U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
Division of Quality Assurance, Safeguards, and Inspection Programs
Quality Assurance Branch

Report No.: 50-443/83-23 Supplement 1

Docket No.: 50-443

Licensee: Public Service of New Hampshire
P.O. Box 330
Manchester, New Hampshire

Facility Name: Seabrook Station, Unit 1

Inspection At: United Engineers and Constructors, Inc., Philadelphia, PA

Inspection Conducted: November 7-9, 1984

Inspection Team Members:

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Mechanical Systems	J. Nevshemal, Consultant, Westec
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Instrumentation & Controls	L. Stanley, Consultant, Zytor, Inc. C. J. Crane, Consultant, Westec Services
Others	A. C. Cerne, Senior Resident Inspector, Region I* J. L. Milhoan, Section Chief, IE* R. Gallo, Section Chief, Region I* E. V. Imbro, IDVP Program Manager, IE*

*Part Time

Ralph E. Architzel
Team Leader

1/22/85
Date

Approved By:

James L. Milhoan
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1/22/85
Date

DETAILS

1. Background and Persons Contacted

The NRC conducted an Integrated Design Inspection of the Seabrook Unit 1 Nuclear Power Plant during the fall of 1983. The inspection report was issued on April 2, 1984. The applicant responded to this report in a letter dated June 29, 1984. The NRC reviewed and evaluated the initial response. A letter requesting additional information, announcing certain items selected for reinspection and noting acceptability of the other responses without further review was sent on October 5, 1984. A revised/supplemental response, received on November 16, 1984 documented additional actions and clarifications which were discussed during the reinspection.

This report documents the results of the announced reinspection for the Seabrook Integrated Design Inspection and includes a comprehensive listing of items remaining open.

The following technical and supervisory personnel were contacted:

J. R. Slotterback, Project Manager, UE&C*
J. J. Parisano, HO-SDE Piping Analysis, UE&C*
R. P. Neustadter, HO-SDE I&C, UE&C*
O. P. Kalani, Mech Support/Struct., UE&C*
K. M. Kalawadia, STR (SDE), UE&C*
P. J. Gould, H.O. Supv. Mech Serv., UE&C*
G. M. Aggarwal, Supv. Elect. Engr., UE&C*
R. C. Jamison, Lead Elect. Engr., YAEC*
J. Blackman, H.O. ESG, UE&C*
M. K. Sanghavi, Supervisor-Mech. Support Group, UE&C*
H. E. Flora, Supervisor-Mech/Nuc. Group, UE&C*
G. C. Duerr, Mgr. FMEA Group, UE&C*
H. H. Katz, Sup. Lic. Eng., UE&C*
D. D. Boyle, Spec. Projects, UE&C*
D. E. McGarrigan, Mgr.-Project QA, UE&C*
R. H. Leonard, Mgr.-R & QA, UE&C*
K. C. Robertson, Asst. Proj. Eng Mgr-H.O., UE&C*
D. A. Maidrand, Asst. Proj. Manager, YAEC*
W. R. Brown, Assistant Supervisor, Nuclear Mechanical, UE&C*
A. Dufault, Manager Elec Suppts Group, UE&C
R. K. Tucker, Mechanical Engineer, YAEC
D. E. Johnson, Mechanical Engineer, YAEC
T. M. Cizauskas, Lead Mechanical Engineer, YAEC
G. F. Rigamonti, Chief Engineer, UE&C
F. A. Polek, Sup. Eng. Piping Analysis, UE&C
R. H. Carnevale, Piping Engineer, UE&C
E. Skolnick, Mechanical Analysis, UE&C
W. Fadden Sr., I&C Engineer, YAEC
V. Belavadi, I&C Engineer, UE&C
W. Granan, QA Engineer, UE&C
J. Visceglia, QA Engineer, UE&C
C. Greiman, Lead EQ Engineer, UE&C

* Attended exit meeting on November 9, 1984

2. Mechanical Systems

(Closed) Unresolved Item 2-1, CBS Pump NPSH Available. The calculation which determined the NPSH for the Containment Buildings Spray (CBS) pump was reviewed. The approach used was parametric with respect to fluid temperature. The team found that the modeling of the system with respect to flowrate, fittings, etc. was correct. The lowest NPSH available was compared to the NPSH required by the pump and found to be greater.

(Closed) Finding 2-2, System Description Changes. Each of the "technical/editorial" items were reviewed and it was found that none affected a change to a design document (e.g., construction drawing, equipment sizing, equipment list, etc.). Since none of the construction documents are affected, Design Change Notices were not required.

A System Description is considered a "living" document that initiates the design process and is thereafter revised to represent the latest parameters developed through calculation as the design proceeds. Also since the System Description evolves to an operational aid such design process information as the "pump mount caution" needs to be removed when the system design has proceeded to the point where the caution has been made part of the system design. After a System Description has been revised it is reviewed and signed off by the various design disciplines on the project. A Design Change Notice is only required for a change if the change has an effect on a construction document. Removing a caution to the designer after the subject has been made part of the design does not necessitate a Design Change Notice .

The team discussed this item with the licensee and found its actions acceptable.

(Closed) Finding 2-3, Containment Pressure Signal. This item concerned the use of different nomenclature for the various containment pressure signals. United Engineers decided to utilize the Westinghouse approach. This required a change to a construction document which necessitated a Design Change Notice . The Design Change Notice was reviewed by the team to verify that the appropriate documents were changed. This included the System Description and FSAR. The FSAR was reviewed to verify that the change was indeed made.

(Closed) Finding 2-4, Maximum Temperature of Pumped Fluid. The concern had to do with the maximum temperature used for the NPSHa calculation. The revised calculation was reviewed and it was found that it was parametric with respect to temperatures. The NPSHa was calculated for several sump fluid temperatures. It was found that 212°F resulted in the lowest NPSHa and this value was greater than the NPSH required for the pump.

(Closed) Finding 2-5, Sump Water Level. The finding's concern was that water can be trapped in the refueling channel by blocked drains. If the drains are blocked, then that water cannot contribute to the sump water level, thus lowering the NPSHa for those pumps taking suction from the sump. The calculation that determined the NPSHa was reviewed and it was found that the assumption of blocked drains was now made. This made the NPSHa calculation conservative.

(Closed) Finding 2-7, Loss Due to Swirl. This finding concerned the appropriate inclusion of swirl in the NPSHa calculation. The calculation used the friction loss coefficient developed by the Alden hydraulic testing of the sump design. This friction loss coefficient included a swirl effect that extended for 30 pipe diameters into the suction piping. The NPSHa calculation used the Alden coefficient plus the standard

fitting and piping loss for the same 30 pipe diameters. This resulted in a conservative NPSHa calculation. Therefore, any uncertainty of swirl is covered. The team reviewed the revised calculation and found it acceptable.

(Closed) Finding 2-8, RHR Pump NPSH Calculation. The concern was that the Westinghouse RHR pump NPSH calculation used different assumptions than the United Engineers calculation. It had been decided between Westinghouse and United Engineers that the United Engineers calculation would govern with Westinghouse review. The United Engineers calculation was reviewed and found to be acceptable. Westinghouse's comments to the calculation were reviewed. The team found them to be minor and they did not affect the results.

(Open) Finding 2-12, Coolant Velocity at Sump Screen. This finding concerned the sump inner screen approach velocity regarding whether or not it meets the requirements of Regulatory Guide 1.82. Depending on the assumption used for the calculation, the licensee states that the approach velocity varies from .192 ft/sec. to .204 ft/sec. This was deemed by the licensee to satisfy the Regulatory Guide requirement of .20 ft/sec. This item remains open pending additional NRC review of United Engineers' calculation and assumptions.

(Closed) Unresolved 2-3, Sump Screen Pressure Drop. The concern had to do with the pressure drop for the inner screen. The Alden hydraulic tests modeled the screen with 50% blockage; therefore, their resulting friction loss coefficient included the screen loss. The Alden coefficient was used in the NPSHa calculation.

(Open) Finding 2-17, CBS Pump Motor Seismic Qualification. The concern was that a purchase specification requirement for a seismic analysis of the stator end turn insulation support system was not fulfilled. United Engineers informed the team that the Containment Building Spray pump motor does not have the configuration addressed by the purchase specification. Westinghouse letter dated December 10, 1984 confirmed this. Therefore, the seismic analysis is not required. The licensee made a commitment to review all safety-related pump motors for the need of this seismic analysis since it is a standard statement in the purchase specification. The various vendors have been contacted but not all had replied by the last day of the inspection. This finding remains open pending NRC review of safety-related pump vendor responses.

(Closed) Finding 2-18, Containment Building Spray Pump Motor Torque. The concern has to do with the FSAR commitment to determine by actual test data the torque margin (acceleration) for the Containment Building Spray pump motor. The overall process requirement is to reach a level of spray or flow by a certain time. This will be verified during preoperational system testing. For the initial response, the licensee made a commitment to revise the FSAR to remove the requirement to determine torque margin by test. The revised response stated that the FSAR would retain the testing requirement, but provide an alternative for confirming torque margin by analysis. A draft FSAR change to be included in Amendment 54 was attached to the November 16, 1984 letter.

(Open) Finding 2-19, Jet Impingement Analysis; Finding 2-20, Basis for Analysis; Finding 2-21, Pipe Whip Evaluations; and Finding 2-22, Cracks in Moderate Energy Piping. All of these findings are associated with the required jet impingement and moderate energy line break analyses. A cursory review was conducted during the reinspection. The team found that the analysis effort did not have an approved

procedure. In addition, work was not sufficiently completed for review by the team. Therefore, these findings remain open pending additional inspection.

3. Mechanical Components

(Closed) Finding 3-1, Design Temperatures. Inconsistencies in the refueling water storage tank design temperature were found to exist between various documents. The FSAR specifies a design temperature of 88 degrees F; the United Engineers system design description specifies a design temperature of 100 degrees F; the Westinghouse system description for the safety injection system specifies a design temperature of 200 degrees F, while the United Engineers specification specifies a design temperature of 100 degrees F. The temperature listed in the FSAR is given as the "maximum design temperature".

Westinghouse declined to incorporate changes to the Westinghouse system description as requested by United Engineers, noting that the parameters are "order of magnitude estimates". However, United Engineers will amend FSAR Table 6.2-75 to specify design temperatures and maximum fluid temperatures for the refueling water storage tank and the spray additive tank that render United Engineers documentation consistent. The team reviewed the proposed changes and had no further questions.

(Closed) Finding 3-2, Equipment Qualification Procedures. The seismic qualification analyses for the refueling water storage tank and the spray additive tank were based on static analyses which used 150 percent of the peak vertical acceleration. This qualification method is not consistent with the requirements of the United Engineers specifications, which specify that a dynamic analysis be performed.

United Engineers noted that Sections 1.1.2 of specifications 9763-SD-246-1 and -6 allow the seller to take exceptions to the seismic qualification requirements detailed therein. The Pittsburgh-Des Moines bid proposal specified an alternate method for qualification by seismic analysis which was reviewed and accepted by United Engineers. The team reviewed this documentation and found the approach acceptable.

(Closed) Finding 3-3, Stress Calculations. Finding 3-3 indicated inconsistent containment spray pump casing stress levels in separate seismic design reports prepared by Bingham-Willamette and McDonald. The team reviewed this item with United Engineers.

United Engineers has shown that the McDonald stress report analyzes a section of the pump casing that had not been adequately addressed in the initial Bingham-Willamette stress report. The cited stresses therefore occur at different locations. The stress cited in the Bingham-Willamette report occurs in the pump section below the suction flange, while the stress cited in the McDonald report occurs at the suction flange longitudinal hub. Therefore, the two reports jointly constitute the seismic qualification documentation for the containment spray pumps.

(Closed) Finding 3-4, Pressure Boundary Requirements. Finding 3-4 indicated that the McDonald seismic qualification report does not address the seal cooler heat exchanger shell side ASME Section III, Class 3 pressure boundary requirements. The team verified that McDonald had prepared an addendum to the stress report which incorporates the heat exchanger shell side pressure boundary calculations.

(Closed) Finding 3-5, Documentation. Finding 3-5 indicated that a number of Bingham-Willamette documents had not been certified by a registered professional engineer as required by United Engineers specification.

The team verified that Bingham-Willamette notified United Engineers that drawings, calculations and test reports associated with the purchase order will be revised to show certification by a registered professional engineer.

(Closed) Finding 3-6, Bolted Joints. Finding 3-6 indicated that the Velan stress report for the containment sump isolation valves did not address preloading effects in the yoke mounting screws. United Engineers has demonstrated that preloading effects are addressed in the Velan report. The Velan report, reviewed by the team, provides assurance that the yoke mounting screws will not be overstressed when preloading effects are included.

(Closed) Finding 3-7, Design Temperatures and Pressures. Finding 3-7 indicated inconsistencies in the design pressures and temperatures for the containment isolation valves that had been specified in a Velan test procedure and drawing.

United Engineers showed the team that the test temperature and pressure and the original design temperature and pressure were identical, and that the design temperature and pressure were subsequently revised downward. Since the test temperature and pressure envelope the design temperature and pressure, the team finds this acceptable.

(Closed) Finding 3-8, Torsional Rigidity and Finding 3-9, Vibratory Modes. Findings 3-8 and 3-9 are related. Finding 3-8 indicated that the valve torsional rigidity had been incorrectly defined in a Velan seismic analysis report. Finding 3-9 indicated that the minimum stiffness as a function of twisting and bending stiffness was also incorrectly defined in the Velan report.

The team verified that United Engineers performed a confirmatory calculation which Velan appended to the seismic report.

(Closed) Finding 3-11, Isolation Valve Closure. Finding 3-11 was concerned with possible closure of the motor operated containment isolation valves during containment spray operation. The team discussed this finding with the licensee. The licensee stated in the revised response that the emergency procedure to be invoked for containment spray does not include any steps associated with the operation of the containment isolation valves. There is no automatic closure signal to the isolation valves. Because the valve in question can only create a waterhammer if an accident signal exists and it is then closed by an operator, and the operators would be following an emergency procedure which does not allow closure, there is a very limited potential for a waterhammer event.

(Closed) Finding 3-12, Waterhammer Loading. Finding 3-12 noted that the containment spray rings had not been stress analyzed for waterhammer loads. United Engineers has since implemented a program which has defined the waterhammer loads acting on the containment spray rings, and is performing waterhammer stress analyses for a total of 15 containment spray ring piping subsystems. Six of these analyses have already been completed and were reviewed and found acceptable by the team. United Engineers has scheduled completion of the remaining 9 subsystems by November 19, 1984.

(Open) Finding 3-20, Connection Design. Finding 3-20 addressed the effect of torsional moments induced in a support beam by vertical and lateral seismic loads.

United Engineers has performed a stress analysis which was reviewed by the team which confirms the structural integrity of this configuration, and has formulated a program to perform an evaluation of additional configurations where significant torsion is transmitted through beam connections.

This program is subject to verification by Yankee Atomic. This item remains open pending implementation of the evaluation program and reinspection.

(Closed) Finding 3-22, Thermal Transient Test. Finding 3-22 questioned the operability of the containment building spray pumps under a thermal transient, based upon possible differences between as-machined and as-mounted wear ring clearances.

The team confirmed that Bingham-Willamette letter dated October 29, 1984 had verified that the as-machined and as-mounted clearances are essentially identical.

(Open) Unresolved Item 3-1, Equipment Preoperational Test. Unresolved Item 3-1 noted that containment spray pump CBS-P-9B had sustained flood damage, and recommended that the pump be monitored during preoperational testing to confirm the acceptability of the repairs.

United Engineers noted that the containment spray pump is currently under construction jurisdiction and is being periodically monitored under the construction preventive maintenance program.

This item remains open pending NRC review of the results of the series of tests performed on the containment spray pump to assure that the pump will adequately perform its design function.

(Open) Unresolved Item 3-2, Valve Qualification Test Report. This item noted that the test results for the seismic qualification of the containment isolation valves, which yielded frequencies below 33 Hz, were contrary to the requirements of the United Engineers active valve test guidelines.

The Mechanical Analysis group found the test results conditionally acceptable, subject to review under a verification program which was being formulated by the Piping group. At the time of the initial inspection, the team could not determine if the valves had been modeled in accordance with the governing United Engineers procedure.

United Engineers has since formulated the verification program, which requires that valve frequencies identified by the vendor below 33 Hz be reconciled with the analysis in accordance with the United Engineers procedure. The containment isolation valves are part of two calculation sets which are presently in the review cycle and scheduled for completion on November 19, 1984. The team examined the program and found it acceptable.

Follow-up inspection is planned to confirm that the valves have been modeled in accordance with the United Engineers procedure.

(Open) Unresolved Item 3-3, Interaction Between Support Steel and Pipe. This item addressed the concern for possible dynamic interaction between piping and support steel for a specific configuration.

United Engineers performed a coupled stress analysis which confirms the structural integrity of this configuration, and formulated a program to evaluate additional configurations where dynamic interaction between support steel and piping could possibly occur. This program is subject to verification by Yankee Atomic. This item remains open pending approval and implementation of the program and NRC inspection.

4. Civil/Structural

(Closed) Finding 4-1, Tank Farm SSE Loads. Sheets 1B, 10A, 10B and 31 of calculation set WB-61, Rev. 7, dated June 1, 1984 were reviewed during the inspection. The revised calculations indicated that the operating design earthquake governs the design. Appropriate FSAR revisions (Amendment 53, dated 9-25-84), were made to be consistent with the analysis.

(Open) Finding 4-2, Live Loads and Finding 4-18, Equipment Vault Live Load. The additional response indicates that for all Category I structures, floors will be verified for an additional single concentrated live load per bay anywhere on the floor in combination with seismic loads. Appropriate sections of the FSAR and SD-66 (Structural Design Criteria) will be revised to reflect the minimum live load design condition. Uniform live load which produces equivalent effects may be considered in lieu of a single concentrated live load. Imposition of any live load greater than the specified live load must be verified by the responsible plant engineer. The final verification for this additional load will be performed after completion of the project design, but prior to fuel load. This limitation will be included in technical specifications and controlled by the plant operating engineer.

These items remain open pending further licensee action and verification by the NRC.

(Closed) Finding 4-3, Tank Farm Tornado Loads. Calculation set WB-61 has been supplemented by the Calculation Set WB-94, Rev. 0, dated June 29, 1984, which evaluated the effects of tornado loads on the tank farm steel structure. The team reviewed the supplemental calculation. The tank farm steel structure is not classified as a Category I structure. It is designed in such a way that its collapse will not damage Category I structures. The failure mechanism is predicted by postulation of plastic hinges at the heavily stressed areas. The Structural Design Criteria, SD-66 has been revised (Rev. 2, dated 3-2-84) to reflect the design conditions stated above.

(Closed) Finding 4-4, Controlled Manuals. The team confirmed the statement in the licensee response that Administrative Procedures #38 and #46 have been updated. The licensee response stated that this finding was an isolated omission due to an oversight by the filing clerk. We determined that this was an appropriate corrective action.

(Open) Finding 4-6, Tank Farm Building Stiffness. New analysis is under way to account for the discrepancies identified in the findings as indicated in the revised response. It has been found that the new accelerations of the as-built structure are generally lower than the design values. New Amplified Response Spectra values have been generated and their impact on mechanical systems and equipment is being studied. This finding is open pending further review of the analysis and the results by the NRC.

(Open) Finding 4-7, Structural Steel Bracing. Seismic responses of the tank farm steel structure are significantly different from the original model's response. The impact is an apparent overstress of some anchors and bracing members. A confirmatory analysis and physical modifications are under way. An assessment effort is expected to be completed by January 31, 1985. This item is open pending further review by the NRC.

(Closed) Finding 4-8, Containment Internals Earthquake Loads. The team confirmed that the Calculation Set CI-2 (page 2.5 and 11) was revised (Rev. 2, dated 11/28/83) to account for the earthquake loads. Thermal effects have been addressed in Appendix A to Calculation Set CI-2 (Rev. 1, dated 8/29/83).

(Closed) Finding 4-9, Stresses at Connecting Plates. The team confirmed that the effects of the eccentric connections have been evaluated and the resulting stresses are within the code allowables. These calculations have been incorporated in the Calculation Set CI-2, App. B, Rev. 3, dated February 6, 1984.

(Closed) Finding 4-10, Analysis of Eccentricity. The connections were grouped according to their similarity and loads were established which enveloped loads for each group. Each group was checked for the envelope loading condition. The analysis included all appropriate loads. During the analysis it was realized that the original mathematical model, which assumed fixed connections at the end of the beams, was unrealistic. The final beam verification program which is in progress, uses a modeling technique which accounts for flexible connections. This is more realistic and will result in absorption of the bending moments by the girder rather than by the connection.

The connection design will be checked according to the results of this new computer program and the final beam verification program. The team noted that the computer code used (STRUDL PSDI) was not listed in the FSAR.

The applicant stated that the FSAR would be amended to include the STRUDL program. The applicant submitted revised FSAR Appendix 3F (to be included in Amendment 54) in their supplemental response dated November 16, 1984.

(Closed) Finding 4-11, Torsion in Column. The team confirmed that effects of the eccentric connections have been evaluated in the Calculation Set CI-87, Rev. O, dated 3/5/84. The seismic loads have been evaluated by the square-root-of-the-sum-of-squares (SRSS) method and the thermal loads have been added absolutely. The increase in stresses is less than 3 percent and the resulting stresses are within the code allowables.

(Closed) Finding 4-12, Seismic Input Data. The team confirmed that the Calculation Set CS-15 (Rev. 4, dated 6/19/84) has been revised using data from seismic analysis SBSAG-4CS4. Review of the calculations disclosed that the data used in design were the more conservative of the two analyses (4CS4 and 4CS3) and that the discrepancies were minor.

(Closed) Finding 4-13, Computer Program Verification. The programs SHELL 1 and SHELL 2 have been verified by hand calculations and the results of the verification included in the Calculation Set CS-15 (Rev. 4, dated 6/19/84).

(Closed) Finding 4-14, Beam Loads. The Calculation Set WB-61 has been revised (Rev. 7, dated 6/1/84). In the revision, beam B9 has been replaced by beams B9A, B9B, B9C and B9D and the new calculations included the sag rod loads.

(Closed) Finding 4-15, Tank Farm Wall Reinforcing Design. The team confirmed that the Calculation Set CT 55 (Rev. 2, dated 9/25/84), "Local Effects of Pipe Supports on Concrete Walls and Beams", Sh. 35A, has been revised to adjust the value of the capacity reduction factor for combined bending and axial load. The calculation reviewed was selected as a sample with an understanding that all other, related calculations were reviewed for the proper use of the factor.

(Open) Finding 4-16, Refueling Water Storage Tank Stiffness. The Calculation Set 9763-SQ-001610737025 was reviewed. The new analysis of the tank was performed using a lump-mass stick model. Buckling of the shell due to compressive stresses has been considered. Review of the calculations raised two additional questions:

1. Effect of the ovaling of the shell due to earthquake motion, and
2. Comparison of the buckling criteria used with those approved in the past by the NRC.

This item remains open pending further review by the NRC.

(Closed) Finding 4-17, Equipment Vault Steel Framing Drawings. Calculation Set PB-76, "Primary Auxiliary Building Equipment Vault Steel Framing" was reviewed and it was confirmed that the structural design drawings F-101558 and F-101562 reflect the information contained in the calculations.

(Closed) Finding 4-19, Liner Anchor Test Machine Calculation. United Engineers presented a letter from Prof E. Burdette, dated June 6, 1984, which indicated that:

a) The tests were performed in 1981 and 1982.
b) The Tinius OLSEN Universal Testing Machine was calibrated in 1980 and 1983, thus before and after the tests.
c) The calibration results varied by about 1 percent, thus indicating that the accuracy of the machine was maintained during the period of the tests.

(Closed) Finding 4-20, Spacing of Horizontal Stirrups. The team verified that United Engineers drawing F-101402 was revised so that the engineering and shop drawings are consistent (Rev. 14, dated 1/12/84).

(Closed) Finding 4-21, Site Approved Change. United Engineers Administrative Procedure No. 38 "Cutting Reinforcing Steel in Permanent Concrete Structures" has been revised (Rev. 2, dated 5/11/84) to eliminate references to Request for Information (RFI) and Site Approval Change (SAC) and replace them with Engineering Change Authorization (ECA), thus making AP-38 the document for approval of cutting reinforcing bars. The revision of AP-38 is now consistent with the provisions of Administrative Procedure No. 15 "Changes to Project Documents".

5. Electrical

The team reviewed the licensee responses to the findings in the Electrical area and found them acceptable. No reinspection was performed in this area.

6. Instrumentation and Control

(Closed) Unresolved Item 6-2, Associated Circuit Designations. The team requested clarification of the United Engineers methodology for designating a circuit as either "Train A Associated" or "Train B Associated". United Engineers stated that no formal methodology or criteria exist for the designation of associated circuits, but that the circuit power source is ordinarily used as the basis. United Engineers stated that, regardless of which designation was chosen, the planned analysis of the impact of unqualified non-safety-related component failures on safety-related electrical busses would encompass both the source and the load portions of the circuit, and would therefore include the Train A-to-Train B interface of concern to the team.

The team agrees with this position, and closed this unresolved item based on the proposed scope of circuit analysis to be performed by Yankee Atomic and United Engineers.

(Closed) Finding 6-1, Computer Specification. The types of design engineering work performed by Public Service of New Hampshire for Seabrook were described by Yankee Atomic during the reinspection. In addition to the process computer specification,

specification of meteorological tower requirements, construction roads, construction buildings, designation of protective relays by catalog number, and designation of setpoints for substation protective relays were performed by Public Service. Based on this additional clarification, Finding 6-1 is closed.

(Closed) Finding 6-3, Instrument Power Source, and Finding 6-4, Standard Equipment List. Recent issues of two United Engineers computerized listing documents identified in two findings were examined by the team. For both the Standard Instrument Schedule and the Standard Equipment List United Engineers has added a legend at the top of each sheet that the document is "for information only."

(Closed) Finding 6-6, Nuclear Safety-Related Legend. Approximately 40 sheets of the Westinghouse Solid State Protection System Block Diagram were examined by the team. Correct marking of the Nuclear Safety-Related legend has been accomplished for the required sheets in this drawing.

(Closed) Finding 6-7, Qualification Test Reports in Site Data Packages. The initial response indicated that nonconformance report tags would be used to identify that environmental qualification reports were not completed and were not provided in the site data packages for equipment received from vendors. This planned approach was deemed by the applicant to be overly complex, and a simpler method using the Class 1E List and Environmental Qualification Report to track completion of environmental qualification was proposed in the revised response.

The team reviewed the Class 1E List (M-505300 Revision 12 dated 10/22/84) and determined that the environmental qualification status of equipment was listed by purchase order number. The team reviewed an unnumbered Equipment Qualification Report (Environmental Qualification of Electric Equipment Important to Safety, Revision 1, dated 8/24/83), and noted that it contained environmental qualification status information in Appendix B. The team determined that environmental qualification status information was provided in each document, and that the documents were controlled by United Engineers procedure.

Based on the revised plan to use these two controlled documents to track completion of environmental qualification activities for safety-related equipment, the elimination of the nonconformance tag requirement is considered acceptable.

(Closed) Finding 6-8, Qualification Test Conditions (ITT Barton). The team reviewed United Engineers 252-16 and 252-16S Specification changes submitted to ITT Barton in early 1984. Since ITT Barton had not yet responded to United Engineers, a telephone call was placed to obtain clarification of any remaining differences between the United Engineers specifications and the ITT Barton qualification test results.

Non-safety-related instruments covered by the 252-16 Specification will be specified for either 3 megarads or .02 megarads exposure depending on the internal parts provided for a particular device. These radiation exposure values are consistent with the qualification test results and represent a satisfactory resolution for the non-safety-related components.

During the inspection, the four safety-related components covered by the 252-16 specification were downgraded by Yankee Atomic and United Engineers based on their actual function in the plant. This downgrading eliminates the need for qualification of these components at 375 degrees F.

Based on the proposed specification changes which were committed to by the applicant in the revised response following the reinspection, this finding is closed.

(Closed) Finding 6-12, EAH System Failure. This finding concerned a design inadequacy in that both containment enclosure emergency exhaust filter-fan trains can be rendered inoperable by common mode failure of non-safety-related current-to-pneumatic converters which modulate the fan vortex inlet dampers.

The team reviewed United Engineers letter SBU-91319, Design Change Notice DCN-660031A, and evaluation BER-703A which were developed by United Engineers to resolve this finding. Based on an evaluation of the system, United Engineers has concluded that the fan inlet vortex dampers can remain in the full open position at all times thus producing maximum negative pressure within the containment enclosure.

United Engineers proposed to implement a partial modification to the system wherein the pneumatic air supply line to the inlet vortex dampers will be removed, the electrical power to the solenoid valves will be disconnected, and the inlet vortex dampers will be placed in the full open position. Yankee Atomic has stated that this proposed system modification will ensure that the system performance will not be degraded and the operator will not be misled by erroneous indication. An engineering change authorization will be developed by United Engineers to detail the required drawing and hardware changes for the modification to be completed in the field. In addition, Yankee Atomic has agreed, as documented in the revised response, to remove the fan inlet vortex control switches from the main control board based on the team's evaluation of this issue.

(Closed) Finding 6-13, RHR System Failure. This finding concerned a design inadequacy in that the emergency core cooling function of both Residual Heat Removal trains can be rendered inoperable or seriously degraded by common mode failure of non-safety-related current-to-pneumatic converters due to environmental or seismic effects concurrent with improper placement of valve control switches.

Yankee Atomic has committed to implementing a specific Technical Specification on the main control board control switches for the Residual Heat Removal heat exchanger temperature control valves to ensure that they are in the proper position during plant operation. In addition, Yankee Atomic has committed (in the revised response) to implement a circuit modification to provide an alarm when these valve control switches are in the modulating position based on the team's evaluation of this issue and a desire to aid operators in meeting the technical specification. The alarm will be incorporated into the bypassed and inoperable status monitoring system which is designed in accordance with guidance provided by Regulatory Guide 1.47.

(Open) Finding 6-14, PCCW System Failure. This finding concerned the Primary Component Cooling Water system design wherein the design consisted of unqualified loads of associated circuits; an analysis was not conducted to address the potential degrading effects of these loads to ensure that the system safety function was not degraded below acceptable levels.

For the generic implications of this finding, United Engineers was to evaluate the design of other systems to ensure that unqualified current-to-pneumatic converters and other non-safety-related equipment would not be the source of common mode failure of safety-related systems.

The team observed during its reinspection that United Engineers had not documented or completed the circuit analysis for the primary component cooling water heat exchanger temperature control valves (TV-2171-1, TV-2271-1, TV-2171-2 and TV-2271-2) to demonstrate that deviations from separation criteria and use of unqualified components in the design will not degrade system performance below acceptable levels. Yankee Atomic provided an additional response which stated that calculation CALC. NO. 9763-3-ED-00-64-F will be developed to demonstrate that the maximum credible circuit voltage and current available due to failure of unqualified components will not degrade safety circuits. An important factor in the analysis will be to establish the seismic qualification of the Westinghouse process instrumentation electronic circuit cards which are used in the design.

Calculation CALC. NO. 9763-3-ED-00-64-F has not been developed by United Engineers to demonstrate that the failure of unqualified components in the primary component cooling water system will not degrade safety circuits. Follow-up inspection is required.

With respect to the generic implications of this finding, the team observed that United Engineers had evaluated approximately 55 electrical schematic packages consisting of 1500 circuits. This review was conducted to ensure that Class 1E circuits which are connected to non-class 1E components and circuits are not degraded by failure of the non-Class 1E components. The preliminary work has been completed and several problem areas were identified, however, the team found that the review was not adequately documented to substantiate the conclusions. United Engineers is continuing its efforts in this area. The team also observed that approximately 65 systems consisting of 2000 instrumentation loops were being reviewed to verify that safety systems are not rendered inoperable or seriously degraded by common mode failure of unqualified components such as current-to-pneumatic converters. In the additional response Yankee Atomic stated that these generic studies are still in progress. An outline of the methodology was included in the revised response. The basis and documentation for these studies will be presented in calculation CALC. Nos. 9763-3-ED-00-63-F and 9763-5-ES-00-1F.

Calculation CALC. Nos. 9763-3-ED-00-63-F and 9763-5-ES-00-1F has not been completed by UE&C to demonstrate that the failure of unqualified components will not degrade safety systems below acceptable levels. Therefore, this generic issue is not resolved.

This item remains open pending licensee action and NRC inspection.

(Open) Finding 6-15, Temperature Control Circuit Isolation. This finding concerns the design of the Westinghouse process instrumentation electronic cards and circuits in main control room panel CP-152B wherein the design consisted of non-safety-related circuits interconnected with safety-related circuits; an analysis was not conducted to address the potential degrading effects of these circuits to ensure that the safety related circuits are not degraded below acceptable levels.

The team observed during its reinspection that UE&C had not documented or completed the circuit analysis for panel CP-152B to demonstrate that use of unqualified components in the design will not degrade the Class 1E circuts below acceptable levels. The additional response stated that evaluation MM24272A will be developed to demonstrate that the non-safety-related components in panel CP-152B will not degrade safety circuits. An important factor in the analysis will be to establish the seismic qualification of the Westinghouse process instrumentation electronic circuit cards and panel internal components which are used in the design.

'This item remains open pending completion of the evaluation and follow-up inspection.

(Open) Finding 6-17, Circuit Breaker Fault Current Qualification. Discussions were held with United Engineers regarding the absence of qualification data to support the fault current interruption characteristic required of the E22 and BQ circuit breakers at Seabrook.

In this instance, these circuit breakers are designated as safety-related devices since they are assumed to be an isolation device between unqualified non-safety-related loads and the Class 1E busses. The required safety function of these circuit breakers is to open the electric circuit based on fault current. However, demonstration of this fault current interruption requirement was not accomplished during or after seismic qualification testing of these particular breakers. The team's position was that the fault current interruption characteristic should be demonstrated either by qualification test or by an analysis that extrapolates qualification results of similar circuit breakers.

No agreement on this technical issue was reached during the reinspection. This finding remains open pending further review by NRC.

(Open) Finding 6-30, Conduit Marking. This finding concerned the adequacy of Class 1E conduit marking. The installed and exposed Class 1E conduit is not marked to identify the separation group at periodic intervals in accordance with IEEE Std. 384-1974, FSAR appendix 8A and Regulatory Guide 1.75 Revision 2.

The revised response stated that the FSAR will be revised to take exception to the requirement to mark exposed Class 1E conduit to identify separation group at periodic intervals (every 15 feet). This item remains open pending further NRC review.

7. Exit Interview

A management meeting was held at the conclusion of the inspection on November 9, 1984 to discuss inspection scope and findings as detailed in this report (see Paragraph 1 for Attendees). No written information was provided to the licensee at any time during the inspection.

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