

REPORT OF AUDIT NO. 2

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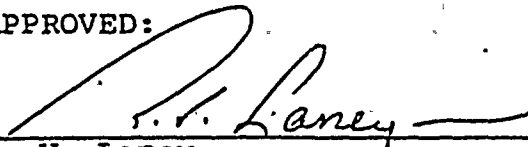
WASHINGTON PUBLIC POWER SUPPLY SYSTEM'S
PLANT VERIFICATION PROGRAM FOR WNP-2

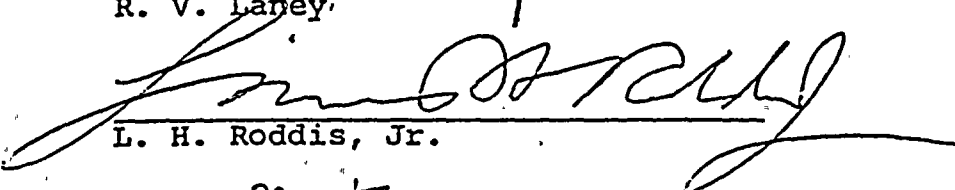
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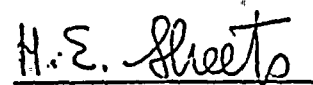
TECHNICAL AUDIT ASSOCIATES, INC.
AT RICHLAND, WASHINGTON ON
JANUARY 26-28, 1983

February 15, 1983

APPROVED:


R. V. Laney


L. H. Roddis, Jr.


H. E. Sheets

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ATTACHMENTS

- A. Audit Agenda
- B. TAA's Pre-Audit Questions
- C. Design Reverification Schedule
- D. Reverification Program Substitutions (Engineering Mechanics)
- E. Response to TAA December 9, 1982 Letter
- F. WNP-2 Fire Hazard Evaluation, Design Reverification Plan

- G. WNP-2 Reverification Program,
Pipe Break and Missiles Review
- H. Design Reverification of Fishbach/Lord
By Associated Technologies, Inc.
- I. Skewed Weld Evaluation
- J. Contract 215 Reverification Report Outline
(Draft)
- K. Documents Reviewed by TAA Before Audit
- L. QVP/QAP Pie Chart
- M. Biographical Information on TAA Audit Team

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 enough 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 committee'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 January 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 schedules. 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 appearing 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 respect 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, Sacrificial 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.

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

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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)	
	<u>WNP-2 Site, Building 1 (Construction Management Conf. Room)</u>	
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

26.22.04

TAA QUESTIONS FOR WNP-2 PVP AUDIT NO. 2SCHEDULED 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
803/723-0318

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 competent 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 installed either for them alone, or as part of an area system.
5. The electrical drive safety systems had no 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 operator 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 presumably 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 protection system might 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) 966-0383

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."

Mr. John H. Honekamp
December 9, 1982
Page 2

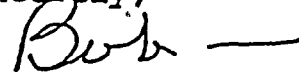
Third, what rationale was used in preparing the list of Principal Design Documents, Attachment 4.1 of SDE 3.1 and the Design Requirements Reverification Checklist which appears as Table 5.3.1 of SDE Instruction 3.5? What is the logical process by which this checklist leads to the System and Component 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,



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. 2SCHEDULED 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 Re-verification Report:

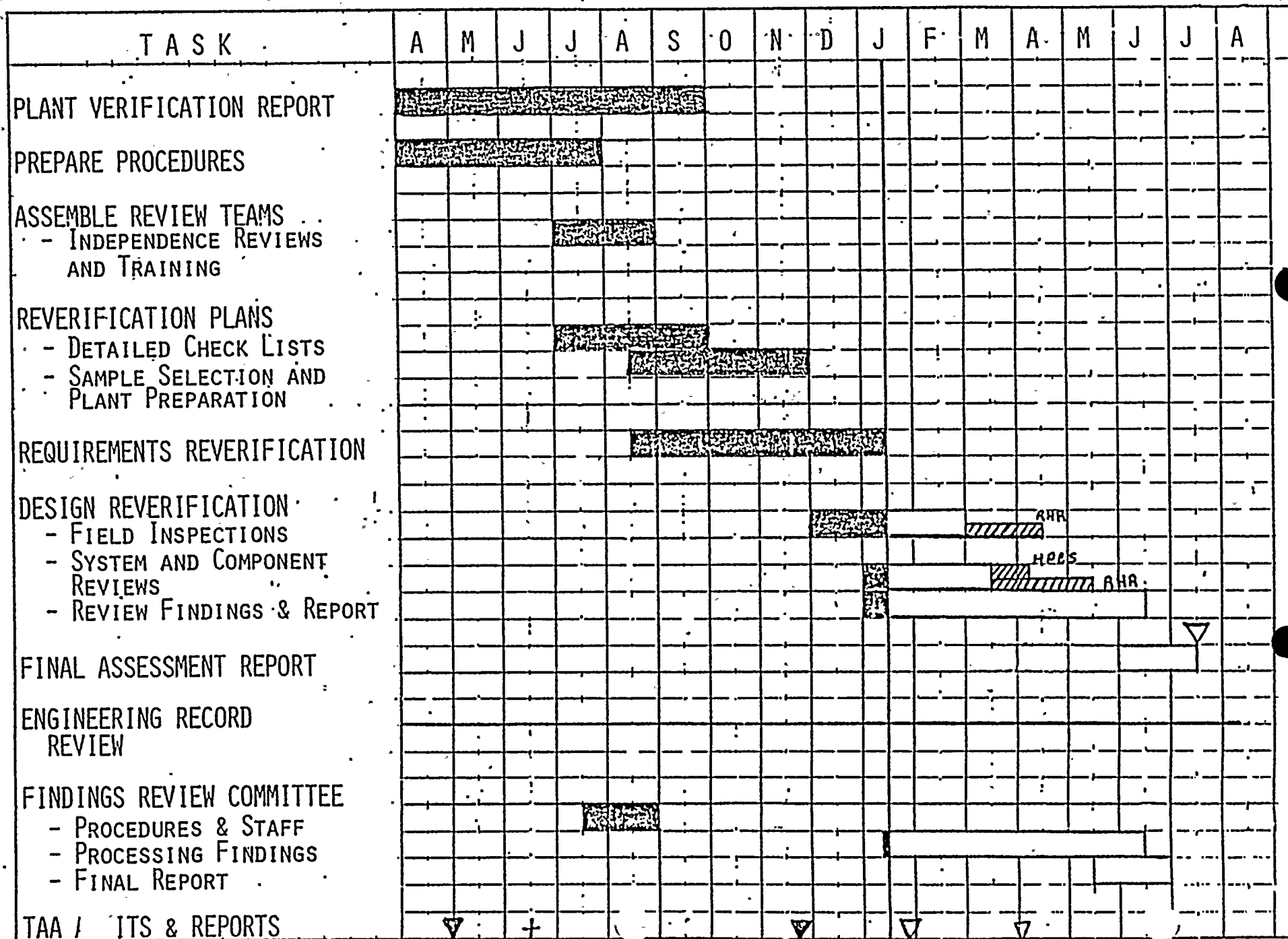
- 12(a) Why was TWC home office documentation concerning TWC fabricated materials never reviewed by TWC QA and what are the implications of this QA breakdown?
- 12(b) Why was this not discovered earlier by S.S. or B&R audits?
- 12(c) Considering the loss of timely information, why was the review of this 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



REVERIFICATION PROGRAM SUBSTITUTIONS
(Engineering Mechanics)

<u>Item</u>	<u>Subtracted From RFW Components</u>	<u>Added to RHR or HPCS Components</u>
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 reversion 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 reversion 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 Reversion 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 consensus 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.

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.

- o The plan will also review fire protection features to assure that no adverse interaction will occur with the RHR System.
- o 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.

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

III. PLAN DETAILS

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

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 FAILURE

- 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)

- o 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.
- o 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.
- o 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.
- o 59 tray supports were design verified, all were demonstrated to be structurally acceptable.
- o 59 conduit supports were design verified, all were demonstrated to be structurally acceptable.
- o 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.
- o The design verification program is complete with the final report submitted 9/17/82 to Burns and Roe/Supply System.

26.22.09

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-building, a sampling program for past work was undertaken while procedures to assure the extra fillet leg was added and the as-built program incorporated evaluation of skewed welds for future work beyond November 2, 1982.

Random sample of:

- o 60 WBG large piping hangers with skewed welds.
- o 60 Bechtel large piping hangers with skewed welds.
- o 60 WBG small piping welds with skewed welds.
- o 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 $\frac{1}{8}$ " allowance for lack of penetration for acute groove welds less than 60° .

26. 11.24

DRAFT

ATTACHMENT J

CONTRACT 215 REVERIFICATION REPORT

OUTLINE AND STATUS

SECTION	% COMPLETE
<u>INTRODUCTION</u>	
Report Hierarchy	100
<u>SUMMARY & CONCLUSIONS</u>	
<u>PROGRAM DESCRIPTION</u>	
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	
<u>SCOPE</u>	
Total Work Scope and Type	
Work Remaining after Redesign	
Subcontractors	
<u>OTHER PROGRAMS</u>	
Anchor Bolts	
As-Built	
Grout	
Pre-Service Inspection	
Sacrificial Shield Wall	100
Pipe Whip Restraints	
Start-Up Test Program	50
Drywell Seal	100
Cranes & Hoists	
Hanger Balancing	
Concrete & Rebar	
Structural Steel Bolting	

CONTRACT 215 REVERIFICATION REPORT
OUTLINE AND STATUS

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

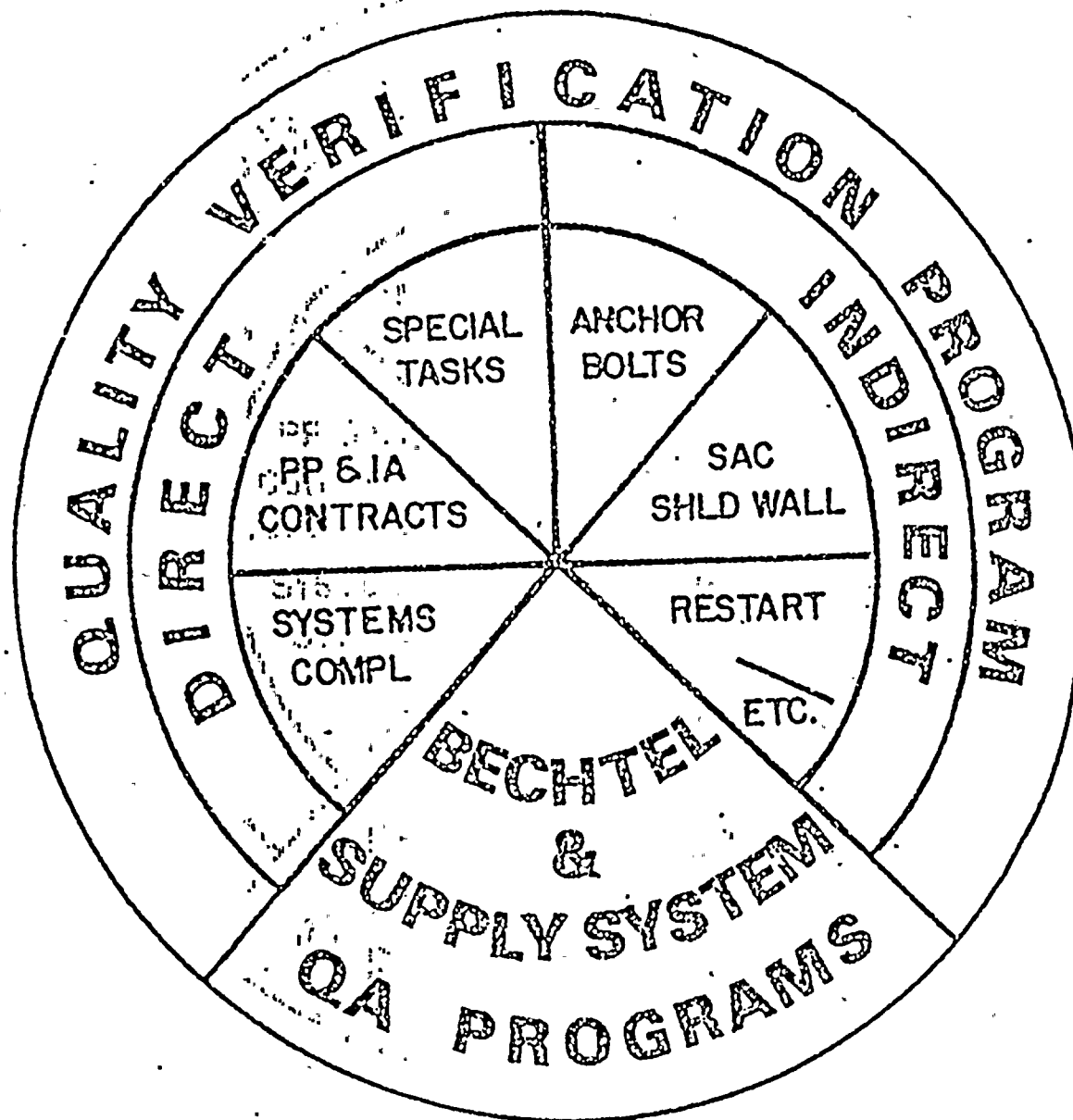
DOCUMENTS REVIEWED BY TAABEFORE AND DURING AUDIT

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.



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; MBAA (mcl). Harvard University.

589 Oenoke Ridge
New Canaan, CT 06840
H (203) 966-3119
O (203) 966-0383

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.

24 Trout Farm Lane
Duxbury, MA 02332
(617) 585-8912

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

Commission; World Bank on Nuclear Safety in Korea. Member National Academy of Engineering; Fellow ASME. Adjunct Professor, University of California at Los Angeles. ASME Heat Trans. Memorial and Conf. Award. BS, MS, PhD, University of California, Berkley.

Suite 725
1999 S. Bascom Avenue
Campbell, CA 95008
(408) 377-4870

Charles Q. Miller, Consultant to the Review Panel: Registered Professional Engineer. Eight years United Engineers & Constructors; Dep. Proj. Mgr., WPPSS Unit 1; Asst. Ch. Power Eng., including supervision and management of power projects and studies involving mechanical, nuclear, piping, process disciplines; standards development, tech. des. guides, design reviews; technical support and direction to various major power projects, including seven nuclear plants; supervised design reverification Seabrook Nuclear Units 1 & 2; Sup. Eng. for preliminary design of five standard nuclear plants, including GE nuclear steam supply system. Seven years USN, including operation, testing, maintenance of diesel-electric and nuclear submarines during new construction, overhaul, and operation. B.S. Mech. Eng. and Math., U. S. Naval Academy; M.S. Appl. Mech., Stanford; Juris Doctor, Rutgers.

United Engineers & Constructors, Inc.
P. O. Box 460
Richland, WA 99352

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.

110 Broad Street
Charleston, SC 29401
(803) 723-0319

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.

87 Neptune Drive
Groton, CT 06340
H (203) 443-1140
O (203) 599-3910

