March 20, 1986 response to NRC's January 3 request that TVA state its position with respect to whether TVA was meeting its Appendix B requirements at Watts Bar. QTC made the following general comments on the matter:

- It is unclear from the response whether TVA intends to state that it had substantially complied with commitments derived from Appendix B, or whether TVA merely intended to inform the NRC that there had been no "pervasive" breakdown in its QA program where the word "pervasive" was intended to mean "diffused through every part of" the QA program. If TVA intends to imply the latter, would TVA have been willing to substitute the word "widespread" or "significant" in place of pervasive?
- Rather than explaining why the NSRS perceptions were erroneous, the March 20 response lends considerable credence to them.
- The TVA response is a series of vague generalizations: it refers to documents and reviews without providing citations to them. There is no way, therefore, that the statements in the letter and its enclosure can be checked against source documents. No reference is made to required reviews that are supposed to report on the status and adequacy of the quality assurance program.
- The TVA response is largely a compendium of statements to the effect that TVA had procedures intended to implement requirements derived from Appendix B. The response contained little discussion as to the

significance of inadequate procedures or failures to properly implement them.

- TVA does not indicate whether it believes that it was in compliance with Appendix B at various critical times relevant to the NRC request for information: e.g., when it was certified on February 20, 1985 that Watts Bar had been constructed in accord with NRC regulations; on December 19, 1985 when NSRS made its presentation to Commissioner Asselstine; and in January 1986 when Mr. White assumed responsibility for the TVA nuclear program.

- The TVA response, at bottom, implies that Appendix B requires nothing more than a commitment by the licensee to identify and correct problems, notwithstanding the licensee having only a dim comprehension of the scope of the problems and nature of corrective action. QTC does not believe that this is the intent of Appendix B nor that a QA program based on this interpretation fulfills a licensee commitment to meet Appendix B.

June 5, 1986. Steven White sent a clarification of TVA's March 20 letter. The June 5 clarification stated:

The conclusions which resulted from that specific review are stated in my letter of March 20, 1986. I think it is important to repeat that conclusion. "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 . . . ." [NOTE: The text represented by dots in the June 5 letter included the following: "; 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."]

June 11, 1986. During a hearing before the Subcommittee on Oversight and Investigations, Mr. White stated in response to a question from Chairman Dingell that the structural steel weld "program is in compliance with Appendix B." Mr. White referred to the EG&G review of TVA's structural steel welds and said: "They (EG&G) have essentially completed their review of the (weld) program, and by that I mean literally they are 99.9 percent complete with their review, and they have found, and this is important, they have found no deviation from Appendix B, no deviation from ASME-AWS standards of the final safety analysis report."

[Note: The EG&G review did not encompass certain QA aspects of the welding program. (S) Transcript of June 25, 1986



meeting between TVA and NRC, p. 140.) NRC stated in a July 23, 1986 letter to Chairman Dingell concerning TVA's June 10 testimony on welding issues:

"It is also our understanding that the scope of the DOE/EG&G program review was limited to certain codes, regulatory guides, and standards (which assure, in part, Appendix B requirements are met) but they did not review TVA conformance to other applicable Appendix B related standards, such as the ANSI N45-series."

There is, therefore, no apparent basis for Mr. White's assurance to Chairman Dingell concerning compliance with Appendix B.]

July 10, 1986. NRC staff including Director of Inspection and Enforcement, James Taylor met with Congressional Staff including Bruce Chafin (E&C/O&I), Jim Gray (Congr. Cooper), Henry Myers (IAIA), and Norman Zigrossi (TVA Inspector General) for the purpose of discussing requirements of Appendix B. The NRC position was in direct conflict with that implied by TVA's March 20 letter; i.e. the NRC held that compliance with Appendix B could not be achieved merely by declaring the existence of a program to identify and correct deficiencies.

July 16, 1986. The NRC, in a letter to Steven A. White, requested, among other things that TVA:

"...review the QTC evaluation of the TVA position regarding Appendix B compliance and confirm that these concerns will be systematically considered and accounted for in the TVA responses to employee concerns."

September 10, 1986. In a letter to Chairman Dingell concerned primarily with weld issues, Commissioner Asselstine stated:

"The Appendix B requirements are intended to ensure timely identification of deviations from licensing commitments. The construction of Watts Bar is essentially complete and TVA is unable to certify the plant's safety in general, and in particular the adequacy of its welds, let alone their compliance with license commitments. Thus the straightforward conclusion is that TVA did not comply with Appendix B."

October 1, 1986. The Appendix B matter was the subject of discussion at a hearing before the Oversight and Investigations Subcommittee of the House Committee on Energy and Commerce. In prepared testimony NRC said:

"TVA responded to the NRC's inquiry on March 20, 1986 and addressed the eleven NSRS Perceptions of Watts Bar Status,

identified the programs and procedures in place to address each of these issues, and identified the corrective actions taken in response to such issues. ... [Underline added.]

[Note: The NRC testimony is inaccurate to the extent it implies (A) that TVA's March 20 Appendix B letter adequately addressed the NSRS perceptions, (B) that it adequately identified programs to address the issues, and (C) that the corrective actions taken in response to such issues were adequate.]

"As stated in the NRC letter to TVA of May 16, 1986, the Staff is not prepared to agree with TVA conclusions regarding overall compliance with Appendix B.

"Appendix B provides 18 broad criteria to assure the quality of design, construction and operation of commercial nuclear power plants.<sup>2</sup> .... The broadness of Appendix B makes it possible that any nuclear plant under careful scrutiny may not meet some part of the criteria at any given time. ... However, licensees are responsible to have programs to detect and correct deficiencies which fall under Appendix B. ... This approach, coupled with careful application of Appendix B is intended to preclude any pervasive or extensive breakdowns in hardware quality which could adversely impact plant safety. [Underline added.]

"We are addressing the degree of breakdown in quality assurance programs by evaluation, in each of the technical areas being reviewed, the nature and extent of the deficiencies being identified. ...

"The Commission has not yet drawn a final conclusion as to the extent of a quality assurance breakdown at TVA."

[Note: In numerous areas, deficiencies involving failures to comply with Appendix B criteria are identified in documents pre-existing TVA's March 20 response. Because of these deficiencies, TVA cannot certify that Watts Bar was designed and constructed pursuant to TVA's licensing commitments (including commitments to fulfill requirements derived from Appendix B). NRC's inability to reach a "final" conclusion on this matter results from the NRC's not having reviewed documents available to TVA on March 20, 1986.]

<sup>2</sup> The NRC regulations state that quality assurance activities are those "necessary to provide adequate confidence that a structure, system, or component will perform satisfactorily in service."



With respect to structural steel welds, Mr. James Taylor, Director of the NRC Office of Inspection and Enforcement, testified that:

The high rejection rate of AWS welds clearly indicates the inadequacy of the original acceptance inspections. ... My preliminary view is that TVA's failure to conduct proper inspections at Watts Bar represents a significant breakdown of this inspection aspect of QA/QC as applied to the structural welding program. [Tr., p. 18.]

In response to Mr. Wyden's question as to whether there was any doubt in his mind that TVA had failed to meet its Appendix B requirements, Mr. Taylor said that "in structural welding, there is no doubt in my mind." [Tr., p. 31.]

Mr. Wyden asked: "When will the NRC be ready to inform TVA that the Appendix B certification is false? ... Give us an approximate date." Mr. Taylor responded: "I would say within the next several weeks. If the rest of the experts on the Commission agree with my personal view." [Tr., p. 32.]

When asked by Mr. Wyden who was conducting the investigation concerning possible wrongdoing with respect to the Appendix B letter, Mr. Taylor said: "On the March 20 letter, the staff has not yet formally referred that position to OI ..." [Tr., p. 33-34.]

In response to Mr. Wyden's request as to the state of the NRC's review of QTC's May 30 critique of TVA's position on Appendix B, Mr. Thompson said: "That was given to the NRC staff for review as part of our normal practice on allegations (sic) we have given that to TVA for their response as well as our staff review. That document will be part of the review that we do in detail in evaluating the overall pervasiveness of the breakdown." [Tr., p. 34-35.]

When asked whether he agreed with Commissioner Asselstine's conclusion that TVA did not comply with Appendix B, Mr. Taylor said: "I would technically not be in a position to say that overall until I had more information developed. That is the Commission[er]'s own opinion." [Tr., p. 37.]

When asked, with respect to the Appendix B matter, whether there was any point where he disagreed with Commissioner Asselstine, Mr. Taylor said: "No. I agree with him." [Tr., p. 37.]

When asked how the Appendix B matter affected the credibility of the management team at TVA, Mr. Taylor stated:

"If I were asked that [Appendix B] question, I would not have said what they [TVA] said because I am familiar with the difficulties, applicability of Appendix B, which I talked out (sic) when I talked to some of the Subcommittee staff. There were so many things ongoing that I personally would not have given that type of answer, just from my experience with Appendix B, what it covers and through the disciplines, through the design, through the work onsite. It is a very, very broad, expansive document. [Tr., p. 40-41.]

Mr. Wyden asked if this were not a sign that Mr. White was continuing the problems of the past, Mr. Taylor said: "I couldn't answer that. That depends on what was in his mind when he wrote it. I personally would not have said that. I personally, knowing -- perhaps it is his inexperience with this particular criteria." [Tr., p. 41.]

October 14, 1986. NRC informed TVA that data indicated a QA breakdown in structural steel welding and suggested that TVA reassess the welding aspects of the quality assurance program and its position discussed in its March 20 and June 5 Appendix B letters. [The October 14 letter is discussed in greater detail in the initial section of the following critique of the Attachment to TVA's March 20 Appendix B letter.]

November 18, 1986. The NRC TVA Senior Management Team met in Chattanooga with managers of the TVA nuclear program. At this meeting Mr. C. C. Mason, the Acting Manager of the TVA Office of Nuclear Power, said:

"...we wouldn't certainly wouldn't be in the situation we're in now if our QA departments had been effective in the past five years. They would have found the problem areas and they would have effectively corrected them before, long before we got to where we are. We've had some major deficiencies in the QA program. I think it's been aggravated by the fact we've had a fragmented organization. We didn't have a QA program. We've had several different QA programs, and we didn't have the top management support, particularly for interface controls in the QA organization." [Tr., p. 213.]

December 16, 1986. The NRC staff informed the Commission of preliminary results of a review of documents used by TVA as the basis for its March 20 assertion of compliance with NRC's QA requirements. The NRC staff said its findings to date did not support TVA's claims of compliance made in its March 20 letter to the Commission.



**CRITIQUE OF ATTACHMENT TO TVA'S MARCH 20, 1986 APPENDIX B**

**1. NSRS: "AS-CONSTRUCTED WELDING PROGRAM IS INDETERMINATE"**

On February 3, 1986 NSRS staff stated in a memorandum on Appendix B issues that key elements necessary to assure a quality welding program had not been present at Watts Bar and that, "Due to the pervasive nature and magnitude of problems in the area of welding, our conclusion is that the end product is indeterminate."

TVA's March 20 response to NRC's January 3 letter includes the following. The first paragraph states that TVA has a program to assure compliance with regulatory commitments. The second paragraph states that:

The total [TVA] welding program has been reviewed by internal and external organizations and determined to be in compliance with Appendix B.

[Note: This statement is contradicted by the statement of Mr. Lawrence Martin of the TVA staff at a meeting with NRC staff on June 25, 1986:

"...we are not certifying right now in the welding task group or asking anyone else to certify that we met our (i.e. QA and other) commitments (in the conduct of TVA's welding program.") (Tr. p. 37.)]

The TVA response did not provide information to identify reports of such internal and external organizations. The TVA responses did not indicate when and by whom such reviews had been conducted. TVA did not indicate the nature of findings resulting from such reviews. TVA did not indicate where such reviews were documented. Nor did this portion of the response deal with manifestations of breakdowns in quality programs affecting welding; e.g. TVA has been required to embark upon a \$20 million program to demonstrate that welds were suitable-for-service rather than that they were made in accord with TVA's licensing commitments.

Contrary to the March 20 statements to the effect that TVA's welding program complied with Appendix B is Commissioner Asselstine's September 10, 1986 letter to Chairman Dingell:

Moreover, there is much evidence which calls into question whether TVA's welding program did in fact comply with Appendix B to CFR Part 50. This evidence includes the large number of components being identified by the reinspection program which were rejectable under TVA's original licensing

commitments, and TVA's practices of allowing welding foremen to perform weld inspections.

Also contrary to the March 20 certification that the welding program complied with Appendix B is the testimony by the NRC Director of Inspection and Enforcement at the Oversight & Investigations Subcommittee October 1, 1986 hearing:

The high rejection rate of AWS welds clearly indicates the inadequacy of the original acceptance inspections. ... My preliminary view is that TVA's failure to conduct proper inspections at Watts Bar represents a significant breakdown of this inspection aspect of QA/QC as applied to the structural welding program. [Tr., p. 18.]

Also at the October 1 hearing, in response to Mr. Wyden's question as to whether there was any doubt in his mind that TVA had failed to meet its Appendix B requirements, Mr. Taylor said that, "...in structural welding, there is no doubt in my mind." [Tr., p. 31.]

The third paragraph in the welding section of the March 20 response contains 16 lines of which 13 are devoted to stating that TVA has a program for qualifying welders. [Note: This discussion in the March 20 TVA response conflicts with NRC Office of Investigation findings (2-85-018, August 8, 1986) that the welder requalification program was inadequate.] Three lines in the third paragraph state that several concerns about the welder renewal qualification process at Watts Bar had been expressed and that, "These concerns have been identified in a nonconformance report addressing program deficiencies." The number of the nonconformance report is not provided, nor is there any indication of the nature of the concerns leading to the nonconformance report nor whether concerns have been expressed with respect to other aspects of training. With respect to welder certification, QTC stated [p. 16/86] the following in its critique of TVA March 20 Appendix B response:

The WBN welding program, from 1975 to 1986, did not establish verification of welder qualification/certification prior to welding on safety-related systems, structures and components.

The quality control procedure (QCI/QCP 4.01) was found not to contain a provision to verify the current status of the welders certification prior to issuance of weld material.

It was found that the procedure was in the process of being revised to establish the requirement and method for verification of welder qualification prior to issuance of filler material (welding rod) to the welder.



Welder certifications were falsified.

Backdating of certifications was found to be a common practice, and was done without supporting evidence or justification as to welders' qualification.

No procedural controls existed regarding the backdating process.

Controls for maintaining welders qualification were not established in the applicable quality control procedure (QCI-4.02) until August 1985.

The fourth paragraph of the TVA response, regarding welding, addresses training of welding inspectors. Eleven lines describe inspector training. Three lines state that 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." The TVA response does not provide information to identify any reports of such internal and external organizations. The TVA response did not indicate when and by whom such reviews had been conducted. TVA did not indicate the nature of findings resulting from such reviews. TVA did not state where the reviews had been documented. [Note: See foregoing statements regarding a breakdown in the weld inspection program.] In addition, with respect to inspector training, QTC, in its May 30, 1986 critique of TVA's March 20 Appendix B letter, stated the findings of its investigation of Concern No. EX-85-052-005 and 35 (p. 18/86):

"Inspectors are generally untrained or inadequately trained, are unqualified, and do not follow procedures.

"Training, both formal and OJT (sic) is (sic) inadequate.

"Inspectors do not receive the required minimum training."

The fifth paragraph of the TVA response, regarding welding, states that, "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." TVA stated that a project to review welds had been established and that the Department of Energy was performing an "independent evaluation of the TVA Watts Bar Welding program." TVA did not indicate what it meant by independent evaluation; e.g. whether the Department of Energy had been free to decide upon the specifics of what would be done in the course of the welding evaluation, and what influence had been exerted by TVA in the design of the evaluation effort. [Note: As of December 15, 1986, NRC had not approved the plan then being implemented by the DOE contractor, EG&G. Moreover, the EG&G program did not address significant QA aspects of the welding program, a fact which raises questions as to the

relevance of DOE/EG&G to arguments, presented in the March 20 letter, claiming that the welding program complied with Appendix B.]

TVA provided examples of welding "problem areas" that were the focus of concerns.

The first of the examples concerned weld rod control.

TVA said: "The quality assurance program controls welding filler materials from initial procurement to receipt, storage, issue, and use in the fabrication and erection process." TVA is stating here that a weld filler material control program existed; TVA implies a degree of control to the point of use which may or may not have existed. For example, weld filler material was not controlled to specific welds by heat and lot number. TVA did not indicate the number or nature of concerns expressed with respect to control of weld filler material. Nor did TVA indicate the results, if any, of the investigation of such concerns.

TVA stated: "A complete review of all certified material test reports for all welding material received at WBN indicated no discrepancies." This finding, which implies that all welding material received at the site was of proper quality, is undercut by the fact that defective weld rod was found on site. The TVA response did not provide information to identify a report of any such review of certified material test reports. TVA did not state when and by whom any such review had been conducted. TVA did not indicate the nature of findings resulting from any such review nor did it state where the review was documented. In its critique of TVA's March 20 Appendix B letter, QTC [p. 15/86] stated with respect to weld rod control:

Weld rod or welding filler material does not have traceability, by any appropriate means, from storage to use of material.

Weld rod issue slips, which are not maintained as QA records, do not identify use of material.

Weld rod stubs are not controlled for accountability.

QTC concluded [p. 15/86]:

The TVA [March 20 Appendix B] response does not refute the NSRS conclusion [regarding inadequate



weld rod control], and does not address the issue of accountability of welding filler metal.

The second of the examples concerned fit-up inspections.

TVA stated that: "Concerns have been expressed concerning fit-up inspections on structural welding." TVA did not provide the specifics of the concerns, but implied that they bore on the fact that not all fit-up inspections had been performed and documented by certified QC inspectors.

[Note: The February 3, 1986 NSRS memorandum states that fit-up inspections for structural steel welding were not required by TVA's QC procedures. The absence of such a requirement indicates noncompliance with ANSI N45.2.5-1974 which states that "...Inprocess inspections shall include joint fit up prior to start of welding." ANSI N45.2-1971, Section II states that:

"...Inspection activities to verify the quality of work shall be performed by persons other than those who performed the activity being inspected. Such persons shall not report directly to the immediate supervisors who are responsible for the work being inspected."

Notwithstanding the above, TVA stated that there was no requirement that all fit-up inspections on structural welding be performed by certified QC inspection personnel. [NOTE: Among examples of TVA not complying with its licensing commitments as understood by the NRC, NRC noted fit-up inspections in its July 23 letter to Chairman Dingell.]

The third of the welding problem areas listed in TVA's March 20 letter concerned deficient welds in supports and miscellaneous steel.

TVA stated that these problems had been identified by previous NCR's and that sample programs had been conducted 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." TVA did not provide information that would identify the NCR's or associated reports. TVA did not indicate whether the sampling process, which led to a finding that welds were capable of meeting intended design functions, had been accepted by the NRC as either (A)

meeting TVA's licensing commitments or (B) satisfactory notwithstanding a failure to meet design commitments. In failing to make the distinction between (A) and (B), TVA did not state whether its position was that welding programs had been conducted in a manner such that Appendix B requirements were satisfied.

With respect to TVA's weld sampling programs applied to supports and miscellaneous steel, QTC stated that the "sampling programs":

Do not meet the requirements of ANSI N45.2-1971.

Were not conducted in accordance with established sample and inspection procedures.

Were not based on recognized standard practices.

Do not provide adequate and documented justification for the sample size and selection process.

Were not prescribed by documented instructions or procedures (Appendix B, Criteria V).

QTC noted in its May 30, 1986 critique that TVA had not attempted in its March 20 letter to respond to the following issues: conflicting weld acceptance criteria; inaccessibility of drawings; failure to use weld rod ovens; absence of QC welding inspectors before 1979; and inspection of welds through carbonizing. QTC said that TVA had not responded adequately to the following issues: adequacy of fit-up inspections for structural steel welding; weld rod accountability; welder certification control; welding inspector training; and adequacy of sample programs.

QTC [p. 21/86] concluded:

The welding has not been controlled and accomplished in accordance with applicable codes, standards, criteria and other special requirements, contrary to Appendix B, Criterion IX. The welding program has not been subjected to a comprehensive system of planned and periodic audits to verify compliance with the welding aspects of the QA program and to determine effectiveness of the welding program, contrary to Appendix B, Criterion XVIII. Inspections of activities affecting weld quality have either not been executed at all or have been inadequately executed, contrary to Appendix B, Criterion X. Noncompliance with these and other Criterion of Appendix B have been objectively demonstrated by NSRS, QTC and others. The TVA [March 20 Appendix B] response does not provide or reference any



credible evidence as to the status and adequacy of the welding program and implementation of that program. The TVA response admits that TVA is currently in the process of evaluating the welding program by establishing the Welding Evaluation Project and engaging a contractor (DOE/EG&G).

On July 24, 1985, B.J. Youngblood (NRC) to TVA's Nuclear Manager, a letter requesting that, within one month, TVA provide additional information concerning the Project Management Plan for the DOE weld evaluation project as described in TVA's May 23, 1986 letter to NRC and by TVA during the June 25, 1986 meeting with NRC staff in Bethesda. NRC stated:

"...the staff has concluded that a demonstration that welds are 'suitable-for-service' on a statistical 95/95 basis (i.e., there is a 95% confidence level that 95% of welds in a given population are 'suitable-for-service') is not equivalent to TVA's FSAR commitment to meet specific industry codes and standards unless specifically provided for in the individual codes."

The enclosure to the July 24 letter requested information concerning weld populations selected for reinspection, conditions for expanding weld sample size, identification and documentation of findings of deviations from commitments, determinations as to implementation of Appendix B commitments, project schedules, applicability of the plan to Watts Bar 2, sources of quality indicators, procedures for addressing inaccessible welds, Preservice Inspection (PSI) results for Watts Bar 1, procedures for addressing employee concerns, magnetic particle inspection through carbo zinc, procedures for dealing with vendor welds, assessments of deviations from ASME Section III at Watts Bar 1, and a proposed contract to encompass review of 1500 radiographs at Watts Bar 1. [On December 5, 1986 TVA responded to this and a subsequent (October 14, 1986) NRC request for information concerning welds.]

On October 14, 1986, Richard Vollmer (Deputy Director, NRR/NRC) sent to Steven White (TVA Manger of Nuclear Power) a letter concerning welding issues. The NRC was critical of the TVA's proposal to assess weld deficiencies on the basis of the number of nonconforming attributes; i.e. TVA proposed that if an inspection 100 welds, each having 10 attributes, revealed one deficient attribute per weld, that the percentage of deficiencies would be 10% rather than 100% which would be the case were it required that all attributes on a particular weld would need to be satisfactory if the weld itself were to conform to code requirements.

The NRC noted that current reinspection results indicated 42 percent of the reinspected structural elements were deficient with respect to one or more inspection attributes.

The NRC noted that TVA had provided information indicating that weld deficiencies in a structural platform supporting safety-related cables had resulted in welds that were unsuitable for service; i.e. engineering calculations failed to demonstrate that the design criteria were met.

The NRC's October 14 letter also stated that high rejection rates indicated inadequate original inspections and inadequate inspector training. The NRC stated that the finding of deficient welds called into question welder qualification.

The NRC requested information on a series of weld-related issues. The NRC further stated:

As you may recall, you provided your views regarding the adequacy of the Watts Bar QA program in your letters of March 20, 1986 and June 5, 1986. You stated in your June 5, 1986 letter, "...if such reviews indicate to me that there has been a pervasive breakdown of the QA program anywhere within TVA's nuclear program, I would so advise you." In view of these preliminary findings in the structural welding area at Watts Bar, TVA should reassess the welding aspects of the quality assurance program and its position discussed in those letters.

The NRC requested that TVA respond to the October 14 letter within 30 days.

On December 5, 1986, TVA responded to NRC's July 24 and October 14 requests for information on welding-related matters. [In making each such request NRC had asked for a response within one month.] The December 5 TVA response stated: "The purpose of the TVA weld evaluation program is to determine if the welding program was conducted in accordance with FSAR commitments and if welded components and structures will perform their intended function." The December 5 response did not state, as did TVA's March 20 Appendix B letter that, "The total welding program has been reviewed by internal and external organizations and determined to be in compliance with Appendix B." Rather, with respect to whether the QA/QC aspects of the welding program had been implemented in accord with the requirements of Appendix B, TVA stated that a review of implementation had not been a specific task of the weld review program; TVA said (Item 4):

"Instead, the results achieved, i.e., the quality of the installed hardware, was deemed a more relevant test. However, because the question has been raised by the NRC, an additional task to specifically address the question has been added to test the implementation by evaluating the conduct and results of the audit and corrective action portions of [the] QA program as applied to welding at WBN."



2. NSRS: "ELECTRICAL CABLE PRESENT QUALIFICATION CONDITION IS INDETERMINATE."

In its February 3, 1986 proposed response to the NRC's January 3 Appendix B letter, NSRS stated with respect to cables:

"Due to the many substantiated concerns regarding cables, it has become obvious that many cables have been bent, stretched, cut, and possibly crushed during the process of installing them. In fact, some were subjected to so much tension they broke during the pulling process. It is therefore obvious that we have exceeded the manufacturer's "normal" mechanical stress values during the installation process. This being the case, one can only conclude that the cables no longer meet the requirements of IEEE Standard 383-1974. Therefore, the plant's ability to withstand a DBE is indeterminate."

The first paragraph in the TVA March 20 response states that TVA has cable installation procedures governing electrical cable design, installation, inspection, and testing. The second paragraph states that the NSRS has stated that (A) deficient cable installation practices raise doubt about the ability of cables to perform safety functions; and (B) "... the present qualification of class 1E cables is in question."

[Note: NSRS I-85-06-WBN (July 9, 1985) (pages 2-5) enumerated 6 conclusions: (A) inadequate resolution of cable bend radius problem (e.g. WBN NCR's 4194R, 4274, 4933, 5062); (B) inadequate program for cable pulling activities; (C) inadequate short circuit and voltage drop calculations; (D) inadequate Office of Engineering QA verification program for electrical engineering and design activities; (E) inadequate implementation of QA program which itself was deficient; (F) corrective action program that was neither timely nor responsive to the cable bend radius problem. NSRS stated that the existence of the deficiencies described in I-85-06-WBN resulted in "an indeterminate cable installation at WBN (Watts Bar)." NSRS stated that: "The existence of these conditions will not provide assurance that the cable system will be capable of performing the intended function during the life of the plant for all postulated conditions."]

The third paragraph of the TVA March 20 Appendix B response, contrary to the findings of I-85-06-WBN cited above, states nonconformances have been investigated, corrective actions defined, and required rework 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 10CFR50.55e."

[Note: TVA did not indicate the number or nature of additional nonconformances that had been identified. TVA did not specify dates, NCR numbers, numbers of deficiencies reported to the NRC. Nor did TVA describe its response to the detailed criticisms specified in I-85-06-WBN.]

The fourth paragraph discussing cables in the TVA March 20 Appendix B response indicates a revision and upgrading of cable installation procedures. TVA also discussed an evaluation of already installed cables and stated that "Preliminary results of the evaluation program indicate that the cables have not been damaged during installation."

A June 22, 1983 TVA memorandum from J.D. Collins to C.H. Sudduth discussed steps that might be taken to resolve the cable bend radius problem. The memorandum concluded:

In summary, bottom line, - Due to the detail, physical conditions, and the many evaluations and/or testing that may be required OEDC must expect this problem to be a long term open issue for both WBNP and BLNP. However, based on CONST [Office of Construction] testing of the installed cable which includes megger testing and flip the switch testing (smoke test), and our ongoing evaluations, TVA must take the position that the cable as installed is acceptable for plant operations with evaluations continuing to determine acceptability or to determine life of cable based on it being installed in a potentially degraded condition. We must be prepared to defend the licensability of Watts Bar #1 using the as installed configurations because there is not time for modifications. [Emphasis added.]

In its May 30, 1986 critique of the March 20 Appendix B letter, QTC questioned the adequacy of TVA's program to ascertain whether cables had been damaged during installation. QTC concluded (p. 27/86) that TVA's March 20 Appendix B response TVA did not address (A) whether TVA's failure to establish proper cable installation criteria in its procedure resulted in a violation of Appendix B requirements and (B) whether TVA's revised cable installation criteria were currently in compliance with Appendix B.

On August 4 and 15, 1986, the NRC requested TVA to provide within 45 days documentation of various aspects of (A) its cable installation program and (B) the program established to verify that cable installation procedure deficiencies had not compromised cable quality. The NRC stated that its previous decision to close the cable bend issue was based on information provided by TVA, and it now appeared that the TVA report that



provided the basis for the closure was incomplete with respect to technical content. Among other things, the NRC requested TVA to provide reasons for cable installation activities that did not comply with TVA procedures and/or industry standards. NRC asked for an explanation of the QA/QC breakdown that allowed the cable bend deficiency to go undetected until 1982.

October 6, 1986. TVA informed NRC that TVA would not provide information requested in NRC's August 15 letter within the specified 45 days; rather the cable information sought by the NRC would be submitted on or about December 22, 1986 as part of the final report for NCR WBN 4149R.

3. NSRS: "INSTRUMENT LINE INADEQUACIES [INCLUDING] SLOPE, FITTINGS, BENDING INDUCE STRESSES IN CONDUIT, HYDROSTATIC TESTING."

NSRS stated in its February 3, 1986 memorandum that the instrument line construction process "...is apparently flawed with some very elementary failures that cause the end product to be indeterminate. Basic controls for tube bending were not in place, ferrules put in backwards, incompatible vendor's fittings interchanged, line slopes not maintained, inspection documents forged, and line supports not identified."

In its March 20 response, TVA agreed with NSRS that significant instrument line deficiencies had been identified. TVA implied, however, that:

"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."

NOTE: The TVA response implies that the instrument line problems were discovered as a result of business-as-usual implementation of TVA's QA program. The TVA response further indicates that sampling of installed lines and associated fittings demonstrated that the hardware could be "accepted-as-is." The TVA response does not indicate: (A) the date of identification of the instrument line problems (e.g. before or after certification of Watts Bar readiness for licensing); (B) the circumstances leading to this identification (e.g. the nature of the employee concern and the manner in which it came to light); and (C) whether the fittings will be accepted on the basis of being found "suitable for service" or on the basis of compliance with licensing commitments.

In its May 30, 1986 critique of TVA's March 20 response, QTC (p. 32/86) concluded:

The TVA response describes significant problems which indicate a history of noncompliance with the requirements of Appendix B. In fact, the problems stated precipitated a management decision to suspend further instrumentation installation activities until the program is corrected.

However, TVA's March 20, 1986 response does not indicate when or if the instrumentation installation program will be in compliance with the requirements of Appendix B."

Subcommittee staff were informed in November 1986 that 150,000 worker hours would be required to bring instrumentation lines into conformance with conditions required by NRC regulations.

4. NSRS: "CONSTRUCTION PROCESSES, IN GENERAL ARE LOOSELY CONTROLLED."

10CFR50, Appendix B, Criterion X requires establishment and execution of an inspection program to verify that construction activities conform to documented procedures, instructions and drawings.

On February 3, 1986 NSRS staff enumerated, in a memorandum on Appendix B issues, hardware deficiencies resulting from inadequate control of the construction process. These deficiencies involved uncontrolled cutting by welders, loose bolt installation, improperly installed expansion anchors, inadequately inspected concrete, and an inspection process which did not assure that as-built conditions conformed to designs. NSRS concluded:

.... the original installations were poorly controlled, often performed by untrained people and inadequately inspected resulting in an indeterminate end product that has deteriorated through time due to disregard for procedures.

In TVA's March 20 response to NRC's January 3 letter, TVA described procedures intended to assure control of construction. TVA noted that, where appropriate, nonconformance reports had been written to identify and correct deficiencies. TVA noted that improvements were being made "to correct problems and strengthen our work control program." The TVA response concluded:

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



The TVA response does not address all items cited by NSRS. Further, the TVA response is ambiguous with respect to whether it intends to state that prior to December 19, 1985 construction was in accord with requirements of Appendix B, and in particular the relevant Appendix B criteria, Criterion X, XI and II.

In its May 30, 1986 critique of TVA's March 20 response, QTC (p. 33/86) stated:

The TVA response incorrectly implies that instructions and procedures to control construction processes have been in effect "since early construction in 1973" and "during the life of the WBN construction project" for "activities within the scope of 10 CFR 50, Appendix B."

The TVA response fails to disclose that most of the current quality control procedures and instructions did not exist, or are subsequently revised from the versions that may have existed, when the bulk of the work was performed. For example, QTC investigation (Concern No. PH-012-001; report issued October 1985) revealed that QA program procedures for inspection and documentation of safety-related HVAC duct work was not initiated until 1981, after 95 percent of the work had been installed.

QTC noted that the response had not addressed two items specified in the NSRS memorandum, expansion anchors and conduits, and that the TVA response had not adequately addressed other items involving concrete, support installation notes, unistrut support bolting, test control, and journeyman training. QTC (p. 39/86) concluded:

The objective evidence indicates that TVA has not adequately controlled inspection processes involving activities affecting quality. A program of inspection has not [been] adequately established and executed, contrary to Appendix B, Criterion X. A test program has not been adequately established and executed, contrary to Appendix B, Criterion XI. Personnel performing activities affecting quality have not been adequately selected, indoctrinated and trained to account for the need for skills to attain the required quality, contrary to Appendix B, Criterion II. Further, we are aware of no program to verify the work of inadequately qualified personnel. This deficiency represents a significant breakdown in portions of the quality assurance program conducted under 10 CFR 50, Appendix B.

5. NSRS: "RECORDS ARE OF POOR QUALITY."

On February 3, 1986 NSRS staff stated in a memorandum on Appendix B issues: "From a review of issued reports we have concluded that

Quality Assurance records are inadequate and in some instances non-existent."

In TVA's March 20 response to NRC's January 3 letter, TVA stated that "Records of poor quality at Watts Bar can be traced to vendor-supplied records. Vendor records are sometimes furnished to TVA from copies which are of poor quality. ... Concerns on vendor records and the retrievability of certain instrumentation support records have been identified and corrective actions are in process for resolution of these concerns." [Note: TVA's March 20 response did not state any of the following:

-that TVA was or was not in overall compliance with applicable record keeping requirements during particular periods, if any, since issuance of the Watts Bar Construction Permit.

-that TVA disputed the December 19, 1985 NSRS statement to the effect that records were of poor quality.

TVA's March 20 response did not indicate that the procurement records problem had been described at length in a 1983 NSRS report, I-83-13-NPS. This report, which had been completed on June 17, 1983, was issued on March 1, 1984. The documentation problems described in I-83-13-NPS led NSRS to conclude: "These deficiencies place TVA in violation of 10CFR50, Appendix B, Criterion VII requirements for SQN; and unless changes are made to correct the problems, both Watts Bar Nuclear Plant (WBN) and Bellefonte Nuclear Plant (BLN) will be subject to the same violations." [GNS 84 030i 150, p. 1.]

While I-83-13-NPS was completed in June 1983, it appears not to have been placed in the TVA document control system until March 1, 1984 when TVA reported NCR DD1-A-84-0001-D05 to the NRC pursuant to requirements of 10 CFR 50.55e. NRC Inspection Report 50-390/84-07 indicates that NRC learned of these deficiencies and I-83-13-NPS in the course of an inspection conducted on February 6 - 10, 1984. The 390/84-07 report stated that:

"...the true extent, depth and validity of this concern [about incomplete and missing records] could not be evaluated by the inspectors due to the incomplete status of the TVA investigation. The inspectors requested the licensee to determine the extent of the problem, the generic applicability to other plants and the resolution of this problem if found significant."

On August 1, 1984 TVA transmitted to NRC its final report on the 50.55e concerning document control. TVA stated that it had revised its procedures regarding handling of supplier quality control records. TVA noted that a new system for indexing, storage, and retrieval of supplier quality control records had



been placed in operation on March 19, 1984. The final 50.55e report on NCR DD1-A-84-0001-D05 did not indicate what actions were taken, if any, to correct existing records deficiencies.

On February 7, 1985, the NRC issued Inspection Report 390/84-86 pertaining to an inspection conducted on December 10 through 14, 1984. In reference to the 50.55e Final Report on NCR DD1-A-84-0001-D05, the 84-86 report stated:

The final report [on NCR DD1-A-84-0001-D05] was issued (by TVA) August 1, 1984. The inspector reviewed the final report and held discussions with responsible personnel at the construction site and in the quality engineering branch. The final report is considered inadequate in that objective evidence was not presented to confirm that required records are now available and retrievable.

On July 5, 1985, NSRS issued Report R-85-07-NPS, FOLLOWUP REVIEW OF QUALITY ENGINEERING BRANCH (QEB) RECORDS INVESTIGATION I-83-13-NPS which stated:

While procedural changes were made to improve the accountability and retrievability of OE, OC, and NUC PR records, the implementation of those procedures was not yet in a stage of completeness that would allow closure of open items.

....

The NRC has indicated to NSRS that an open NRC item relating to QEB records will require resolution prior to full power operation of WB Unit 1. NRC personnel have also indicated that their closure of the item could be based to some extent on the NSRS resolution of the issues present in this report.

In its May 30, 1986 critique of TVA's March 20 Appendix B letter, QTC (p. 40/86) stated, among other things:

The TVA response for this item does not contain a statement of compliance with 10 CFR 50, Appendix B, Criterion XVII.

...

The TVA response fails to recognize the quality requirements for QA records encompass more than legibility. The response does not demonstrate an awareness of the need for QA records to exist, to be accurate and complete, to be identifiable and retrievable, and to furnish evidence of activities affecting quality. The TVA response does not address aspects of QA records involving content and validity.

...

The QTC critique described record deficiencies involving concrete, the Component Cooling System Heat Exchangers, HVAC ductwork welds, and structural steel weld repairs in the Main Steam Valve Rooms. QTC (p. 44/86) concluded:

The TVA [March 20, Appendix B] response did not address specifically nor in general documentation problems described in various TVA reports, memoranda, etc. The TVA response contains insufficient detail to allow an assessment as to whether, on January 3, 1986, TVA complied with recordkeeping requirements derived from Appendix B as they applied at Watts Bar.

TVA has failed to prepare and maintain sufficient records to furnish evidence of the quality of items and of activities affecting quality, contrary to ANSI N45.2-1971 and Appendix B, Criterion XVII. This deficiency in design and construction represents a significant breakdown in a portion of the quality assurance program conducted under 10 CFR 50, Appendix B.

On October 21, 1986, NRC informed TVA that, following a recent inspection of corrective actions taken pursuant to the above referenced NSRS reports, the NRC had concerns regarding the possible degradation of the seismic and environmental qualification of previously qualified equipment at Sequoyah. While the NRC letter concerned deficiencies at Sequoyah, the NSRS reports cited above indicate that similar document deficiencies exist with respect to items at Watts Bar.

On November 14, 1986, NRC transmitted to TVA the report on Inspection 50-327/86-61 which had led to the October 21 letter referred to in the foregoing item. The cover letter to this inspection report stated:

The findings in the areas of procurement of safety-related equipment, record storage and retrieval, and receipt inspection indicate a failure to take adequate corrective action to these previously identified concerns. In particular, your program has allowed previously qualified equipment (seismic and environmental) to be degraded by purchasing replacement parts as commercial grade, without documentation of its qualification, and without adequate dedication of the items by TVA. In addition, retrieval of quality assurance records for installed equipment was extremely difficult and in some instances, where the equipment did not have a unique plant identification number, the records could not be retrieved. Further, in some cases receipt inspectors have not been provided with adequate instructions to enable them to perform meaningful inspections.



**6. NSRS: "LACK OF INDEPENDENCE OF QA/QC PERSONNEL (CONST)."**

NSRS staff stated in their February 3 memorandum on Appendix B issues that the organizational freedom, necessary to allow functioning of corrective action mechanisms, had not been demonstrated to be sufficient to satisfy 10 CFR 50, Appendix B, Criterion I.

In its March 20, 1986 Appendix B response, TVA stated that:

Inspectors have sufficient independence and authority to implement procedures, report results, and identify problem areas as required by 10CFR50, Appendix B.

In its May 30, 1986 critique of TVA's March 20 response, QTC (p. 47/86) described circumstances indicating the organizational freedom necessary to satisfy Criterion I did not exist. QTC described certain of its findings. Among these were that:

TVA quality organizational independence was inadequate.

TVA site management engaged in activities/policies that significantly limited the quality organization.

TVA site management endorsed policies that discouraged quality problem identification.

TVA site management improperly terminated personnel performing quality related activities for identifying quality problems.

**7. NSRS: "Q LIST NOT IN GOOD SHAPE AND IS INCONSISTENT WITH CSSC LIST."**

NSRS staff stated in their February 3 memorandum on Appendix B matters that there was confusion as to which of 2 or 3 "Q-Lists" at Watts Bar was the appropriate one, and that, therefore, there was a distinct possibility that some "Q-List" items are outside the scope of the quality program.

In its March 20, 1986 Appendix B response, TVA stated that "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). [Note: The NCR and CAR numbers were not indicated; it is therefore not possible to determine the extent to which this NCR and CAR dealt with the NSRS contentions.]

TVA stated:

In conclusion, the problems are identified and are being dispositioned in accordance with the corrective action program as required by 10CFR50, Appendix B.

In its May 30 critique of TVA's March 20 Appendix B letter, QTC stated that TVA appeared to defend the adequacy of its CSSC-Q-List on the basis of a partial review. QTC (p. 49/86) concluded:

TVA has not adequately identified the structures, systems and components to be covered by the quality assurance program, contrary to Appendix B, Criterion II. This deficiency in design and construction represents a significant breakdown in a portion of the quality assurance program conducted under 10 CFR 50, Appendix B.

B. NSRS: "MATERIAL TRACEABILITY VERY POOR, ESPECIALLY SEISMIC CATEGORY 1 (PIPING, HVAC, CONDUIT, TRAYS, INSTRUMENTATION, ETC.)"

10 CFR 50, Appendix B, Criterion VIII requires:

".....measures [that] shall assure the identification of the item is maintained by heat number, part number, serial number, or other appropriate means, either on the item or on records traceable to the item, as required throughout fabrication, erection, installation, and use of the item. These identification and control measures shall be designed to prevent the use of incorrect or defective material, parts, and components."

NSRS staff stated in their February 3 memorandum on Appendix B that materials had been upgraded to higher classes than those assigned upon purchase. NSRS also stated that there had been a significant breakdown in traceability of support materials.

In its March 20 response to the NRC on Appendix B issues, TVA stated that TVA's material control program met the requirements of 10CFR50, Appendix B. TVA did not state that its material control program had been implemented in a manner so as to comply with Appendix B.

In its May 30 critique of TVA's March 20 Appendix B letter, QTC described failures to maintain traceability of weld rod material (some of which was defective) and to trace support material to the point of installation and use. QTC (p. 51/86) stated that:

TVA's interpretation of 10 CFR 50, Appendix B material traceability requirements does not ensure that incorrect or defective material is not installed nor does it ensure that such material could be traced to the point of installation.

Contrary to the requirements of 10 CFR 50, Appendix B, Criterion VIII, TVA's program for material traceability is



inadequate relative to traceability to point of installation.

QTC also noted that commercial grade items had been purchased and designated as Quality Level II with no QA documentation.

9. NSRS: "FIELD CONFIGURATION OF CABLES, SUPPORTS HAS LOST ACCUMULATED LOADING CONTROLS ON EMBEDDED PLATES."

NSRS staff stated in their February 3 memorandum on Appendix B issues that:

In the area of anchor installation, there are problems with installation procedures, inspection procedures and records, responses to requirements in IE Bulletin 79-02, and documentation that would identify faulty installations such as cut anchors. The as-built configuration using (sic) anchors is unknown.

All of these conclusions and recommendations from completed investigations leads (sic) to an overall conclusion of a field condition and configuration that is indeterminate.

In its March 20, 1986 letter on Appendix B issues, TVA described its process for controlling loads on embedded plates. TVA noted that, in 1982 questions had been raised as to the adequacy of the process of controlling loads and that a nonconformance report (NCR WBNCE8203) had been written. This NCR had led to a sampling program which showed that loads were acceptable and "no additional corrective action was required for existing installations."

TVA also stated that the sample results indicated a potential for "a continuing problem" and that, "Therefore, controls were implemented to assure design review of attachments to embedded plates to prevent the recurrence of this problem."

TVA described a further sampling program undertaken pursuant to WBN Employee Concern (IN-85-033-001) which did not ".... identify any attachments that should have been visually rejected. ... The sampling program for visually approved FCR's has verified that the in-place installations are acceptable; therefore, the visual approval process has been effective and is in compliance with Appendix B."

[Note: The TVA response does not state that loads were controlled via a program that complied with Appendix B. Rather, loads were determined acceptable on the basis of an after-the-fact "suitable-for-service" determination based on a limited sample.]

In its May 30, 1986 critique of TVA's March 20 response, QTC (p. 52/86) stated that:

... TVA failed to consider support base flexibility during design.

...the construction specification for expansion anchor installation, G-32, does not meet the requirements of IE Bulletin 79-02.

TVA admittedly failed to meet Requirement No. 4b of the 79-02 bulletin. More than 50 percent of the anchors sampled as a result of the bulletin failed to meet installation acceptance criteria, but were accepted based on pull testing.

With knowledge of all of the above, TVA issued the final report in response to the bulletin stating that TVA was in compliance with the bulletin.

QTC (p. 53/86) concluded:

The facts presented indicate that contrary to Appendix B, Criteria II - Quality Program: TVA failed to provide adequate special controls, processes and verification of quality as related to IE Bulletin 79-02.

With respect to embedded plate loadings QTC (p. 55-56/86) stated:

TVA failed to provide adequate control measures relative to embedded plate design changes.

Design change calculations contained errors that have resulted in the generation of significant condition Report No. WBN CEB 8623. [QTC indicated that this NCR was prepared as a result of QTC's Employee Response Team program at TVA.]

Visual approval of design changes, i.e., field load modifications, to embedded plates is contrary to the requirements of 10 CFR 50, Appendix B, Criterion III.

The 47A050 notes and drawing details have been found to be confusing, contradictory, ineffective, and contributory to poor quality support installation.

TVA did not provide objective evidence of an adequate sample or acceptance criteria for sample programs conducted on embedded plates.

QTC (p. 56/86) concluded with respect to embedded plate loadings:

TVA failed to adequately meet the requirements of 10CFR50, Appendix B, Criterion III, Design Control.



With respect to specifications, drawings, and procedures. QTC (p. 57-58/86) stated:

Relative to procedures governing quality activities, (attachments to embedded plates), TVA failed to provide procedures appropriate to the circumstances.

Relative to procedures governing quality activities, (attachments to embedded plates), TVA failed to include appropriate quantitative or qualitative acceptance criteria.

TVA admits to documentation discrepancies, but fails to specify the problems.

TVA supports the visual approval process in spite of the fact that it is contrary to the requirements and intent of Criteria III - Design Control, and Criteria V - Instructions, Procedures and Drawings.

TVA justifies the use of the visual approval process by stating that providing the appropriate drawings and calculations is a "very labor intensive" activity. This indicates that the TVA has chosen to submit to cost and schedule pressures rather than adherence to Appendix B requirements.

QTC's conclusions (p. 58/86) concerning specifications, drawings, and procedures were:

TVA failed to provide procedures that, 1) were appropriate to the circumstances and, 2) provided appropriate quantitative or qualitative acceptance criteria.

TVA failed to adequately meet the requirements of 10 CFR 50, Appendix B, Criterion V - Instructions, Procedures and Drawings.

With respect to anchor inspection activities, QTC (p. 59/86) stated that TVA, in its March 20 response, failed to address NSRS Report I-85-437-WBN which substantiated that "expansion anchor installations for instrumentation systems is indeterminate based on inadequate inspection and associated documentation."

QTC (p. 59/86) concluded that contrary to Appendix B, Criterion X - Inspection, TVA failed to verify conformance to documented instructions, procedures, and drawings by not providing adequate inspection of activities affecting quality.

10. NONCONFORMANCE REPORTING DOES NOT ADDRESS CORRECTIVE ACTION ASPECTS APPROPRIATELY.

Appendix B, Criterion XVI states:

Measures shall be established to assure that conditions adverse to quality ... are promptly identified and corrected. ... The identification of the significant condition adverse to quality, the cause of the condition and the corrective action taken shall be documented and reported to appropriate levels of management.

DRAFT NSRS 85-11 (July 1985) stated:

..the C/A (Corrective Action) system in place from 1979 through early 1985 was incapable of correcting difficult problems in a timely manner.

The bottom line of DRAFT NSRS 85-11.

The [Office of Engineering] corrective action process has been found to be inadequate ..

The November- 19, 1985 Annual Assessment of OE QA states:

The nonconformance and corrective action elements of the [OE QA] program were not adequate to assure that problems were documented, generic implications considered, root causes identified, and appropriate corrective were taken to prevent recurrence.

TVA's March 20 response stated:

"Deviations (sic) 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."

[NOTE: TVA's March 20 discussion is largely a series of sentences stating that adequate corrective procedures exist. Out of 2-1/2 pages, one paragraph is devoted to generalized discussion of weaknesses in corrective action programs. In this one paragraph, TVA indicates identification of 'weaknesses' but provides no description of those weaknesses or the effectiveness of actions to correct them.]

TVA's March 20 response summarized its corrective action discussion as follows:

"TVA has a documented [corrective action] program which



complies with the requirements of Criterion XVI of 10CFR50, Appendix B."

[NOTE: It is unclear whether TVA intended by this to convey to the NRC that TVA's corrective action program complied with Appendix B. In its March 20 response on Appendix B, TVA did not explicitly state that the corrective action program was properly implemented. TVA did not indicate whether it intended to state by inference (i.e. that its corrective action program encompassed procedures plus implementation) that the requirements of Criterion XVI were in fact implemented.]

In its May 30, 1986 critique of TVA's March 20 Appendix B letter, QTC (p. 64/86) noted that the February 3 NSRS memorandum "...addresses the misuse or non-use of specific nonconformance reporting vehicles (e.g. IRN's, DCR's, and CARs). Because of the improper or non-use of these documents, nonconforming conditions are not properly identified or if they are, inadequate corrective action statements preclude root cause and actions to prevent recurrence.

QTC (p. 65/86) stated:

TVA's March 20 response to the NSRS memorandum does not address this (Corrective Action) implementation problem, but merely states that the programs are in place to properly identify and document nonconforming conditions. The response does not address the specific issues raised by the NSRS memorandum and, therefore, falls short of providing objective evidence of whether TVA is in compliance with 10 CFR 50, Appendix B, Criterion XV, XVI, and XVII for the examples noted in the NSRS memorandum.

QTC (p. 65/86) concluded:

Contrary to the requirements of 10 CFR 50, Appendix B, Criterion XV (Nonconforming Materials, Parts, or Components), XVI (Corrective Action), and XVII (Quality Assurance Records), TVA has failed to: (1) adequately identify nonconforming conditions, (2) adequately determine root cause and provide adequate corrective action to prevent recurrence, and (3) maintain sufficient records of activities affecting quality relative to IRN's/nonconforming conditions.

11. NSRS: "BOTTOM LINE - Design control is not initially specified up front nor is final configuration feedback given back to design --margins of safety are indeterminate."

Appendix B, Criterion III states:

Measures shall be established to assure that applicable regulatory requirements and the design basis ... for [safety related] structures, systems and components are correctly translated into specifications, drawings, procedures, and instructions ..

The design control measures shall provide for verifying or checking the adequacy of design ..

The November 19, 1985 Annual Assessment of OE QA states:

These [control of design configuration] elements of the OE program were not adequate to assure that design bases were documented or considered during the design of specific systems or components. Without this documentation, OE cannot ensure that systems and components were adequately designed. [p. 2-3.]

TVA's March 20 response -- after claiming that "An engineering design program, which meets the requirements of 10CFR50, Appendix B, has been in place since the initiation of design for the Watts Bar Nuclear Plant" and noting that on June 25, 1985 the steps were taken to "further enhance the program" -- states in conclusion that:

The TVA design control program ensures compliance with codes and standards as required by 10CFR50, Appendix B for Watts Bar Nuclear Plant.

Appendix B, Criterion III states:

Measures shall be established for the identification and control of design interfaces and for coordination among participating design organizations ...

The November 19, 1985 Annual Assessment of OE QA states:

Interfaces between OE and external organizations (e.g., OC and NUC PR), were not adequately documented or, in some cases, were not adequately implemented.

TVA's March 20, as noted above, concludes:

The TVA design control program ensures compliance with codes and standards as required by 10CFR50, Appendix B for Watts Bar Nuclear Plant.

In its May 30, 1986 critique of TVA's March 20 QA response, OTC (p. 67/86) stated with respect to design control:



The TVA response does not reference or include any objective evidence as to the status and adequacy of the Watts Bar design control program of the past. The reference to current revision of the program tends to support the NSRS conclusion. The references to a Gilbert/Commonwealth review of the revised program at Sequoyah are misleading, and do not provide relevant information regarding Watts Bar design control.

The TVA response does not include or reference any objective evidence as to the adequacy of establishment and implementation of the Watts Bar design control program prior to the referenced date of "June 28, 1985."

The TVA response fails to disclose pertinent results of the TVA Annual Assessment of the Office of Engineering Quality Assurance Program for Fiscal Year 1985 (TVA memorandum L19 851119 861, dated November 19, 1985).

In its May 30, 1986 critique of TVA's March 20 QA response, QTC stated with respect to indeterminate margins of safety:

The TVA response does not specifically address the subject of "Margin of Safety" and does not refute the NSRS conclusion that such margins are indeterminate.

On November 24, 1986, Inside NRC reported that TVA's Acting Manager of Nuclear Power stated, "There are about 4-million man-hours of engineering work alone to do in order to close out remaining design issues at Watts Bar."