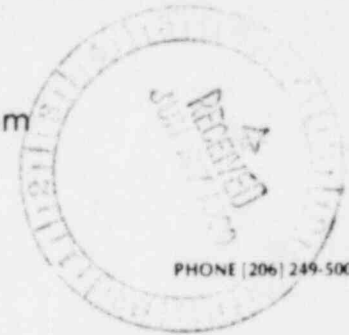


Washington Public Power Supply System
A JOINT OPERATING AGENCY

P. O. BOX 1223

ELMA, WASHINGTON 98541

June 25, 1980
G03-80-1516



PHONE (206) 249-5001

Nuclear Regulatory Commission, Region V
Suite 202, Walnut Creek Plaza
1990 N. California Boulevard
Walnut Creek, California 94596

Attention: Mr. G. S. Spencer
Chief Reactor Construction and
Engineering Support Branch

Dear Mr. Spencer:

Subject: WPPSS NUCLEAR PROJECTS 3 AND 5
DOCKET NUMBERS 50-508 AND 50-509
REPORTABLE DEFICIENCY, 10CFR50.55(e)

Reference: Telecon, J. C. Lockhart to D. Kirsch,
dated May 22, 1980.

In accordance with the provisions of 10CFR50.55(e) your staff was informed on May 22, 1980 of a reportable condition involving the WNP-3 and 5 Shutdown Cooling Heat Exchangers. During the conversation the applicability of 10CFR50.55(e) or Part 21 was discussed. The Supply System is reporting under the provisions of 10CFR50.55(e) but we believe that some elements of the Part 21 provisions are applicable. Specifically the cause of the defects involves a breakdown of the material selection and manufacturing processes. These breakdowns resulted in chloride contamination of the units, contamination in tubes, below minimum design weld overlay thickness and cracking of the weld overlays. Other nuclear projects may be affected by the same type of defects.

It is our intention to have the supplier, Combustion Engineering, thoroughly investigate the reasons and causes of the deficiencies associated with these units and to pursue an acceptable repair program or replacement of the unit.

This is an interim report reflecting the current status. A final report will be issued when the problem is resolved.

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Washington Public Power Supply System

Mr. G. S. Spencer
Page Two

Please contact us if you require additional information.

Very truly yours,

D. L. RENBERGER
Assistant Director, Technology

- Attachments: 1) C-E Power Systems letter, No. CEWP-80-76,
dated June 10, 1980.
- 2) WPPSS Interim Report, Defects Associated
With Shutdown Cooling Heat Exchangers.

cc: D. Smithpeter - BPA
WNP-3/5 Files - Richland
C-E Power Systems, Windsor, Conn.

DEFECTS ASSOCIATED WITH SHUTDOWN COOLING HEAT EXCHANGERS

10CFR50.55(e) Defect/Noncompliance Report
Report Number 007 WPPSS Units 3 and 5

Summary

The Supply System has experienced a significant number of defects associated with Shutdown Cooling Heat Exchangers supplied for WNP Units 3 and 5 by Combustion Engineering, Inc. These units were manufactured for Combustion Engineering by Ametek, Schutte and Koertering Division, Bethayres Plant. The defects include high chloride water contamination, below minimum design thickness for weld overlays, tube contamination and defective (cracked) weld overlays.

Description

On August 13, 1979 the WNP-3 Shutdown Cooling Heat Exchangers (SDCHX) were inspected prior to turnover to the installing contractor. An accumulation of rust on the shell side and standing water on the tube side was discovered. Since the water in each heat exchanger amounted to several hundred gallons it was concluded that the water had been present in the heat exchangers upon arrival at the site. The supplier, Combustion Engineering, Inc. (CE), was notified.

A water sample was drawn and analyzed from each heat exchanger. The analysis indicated unacceptable chloride concentrations of 32ppm in Unit 79217 and 50 ppm in Unit 78-11-118. Chloride contaminated water has the potential of degrading tube material by promoting intergranular stress corrosion cracking. An evaluation was started to determine if any degradation of the components had occurred.

The heat exchanger data package material certifications were reviewed by the Supply System. Those areas most susceptible to halide induced intergranular stress corrosion cracking were identified. Liquid penetrant testing (PT) of these areas would be required for proper evaluation. In addition, Combustion Engineering was required by the Supply System to provide an engineering evaluation to establish the improbability that any chloride stress cracking had occurred. In support of this CE requested Eddy Current Testing (ET) of the tubes which had been emersed in the contaminated water.

The units were shipped off site to Harris Thermal Transfer, Inc., for cleaning. Each unit was partially disassembled (tube bundle removed from shell), inspected and cleaned. During the inspection it was determined that some areas on the tube side of each heat exchanger had insufficient stainless steel weld overlay (thickness) and required repair.

Cleaning of the units was completed at Harris under the direction of Combustion Engineering, Inc. They were returned to the site and installed in Unit 3. It was decided the weld overlay repair and all non-destructive examinations would be conducted concurrently on site with the units in place.

A program for performing the required NDE and a weld overlay repair plan was developed. The repair plan called for identifying the areas which required recladding, weld overlaying the areas, grinding the overlay surfaces and testing to assure the reclad surface was free of cracks and of the required thickness. The NDE Program consisted of PT examination of the predetermined susceptible welds, a UT check of cladding thickness and Eddy Current Testing of all the tubes.

During the examination and repair, the following problems were discovered:

- 1) During the Eddy Current Testing an unidentified "crud" and scale-like coating was found on the ID surfaces of the tubes. Samples of the substance were taken and analyzed. The analysis revealed a very high chloride concentration and heavy metal contamination. The test on slightly less than half the tubes was inclusive because of the contaminant.
- 2) Extensive cracking of the stainless steel weld overlay on both units around the flange internal diameter was discovered during the post overlay repair PT Examination. The cracking was evident in areas which had not been reclad as well as areas which had.

Because of the number of problems found with these units and the severity of the clad cracking a manufacturing process review was conducted at the manufacturer's facility to determine the design integrity of the components. Material specifications and manufacturing processes were reviewed. It was determined that the choice of filler metal and clad welding techniques used on the Unit 3 heat exchangers was very poor. Both the filler metal and the technique employed would most likely result in cracking of the weld overlay. In addition, the documentation offered by the manufacturer to support the work done was incomplete and inconcise.

A review of the Unit 5 Heat Exchangers manufacturing process was also conducted. The machine applied submerged arc weld (SAW) overlay process utilized on the WNP-5 units is a process not likely to induce the problems discovered on WNP-3 units. In areas which could not be overlayed with a machine process, manual shielded metal arc weld (SMAW) was applied. The filler metal used in these areas is not favorable and may produce the same clad cracking observed in Unit 3. CE is committed to evaluate the acceptance of these areas. A tube cleanliness inspection and PT examination of the WNP-5 units is in progress.

The following action items remain open:

- 1) Complete the Eddy Current Testing of the tubes on both Unit 3 Heat Exchangers.
- 2) Complete the non-destructive examination of both Unit 5 Heat Exchangers.
- 3) Determine the acceptability of weld overlay on both Unit 3 and

5 Heat Exchangers.

- 4) Complete the evaluation on the possibility of intergranular stress corrosion cracking having occurred.
- 5) Repair of the components.

Corrective
Action

- 1) The Supply System has taken the following measures to prevent recurrence of the problems associated with the delay in discovery of the water contaminated units:
 - a) The Administrative Site Procedure used to delineate the minimum maintenance requirements has been revised to assure adequate protection for all future equipment received. This procedure is ASP-RE-2-28, Rev. (1), effective January 2, 1980.
 - b) A procedure has been written for the guidance of the maintenance function. This procedure, ASP-AM-8-2, Rev. (0) effective September 17, 1979.
 - c) The responsibility for surveillance of Storage and Maintenance activities has been reassigned to the Receiving Inspection Department. This function is described in Procedure QAI 13-1, Rev. (0), which became effective October 16, 1979.
 - d) Receiving Inspection conducted an inspection of all Class I equipment received from suppliers. Nonconformance reports were initiated for any noncompliance conditions.
- 2) The supplier, Combustion Engineering, Inc., has been required by the Supply System to detail the actions being planned or performed to determine the cause of the SDCHX deficiencies and corrective actions taken or to be taken to resolve them. Combustion Engineering's response is attached.
- 3) The Supply System will continue to monitor, review and where necessary, supplement the evaluation and repair activities to assure that acceptable heat exchangers result.

C-E Power Systems
Combustion Engineering, Inc.
1000 Prospect Hill Road
Windsor, Connecticut 06095

Tel. 203/688-1911
Telex 99297



80 JUN 16 P 2: 08 WPP-80-76
June 10, 1980

Mr. W. J. Talbott, Project Manager
Washington Public Power Supply System
P. O. Box 1223
Elma, Washington 98541

3/5 FILES

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|----------------------|--------|
| WHP-3&5 | 1 of 2 |
| TITLE | |
| DIV. MANAGER | |
| MGR. PROJECTS | |
| QUALITY CONTROL MGR. | |
| MGR. CONSTR. | |
| MGR. ENGINEERING | |
| PROJ. SVCS. MGR. | |
| CONTRACT MGR. | |
| OPERATIONS | |
| BUSINESS MGR. | |
| CONTROL MGR. | |
| QUALITY MGR. | |
| ADMIN. MGR. | |
| CONTROLLER | |
| SECRETARY | |
| FILE | |
| A = ACTION | |

Baron

Washington Public Power Supply System
Nuclear Units No. 3 & 5

Subject: Shutdown Heat Exchanger (SDHX)
10 CFR 50.55(e) Report

Reference: (A) WPPSS Ltr. No. G03-80-1204,
dated 5/23/80, W. J. Talbott to
E. Guenther

Dear Mr. Talbott:

Reference (A) requested CE to provide WPPSS with a detailed report for their submittal to the NRC in response to the 10 CFR 50.55(e). Per your request, this interim report is being submitted to detail the action items being planned or performed by Combustion Engineering, Inc. to determine the causes of the deficiencies in the SDHX's and corrective actions taken/to be taken to resolve the nonconformance.

Investigations have been/will be initiated to determine the reasons and causes of the problems encountered with the SDHX's. These investigations include the following:

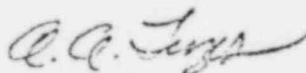
1. Areas of thin or non-existent cladding are being or have been identified and will be re-clad. Shop procedures and inspections are being reviewed to preclude further occurrence.
2. Perform a dye penetrant examination covering 100% of the weld overlay cladding (this does not include roll bond clad) on both WPPSS Unit 3 SDHX's to determine the extent of any crack-like indications on the weld overlay clad surfaces.
3. Perform a dye penetrant examination covering 100% of the weld overlay cladding (this does not include roll bond clad) on both WPPSS Unit 5 SDHX's to determine if these heat exchangers exhibit similar indications to those found on the WPPSS Unit 3 SDHX's.
4. Perform a metallurgical analysis of weld overlay clad samples removed from selected areas of the WPPSS Unit 3 SDHX's.
5. Review the manufacturing processes used to fabricate the tubes and to install them into the heat exchanger bundle. This review will encompass a study of any lubricants or foreign substances used during the manufacturing, bending, rolling, installation, testing

and inspection of the tubes. Additionally, shop procedures are being reviewed to determine the cause of residual water containing a higher than allowed chloride level. Tube inspections by Eddy Current Test (ECT) will be performed to determine whether any significant tube degradation has occurred as a result of this condition. A tube(s) will be removed for destructive examination.

6. Perform an Engineering/Quality Assurance review of the welding procedures/processes used to apply weld overlay cladding. A partial review of the weld procedures has already shown that the procedures may not have been qualified in strict compliance with the ASME Code. A review has shown that the required chip samples were not in all cases taken from the area of minimum required clad thickness. Also, the required chemical composition of the clad was not specified in any procedure.
7. Perform a Quality Assurance review of documentation associated with the overlay welding. This investigation is centering on material test reports, weld material issuance records, shop travelers and weld procedures. This investigation has turned up questions relating to the traceability of weld material and procedures to particular weld overlay clad areas. The questions already raised have precipitated further investigations and questions.

These and other investigations are being performed at this time. Also, Combustion Engineering Quality Assurance has removed Ametek, Schutte & Koerting Division, Bethayres Plant from Combustion Engineering's Nuclear Approved Vendors Listing as of June 4, 1980. Combustion Engineering, Inc. will keep you informed of further developments and investigative results and conclusions.

Very truly yours,



A. A. Tuzes
Project Manager

AAW:EM:slp -
cc: F. J. E. Storey, Ebasco
E. R. Bottrill, CE-NY
W. Douglass, CE-Site