AN INDEPENDENT EVALUATION OF THE PLANT VERIFICATION PROGRAM

AT THE

WASHINGTON NUCLEAR POWER STATION NO. 2

VOLUME III

TAA AUDIT REPORTS

TAA REPORT 1126-F3

TAA
TECHNICAL AUDIT ASSOCIATES, INC.
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SEPTEMBER 1983

THIS IS VOLUME III OF THREE VOLUMES:

I AN INDEPENDENT EVALUATION OF THE QUALITY VERIFICATION PROGRAM AND QUALITY CONTROL EFFECTIVENESS

II AN INDEPENDENT EVALUATION OF THE REQUIREMENTS AND DESIGN REVERIFICATION PROGRAM

III TECHNICAL AUDIT ASSOCIATES REPORTS OF WNP—2 AUDITS

TAA
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An Evaluation

of the

Washington Public Power Supply System

WNP-2 PLANT VERIFICATION PROGRAM

prepared by

Technical Audit Associates, Inc.

May 28, 1982

Approved:

R. V. Laney

L. H. Roddis, Jr.

H. E. Sheets

CONTENTS

I. SUMMARY

The TAA team considers the Plant Verification Program draft of April 9, 1982, to be unsatisfactory for the purposes which WPPSS intends. This report contains a number of recommendations which we believe would sharpen the focus of the program, substantiate its objectivity, strengthen its engineering and design verification activities, and improve the clarity of presentation.

With these changes, the team believes that the program, when completed, would provide substantial additional confidence that WNP-2 has been designed and constructed to meet committed requirements.

II. INTRODUCTION

The Washington Public Power Supply System contracted with Technical Audit Associates on April 5, 1982 to review, evaluate and submit a report on the adequacy of the Supply System's Plant Verification Program(PVP) plan for WNP-2. We recognize that the verification program being addressed herein is one element of the Supply System's broader Plant Completion Plan which has been developed in response to the Managing Director's instructions of January 22, 1981[1]. The bases for TAA's review are the draft PVP plan dated April 9, 1982, as modified by changes supplied on April 27,[2] and interviews with Supply System representatives and their principal contractors in Richland on April 26-28. The agenda for these interviews is shown in Appendix A. All persons shown were interviewed.

The TAA review team is identified in Appendix B.

The team held exit interviews with Supply System management at the conclusion of the April 26-28 visit to discuss initial impressions and to clarify points of uncertainty. An oral report of findings and recommendations was presented to Supply System management on May 25, followed by discussions intended to clarify the recommendations and to correct any erroneous information which the team might have obtained.

The TAA team report on the April 9 draft PVP, as modified, is presented below. For convenience, findings and recommendations appear under the following headings: Define the Purpose; Substantiate Objectivity; Strengthen Engineering and Design Verification; Improve the Presentation.

(1) "Acceptance Review Plans for Supply System Nuclear Facilities", letter, R. L. Ferguson to G. D. Bouchey, dated January 22, 1981. Appendix C hereto.
(2) The Supply System provided replacement pages for parts of Sections IIIA, VC, VD and VG.

III. FINDINGS AND RECOMMENDATIONS

Define the Purpose

Section I of the PVP, "Purpose", identifies three purposes for the PVP. The first two are related to educating and training Supply System personnel to accept the operating responsibilities of an owner. These are valid objectives but seem out of place in a document devoted to plant verification.

The third objective, to establish confidence that WNP-2 is ready to operate "in a safe and reliable manner" is considerably broader than is warranted by the PVP program put forth, inasmuch as the Supply System will not (nor should it) attempt to reverify the basic requirements contained in governing codes and standards, but rather accepts them as a point of departure. In addition, the PVP is not concerned with personnel qualification and training, operating crew manning, maintenance organization, or numerous other factors which must contribute to safe operation. For both of these reasons, we believe the purpose of the PVP should be stated more exactly.

Recommendation on Purpose

We recommend that the Plan's purpose be more exactly stated, as, for example:

> "To establish confidence that WNP-2 has been designed and built to committed requirements."

Substantiate Objectivity

The appearance of objectivity in an internal audit can be every bit as important as the fact of objectivity. The team is convinced that Supply System management wants an objective review to validate WNP-2 design and construction. We believe that a review conducted largely by Supply System personnel has important advantages over an external review, provided objectivity can be positively substantiated. In the team's opinion, the present PVP does not do all that should be done to assure that it will be conducted objectively.

Management's intent has been manifested in a number of ways. For example, the present verification program was initiated by the Managing Director's instructions of January, 1981, long before such reviews began to attract the wide attention they now receive; top management's statements to TAA team members reflect a determination to get the facts; comments from Supply System staff members concerning their understanding of management's purpose confirm this determination; and the Supply System's hiring TAA to assess the plan's adequacy and audit its performance clearly underscores a desire for external and independent standards.

We believe, however, that management's determination to have the PVP plan carried out in an objective manner could be strengthened and substantiated by incorporating a number of additional features in the plan. These are embodied in the recommendations which follow:

Recommendations to Substantiate Objectivity

1. Direct the PVP plan preparation and execution from the Managing Director level rather than from the WNP-2 Program Director level.
2. Consistent with recommendation 1, assign responsibility for plan execution to executives at the Director level, thus involving the Director of Technology, Director of Generation, Director of Quality Assurance, etc.
3. Require regular progress reports on implementation to the Managing Director.
4. Assign review responsibilities only to personnel who did not perform or direct the original design or construction work being reviewed; by including in the PVP a detailed person-by-person tabulation of reviewers' names, show that this rule has been observed.
5. Incorporate some external (not Supply System) personnel into the Supply System review teams by using loanees (as from other utilities) and through subcontract (as from another AE).
6. Incorporate in the PVP plan a specific provision for audit of its implementation by a competent independent organization which would report periodically to the Managing Director.
7. The team understands that Burns and Roe's involvement in startup testing is limited to the preparation of test acceptance criteria. Inasmuch as the test program is intended, insofar as possible, to validate

both design and construction, we recommend that Burns and Roe be required to review and comment on test procedures and to confirm that test results satisfy the acceptance criteria.

8. The Supply System places considerable reliance on Bechtel's expertise and performance record in construction management and QA/QC and is therefore providing normal QA/QC surveillance of Bechtel's activities. In view of the early history of WNP-2 construction and the late date of Bechtel's assumption of its present responsibility, the team recommends that the Supply System conduct intensive surveillance of Bechtel's QA/QC activities and construction maintenance performance until the Supply System is satisfied that these factors have been adequately compensated. This surveillance pattern should be explained in the PVP plan.

9. The team was told that the Project Test and Startup Section is conducting an extensive open-and-inspect program for major plant components because it has found evidence that some early construction maintenance programs were defective. We recommend that the Supply System emphasize their recognition of this problem, explain their criteria for selecting components to inspect, and give it greater prominence in the PVP. In this connection it would add to other evidences of primary system construction integrity

if it could be confirmed (as we were told) and stated in the PVP that none of the stainless steel primary system has been filled with water since installation.

Strengthen Engineering and Design Verification

TAA team members formed a distinct impression that insufficient engineering resources are being applied to perform requirements verification, system design verification, and timely transition of engineering responsibility to the Supply System. This could threaten timely completion of the PVP and meeting transition goals.

This impression is based more on a series of related pieces of information received during discussions of the PVP, rather than on a comprehensive assessment of total engineering workload and resources. This information includes the following:

- Test and Startup advised the team that suitable engineering information packages have not been provided to support their needs, making it necessary for them to prepare their own electrical diagrams. The team was also told that as many as forty drawings must be consulted to check a single valve control system, due to the absence of appropriate electrical wiring diagrams. We understand further that this situation is being corrected.
- Burns and Roe representatives do not reflect a sense of full involvement in the test program; their function appears to be limited to defining test acceptance criteria (see item 7, page 5, above).

- The need for engineering information packages assembled by systems is recognized by a requirements list in Section VA of the PVP. The organization best equipped to assemble these engineering packages, Burns and Roe, has not been involved in doing so.
- The team doubts that there is an estimate and schedule of the engineering effort required to assemble engineering information into system packages, perform requirements and system design verification as presented in the PVP, and transfer design control from Burns and Roe to the Supply System.
- There is no contractural provision for retaining Burns and Roe's experienced engineers and draftsmen in a continuing support role beyond commercial operation, although this is apparently receiving consideration. The team was told that some key Burns and Roe personnel have already left.
- Project Engineering and Central Engineering seem to have different views as to how and by whom these various problems are to be handled, what additional resources are needed, and who is to manage these resources.
- The amount of engineering effort estimated to be needed for an independent system design reverification (9 man-months/system) appears to us to be too low.

Recommendations to Strengthen Engineering and Design Verification

We believe that WPPSS management should devote attention to resolving the present unsatisfactory situation which is suggested by the above observations. Some constructive steps might include

these:

1. Prepare a detailed definition, estimate, and schedule of the engineering effort required for requirements and system design verifications as described in the PVP, and for transition of design responsibility to the Supply System.
2. Identify clearly the organizational units responsible for performing these engineering functions, and fix the timing of the transfer of responsibility from one to the other.
3. Burns and Roe effort in support of the PVP and transition to Supply System design control should be contracted so as to permit Central Engineering to obtain the necessary support from Burns and Roe.
4. Define more clearly what is to be accomplished by an independent design review and by system document assembly, and develop means to insure that deficiency findings are resolved.
5. Assign Burns and Roe responsibility to help assemble suitable system information packages, allowing Central Engineering to give increased attention to the system design verification program.
6. Define in more detail the level of independent design reverification to be required for the systems chosen. Verify complete systems rather than partial systems. We believe that review in depth of a smaller number of systems is more useful for verification purposes than a larger number done in less detail.

7. Plan the transfer of design control responsibility from Burns and Roe to Central Engineering so that control of an entire system is transferred at one time, avoiding a situation where, for an interval, control of a single system is divided between organizations. As each system is turned over, obtain assurance from Burns and Roe that all required changes have been incorporated, or obtain status reports on those which have not.

8. Because of the intense interest in pipe hangers, describe prominently in the PVP what the Supply System has done to assure that WNP-2 hangers are satisfactory.

Improve the Presentation

The team believes that the April 9 PVP document does not clearly set forth what the verification program is and how and when it is to be carried out. The reader is required to do an unreasonable amount of digging, interpreting, and assuming in order to achieve a minimum understanding. As a result, the document does not convey the full strength of the PVP program.

Program logic is not adequately explained anywhere. Such an explanation would permit the reader to identify the sub-programs of the plan, the reasons for each, and their time relationships and relative importance. For example, one must read almost half-way through the document before learning that recurrent construction quality problems during the late 1970's led to a one-year shutdown of construction to take remedial measures. Yet, two of the major parts of the

PVP plan, the Restart and Quality Verification Programs, are intended to remedy this early quality breakdown.

It would be helpful to inform the reader at the outset that the PVP program incorporates and describes several types of verification actions and information as follows:

- Information to show that the design processes used have assured the integrity of plant design as reflected in construction drawings and other design paper.
- Actions to assure recovering from an early period of deficient construction quality and from several specific quality defects.
- Actions to assure continuing an acceptable level of construction quality after the resumption of construction.

(Note that all of the above are intended to verify that WNP-2 incorporates a normal acceptable level of design and construction quality, rather than to provide "extraordinary" assurances. They are essential to the PVP program in that they provide a baseline of acceptability which is the foundation for the extraordinary features of the PVP program.)

- Design requirements verification, systems design verification, opening and inspecting of components, audit of the plan and its implementation by an independent organization, and other beyond-the-ordinary actions, laid on top of an already acceptable level of design and construction quality, provide extra levels of assurance.

A program plan as important as this one should include a schedule of activities in sufficient detail to show important inter-dependencies, such as the dates of availability of requirements packages and dates of corresponding system verifications activities, and to allow progress to be measured and controlled. The schedule shown on the final page of the document is inadequate. It omits numerous PVP activities and lacks detail for those activities which are mentioned. The team recognizes that some PVP activities are part of the normal construction process and are already scheduled for other purposes. Nevertheless, we believe that the PVP program would gain credibility if all related activities are shown on its schedule. Existing schedules could be included by reference, if desirable.

With respect to format, we believe that the document would be significantly improved by two principal changes. First, provide an initial summary which states the reason for the program and identifies its principal parts, distinguishing those parts which are normal practice from those parts which go beyond the normal and add appreciably to verification of quality. Second, change the order of presentation to increase the visibility of and to emphasize those activities which go beyond normal good practice, since it is these that constitute "extra" verification..

Recommendations to Improve the Presentation

1. Provide a summary as the first section of the report. This summary should define the PVP in the context of

the Plant Completion Plan, identify the PVP component parts, explain the plan's logic, and lay the groundwork for the presentation sequence to follow.

2. In the next section describe how a baseline of acceptability is achieved. Present and discuss briefly the adequacy of the design process, referring to appendices for details. Present the problem of unsatisfactory construction quality in the late 1970's and briefly describe the remedial programs. Details of Restart and QVP should be put in appendices. This section should show that WNP-2 is establishing a baseline of adequate design and construction quality, and a management system to assure its continuation.

3. In the following section, highlight the extraordinary actions which the Supply System Management is taking to give additional assurance of quality, over and above that which would result from normal good design and construction practices as established in the preceding section.

4. Conclude with a section for reporting findings and correction of deficiencies. Demonstrate that a complete PVP program will give a basis for concluding that the plant was designed and built to meet original commitments.

5. Put in appendices: the detailed justification to show that Burns and Roe and GE design processes have been satisfactory, (Section IV); that pre June 1980 construction quality has been upgraded (Restart and QVP); that post June, 1980 and present construction

management and QA/QC practices are satisfactory; that present Supply System Project Management and QA/QC are satisfactory (Section IV); and that Performance Testing will be effectively conducted (VF).

AGENDA FOR TECHNICAL AUDIT ASSOCIATES VISIT TO WPPSS/WNP-2 April 26-29, 1982

April 26

8 a.m.	Interview with D. W. Mazur, Director of Projects, and J. R. Honekamp, Technical Specialist, Asst. to Managing Director
8:30 a.m.	TAA Team Executive Session
10:30 a.m.	Interview with R. G. Matlock, WNP-2 Program Director, at WNP-2
11:30 a.m.	Interview with T. A. Mangelsdorf, Bechtel WNP-2 Project Manager
12:45 p.m.	Plant Verification Program Overview Presentation by D. C. Timmins, Technical Specialist, Asst. to WNP-2 Program Director. (Several WPPSS and contractor staff also attended.)
2:30 p.m.	Interview with J. Verderber, Burns and Roe New York Office, and A. Forrest, Burns and Roe WNP-2 Project Director, Richland
3:30 p.m.	Interview with F. MacLean, S. Mather, and R. Friis, General Electric
4:30 p.m.	Tour WNP-2

April 27

8 a.m.	Interview Geoff Gelhaus, Supervisor, Systems Design, Central Engineering
9 a.m.	Interview Kirk Cowan, Technical Manager, WNP-2 Operations
10 a.m.	Interview Gerry Afflerback, Test and Startup Manager, WNP-2 Project
11 a.m.	Interview Roger Johnson, QA Manager, WNP-2 Project
12 a.m.	Interview H. Crisp, Construction Manager, WNP-2 Project, and R. L. Knawa, Manager, Quality Verification Program
1 p.m.	Interview Donald Johnson, Bechtel QA Manager, WNP-1 and 2.
1:30 p.m.	Interview Mel Leach, Bechtel Systems Completion Supervisor

2 p.m.	Interview Roger Nelson, Licensing Manager, WNP-2 Project
3 p.m.	Interview Bruce Holmberg, Engineering Manager, WNP-2 Project
4 p.m.	Interview J. M. Yatabe, Systems Engineering Supervisor, Central Engineering

April 28

8 a.m.	TAA Team Executive Session. J. R. Honekamp present as observer
2 p.m.	Interview R. G. Matlock, WNP-2 Program Director
2:30 p.m.	Exit interview with R. G. Matlock, P. K. Shen, W. C. Bibb, R. B. Glasscock, J. R. Honekamp, D. C. Timmins

April 29

8:30 a.m.	Exit interview (Laney, Sheets, Jewett only) with A. Squire, Deputy Managing Director, in Seattle

NOTE: Except as noted, persons interviewed were unaccompanied during team interviews.

Technical Audit Associates, Inc.
Plant Verification Program Plan Evaluation Team
for WPPSS/WNP-2

BIOGRAPHICAL INFORMATION

Frank B. Jewett, Jr., Assignment Manager: Founder & President TAA, member Technical Audit Board. Assignment Director: Indian Point -2 Containment Flooding Accident Audit, Nine Mile Point -2 Cost to Complete Audit. Former: President and Chief Executive Officer, Vitro Corporation of America; Director of Engineering Research and Development, General Mills, Inc. & Vice President Mechanical Division; Vice President & Manager Vacuum Equipment Division, National Research Corporation; Member President's Council, Cal Tech. Member: of the Corp., Wood Hole Oceanographic Institute; NY Academy of Sciences; ASME Safety Committee. Merit Citation, Crusade for Freedom. Registered Professional Engineering, Minnesota. BS, CIT; MBA (mcl) Harvard University.

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Robert V. Laney, Chairman of the Review Panel: Vice President of TAA. Former Deputy Director, Argonne National Laboratory; Vice President and General Manager, Quincy Shipyard Division, General Dynamics; Technical Representative of AEC at Westinghouse Bettis Atomic Power Lab; Project Manager, Naval Reactor Program AEC and Bu Ships. Ch. Engineering Review Team. Wash. State Public Power Supply System. Member, GPU and Commonwealth Edison Ad Hoc Advisory Committees on Three Mile Island; Member Presidential Board on National Breeder Reactor Policy. Consultant: Department of Energy; Argonne National Laboratory; MA Attorney General; Commonwealth Edison; State of Illinois. BS, U.S.Naval Academy; MS,MIT; MBA,U of Chicago.

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Louis H. Roddis, Jr., Member of Review Panel: Consulting Engineer. Chairman Energy Research Advisory Board of US Department of Energy. Director: Hammermill Paper Co.; Gould Inc.; Research - Cottrell Inc. Former President and CEO, John K. McMullen Associates; President and V. Ch., Con Ed; Chairman and President, Penna Electric Co.; Deputy Director Reactor Development, USAEC; Project Officer Power Plant Development Nuclear Subs NAUTILUS and SEAWOLF, USN; Task Force I, Bikini atom weapons tests. Fellow: Royal Institute of Naval Architects, ASME, American Nuclear Society. Member and VC US National Committee CIGRE. Member: SNE, ASME, IEEE, ASEE, NSPE, HFS, ASHAE. Registered Professional Engineer, NY, NJ, PA, DC, SC, Chartered Engineer UK. Member National Academy of Engineering. Outstanding Service award USAEC. Expert witness.

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Dr. Herman E. Sheets, Member of Review Panel: Director of TAA. Director of Engineering, Analysis and Technology, Inc. Former Chairman and Professor, Ocean Engineering Department, University of Rhode Island; sixteen years, Vice President, Engineering and Research, Electric Boat Division, General Dynamics Corporation; Engineer Manager, Goodyear Aircraft; Program Manager, Elliott Co.; Director Research, St. Paul Engineering and Manufacturing Corporation; Chief Engineer, Chamberlain Research Corp.; Design Engineer, Erste Bruenner Maschinen Fabrik. Cit. Sec. War, Manhattan Project. Member: National Academy of Engineering, New York Academy of Sciences, Fellow ASME, AAAS; Member ASNE, SNA and ME. Associate Fellow, AIAA. Dip Ing (1st in class), Tech. Inst., Dresden; Dr. Tech Sci (award for excellence) Tech Univ, Prague.

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INTEROFFICE MEMORANDUM

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

APPENDIX C

Date: January 22, 1981

To: G. D. Bouchey, Director, Nuclear Safety (#396)

From: R. L. Ferguson, Managing Director (#387)

Subject: ACCEPTANCE REVIEW PLANS FOR SUPPLY SYSTEM NUCLEAR FACILITIES

Reference:

A Squire (387)
DW Mazur (821)
RG Matlock (901A)
DE Dobson (1000)
PK Shen (388)
ME Witherspoon (1
LL Grumme (390)
lb/RLF
lb/GDB

Confirming our recent discussions on this matter, I would like to request that you develop detailed "acceptance review" plans for each of our Projects which will assure a thorough, systematic review by Supply System personnel of our nuclear plants prior to turnover from our contractors for commercial operation and which will constitute a well-documented basis for my acceptance of plant completion, safety and technical adequacy.

As we discussed, the Supply System reviews will involve all of our technical organizations. The plan should cover design documentation and safety reviews, engineering certifications, construction completion/turnover process, startup testing and operational readiness assessments culminating in fully operational plants ready for commercial power production.

In developing these plans for plant acceptance, first priority should be given to WNP-2. For WNP-2, special consideration should be given to assuring that any undetected quality defects that significantly affect plant performance or safety would be identified and corrected in the course of our functional testing and acceptance reviews.

rd

TECHNICAL AUDIT ASSOCIATES, INC.
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FRANK B. JEWETT, JR
PRESIDENT

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August 6, 1982
Ref. 98-2761

Mr. R. L. Ferguson
Washington Public Power Supply System
P.O. Box 968
3000 George Washington Way
Richland, Washington 99352

COMPLETION REPORT, PHASE IA
WPPSS Contract C-0878 - TAA Assignment 1126

Dear Mr. Ferguson:

The first phase of our assignment for Washington Public Power Supply System involved an audit of your written Plant Verification Program plan. The object of this phase was to satisfy our Review Team that the charter, organization, personnel, scope and methodology of the PVP plan would, if properly implemented, achieve the desired end: namely, to give credible assurance that WNP-2 has been designed and built to meet committed requirements. This letter reports our conclusions on that subject.

We have examined the Supply System "WNP-2 Plant Verification Report," dated June, 1982, and various supporting documents, including an earlier version of the plan on which we submitted written comments May 28, 1982. We later received and reviewed "Supply System Response to the May 28, 1982 Evaluation of the WNP-2 Plant Verification Program by Technical Audit Associates, Inc." and "Criteria for Assessing the Independence of the Technical Personnel Assigned to the WNP-2 Reverification Reviews", June 30, 1982.

We have interviewed a number of managers, engineers, and other personnel of the Supply System and its contractors in order to understand their views of the documents and how they intend to carry out the tasks set forth. We have visited and toured the WNP-2 construction site. Our examination was conducted by a Review Panel composed of independent experts who are experienced in the reviews needed to validate nuclear design and construction in order to assure that both have been performed to committed requirements.

The June report is much improved as compared with the April version. Although we offer a number of detailed comments in the attachments hereto, which you may wish to use, the June report, as it stands and with the modifications referred to in the second paragraph above, sets forth the WNP-2 verification program adequately. It is our opinion that, if properly implemented, the Plant Verification Program will provide convincing evidence that WNP-2 has been designed and constructed to meet committed requirements.

Our Review Panel for this assignment consisted of Mr. Robert V. Laney, Chairman; Mr. Louis H. Roddis, Jr. and Dr. Herman E. Sheets. Dr. Salomon Levy served as a consultant to the Review Panel. The statements herein reflect the unanimous opinions of TAA's Review Panel.

With this letter and its attachments TAA completes Phase I of its assignment. We look forward to working with you and your staff in the Implementation Phase of the WNP-2 Plant Verification Program.

Sincerely yours,

Frank Jewett, Jr.

Frank B. Jewett, Jr.

FBJ:fj
Attachments

cc R. V. Laney
L. H. Roddis, Jr.
H. E. Sheets
S. Levy

Attachment A

to Mr. R. L. Ferguson letter

August 6, 1982

WNP-2 PLANT VERIFICATION REPORT, JUNE 1982

SUMMARY OF DETAILED COMMENTS

by

TAA REVIEW PANEL and CONSULTANT

Attachment A

DETAILFD COMMENTS

Comments with respect to:

I "WNP-2 Plant Verification Report, June 1982"

Title Page - Managing Director's approval of PVP should be shown in some manner.

page 1. A comment from almost all team members is that page 1 requires editing for clarity. Rather than make a lot of editorial comments, we have prepared a redraft of page 1 which utilizes those comments. See Attachment B.

page 2. Same comment as page 1. A suggested redraft of page 2 appears in Attachment B.

page 3. Substitute the following for the second sentence, page 3: "As a part of this transition, and in response to recent design quality problems experienced elsewhere in the industry, the Supply System decided to focus the requirements and design reverification program upon a complete recheck of all safety system engineering documents and an in-depth review of three systems to ascertain that all design requirements were carried through to construction across the various design and construction interfaces. The three systems to be reverified are:

"Residual heat removal system, suppression pool cooling mode,

"High pressure core spray system, and

"Reactor feedwater system, from condensate valves COND-V-142 A and B (condensate side of reactor feed pumps) to the reactor vessel nozzles."

page 6, ¶ 3. Refer to additional actions which would be taken if excessive errors are disclosed by the QVP program.

page 6, ¶ 5. Insert as a final sentence: "While this program's primary objective was to correct construction problems which occured prior to 1980, it provides extra assurance of correct construction through review of equipment maintenance records and inspection of installed equipment. Such actions give added construction insight which is unique to WNP-2."

page 8. Is Q. C. involved in Tech. Spec. preparation? What actions would be taken if large or generic errors were found in procedures or Tech. Specs.?

page 9. Final ¶: Insert after In-plant testing, "and operating envelope verification"; after the testing programs insert, "and preparation and independent review of Technical Specifications."

page 10. A suggested rewrite of this page, revised to reflect the teams' comments, is presented in Attachment B.

Figures 3 and 4 - Supply suitable titles. Explain dotted lines. Show where equipment suppliers report on the chart. By rearrangement, the chart could better emphasize the organizational separation of Technology from Project.

Figure 5 - Supply title. Clarify that "Safety Issues" are reviewed by FRC.

page 14, ¶ 1, second sentence to read "Over and above such considerations, the Supply System has....etc."

page 14. Insert between ¶'s 1 and 2: "The verification activities being conducted by the Supply System which are considered unique to WNP-2 and beyond normal industry practice are listed here, together with references to pages in this report which present details:

a. Independent reverification of the design requirements of all safety systems. (Section IV, pages 17-19)

b. Independent reverification of the design of three selected safety systems. (Section IV, pages 20-24)

c. Formal evaluation and disposition of findings from the above two activities. (Section IV, pages 25-27)

d. Extensive program to disassemble and inspect components and correct any deficiencies uncovered before system test.

page 14, ¶ 2, first sentence. Make read, an in-depth "independent" design review . . . .etc.

page 14, ¶'s 2 and 3. In each instance where the term Design Reverification is used, insert "Requirements and" before it.

page 14, ¶ 3. If the two numbered reviews described are beyond normal practice, the text should emphasize this fact.

page 15. This page needs editing for clarity and directness. For example, " . . . will be taken credit for . . ." is not good usage.

page 15. The number 39,000 is startling to say the least. Is it exaggerated?

page 16. Add at the end of ¶ A, "Any anomoly noted during the engineering record review will be reported to those involved in the Plant Verification Program, but resolved through the normal design and construction process."

page 19, ¶ 4, final sentence - In view of FRC's interest in discovering generic problems, should not they be informed of all problems and deficiencies found in Requirements Reverification process?

page 22, ¶ 3. The extent of modification of ANSI N45.2.11 should be indicated.

pages 22, 23, 24. The following review subjects should be considered for inclusion under system or component design review where appropriate:

single failure criterion
in-service inspection requirements
maintenance and maintenance accessibility

material specifications
weld specifications
environmental qualification
training, maintenance and repair manuals
test acceptance criteria

Figure 7. This schedule shows requirements and design reverification only. Presumably there are schedules for other critical PVP activities, such as Quality Verification Program, Performance Verification, and Operating Envelope Verification. It would strengthen the credibility of the PVP program if these schedules were included or referred to in the report.

page A-3. Can the Supply System comment on performance by B&R before and after reorganization? Such comment, if favorable, would strengthen Burns & Roe design credibility.

page A-12. What resulted from NRC's review of FSAR? Discussion of design documents would be strengthened by relating them to the process of design development, showing how design quality is influenced.

page A-18, final ¶. What was the effect of introducing PED's rather than PCN's in August, 1978? Is this significant?

page A-25, ¶ 2. Were QC organizational changes described significant in terms of performance? What was the occasion for the changes and what were the results?

Appendix A, page A-28. The conclusion stated in the first sentence of ¶ 3 concerning "adequate design verification" is weakly supported by information presented in the report. More evidence is required. Also, the Supply System should exert whatever pressure is necessary to obtain access to suppliers' records; as written, the Supply System has apparently acquiesced (see ¶ 2, page A-28).

Appendix B, Attachments 8 and 11 - Obsolete documents should not be used.

Appendix B, Attachment 16 - What was final result of problem reported?

page C-5. Fourth ¶ states that the Supply System has increased its surveillance of Bechtel in critical areas. Suggest that this same point be mentioned on page 6 of the main report, for emphasis.

page E-1. Are there any objective measurements or data which compare construction quality before and after the construction suspension? Such data might verify the effectiveness of Restart Management improvements.

Appendix E, Figure 8 - Staff planning for operators should show 1) number on hand, 2) provision for adequate training and retraining time, and 3) provision for dealing with possible large turnover rate.

Appendix E - There should be some statement showing how Supply System is tracking and utilizing industry experience.

General - The report would benefit from editing for clarity, titles, figures, etc. (see proposed rewrites of Pages 1, 2 and 10, Attachment B); but this comment can be carried too far. When the intent has been clarified and approved, time is better spent getting on with the job.

* * * * *

Comment with respect to:

II "Criteria for Assessing the Independence of the Technical Personnel Assigned to the WNP-2 Reverification Reviews, June 30, 1982"

Page 2, ¶ 3, last sentence. As written, the use of "etc." leaves open ended the list of areas which do not disqualify Supply System personnel. The Criteria would be improved if the list were made definitive and the "etc." omitted. If this were done any additional areas raised would require management interpretation rather than individual engineer's interpretation.

2767
8/05/82

Attachment B

to Mr. R. L. Ferguson letter

August 6, 1982

WNP-2 PLANT VERIFICATION REPORT, JUNE 1982

SUGGESTED REWRITE OF PAGES 1, 2 and 10,

I. BACKGROUND AND PURPOSE
II. OVERVIEW OF PLANT VERIFICATION
III. INDEPENDENT ADMINISTRATION OF THE PROGRAM

(for clarity in presenting WPPSS intent)

I. BACKGROUND AND PURPOSE: (suggested rewrite of Page 1.)

This report presents in a single document the bases for confidence that WNP-2 has been designed and constructed to meet applicable regulatory requirements and Safety Analysis Report commitments. The Plant Verification Program described herein is part of a broader WNP-2 Plant Completion Plan, as shown in Figure 1.

Plant Verification was first conceived as a response to the Supply System Managing Director's request for a "...well documented basis for acceptance of plant completion, safety and technical adequacy." (See Attachment 1.) This request, issued in January, 1981, six months after he assumed the Directorship, came during a one year's construction suspension required to correct prior quality problems of several construction contractors.

The report describes programs which were conducted or begun during the suspension to correct deficiencies and reestablish a firm, documented construction baseline. It also describes the changes in management practices which the Supply System adopted to correct these early construction problems, including the employment of a more experienced construction and startup contractor to assist in maintaining a high level of quality following construction restart in July, 1981.

In addition to verifying the construction baseline and describing methods for assuring that it will be continued to completion, the report also describes the bases for confidence in the design as developed by the architect-engineer and the reactor steam supply system contractor. When both are complete, these design and construction verification activities would, under normal circumstances, be sufficient to satisfy the most exacting requirements for confidence in WNP-2's technical adequacy.

However, the Supply System management, noting the design quality problems which have recently been observed at Diablo Canyon and elsewhere, has decided to take several additional verifying steps which go beyond normal practice, and which address NRC's concerns for strengthening quality assurance for nuclear plants under construction. These include a reverification that valid design requirements were used in the design of all safety systems and, by independent design reviews of three selected systems, that those requirements were correctly reflected in the detailed design documents used in construction. Any deficiencies noted in these reviews will be submitted to a formal "findings review process" for evaluation and disposition. The Plant Verification Program plan and the

implementation of several of its critical steps will be subjected to independent technical audit.

The Supply System believes that the verification program described herein will, when complete, provide confidence that WNP-2 is designed and constructed in accordance with committed requirements.

II OVERVIEW OF PLANT VERIFICATION: (suggested rewrite of page 2)

Plant Verification is accomplished through proper implementation of design, construction, and testing practices; an appropriate level of checking and auditing against suitable standards; and a thorough evaluation and disposition of defects found. A number of the verification activities are standard practice in the course of designing and constructing a nuclear power plant. They are documented and controlled for WNP-2 through quality assurance manuals, design and construction procedures, and test and startup manuals and procedures. These activities are summarized in this section and presented in detail in Appendices.

In the following paragraphs, the WNP-2 verification activities are identified. Those which go beyond normal industry practice are underlined for differentiation. (Refer to Figure 2.)

- Design Verification - The WNP-2 design development process, including design reviews and audits, is described in Appendices A and B. These meet the standards of normal good industry practice. <u>Design requirements and design reverification and the formal processing of findings, both of which are considered to go beyond normal industry practice, are discussed in Section IV.</u>

- Construction Verification - The Quality Verification Program, designed to reestablish a firm construction quality base during and after the one year's construction suspension, is described in Appendix E. Even though this program is aimed at reestablishing an adequate baseline and not a quality level significantly above the industry norm, it still provides a unique opportunity at WNP-2 to recheck construction shortly before plant operation. The Restart Program and the improved quality assurance program, designed to assure an adequate level of quality following resumption of construction, are described in Appendices C and E. An extensive program of opening and inspecting components, which we believe goes beyond normal industry practice, is described in Section IV.

- Performance Verification - The testing program to ensure that components and systems perform in accordance with design requirements is described in Appendix E.

- Operating Envelope Verification - The process for assuring that the technical specifications and plant operating, maintenance, and emergency procedures are consistent with the design, industry experience, and regulatory requirements is discussed in Appendix E.

Each of the four elements of Plant Verification is discussed briefly in this section and more fully in other parts of the report as noted.

III INDEPENDENT ADMINISTRATION OF THE PROGRAM: (suggested rewrite of page 10)

As noted in the preceding Section II, verification is achieved through proper implementation of design and construction, combined with tests, reviews, audits and inspections conducted by qualified individuals who had no part in the original work being verified.

The Supply System has conducted such reviews as part of its basic design and construction programs in accordance with 10CFR50, Appendix B, and ANSI N45.2. The Supply System conducted additional technical and quality reviews to correct construction problems which arose prior to July, 1980. These basic verification programs, equivalent to best industry practices, will, when complete, provide an acceptable level of confidence in WNP-2 as constructed and tested. These programs are described in Appendices A through E.

Going beyond this, the Supply System has taken particular care to assure the independence and objectivity of several unique verification activities which are over and above normal industry practices. This section describes explicit steps to insure the credibility of the Requirements and Design Reverification reviews, the evaluation and disposition of findings, and the Quality Verification Program.

III. INDEPENDENT ADMINISTRATION OF THE PROGRAM
Page 2

These include the direct involvement of the Managing Director and his principal managers (see Attachment 2); internal organizational separations; careful selection of review personnel for objectivity; and a formal procedure for reviewing and disposing of findings. The Supply System has retained an independent technical auditing firm to review the verification program plan and the implementation of its key features.

REPORT OF AUDIT

of the

WASHINGTON PUBLIC POWER SUPPLY SYSTEM'S
PLANT VERIFICATION PROGRAM FOR WNP-2

performed by

TECHNICAL AUDIT ASSOCIATES, INC.
AT RICHLAND, WASHINGTON ON
NOVEMBER 19-22, 1982

January 10, 1983

APPROVED:

R. V. Laney

L. H. Roddis, Jr.

H. E. Sheets

CONTENTS

Summary of Findings and Observations*

The Findings from this audit are stated below, together with a page number reference to the text.

Finding No. 1

Based on a review of documents in the S.S.'s files, we believe that the Supply System personnel engaged in design reverification activities and members of the Findings Review Committee meet the criteria for assessing independence set forth in the S.S. memorandum of June 30, 1982. (page 7)

Finding No. 2

All three design reverification plans should give greater consideration to system-to-system interactions. We recommend that a spot check be made of the adequacy of those portions of important interfacing systems which are vital to the functioning of the three systems being reverified. (page 10)

Finding No. 3

The S.S. should incorporate in the reverification process for each of the three systems a way of showing clearly how FSAR design commitments are reflected into engineering requirements documents, and into final detail design. (page 11)

*See Introduction, which follows, for discussion of these terms.

Finding No. 4

The S.S. should select and validate the design of a small number of A-E specified, plant specific, pre-purchased components from the three systems, checking on vendor design and A-E review of vendor design. (page 12)

Finding No. 5

In view of the significant number of additional loads which have been added to floors and bulkheads since they were originally designed, especially the additional loads represented by piping supports and restraints, we believe that the S.S. should make a spot check of a selected heavily loaded area to determine if the original structural design is still adequate. The bulkhead which supports the Main Steam Isolation Valve may be an appropriate example for this purpose. (page 14)

Finding No. 6

We recommend that QVI-09 be revised to make clear that its purpose is to permit, with the A-E's case-by-case approval, certain specific deviations from the AWS D1.1 code when found upon reinspection in selected applications. If this were done, we would see no objection to its use as a basis for disposing of the specified deviations.

We recommend also that the Supply System clarify whether QVI-09 is intended to apply to the sacrificial shield wall and pipe whip restraints. (page 17)

Finding No. 7

The apparent coincidence of discontinuing film quality review of WBG radiographic film, coupled with the subsequent decline in the percentage of welds actually rejected for weld quality should be investigated by the S.S. and the results documented. (page 18)

Finding No. 8

If it is true that the Burns and Roe team engineer has authority to accept or reject structural welds which do not meet the acceptable deviation criteria of QVI-09, we believe that this authority should be withdrawn and that such decisions should be referred to the responsible B&R structural design supervisor. (page 19)

The Observations from this audit follow, together with a page reference to the text.

Observation No. 1

The S.S. should consider incorporating into the design reverification program a separate check of the effectiveness of the as-built drawing program, both as to its timeliness for producing as-builts and as to their accuracy in reflecting the actual plant hardware as installed. (page 13)

Observation No. 2

We believe that dealing with the uncertainties of turbine disc cracking requires a total systems

evaluation, including water chemistry, turbine operation, and condenser leakage. In its turbine planning, the S.S. should determine as exactly as possible the conditions obtaining in other turbines on which it is relying for its strategic planning model, and compare those conditions with the conditions which can realistically be maintained for the WNP-2 turbine. Until this has been done and the data analyzed, the S.S. should be cautious about assuming three years of satisfactory service. (page 22)

Observation No. 3

TAA believes that the present period of transition of design responsibility from Burns and Roe to S.S. Technology is a time of exceptional vulnerability for configuration control, and that additional means should be explored and adopted to assure that Generation and Technology have adequate and continuing inter-ties. (page 23)

AUDIT REPORT

Introduction

The Washington Public Power Supply System retained Technical Audit Associates, Inc. to, first, review and comment on the Supply System's Plant Verification Program Plan (PVP), and, second, to audit its implementation. TAA's review of the PVP was completed and our final report on the plan submitted on August 6, 1982.

TAA is now engaged in auditing the Supply System's implementation of the PVP, an activity which will continue until readiness for fuel load in August, 1983. We have been asked to give principal attention to those portions dealing with the reverification of design, the Quality Verification Program (QVP), which addresses the quality of construction before July, 1981, and the effectiveness of management actions to resolve quality problems arising since July, 1981. The ultimate objective of this continuing audit is to enable TAA, at the conclusion of the PVP and before fuel load, to state a knowledgeable opinion on the adequacy of implementation of the PVP and the extent to which it provides substantive confirmation that WNP-2's design and construction comply with applicable Regulatory and Safety Analysis Report commitments.

To assist the TAA panel to prepare for this audit, the panel chairman selected a number of internal Supply System documents which were sent to each panel member and the two panel consultants. These documents are listed in Attachment D. Based on a reading of these documents, panel members

prepared and forwarded in advance to the Supply System a number of questions which provided a framework for the on-site audit, November 19-22, 1982. These questions are appended as Attachment C. Additional documents were reviewed by the TAA panel during and after the audit. These are listed in Attachment E.

The audit agenda is appended as Attachment A, and a list of the persons interviewed as Attachment B. All agenda items were taken up during the audit. With the exception of Dr. Salomon Levy, all TAA panel members and consultants shown on Attachment F were present throughout.

In the preceding Summary and throughout this report we have used either a Finding or an Observation to present our conclusions and recommendations. A Finding is a conclusion or recommendation which, in our opinion, is sufficiently important to require a formal response from the Supply System, leading either to a mutually satisfactory disposition or to continued dialogue. Each Finding should be formally resolved.

An Observation is a conclusion or recommendation of lesser importance for which no formal resolution is expected.

Opening Session

The opening session was attended by representatives of the Managing Director, Technology, Quality Assurance, Generation, Licensing, the QVP program, the WNP-2 Project, and the TAA Panel.

A vue-graph presentation was made by S.S. personnel of the status of PVP implementation. Questions Number 3, 7, 9, 11, 13, 16, 17, 20, 21, and 23 (see Attachment C) were discussed, and satisfactory answers were received. Following this opening session, the Panel was supplied a file showing the steps which the S.S. has taken to assure that personnel engaged in the design verification portion of the PVP program meet the S.S.'s "Criteria for Assessing Independence", dated June 30, 1982.

Finding No. 1

Based on a review of documents in the S.S.'s files, we believe that the Supply System personnel engaged in design reverification activities and members of the Findings Review Committee meet the criteria for assessing independence set forth in the S.S. memorandum of June 30, 1982.

Design Reverification Program

The design verification audit was divided into two parts. In part one, Duane Renberger, John Yatabe, and D. Whitcomb reported on the status of the program and answered and discussed TAA Panel questions number 1, 2, 4, 5, 6, 8, and 14 (see Attachment C). In part two, the TAA Panel met separately with the team responsible for reverifying the requirements and design of the High Pressure Core Spray System (HPCS). By meeting with the team members alone, we were able to learn of team viewpoints and attitudes free of management constraints.

Part one, the discussions with Technology management, related to program schedule, the adequacy of personnel resources, and the structure of the HPCS Reverification Plan. (Reverification plans for the Residual Heat Removal System (RHR) and the Reactor Feedwater System (RFW) were available at the time of the audit, but not before. Hence the audit focused on the HPCS plan.)

John Yatabe made a vue-graph presentation covering program objectives, schedule, and process flow. He discussed system selection, requirements reverification, the selection of sampling criteria, and the performance of reverification. TAA Panel members expressed the importance of considering system interactions, such as the potential for HPCS system to be flooded by a break in another system, or to be flooded by intentional operation of the fire protection system.

Following its subsequent review of all three of the system reverification plans, the Panel notes that the following words appear, in slightly different form, in each:

> "Incorporation of primary requirements necessary for proper functioning of the HPCS (RFW, RHR) system, then, such as requirements for cooling, flood and fire protection, pipe whip restraint, missile protection, etc., will only be reverified to the point of assuring that provisions have been incorporated into the plant design via some other systems to accommodate those requirements. The systems provided to accommodate these interface requirements will not be reviewed for adequacy as part of this effort. This approach will provide confidence on a "spot check" basis that the remaining systems are designed correctly." (See HPCS Plan, page 1-25.)

We understand but are not convinced that this concluding assertion is justified. It assumes that the systems being reverified are typical of the remaining systems, and that reverifying the selected systems validates the design process as well as the design of the remaining systems.

This seems to overlook the fact that the systems selected for validation were designed largely by GE, whereas the interfacing systems of concern, such as fire protection, compartment drains, HVAC, and pipe whip restraints are plant-specific and hence were probably designed by the architect-engineer. In addition, system interactions occur not only between systems

which are physically interconnected, but also between systems which share a common space or area. A number of the interfacing concerns involve such system-to-system spatial relationships, such as accessibility for maintenance, hazard from fire protection flooding, and missile hazards.

We believe that the S.S.'s present interpretation for all systems of System Design Review Question No. 11 (HPCS page 1-10, Table 1-1) is too narrow, and that a spot-check should be made of the adequacy of those portions of important interfacing systems, where those interfacing systems are vital to the functioning of the HPCS, RHR, or RFW systems.

Finding No. 2

All three design reverification plans should give greater consideration to system-to-system interactions. We recommend that a spot check be made of the adequacy of those portions of important interfacing systems which are vital to the functioning of the three systems being reverified.

Responding to a question on the major FSAR commitments, Yatabe presented and discussed a document titled, "Design Verification", which describes the process linking the FSAR, engineering requirements documents, and the detailed design. The TAA Panel understands that both sections A and B of this document will be followed for each of the three systems, HPCS, RHR, and RFW, thus assuring increased attention to tracking FSAR requirements. Some members of the TAA

Panel, however, found that the HPCS plan gives insufficient visibility into how design commitments are incorporated into engineering requirements documents, and how they are ultimately verified by the design verification check lists in the Plans, with the result that external observers, including S.S. managers, may find it difficult to understand the Plan's logic. A specific suggestion on this point was offered by Charles Miller, TAA consultant, for S.S.'s consideration.

Finding No. 3

The S.S. should incorporate in the reverification process for each of the three systems a way of showing clearly how FSAR design commitments are reflected into engineering requirements documents, and into final detail design.

In discussing the system level and component level sampling matrices which appear in the HPCS plan, TAA members asked whether the S.S. intended to reconfirm the adequacy of design of various pre-purchased components. The S.S. pointed out that most of the components in the systems being reviewed were specified by GE as NSSS supplier, and have been used, and hence validated, on other earlier plants. Generally, the HPCS plan does not provide for reconfirming the design of vendor supplied equipment. The TAA Panel suggested that the design of some A-E specified, plant-specific, pre-purchased components ought to be reverified as part of the

total process. The Panel notes also that some components in the three systems being reverified will receive their principal design and construction validation through the test program.

Finding No. 4

The S.S. should select and validate the design of a small number of A-E specified, plant specific, pre-purchased components from the three systems, checking on vendor design and A-E review of vendor design.

Yatabe gave the TAA Panel a handout showing the professional experience of each member of the three reverification teams. The Panel noted that the teams could be strengthened by the addition of persons having system design experience.

Part two of TAA's audit of design reverification was an interview with the six members of the HPCS team, under the leadership of Paul Macbeth. Principal topics of discussion were the selection of the sampling points (who made the selections and why); the need for considering system interactive effects; and how independent the team members feel as they go about their reverification tasks. Team members described the logic for their own selection of the sampling points, making clear that the choice had been largely delegated to them. They showed a good understanding of the purpose of the program and gave convincing justification for the sampling points chosen. It appeared to the Panel that system interactions

had not weighed as heavily in plan preparation as would be desirable.

The S.S. team members exhibited an understanding of the need for total objectivity in their work. They made clear to the Panel that they have been given complete freedom to perform their reverification tasks in a manner which satisfies their own professional standards.

The TAA team learned in the course of the above discussions that verification of the timely completion of as-built drawings is not currently a part of the HPCS plan. This led to the following observation.

Observation No. 1

The S.S. should incorporate into the design reverification program a separate check of the effectiveness of the as-built drawing program, both as to its timeliness for producing as-builts and as to their accuracy in reflecting the actual plant hardware as installed.

During the plant tour, TAA team members were struck by the massive weights, heavy structural loads, and access congestion caused by pipe and equipment restraints and supports, many of which have been added to the plant after the initial structure was designed. This observation led to a question of whether the original loadings which had been assumed in designing floors and bulkheads may now have been exceeded and whether the original structural design is now satisfactory.

Finding No. 5

In view of the significant number of additional loads which have been added to floors and bulkheads since they were originally designed, especially the additional loads represented by piping supports and restraints, we believe that the S.S. should make a spot check of a selected heavily loaded area to determine if the original structural design is still adequate. The bulkhead which supports the Main Steam Isolation Valve may be an appropriate example for this purpose.

Construction Quality Verification Program

Messrs. R. Knawa, C. Anderson, and R. Ramsgate of the Supply System and M. Leach of Bechtel gave TAA an informal presentation on the status of the QVP program. TAA was given handouts on overall program status and on Contract 215 (WBG) system completion status. In addition, contract completion reports, deficiency disposition reviews, and the reevaluation of personnel qualifications were discussed. TAA questions number 31 and 32 were answered.

TAA members commented that the several QVP audit reports and contractor completion reports which we have reviewed seem to have one common feature, namely, that none of them reports finding any significant quality deficiencies in work done before July, 1980. Since a ten percent sample of safety related hardware is being reinspected as part of the QVP program, the virtual absence of significant defects might seem surprising. Knawa pointed out that a number of hardware defects had already been identified at the time of work stoppage. He suggested that the small number of additional defects which have been found is due to the fact that most of the problems were already known when work was stopped in 1980.

Leach reported that the principal problem which has been encountered in verifying QA documentation, especially construction contractor documentation, was locating and assembling verification records for an entire system, since the relevant documents had originally been filed by date of origin rather

than by system. A large amount of relocating and resorting work has been required, but it has generally succeeded in locating the correct records.

In discussing the ten percent reinspection of structural steel welds, the TAA team was informed of and discussed reverification instruction QVI-09 "Special Structural Steel Reinspection Criteria", dated May 13, 1982. The TAA Panel raised several questions concerning QVI-09 which were not satisfactorily answered during the audit. Subsequently, the Supply System furnished additional information by letter D. C. Timmins to R. V. Laney of December 2, 1982, and by letter J. R. Honekamp to R. V. Laney of December 22, 1982. Our review of QVI-09 and the information contained in these letters reveal the following:

(a) QVI-09 authorizes the A-E field engineer to make generic dispositions of certain specific deviations from AWS D1.1 when found in selected weld applications during reverification inspections.

(b) While QVI-09 is currently being used to determine the acceptability of discrepancies found during reverification inspections, it may also be used, under the A-E's direction, to disposition deviations of the same type found in new construction.

(c) The text of QVI-09, especially the eight page "Justification," makes the document appear to be a significant revision of the AWS code, rather

than merely an identification of specific acceptable deviations.

(d) The Supply System intends to inform the NRC of QVI-09 as part of Amendment 27 to the SAR.

(e) The draft notification attached to the Honekamp letter referred to above, to be forwarded with Amendmenc 27, appears to be inconsistent with QVI-09 with respect to its applicability to the sacrificial shield wall and pipe whip restraints. (Compare para. 3.1, page 2, Attachment 2 to QVI-09, with the final sentence of the draft notification to be a part of Amendment 27.)

The TAA Panel inspected several examples of welds which had been inspected and accepted to QVI-09 criteria during a tour of the plant.

Finding No. 6

We recommend that QVI-09 be revised to make clear that its purpose is to permit, with the A-E's case-by-case approval, certain specific deviations from the AWS D1.1 code when found upon reinspection in selected applications. If this were done, we would see no objection to its use as a basis for disposing of the specified deviations.

We recommend also that the Supply System clarify whether QVI-09 is intended to apply to the sacrificial shield wall and pipe whip restraints.

TAA raised a question concerning the discontinuance of review for film quality as a basis for accepting certain WBG radiographic film, referred to in an S.S. letter to the NRC of September 1, 1982. concerning reportable condition No. 175. (See TAA question number 45, Attachment C.) This question was discussed with Mr. Knawa and, in a subsequent meeting, with Mr. Roger Johnson, WNP-2 Q.A. Manager. Based on these discussions and on review of Bechtel's explanatory letter BEC WNP-2-0437, of April 22, 1982, the Panel concluded that there was justification for discontinuing the film quality review. However, it was noted (S.S. letter to NRC of September 1, 1982, Attachment A, p. 3) that the percentage of welds actually rejected for weld quality declined from 4.73% (65 of 1373) to 1.21% (16 of 1317) after discontinuance of film quality review, with no apparent reason. TAA believes that this anomaly needs to be reconciled in order to demonstrate that it is not due to discontinuing the film quality review.

Finding No. 7

The apparent coincidence of discontinuing film quality review of WBG radiographic film, coupled with the subsequent decline in the percentage of welds actually rejected for weld quality should be investigated by the S.S. and the results documented.

TAA discussed the "team concept" for reverification inspection which is being used by the S.S., described in QVI-08,

TAA raised a question concerning the discontinuance of review for film quality as a basis for accepting certain WBG radiographic film, referred to in an S.S. letter to the NRC of September 1, 1982, concerning reportable condition No. 175. (See TAA question number 45, Attachment C.) This question was discussed with Mr. Knawa and, in a subsequent meeting, with Mr. Roger Johnson, WNP-2 Q.A. Manager. Based on these discussions and on review of Bechtel's explanatory letter BEC WNP-2-0437, of April 22, 1982, the Panel concluded that there was justification for discontinuing the film quality review. However, it was noted (S.S. letter to NRC of September 1, 1982, Attachment A, p. 3) that the percentage of welds actually rejected for weld quality declined from 4.73% (65 of 1373) to 1.21% (16 of 1317) after discontinuance of film quality review, with no apparent reason. TAA believes that this anomaly needs to be reconciled in order to demonstrate that it is not due to discontinuing the film quality review.

Finding No. 7

The apparent coincidence of discontinuing film quality review of WBG radiographic film, coupled with the subsequent decline in the percentage of welds actually rejected for weld quality should be investigated by the S.S. and the results documented.

TAA discussed the "team concept" for reverification inspection which is being used by the S.S., described in QVI-08,

"Reverification Inspection Team Concept", dated May 13, 1982. One member of the reinspection team is a Burns and Roe Design Engineer who is responsible for "accepting or rejecting those items judged by the Bechtel Quality Control Engineer as out of tolerance to the inspection criteria." (QVI-08, page 2, para. 3.3c) Discussions brought out that the B&R engineer can accept structural welds provided they conform to the acceptable deviation criteria of QVI-09. This is a satisfactory practice provided QVI-09 is clarified as recommended in Finding 6. However, we were also told that the B&R team engineer can accept structural welds which do not meet the acceptable deviation criteria of QVI-09. The limits of this authority to accept or reject outside QVI-09 are unclear to us, and are not explained in QVI-08.

Finding No. 8

If it is true that the Burns and Roe team engineer has authority to accept or reject structural welds which do not meet the acceptable deviation criteria of QVI-09, we believe that this authority should be withdrawn and that such decisions should be referred to the responsible B&R structural design supervisor.

Construction Quality Assurance Effectiveness

In assessing management's effectiveness in quality assurance since restart in July, 1981, TAA discussed various audit reports, audit findings, potentially reportable conditions, and the timeliness and effectiveness of management's actions when confronted with quality problems. Roger Johnson, WNP-2 Project Q.A. Manager, responded to TAA questions numbers 15, 18, 19, 22, 24, 25, 27, 28, 29, 30, 44, 45, 46, and 47, which probed into many of these matters. In addition, as a specific example, the TAA panel investigated the S.S. program for dealing with the possibility of stress corrosion cracking in low pressure turbine discs.

Mr. Johnson's reply to the panel's questions were generally satisfactory, indicating that the present level and competence of quality audit, surveillance, and inspection by S.S. corporate Q.A., Project Q.A., and Bechtel Q.A. are satisfactory. Several minor problems were noted which, when corrected by the S.S., will further improve ongoing quality assurance. These problems are:

- increased project pressure is required to overcome procedural problems causing twelve month old NRC inspection items to remain unclosed.

- Project response to quality findings from S.S. corporate Q.A. audits would benefit from a Program Director level system for tracking such findings until closed.
- the Project should exert greater pressure on Burns and Roe to clear up old audit findings.

TAA's discussion with Dr. Shen, John Yatabe, A. McDonald, and W. Bibb on stress corrosion cracking in low pressure turbine discs explored the attention being given by S.S. management to this generic problem. We found them to be informed on the current status of this problem, both in the U.S. and abroad. Answers were provided to TAA questions 34 through 43.

We learned that a S.S. plan for minimizing the chances of cracking in the early years of operation is being developed. The avoidance of unfavorable environmental conditions, especially the presence of oxygen and other impurities in feedwater, is particularly important for a BWR reactor coupled to a Westinghouse turbine. The specifications for steam purity from the reactor manufacturer may not be entirely compatible with the steam purity prescribed by the turbine manufacturer. The Supply System thus faces a complex of problems in minimizing turbine disc cracking -- water/steam purity control, condenser leakage control, and avoidance of turbine overspeed. This makes it quite important, as the S.S. recognizes, to make the best use of available operational experience

elsewhere (for example, Taiwan), and to continue the present program of identifying and locating spares and defining a long range strategy.

TAA believes the S.S. needs to obtain additional detailed information concerning the specific turbines which they are using as models to assist them in developing their strategic plans. Such information as elapsed time between manufacture and first operation, as-built dimensions and stresses for shrink fits, and feedwater steam purity operating history would be useful.

Without data of the kind indicated, there does not appear to be adequate justification for the S.S.'s present optimistic assumption that they can expect three years of satisfactory service.

Observation No. 2

We believe that dealing with the uncertainties of turbine disc cracking requires a total systems evaluation, including water chemistry, turbine operation, and condenser leakage. In its turbine planning, the S.S. should determine as exactly as possible the conditions obtaining in other turbines on which it is relying for its strategic planning model, and compare those conditions with the conditions which can realistically be maintained for the WNP-2 turbine. Until this has been done and the data analyzed, the S.S. should be cautious about assuming three years of satisfactory service.

Plant Performance and Operating Envelope Verification

In discussing the status of operating procedures preparation with J. D. Martin, the Panel noted that, with over one thousand plant operating procedures now written, the Generation staff appears to be far ahead of Technology, which is still collecting the System Technical Turnover Packages (STTP). We raised the following question: how will the S.S. assure that the systems which are reflected in Operating Procedures are exactly the same as the systems reflected in the STTP's, these latter being of a later vintage? It has been noted elsewhere that operating plants experience difficulty keeping system descriptions in their engineering files current with the actual hardware because of continuing system changes.

Messrs. Martin and Cowan pointed out that Generation and Technology both draw upon the same information source, namely Burns and Roe's Design Control Log, which contains the latest design information. Hence, Generation's system descriptive material should match with Technology's. They also stated that Generation and Technology coordinate with one another's activities in various ways, and that both are in the approval circuits for materials prepared by the other. Finally, it is intended that Technology will have staff members at the plant site to assure close liaison.

Observation No. 3

TAA believes that the present period of transition of design responsibility from Burns and Roe to S.S.

Technology is a time of exceptional vulnerability for configuration control, and that additional means should be explored and adopted to assure that Generation and Technology have adequate and continuing inter-ties.

During the Panel's discussions with Messrs. Martin, Afflerbach, and Cowan, answers were provided to TAA question numbers 10, 12 and 33. In the matter of Burns and Roe's responsibilities in the test program (question number 12), we understand that, although there is a satisfactory working agreement, the S.S. has not yet prepared a written confirmation, but intends to do so. The TAA Panel will want to review this document when it is complete.

During the session on Performance and Operations, Doug Timmins gave the TAA Panel a brief account of the work of the independent Electrical Separation Task Force, whose work is to be completed in January, 1983. The TAA Panel has requested that the Task Force report be sent to us for information.

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ATTACHMENT A

TECHNICAL AUDIT ASSOCIATES, INC., AUDIT

November 19, 20, 21, and 22, 1982

AGENDA

Friday, November 19, 1982

8:00 a.m.	TAA Executive Session Hanford House	
10:30 a.m.	Opening Session with Supply System Supply System, Snohomish Room	
	Scope of Audit	R. V. Laney
	Agenda - who will be addressing TAA's initial inquiry areas	J. R. Honekamp
	Program Status and Summary of NRC meeting on Plant Verification	J. R. Honekamp
	Response to TAA inquiry areas of a more general nature	J. R. Honekamp/ D. L. Renberger/ J. M. Yatabe/ R. T. Johnson
	QA Audit Program responsibilities for conduct of audits, tracking of findings, evaluation of responses	R. B. Glasscock/ R. T. Johnson
12:00 N	LUNCH	
1:30 p.m.	Status of Requirements and Design Reverification Supply System, CDC Bldg.	D. L. Renberger/ J. J. Yatabe
2:30 p.m.	Interview High Pressure Core Spray (HPCS) System Team Supply System, CDC Bldg.	P. J. MacBeth/ et al

Saturday, November 20, 1982

8:00 a.m.	Quality Verification Program WNP-2 Site, Trailer 30 Status report on QVP, including system completion, prepurchase and inactive site contracts, and special tasks. Identify problems found and actions taken. Performance as compared to schedule. Show the significance of QVP findings to the quality of work performed before 1980 shutdown.	R. L. Knawa
10:00 a.m.	Project Quality Assurance WNP-2 Site, Trailer 56 (Includes working lunch) Review of selected quality problems which have arisen since 1981 startup, emphasizing Supply System management method of dealing with the problems and the effectiveness of their actions. TAA has submitted a number of questions based on their review of documents transmitted to them. The intent is not for TAA to track each item to closure but rather by examining a number of examples to assess the effectiveness of management action to resolve quality problems identified since restart.	R. T. Johnson
3:00 p.m.	WNP-2 Tour	J. R. Honekamp/ Shift Manager (2242)

Sunday, November 21, 1982

a.m.	TAA Executive Session Hanford House	
1:00 p.m.	Presentation of Supply System Plans for Dealing with Stress Corrosion Cracking of the Discs in the Westinghouse Main Turbine Supply System, Shen's Conference Room 2-212	P. K. Shen/ D. L. Renberger/ et al

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Monday, November 22, 1982

8:00 a.m.	Interviews with the Plant Staff on the Process for and the Status of the Preparation, Review, and Approval of Plant Procedures and Technical Specifications WNP-2 Site, Service Bldg. Conference Room	J. D. Martin/ C. M. Powers/ K. D. Cowan/ L. H. McGilton
9:30 a.m.	Overview of Electrical Separation Task Force Activities WNP-2 Site, Service Bldg. Conference Room	D. C. Timmins
10:00 a.m.	Interviews with Test and Startup on the Status of the Test Program and the Process for Review and Approval of Test Procedures and Test Results WNP-2 Site, Service Bldg. Conference Room	G. K. Afflerbach/ D. C. Timmins/ D. M. Myers
1:00 p.m.	TAA Exit Interview Supply System, Ferguson's Conference Room	D. W. Mazur/ R. G. Matlock/ W. C. Bibb/ R. B. Glasscock/ P. K. Shen/ J. R. Honekamp

ATTACHMENT B

LIST OF PERSONS INTERVIEWED DURING

TAA ON-SITE AUDIT, NOV. 19-22, 1982

Carl Anderson, QVP Program, S.S.
G. K. Afflerbach, Test and Startup Mgr., WNP-2, S.S.
W. C. Bibb, Director of Power Generation, S.S.
Jack Cole, HPCS Team Member, Technology, S.S.
K. D. Cowan, Technical Mgr., WNP-2 Operations
R. B. Glasscock, Director Licensing and Assurance, S.S.
J. F. Gorman, HPCS Team Member, Technology, S.S.
J. R. Honekamp, Technical Asst., Managing Director, S.S.
T. J. Houchins, Manager of Audits and Surveillance, Corp. QA, S.S.
R. T. Johnson, Manager of QA, WNP-2, S.S.
T. H. Keheley, HPCS Team Member, Technology, S.S.
R. L. Knawa, Manager, Qual. Verification Prog., S.S.
M. N. Leach, Bechtel Supervisor, Qual. Verification Prog.
Paul J. Macbeth, HPCS Team Leader, Technology, S.S.
J. D. Martin, WNP-2 Plant Manager
R. G. Matlock, Director WNP-2 Program, S.S.
D. W. Mazur, Director Operations, S.S.
A. McDonald, Plant Mgr., Hanford/Packwood Generation, S.S.
Dennis Meyers, Test Working Group Member, WNP-2 Eng., S.S.
Adolfo B. Rafer, HPCS Team Member, Technology, S.S.
R. Ramsgate, QVP Program, S.S.
D. L. Renberger, Dep. Director, Technology, S.S.
P. K. Shen, Director Technology, S.S.
G. C. Sorenson, Manager Licensing Programs, S.S.
David T. Thonn, HPCS Team Member, Technology, S.S.
D. C. Timmins, Tech. Asst., WNP-2 Proj. Mgr., S.S.
D. L. Whitcomb, Reverification Lead Engineer, S.S.
J. M. Yatabe, Asst. Director Systems Engineering, Technology, S.S.

LIST OF PERSONS PRESENT AS OBSERVERS ONLY

W. Chin, Bonnville Power Authority (partial attendance)
Richard A. Feil, NRC, Resident (partial attendance)
Benjamin Reusche, Bonnville Power Authority (exit interview only)
A. D. Toth, NRC, Resident (partial attendance)

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ATTACHMENT C

TAA QUESTIONS FOR WNP-2 PVP AUDIT, OCTOBER 13-15
(Set #1)

1. Design reverification program schedule.

   Has a complete schedule been established? Has the actual program met the schedule from start to October 1982? Is the program ahead or behind schedule? How does the complexity of systems or components affect schedule?

2. Burns & Roe documentation.

   Has any deficiency been found in the Burns & Roe documentation? Has Burns & Roe supplied the needed documentation for the transfer of engineering information to the Supply System? Are Burns & Roe system descriptions complete and have Burns & Roe drawings the latest revisions? How many deficiencies have been found?

3. System Technical Turnover Package.

   This identifies a complete and thorough documentation. How much additional work by the Supply System is required in addition to the technical information supplied by Burns & Roe?

4. System Technical Turnover Package - SDE Instruction 3.1, Attachment 4.1.

   The following statement is made:
   "The Engineer has reviewed the following items in sufficient detail to be <u>reasonably</u> certain of the <u>general</u> completeness of the data/information pertaining to this system."

   Are the underlined adjectives necessary? It is suggested that they be omitted.

5. Design Reverification - SDE Instruction 3.5, pages 2, 35, 26, 27.

   What is the percentage of reverification by:

   a) design review
   b) alternate calculations
   c) component testing

   On what basis is a selection made among the above 3 methods?

6. Design Reverification - SDE Instruction 3.5, Page 1.

   2.3 Potential Finding:
   How many potential deficiencies have been found out of how many systems and components?

7. Design Requirements

   Has agreement been reached regarding the value of seismic loads?

8. System and Component Interference.

   As part of the reverification plan, how many interferences of systems or components have been identified?

9. Manufacturing Q.C.

   During design reverification walkdowns, how many deviations from design drawing have been found in critical areas?

10. Turbine, Generator and Pump - Readiness for Operation.

    The turbines, generator and some pumps have been installed for a considerable length of time. What steps are being taken to check this machinery for full power operation? The turbines and generator have been rotated for years and the machinery may have deteriorated to some extent.

11. System Technical Turnover Package.

    Is there a reliable method of tracking and controlling design changes which are "in process" at the time of turnover of design responsibility?

12. Burns and Roe letter, Forrest to Holmberg, of July 30, 1982, seems to us to leave several questions unanswered regarding B&R responsibilities in the test program, as follows:

    page one: second bullet refers to "official" scope of review of procedures being limited to acceptance criteria. Is there an "unofficial" scope which differs?

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page one: second bullet refers to "actual" review of test procedures extending beyond criteria to the complete procedure, but calls this "unstructured" with "no disposition of...comments...required." Can the S.S. be satisfied with "no disposition" of AE comments?

page two: final paragraph does not commit Burns & Roe to review and approve test results, nor does it relate test results to certification. The allusion to "ability to certify" is unclear to us.

We continue to believe that there should be a more explicit statement of the AE's responsibilities in the Performance Verification (Test) Program, and that it should include review and acceptance of test results.

13. What information is in hand to show that design reverification personnel meet S.S. independence criteria?

14. Request design reverification personnel who address the TAA panel to describe briefly the professional qualifications of their team members.

TAA QUESTIONS FOR WNP-2 PVP AUDIT, OCTOBER 13-15
(Set #2)

(NOTE: This list supplements Set #1, questions 1 through 14, attached to my letter to J. R. Honekamp dated September 28, 1982.)

15. Refer to Burns & Roe letter to NRC Region 5, dated August 24, 1982, concerning a 10CFR21 potentially reportable condition #82-04. Was the condiction described therein, related to the ECCS pump discharge pressure switches, discovered as a result of a systematic casualty analysis program or by accident?

16. How does the S.S. assure that design reverification reviewers do not overlook and fail to report a potential finding to the FRC?

17. Are the STTPs complete enough to give adequate assistance to operating personnel with respect to operating, testing, and maintaining the plant? Can operating, testing, and maintenance procedures be prepared by the S.S. based on the STTP content as described in SDE 3.1?

    Who checks STTPs for accuracy and completeness?

18. The problems identified with WBG welds and radiographs and the successively wider sampling which the S.S. found necessary are reported in QVP progress reports to Region V, Nos. 2, 7, 8, 9, 10, and 11. The WBG review was reported complete in report No. 11, page 5, with 87.8 percent of radiographs found acceptable, 9.1 percent rejected for film quality, and 3 percent rejected for weld quality. Give the TAA panel a summary report of WBG welding review as it stands now.

    Although WBG was the principal contractor responsible for making safety-grade welds, we assume it was not the only such contractor. Has the S.S. satisfied itself with respect to the weld and radiograph quality of other on-site contractors? How was this done?

19. 1E bulletin 82-01 reported examples of altered radiographs by AP&E, Inc. Advise the TAA panel of any additional WNP-2 actions on 82-01, following the project's interim report to Region V of June 24, 1982. Bulletin 82-01, Rev. 1, Supplement 1, reported an additional contractor/supplier, ITT Grinnell Industrial Piping, Inc., from whom altered radiographs have been received by some nuclear plants (WNP-2 not included).

    Has the S.S. considered the possibility that these may be examples of a generic problem related to safety-grade welds and radiographs received from the shops of off-site suppliers? For example, were the individual's motivations for altering

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    Has the S.S. considered the possibility that these may be examples of a generic problem related to safety-grade welds and radiographs received from the shops of off-site suppliers? For example, were the individual's motivations for altering

radiographs peculiar to the person or shop, or did they stem from conditions which might reasonably be expected to exist elsewhere? Is any further inquiry indicated?

20. What procedures does the S.S. have in place to assure follow-up and satisfactory close out of action items related to 10CFR21 reportable conditions or 1E bulletins?

21. The S.S. has reported difficulty in obtaining access to records of work performed under closed-out contracts. What is the present status?

22. Most nuclear power plant constructors receive letters from time to time alleging that certain work has not been performed in a safe manner, or has not followed proper procedures, or that other potentially unsafe conditions exist.

    How does the S.S. handle allegations of this kind? Are they investigated and disposed of by some formal process, or are they handled informally. At what management level are they handled?

10/28/82

TAA QUESTIONS FOR WNP-2 PVP AUDIT
(Set #3)

(NOTE: This list supplements Set #1, questions 1 through 14, Set #2, questions 15 through 22, previously submitted to the Supply System.)

23. QA Audit No. 82-218 - There is no evidence of Project Engineering review of vendor drawings, specifications and other documents. In addition, the audit does not touch on as-building procedure and policy and, in particular, how these will fit with SS reverification program.

24. 10 CFR 21 Potentially Reportable Condition #82-04 - What were GE requirements on location of pressure switches for RHR? Will the reverification program recognize other water hammer findings about BWR RHR systems?

25. 10 CFR 21 Potentially Reportable Condition #82-06 - How does reverification plan to address separation?

26. Duplicates Question 20.

27. What is the status of access to the closed out contractors' and suppliers' records? My recollection is that some of these QA records are in very poor shape, and in others, unobtainable.

28. What contractual remedy exists if a contractor, Johnson Control, does not utilize qualified personnel nor maintains a Quality/Certification program? (ref. Report #2 to NRC.)

29. What changes in sampling procedures were made, if any, as a result of finding unacceptable radiographs on Contract 215, WBG? (ref. Report #7 and 8 to NRC)

30. What weld inspection or radiographs require disposition by the architect-engineer and why? (ref. Reports #8 and 10 to NRC.)

31. What is the policy regarding quality verification and reinspection for off-site shops? (ref. Report #10 to NRC and audit reports.)

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32 What and who determines sampling size and statistical sampling logic?

33. What action has the S.S. taken or planned as a result of IE Information Notice 82-16 on HPCI/RCIC high steam flow set points?

10/28/82

TAA STEAM TURBINE QUESTIONS FOR WNP-2 PVP AUDIT
(Set #4)

34. What does WPPSS plan to do in addition to memo of 9 September 1982 by J. M. Yatabe to R. V. Laney, with enclosures, in view of statement in EPRI-project 1398-5 Volume 2, page 3-24, "It should be noted that cracking occurred in the single BWR plant in which Westinghouse rotors were used (Plant 0-1) and that the cracking in this plant was more widespread and more severe than in any of the PWR plants."?

35. What is blade length of last stage in the Westinghouse turbine?

36. Is the steam reheated before the Westinghouse low pressure unit?

37. Is the arrangement in the Westinghouse turbine such that water cutting can occur, as described in EPRI report?

38. How many reports and what are the titles of the reports which Westinghouse has submitted to the NRC, as mentioned in "WNP-2 Status of Turbine Missile Issue"?

39. a) When will WPPSS know NRC's reaction to Westinghouse inspection methods and reports which have been submitted to NRC?
    b) What will WPPSS do if NRC requires substantial changes to Westinghouse proposed methods and approval if delayed beyond WPPSS start up?

40. What are the details of the WPPSS surveillance program which the NRC has accepted?

41. The memo on "Recommended Strategy-WNP-2 Turbine" has four Recommended Course of Action. This statement leaves open questions as follows:
    a) What does the procurement contract define?
    b) What does the specifications identify?
    c) What is the recommended steam purity in oxygen and copper at turbine entrance?
    d) What action will be taken if a condenser leak occurs?

42. Is the recommended strategy satisfactory for WNP-2 considering the long building period, the long storage of the turbine, and the increased knowledge of stress corrosion cracking?

TAA STEAM TURBINE QUESTIONS FOR WNP-2 PVP AUDIT
(Set #4)

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42. Is the recommended strategy satisfactory for WNP-2 considering the long building period, the long storage of the turbine, and the increased knowledge of stress corrosion cracking?

43. Turbine history
   a) When was the turbine delivered to WPPSS in Richland?
   b) When was the turbine accepted by WPPSS?
   c) When was the turbine first rotated?
   d) How long has it been rotated?
   e) Was steam used for rotation?
   f) In what turbine was steam used?
   g) What steam purity was specified for this use?
   h) Total length of steam rotation use?
   i) Has turbine been inspected - will it be inspected?

TAA QUESTIONS FOR WNP-2 PVP AUDIT
(Set #5)

44. Refer to letters Matlock to Engelken (NRC) of September 23 and September 28, 1982, concerning reportable conditions #22, 37, 40, 49, 53, 54, 60, 64 and 82 in electrical cable routing, and reportable conditions #10, 58, 62 and 83 in concrete expansion program, and #73, deficiencies in grout.

Both letters refer to "reopening" these 10CFR50.55's, which indicates they once had been closed. If this interpretation is correct, i.e. if they were once closed and have now been reopened, TAA has these questions:

a) What was the justification for closing them, and when was this done?

b) What was the reason for reopening?

c) Has the SS considered whether these may be examples of a wider problem?

45. Refer to letter Matlock to Engelken (NRC) of September 1, 1982, on reportable condition #175, WBG radiographs, Attachment A, page 2, para 5.

This paragraph states that, after reshooting 192 WBG radiographs, it was found that there was no significant difference between the original WBG and the new Bechtel film; that all 192 welds were accepted; and that, as a consequence, the review program for evaluating film quality was modified. Explain in what respects the review program was modified, and whether the original 1373 radiographs were re-reviewed to the new standard.

46. Refer to letter Glasscock to Forrest (B&R) of September 27, 1982, QA-82-201, subject, SS QA audit of Burns & Roe No. 82-219.

On page 4 of the report is a reference to previously identified QFR's, showing that QFR 2 from Audit Report 82-4 is overdue and therefor has become a violation of 10CRF50. What additional management level action has the SS taken towards B&R, in addition to the September 27 letter to Forrest, to bring about compliance with QFR-2.

Section A, page 1, final paragraph states that a B&R verification checklist was completed by an employee who was involved in the original design. What has B&R done to correct?

Section A, page 3, para. 2. What has B&R done about the pre-xeroxed" checklists with signatures filled in? What investigation has SS made of the implications of this practice?

47. Bechtel Audit 5.4-1, 8-23-82 thru 9-9-82. Has a response, scheduled for October 18, 1982, been received?

ATTACHMENT D

LIST OF DOCUMENTS REVIEWED BY TAA PANEL IN PREPARATION FOR NOV. 19-22 ON-SITE AUDIT

1. WNP-2 Program Director's Monthly Progress Reports for July, August, and September, 1982.

2. 10 CFR 50.55(e) Potentially Reportable Conditions for August and September, 1982.

3. NRC Region V Inspection Reports issued in August, 1982.

4. Supply System Corporate Audit Reports issued in August and September, 1982.

5. Bechtel Audit Reports issued in August and September, 1982.

6. Contractor Audit Reports issued in August and September, 1982.

7. Summaries of QVP Contractor Audit Reports for Peter Kiewitt Sons Co. (210A), Oliver B. Cannon & Son (234), Sentry Automatic Sprinkler Co. (217), Oliver B. Cannon & Son (219), The Waldinger Corp. (216), Pittsburg DesMoines Steel Co. (213A).

8. NRC IE Bulletin 82-01 of March 31, 1982; Rev. 1 of May 7, 1982, and Rev. 1, Supplement 1 of August 18, 1982, concerning Alteration of Radiographs by Assoc. Piping and Engineering and ITT Grinnell Industrial Piping.

9. WNP-2 letter to NRC Region V in response to IE Bulletin 82-01.

10. Supply System (John M. Yatabe) letter of Sept. 9, 1982, to TAA (R.V. Laney) forwarding internal S.S. report, "Status of Turbine Safety Issues", and S.S. internal memorandum of Aug. 17, 1982, "Recommended Strategy-WNP-2 Turbine.

11. "Steam Turbine Disc Cracking Experience", EPRI report NP-2429, Volume 2 of 7, Data Summaries and Discussion.

12. Paper "Finding the Flaws in Nuclear Power Plants", by Evan Herbert, published in IEEE Spectrum, Sept., 1982.

13. Article "Serendipity - and Nondestructive Examination", by Spencer H. Bush, published in the National Academy of Engineering "Bridge", Spring, 1982.

14. IE Bulletin 81-03 on Flow Blockage of Cooling Water by Clams and Mussels, dated April 10, 1981.

15. WNP-2 letter to NRC Region V of July 6, 1981, responding to IE Bulletin 81-03.

16. Supply System procedures: System Technical Turnover Package, SDE Inst. 3.1; Design Reverification, SDE Inst. 3.5; WNP-2 Findings Review Committee (CPP 4.3.7).

17. Supply System bi-monthly progress reports to NRC concerning progress of Restart and Quality Reverification Programs per 10 CFR 50.54(f) of July 17, 1980: Reports No. 1, dated Oct. 16, 1980, through No. 12, dated Oct. 19, 1982.

18. Supply System Corporate Assessment of Quality Verification Program, dated June 3, 1982.

19. QVP Office Response to above assessment dated Aug. 13, 1982.

20. Bechtel Audits No. 10.4.2 and 13.3.1 of Johnson Controls, Inc., dated June 28-July 6, 1982.

21. Fishbach-Lord formal audit report 82-13, of July 23, 1982.

22. Bechtel Audit No. 13.8.1 of Sentry/Lord, of April 1, 1982.

23. Bechtel Audit No. 10.7.1 of WBG, of Aug. 3, 1982.

24. WNP-2 Project QA Audit No. 82-1 of Quality Verification Program, dated Jan. 20, 1982.

25. Bechtel Audit No. 13.4.1 of The Waldinger Corp., dated March 4, 1982.

26. WNP-2 Project Quality Control Audit of Bechtel/ Pittsburg DesMoines Steel, No. 13.7.1, dated Jan. 28 to Feb. 4, 1982.

27. "High Pressure Core Spray System Design Reverification Plan", Oct. 29, 1982.

28. Charles Q. Miller Progress Reports to TAA Panel Nos. 1 and 2, dated Sept. 17, 1982, and Nov. 12, 1982.

29. Salomon Levy letter report to the TAA Panel dated Nov. 15, 1982.

ATTACHMENT E

LIST OF DOCUMENTS RECEIVED AND REVIEWED BY TAA DURING AND AFTER AUDIT OF NOV. 19-22

1. Supply System notes titled "Design Verification" presented by J. M. Yatabe.

2. Vue-graphs, "WNP-2 Plant Verification Meeting with NRC", Nov. 10, 1982.

3. Qualifications of HPCS Team Members, presented by J. M. Yatabe.

4. "Quality Verification Program Summary Status Report", dated Nov. 19, 1982, presented by R. Knawa.

5. "Deficiency Evaluation Sheet, Small Bore ISOS", presented by R. Knawa.

6. WPPSS Instruction QVI-08, "Reverification Inspection Team Concept", dated May 13, 1982.

7. WPPSS Instruction QVI-09, "Special Structural Steel Reinspection Criteria, dated May 13, 1982.

8. S.S. document titled "Contract 215 Reverification Program."

9. Bechtel letter to S.S., BEC WNP-2-82-0437 of April 22, 1982, concerning "WNP-2 Reverification of WBG Pipe Weld Radiographs."

10. General Electric Co. letter, "Nuclear Wheel Newsletter No. 2", dated Nov. 12, 1982, plus Attachment I, "Nuclear Wheel Sonic Test Results."

11. General Electric "Nuclear Newsletter No. 2", Nov. 8, 1982.

12. Table I, "Steam Purity Recommendations", presented by J. M. Yatabe as an extract from a Westinghouse letter setting purity recommendations for steam entering the WNP-2 turbine.

13. "WNP-2 Plant Operations Summary", dated Oct., 1982, presented by J. D. Martin.

14. File of ten (10) WPPSS internal memos which reflect that the professional backgrounds of the Design Reverification Team Members and the Findings Review Committee Members have been examined and have been found to meet the S.S. Criteria of Independence.

15. Residual Heat Removal System Design Reverification Plan, dated November 5, 1982.

16. Reactor Feedwater System Design Reverification Plan, dated November 8, 1982.

17. Supply System letter D. C. Timmins to R. V. Laney et al, dated December 2, 1982, with enclosures concerning Structural Welding Code and the American Welding Society.

18. Supply System letter J. R. Honekamp to R. V. Laney et al, dated December 22, 1982, enclosing AWS D1.1 pages 20, 21, and 22; page 1 of Structural Welding Code General Provisions; and Supply System Memo SCN 82-165, containing a draft SAR change notice.

ATTACHMENT F

Technical Audit Associates, Inc.
Plant Verification Program Plan Evaluation Team
for WPPSS/WNP-2

BIOGRAPHICAL INFORMATION

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REPORT OF AUDIT NO. 2

of the

WASHINGTON PUBLIC POWER SUPPLY SYSTEM'S
PLANT VERIFICATION PROGRAM FOR WNP-2

performed by

TECHNICAL AUDIT ASSOCIATES, INC.
AT RICHLAND, WASHINGTON ON
JANUARY 26-28, 1983

February 15, 1983

APPROVED:

R. V. Laney

L. H. Roddis, Jr.

H. E. Sheets

CONTENTS

I. Summary of Findings and Observations*

The findings from this audit are stated below, together with a page number reference to the text.

Finding No. 9*

The Panel believes that the S.S. should take additional steps to inform reverification team members of the importance of deciding and indicating on the report whether a Potential Finding is or is not a reportable event. (page 7)

Finding No. 10

TAA does not agree with the present plan for the RFW system in which no piping or support/restraints are being reverified. We believe that a sample should be included, using design level information, if necessary, to avoid the schedule delay which would result from awaiting as-built verification. (page 10)

* Findings No. 1 through 8 and Observations No. 1 through 3 appear in TAA's Audit Report dated January 10, 1983.

Finding No. 11

The Requirements Reverification Report requires additional review and improvement, to ensure that the relationship between commitments and requirements are more thoroughly analyzed and more clearly presented. (page 11)

Finding No. 12

The RFW design reverification team is behind schedule and requires strengthening in order to complete on schedule. (page 14)

Finding No. 13

We believe that the pipe stress/nozzle problem should be investigated by the S.S. to determine the root causes of it, and whether the root causes have any implications for other S.S. work done by the architect-engineer. (page 15)

The Observations from this audit follow, together with a page reference to the text.

Observation No. 4

While recognizing that additional commitments will continue to be issued, the Panel believes that the Requirements Reverification Report contains encugh comparisons to provide an adequate assessment of whether commitments are expressed in design documents. (page 12)

Observation No. 5

For the purpose of deciding whether or not to extend the sample size, tray and conduit supports which do not conform to design plans, but are found acceptable as is, should be analyzed. It is important to determine if the same deviations might be unacceptable in other tray and conduit support situations. If so, such "acceptable as is" items should be counted as deviations for sample size analysis. (page 19)

AUDIT REPORT

II Introduction

The Washington Public Power Supply System (Supply System or S.S.) retained Technical Audit Associates, Inc. (TAA) to, first, review and comment on the Supply System's Plant Verification Program Plan (PVP), and, second, to audit its implementation. TAA's review of the PVP was completed and our final report on the plan submitted on August 6, 1982.

TAA is now engaged in auditing the Supply System's implementation of the PVP, an activity which will continue until readiness for fuel load in August, 1983. We have been asked to give principal attention to those portions dealing with the reverification of design, the Quality Verification Program (QVP), which addresses the quality of construction before July, 1981, and the effectiveness of management actions to resolve quality problems arising since July, 1981. The ultimate objective of this continuing audit is to enable TAA, at the conclusion of the PVP and before fuel load, to state a knowledgeable opinion on the adequacy of implementation of the PVP and the extent to which it provides substantive confirmation that WNP-2's design and construction comply with applicable Regulatory and Safety Analysis Report commitments.

This is the report of the second on-site audit, conducted on January 26, 27 and 28, 1983. The first on-site audit was reported in TAA report dated January 10, 1983. As in the previous audit the TAA panel selected and reviewed a number of pertinent documents, listed in attachment K. TAA prepared and forwarded to the Supply System various questions, arising from the document review and from the previous audit, which provided a focus for this audit. These questions appear as attachment B.

The audit agenda (attachment A) shows the topics covered in the audit. All TAA Panel members and consultants were present.

In the preceding Summary and throughout this report we have used either a Finding or an Observation to present our conclusions and recommendations. A Finding is a conclusion or recommendation which, in our opinion, is sufficiently important to require a formal response from the Supply System, leading either to a mutually satisfactory disposition or to continued dialogue. Each Finding should be formally resolved.

An Observation is a conclusion or recommendation of lesser importance for which no formal resolution is expected.

III Design Reverification Program

TAA reviewed the status of the requirements and design reverification program as shown on agenda items numbers 1 through 10 (attachment A). Since the TAA panel reviewed the High Pressure Core Spray System (HPCS) in November, this audit concentrated on the Reactor Feedwater System (RFW) and Residual Heat Removal System (RHR) systems. The following TAA questions were discussed during these sessions: 3; 5; 6; 7; 8a, b, c, d; 9a, b, c, d, e, f; and 10a, b, c, d, e, g, h (attachment B). Except as appears in the following discussion, satisfactory answers were received.

A. Findings Review Committee (FRC)

The Panel discussed with Chairman Newell S. Porter, C. H. McGilton and Ronald J. Barbee, members, and Doug Timmins, secretary, of the FRC the results of their first meeting and potential findings reviews which had been held on Wednesday, January 19, 1983, with TAA Consultant Charles Q. Miller present as an observer. Mr. Porter summarized the professional credentials of each committee member and provided copies of the memoranda by which each member stated his compliance with the S.S.'s independence criteria.

Potential Findings Reports (PFR) HPCS-1, -2, -3, -5 and -6 and RHR-1, -2, -3, -4, -5, -6 and -7 were discussed

individually with respect to the comittee's depth of review and actions taken.

The Panel noted that three of the PFR's did not indicate, as required by the S.S.'s FRC procedure, whether the originating engineers believed that the potential findings were reportable events. While agreeing that they should have done so, S.S. spokesmen pointed out that another, independent routine exists for the same purpose. We later learned that none of the three is, in fact, reportable.

Finding No. 9*

The Panel believes that the S.S. should take additional steps to inform reverification team members of the importance of deciding and indicating on the report whether a Potential Finding is or is not a reportable event.

B. Discussions with Design Reverification Management

The TAA Panel discussed program status, scope and schedule (agenda item No. 3) with J. R. Honekamp, D. W. Porter, D. L. Whitcomb and G. L. Gelhaus; at a later time we discussed related questions with John Yatabe. Dave Whitcomb told the Panel that the initial three design reverification plans which

* Findings No. 1 through 8 are in TAA's Audit Report dated Janauary 10, 1983.

the Panel had received are being revised in order to incorporate clarifications, corrections, and scope changes. Using a bar chart (attachment C), he explained that the Engineering Mechanics reverification for HPCS and RHR are pacing the program.

The Panel inquired whether team engineers have a ready way to raise questions which come to their minds during walk-downs or at other times, but which are not on their checklists and which may not be directly related to their area of interest. We were told that this is encouraged, and that cross-team discipline meetings will be hold to make it convenient to raise questions. However, such questions must be subordinated to accomplishing each engineer's main tasks.

In answer to TAA's question No. 9(a) (attachment B), S. S. spokesmen advised that, due to Burns & Roe's late discovery of a piping-nozzle mismatch at the main feed pump, final design stress confirmation, based on as-built drawings, would become available too late to allow RFW system reverification to be completed on the present schedule. For this reason, the S.S. had decided and shown in their reverification reports that they would perform no analysis of RFW piping, supports, or restraints, and that they would compensate for this omission by increasing the number of such items to be reverified in the other two systems. Mr. Yatabe later supplied the details of these substitutions (see attachment D).

The TAA Panel pointed out that it is especially important to reverify pipe and support stresses in the RFW system for the following two reasons:

a) It is consistent with the original intent expressed in the PVP plan to reverify three complete systems.

b) Among the three systems, RFW provides the largest sample of Burns & Row system design.

To look more closely into the possibility of doing some reverification of piping or hanger stress analysis in the feed system, the Panel arranged to discuss the status of feed system design with Mr. Andre Cygleman of Burns & Roe. He informed the Panel of two problems in the RFW system. The first, involving a Quality Class I interface, required replacing a six-way anchor support with five new supports located from the containment through the main steam tunnel. This work is in progress; final as-built information is expected from Bechtel in May, 1983, with final stress verification to be completed by Burns & Roe in July, 1983.

The second problem arose when Burns & Row discovered, during design verification of Quality Class II hot systems, that main feed piping was causing excessive stress on the main feed pump nozzles and baseplate. The resolution of this problem has required piping redesign to incorporate

additional expansion loops, hanger redesign and obtaining pump vendor (Ingersoll Rand) acceptance of higher base plate loads. Some of this work may still be in progress, although the Panel observed during their plant tour that the affected piping is installed.

In light of the discussion with Burns & Roe, the Panel understands that fully verified as-built information which would be needed for reverification of RFW piping and supports will not become available from Burns & Roe until a date which would be too late to support present design reverification scheudles. However, it does appear possible to include some smaller sample of RFW piping or supports for reverification at the design level, before as-built verification. Even recognizing the limitations of this course of action, we believe it is preferable to the present plan. If personnel resources are a limitation, we would suggest an offsetting reduction in the effort on the HPCS and RHR systems.

Finding No. 10

TAA does not agree with the present plan for the RFW system in which no piping or support/restraints are being reverified. We believe that a sample should be included, using design level information, if necessary, to avoid the schedule delay which would result from awaiting as-built verification.

C. Requirements Reverification Report

There was considerable discussion of the Requirements Reverification Report which the Panel had received and reviewed prior to the audit. The discussion centered on three types of problems which TAA's review had revealed:

- cases for which the information presented in the report does not fully support the Comparison Statement (example, page D-51, ¶ 10.1)
- comparison statements which are imprecisely worded, leaving uncertainty as to their meaning (example, page B-32, ¶ 7.1)
- at least one example where the information is clearly incorrect, apparently caused by errors in copying or transposing (example page A-88, ¶ 12.1)

In addition to those cited above, a number of other similar examples were raised and discussed with design management and team members.

Finding No. 11

The Requirements Reverification Report requires additional review and improvement, to ensure that the relationship between commitments and requirements are more thoroughly analyzed and more clearly presented.

The Panel noted that the Requirements Reverification Report does not include all commitments since issues are still being raised and settled, as, for example, in Supplement Safety Evaluation Reports #2 and #3.

Observation No. 4*

While recognizing that additional commitments will continue to be issued, the Panel believes that the Requirements Reverification Report contains enough comparisons to provide an adequate assessment of whether commitments are expressed in design documents.

D. Design Reverification Logic and System Interactions

Mr. Gelhaus, using a handout (attachment E) discussed and explained the logic for the sampling used in constructing the design reverification plan, answering questions which had been raised by TAA's letter of December 9, 1982. This discussion brought out a concern, felt by some members of the TAA Panel, that the S.S. may place itself in an ambiguous position by its various references to use of N45.2.11, when, in fact, the S.S. has made clear that it is not actually committed to do

* Observation Nos. 1 through 3 are found in TAA Audit Report Number 1, dated January 10, 1983.

so. The S.S. pointed out that N45.2.11 has been used only as a guide to assure covering the necessary design input areas.

Mr. J. Cooney discussed how fire hazard evaluation is being taken into account, using a January 18, 1983 "Fire Hazard Evaluation (RHR System) Design Reverification Plan", previously supplied to Panel members, and a handout (attachment F). Mr. D. M. Bosi discussed the reverification program for missiles, pipe break, and flooding, based on a previously supplied document, "Evaluation of Interactive Design Commitments" and using a handout (attachment G).

Based on these presentations, on TAA's review of the above mentioned interaction documents, and on additional interaction reverification instructions provided us concerning seismic and hydrodynamic loads and other environmental conditions, the Panel believes that the S.S. has made a good plan for dealing with this difficult subject. The S.S.'s responses to Findings No. 2 and 3 of Audit No. 1 will also deal with these topics.

E. Discussions with the RFW Team

TAA met with R. L. Heid, Team Leader, and G. L. Waldkoetter, C. C. Patel and J. M. Curren of the RFW reverification team. Subjects discussed included the reasons for omitting pipe stress reverification, feed pump control systems and tests, heat balance reverification calculations, and

schedule. The Panel observed that the RFW team is experiencing schedule difficulty and needs strengthening.

Finding No. 12

The RFW design reverification team is behind schedule and requires strengthening in order to complete on schedule.

In discussing this finding later with management, we were advised that the S.S. is taking steps to bring in additional qualified design engineers from outside contractors.

F. Discussions with the RHR Team

TAA met with RHR Team Leaders F. J. Markowski, and J. T. Person, W. Edwards, J. R. Cole, and M. A. Mihalic, team members. Mr. Markowski and his team discussed and answered questions concerning all RHR Potential Findings Reports, as well as TAA's questions 10a, c and g. Mr. Markowski estimated that all but about 10 percent of his time is devoted to reverification activity and that he expects to meet his schedule.

G. Discussions with Burns & Roe on the Pipe Stress/Nozzle Problem

During the discussion with Mr. Cygleman reported above and a follow-up discussion the next day, January 28, with Mr.

Forrest and Mr. Cygleman of Burns & Roe, the Panel learned that a number of similar nozzle problems have been discovered, some only recently. We were told that there are sixty-four problems of a similar nature, and that twenty-seven of these potentially involve safety related piping. At least one large valve, the main steam crossover valve to the main condenser, and the main turbine to main condenser exhaust trunk are implicated, in addition to nozzles. Resolution of these problems may involve only hanger adjustment or may require more extensive hardware changes. In the brief time available we did not learn if Burns & Roe is attempting to learn why these problems are apprearing at this late date.

In order to scope the extent of this problem, Burns & Roe stated that they have already reviewed all large and small bore safety class piping, all large bore non-safety piping, and that they are presently reviewing all small bore (under 8 inch diameter) non-safety piping. Burns & Roe believes, therefore, that they now know the full scope. We believe, nonetheless, that the S.S. management should learn considerably more about this problem.

Finding No. 13

We believe that the pipe stress/nozzle problem should be investigated by the S.S. to determine the root causes of it, and whether the root causes have any implications for other S.S. work done by the architect-engineer.

IV Construction Quality Verification Program

The status of the QVP program was reviewed in three sessions which are reported below.

A. Review of QVP Status with Program Management

TAA reviewed the status of the QVP program with Rob Knawa, S.S. QVP Program Manager, and Mel Leach, Bechtel Reverification Group. Discussions included responses to TAA questions No. 2, 11, 12, and 13 (attachment B).

Mr. Leach, responding to question No. 2, said that out of approximately 8400 large bore hanger welds, 41 had been rejected for weld quality, or 0.49 percent.

In responding to TAA question No. 11(a), Mr. Knawa pointed out that the QVP program does not attempt to evaluate the contractor or the design adequacy, but instead focuses only on the acceptability of work installed and inspected before the July, 1980 work shutdown. Therefore, when work is known to be unsatisfactory and is to be reworked or replaced after restart, it is justifiable to remove such work from the population being sampled for the QVP. This point was discussed in detail with repsect to work which has been removed from the population for sampling in the Pittsburgh-Des Moines Steel Co. (PDM) (213A), Waldinger (216), and O. B. Cannon (219 and 234) contracts. TAA accepted the S.S.'s answer to the question.

Mr. Knawa and Mr. Leach responded to question 11(b) by stating that simple, hard-and-fast rules for sample size enlargement are not feasible due to the complexity of the situation in which numerous hardware features and applications are involved. However, the S.S. is preparing written guidelines or criteria which, together with use of engineering evaluation and judgement, will enable such decisions to be made.

The two O. B. Cannon reverification reports (219 and 234) are to be edited so as to make clear that major exemptions of Cannon work from the QVP program were based, in effect, on 100 percent rejection followed by 100 percent reinspection and rework as necessary. This responded to question No. 13.

During the QVP discussion, TAA asked whether the final QVP report would include identifying and summarizing those various related inspection programs which are shown in the PVP as being in support of QVP but which have been carried out at different times and under different (not QVP) management. In reply, Mr. Knawa showed a pie-chart (attachment L) which expressly identified those programs as being part of the total QVP concept; Mr. Leach showed a draft outline of Contract 215 Reverification Report which identified twelve such "other programs", for example, Anchor Bolts, As-Built, Grout, Sacrifical Shield Wall, Pipe Whip Restraints, etc. (attachment J).

TAA requested certain reports on the Sacrificial Shield Wall (to L. H. Roddis), Grout (to all but Levy), and Electrical Separation (to all) for its review.

B. Associated Technologies, Inc. (ATI) Review of Fishbach/Lord Supports

Thomas Bostrom of Bechtel, a member of the Project Engineering Staff, reported on this subject in response to TAA's question 9(d) (attachment B). The content of Mr. Bostrom's report is contained in attachment H. TAA notes that the 59 tray and 59 conduit supports were "designed verified" by individual engineering review. Based on these reviews, all were accepted "as is". However, we also understand that a number of the supports sampled, although structurally acceptable, were not in full conformance with design. We do not question the acceptance of such supports, based on engineering analysis, but we believe that the nature of the deviations found should be analyzed before deciding that the deviations do not require consideration of enlarging the sample size. A deviation which, upon engineering evaluation, can be accepted in one application may be unacceptable in another application.

Observation No. 5

For the purpose of deciding whether or not to extend the sample size, tray and conduit supports which do not conform to design plans, but are found acceptable as is, should be analyzed. It is important to determine if the same deviations might be unacceptable in other tray and conduit support situations. If so, such "acceptable as is" items should be counted as deviations for sample size analysis.

C. Skewed Weld Evaluation

J. C. Mowery reviewed skewed welds in response to TAA's question No. 4 (attachment B). The substance of Mr. Mowery's presentation is shown on attachment I. He stated that his final report will be issued in early February, 1983. TAA will review this report.

V Effectiveness of S.S. Management in Quality Assurance Problems

This subject was discussed with Roger Johnson, WNP-2 Project QA. The discussion included his preliminary response to Finding No. 7 and comments on pages 20-21 on TAA's Audit Report of January 10, 1983.

Mr. Johnson is preparing a report on TAA's Finding No. 7 concerning the matter of WBG radiographic film. The report will be available for review in mid-February. He also advised TAA that a status sheet showing Project response to Corporate QA audit findings will be included in future issues of the Program Director's monthly report. This status sheet will identify late and unsatisfactory responses and bring them to the attention of Project Management both through the report and in monthly presentations.

Mr. Johnson stated that the most recent Program Director's Report (December, 1982) shows nine (9) NRC inspection items which are awaiting S.S. actions as compared with twenty-eight (28) in October, 1982. During this same two month period the number of items submitted to, and awaiting NRC approval grew from sixteen (16) to twenty (20). The total number of open items was reduced from forty-four (44) to twenty-nine (29).

This reflects Project activity to reduce the backlog of unresolved NRC inspection items, which had been urged in the report of TAA's November audit.

TAA observed that the S.S.'s approach to WNP-2 construction quality relies heavily on the QVP program for construction which was completed before July, 1980, and on Bechtel for construction which has taken place since restart. Persistent S.S. appraisal and audit of Bechtel's quality performance is, in our opinion, essential. Mr. Johnson discussed the S.S.'s continuing activity to assure that Bechtel is discharging their responsibilities adequately. He showed an awareness of the need for S.S. oversight, and, by citing examples, indicated that effective surveillance is being conducted. Specific S.S. reports were mentioned, which TAA will review.

ATTACHMENT A

26.22.07

TAA AUDIT

January 26, 27, and 28, 1983

A G E N D A

Wednesday, January 26 - CDC Building (Clallam Room)

10:00 a.m.	No. 1	Interview with Findings Review Committee	FRC Members
10:30 a.m.	No. 2	Agenda Review	JR Honekamp
10:35 a.m.	No. 3	Design Reverification Schedule/Status	DL Whitcomb
10:45 a.m.	No. 4	Response to General Questions (Nos. 3, 5, 6, 8a, 8b, 8c, 9a, 9e, 9f, 10e, and 10h from 1-13-83 ltr)	JR Honekamp GL Gelhaus DL Whitcomb
11:15 a.m.	No. 5	Reverification Logic (Response to 12-9-82 ltr)	GL Gelhaus
	No. 6	System Interactions	
11:30 a.m.		a. General Approach	GL Gelhaus
		b. Fire Protection	
11:45 a.m.		. Overview of WNP-2 Fire Protection Design and Fire Hazard Analysis	DT Evans
12:00 N		. Fire Protection Reverification Review (also question No. 8d 1-13-83 ltr)	J. Cooney
12:15 p.m.		(lunch)	
1:00 p.m.		c. Equipment Qualification Reverification Review	E. Vogeding
1:30 p.m.		d. Missile, pipe break, and flooding review	DM Bosi
2:00 p.m.	No. 7	Interviews with Reactor Feedwater Team Members (individual interviews, RL Heid address question 9b, 1-13-83 ltr)	RL Heid CC Patel JM Curren
4:00 p.m.	No. 8	Review of Findings from last TAA Audit	JR Honekamp DC Timmins GL Gelhaus RL Knawa

Thursday, January 27 - CDC Building (Clallam Room)

8:00 a.m.	No. 9	Interviews with Residual Heat Removal Team Members (individual interviews, JR Cole address questions 10a, 10c, and 10g in 1-13-83 ltr)	FJ Markowski JT Person W. Edwards JR Cole MA Mihalic
11:30 a.m.	No. 10	Followup questions in Design Reverification area	JR Honekamp GL Gelhaus DL Whitcomb DW Porter
12:30 p.m.		(lunch and travel to WNP-2)	
		WNP-2 Site, Building 1 (Construction Management Conf. Room)	
2:00 p.m.	No. 11	Overview of Scope, Status, and Results from ATI Review of Fischbach & Lord hanger/support design activities	BA Holmberg et al
3:00 p.m.	No. 12	Results of Burns & Roe review of skewed welds which lack increased leg length (reference BRWP-RO-82-347)	JC Mowery
3:15 p.m.	No. 13	Interview with Project QA Manager (general followup from previous audit, Finding No. 7 and Comments on pages 20 and 21 of 1-10-83 Audit Report)	RT Johnson
4:15 p.m.		(tour)	JR Honekamp

Friday, January 28 - WNP-2 Site (QVP Trailer)

8:00 a.m.	No. 14	Interview with QVP Staff (Question No. 2 from 1-13-83 ltr plus questions Nos. 11, 12, and 13 in 1-18-83 ltr)	RL Knawa
11:00 a.m.		Travel to MPF, TAA Executive Session	
1:30 p.m.		Exit Interview	RB Glasscock PK Shen WC Bibb RG Matlock DW Mazur A. Squire JR Honekamp JM Yatabe

ATTACHMENT B

26.22.04

TAA QUESTIONS FOR WNP-2 PVP AUDIT NO. 2

SCHEDULED JANUARY 26-28, 1983

Set No. 1, January 13, 1983

1. TAA's report of Audit No. 1, transmitted to the S.S. on January 12, 1983, contained eight findings. We request that each of these, except Finding No. 1, be discussed by the S.S. at the appropriate time in the January 26-28 agenda. Findings Nos. 2, 3, 4 and 5 are related to design reverification, and Nos. 6, 7 and 8 are related to the Quality Verification Program.

2. In the S.S.'s discussion of Finding No. 6 concerning QVI-09, the TAA Panel would like to know what design and inspection codes and standards have been used in the design of pipe supports, pipe whip restraints, and cable tray supports? We would also like to know what percent of the 10 percent sample of structural welds reinspected under QVI-09 were rejected for weld quality.

3. In the text and in Finding No. 2 of TAA's first audit report we recommended that there be increased attention to system interactions. We emphasize, in this connection, the possibility that the WNP-2 fire protection system could pose a flooding threat to vital electrical equipment, something which has been observed in other plants. See attached letter, L. H. Roddis to R. V. Laney, dated January 1, 1983. Please include such a consideration in your response to Finding No. 2.

4. Attachment 1 to Burns & Roe (Forrest) letter BRWP-RO-82-347 to WNP-2 (Holmberg), dated November 8, 1982, advises that B&R will have completed, by the end of November, 1982, its evaluation of skewed welds which lack increased leg length. Please inform TAA Panel of the results.

5. Page 17 of the PVP states that the design requirements to be used are "based on" ANSI N 45.2.11-1974. A document titled "Design Reverification" provided to the TAA Panel by John Yatabe on November 19, 1982, states that the requirements completeness review will utilize a checklist "based on" ANSI 45.2.11, Sect. 3. NRC Region V inspection report No. 50-397/82-13, page 2, notes that the Supply System's position, stated in FSAR Amendment No. 23, is that ANSI N 45.2.11 does not apply to WNP-2. Since WNP-2 design is not committed to conform to ANSI 45.2.11, but to requirements "based on" it, how will the S.S. assure that design reverification is carried out at the same level as committed in Amendment 23 to the FSAR?

6. Refer to SS's report of audit of Burns and Roe's WNP-2 and Richland office's report No. 82-226 for audit performed September 17-27, 1982. We would like to know Burns and Roe's actions on QFR's Nos. 1, 2 and 3 referred to on page 2; these B&R responses were requested by November 12, 1982. In addition, we would like to know how the reported deficiencies may have impacted Burns and Roe's design of the three systems being reverified.

7. Refer to TAA letter, R. V. Laney to J. R. Honekamp, dated December 9, 1982, concerning sampling logic as used in requirements reverification: in the selection of major FSAR design commitments; in tracing these to the engineering requirements documents; in preparing Design Requirements Reverification Checklist and Design Review Questions; and the selection of questions in the System and Component Checklists. Please address the questions posed in this letter. A copy of the referenced letter is attached for convenience.

8. Questions related to the HPCS reverification plan:

   (a) Pages 3-45 and 3-50 all include considerations of condensation water interfering with insulation. Shouldn't this apply with equal force to stray water from the fire protection system?

   (b) On page 3-52 reference is made to the motor being class 1E or, if non-1E, having a drip proof enclosure. The main core spray pump motor is not a totally enclosed waterproof motor. Fire spray activated in the area could take the motor out of service. Shouldn't the Design Reverification include an appraisal of the possible effect of fire system spray on electrical equipment and a validation of the equipment selected? The comments on page 1-25 are also applicable in this regard.

   (c) We note on page 1-26 the statements that flooding of the HPCS pump room will not preclude safe shutdown, and that verification of the adequacy of the floor drain system is beyond the scope of HPCS reverification. In view of the importance of HPCS, shouldn't some limited evaluation of drainage be made, if only to assure that drains are not themselves a potential source of flooding? (See also Finding No. 2 from TAA's Report of Audit of November 19-22, 1982.)

   (d) During our WNP-2 plant tour on November 20, 1982, we noted a battery installation with a non-standard

hood design located directly under a fire protection sprinkler head. If the function of this battery is crucial to the startup of the diesel, the installation should be looked at critically. There is apparently a single hydrogen off-gas system serving the hood. Whether there are hydrogen level alarms was not clear. Also, a nearby charger/inverter is directly under the spray and is unprotected. If its function is only battery charging, this is probably adequate, but some DC terminals exposed to direct water spray could lead to shorting and inactivation of the battery. We do not see any mention in the Design Reverification Plan of this battery installation.

(e) Please comment on current plans for reviewing other system interactions with HPCS. (Refer to Finding No. 2 of TAA Audit Report on November 19-22, 1982 audit.)

9. Questions related to the Reactor Feedwater System reverification plan:

(a) The following appears on page 1-25: "There are currently no plans to include FW piping, support/restraints or their associated analysis as part of the reverification plan." The reason given for this omission is that current engineering and construction schedules make it unlikely that a final design verification could begin before May, 1983.

We also note that the PVP, Sect. IV, page 15, states that Bechtel and SS engineers are conducting in-depth reviews of ASME Code piping and supports, as described in PVP App. B, and that these reviews will be "taken credit for" in the piping and support portion of the Design Reverification reviews.

Please inform the TAA Panel how the design of feedwater piping and supports are to be reverified.

(b) Inasmuch as the purpose of design reverification is to show that applicable design requirements have been incorporated into the final plant configurations, and in view of the incomplete design and construction of RFW systems, how will the system walkdown, described on page 4-1, be modified to suit the circumstances?

(c) Please comment on current plans for reviewing other system interactions with RFW. (Refer to Finding No. 2 of TAA Audit Report on November 19-22, 1982 audit.)

(d) We note on page 3-16 that Fishback and Lord has contracted with ATI to review F/L design of cable trays, conduits, and their supports. The TAA Panel would like to know the scope, status, and results of the ATI review.

(e) On page 1-31 this appears, "The selection process results in a broad enough coverage...to ensure that the design complies with the commitments...." Please discuss the basis for the "broad enough" statement.

(f) On page 2-2, this appears, "Sufficient numbers and types ...will be reevaluated to provide assurance, when coupled with the component level reverification...that the design of the RFW system (meets) its specified design requirements..." Please discuss the basis for this assurance.

10. Questions related to the Residual Heat Removal System reverification plan:

(a) On pages 3-20 and 3-21 a statement is made concerning the design of support RHR-436. It contemplates design review based on ASME Section 3 conditions. It does not mention the applicability or otherwise of the American Welding Society code. At the back of the book on pages 6-3 and 6-4, applicable codes and standards are listed, neither the American Welding Society code nor QVI-09 are mentioned in this listing. To what applicable code is the design review to be made?

(b) Please comment on current plans for reviewing other system interactions with RHR. (Refer to Finding No. 2 of TAA Audit Report on November 19-22, 1982 audit.)

(c) On page 1-10 it is noted that the structural engineering discipline is not planned for review on the system level. Only a few specific structural engineering supports will be evaluated as specified on page 1-3 in figure 1-1A. Please clarify which are the specific structural features which will be reverified.

(d) On page 1-8 it is mentioned that operation of the system from the remote shutdown panel is different "in that all of the valve interlocks are removed." Exactly what switching is involved in defeating these interlocks is apparently not going to be looked at in the scope of the review. We believe such an important function should be included.

(e) On page 2-2 at the bottom of the page it mentions that any deficiencies in design related matters on interfacing systems will be documented "but they will be pursued further outside of the RHR Reverification Program." Does this mean they will not constitute "preliminary findings"? We believe that any design related findings which could affect the reliable operation of the three systems being reverified should be pursued within the reverification program, including the treatment of potential findings by the FRC.

(f) Page 3-16 of the plan states that review of cable tray, conduit, and their hanger/support design will not be performed as part of this reverification activity, and that Fishback/Lord have a separate contract with ATI to review the F/L design. We would like to know the scope, status, and results of ATI's work.

(g) Page 3-17 indicates that pipe supports will be looked at on a sample basis, but does not tie back to the statement on page 1-10 or to figure 1-1a. It is not clear from this page which pipe supports will be re-examined.

(h) On page 2-2 this statement appears: "Sufficient numbers and types of system requirements will be reevaluated to provide a high level of confidence, when coupled with the component level reverification strategy..., that the RHR system as a whole is designed in compliance with its specified requirements and FSAR commitments". Please advise what is meant by "a high level of confidence" and explain your basis for it.

26.13.08

LOUIS H. RODDIS, JR., P.E., C. ENG.
CONSULTING ENGINEER

110 BROAD STREET
CHARLESTON, SOUTH CAROLINA 29401
803/723-0319

January 1, 1983.

Mr. Robert V. Laney,
24 Trout Farm Lane,
Duxbury, MA., 02332.

Dear Bob:

I recently had occasion to visit a nuclear plant under construction which had a fire protection system that I believe had been designed with considerable input from knowledgeable and compent utility power plant and electrical equipment people. Considerable care had been taken to keep water from electrical equipment. Steps included the following:

1. All cabinets were bottom entry, and of spray tight construction.
2. In the control room, computer room, and relay room only a Halon system was installed.
3. The cable spreading room had both a Halon and a water spray system.
4. Cable racks generally had water spray systems installe either for them alone, or as part of an area system.
5. The electrical drive safety systems had <u>no</u> installed spray systems, only a standpipe and hose.
6. Where steam turbine drive safety systems were installed a water spray system was installed, but the only electrical equipment (aside from lighting) was a valve operater that was of watertight construction.
7. The emergency diesels themselves had a CO2 system only, the Diesel day tank had a water spray system in a separate room, and the electrical equipment was in a separate room, with only a hose and standpipe outside the door.
8. The only bad spot I saw was where all three of the battery chargers for the station batteries were under the same water spray head. While I did not check the circuitry, the chargers were of the Trickle charge type, so presumeably the charger had the DC leads inside. The batteries themselves were in separate rooms, no fire protection except the room separation and hose outside.

I really think that some further look at the WNP-2 fire protectio system micht be in order by someone knowledgeable about the ability of the electrical equipment, including those large motors, to perform their assigned safety function in case the spray systems installed in those compartments are activated. Same for the Diesel installation.

cc: Jewett
Sheets
Levy
Miller

Faithfully Yours,

Louis H. Roddis, Jr.

26.22.00

TECHNICAL AUDIT ASSOCIATES, INC.

589 OENOKE RIDGE
NEW CANAAN, CT 06840

(203) 966-0382

December 9, 1982

Mr. John H. Honekamp
Washington Public Power Supply System
P. O. Box 968
Richland, WA 99352

Dear John:

According to schedules enclosed in the HPCS, RHR, and RFS reverification plans, three principal milestones will have been completed for all three systems by the time of our January visit. These are STTP Updating, Requirements Reverification, and As-Built Inspections. We write to advise you and John Yatabe that, during the January 26-28 audit, the TAA Panel will look closely at Requirements Reverification activities for all three systems. We will examine the logic and the methods by which FSAR commitments are traced to the engineering requirements documents and from the engineering requirements documents to the detailed questions which are used for testing the design. Wherever the process involves sampling, we will want to understand the sampling plan, the selection criteria, and the level of confidence which the plan provides.

We are particularly interested in the logic of four steps in Requirements Verification. These are:

First, what is the logic for selecting the "major FSAR design commitments" referred to in para. B of "Design Verification", given us by John Yatabe on November 19? We would like to review the criteria used in making these selections, learn the total numbers of major (and minor) commitments, and understand what level of confidence the sampling plan produces with respect to the incorporation of FSAR commitments into engineering requirements documents.

Second, how have these major commitments been traced to the applicable engineering requirements documents? We would like to see several examples of working documents for each of the three systems which demonstrate the "extract and compare" process. We would like to review for each system several of "statements summarizing the compliance of the engineering requirements."

Third, what rationale was used in preparing the list of Principal Design Documents, Attachment 4.1 of SDE 3.1 and the Design Requirements Reverification Checklist which appears as Table 5.3.1 of SDE Instruction 3.5? What is the logical process by which this checklist leads to the System and Component Design Review Questions which appear in each plan (for example, on pages 1-10 and 1-11 of the HPCS Plan)?

Fourth, starting with these System and Component Design Review questions, what was the logical process which resulted in the selection of the questions which appear in the plans as Specific System and Component Checklists (page 2-11 of RHR plan and page 3-24 of the RHR plan)?

We would like to see any materials available which address the questions of logic posed above. In addition, when they become available, we would like to receive working papers showing the details of implementation of these four steps.

I have requested Chuck Miller to assist in selecting this material to assure that the TAA Panel will have sufficient information to comprehend the rationale governing the Requirements Reverification process as well as the thoroughness with which it is being carried out.

Sincerely,

Bob

Robert V. Laney

RVL:pb
cc: Mr. Frank B. Jewett, Jr.
Dr. Salomon Levy
Mr. Charles Q. Miller
Mr. Louis H. Roddis, Jr.
Dr. Herman E. Sheets

TAA QUESTIONS FOR WNP-2 PVP AUDIT NO. 2

SCHEDULED JANUARY 26-28, 1983

SET NO. 2, JANUARY 18, 1983

(NOTE: Set No. 1 contained questions 1 through 10.)

11. Since TAA Audit No. 1, Nov. 19-23, 1982, we have reviewed several QVP Contract Reverification Reports: 213A, PDM; 210A Peter Kiewitt; 216 Waldinger; 217 Sentry; 219 and 234 Cannon. These reviews have raised several questions which apply generally to all of these reports. These general questions are grouped here as a part of Question 11. Questions which are specific to individual reports are separately numbered below.

    (a) We find that identified deficiencies have been eliminated from QVP consideration by redefining the work which is subject to reverification. This, in our view, tends to give a wrong view of the contractor's work quality, even though the practice may result in achieving a satisfactory level of quality, through later rework.
    Example 1 - In Waldinger, 216, when it was discovered that forty-one out of 148 supports required redesign, the population for reinspection was reduced to 107 and nothing more appears in the report concerning the 41 cases.
    Example 2 - In PDM 213A, electrical penetrations and downcomers were, by reassignment to Bechtel, removed from the scope of PDM work which is subject to QVP reverification.

    As a result of such practices, QVP reverification reviews tend to give an assessment of the work quality which is based on an unrepresentative sample.

    These reviews and observations lead to the following questions:

    11(a)(1) Might this practice of excluding selected work from the population being reverified cause overall assessments of contractor work quality to be misleading?

    11(a)(2) Might this practice lead to a distortion of accept/reject ratios, obscure trends, or hide a need for sample enlargement?

    (b) As mentioned in our Audit Report No. 1, none of the QVP Contract Reverification Reports which we have seen has identified either an unsatisfactory trend condition or reject percentage, leading to a

need to increase the 10% sample size. Since the major mechanical contractor report (WBG-215) is still incomplete, however, we believe it is important for the S.S. to state now its criteria or guidelines to be used for this purpose. This leads to a question:

11(b) What criteria or guidelines will be followed for increasing inspection sample sizes, following evaluation of discrepancies found in original and subsequent reverification inspections?

12. The following questions relate to TWC-216 Contract Reverification Report:

12(a) Why was TWC home office documentation concerning TWC fabricated materials never reviewed by TWC QA and what are the implications of this QA breakdown?

12(b) Why was this not discovered earlier by S.S. or B&R audits?

12(c) Considering the loss of timely information, why was the review of this documentation deferred until the turnover review process?

12(d) Has the turnover document review taken place? What were the results?

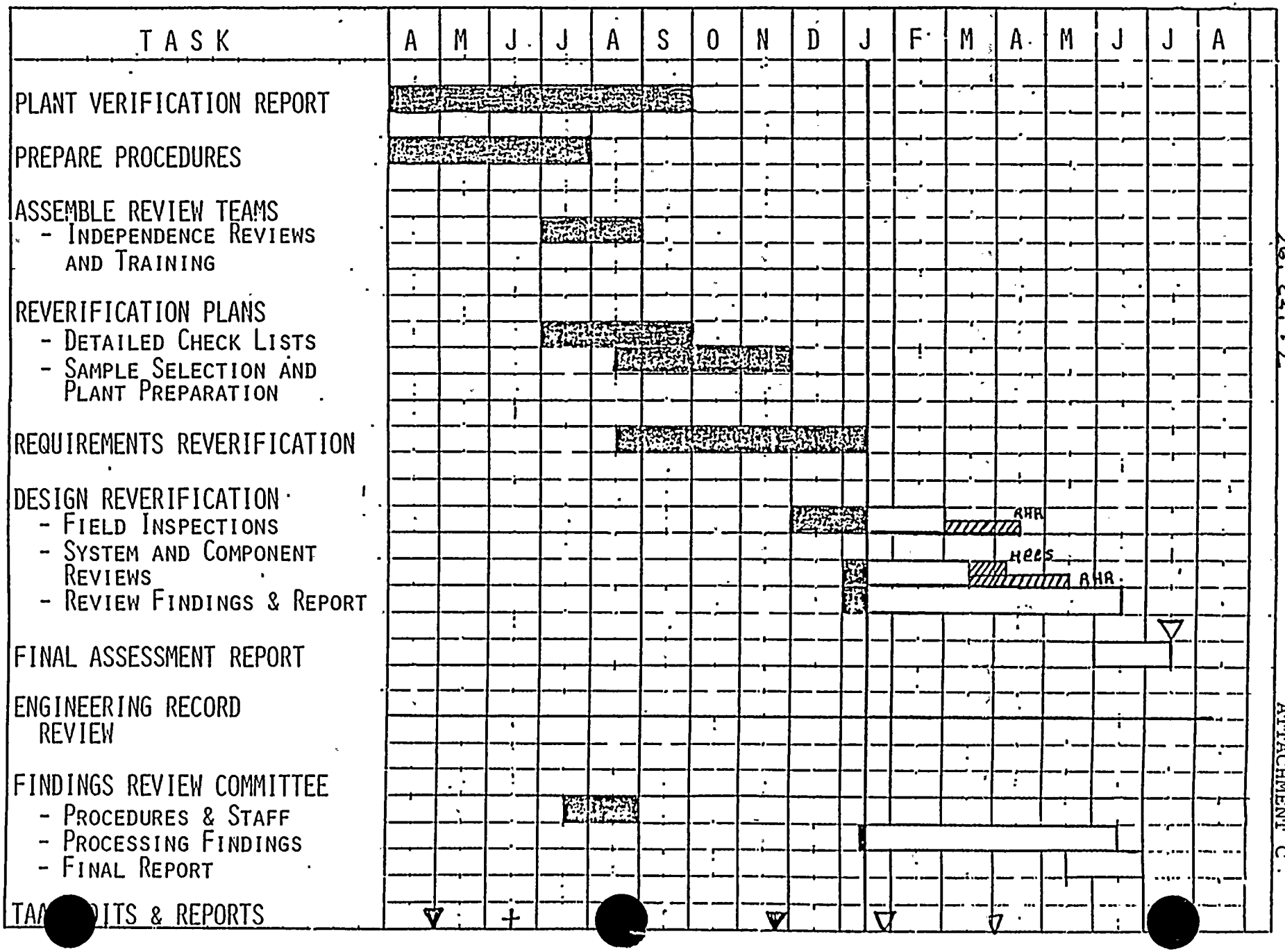
12(e) Were there, as the report suggests, two significant overhauls of IHP QA management and processes during the two year period beginning in 1979? If so, what were the causes, what affect did they have on work quality, and are there any implications for work quality beyond those noted in the TWC report?

13. The following question applies to O.B. Cannon 219 Contract Reverification Report:

13(a) Attachment 2 of 219 is concerned with reinspection of the drywell before and after recoating. Hardware inspections, document reviews and personnel qualification are presented in the future tense: "will be performed", "will be reviewed", "personnel who will perform...". This raises a question concerning the value of a final report which

concludes, "the actions to be performed... meet the requirements of the Quality Verification Program"... . (Summary and Conclusions, page 1) Wouldn't it be more convincing to report on what has been done?

1/24/83



26, 23, 17

ATTACHMENT C.

REVERIFICATION PROGRAM SUBSTITUTIONS

(Engineering Mechanics)

Item	Subtracted From RFW Components	Added to RHR or HPCS Components
Small Bore Pipe	M200-341	RHR-2289-1
Small Bore Hanger	None included in original scope	RHR-2289-11
Pipe Whip Restraint	PWS-27-2	PWS-2-1
Large Bore Hanger	COND-28	HPCS-901N
Large Bore Hanger	RFW-186	HPCS-52
Large Bore Stress Analysis	M200-27 (Class I)	HPCS-100A (Class II)

*Class I already being reverified in HPCS.

RESPONSE TO TAA DECEMBER 9 LETTER

Concern #1: "...what is the logic for selecting the major FSAR design commitments given us by John Yatabe on November 19? We would like to review the criteria used in making these selections, learn the total number of major (and minor) commitments, and understand what level of confidence the sampling plan produces with respect to the incorporation of FSAR commitments into engineering requirements documents."

Response: For the applicable FSAR chapters addressing design commitments (Chapters 1, 3, 5, 6, 7, 8, 9.5, and 10) all design commitments identified were compared to the engineering requirements documentation. It should be noted the detailed review of the FSAR showed two types of FSAR information: 1) Commitments, and 2) Descriptive Material. The latter classification was not included in the requirements reverification in that it only provided a description of the plant design or design parameter which implemented a commitment.

Based on the total of 125 FSAR commitments identified, eight resulted in PFRs due to document inconsistencies. On this basis, good confidence can be established in relating the FSAR commitments were incorporated to the WNP-2 design.

Concern #2: "...how have these major commitments been traced to the applicable engineering requirements documents? We would like to see several examples of working documents for each of the three systems which demonstrate the "extract and compare" process. We would like to review for each system several of "statements summarizing the compliance of the engineering requirements."

Response: Applicable paragraphs from the FSAR were extracted or paraphrased and compared with paragraphs extracted or paraphrased as obtained from the engineering requirements documentation. See the requirements reverification report for examples.

Concern #3: "...what rationale was used in preparing the list of Principal Design Documents, Attachment 4.1 of SDE 3.1 and the Design Requirements Reverification Checklist which appears as Table 5.3.1 of SDE Instruction 3.5? What is the logical process by which this checklist leads to the System and Component Design Review Questions which appear in each plan (for example, on pages 1-10 and 1-11 of the HPCS Plan)?"

Response: The list of Principal Design Documents in SDE 3.1 is based on the known documents utilized on WNP-2. The original intent of the list was to provide the system engineer guidance in assuring all applicable documents that were

known to be used in Burns and Roe's design and necessary for performing any follow-on design change engineering were included in the engineering record for each system. SDE 3.1, while "frozen" for the three system reverifications, has been revised as a Technology-level procedure for system turnover and includes a defined document hierarchy for configuration control. This list of documents was verified by Burns and Roe to be complete. The later revision does not differ materially from SDE 3.1. The table 3.5.1 is an abridged version of Section 3.2 of N45.2.11, which (in our opinion and use) represents an accepted industry concensus on the definition of a typical listing of design input areas. This listing has been used as a guide to assure ourselves that requirements extracted from documents types listed in Table 5.3.1 do cover the necessary design input areas (or rationalized as to why a design input area is not applicable in specific cases). The product of this effort is the literature survey (verified for completeness) for future design modification work relative to a system or for use in the design reverification program.

The system and component design review questions represent a list of candidate areas to be probed during this design reverification. These questions are based on basic questions required as part of design reviews per Section 6.3.1 of N45.2.11. They are not intended to be all-encompassing (i.e., do not cover every aspect of the design process), but rather are intended to address the more important considerations given in the design of a system or component. Each question is used as a probe for "softness" in the design adequacy. It was intended that a given probe would be expanded whenever initial efforts revealed a problem area. Each reverification plan identifies those design review questions which will be addressed for each system and component. We have chosen to use this level of review (which is the level of review in current industry practice for design verification) as an acceptable approach for reverifying the adequacy of the three WNP-2 system designs.

Concern #4: "...starting with these System and Component Design Review questions, what was the logical process which resulted in the selection of the questions which appear in the plans as Specific System and Component Checklists (page 2-11 of RHR plan and page 3-24 of the RHR plan)?"

Response: The detailed (specific) system and component design review questions (checklists) were prepared to address the system and component design review questions for each component type being reverified. These checklists are based on the combined experience and judgement of our engineers. These checklists have been reviewed and approved by each of our discipline Lead Engineers. As noted in each system reverification plan, each checklist item may address portions of different design review questions as judged applicable.

The WNP-2 design reverification is not checking of all steps for each selected component throughout the WNP-2 design process. The WNP-2 design reverification does identify the required design inputs and uses them in review of the design. These questions become a test of the reasonableness of the final design.

WNP-2 FIRE HAZARD EVALUATION

DESIGN REVERIFICATION PLAN

I. GOALS

The goal of this plan is to reassure that fire protection features will provide protection of the RHR SYSTEM (Suppression Pool Cooling Mode) per 10CFR50 Appendix R.

- The plan will also review fire protection features to assure that no adverse interaction will occur with the RHR System.
- Other systems required for hot or cold shutdown to meet 10CFR50 Appendix R requirements are not included in the reverification plan.

II. CRITERIA

The principal criteria document is Appendix F of the FSAR. Appendix F has successfully demonstrated how WNP-2 meets the intent of the regulatory requirements of 10CFR50 Appendix R.

- Burns and Roe fire analysis methodology is contained in Technical Memo 1227.
- There is no other overall system description.
- Commitments made in Appendix F are implemented on functional design drawings.

III. PLAN DETAILS

- Section 1, 2 and 3 provide background, regulatory requirements and a summary of WNP-2 fire protection features.
- Section 4 limits the review to the RHR system and commits to tracing Appendix F commitments to lower level drawings for selected fire areas.
- Section 5 describes the boundaries which include the onsite power supply and electrical distribution system (Table 1).
- Section 6 - Program Definition (Six Steps)

  1. Commitments Review
  2. Intruding Cable Review
  3. Protected Cable Review
  4. Suppression Systems Review
  5. Fire Barrier Effects
  6. As-built Inspection

The copy of the plan that has been prepared is preliminary and we are now reviewing the attachments to it with the intention of eliminating repetition and questions that address the Fire Protection System design rather than the interactive effects. We expect that the effort required to implement the plan will be more clearly defined and should be reduced from that shown on page 7-1.

ATTACHMENT G

26.19.08

WNP-2 REVERIFICATION PROGRAM

PIPE BREAK & MISSILES REVIEW

JAN 25, 1983

COLE / BOSI

Bosi
1/25/83

METHOD & SCOPE

APPROACH: USE DETAILED CHECKLISTS TO ORGANIZE AND DOCUMENT REVIEW

- PIPEBREAK CHECKLIST
- MISSILES CHECKLIST

EMPHASIS: REVIEW STRUCTURAL ANALYSIS AND ITS COORDINATION WITH SYSTEM ANALYSES FOR SAFE SHUTDOWN

- FSAR CRITERIA & CITED STANDARDS
- SYSTEM ANALYSES
  - FLOODING
  - ENVIRONMENTAL
  - ACTIVE COMPONENT FAILUR
- STRUCTURAL MECHANICS
  - STRESS/FAILURE CRITERIA
  - SYSTEM RESPONSE
  - DAMAGE/IMPACT ANALYSIS

OVERVIEW: CHECKLIST DETAILS

- PIPEBREAK REVIEW TASKS
  - BREAK LOCATIONS
  - NO BREAK CRITERIA
  - PIPE WHIP RESTRAINT DESIGN
  - STRUCTURAL & ENVIRONMENTAL IMPACTS
  - SAFE SHUTDOWN
- MISSILES REVIEW TASKS
  - COMPLIANCE WITH FSAR CRITERIA
  - MISSILE ENERGY & TARGETS
  - BARRIER INTEGRITY
  - SAFE SHUTDOWN

EXAMPLES

- PIPEBREAK
  - HPCS INJECTION LINE
    - FOCUS OF REVERIFICATION
    - HIGH ENERGY LINE
    - PRIMARY CONTAINMENT LOCATION
  - RWCU PUMP DISCHARGE
    - HIGH ENERGY LINE
    - REACTOR BLDG FLOODING/ ENVIRONMENTAL CONSIDERATIONS SIGNIFICANT
- MISSILES
  - RHR PUMP
    - FOCUS OF REVERIFICATION
    - PUMP ROOM FLOODING
    - PLANT SAFESHUT ANALYSIS
  - RPS MOTOR GENERATOR SETS
    - MISSILE BARRIER REQUIRED

DESIGN VERIFICATION OF FISCHBACH/LORD (CONT. 218)

BY ASSOCIATED TECHNOLOGIES INCORPORATED (ATI)

- ATI was retained on 1/1/82 to perform design verification of electrical cable tray and conduit supports originally designed for Fischbach/Lord by NPS. ATI was also contracted to provide ongoing engineering design services.

- Scope of Design Calculations
  - ~300 original NPS tray support generic designs.
  - ~2400 individual tray support drawings.
  - ~1100 original NPS conduit support designs.
  - ~1100 generic conduit support drawings.
  - ~14000 individual conduit supports.

- Random numbers were applied to the items in each of the five categories, and a random sampling plan per MIL-STD-105D implemented. This sampling plan is based on obtaining a 95% level of confidence that the total population has 5% or less deficient supports.

- 59 tray supports were design verified, all were demonstrated to be structually acceptable.

- 59 conduit supports were design verified, all were demonstrated to be structurally acceptable.

- Software or drawing changes, not affecting hardware was required as a result of the design verification on 41 of the 59 conduit supports and on 41 of the 59 tray supports.

- The design verification program is complete with the final report submitted 9/17/82 to Burns and Roe/Supply System.

ATTACHMENT H

26.22.10

Skewed Weld Evaluation

Problem

Skewed welds with obtuse angles between 90° and 135° did not have the additional leg required by AWS.D.1.1 specified by the designer or added by the constructor for the 215 and 250 contracts.

Program

Since the hangers were complete and the skewed welds had not been evaluated during as-builting, a sampling program for past work was undertaken while procedures to assure the extra fillet leg was added and the as-built program incorporated evaluated of skewed welds for future work beyond November 2, 1982.

Random sample of:

- 60 WBG large piping hangers with skewed welds.
- 60 Bechtel large piping hangers with skewed welds.
- 60 WBG small piping welds with skewed welds.
- 60 Bechtel small piping welds with skewed welds.

Basis of sampling:

Each of the above four samples represent groups of hangers done by the same design methods, fabrication procedures and fabrication management.

Results:

All welds that had the weld size specified on the drawing* were within code allowable stresses. The reasons why they were adequate are attributed to:

(1) Most skewed welds are on kicker supports for seismic loads where the member size is large compared to the welds size required.

(2) Burns and Roe design procedures do not take credit for the skewed weld, even though the weld symbol calls for them, for angles less than 45°.

*Two Bechtel LP welds were below the specified size. One WBG LP weld was below the specified size.

(3) The acute angle weld was always larger than specified even after subtracting the 1/8" allowance for lack of penetration for acute groove welds less than 60°.

26.11.24

ATTACHMENT J

DRAFT

CONTRACT 215 REVERIFICATION REPORT

OUTLINE AND STATUS

SECTION	% COMPLETE
INTRODUCTION	
Report Hierarchy	100
SUMMARY & CONCLUSIONS	
PROGRAM DESCRIPTION	
Organization	100
Special Instructions	100
QVI-08	100
QVI-09	100
Program Directives	100
Major Decisions	100
Offsite Fabricators	100
Reinspect Prior to System T/O.	100
Sandblasting	100
Inspection Reference Documents	100
WBG Document Review Program	
Supply System Involvement	
SCOPE	
Total Work Scope and Type	
Work Remaining after Redesign	
Subcontractors	
OTHER PROGRAMS	
Anchor Bolts	
As-Built	
Grout	
Pre-Service Inspection	
Sacrificial Shield Wall	100
Pipe Whip Restraints	
Start-Up Test Program	50
Drywell Seel	100
Cranes & Hoists	
Hanger Balancing	
Concrete & Rebar	
Structural Steel Bolting	

CONTRACT 215 REVERIFICATION REPORT

OUTLINE AND STATUS

SECTION	% COMPLETE
Generic Problem Areas	
Documentation	
Hardware	50
Sampling	
Logic	
System Reports	
Selection for Hydro	
Reduction in Numbers because of Rework	
Selection Matrix	50
Deviations	
Socket Weld Sandblasting in Containment	
QCIR Re-Evaluation	
Chronological History	100
Results	
Results Evaluation	

26.22.14

ATTACHMENT K

DOCUMENTS REVIEWED BY TAA

BEFORE AND DURING AUDIT

1. S.S. Interoffice Memo, D. L. Whitcomb to N. S. Porter, dated January 7, 1983, with attachments: PFR Nos. HPCS-1, -2, -3, -5, -6, and -7; RHR-1, -4, -5.

2. S.S. Interoffice Memo, D. L. Whitcomb to D. C. Timmins, dated January 13, 1983, with attachments: PFR Nos. RHR-2, -3, -6, and -7.

3. Residual Heat Removal Design Reverification Plan, dated November 5, 1982.

4. Reactor Feedwater System Design Reverification Plan, dated November 8, 1982.

5. S.S. letter, J. R. Honekamp to R. V. Laney, dated January 19, 1983, with enclosure dated January 18, 1983 (draft copy):

   "Plant Verification Program - Evaluation of Interactive Design Commitments", containing the following sections:

   a) Seismic and Hydronamic Loads
   b) Fire Hazards Evaluation, RHR System
   c) Pipe Break/Missile Evaluation/Jet Impingement/ Falling Objects/Flooding
   d) Qualification of Safety Related Equipment for Environmental Conditions and Dynamic Loads

6. Design Reverification Program Schedules (bar charts)

Engineering Mechanics	Jan. 14, 1983
HPCS, Mechanical, Diesel, I&C, Electrical	Jan. 14, 1983
RHR, Mechanical, I&C, Electrical, Structural Engineering	Jan. 14, 1983
RFW, Mechanical, I&C, Electrical	Jan. 14, 1983

7. "Requirements Reverification Report" for HPCS, RFW, and RHR Systems, forwarded by S.S. letter J. R. Honekamp to R. V. Laney, dated January 17, 1983.

8. SDE Instruction 3.5, Revision 3, titled "Design Reverification", dated December 8, 1982.

9. WNP-2 Program Director's Monthly Progress Reports for October, November, and December, 1982.

10. Final Contract Reverification Reports for the following construction contracts:

    210A Peter Kiewitt Sons Co.
    213 Pittsburg-DesMoines Steel Co.
    216 The Waldinger Corp.
    217 Sentry Automatic Sprinkler Company
    219 O. B. Cannon and Sons, Inc.
    234 O. B. Cannon and Sons, Inc.

11. NRC Inspection Report of WNP-2 No. 50-397/82-13, dated October 19, 1982.

12. NRC Inspection Report of WNP-2 No. 50-397/82-19, dated November 4, 1982.

13. S.S. Corporate QA report of audit of Bechtel Power Co. at WNP-2, No. 82-221, dated October 7, 1982.

14. Burns and Roe letter to the S.S., J. A. Forrest to B. A. Holmberg, dated November 8, 1982, concerning evaluation of skewed welds.

15. Bechtel interoffice memorandum, J. A. Gatewood to T. A. Mangelsdorf, dated October 12, 1982, concerning skewed welds.

16. S.S. Corporate QA report of audit of Burns & Roe, No. 82-226, dated October 12, 1982, enclosing QFR Nos. 1 through 6.

17. Bechtel QA report of audit No. 5.6.1 of Bechtel Test Engineering, dated October 17, 1982.

18. Bechtel QA report of audit No. 8-1-1 of Bechtel QC Field Engineering and Procurement, dated October 18, 1982.

19. Bechtel QA report of audit No. 10.2.2 of Fishbach/Lord Elec. Co., dated October 29, 1982.

20. Johnson Controls report of audit No. 220-6-1-1982, dated December 7, 1982; audit No. 220-8-1, dated October 5, 1982; audit No. 220-12-1-1982, dated December 9, 1982.

21. Fishbach/Lord report of audit No. 82-18, dated November 9, 1982.

22. S.S. interoffice memo from R. T. Johnson to B. A. Holmberg, dated January 6, 1983, concerning evaluation of potential reportable findings #127.

23. S.S. letter, C. S. Carlisle to D. M. Sternberg, NRC Region V, dated December 2, 1982, concerning NRC Inspection Report 82-21 - Notice of Violation.

24. NRC Region V report of inspection of WNP-2, No. 50-397/82-26, dated December 8, 1982.

25. NRC Region V report of inspection of WNP-2, No. 50-397/82-28, dated December 15, 1982.

26. NRC Region V report of inspection of WNP-2, No. 50-397/82-27, dated January 3, 1983, enclosing Notice of Violation dated January 4, 1983.

27. Bechtel QA report of audit of Bechtel QC program, No. 4.1.1, dated July 23, 1982.

28. Bechtel QA report of audit of Bechtel QC program, No. 11.1.1, dated June 4, 1982.

29. Bechtel QA report of audit of Best Co., No. 10.1.2, dated January 5, 1983.

30. Fishbach/Lord report of audit No. 82-19, dated December 14, 1982.

31. S.S. 13th Progress Report to NRC Region V dated January 27, 1983, concerning Notice of Violation 10CFR50.54(f), dated July 17, 1980.

32. Professional resumes of G. L. Waldkoetter, R. J. Cooney, E. L. Vogeding, Westinghouse employees assigned to the S.S. design reverification program.

33. S.S. interoffice memo, L. T. Harrold to J. R. Honekamp, dated October 28, 1982, enclosing "statements of independence" from members of the Findings Review Committee.

34. Minutes of Meeting of Findings Review Committee for meeting of January 19, 1983, dated January 21, 1982.

35. S.S. interoffice memo, R. T. Johnson to L. C. Floyd, dated January 25, 1983, concerning TAA Audit Observations.

ATTACHMENT M

Technical Audit Associates, Inc.
Plant Verification Program Plan Evaluation Team
for WPPSS/WNP-2

BIOGRAPHICAL INFORMATION

Frank B. Jewett, Jr., Assignment Manager: Founder & President TAA, member Technical Audit Board. Assignment Director: Indian Point -2 Containment Flooding Accident Audit, Nine Mile Point -2 Cost to Complete Audit. Former: President and Chief Executive Officer, Vitro Corporation of America; Director of Engineering Research and Development, General Mills, Inc. & Vice President Mechanical Division; Vice President & Manager Vacuum Equipment Division, National Research Corporation; Member President's Council, Cal Tech. Member: of the Corp., Wood Hole Oceanographic Institute; NY Academy of Sciences; ASME Safety Committee. Merit Citation, Crusade for Freedom. Registered Professional Engineering, Minnesota. BS, CIT; MBA (mcl) Harvard University.

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Dr. Salomon Levy, Consultant to the Review Panel: Consultant. Twenty-four years General Electric Co., San Jose, CA: General Manager Boiling Water Reactor Operations; General Manager BWR System Dept.; Manager Des. Engr. Atomic Pwr. Equip. Dept.; Manager System Engineer, At. Pwr. Equip. Dept.; Manager Heat Trans. and Reactor Program, APED. Former: Member AEC Task Force, Emergency Core Cooling; Ch. ASME Heat Trans. Division; Member Argonne National Laboratory Review Committee, Reactor Safety; Industrial Advisory Board, TMI-2 accident. Cons.: Kemeny Commission; NRC Advisory Code

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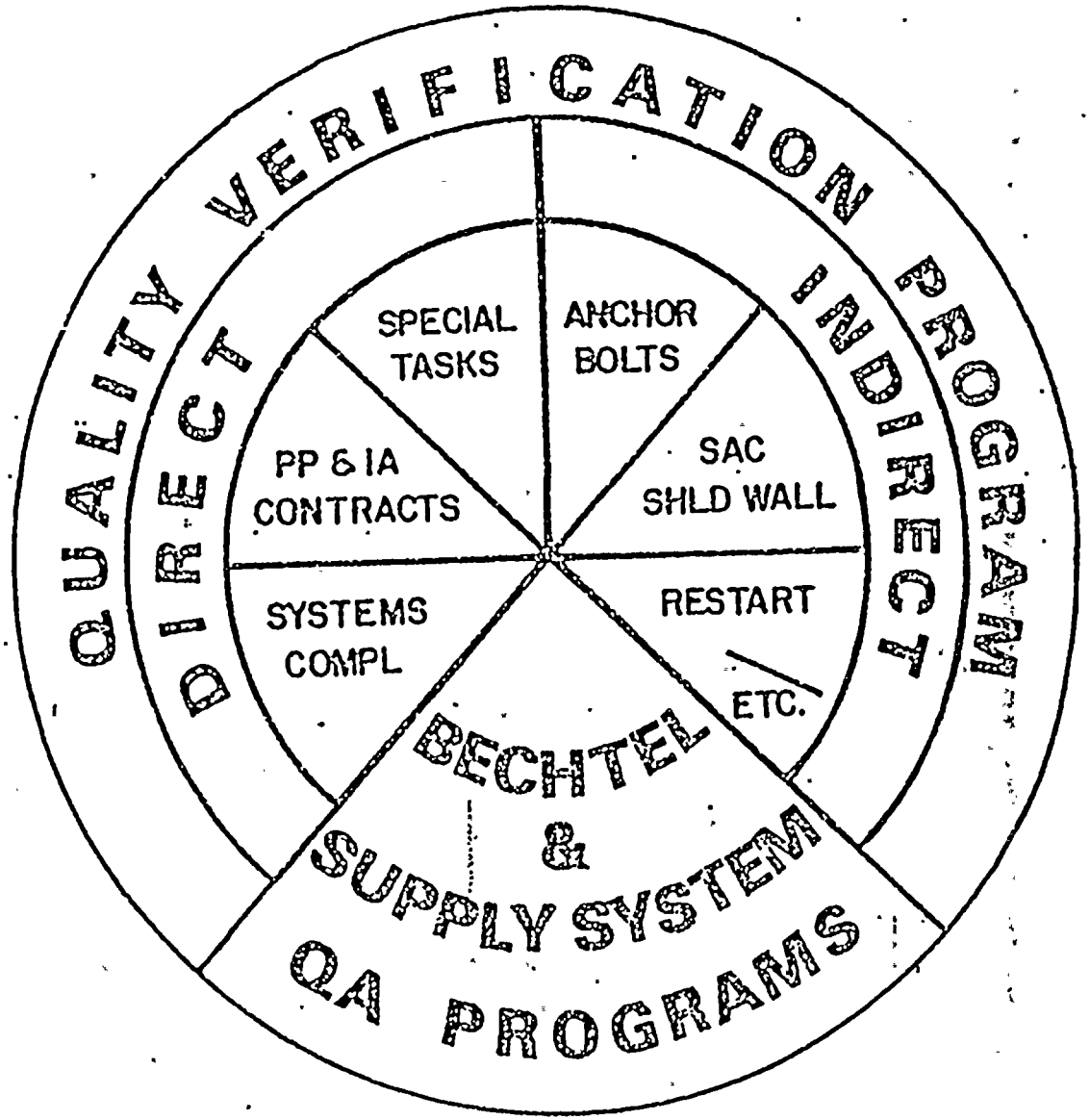
ATTACHMENT L
26.21.02



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REPORT OF AUDIT NO. 3

of the

WASHINGTON PUBLIC POWER SUPPLY SYSTEM'S
PLANT VERIFICATION PROGRAM FOR WNP-2

performed by

TECHNICAL AUDIT ASSOCIATES, INC.
AT RICHLAND, WASHINGTON

on

APRIL 27, 28, and 29, 1983

May 16, 1983

APPROVED:

R. V. Laney

R. V. Laney

L. H. Roddis, Jr.

H. E. Sheets

H. E. Sheets

CONTENTS

I. Summary of Findings and Observations

The Findings from this audit are stated below, together with a page number reference to the text.

Finding No. 14*

TAA is concerned with the numerous evidences that Burns and Roe's design closure implementation is late and inadequate. In addition to the nozzle load problem (Finding No. 13), there are several Potential Finding Reports involving out-of-date calculation and calculations which have not been reconciled with the latest design information. To emphasize the importance of actions which the FRC and the Project have started, we recommend that Supply System corporate management inform itself promptly on the background of this matter and assure that a comprehensive remedial program for design closure, if necessary, be established and carried through. (page 11)

*Findings No. 1-13 and Observations No. 1-5 are found in previous audit reports and in Attachment D hereto.

Finding No. 15

The QVP program does not inspect certain important construction features such as the supporting and securing of power plant components. This "hole" in QVP's scope should be filled. (page 14)

Finding No. 16

In view of the gap in the QVP inspection program identified in Finding No. 15, we believe there should be a fresh, systematic appraisal of the QVP scope to determine if there are other significant areas which are not covered by it. (page 14)

The Observations from this audit follow, together with a page reference to the text.

Observation No. 6

The evidence which we have seen during this audit suggests that, despite schedule pressures, Management remains wholly dedicated to completing the Plant Verification Program as planned. We agree with that intent. (page 12)

Observation No. 7

We believe that the Design Verification Program is being conducted in a thorough, professional manner, and that the review teams and the FRC demonstrate that their activities are independent of external influence. (page 12)

AUDIT REPORT

II Introduction

The Washington Public Power Supply System (Supply System or S.S.) retained Technical Audit Associates, Inc. (TAA) to review and comment on the Supply System's Plant Verification Program Plan (PVP), and to audit its implementation. TAA's review of the PVP was completed and our final report on the plan submitted on August 6, 1982.

TAA is now engaged in auditing the Supply System's implementation of the PVP, an activity which will continue until PVP completion. We have been asked to give principal attention to those portions dealing with the reverification of design, the Quality Verification Program (QVP), which addresses the quality of construction completed before July, 1981, and the effectiveness of management actions to resolve quality problems arising since July, 1981. The ultimate objective of this continuing audit is to enable TAA, at the conclusion of the PVP and before fuel load, to state a knowledgeable opinion on the adequacy of implementation of the PVP and the extent to which it provides substantive confirmation that WNP-2's design and construction comply with applicable Regulatory and Safety Analysis Report commitments.

This is the report of the third on-site audit, conducted on April 27, 28 and 29, 1983. All Panel members and consultants were present throughout the audit. As in previous audits, the Panel selected and reviewed a large number of relevant documents; these included all Potential Findings Reports (PFR) which had been issued at the date of the audit, as well as minutes of all meetings of the Findings Review Committee and internal correspondence between the Committee, the WNP-2 Project and Burns and Roe related to PFR's.

From its review of these and other documents, the Panel prepared and transmitted a number of questions to the Supply System to provide a focus for the audit discussions. These questions are attached marked B.

The audit agenda is attached marked A. All agenda items were discussed.

III Design Reverification Program

A. Attendance at FRC Meeting

The TAA Panel attended, as observers, a regular meeting of the Findings Review Committee on Thursday morning, April 28. The meeting took place in three segments. In segment one FRC members questioned reviewer M. Mihalic on several PFR's which he had prepared, namely RHR-23, 24, 25, 26, 27, 28, 29, 32, and 33. The questions were directed towards clarifying the PFR's. In segment two, which followed, a similar process was used with reviewer Adolfo Rafer to give the Committee a better understanding of two other PFR's, HPCS-24 and 25.

In segment three, with both reviewers absent, the FRC discussed the findings one by one to reach agreement on their importance. Each potential finding was classified as a Finding or an Observation, except RHR-29 and HPCS-25, for which more information is to be obtained.

A principal objective of the FRC's discussions was to decide if the PFR's had the potential for reflecting a generic fault in the design process, and, if so, to pose questions to the Project and to Burns and Roe which would identify that generic fault if one exists. For example,

the FRC's discussion of RHR's 23 through 33 developed the following tentative list of design failures for which they decided a generic question should be asked:

a. Apparent Burns and Roe procedure violations involving failure to pick up new loads and calculations apparently non-existent under conditions where procedures require a calculation (RHR-25, 27 and 28).

b. Apparent lack of correspondence between calculations and associated drawing (RHR-23).

c. Apparent failure to reflect GE installation specification in associated installation drawing (RHR-24).

d. Apparent calculation error of a kind checker should have found, but did not (RHR-32).

The detail in which these PFR's had been written and the knowledge displayed by the reviewers under FRC questioning gave positive evidence of the thoroughness and utility of the Design Verification process. The FRC asked searching questions in order to understand root causes and possible wider implications of these PFR's.

While making a field inspection of the RHR heat exchangers in connection with RHR-25, two conditions were discovered by the design reverification reviewer which appeared to him to be installation errors. In both instances

shims shown on installation drawings appeared not to have been installed on the RHR heat exchange which he inspected. See Section IV of this report, Construction Quality Verification Program, for further discussion of this subject.

B. Discussions with FRC

Following TAA's attendance at the FRC Meeting, the TAA Panel met again with the FRC for a discussion which addressed TAA's written questions (Attachment B) as well as new questions raised as a result of the TAA Panel's attendance at the morning's FRC meeting.

Topics discussed included FRC's previous (March 9, 1983) queries to the Project concerning reconciliation of calculations for safety systems and variations found between GE design specifications and Burns and Roe design documents. The TAA Panel was particularly interested in learning about the Project's and Burns and Roe's program for completing the reconciliation of original assumptions with later changes in calculation inputs. This interest had been increased during the day by two factors: first, several of the PFR's discussed in the morning's meeting centered on apparent problems with Burns and Roe calculations, and second, by learning that the engineering mechanics portions of design

verification is still in the early stages of execution and could produce additional examples.

Speaking for the Project, Mr. Timmins discussed their present outlook on "unclosed" calculations as a possible generic problem. He divided the problem into several design areas as follows:

a. A comprehensive pipe support reconciliation program is ongoing independent of the Design Verification Program.

b. There are other ongoing reconciliation programs which he did not identify.

c. There are a number of calculations whose adequacy will be clearly demonstrated by the test program.

d. Finally, there is some number of safety related calculations not included in any of a, b or c above. It is this group of calculations, unknown in scope, on which the Project's interest is centered.

Mr. Timmins stated that Burns and Roe is to investigate and describe to the Project their procedure for closing calculations and for reconciling later design information with earlier calculations so as to assure closing the loop. He stated that the Project will pursue the matter until procedures and reconciliation satisfactory to the Project are

obtained. (See Finding No. 14 in this report.) TAA will review the Supply System's response to that finding.

TAA pointed out the difficulty, as well as the necessity, of maintaining strict separation and independence of the FRC, while the Project and Burns and Roe evaluate and respond to Design Reverification Program findings. The Chairman of the FRC advised that in this present case the responsibility for assessing the problem and taking action on it lay with the Project. The FRC retains its independent review status, in which it may agree or disagree with the Project's response.

It was evident in these discussions that Project and Burns and Roe responses to PFR's may be, and generally are, received two weeks or so after they receive PFR's from the FRC. TAA's receipt of Project responses is likewise delayed for the same reason. The effect of this is that both the FRC and TAA have, at this time, seen numerous unevaluated PFR's and a smaller number of responses from the Project or Burns and Roe. Passage of time will, of course, correct this present disparity. TAA recognizes that our perception of particular PFR's has been materially changed by our review of the responses, when received. We intend that our audit report and findings give this delay factor a proper consideration. With this in mind TAA suggested to the FRC that a

revision to or update of PFR's should be considered as a way of recognizing, when appropriate, the impact of Project and Burns and Roe responses.

Based on its prior review of some sixty PFR's, on its attendance at the FRC's meeting on April 28, on the TAA Chairman's attendance at the FRC meeting of March 7, on discussions with our consultant, Mr. C. Q. Miller, who has attended all FRC meetings, and on the discussions with the FRC reported above, the TAA Panel reached the following finding and observations on the Design Reverification Program implementation, so far as it has progressed to date. (See also Section VI below which reviews the Supply System's responses to previous TAA findings.)

Finding No. 14*

TAA is concerned with the numerous evidences that Burns and Roe's design closure implementation is late and inadequate. In addition to the nozzle load problem (Finding No. 13), there are several Potential Finding Reports involving out-of-date calculation and calculations which have not been reconciled with the latest design information. To emphasize the importance

*Findings No. 1-13 and Observations No. 1-5 are found in previous audit reports and in Attachment D hereto.

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Observation No. 7

We believe that the Design Verification Program is being conducted in a thorough, professional manner, and that the review teams and the FRC demonstrate that their activities are independent of external influence.

IV Review of Quality Verification Program

The status of the QVP was discussed with Robert L. Knawa, Manager QVP, and M. N. Leach, P.E., Bechtel Reverification Group.

In reply to TAA's question number 14, attachment B, we were informed that the QVP has not developed firm criteria for extending sample size, but intends to use their best judgment in each set of circumstances.

TAA acknowledged receipt the previous day of revised contract verification reports on O. B. Cannon (Contracts 219 and 234) and on Johnson Controls (Contract 220). These are to be reviewed by Dr. Sheets for 219 and 234, and by Mr. Roddis for 220.

In reply to TAA question number 18, Mr. Knawa provided copies of Burns and Roe letters of March 11 and March 2, 1983. TAA has not yet reviewed these letters.

TAA asked whether the QVP's ten percent sampling of work performed before work stoppage included such construction features as shims in foundation bolts or shims in heat exchanger support lugs, such as had been revealed in PFR's RHR-25 and 33. After hearing of the two apparent construction errors which are referred to earlier in this report (see page 7), Mr. Knawa stated that the QVP program,

as presently structured, does not sample foundation or mounting details of equipment, such as those in question. He also stated that the QVP program is aware of the start-up group's program of open-and-inspect rotating plant equipment, but recognizes that it does not include detailed inspection of foundation bolts, shims, etc.

As a result of the previous day's discussion with the FRC and the above reported discussion with Mr. Knawa, the TAA Panel reached the following findings:

Finding No. 15

The QVP program does not inspect certain important construction features such as the supporting and securing of power plant components. This "hole" in QVP's scope should be filled.

Finding No. 16

In view of the gap in the QVP inspection program identified in Finding No. 15, we believe there should be a fresh, systematic appraisal of the QVP scope to determine if there are other significant areas which are not covered by it.

V Discussion of Nozzle Load Report

The TAA Panel discussed Burns and Roe's Nozzle Load report (BRWP-RO-66, dated March 7, 1983) with J. A. Forrest, B & R Project Director, and B. A. Holmberg, WNP-2 Project Engineering Manager.

Mr. Forrest briefly reviewed the history of piping and pipe support design responsibilities in the WNP-2 project. While the original responsibilities were shared by several contractors, and were changed during the design process, Burns and Roe now has total responsibility for these areas. He pointed out that early reliance placed on piping contractors did not produce satisfactory results, which led to changes in contractors.

He stated that it is not practical to give specific criteria or guidelines for acceptable nozzle loads, since each case tends to be unique, requiring solutions which involve pipe runs, pipe supports, nozzle loads, etc. He stated that, under original contracts, the division of responsibility which assigned piping design to one contractor and piping support to another was not a viable arrangement.

Mr. Forrest and Mr. Holmberg stated that recent "management attention" to the nozzle load problem has reduced the

number of unresolved cases from a peak of eighty (80) cases to six (6) cases, at present.

As noted in Section VI, Finding No. 13, of this report, TAA believes the nozzle load problem is now receiving effective attention. However, as acknowledged by Mr. Forrest in these discussions, it has not been handled in a timely way. The TAA Panel is concerned that the nozzle load problem may also be an example of an inadequate or too-long-delayed design closeout process. We view it as having similar characteristics to some of the calculation examples mentioned earlier in this report, namely too-late or incomplete reconciliation of design documents with as-built configuration. Our Finding No. 14 in this report reflects this concern.

VI Review of Supply System Responses to Findings From Previous TAA Audits

Discussions were held with J. R. Honekamp, D. C. Timmins, and J. M. Yatabe concerning TAA's understanding and appraisal of Supply System's responses to TAA Findings No. 1 through 13, resulting from earlier audits. The responses are found in J. R. Honekamp letters dated March 8 and April 18, 1983, and their enclosures, which are attached marked D. Attachment D should be referred to while reading this section.

Finding No. 1 - No response is required since the Finding is positive.

Finding No. 2 - TAA considers the described S.S. plan to conduct cross-system interactive reviews to be a good plan and responsive to the Finding. If subsequent reports, when received, are similar in quality to the completed Fire Protection report, this will satisfy the Finding. TAA offered a number of specific detailed comments on the Fire Protection report.

Finding No. 3 - The preparation and issuance of the Requirement Reverification Report satisfies the Finding. TAA's detailed comments on this Report are the subject of Finding No. 11 (see below).

Finding No. 4 - The plan proposed by the S.S. to review the design of several Quality Class I, Seismic Category I instrument racks procured by Burns and Roe is satisfactory. TAA wishes to review the results when available.

Finding No. 5 - The S.S. plan to review the structural strength of the north wall of the steam tunnel is acceptable. However, TAA was advised during this audit that the north wall of the steam tunnel is not a satisfactory example because there has been insufficient added loads; the S.S. will select another example for reverification. TAA will review the results.

Finding No. 6 - The S.S. revisions to QVI-09 are satisfactory.

Finding No. 7 - The S.S. response, although inconclusive as to the cause of the apparent anomaly in weld rate rejection, is satisfactory.

Finding No. 8 - The S.S. response is unsatisfactory in two respects; first, it is not clear that the Burns and Roe design engineers that were members of the field inspection teams were fully qualified and licensed to make the dispositions which they made, and, second, TAA wishes to review Burns and Roe's evaluation of the dispositions made by "one of the BRI engineers formerly assigned...". The S.S. was requested to clarify these points.

Observation No. 1 - TAA notes without comment the S.S. response that design reverification includes verification of as-built configuration.

Finding No. 9 - The S.S. response, emphasizing the need to indicate whether a PFR is reportable, is satisfactory.

Finding No. 10 - The S.S. plan to reverify stress calculations in the design of several significant items in the RFW system is satisfactory. TAA will review the results.

Finding No. 11 - The S.S. plan for resolving TAA's comments on the Requirements Reverification Report is satisfactory. TAA will review the revised document.

Finding No. 12 - The S.S. response, indicating their strengthening of the RFW review team, is satisfactory.

Finding No. 13 - The S.S. response is satisfactory so far as the nozzle load problem itself is concerned. TAA is not yet satisfied that, when viewed as a problem in design closeout, its broader implications are fully recognized. (See Finding No. 14 in this report.)

Attachment A

AGENDA FOR TAA AUDIT

April 27, Wednesday

8:00 - 11:30	Executive Session Hanford House	

Afternoon - Mason Room

1:00 - 3:00	Review Supply System Responses to Findings from previous TAA Audits	Honekamp Yatabe Timmins
3:00 - 4:00	Nozzle Load Report	Forrest
4:00 - 4:30	Electrical Separation Status Report (Question No. 1)	Timmins
4:30 - 5:00	Overview of Engineering Turnover Process.	Yatabe

April 28, Thursday

Mason Conference Room (MPF - first floor near rear entrance)

8:00 - 11:30	Observe Findings Review Committee Meeting.	FRC
12:30 - 4:00	TAA Followup discussion with Findings Review Committee focusing on the attached questions.	FRC

April 29, Friday

WNP-2 Sites (Trailer No. 30)

8:00 - 10:00	Discuss QVP program with representatives of Supply System and Bechtel. Discussion will be focused on TAA questions supplied in advance. (To be sent directly to R. Knawa by TAA.)	Knawa
10:00 - 11:30	Tour WNP-2	Honekamp
12:00 - 1:30	Lunch and Executive Session, Supply System Headquarters	
1:30 - 3:00	Exit interview with Supply System management.	Mazur Ferguson Glasscock Yatabe Bibb Carlisle Bouchey Shen

Attachment B

TAA QUESTIONS FOR WNP-2 AUDIT #3

Set #1

April 9, 1983

Questions on Design Reverification, FRC, and PFR's

1. The Monthly Progress Report for January 1983 states that "The upgrade of the electrical separation analysis for the FSAR was completed...". Explain how the Design Reverification Program will assure that such late agreements or resolution of issues will be incorporated in the design. (S.L.)

2. Several PFR's (HPCS-4 and RHR-16) call attention to the use of outdated inputs to calculations. N.S. Porter memos of March 7 and 9 to S. A. Holmberg request a review. Please advise the TAA Panel of the results of this review. (R.V.L When the S.S. accepts a System Technical Turnover package, where does the responsibility lie to assure that calculations have been updated and are complete? (H.E.S.)

3. N. S. Porter memo of March 7 to B. A. Holmberg requests answers to several questions concerning BRI's methods of calculating electrical loads, related to PRF's RHR-11 and RHR-12. Please inform the TAA Panel of the response. (R.V.L.)

4. The above referenced memo also poses questions concerning difference found between GE design specs and BRI design, as in RHR-13 and HPCS-16. Please inform the Panel of the answers received. (R.V.L.)

5. Meeting Minutes of February 28 FRC meeting discusses the subject of "trending", or possible generic design faults. FRC IOM of March 9, N. S. Porter to B. A. Holmberg concerning updating calculations, asks the Project to review the BRI program for completing reconciliation of calculations with later information.

   Please advise the TAA Panel:

   - What other potential generic design problems have been identified?
   - What has been done about them?
   - What response has been received to the March 9 IOM?
   - How has the FRC treated the several PRF's which reveal apparent differences between the FSAR and the actual design or installation? (HPCS-3, 6, 8, and RHR-4) (L.H.R.)
   - What is the FRC's policy with respect to suspected generic problems?

6. HPCS-16 - Both the GE Design Specification and the B&R Engineering Criteria Document specify the shut-off valve shall have double gaskets and provisions for inter-gasket leak checking. The valve was bought not meeting the above specifications. The probable (?) cause for this change states "Incorrect incorporation of design requirements in subsequent design documents". There is no substantiation given for this statement. Later it is stated that the failure to provide leak testing capability necessitated change in Type B to Type A testing which is apparently (?) acceptable to the NRC.

   Has a statement been requested from GE-B&R that the original specification can be changed? What other action has been taken? (H.E.S.)

7. RHR-13 - Please inform TAA Panel of the FRC's evaluation of BRI's response to RHR-13 contained in J. A. Forrest letter of March 23. (H.E.S.)

8. Please inform the TAA Panel of the FRC's evaluation of RHR-14, its subsequent action, and any response received. (H.E.S.)

9. Concerning RHR-16:

   - What is the basis for the conclusion that the design is adequate?

   - Will cable permit the higher load with the greater voltage drop? (H.E.S.)

10. FRC Meeting Minutes of February 28 identifies several PFR's which reflect apparent failures to follow GE specs. Does the FRC view this as a possible trend or generic problem? Please advise the TAA Panel of FRC's evaluation. (H.E.S.) When a designer departs from GE specifications, is this departure always referred to GE for approval? (H.E.S.)

11. Please inform the TAA Panel of the responses received to IOM Honekamp to Holmberg of March 23 related to:

    a) HPCS-9 and HPCS-10 - ASME classification of diesel piping and heat exchanger.
    b) HPCS-19 - Drain collection tank.
    c) RHR-17 - Routing of instrument lines.
    d) RHR-18 - Apparent discrepancy in meter installati (H.E.S.)

12. Refer to HPCS-5 and HPCS-17. With the correctly calculated exhaust back pressure, can the diesel develop full power? H.E.S.)

13. Is the S.S. conversant with industry's experience on BWR piping stress corrosion, and with EPRI sponsored research aimed at understanding and mitigating this phenomenan? (H.E.S.)

April 19, 1983

TAA QUESTIONS FOR WNP-2 ON-SITE AUDIT,

APRIL 27, 28, 29

Set No. 2

14. During our January 26-28, 1983 audit, the S.S. and TAA discussed the subject of sample size enlargement as applied to the 215 contractor. We were told that the S.S. was then preparing guidelines or criteria for this purpose. Please advise status.

15. What is the status of the 215 verification report? When will it be completed and available for TAA's review?

16. Have the O. B. Cannon reverification reports (219 and 234) been revised as agreed during the January audit? (See p. 17, TAA Report dated February 15, 1983.)

17. Quality Assurance Audit 83-242 reports that the 220 contract reverification report did not include a number of Bechtel reverification QC surveillance reports. What action has been taken on this audit report?

18. The S.S. response to TAA Finding No. 8, attached to J. R. Honekamp letter to Laney dated March 8, advises that a report from BRI was due in March on the dispositions prepared by a particular engineer. What results were found?

19. The S.S. responses (same letter as in 18 above) to two previous TAA Findings promised certain additional work. For the following TAA Findings, please report the status of the additional work promised:

    Finding No. 4 - review of instrument racks procured by BRI

    Finding No. 5 - review of the north wall of the steam tunnel

TECHNICAL AUDIT ASSOCIATES, INC.
589 OENOKE RIDGE
NEW CANAAN, CT 06840

ROBERT V. LANEY
VICE PRESIDENT
24 TROUT FARM LANE
DUXBURY, MA. 02332
(617) 585-8912

(203) 966-0383

April 15, 1983

Mr. John R. Honekamp
WPPSS
P. O. Box 968
Richland, WA 99352

Dear John:

Please note the attached comments which I have received from Herman Sheets. Based on these examples, please be prepared to discuss with the Panel during our visit April 27, 28, 29, the following question:

> Are the FRC and the Project being sufficiently searching in their reviews of PFR's and sufficiently demanding of Burns and Roe in evaluating their (B&R) proposed remedies?

We know this question is not subject to a yes or no answer. However, it goes to the heart of the sampling process which you are using, and we need to understand how you and the others involved are dealing with it.

Sincerely,

Robert V. Laney /pb

Robert V. Laney

RVL:pb
enc
cc: Mr. Frank B. Jewett, Jr.
Dr. Salomon Levy
Mr. Charles Q. Miller
Dr. Herman E. Sheets
Mr. Louis H. Roddis, Jr.

COMMENTS ON DOCUMENTS SUBMITTED AS ENCLOSURE TO LETTER DATED 3/23/83 FROM D. C. TIMMINS, WPPSS TO FRANK B. JEWETT, TAA

I. The following PFRs are submitted:

a) HPCS-12 - Design Requirement on Piping Materials is not in Agreement with FSAR. Accepted as is - ultimate and yield strength are slightly different for both materials. No check is made regarding fatigue and corrosion characteristics.

b) HPCS-13 - Non-Agreement between Different Sections of the Engineering Criteria Document on Corrosion Allowance. Accepted as is - difference in corrosion allowance is 0.080" in ECD document and 0.010" in discharge piping. It is stated there is no impact because actual design appears to be based on 0.080" allowance(?).

c) HPCS-14 - Piping Design Requirement is not in Agreement with FSAR on ASME Design Basis Code Date - Accepted as is - revise paragraph.

d) HPCS-18 - The HPCS Diesel Fueld Oil System Does Not Meet the Requirement of NFPA Standard No. 37, 5-4.2. (NFPA=National Fire Protection Association). This is also a violation of ANSI N195 and a possible fire hazard. There is no statement that corrections will be made.

e) HPCS-20 - Design Documents Allow the Use of 1% Damping Value While FSAR Specifies 0.5% - Accepted as is - Revision of FSAR table is recommended.

f) RHR-15 - On E528-26 There is No Entry for RHR-V-4B. On E528-37 There is No Entry for RHR-V-47B. Accepted as is - Drawing correction recommended.

g) RHR-19 - RHR-MO-24B and 64B Have Been Ordered Specifying the Wrong Environmental Class. Accepted as is - Recommendation to leave classification as is.

April 23, 1983

TAA QUESTION FOR WNP-2 ON-SITE AUDIT,

April 27, 28, 29

Set No. 2A

PFR-RHR-20 (23.24.62) and PFR-RHR-21 (23.24.63) both involve cavitation calculations absent from AE design documents. The FRC considers RHR-20 closed, except for correction of orifice labeling error [Honekamp to Holmberg, 4/7/83 (26.24.86)]. The FRC requires no response to RHR-21 since the need to correct the specific problem has been subsequently confirmed by Test & Startup [Honekamp to Holmberg, 4/8/83 (26.24.88)].

The latter states, "It was noted during our evaluation that cavitation checks are included in other BRI calculations we have reviewed. The FRC classified this PFR (RHR-21) as an observation on the basis that a calculationed (sic) check for cavitation in each orifice is not necessary given that testing will check the actual performance." (emphasis added)

It also suggests "you may wish to consider checking the calculations for other orifices where cavitation appears likely".

For purposes of evaluating the significance of cavitation calculation omissions in the sample systems and gaining assurance in the PVP treatment of this matter TAA asks the following questions:

20A How many "other BRI orifice calculations" were reviewed? What is the total number of orifices in the HPCS, RHR and RFW Systems where cavitation may occur?

20B Have any reviews shown borderline cavitation conditions (ie within or close to the ± 5% error band for the delta P calculation, PFR-RHR-20, Sheet 12, 3/2/83)? If so, please give details and numbers. [Note: these would include the "other orifices where cavitation appears likely".]

20C Do the Test procedures prescribe testing at (or above) the maximum fluid temperature (eg 170°F for RHR-RO-1B as indicated in PRF-RHR-20, Sheet 4)? [It is noted that the test for RHR-RO-4 "was run with cold water" (PFR-RHR-21, Page 2.]

April 23, 1983

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April 27, 28, 29

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20C Do the Test procedures prescribe testing at (or above) the maximum fluid temperature (eg 170°F for RHR-RO-1B as indicated in PRF-RHR-20, Sheet 4)? [It is noted that the test for RHR-RO-4 "was run with cold water" (PFR-RHR-21, Page 2.]

h) RHR-22 - Cable 2M8BA-20 Not Sized for 125% of Motor Rated Full Load Amps in 150°F Ambient. There could be other cables undersized due to the same method of calculation. Recommendation that B&R redo cable sizing calculations. This specific cable may be accepted.

i) RFW-4 - Improve Selection of Flow Element Type for RFW-FE-15 - No clear recommendation. It is stated "Consider the immediate purchase of a flow nozzle with a lower differential range.

Note: The majority of the problems are B&R mistakes. There is a proclivity to accept everything as is. The reviews from a technical point of view was limited and no consideration is given regarding the effects on other systems and components. Also the overall reliability of the plant is not considered. Many justifications are marginal regarding their technical substantiation.

H. E. Sheets

H. E. Sheets

4-28-83
J. YATABE

Attachment C

SDTP STATUS REPORT
Effective April 22, 1983

		Current Week	Previous Week
TOTAL SDTPs REQUIRED	-	85	86
TOTAL SDTPs ON HOLD	-	16	15
TOTAL SDTPs CURRENTLY RELEASED FOR PREPARATION	-	69	---
TOTAL SDTPs PREPARED	-	27	26
TOTAL SDTPs CURRENTLY AT SUPPLY SYSTEM FOR REVIEW	-	13	16
TOTAL SDTPs REVIEWED BY SUPPLY SYSTEM	-	14	10
TOTAL SDTPs IN REWORK	-	3	2
TOTAL SDTPs AT SITE FOR REVIEW	-	1	---
TOTAL SDTPs REVIEWED BY SITE	-	8	8
TOTAL SDTPs COMPLETED	-	8	8

TECHNICAL TRANSITION

PROCEDURE STATUS

- o SUPPLY SYSTEM
  - REMAINING ESSENTIAL TDP's ISSUED THIS WEEK
  - FINAL TRAINING SCHEDULED COMPLETE BY 1st OF MAY
  - PLANT INTERFACES ESTABLISHED
  - PLANT MODIFICATION PROCEDURE (PPM) ISSUED
- o BURNS AND ROE
  - INTERFACES ESTABLISHED
  - ESSENTIAL PROCEDURES ISSUED OR IN FINAL STAGES - COMPLETE BY 1st OF MAY
  - TRAINING IN PROCESS - COMPLETE BY 1st OF MAY
  - DOCUMENT CONTROL SYSTEM IN PLACE
- o GENERAL ELECTRIC
  - INTERFACES ESTABLISHED
  - ESSENTIAL PROCEDURES IN PLACE (use existing GE FDDR's, FDI's, etc.)
  - DOCUMENT TRANSFER PROCESS AGREED TO

REVISION 6

SYS	DESCRIPTION	SYS ENGR/OPS ENGR/TEST ENGR	DRAFT SDTP	DWGS/COMM	SS DES CON	PREOP APPROVED	RO STATUS
	LOW PRESS. CORE SPRAY	MARKOWSKI/WEBRING/CHALLBERG	1/27/83	3/11/83			
	STANDBY LIQ. CONTROL	MARKOWSKI/WUESTEFELD/BENELO	4/4/83	-	--	---	----
	NUCLEAR SYSTEM SERV. EQMT	KELSO/REIS/MCCUTCHEON	3/24/83	-	--	---	----
.2	EFFLUENT RELEASE MON	OWEN/BESEL/HODGES	-	--	--	---	
.2	CRD INSTALL. EQMT	KELSO/REIS /MCCUTCHEON	--	---	----	-----	
	FUEL POOL COOLING	KENELEY/RIPPEE/MONTGOMERY	3/24/83	-	--	---	----
	OFFGAS	ROBERTS/COLEMAN/FELLMAN	4/11/83	-	--	---	----
	SUPERVISORY CONTROL	JOSHI/DOCKTER	3/8/83	--	---	----	I 11/18/82
	STANDBY AC POWER	THOMM/KIDDER/MIZELL	3/21/83	-	--	---	----
	ANNUNCIATOR	CURREN/HOFFMAN/KRUGER	1/27/83	-	--	---	I 1/28/83
	BUS DUCT COOLING	KENELEY/KIDDER/CUSTODIO	-	--	---	----	A 2/23/83
	TOWER MAKEUP	HEID/RIPPEE/THIEDERMAN	3/8/83	-	--	---	----
	CIRC WTR	HEID/RIPPEE/MARTINEZ	1/6/83	1/15/83	2/4/83	3/8/83	-
	MAKEUP WTR TREATMENT	ROBERTS/COLEMAN	11/15/82	12/10/82	12/15/82	8/10/82	A 12/16/82
	DEMINERALIZED WATER	NGO/COLEMAN/DANA	3/8/83	-	--	---	----
	POTABLE WTR	NGO/BESEL/CATLOW	1/18/83	3/11/83	*4/11/83	--	
	AUXILIARY STEAM	KENELEY/KIDDER/WILKINSON	4/4/83	-	--	---	----
	TURBINE LUB OIL PUR & TRANS	KENELEY/KIDDER/CAPELLEN	1/27/83	3/11/83	*4/11/83	--	A 2/9/83
	SANITARY	ROBERTS/BESEL/CATLOW	1/6/83	1/15/83	2/4/83.	NO PT	A 2/23/83
	TURBINE BLDG H&V	NGO/KIDDER/CAVANAUGH	4/11/83	-	--	---	----
	CONTROL,CABLE SWITCHGEAR H&V	NGO/FREEMAN/BEERS	3/8/83	-	--	---	----
	SW PUMPHOUSE H&V	NGO/MAUWS/MEEHAN	3/8/83	-	--	---	----
	SERVICE BLDG H&V	NGO/MEADE/BEERS	4/11/83	-	--	---	----
	CIRC WTR PUMPHOUSE H&V	NGO/LAUBY/CUSTODIO	1/6/83	1/15/83	2/4/83	NO PT	A 3/7/83
	MAKEUP WTR PUMPHOUSE H&V	NGO/ /MEEHAN	2/3/83	3/11/83	*4/11/83	--	---
	COOLING TOWER H&V	NGO/LAUBY/CANTRELL	1/6/83	1/15/83	2/4/83	NO PT	-
2	POWER PLANT INFO COMM	JOSHI/MANFORD/JENKINS	N/A	--	---	----	A 12/16/82
5	CATHODIC PROTECTION	THOMM/FREEMAN/HENDERSON	2/23/83	-	--	---	----
2	TURBINE BLDG	STOCKDALE/KIDDER/POWERS	4/11/83	-	--	---	----

TES

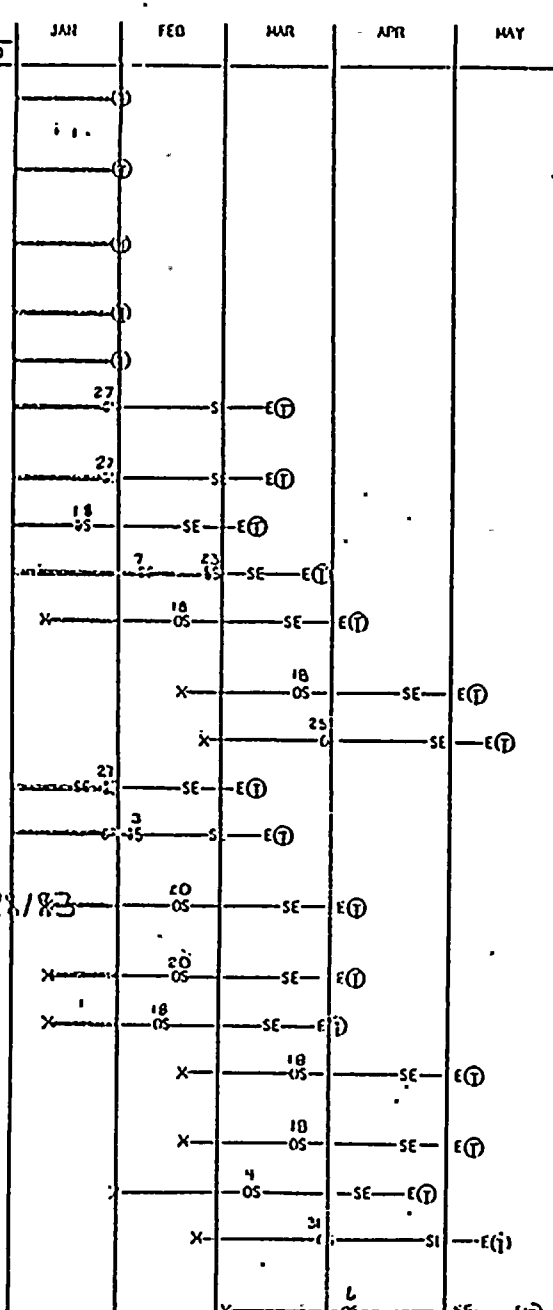
I REFERS TO INITIATION OF RELEASE FOR OPERATION
A REFERS TO ACTUAL RELEASE FOR OPERATION DATE
"PREOP APPROVED" REFERS TO TUG APPROVAL OF PREOP RESULTS
"SS DES CON" REFERS TO SUPPLY SYSTEM DESIGN CONTROL
"DWGS/COMM" REFERS TO DATE DWG LIST AND SDTP COMMENTS TRANSMITTED
SYSTEMS NOT LISTED HAVE NOT HAD THESE ITEMS COMPLETED YET
'*' ON DATES INDICATES CHANGES SINCE LAST REVISION OF THIS LOG

TAB FOR INPUT 7 37 69 81 93 105 122

SYSTEM DESIGN TURNOVER - SCHEDULE FOR SDTP PREPARATION, REVIEW AND TURNOVER

Rev. 2
2/26/83

NO.	SYS	AND	DESCRIPTION	WRO	ESTIMATE HR TOTAL	E	H	I	C	H&V	D&D
1	59	WT	MAKE-UP WATER TREATMENT	7	421						
2	94		C.W. PUMP HOUSE - H&V	7	422						
3	96		COOL. TOWER ELEC.- H&V	7	421						
4	56	CW	CIRCULATING WATER	7	422						
5	77	PSD	SANITARY	4	237	4	60	0	16	157	0
6	*8	LPCS	LOW PRESSURE CORE SPRAY	4	487	60	297	90	40	0	0
7	75	TO	TURBINE OIL	4	290	40	186	60	4	0	0
8	61	PW	PORTABLE WATER	4	242	68	48	0	40	194	0
9	105	CP	CATHODIC PROTECTION	4	422	326	20	60	16	0	0
10	84	CR-H&V	CONTROL ROOM ELEC.- H&V	4	448	40	0	140	50	190	28
11	*38	FPC	FUEL POOL COOLING	4	552	62	352	8	32	0	98
12	89	S-H&V	SERVICE BLDG.- H&V	4	577	40	0	140	80	269	28
13	49	ANN	ANNUNCIATOR SYSTEM	10	242	30	0	180	32	0	0
14	95	HP-H&V	MAKE-UP WATER PUMP HOUSE - H&V	10	287	30	0	65	32	160	0
15	102	PPICS	POWER PLANT INFO. COMM. SYS.	10	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	0
16	45	SC	SUPERVISORY CONTROL	10	136	120	0	0	16	0	0
17	87	SP-H&V	SW PUMPHOUSE - H&V	10	302	30	0	80	32	160	0
18	*10	SLC	STANDBY LIQUID CONTROL	10	340	30	208	70	32	0	0
19	68	AS	AUXILIARY STEAM	10	522	30	200	96	60	120	16
20	*47	SBAC	STANDBY AC POWER	10	506	200	100	110	80	0	16
21	*7	HPCS	HIGH PRESSURE CORE SPRAY	11	440	100	180	100	30	0	30
22	*107	HT-REAC	CRANES & HOISTS - REACTOR BLDG.	11	380	20	100	0	40	0	40



KEY

* - CLASS 1 SYSTEM
X - START SDTP PREPARATION
O - COMPLETE SDTP PREPARATION
S - SUPPLY SYSTEM REVIEW
E - SITE ENGINEERING REVIEW
T - TURNOVER

TECHNICAL TRANSITION

AREAS TO WATCH

- o NEW PROCEDURES/PROCESS - DEBUGGING TO BE EXPECTED
- o LARGE VOLUME OF SDTP's TO PROCESS - NEED TO MAINTAIN EMPHASIS - TRACKING
- o OPEN ITEMS AT TURNOVER
  - EXAMPLE - LPCS - FINAL STRESS REPORT
  - NEED TO CLEARLY IDENTIFY - DOCUMENT
  - GE REVIEW OF CHANGES TO GE SYSTEMS

WNP-2 PRIORITIES

1. EQUIPMENT QUALIFICATION
2. CONSTRUCTION PROBLEM RESOLUTION
   a. Code
   b. Design
   c. SPR's
   d. Licensing
   e. Deferred Changes
   f. TWG
3. REVERIFICATION
4. PAT/SURVEILLANCE PROCEDURES
5. SET POINT EVALUATION
6. POC ACTIONS
7. OER's
8. PROCEDURES
9. SYSTEM DESIGN TURNOVER
10. TECHNICAL SPECIFICATION REVIEW
11. DESIGN ON TURNED OVER SYSTEMS
12. SECURITY SYSTEM
13. TSC

Attachment D

RESPONSE TO TAA AUDIT REPORT
DATED JANUARY 10, 1983

TAA Finding No. 1

Based on a review of documents in the Supply System's files, we believe that the Supply System personnel engaged in design reverification activities and members of the Findings Review Committee meet the criteria for assessing independence set forth in the Supply System memorandum of June 30, 1982.

Supply System Response

No response required.

TAA Finding No. 2

All three design reverification plans should give greater consideration to system-to-system interactions. We recommend that a spot check be made of the adequacy of those portions of important interfacing systems which are vital to the functioning of the three systems being reverified.

Supply System Response

The design reverification plans as currently written include the principle functional interfaces (e.g., water supply, containment isolation, pipe and equipment mounting, electrical power supply and instrumentation and control). Cross-system interactive design dependencies were not included in the original plans to their ultimate design impact. However, a few cross-system interactive design dependencies (e.g., HPCS diesel heat loads, jet impingement loads and RHR pump room flooding) were included to check if the correct design input had been fed into the dependent system design. In response to the TAA concerns expressed during the November, 1982 audit, the Supply System has augmented the basic plans to include several cross-system interactive reviews covering equipment qualification, fire protection and pipe break/jet impingement/flooding/missile protection. Draft copies of these supplemental review plans were transmitted to TAA in advance of the January, 1983 audit. We believe that the design review plans as supplemented by the interactive reviews address the TAA concerns and provide a substantive check of both the primary functional interfaces and key cross-system interactions.

TAA Finding No. 3

The Supply System should incorporate in the reverification process for each of the three systems a way of showing clearly how FSAR design commitments are reflected into engineering requirements documents and into final detail design.

Supply System Response

As discussed during the January, 1983 TAA Audit, the process by which the reverification reviews check if FSAR commitments are incorporated into the implementing design documents and the final design consists of several steps. First, FSAR commitments are compared with the design implementing documents. The results of this comparison are contained in the Requirements Reverification Report which was transmitted for your review on January 17, 1983. Implementation of the design requirements into the final design is checked in the Design Reverification Reviews. These reviews utilize a series of system level, component level and field inspection checks to probe details

of the design for a sample of key components and system design features. The checks cover a range of design process elements from specification of design inputs to feedback of as-built data from the field. Some of these checks have a direct relationship to specific FSAR commitments while others, due to the depth of the review, are several levels of detail removed from the basic FSAR commitment. However, the record of the reviews will indicate what was checked, how it was checked and the source of the information used in addition to the results of the check.

TAA Finding No. 4

The Supply System should select and validate the design of a small number of A-E specified, plant specific, prepurchased components from the three systems, checking on vendor design and A-E review of vendor design.

Supply System Response

The design verification plans as currently written include a number of components procured (prepurchased) by the A-E (Burns & Roe). These components are listed in Enclosure 1. As indicated, some of these component procurements by the A-E were based on process specifications provided by the NSSS vendor (General Electric) while others were specified and purchased by Burns & Roe. While it is true that these components are "standard" items (pumps, valves, motor controllers, etc.), they are representative of the major components and design interfaces involved in the systems under review. The main plant specific A-E specified components in these systems are the piping and supports. In this area, our sample includes pipe and supports designed by the A-E, by an A-E subcontractor (Gilbert Commonwealth) and by a construction contractor (Johnson Controls). In response to your request for A-E specified, plant specific prepurchased components, we will include in our review several Quality Class I, Seismic Category I instrument racks procured by Burns & Roe. These instrument racks will, of necessity, be selected from systems other than HPCS, RHR or RFW. The HPCS and RHR instrument racks were provided by GE, and the RFW instrument racks are not Quality Class I, Seismic Category I. The review of these instrument racks will address the following general areas:

- Was the design, as specified, adequate for its intended operation?
- Did the vendor provide what was specified (i.e., check vendor qualification tests)?
- Were the instrument racks installed as designed and delivered, or if changes were made, were they reconciled with the vendor design/ qualification tests?

TAA Finding No. 5

In view of the significant number of additional loads which have been added to floors and bulkheads since they were originally designed, especially the additional loads represented by piping supports and restraints, we believe that the Supply System should make a spot check of a selected heavily loaded area to determine if the original structural design is still adequate. The bulkhead which supports the Main Steam Isolation Valve may be an appropriate example for this purpose.

Supply System Response

Initially, local pipe hanger and restraint loadings outside containment were considered in structural wall and floor designs by using specified load levels for equipment types for floor loadings. This loading level varies by area within the plant. Burns & Roe established criteria for controlling spatial separation of hanger and support loads that may be applied to embedded plates or by means of expansion bolts which were given to contractors for their detailed designs. Burns & Roe reviews the contractor design and resulting local loadings from the different contractors to assure that structures to which supports are attached are not overloaded. In addition, since January 1982, Burns & Roe checks the local loading caused by pipe support designs prior to issuance for construction.

In the room turnover process, Burns & Roe performs a walkdown to identify areas of highly loaded or congested areas. The local hanger and restraint loads are assembled and an overall slab loading check is made. The results of the walkdown and slab loading check are documented in calculations.

Because of reviews resulting from the retrofit of hydrodynamic loads into the equipment and structures attached to and inside of the containment, additional controls were instituted to assure acceptable load levels were maintained for these areas. Particular emphasis was placed on the radial beams and the primary containment structure. Burns & Roe reviews all attachments to these structures and verifies the overall structures' capacity to accept the required loads.

As a check of the Burns & Roe program, the design reverification reviews will review the north wall of the steam tunnel which supports seismic restraints, pipe whip restraints, dead load of mainsteam line and other piping. The wall was chosen on the basis of being a very heavily loaded wall. The review will include:

- Review Burns & Roe walkdown results as documented in calculations.
- Perform walkdown to identify supports and equipment attached to north steam tunnel wall.
- Review overall wall loading calculations to verify their completeness and adequacy. This includes evaluating applicable load combinations.

TAA Finding No. 6

We recommend that QVI-09 be revised to make clear that its purpose is to permit, with the A-E's case-by-case approval, certain specific deviations from the AWS D1.1 code when found upon reinspection in selected applications. If this were done, we would see no objection to its use as a basis for disposing of the specified deviations.

We recommend also that the Supply System clarify whether QVI-09 is intended to apply to the sacrificial shield wall and pipe whip restraints.

Supply System Response

Quality Verification Instruction No. 09 (QVI-09) has been revised to make clear that it is a generic disposition for limited deviations from AWS D1.1 in specific applications. Enclosure 2 provides the Burns & Roe input to the revised section of QVI-09.

The inspection criteria contained in QVI-09 (Enclosure 3) and FSAR Amendment 27 (Enclosure 4) are both correct as written. Category B of the inspection criteria does include the sacrificial shield wall (SSW) and pipe whip restraints (PWRs). However, the reinspection of both of these areas was completed prior to the use of QVI-09. Hence, the statement in FSAR Amendment 27 that the SSW and the PWRs were reinspected to AWS D1.1 is correct.

TAA Finding No. 7

The apparent coincidence of discontinuing film quality review of WBG radiographic film, coupled with the subsequent decline in the percentage of welds actually rejected for weld quality should be investigated by the Supply System and the results documented.

Supply System Response

The Supply System has directed Bechtel to review all the data from both phases of the WBG radiograph reevaluation for trends or patterns that explain the apparent anomaly in the results. This includes an examination of the film density data taken during the first phase of the program. A draft report of the Bechtel review has just been issued. Upon evaluation of the Bechtel report, the Supply System will determine if further investigation is warranted.

TAA Finding No. 8

If it is true that the Burns & Roe team engineer has authority to accept or reject structural welds which do not meet the acceptable deviation criteria of QVI-09, we believe that this authority should be withdrawn and that such decisions should be referred to the responsible B&R structural design supervisor.

Supply System Response

The activity referred to in Finding No. 8 is the Team Inspection conducted under Quality Verification Instruction No. 08 (QVI-08). This activity utilizes Burns & Roe (BRI) design engineers as members of field inspection teams reexamining work completed prior to the July, 1980 stop work. The BRI engineers disposition minor deviations within their discipline authority on the Quality Control Inspection Report (QCIR) if they are acceptable as is. Deviations which are not acceptable as is or which require more extensive evaluation are dispositioned via the normal Nonconformance Report process. It is our position that the Team Inspection process conducted under QVI-08 meets the requirements of 10CFR50 Appendix B for identification and control of nonconforming conditions.

As indicated during your November, 1982 audit, the Quality Verification Program (QVP) management identified several problems in reviewing the records of dispositions prepared by one of the BRI engineers formerly assigned to the Team Inspections. Based on this review, QVP management has requested that BRI evaluate all the dispositions prepared by this engineer. The results of this evaluation are expected to be available in March.

The basic reinspections conducted under QVI-08, except for the reevaluations mentioned above, have been completed. However, the procedure is being revised to strengthen the Team Inspection process in the event that additional reinspections are required as part of the Quality Verification Program.

TAA Observation No. 1

The Supply System should consider incorporating into the Design Reverification Program a separate check of the effectiveness of the As-Built Drawing Program, both as to its timeliness for producing as-builts and as to their accuracy in reflecting the actual plant hardware as installed.

Supply System Response

TAA did not request a response to the observations presented in the audit report. However, Observation No. 1, which relates to as-built drawings, is so closely tied to the Design Reverification Reviews that a response is warranted. It is correct that problems have been encountered in producing final as-built data for use by Burns & Roe in their final stress reconciliation. As discussed during the January, 1983 audit, delays in completion of some pipe supports and problems in producing satisfactory as-built data has resulted in a schedule slippage in our design reverification activities in the piping and support area. However, it is not correct that the Design Reverification Reviews do not include a check of the effectiveness of the as-built program. The piping and support segment of the Design Reverification Reviews have always included an independent verification of the accuracy of the as-built configuration used by Burns & Roe for their final stress reconciliation. As a result of delays in this area, we may need to modify the sequence in which we planned to conduct our reviews. However, checks of the as-built configuration will be performed.

In addition to the as-built configuration checks in the pipe and support area, a number of other field inspection checks are included in the Design Reverification Reviews. Some examples include: confirmation that name plate data on selected mechanical, electrical and I&C components match the specified requirements; a check that manufacturer and model number of selected Class IE components match the equipment qualification records and checks that selected components are installed per functional and general arrangement drawings.

The primary focus of the Design Reverification Reviews in this area is on the accuracy of as-built records. While some information on timeliness of as-built data may fall out of the design reverification checks, an overall assessment of the schedular aspects of the as-built program is more properly addressed by the WNP-2 program management. For your information, the as-built program as required to meet IEB 79-14 is receiving substantial management attention and resources and is an integral part of construction completion.

ENCLOSURE 1

A-E PREPURCHASED COMPONENTS INCLUDED IN DESIGN REVERIFICATION PLANS

Component Description		Process Requirements Specified By	Component Purchased By	Component Manufactured By
HPCS				
Valve	HPCS-V5	GE*	BRI	Velan
Valve	HPCS-RV-35	GE	BRI	J.E. Louergon Co.
Restricting Orifice	HPCS-RO-4	BRI*	BRI	Permutit
Pump Suction Strainer	HPCS-ST-2	GE	BRI	Zurn
Water Leg Pump Motor	HPCS-M-3	BRI	BRI	GE
Motor Controller for Water Leg Pump	HPCS-42-4A7C	BRI	BRI	Gould
RHR				
Valve	RHR-V-3B	GE	BRI	Velan
Valve	RHR-V-24B	GE	BRI	Anchor Darling
Flow Control Valve	RHR-FCV-64B	GE	BRI	Fisher
Valve Motor Operators	(Various)	GE	BRI	Limitorque
Motor Controllers	(Various)	BRI	BRI	ITE
Circuit Breaker	RHR-P-2B	BRI	BRI	Westinghouse
RFW				
Main Feed Pump	RFW-P-1A	GE	BRI	Ingersoll Rand
Feed Water	COND-HX-5A	Westinghouse	BRI	S.W. Eng.
Heaters	RFW-HX-6A	Westinghouse	BRI	S.W. Eng.
Flow Control Valve	RFW-FCV-15	BRI	BRI	Fisher
Valve	RFW-V-32	BRI	BRI	Anchor Darling
Valve	RFW-V-6J	BRI	BRI	Velan

*GE = General Electric; BRI = Burns & Roe, Inc.

ENCLOSURE 1

A-E PREPURCHASEC COMPONENTS INCLUDED IN DESIGN. REVERIFICATION PLANS

Component Description		Process Requirements Specified By	Component Purchased By	Component Manufactured By
Signal Converter	RFW-E/P-10	BRI	Circle AW	Fisher
Flow Element	RFW-FE-15	BRI	BRI	Vickery Simms
Flow Transmitter	RFW-FT-15	BRI	Circle AW	Rosemount
Signal Converter	RFW-E/P-15	BRI	BRI	Fisher
Motor Controller	RFW-42-7A3C	BRI	BRI	ITE

ENCLOSURE 2

Burns and Roe, Inc.

... Project No. 2 – Washington Public Power Supply System • P.O. Box 968 • Richland, Washington 99352 • 509-217-2501 • 509-943-8200

Subject: Work Order 3900/4000
Washington Public Power Supply System
WNP-2
Contract 215
RCSW - Quality Verification Instruction Manual
Justification for WNP-2 Visual Examination
Criteria (QVI-09)
Responds To: N/A

RECEIVED
JAN 19 1983
QVP OFFICE

January 19, 1983
BRWP-F-83-0434
Response Required By: N/A

Washington Public Power Supply System
P.O. Box 968
Richland, WA 99352

Attention: Mr. R.L. Knawa

Reference: BRWP-F-83-0088, dated January 7, 1983

Gentlemen:

Attached is Attachment 1, "Justification for WNP-2 Visual Examination Acceptance Criteria" for incorporation into QVI-09 of the RCSW - Quality Verification Instruction Manual.

The wording has been modified slightly for clarification since the "draft" which was transmitted earlier.

Should there be any questions regarding this matter, please contact this office.

Very truly yours,

R L Schlosser
for A.I. Cygelman,
Manager, Site Engineering

AIC/WNC/RLS/bab
Attachment
cc: WS Chin, BPA
HA Crisp, 901A
BA Holmberg, 906D
RT Johnson, 917B
TA Mangelsdorf, BPC

JUSTIFICATION FOR WNP-2 VISUAL EXAMINATION ACCEPTANCE CRITERIA

The use of the AWS D1.1 code for the WNP-2 Plant was specified by the Engineer as the applicable structural welding code on behalf of the Owner, and as such AWS D1.1-72 is identified in the FSAR. Unlike the ASME code, the use of the code is not a mandatory State or NRC regulatory requirement.. The Engineer has the authority under the AWS code to modify selected provisions of the AWS code to suit a particular application.

It is important to understand that the AWS D1.1 code is the applicable structural code for both completed work (first-line inspection) and ongoing construction. Site construction and inspection procedures require that welds be made to the applicable AWS criteria and that the first-line inspection be performed in accordance with the AWS D1.1 code. In cases where deviations are evaluated by the Engineer to be non-significant in terms of the ability of the component to perform its designed function, the Engineer has the authority to disposition the deviation "accept-as-is" as appropriate, or compensate for the deviation by additional evaluation or have construction performed to an approved, revised design.

During the initial QVP reinspections of completed work, a number of minor deviations with respect to some AWS criteria were encountered which were evaluated by the Engineer as acceptable in certain categories of application. Since the specific deviations had been evaluated by the Engineer to be acceptable for these categories of application, the processing of additional deviations of the same type in the same categories served no purpose.

Thus, a generic disposition was developed by the Engineer for acceptance of specified deviations from the AWS D1.1, 1972 code in selected applications. This generic disposition has taken the form of a revised inspection criteria for use by the QVP for reinspection of completed work. These criteria are embodied within the reverification inspection requirements in Attachment 2 of QVI-09.

A Holmberg - 906D
D Martin - 927M
G Matlock - 901A
M Nelson - 905A
L Powell - 905A
C Sorensen - 340
Taylor - 905A
addel - 570
M Yatabe - 410
ocket File Docket No. 50-397
t/file-906D
L2/LB
AH/LB-906D
TH/LB-906D
DB/LB-370
DM/LB-927M
f(2)

WG Conn - B&R RO
A Lageraaen - B&R NY
NS Reynolds - D&L
WNP-2 Files

ENCLOSURE 3

RECEIVED
JAN 21 1983
WNP-2 Program Director

January 17, 1983
G02-83-007

Director of Nuclear Reactor Regulation
Attention: Mr. A. Schwencer, Chief
Licensing Branch No. 2
Division of Licensing
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Subject: NUCLEAR PROJECT NO. 2
WNP-2 PROJECT VISUAL EXAMINATION ACCEPTANCE CRITERIA FOR REVERIFICATION INSPECTION OF WELDED STRUCTURES (QVI-09, REV. 0)

During a reinspection of structural steel and miscellaneous metal welds, certain exceptions were taken to AWS D1.1. These exceptions are described in the attached report, QVI-09, and referenced in the WNP-2 FSAR, Page 3.8-190.

Very truly yours,

G. D. Bouchey, Manager
Nuclear Safety and Regulatory Programs

sm

Attachment

cc: R Auluck NRC
WS Chin BPA
R Feil NRC

UTHOR: CD Taylor /DC Timmins			FOR SIGNATURE OF: GD Bouchey		
SECTION					
FOR APPROVAL OF	RM Nelson	BA Holmberg	LT Harrold	JD Martin	GC Sorensen
APPROVED	1/5/83				
DATE		1/10/83	1/12/82	1/13/83	1/14/83

WP-337

WNP-2 PROJECT

VISUAL EXAMINATION ACCEPTANCE CRITERIA

FOR

REVERIFICATION INSPECTION

OF

WELDED STRUCTURES

Approved _____ 5-12-82
Burns & Roe, Inc.
A. I. Cygelman

Attachment 2
(Page 1 of 9)

1.0 SCOPE

This document provides visual examination acceptance criteria for reverification inspection of structural steel and miscellaneous metal welding performed in accordance with AWS D1.1, the Structural Welding Code. These criteria reflect requirements consistent with the engineering approval specified in AWS D1.1 for evaluation of structural welding. This document also includes acceptance standards for light gauge HVAC ductwork, and other systems which are not specifically covered by AWS D1.1.

1.1 These criteria shall be used by Construction Quality Control for performing reverification inspection by including it on the QCIR as an applicable inspection reference criteria document to evaluate deviations to AWS D1.1.

2.0 CODES AND STANDARDS

The criteria in this document provide the basis for visual examination of AWS D1.1 welding. The required engineering approval, as specified in Paragraphs 3.7.4 and 3.7.5 of AWS D1.1 has been provided by the Architect Engineer. Authorization for this is given in Paragraph 1.1 of AWS D1.1.

3.0 BASIS FOR EVALUATION

The applicable weld categories will be entered on the QCIR as a part of the inspection reference criteria based upon the definitions described below.

3.1 Category A Welds

Must be in accordance with the visual acceptance criteria of the specified section of AWS D1.1. This category applies to elements of fans, cranes, rotating equipment, and other machinery subject to frequent stress reversals.

3.2 Category B Welds

Have an acceptance level modified to meet the required service conditions. This category applies to members of the building frame that carry principal design loads, radial beams, sacrificial shield wall, pipe whip restraints, pipe supports, and similar principal load bearing structures.

3.3 Category C Welds

Are connections between Category B Steel and Miscellaneous Metal.

3.4 Category D Welds

Are not part of the main building frame. but rather provide support or framing for electrical, instrumentation, and HVAC systems, components and equipment. Also included in the D Category are welds joining miscellaneous metal including, but not limited to, stairways, embedments, fan housings, doors, windows, hatches, frames, ledger angles, gratings and their supports.

3.5 Category E

Is an acceptance level established for relatively thin materials such as HVAC ductwork, cable trays, and unistrut supports.

4.0 ACCEPTANCE CRITERIA

Acceptance shall be based on the weld joint meeting each criteria listed for the applicable category. Skewed joints will be evaluated in accordance with Contract Specifications and Project Engineering Directives.

4.1 Category A Welds

4.1.1 Category A welds must comply with the visual examination requirements of the specified section of AWS D1.1.

4.2 Category B Welds

4.2.1 Oversize Fillet Welds

The weld shall meet or exceed the specified size requirements. Either or both fillet weld legs may exceed design size. Welds may be longer than specified. Continuous welds may be accepted in place of intermittent welds. Unequal leg fillet welds are acceptable, provided the smaller leg meets or exceeds minimum requirements.

4.2.2 Undersize Welds

4.2.2.1 The fillet leg dimension shall not under run the nominal fillet size by more than 1/16 inch. For flange to web joints the undersize condition may not be within two flange thicknesses of the weld end.

4.2.2.2 Groove welds may be underfilled by 5 percent or 1/32-inch, whichever is greater.

4.2.3 Porosity and Slag

4.2.3.1 The weld may contain a maximum of 5 percent by surface area of unaligned porosity and/or slag.

4.2.4 Profile

4.2.4.1 Convexity height, roll over, and butt weld reinforcement are acceptable.

4.2.5 Craters

4.2.5.1 The weld may have an underfilled crater, provided the underfill depth does not exceed 1/16 inch, and the crater has a smooth contour blending gradually with the adjacent weld and base metal without acute notches.

4.2.6 Undercut

4.2.6.1 Continuous undercut shall not be greater than: 1/32 inch for material 3/8 inch and less; 1/16 inch for material over 3/8 inch thick.

Intermittant undercut may be twice the value for continuous undercut for a maximum accumulated length of 10% of weld length. Localized undercut less than 3/8 inch in length may be accepted provided the depth does not exceed 3/32 inch for thickness 3/4 inch and less or 1/8 inch for thickness over 3/4 inches.

4.2.7 Cracks

4.2.7.1 Cracks are unacceptable.

4.2.8 Fusion

4.2.8.1 Incomplete fusion between weld metal and base metal is unacceptable.

4.2.9 Weld Spatter

4.2.9.1 Weld spatter shall be acceptable.

4.2.10 Arc Strikes

4.2.10.1 Arc strikes are acceptable provided there are no cracks.

4.2.11 Backing Fitup

4.2.11.1 The fitup of backing bars is not a basis for rejection.

4.3 Category C Welds

4.3.1 The welds on the main frame member side shall meet the requirements for Category B.

4.3.2 The welds on the miscellaneous metal side shall meet the requirements for Category D.

4.4 Category D Welds

4.4.1 Oversize Fillet Welds

4.4.1.1 The weld shall meet or exceed the specified size requirements. Either or both fillet weld legs may exceed design size. Welds may be longer than specified. Continuous welds may be accepted in place of intermittent welds. Unequal leg fillets are acceptable, provided the smaller leg meets or exceeds minimum requirements.

4.4.2 Undersize Welds

4.4.2.1 The fillet leg dimension shall not under run the nominal fillet size by more than 1/16 inch.

4.4.2.2 Groove welds may be undersize by 5 percent or 1/16 inch, whichever is greater.

4.4.3 Porosity and Slag

4.4.3.1 Porosity and slag are not a basis for rejection.

4.4.4 Profile

4.4.4.1 Convexity height, roll-over, and butt weld reinforcement are acceptable.

4.4.5 Fusion

4.4.5.1 Incomplete fusion between weld metal and base metal is unacceptable.

4.4.6 Undercut

4.4.6.1 Undercut not exceeding 3/32" for material up to 3/4" thick, and 1/8" for material over 3/4" thick, may be acceptable for the full length of the weld.

4.4.7 Craters

4.4.7.1 Underfilled groove weld craters shall be accepted provided the depth of underfill is 1/16 inch or less. Underfilled single-pass fillet weld craters shall be accepted provided the crater length is less than 5 percent of the weld length. On multi-pass fillet welds a crater depth of 1/16 inch or less is acceptable.

4.4.8 Cracks

4.4.8.1 All cracks are unacceptable.

4.4.9 Misalignment

4.4.9.1 Misalignment not in excess of the thinner member thickness is acceptable.

4.4.10 Arc Strikes

4.4.10.1 Arc strikes are acceptable provided there are no cracks.

4.4.11 Backing Fit-Up

4.4.11.1 The fit-up of backing bars is not a basis for rejection.

4.4.12 Weld Spatter

4.4.12.1 Weld spatter shall be acceptable.

4.5 Category E Welds

4.5.1 Oversize Fillet Welds

4.5.1.1 The weld meets or exceeds specified size requirements. Either or both fillet weld legs may exceed design size. Welds may be longer than specified. Continuous welds may be accepted in place of intermittent welds. Unequal leg fillets are acceptable, provided the smaller leg meets or exceeds minimum requirements.

4.5.2 Undersize Welds

4.5.2.1 The fillet leg dimension may not under run the nominal fillet size by more than 1/16 inch. Fillet weld size need not be greater than the thickness of the thinner member.

4.5.2.2 Groove welds may be undersize by 5 percent by 1/32 inch, whichever is greater.

4.5.3 Porosity or Slag Inclusions

4.5.3.1 Porosity or slag inclusions are not a criteria for rejection.

4.5.4 Profile

4.5.4.1 Convexity height, roll over, and weld reinforcement are acceptable.

4.5.5 Cracks

4.5.5.1 All cracks are unacceptable.

4.5.6 Fusion

4.5.6.1 Incomplete fusion between weld metal and base metal is unacceptable.

4.5.7 Undercut

4.5.7.1 (Same as 4.2.6.1)

4.5.8 Misalignment

4.5.8.1 Misalignment is not a basis for rejection.

4.5.9 Corner Welds

4.5.9.1 Corner welds used to seal ductwork are designated partial penetration welds. Such welds do not require full fusion. Weld reinforcement greater than the material thickness shall verify the adequacy of the weld, provided that the toes of the weld have complete fusion.

4.5.10 Burn-through

4.5.10.1 Fillet welds joining turning vanes to turning vane rails or to heavier gauge ductwork may exceed the profile and convexity limits as previously described and are acceptable for this application. Minor burn-through on vanes will be permitted up to 1/4 inch in length, provided equivalent lengths of fillet welds are added to compensate for welds weakened by burn-through 4.5.10.2. Burn-through is permitted provided there are no visible through-thickness holes. Metal flow on the inside of the duct is permitted, provided it is fused completely with the parent metal and metal thickness is not reduced by greater than 50 percent.

4.5.11 Arc Strikes

4.5.11.1 Arc strikes are acceptable provided there are no cracks.

4.5.12 Weld Spatter

4.5.12.1 Weld spatter shall be acceptable.

4.5.13 Backing Fit-Up

4.5.13.1 The fit-up of backing bars is not basis for rejection.

TABLE 3.8-9 (Continued) Page 3 of 8

REFERENCE NUMBER	DESIGNATION	TITLE	EDITION
18	AISC-69	Specification for the Design, Fabrication, and Erection of Structural Steel for Buildings	Feb. 12, 1969
19	AISC-68	Specification for the Design of Light Gauge Cold-Formed Steel Structural Members	1968
20	AWS D1.1-72	Structural Welding Code	1972**
21	AWS D12.1-61	Recommended Practice for Welding Reinforcing Steel, Metal Inserts, and Connection in Reinforced Concrete Construction	1961

** As part of the WNP-2 Quality Verification Program, visual reinspection of selected structural steel welds, including radial and structural framing systems, steam tunnel beams, and pipe hangers (AISC scope only), was performed under Supply System procedure QVI-09, Attachment 2.*** This procedure included alternative acceptance criteria to AWS D1.1.

These alternative acceptance criteria were established by the Architect/Engineer and determined to be acceptable based on specific knowledge of the design and the significance of these types of minor deficiencies. The criteria were implemented in order to provide a conservative and practical basis for performing a reinspection of the structural steel. Sacrificial shield wall and pipe whip restraint weld reinspections were performed to AWS D1.1.

*** Transmitted to NRC via letter GO2-83-007, G. D. Bouchey to A. Schwencer, "WNP-2 Project Visual Examination Acceptance Criteria for Reverification Inspection of Welded Structures", dated January 7, 1983.

RESPONSE TO TAA AUDIT REPORT
DATED FEBRUARY 15, 1983

TAA Finding No. 9

The Panel believes that the Supply System should take additional steps to inform reverification team members of the importance of deciding and indicating on the report whether a Potential Finding is or is not a reportable event.

Supply System Response

TAA noted that the reportability box (10CFR50.55(e)) had not been filled out by the reviewer for several Potential Finding Reports (PFRs) as required by the procedure. The reportability reviews have been performed and none of these PFRs are reportable. The incomplete lead sheets have been corrected. The importance of documenting the reportability evaluation has been re-emphasized in meetings and via a memorandum to all reviewers (Enclosure 1).

TAA Finding No. 10

TAA does not agree with the present plan for the RFW system in which no piping or support/restraints are being reverified. We believe that a sample should be included, using design level information, if necessary, to avoid the schedule delay which would result from awaiting as-built verification.

Supply System Response

In the Plant Verification Report and the early draft design reverification plans, the scope of the engineering mechanics reviews were intended to be distributed among the three systems (HPCS, RHR and RFW). However, when it became apparent that the final reconciled stress analysis for the RFW piping would be significantly delayed, the Supply System redistributed the engineering mechanics reviews originally planned for the RFW systems to the RHR and HPCS reviews. The redistribution, which is shown in Enclosure 2, is reflected in the issued design review plans (page 10 of TAA Audit Report). This change was justified on the basis that equivalent scope involving the same design organizations was being reviewed. While in our judgment the scope of the engineering mechanics review is adequate, we understand the TAA concern and, therefore, will review several significant items in the modified RFW design. Items to be reviewed will include revised loads on the RFW pump and RFW-HX-6A and 6B heater nozzles and revised loads on a selected support. The review will be based on the design package rather than the final reconciled stress analysis.

TAA Finding No. 11

The Requirements Reverification Report requires additional review and improvement to ensure that the relationship between commitments and requirements are more thoroughly analyzed and more clearly presented.

Supply System Response

The TAA Panel made several specific comments on the Requirements Reverification Report. The Supply System has taken these comments and will resolve them by the following process:

1. Resolution by individual team members;
2. Review by Discipline Supervisor for correctness in terms of area of specialization; and
3. An interdiscipline review by each team member.

Resolution will follow these guidelines:

1. Correction of specific errors such as the error of copying or transposition identified by TAA;
2. Resolution and clarification of areas where the backup information does not fully support the comparison statement; and
3. Clarification of wording where necessary.

We agree that not all commitments are covered in the Reverification Report. The purpose as stated to the NRC at the November 10, 1982 review was to sample FSAR commitments to ensure they are carried out in the implementing documents. The commitments presented in the report represent a substantial sample but not all commitments as pointed out by the Panel.

TAA Finding No. 12

The RFW design reverification team is behind schedule, and requires strengthening in order to complete on schedule.

Supply System Response

The Supply System had recognized the schedule problem and agrees with the TAA finding. The actions taken to resolve the issue are:

1. Review of detailed schedules to evaluate the areas behind schedule and the cause of delay (e.g., construction not complete, inadequate review resources, other priority).
2. Where schedule problems were caused by priority, specific tasks were reassigned to provide design reverification team personnel additional time to support reverification activities.
3. Where inadequate integration occurred, individual team meetings with program supervisor were held to resolve interdiscipline requirements.
4. Where resources were inadequate, the following action was taken:
   a. Qualified analysts from other Systems Engineering Departments were added to address the system analytical reviews.
   b. Added Supply System help from other projects.
   c. Added outside contract help (S&W) in the mechanical discipline area.
   d. Reviewed all work tasks assigned to the team lead and established firm priorities for reverification tasks.

TAA Finding No. 13

We believe that the pipe stress/nozzle problem should be investigated by the Supply System to determine the root causes of it, and whether the root causes have any implications for other Supply System work done by the architect-engineer.

Supply System Response

Both the Supply System and Burns & Roe (BRI) have investigated the cause of the late identification of a significant number of nozzle load reconciliation problems at WNP-2. The conclusions from the two evaluations are consistent and are supported by the engineering record. It is clear from project documentation that reconciliation of nozzle loads has been a requirement since the earliest stages of the project and that considerable correspondence took place between BRI and various vendors to resolve specific nozzle load problems starting as early as 1972 and continuing to the present. However, a formal program for case-by-case reconciliation of nozzle loads was not implemented until late in the project. The delay in initiation of the case-by-case reconciliation was the result of several factors, primarily:

1. Problems with the piping and mechanical contractor (C-215) which led to the July 1980 stop work and changes in the piping design and installation contracts.
2. The need to perform a status as-built program as a result of item 1. to define the construction status of the C-215 piping and supports and identify and resolve areas where this construction was not in conformance with the design.
3. A conscious decision by BRI and the Supply System to wait until final hydrodynamic loads were available before performing the final reconciliation of nozzle loads.

The causes of the nozzle load problems identified during the status as-built stress evaluation are new/increased loads; as-built deviations from design; changes in configuration; application of a uniform, more conservation design criteria identifying as potential overloads previously accepted loads; the existence of excessively conservative vendor allowable loads; and the discovery of previous errors or omissions.

The Design Reverification Program management has reviewed these evaluations and concluded that the late identification of a significant number of nozzle load reconciliation problems is not the result of a design process breakdown. In addition, the Design Reverification Program already includes the review of several Class I nozzles to determine if the applied loads have been adequately reconciled with the acceptance criteria. Furthermore, in response to TAA's request to restore some structural mechanics checks in the RFW System Review, we will also be checking a non-Class I nozzle. Based on the high visibility being given to the Burns & Roe nozzle load program and the independent checks already planned to be performed, it is our conclusion that no further changes to the design reverification plans are needed in this area.

TAA Observation No. 5

For the purpose of deciding whether or not to extend the sample size, tray and conduit supports which do not conform to design plans, but are found acceptable as is, should be analyzed. It is important to determine if the same deviations might be unacceptable in other tray and conduit support situations. If so, such "acceptable as is" items should be counted as deviations for sample size analysis.

Supply System Response

In the ATI review of Contract 218 conduit and tray supports, deviations in generic designs were traced to all affected supports. As discussed below, every individual support reviewed was shown to be satisfactory; hence, it was not necessary to increase the sample size.

- Cable Tray Supports

  Cable tray supports were individually designed, but utilized generic calculations which formed the basis for the original support designs. Both the detailed individual tray support and the associated generic calculations were reviewed by ATI in the design verification process.

  The tray support designs were found, in all 59 cases in the sample, to be satisfactory for the loading conditions specified and resulted in no rework. Since no failures in the cable tray supports were found, the initial sample size of 59 was sufficient to provide a 95 percent confidence level that there would be 5 percent or fewer structurally inadequate cable tray supports in the population.

- Conduit Supports

  Fischbach/Lord utilized generic conduit support designs, rather than individually designed conduit supports. In the sample selected by ATI for design verification, no two supports utilized the same generic conduit support design. Therefore, 59 separate generic conduit support designs were evaluated. In some cases, errors were found in the generic support design which would have resulted in an overloaded condition if the as-built conduit support had been loaded up to the theoretical capacity of the support. These were identified by ATI to Fischbach/Lord with a recommended reduced load-carrying capacity. Each of the deficient generic conduit support designs identified by ATI were traced to all the individual as-built supports utilizing that generic design, and it was found that in no case did the actual loading on the individual conduit support exceed the recommended reduced load-carrying capacity of the generic support. Thus, no rework was required on these supports, and the generic conduit design was revised to reflect the reduced load-carrying capacity.

  Even though some deficiencies were found in the initial sample of generic conduit support designs, all of the individual conduit supports which utilized these designs were satisfactory.

This is because the theoretical generic conduit support capacity is an upper limit, and the actual loading on a given support will generally be less than the theoretical capacity. Since the objective of the design verification effort was to provide 95 percent confidence level that 5 percent or fewer supports (i.e., not generic designs) in the population are structurally inadequate, this was accomplished in the initial sample size of 59.

WASHINGTON PUBLIC POWER SUPPLY SYSTEM

ENCLOSURE 1

☐ EDC WNP-1/4
☐ EDC WNP-2
☐ EDC WNP-3/5
☐ Admin File

M Basu	420
DM Bosi	440
GL Gelhaus	440
JR Honekamp	387
DM Myers	420
DW Porter	420
DC Timmins	901
DL Whitcomb	420
JM Yatabe	410
Chrono	--
DLW/lb	

Date: January 28, 1983

To: Distribution

From: D. L. Whitcomb (420)
D. L. Whitcomb

Subject: COMPLETION OF PFR TRANSMITTAL FORMS
CLASSIFICATION OF PFRS

Reference: None.

SDE Instruction 3.5, Section 3.11 requires that each System Engineer determine if a PFR is potentially reportable and directs that the top section of the PFR transmittal form be completed. Please be advised that the line stating "Potentially Reportable-Transmitted to PQAM (Form Attached) ____Yes ____No" is for the purpose of documenting this determination and shall be completed for each PFR. The next revision of SDE Inst. 3.5 will clarify any confusion that exists.

SDE Inst. 3.5, Section 5.7.1(5) advises that the Findings Review Committee procedure for processing PFRs be used to assist in establishing the recommended classification of the PFRs. Attached is a copy of CPP 4.3.7, WNP-2 Finding Review Committee. This CPP provides the guidance discussed in SDE Inst. 3.5.

DLW/arg

Attachments: 1. Potential Finding Report Transmittal
2. CPP 4.3.7, WNP-2 Findings Review Committee

REPORT OF AUDIT NO. 4

of the

WASHINGTON PUBLIC POWER SUPPLY SYSTEM'S
PLANT VERIFICATION PROGRAM FOR WNP-2

performed by

TECHNICAL AUDIT ASSOCIATES, INC.

AT RICHLAND, WASHINGTON

on

July 20, 21, 22, 1983

August 29, 1983

APPROVED:

R. V. Laney

L. H. Roddis

H. E. Sheets

CONTENTS

I. Introduction

The Washington Public Power Supply System (Supply System or S.S.) retained Technical Audit Associates, Inc. (TAA) to review and comment on the Supply System's Plant Verification Program Plan (PVP), and to audit its implementation. TAA's review of the PVP plan was completed and our final report on the plan submitted on August 6, 1982.

TAA is now engaged in auditing the Supply System's implementation of the PVP, an activity which will continue until PVP completion. We have been asked to give principal attention to those portions dealing with the reverification of design, the Quality Verification Program (QVP), which addresses the quality of construction completed before July, 1981, and the effectiveness of management actions to resolve quality problems arising since July, 1981. The ultimate objective of this continuing audit is to enable TAA, at the conclusion of the PVP and before fuel load, to state a knowledgeable opinion on the adequacy of implementation of the PVP and the extent to which it provides substantive confirmation that WNP-2's design and construction comply with applicable Regulatory and Safety Analysis Report commitments.

This is the report of the fourth on-site audit conducted on July 20, 21, and 22, 1983. The audit agenda is attached

as Appendix A, and all agenda items were discussed. With the exception of L. H. Roddis, all members and consultants were present throughout. Mr. Roddis was present on July 21 and 22.

As in previous audits, TAA selected and reviewed numerous relevant documents before the audit began. These included all PFR's which had been issued, all FRC meeting minutes, and much of the correspondence between the FRC, Project, Burns and Roe, and General Electric related to PFR's. We received and reviewed the S.S.'s response to TAA's Findings No. 15 and 16 concerning equipment installation and alignment, correspondence between the S.S. and NRC Region V regarding prepurchase and inactive contracts, and various S.S., Bechtel, and contractor QA audit reports.

The TAA Panel forwarded to the S.S. a number of questions arising from their review of these documents. These formed the basis for audit discussions. The questions are attached as Appendix B.

No findings or observations resulted from this audit.

II. Project Status and NRC Construction Assessment Team (CAT) Visit

The WNP-2 Project Director, C. S. Carlisle, reviewed the status of the Project, giving particular attention to points of interaction with the QVP and design reverification programs. Construction and Test were reported to be about two weeks behind schedule, expressed in terms of system completion and turnover, preoperational tests completed, and major milestones. Critical items for plant completion were identified as system turnover, punch list work items, and preoperational testing.

Mr. Carlisle advised that the S.S. is planning a program to stress relieve critical reactor recirculating piping welds. He also stated that RHR system completion is controlling for loss of power testing and that, as a result, RHR as-built and final stress analysis may have to be handled as an addendum to the final design reverification report rather than included in it. He stated that BRI has received 75 percent of as-built data from construction and has completed 25 percent of the update of stress calculations.

The S.S. Project Construction Manager, H. A. Crisp, reviewed the recent CAT visit and comments. He then described the S.S.'s plans to respond to each of the areas of concern: as-built program; radiography and NDS; bolts, fasteners, and torquing; welding; disposition of deficiencies; and concrete. TAA will review the S.S. responses as a part of its assessment of QVP implementation.

III. S.S./Bechtel Program for Verifying Equipment Installation Completion

Mr. Crisp and Mr. Tony Arch of Bechtel discussed the above subject in the light of TAA's earlier Finding No. 15 and the S.S.'s written responses to it. That finding referred to a possible "hole" in the QVP program and was based on a design reverification program finding that RHR heat exchanger installations were apparently incomplete. In amplifying the S.S.'s earlier responses, they made these comments:

- The S.S. decided early in the QVP program that all Contract 215 equipment installations would be treated as incomplete, and hence would be included in Bechtel's construction completion scope rather than the QVP scope.

- Bechtel was in the process of strengthening its Equipment Installation and Alignment Procedure SWP/P-G-21 at the time of the RHR heat exchanger finding. Mr. Arch said he believes that the incomplete RHR heat exchanger installation would have eventually been discovered by Bechtel. In fact, it was discovered by S.S. Design Reverification Review personnel while checking on another related design change to the foundation.

- Bechtel's program for equipment completion includes reviewing drawings, installation manuals, and installation specifications, plus a walkdown inspection of 100 percent of approximately 430 equipment packages. Over 300 document package reviews and 83 walkdowns have been completed.

- The S.S. believes that the difficulties caused by Bechtel's taking over responsibility for the incomplete work of a terminated contractor are unique to the 215 contract, inasmuch as other contractors which were on-site at the time of work stoppage continued on the job.

TAA requested that the S.S. clarify the following points by letter:

- Was any 215 contractor equipment turned over directly by WBG to the S.S. Test and Startup Group?

- Provide a description of the scope of Bechtel's equipment completion program so as to show how it and the QVP program scope fit together and provide continuous and adequate coverage.

IV. QVP Status

Mr. R. T. Johnson, WNP-2 Project QA Manager, discussed the QVP program status, giving particular attention to several questions recently raised by NRC Region V. These concerns include the adequacy of sampling for prepurchased and inactive contracts, sample size for active contracts, sample expansion logic, vendor radiography and NDE verification, basis for determining the acceptability of contractor's work, and QVP implications of the CAT report.

Mr. Johnson reviewed the S.S.'s program for responding to Region V concerns. He stated that some of the task reports which are to be prepared may be issued as addenda to the QVP Program Overview Report. TAA requested copies of S.S. responses and will take these into consideration in preparing its assessment of QVP implementation.

V. Test and Startup Action on PFR's Referred to Them

This subject was discussed with WNP-2 Operations Manager, J. D. Martin, and Test and Startup Manager, G. K. Afflerbach. Mr. Afflerbach stated that he performs special tests which are required as a result of PFR's, according to the requirements of the FRC and to test procedures developed to satisfy those requirements. Test results are

then sent to Project Engineering and the FRC.

Both Mr. Martin and Mr. Afflerbach stated that the plant has shown satisfactory performance so far, based on having completed approximately 37 preoperational tests out of 106 to be completed.

VI. Review of Supply System Design Calculations

Mr. A. D. Kohler reported the results of a S.S. initiated review of design calculations made by the S.S. and internal audits involving those calculations. The review was performed by Stone and Webster's Engineering Assurance Division and was reported in June, 1983. This review was conducted as a result of questions about the correct handling of interfaces which arose during the design reverification program. The Stone and Webster review concluded that interfacing has been adequate and appropriate, but that increased administrative attention will be needed in the future to ensure that all aspects of the interface occur. Stone and Webster also observed that the S.S. Technology Directorate has been slow in responding to internal S.S. QA audits.

VII. Burns and Roe Calculation Closure Status

H. R. Canter and A. J. Forrest, both of BRI, reviewed the status of BRI's program for updating and closing design

calculations. This subject was raised by several PFR's which indicated that closure was late or that some calculations have not been reconciled to the latest design information.

Mr. Forrest reported that there has been a problem caused by lack of a unified calculation index and by administrative weakness in maintenance of calculation status and calculation records. He presented details of the total numbers of calculations, broken down by disciplines, concluding that only in the electrical discipline were significant recalculations or calculation update required. These affect a maximum of 22 cables which could require a size increase.

Mr. Forrest stated that all disciplines were found to require some additional calculation review, but that, except in the electrical area, these had minor technical significance. He presented an itemized account of all PFR's, showing those which are calculation related and those which have potential safety significance. This list shows two PFR's, RHR-25 and 30, are both calculation related and also have potential safety significance. Four others, HPCS-15 and 25, RFW-21, and EQ-11, involve calculations, but potential safety significance had not yet been determined.

In summary, the BRI presentation showed that calculation closure is handled by discipline supervisors, that stronger administrative controls are needed, that

a substantial number of calculations still require closure and approval, and that there is an across-the-board BRI program to do this. It should be noted that a majority of the calculations still unapproved are related either to the final as-built program still in progress or to the incorporation of hung loads in structural calculations which are to be performed at the time of room turnover.

The TAA Panel raised several questions concerning BRI's responses to specific PFR's referred to them by the FRC and the Project in which Burns and Roe stated that no action is required. These related to the BRI/GE interface and to considerations of optimizing an already satisfactory design. Mr. Forrest pointed out that the BRI/GE interface involves, in some instances, mandatory GE requirements, and in others GE recommendations which can, by agreement, be removed. PFR-HPCS-16 is such a case in which, by agreement between BRI and GE, a single rather than a double gasketed valve was used for a specific application. Discussion of PFR-HPCS-29 involved a question of whether an existing acceptable installation of an instrument line tap should be changed to a more optimum location. Mr. Forrest stated that BRI, after additional analysis, concluded that the installation is satisfactory and should remain as is. In both of these cases BRI responded to the PFR that no further action need be taken.

VIII. Supply System Corporate QA Audit of Design Verification Program

J. R. Zimmerschied and J. M. Walker, who conducted the above audit in June, 1983, at the request of the Findings Review Committee, reviewed and discussed their findings and observations with the TAA Panel. Their report is titled "WPPSS Quality Assurance Audit 83-259," dated July 9, 1933.

No major deficiencies were found, although three Findings Reports and a number of observations were described by the auditors. They stated that the Design Verification Program as it is being implemented meets the intent as expressed in the WNP-2 Plant Verification Program.

IX. Findings Review Committee's Classification and Closure of PFR's

G. D. Bouchey, the recently appointed FRC Chairman, J. R. Honekamp, former Chairman, members of the Findings Review Committee, N. S. Porter, C. H. McGilton, L. C. Oakes, A. G. Hosler, G. C. Sorenson, and R. J. Barbee, and the review supervisor, D. L. Whitcomb, discussed the above subject with the TAA review Panel. Many of TAA's written questions, Appendix B, were taken up and answered in these discussions.

The discussions emphasized the need for formal corrective action plans in those cases where valid findings could not be closed on the basis of completed corrective action. Such plans are to be reviewed and approved by the senior review engineer and the FRC, and the FRC is to be satisfied that a project tracking system is carrying the item to assure final closure.

The S.S. reviewed their schedule for completing the Design Verification Program. Completion is paced by the as-built program and BRI's update of HPCS and RHR stress calculations which will follow it. PFR's which may come from this source have not yet been evaluated by the FRC. The present schedule for report completion is September 1.

APPENDIX A

AGENDA

TAA AUDIT July 20, 21, 22, 1983

Wednesday, July 20, 1983 - WNP-2 Site, Building 1

7:30am	Meet at Multi-Purpose Facility for Transportation to site
8:00am-10:00am	C. S. Carlisle and H. A. Crisp o Summary status of WNP-2, schedule licensing, etc. o CAT issues and program to resolve them
10:00am-11:00am	H. A. Crisp / Bechtel Status and results from Bechtel review of equipment supports
11:00am-12:30pm	R. T. Johnson QVP update including additional activities from resolution of Region V questions or CAT issues
12:30pm-1:00pm	Lunch
1:00pm-2:00pm	Follow-up with R. T. Johnson as needed
2:00pm-4:00pm	J. D. Martin and G. K. Afflerbach (Service Building) o Discussion of the status of action items or information requests assigned to Test and Startup or Operations by the Design Reverification Program. o Summary review of the results to date from the test program and their implication relative to the quality of the design especially HPCS, RHR, and RFW.
4:00pm-5:00pm	J.R. Honekamp o Plant Tour

Thursday, July 21, 1983 - (Multi-Purpose Facility, Snohomish Room)

8:00am-10:30am	TAA Executive Session
11:00am-12:00N	A. D. Kohler Results and follow-up of Stone and Webster audit of the Supply System calculations

AGENDA - continued

TAA A DIT July 20, 21, 23, 1983

Thursday, July 21, 1983 (continued) Multi-Purpose Facility, Snohomish Room

12:00N-12:30pm	unch
12:30pm-2:30pm	. J. Forrest and H. R. Canter Status report on BRI response to generic calculations closure issue TAA follow-up of BRI responses to specific PFR's (R. V. Laney memo of 7/6/83) and questions related to documentation of GE/BRI interface design requirements.
2:30pm-4:00pm	ouchey, Whitcomb, Honekamp, FRC members ollow-up of TAA questions on specific PFR's

Friday, July 22, 1983 (Multi-Purpose Facility, Snohomish Room)

8:00am-9:30am	ouchey, Whitcomb, Honekamp, FRC members ollow-up of TAA questions on specific PFR's if needed
9:30am-10:00am	. D. Bouchey and J. R. Honekamp Overview of structure, status and schedule of final report
10:00am-11:00am	ouchey, Whitcomb, Yatabe, Porter, Honekamp Follow-up of TAA questions on draft reports
11:00am-2:00pm	AA Executive Session and working lunch
2:00pm-3:00pm	. D. Bouchey, J. R. Honekamp and C. S. Carlisle General discussion on completion of TAA reviews and reports
3:00pm	xit Interview . W. Mazur — R. B. Glasscock . S. Carlisle — P. K. Shen . Yatabe — L. T. Harrold

APPENDIX B

July 6, 1983

Questions for TAA's Fourth On-Site Audit

WNP-2, Richland, WA
July 20-22, 1983

1. Don Mazur's letter of June 8, 1983, responding to TAA Findings Nos. 15 and 16, and letter Timmins to Crisp dated May 17, 1983, advise that "BPC is reviewing all 383 equipment installations...etc." TAA would like to have an oral report on this program either from the S.S. or BPC, concerning its scope, number of installed equipments which have been or will be inspected, schedule, progress, and findings to date. A handout summary either at or before the meeting would be helpful.

2. In a letter P. K. Shen to A. D. Kohler dated May 9, 1983, a review of Supply System design calculations was put in place with a completion date of May 20, 1983. TAA requests an oral report on status and findings of the review and a copy of the report when completed.

3. TAA is interested in the outcome of various action items from the design verification program which have been turned over to Test or to Project Operations for closure. TAA would like an oral report from Test and Operations in which each activity advises what action they are taking, and explaining how each item will be tracked to closure.

4. In addition, we would like a report of test program results to date and their implications for the quality of plant design generally, and especially for the design of the RHR, RFW, and HPCS systems.

5. Please give TAA a QVP update, including any new activities resulting from CAT visit or other causes.

6. TAA requests a status report on BRI's response to the generic FRC question on calculation update and closure. This report should include a status report and findings from the BRI program to update electrical calculations mentioned in BRI's response to PFR-16. Refer to FRC Minutes of Meeting of May 13, 1983.

7. TAA requests BRI to explain more fully why, in responding to the following PFR's, BRI decided that no further action is required:

PFR No.	BRI Response Letter Date
HPCS-29	4-22-83
PB-4	4-22-83
HPCS-16	4-28-83
HPCS-18	4-26-83

July 13, 1983

Questions for TAA's Fourth On-Site Audit

WNP-2 Richland, WA.
July 20 - 22, 1983

Note - These are in addition to topics/questions contained in letter Laney to Honekamp, dated July 6, 1983.

1. The S.S. is preparing a revised Requirements Reverification Report (R.R.R.). What is the status? What consideration is being given, in making this revision, to clarifying the mandatory or non-mandatory use of GE interface criteria? G.E.'s criteria are cited frequently in the R.R.R. as evidence that certain FSAR requirements have been carried forward into design.

2. Referring to PFR HPCS-37, TAA notes that G.E.'s operational readiness review in February 1983 raised questions about instrument line slopes. What actions are being taken by the S.S. in response to the ORR?

3. Referring to the S.S.'s response to TAA finding No. 15, enclosed with Mr. Mazur's letter to R. V. Laney dated June 8, we note on page 2 the following statement: "Records will be checked to assure that applicable vendor requirements have been incorporated in the installation, etc." Would an earlier record check of the RHR heat exchanger documentation have revealed the missing shims?

4. Attachment 1, page 2 of S.S. letter 602-83-366 to Regional Administration, dated April 26, 1983, refers to "Strengthening Review of PP & IA Contracts". Please advise TAA of the scope, status and results of the special review referred to.

5. TAA requests Mr. Forrest to comment on the conclusions expressed by B & R in its letter BRWP - F - 83 - 1646 of Mar. 2, 1983, concerning QCIR's dispositioned by B & R Engineer H. C. Smith. Was a statistically significant sample examined? It appears that three out of nineteen dispositions required change. Does this support the overall conclusion of adequacy expressed in paragraph 2 of the letter?

6. TAA notes that Corporate Policy 4.3.7, "WNP-2 Findings Review Committee", dated Mar. 18, 1983, provides in paragraph 4.5 that "All valid PRFs which, in the judgment of the FRC, are safety significant or require an assessment of their impact on the adequacy of the design process shall be classified as findings." Using the below listed PFRs as examples, please explain how the FRC interprets and applies the quoted passage: HPCS-7, 17, 19, 29 and 43. The specific question is, why are these classified as

"Observations", when the PFRs appear to raise questions about the design process?

7. The same policy document, in paragraph 4.8, defines requirements for closeout of Findings. It requires that the FRC's assessment of impact be documented and that corrective action be complete, or RSE and FRC concur that no corrective action is required, or FRC is satisfied that the corrective action plan is in place and is being tracked in WNP-2 project systems. Please comment on the FRC's application of this passage, using as examples: HPCS 11, 15, 19, 46, 47 and 49. Which of these will be closed by corrective action plans reviewed and approved by the FRC? We note that HPCS-19 has been closed. Was there an FRC approved corrective action plan? How is it to be tracked?

July 18, 1983

TAA QUESTIONS FOR ON-SITE WNP-2 AUDIT

July 20-22, 1983

1. June 10, 1983 FRC meeting, page 2, stated that PFR-PB-4 is closed on the basis that the calculations did evaluate the 5-1/8" weld length adequacy.

   What calculations were submitted to make this statement?

2. Why is PFR-EQ-7 considered closed? (FRC meeting minutes - June 3, 1983, page 3)

   This PFR requires a complex and lengthy change review process which was not complete. The issue appears to be that the PMI has been revised to state that the DCRB will identify the need for procedure revisions to the responsible organization for implementation and tracking to completion.

3. Why is PFR-RHR-11 "considered closed" and PFR-RHR-16 "remains open and a finding"? (FRC meeting minutes - May 13, 1983, pages 4 and 5). Both PFR require updating electrical loads which is an on-going activity.

4. How will WPPSS determine that PFR-HPCS-9 (FRC meeting minutes - May 11, 1983, page 1) has been properly executed?

5. Has WPPSS accepted the below quoted B&R statement regarding pipe support calculations, PFR-RHR-32?

"Burns and Roe feels that each mathematics equation does not have to be updated to the new loads as long as the previous analysis is reviewed by a Pipe Support Engineer for the increased load, and notes under conclusion, his results. It is then checked and approved."

The above statement contained in a B&R letter, dated June 1, 1983, signed by A. I. Cygelman to L. T. Harrold, Assistant Director, WNP-2 Engineering BRWP-F-83-4738.