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February 11, 1985

Mr. S. E. Moore
Oak Ridge National Laboratory
P.O. Box Y
Oak Ridge, TN 37830

Subject: Vogtle, Design Documents Audit, Meeting at Monroeville,
February 7, 1985

Dear Sam:

My letter to you dated January 31, 1985 summarized the status of our audit prior to the 2/7/85 meeting. This letter discusses the 2/7/85 meeting under the headings

- (1) Design Report on Pressurizer Surge Line (ECR No. 18)
- (2) Wording for Valve Operability Qualification As Applicable to Vogel (ECR Item 10)
- (3) Westinghouse Engineering Memorandum No. 5045, Stress Report for Class 1, 6-inch and Larger Gate Valves (ECR Item 8).
- (4) Control of Minimum Wall Thickness

(1) Design Report on Pressurizer Surge Line

The Design Report was not available and, according to Westinghouse, will not be available in final form until after the "as-built" dimensions are available. A completion date of July 1986 was suggested by Westinghouse.

A compilation of calculations identified as an Analysis Package for the surge line was available at the meeting. Enclosure 1 is a "Table of Contents" from the Analysis Package. Enclosure 2 is a page described by Westinghouse as "Input Directions".

While at the meeting, we reviewed the contents of the Analysis Package. With one major and two minor exceptions the contents of the Analysis Package

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appeared to comply with the Code definition in NCA-3551.1: "The Design Report is the design document which includes stress or calculations or both to show that the allowable limits are not exceeded for the loadings specified in the Design Specification".

The major exception concerns the important requirements contained in NB-3640, "Pressure Design". We found nothing in the Analysis Package that indicates that the requirements of NB-3640 have been or will be met.

The two minor exceptions consisted of

- (1) The Code requires an evaluation of the effect of out-of-roundness on stresses due to cyclic internal pressure. The surge lines contain pipe bends which apparently can be out-of-round by up to 6%. Westinghouse indicated that out-of-roundness has not been included in their fatigue evaluations made so far. (We describe this as a minor exception because the surge line dimensions/pressures are such that we think the out-of-roundness effect will turn out to be small for this particular piping.)
- (2) In evaluation of branch connections, the Code requires simultaneous consideration of branch moments and run moments. In Deadweight and Thermal analyses, Westinghouse has apparently "decoupled" the Surge Line from the Main Coolant Loop. This leads to some uncertainty as to whether the moments so obtained are sufficiently representative of the actual coupled lines. (We describe this as a minor exception because the details of the surge line evaluation suggest that a coupled analysis would not differ significantly from the decoupled analysis.)

While the Design Report for the surge line was not available, it is apparent that if that Report were to contain the Analysis Package data, it would be several inches thick. Further, the Analysis Package calculations are themselves abstracted from computer print-outs. If the computer outputs were included, the Design Report might be several feet thick. There is no apparent advantage in having a Design Report which embodies all these detailed calculations; provided

- (a) The Design Report includes a comprehensive and understandable (to an independent reviewer) road map to the files in which the detailed results are stored, and

- (b) The Design Report includes a description of how assurance is obtained that the loadings given in the Design Specification were used in the evaluations.

In summary, we deem our audit of the Design Report of the Surge Line would be satisfactorily completed by a commitment from the applicant to include in the final Design Report the following:

- (A) A section on meeting NB-3640 requirements that would address aspects such as:
 - (a) Selection of corrosion/erosion allowance, "A" in NB-3641.1
 - (b) Branch connections, NB-3643
 - (c) Attachments (if any), NB-3645

The detailed evaluations need not be included in the Design Report, but the Design Report should clearly show where these detailed evaluations are filed and be in a form that can be understood by an independent reviewer.

- (B) A section (Appendix ?) which provides a comprehensive and understandable (to an independent reviewer) road map to the files in which the detailed results are stored, and a commitment to maintain these files for as long as the Design Report is required to be kept.
- (C) A section (possibly as part of (B) above) which describes how assurance was obtained that the loadings (e.g., earthquake spectra) given in the Design Specification (identified: e.g., 955211, Revision number) were used in the evaluations that show that Code limits are not exceeded.
- (D) A section which briefly describes evaluation aspects which do not follow directly from Code rules. Some examples may be:
 - (a) Inclusion of out-of-roundness effects in fatigue evaluations
 - (b) Coupling of piping systems in analyses
 - (c) Use of Stress Indices, if any, which are not included in the Code.
 - (d) Use of combinations of generic system analyses with Vogtle-specific analyses.

(2) Wording for Valve Operability as Applicable to Vogtle (ECR No. 10)

ECR No. 10 concerned a missing portion in General Valve Spec. G-678852/Vogtle-specific Valve Spec. 952172. In the Westinghouse submittal, dated 12/10/84, this missing portion was supplied but I did not recognize it as such. The portion supplied at the 2/8/84 meeting is included herewith, as Enclosure 3. I deem the audit of this particular document as completed.

(3) Stress Report for Class 1, 6-inch and Larger Gate Valves

A sheet (Enclosure 4 herewith) was furnished at the January meeting, which was purported to indicate that the owner (or his designee) had reviewed the Report as required by the Code. I pointed out that the sheet did not clearly indicate that Georgia Power, as owner of Vogtle, had reviewed the Report. During the subsequent discussion of disorder of the Report furnished to me by Westinghouse, Georgia Power representatives at the meeting seemed uncertain as to whether the sheet (Enclosure 4) did, in fact, represent their review of the Report by authorizing Westinghouse to conduct that review for them. A commitment was made by Georgia Power/Westinghouse to provide a written clarification to the question.

The Report itself is deficient from a quality control standpoint. For example, there are approximately 500 unnumbered sheets in the Report. As perhaps indicated by the disorganized two-inch collection of sheets (with at least several sheets missing) that was furnished to us by Westinghouse, there appears to be no way to assure that a copy of the Report is complete and the sheets are in the intended sequence; except, possibly, by a painstaking effort by the writer of the Report.

However, from a technical standpoint, the Report appears to indicate a reasonable effort to demonstrate compliance with the Code rules of NB-3500. Accordingly, I am willing to drop our audit of this Report upon receipt of a satisfactory response on the Owner's review question.

(4) Control of Minimum Wall Thickness

This item was not on my agenda for the meeting but developed during our review of the Analysis Package for the surge line. The problem develops in connection with use of nominal wall thicknesses in Code Eqs. (9) through (14).

If the only control on minimum wall thickness is Code Eq. (1) or (2), then the minimum wall may be much less than the nominal wall. The problem is partially* addressed in the present Code, NB-3683.5 by the restriction that wall thickness must be not less than 7/8 times the nominal wall thickness.

Westinghouse, at the meeting, could only state that minimum wall thicknesses are not less than required by Code Eqs. (1) or (2). Westinghouse made a commitment to review this potential problem, perhaps starting with an inquiry to piping fabricators involved with Vogtle piping to see if, by any chance, the fabricators maintained some control of minimum wall thickness equivalent to a 7/8 times nominal wall. A written response is expected.

(5) Summary

(a) Design Report on Pressurizer Surge Line

A reply to the proposed commitment is expected.

(b) Stress Report for Class 1, 6-inch and Larger Gate Valves

A reply concerning the Owner's review question is expected.

(c) Control of Minimum Wall Thickness

A reply concerning control of minimum wall thickness, other than by Code Eqs. (1) or (2), is expected.

* We should review the adequacy of Code Class 1, 2 and 3 rules from this possible minimum versus nominal aspect, but not as a part of the Vogtle audit.

Yours very truly,

Everett

E. C. Rodabaugh

ECR/mr

Enclosures:

- (1) Table of Contents, Analysis Package
- (2) Input Directions, Surge Line Analysis
- (3) Valve Operability Wording
- (4) Sheet for Stress Report on Valves

cc: Melanie Miller
Dave Terao

SURGE LINE

Westinghouse/Yogt/c : Table of Contents to Analysis Package on Surge Line
Obtained at 2/7/85 Meeting

- SECTION 1 Microfilm Log
- SECTION 2 Support Load Generation
- SECTION 3 Special Component Qualification and Additional Work
(Nozzle Loads, Etc.)
- SECTION 4 Secondary Stress Qualification/Break Selection
(Fatigue, Eq.#12, #13 Break Selection)
- SECTION 5 Primary Stress Qualification (Eq. #9 Design/Faulted)
- SECTION 6 Computer Solutions/Select/Combine (Dwt., Seismic,
Thermal, Jet, Etc.)
- SECTION 7 Modeling and UPDATES
- SECTION 8 BPC Initial Package/All Subsequent Packages/REF's
- SECTION 9 Final As-Designed Reconciliation
- SECTION 10 BPC Final As-Designed Input

W/Vogtle - Input Directions
Surge Line Analysis
Obtained at 2/7/85 Meeting

Encl. 2
ECR+ SEM, 2/11/1
1 of 1

LETTER	DATE	DATA
(1) BW-3202	1/30/81	Original Surge Dwg. (Rev. 0)
(2) GP-5052	6/31/81	Data Clarification
(3) GP-5124	8/13/81	Jet Data Clarification Request
(4) BW-3457	8/14/81	Revision of Jet Data
(5) AM-SSA-1744	9/10/81	Resolution of Jet Quest.
(6) GP-5485	12/28/81 (12/4 Mtg. Minutes)	Identifies Changes to to Dwg's. & Jets
(7) BW-3556	12/17/81	Rev. 1 transmitted With Hand Markups
(8) BW-3565	12/29/81	Revised Jet Loads
(9) BW-4034	6/21/83	As-Designed Package 1X4DL4A17, Rev. 7

Motor Operated Valves

Enc. 3
E-CR to SEM, 2/11/85

1 of 2

This will be inserted in Vogtle - Specific Valve Spec 952072.
It modifies General Valve Design Spec. 678852,
Obtained at 2/7/85 Meeting

- 3.5.3.5 Seismic Qualification - Compliance with Paragraph 3.1.13¹³ for seismic conditions shall be demonstrated.
- 3.5.3.5.1 An extended structure analysis shall be done by simultaneously applying static loads equivalent to the peak accelerations along three mutually perpendicular axes at the center of gravity and the resulting moments and loads at the sections of the valve assembly considered most affected. The analysis shall be submitted to W NEED.
- 3.5.3.5.2 Extended structure deflections which result from faulted condition loads and which affect valve function shall be evaluated. Determination of the deflections and their effect shall be included in the analysis.
- 3.5.3.5.3 The method of analysis shall be verified by a static deflection test of representative valves. The test shall encompass the following:
- A. Valve mounting shall represent the worst case installation. The valve assembly shall include all accessories intended to be valve mounted.
 - B. The valve body shall be pressurized at design pressure.
 - C. The faulted condition seismic loads shall be applied at the center of gravity of the extended structure in the direction of the weakest axis of the extended structure.
 - D. Valves shall be cycled with the extended structure in the deflected position.
 - E. Where a design differential pressure tends to oppose valve opening, tests shall be performed with the design differential pressure initially applied across the disc. Where a design differential pressure tends to assist valve opening, the test shall demonstrate the ability of the operator to maintain the valve in the closed position.

Encl. 3
2 of 2

- F. Operating times in the deflected and undeflected positions shall be compared and the significance of any change shall be evaluated.

Subsequent to deflection testing, the effect on the valves shall be evaluated:

- A. A mainseat leakage test shall be conducted. Seat leakage shall be compared to production test acceptance criteria and the significance of any excess shall be evaluated.
- B. The valves shall be disassembled and examined. Any damage shall be evaluated.

Test reports shall be submitted to W NEED.

3.5.3.5.4 Mountings shall be evaluated when accessories are mounted on the valve assembly. Deflections, natural frequencies and their effects on the mounting and the mounted accessory shall be included in the evaluation.

3.5.3.5.5 Valve operators, position indication devices and control units shall be seismically qualified in accordance with IEEE-323 and IEEE-344. Qualification reports shall be submitted to W NEED.

PAR SUBMITTAL FORM
HOUSE FORM 84936E

PAR 2/11/85 (1 of 1)

C-0495

FROM
WESTINGHOUSE ELECTRIC CORPORATION
NUCLEAR ENERGY SYSTEMS
PO BOX 355
PITTSBURGH, PENNSYLVANIA 15230
ATTN: E. D. Webster

TO
WEMD
CHESWICK, PA. 15024

W. H. Black WB-0-151

PAR NO. 40 PAGE 1 OF 1
ISSUE DATE 6-3-80
ENG. LTR. NO. AE-VE-2078

REVISION ACTION(S) REQUIRED BY THIS PAR MUST BE COMPLETE

COMPONENT
Auxiliary Valves
SPIN NO./ I.D.
GAE/GRF
SUPPLIER SERIAL NO.

P.O.
SEE BELOW
 G.O.
SUPPLIER ORDER NO.

PAR SUBMITTAL CODE
A = FOR APPROVAL
I = FOR INFORMATION
(Use Proper Code)

SEQUENCE CODE (Use proper Code)
O - ORIGINAL SUBMITTAL
R - RESUBMITTAL DUE TO COMMENTS
V - RESUBMITTAL DUE TO SUPPLIER CHANGES
M - RESUBMITTAL DUE TO DOCUMENT QUALITY

APPROVAL STATUS CODE
A - APPROVED
C - APPROVED W/COMMENT
RESUBMITTAL REQUIRED
D - DISAPPROVED
I - RECEIVED FOR INFORMATION
(Use Proper Code)

ITEM NO.	P.O. ITEM NO.	DRAWING NO./SPEC. NO. PROCEDURE NO.	REVISION	DESCRIPTION/TITLE	ENGINEERING COMMENTS
1	A	EM-5161	01	0 Stress Report 6" + Check Valves	A
2	A	EM-5405	01	0 " " 6" + Gate Valves	
Also for G.O. & P.O. below - PAR#					
G.O.	AT-68563-ARG-AR1	P.O. 546-NCJ-191614-BN			44
G.O.	AT-68561-ARG-AR1	P.O. 546-NCJ-191604-BN			40
G.O.	AT-68512	P.O. 546-NCJ-191613-BN			46
G.O.	AT-68510	P.O. 546-NCJ-191603-BN			40

ADDITIONAL ENGINEERING COMMENTS
THIS CERTIFIES THAT STRESS REPORTS EM #5161-1 AND EM #5405-1 HAVE BEEN REVIEWED PER REQUIREMENTS OF SECTION III, DIV. 1, OF THE ASME BOILER AND PRESSURE VESSEL CODE, PARA'S NA-3350 AND NB-3500 AND SATISFIES THE DESIGN AND OPERATING CONDITIONS STATED IN EQUIPMENT SPECIFICATIONS G-678852-2 AND G-678853-2.

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WRITTEN BY & DATE
BONFIGLIO [Signature] 7/28/80
PAR APPROVED BY & DATE
K. DELUSE [Signature] 7/28/80

PURCHASING AUTHORIZATION
If information contained herein does involve a change in price, delivery or terms and conditions, you are not to proceed in accordance with PAR but pursue the scope as currently defined by the order and immediately notify the buyer.
This PAR confirms WIRE Verbal to _____ Date _____
Please acknowledge receipt and acceptance of this PAR by signing and returning one copy to Westinghouse Electric Corporation at the above address, within 15 days from date of this PAR.
MARK for attention of E.D. Webster 6/3/80

ACKNOWLEDGMENT
(RETURN IMMEDIATELY)
ACKNOWLEDGED AND ACCEPTED BY _____
SIGNED BY SUPPLIER _____ DATE _____