



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PENNSYLVANIA 19406

**MAR 29 1990**

MEMORANDUM FOR: Dennis K. Rathbun, Director, Congressional Affairs,  
Office of Governmental and Public Affairs

FROM: William T. Russell, Regional Administrator,  
Region I

SUBJECT: RESPONSE TO QUESTIONS FROM DR. H. MYERS REGARDING THE  
SEABROOK REACTOR COOLANT PUMP SUPPORT LEGS

In a memorandum dated February 27, 1990, the responses to nineteen questions regarding the Seabrook Station reactor coolant pump supports were provided to you for forwarding to Dr. Henry Myers. I indicated that the regional staff was further reviewing the basis for the additional set of plate washers found installed on the subject supports. Dr. Myers has now raised additional questions with respect to the Region I response to his questions.

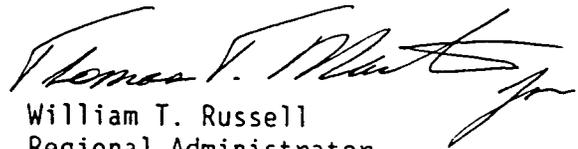
Regional review has verified the acceptability of the existing configuration. The original Westinghouse fabrication drawing did not illustrate the use of the subject plate washers in the reactor coolant pump support assembly design, because the particular edition of the ASME Boiler and Pressure Vessel code to which these supports were fabricated did not require plate washer usage. However, the governing ASME code for installation of the supports, which was promulgated after the original fabrication of support components, required the placement of plate washers over long-slotted or oversized holes. The use of different ASME Code addenda for fabrication vs. installation is not unusual because of the time span involved with project planning. NRC inspection identified missing plate washers with respect to the reactor pressure vessel (RPV) supports, also supplied by Westinghouse, in 1981, and documented the issue as an unresolved item (see Enclosure 1 for applicable section for IR 50-443/81-03). The licensee then reviewed the question of RPV installation requirements and issued a design change (ECA 01/23550) on May 11, 1981, specifying that plate washers would be installed on not only the RPV supports, but all ASME supports supplied by Westinghouse, including the reactor coolant pump leg assemblies that are the subject of Dr. Myers' questions. This resolution of the earlier NRC identified problem with supports was acceptable as documented in IR 50-443/81-05. While the closure of the NRC unresolved item 81-03-04 (reference: closure IR 81-05) specifically addresses the RPV support connections, the RCP supports were generically affected by the same noted ECA which specified the installation of plate washers for all NSSS supports.

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In response to specific questions asked by Dr. Myers in his cover letter, it is noted that in order to get an accurate representation of the as-built condition of the RCP support assemblies, all applicable ECA's must be reviewed in conjunction with the original Westinghouse fabrication drawing. This is not an isolated requirement relative to the RCP supports, but rather is generally true of configurations involving component fabrication drawings, which are later revised by documented design changes. The basis for our conclusion that discrepancies between the authorized design and the as-built conditions do not exist is the design change control process, which was in effect during construction and which was inspected on an ongoing auditing and programmatic basis by the NRC. As noted, the drawings must be viewed with the design change documents applicable to them to get an accurate representation of the final design. In the case of the RCP support details, this system worked and no safety problems were identified.

Hence, the difference between the original Westinghouse fabrication drawing and the as-built reactor coolant pump support details represents an example of how an ASME Code revision was acceptably handled to ensure compliance with committed code requirements. No safety problem exists with the existing installed support configuration; no safety problem exists with the design change process that authorized the current configuration; and no safety problem exists with either the controls or the quality records. Based on our review, we have concluded that the licensee complied with regulatory, code and design requirements in the installation of the reactor coolant pump supports.

The specific responses to Dr. Myers' questions are provided in Enclosure 2.

  
William T. Russell  
Regional Administrator

Enclosures:  
As stated

cc:  
James M. Taylor, EDO  
Thomas E. Murley, NRR

ENCLOSURE 1

NRC Inspection Report 50-443/81-03  
Section 6 - Nuclear Steam Supply System (NSSS) Supports (Unit 1)

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b. Reactor Pressure Vessel Supports

The inspector examined the material and method of installation of the Unit 1 Reactor Pressure Vessel (RPV) support system. Material type, bolt traceability and certification, component configuration, and field installation techniques were all checked against ASME Code requirements and criteria specified in the following documents:

- UE&C Drawings F101483 (Revision 2), F101415 (Revision 5) and F101426 (Revision 3)
- Westinghouse Drawing 1186F47 and Engineering Specification G-952628 (Revision 1)
- Pullman Field Instructions FI-102 and FI-116 (both Revision 0)

While no items of noncompliance were identified, the inspector noted that the connection of the RPV box supports to the reactor cavity concrete was detailed to utilize high-strength bolts. The applicable drawing (F101483) committed to ASME B&PV Code, Section III, Subsection NF and illustrated a slotted hole to be fabricated in one of the plies of this bolted connection. However, the installation criteria for these joints, as specified by the governing installation code (ASME-Winter 77 Addenda), indicated that the slot dimensions were such so as to require a 5/16" plate washer over the slotted ply. No plate washer was supplied. Additionally, ASME III, NF requires these high-strength bolted connections to have the nut either torqued or locked, but the Pullman instructions specified only snug-tightness and the length of the bolts precluded double-nutting.

The inspector questioned the apparent conflict between the actual support installation and the governing requirements of the applicable ASME Code edition. He discussed this issue with the licensee Field QA Manager and Site Manager at exit interviews on March 27 and April 1, 1981 and indicated that pending clarification of this conflict with the ASME Code, this item is unresolved (443/81-03-04).

Question 01

If the design of the RCP supports had incorporated in it the ability to move the support as stated, why was an ECA required in order to make the change?

Also, if the design was such that the ability to move the supports was incorporated, why did it take three iterations of the ECA to get the change correctly incorporated?

Reponse

An Engineering Change Authorization (ECA) was necessary because the RCP support leg movement was accomplished with the RCP casing attached to the leg. The ECA specified criteria regarding pump volute vertical movement, pump flange level checks and weld examination after the relocation of the leg was complete to ensure that no unacceptable stress conditions were applied to the connected RCP casing or piping.

Revision A to the ECA authorized the leg relocation for one reactor coolant pump (RCP-1C). Revision B authorized leg relocation for all four reactor coolant pumps and included additional weld examination criteria. Revision C authorized a larger tolerance in the RCP casing vertical movement, as authorized by Westinghouse, without overstressing the components and accommodated the base plate component adjustment.

Question 02

Response No. 2 stated "The subject RCP support column base assemblies were installed but not yet grouted and connected as designed to the existing anchor bolts." What does this mean? Does this explain the existence of the 6" x 6" plate washers that do not belong there?

Response

The quoted statement means that the RCP support columns were attached to the base plate with the base plate attached to the anchor bolts. The leveling nuts supported this assembly and the grout under the base plate had not yet been installed. This interim installation configuration had no relation to the existence of the 6" x 6" plate washers. Based on our review, these plate washers did "belong there" since they were required by the applicable edition of the ASME Code.

Question 03

What was the cause of the three changes to the ECA (08/1557, Revisions A, B and C) within thirty-one days? What lack of control was present in the process? Did any of these design changes call for the installation of the 6" x 6" washers that have been discovered?

Response

See the response to Question 1. It is not unusual to expand the scope of a design change and revise the criteria used in implementing it, as necessary. In this case, both situations occurred as the original design change for one pump was expanded to apply to all four pumps. Also, the specified criteria for pump casing vertical motion was increased, as approved by Westinghouse, to accommodate the situation encountered in the field to successfully implement the RCP leg relocation. This is not indicative of a "lack of control," but rather evidence of a design change process working as intended, i.e., a change in the scope or the criteria requiring a design change revision with its requisite approvals.

The 6" x 6" plate washers were required by the ASME installation code. The noted ECA revisions did not relate to the existence or installation of the plate washers. However, ECA 01/2355D did require the installation of the 6" x 6" plate washers.

Question 04

Considering all of the questioning and concern that has been raised concerning the movement of the RCP support, why has the NRC been so consistently unconcerned in its answers to the individuals? The continued interest should have been enough to get the NRC to look at the supports and compare the installation with the design before 1990.

Response

The NRC has responded to all questions regarding the subject movement of the RCP supports. This includes questioning of the NRC Senior Resident Inspector by a site worker in 1982 (see response to Question V from Dr. H. Myers' questions dated February 19, 1990) up through the present set of questions by Dr. Myers. There is, however, a difference between a question and a concern. The NRC has had an interest regarding the RCP leg movement as evidenced by the NRC inspections of this process. However, each inspection has resulted in evidence of an authorized, controlled and acceptably implemented design change.

A comparison of installation configurations to the design requirements is a normal sample point in the NRC inspection process. As noted, NRC inspection to such criteria in 1981 (reference: Enclosure 1) resulted in the recognition that plate washers were required for NSSS support code compliance. Subsequent NRC inspections identified no configuration concerns or design conformance problems in this area.

Question 05

Response 5 states "A detailed NRC review of the design data providing the basis for acceptability of the design change was first conducted in 1987 and is documented in Inspection Report 87-07." How could a detailed review be conducted in response to an allegation and not include a physical inspection of the installation at the time? This inspection would (or would it?) have revealed the installation that was not in accordance with the design.

Response

The inspection documented in Inspection Report (IR) 87-07 not only included a physical inspection of the installation, but also independent NRC measurements of the column offsets in loops "A" and "C". It should be noted that the NRC technical response to the issue documented in IR 87-07 even referred to photographs of the reactor coolant pump supports which were taken by the inspection team and included in the inspection report.

There was never a concern raised regarding the RCP leg movement or support details, but rather a concern raised by the Employees Legal Project regarding overstressing conditions that might have resulted from the movement. NRC physical inspection and measurement activities, as documented in IR 87-07, were accomplished to respond to this concern. This inspection did not identify any design nonconformances because none existed.

Specific inspection of the base plate assembly details was not conducted in 1987. The discovery of the plate washers in 1987 would not have caused any concern to NRC personnel, not only because of the known ASME Code requirements, but also because earlier NRC inspection activity (reference: Enclosure 1) was directly related to the need for installation of plate washers. The original inspection focused on the stated concern regarding the overstressing of the piping and vessel nozzles. Questions relating to the RCP support base plates and anchorage are of recent vintage. In reviewing the recent questions, the inspector noted the plate washers were not on the original fabrication drawing and, as is our usual practice, raised the issue as a question requiring resolution and subsequently reconfirmed the acceptability of the installed configuration.

Question 06

Who was responsible for the actual installation of the RCP column base supports? While Westinghouse approved the design, were they responsible for the installation or was it actually accomplished by some other organization?

Response

Pullman-Higgins, the site piping, support and component installation contractor, installed the RCP column base supports, with construction manager overview by United Engineers and Constructors (UE&C) and with design change control by UE&C with Westinghouse's concurrence. It is noted that the anchor bolt installation was provided by the site civil contractor, Perini Corporation.

Westinghouse did not implement the actual installation of the RCP column base supports, but did have engineering representatives on site to monitor activities affecting Westinghouse components and the NSSS scope of work.

Question 07

Explain how material used for the 6" x 6" washers that were found to be installed outside of the design can be traceable material. If the material was not installed in accordance with the design how can you trace the material to the correct installation and purchase order? Where did the material come from? Why was it installed? Who installed it? How can the NRC accept so readily the installation of material that is not in accordance with the design? The material was apparently only located as a result of continued interest by this office and concerned citizens, why did the utility not identify this improper installation to the plant? What other material is installed in violation to the design at Seabrook?

Response

As already noted, the installation of the plate washers was in accordance with the design requirements for the edition of the ASME Code governing support installation and was controlled in accordance with the design change program (i.e., ECA implementation in effect at Seabrook Station during the period of construction). As noted earlier and as evidenced in Enclosure 1, NRC involvement in the need for plate washers dated back to 1981, prior to the need for a design change to relocate the RCP support legs.

The 5" x 6" plate washers were fabricated at the site by Pullman-Higgins from ASME Code field bulk stock. The ASME Code field bulk stock is explicitly designated for use in ASME applications and is purchased and maintained as traceable material. NRC inspection of the material requirements for the subject plate washers was conducted (reference: IR 50-443/84-13, section 7) relative to the steam generator leg support assemblies which, per the Westinghouse drawing, represent the exact same design as the RCP leg assemblies. An NRC unresolved item raised in this report section was subsequently closed in IR 50-443/85-01.

The NRC identification of the difference between the original fabrication drawing and the as installed support was brought to your attention for the purpose of full disclosure of issues to be resolved. Subsequent review determined that the 6" x 6" plate washer was required and properly incorporated in the design by an ECA. No installation violation has been identified during this review.

Question 08

How can the utility state that the 6" x 6" washer material is appropriate to the application when the material is not supposed to be there? The material that by design is not to be installed has difficult time being appropriate to the application.

Response

The 6" x 6" washer material, as noted earlier, is in conformance with the ASME Code installation requirements and is traceable material in compliance with the ASME material and design specifications. ECA 01/2355D documents the design change authorization for installation of the plate washers and, when coupled with the Westinghouse fabrication drawing, provides evidence of a properly designed and installed assembly.

Question 09

Response XVIII details the use of portable testing equipment for the conduct of the original RCP vibration monitoring for the first test and the use of the installed, permanent plant vibration instrumentation for the second and later indication. Did these instruments provide correlating information? Was the information provided by the one compared to the information provided by the other? If so, what were the results? If not, why not? Would the fact that the frame vibration monitors for the RCPs were not installed correctly have been identified if this information had been compared? If so, why was nothing done until 1989?

Response

The two tests requiring RCP vibration monitoring were correlatable in the sense that the same acceptance criteria were met. The data from each test was not required to be compared; there was no reason for conducting such a comparison since the acceptance criteria of each test had been met. It is noted that only the RCP motor frame vibration sensors utilized in the second test were subsequently found to have been wired incorrectly. The vibration monitors associated with the RCP shaft, also utilized in the second test, had been properly installed and the data that the shaft monitors provided were not considered suspect.

Before and after rewiring of the miswired RCP motor frame vibration sensors, testing indicated vibration data within the acceptance criteria. Thus, despite the miswiring problem, there was no indication that the reactor coolant pumps had exhibited unacceptable vibration characteristics.

Additionally, every time a RCP was balanced, calibrated test instruments, separate from the questionable miswired monitors, were utilized to measure vibration data. The pump manufacturer states in a technical manual that the pump shaft vibration data, which was never in question, is the primary indicator of pump vibration data. This information provided the basis for determining no problem with RCP vibration existed. Current testing data has confirmed this conclusion.

The licensee probably should have recognized the invalidity of the miswired monitors, based not upon a comparison to other vibration data, but rather upon the low absolute readings that were being received. Corrective actions have been taken by the licensee and will be reviewed by the NRC site resident inspection staff and will be documented in an inspection report.