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UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT
WASHINGTON, D.C. 20555

May 13, 1983

IE BULLETIN NO. 83-05: ASME NUCLEAR CODE PUMPS AND SPARE PARTS MANUFACTURED BY THE HAYWARD TYLER PUMP COMPANY

Addressees:

For action:

Those utilities with nuclear power reactor facilities holding an operating license (OL) or construction permit (CP) that (1) use or plan to use ASME Nuclear Code pumps manufactured by Hayward Tyler Pump Company (HTPC), or (2) use or plan to use spare parts provided by HTPC in ASME Code pumps manufactured by HTPC or other companies. The period of concern is pumps or parts manufactured by HTPC during the period 1977 through 1981.

For information only:

All other nuclear power reactor licensees and CP holders.

Purpose:

The purpose of this bulletin is (1) to apprise the above addressees that NRC's investigation of allegations resulted in NRC findings that HTPC failed to effectively implement its QA program, and (2) to request that the affected addressees take action to resolve this issue.

Description of Circumstances:

On October 30, 1981 the NRC received an allegation from a newspaper journalist claiming that HTPC located in Burlington, Vermont had manufactured certain safety-related pumps which were found to be defective and had shipped them to various domestic and foreign nuclear plants. On November 2, 1981 the journalist clarified that four individuals had made allegations concerning HTPC and, at that time, he stated he would encourage the allegers to forward specific information to the attention of the NRC. On December 11, 1981 affidavits confirming the allegations and signed by the four former employees of HTPC were forwarded to the NRC.

As a result of these allegations, the NRC initiated an investigation into the matter on January 4, 1982. This investigation/inspection of HTPC was conducted during the period of January 4, 1982 - August 26, 1982. The results of this investigation/inspection are discussed in NRC Report No. 99900345/82-04, "Investigation/Inspection of Allegations Involving the Hayward Tyler Pump Company, Burlington, Vermont, November 1982."*

In view of the findings resulting from the investigation/inspection, the investigation team has recommended (in the Report) that licensees who use, or plan to use, ASME Code pumps manufactured by HTPC during the period 1977 to 1981, conduct certain performance tests to assure that requirements of 10 CFR 50 have been satisfied. The team members believe that satisfactory performance of these pump tests are necessary to verify that the pumps in question will operate as intended. During the investigation, HTPC in letters dated March 10, 1982 and July 27, 1982 (Exhibits 6 and 6a of the Report) proposed certain performance tests (termed "expanded commissioning tests" by HTPC), which in its view, will provide added assurance of pump reliability. The HTPC response (dated January 26, 1983) to the team recommendations documented in Report No. 99900345/82-04 did not result in any change to the HTPC recommendations of March and July 1982.

This office concurs with the inspection team recommendation that pump performance tests are necessary to provide assurance that the pumps will perform their intended safety function. The HTPC proposed performance tests supplemented by an endurance run of some reasonable period of time is considered an adequate test to address the concerns raised by the investigation/inspection report.

Each licensee or CP holder planning to use a pump manufactured by HTPC is being asked to conduct a pump performance/endurance test. This test is the minimum action deemed necessary by the NRC to ensure pump reliability considering the uncertainties identified in the investigation/inspection report. A list of those facilities using Hayward Tyler pumps that have been identified to the NRC is given in Attachment 1. The pump service and number of pumps are also included in Attachment 1. The performance tests recommended by HTPC are provided in Attachment 2.

Each licensee or CP holder planning to use spare parts for ASME Code pumps is being asked to address the HTPC recommendations on installation of replacement parts and to conduct a pump performance/endurance test, if necessary, to ensure reliability of the pumps. The additional recommendations by HTPC for installation of replacement parts are provided in Attachment 3.

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*Affected licensees or holders of construction permits requiring this report should a request a copy from the appropriate NRC Regional Administrator. Copies of pertinent information about the HTPC response to the NRC enforcement letter letter dated December 22, 1982 will also be provided.

Hayward Tyler Pumps - Domestic Nuclear Power Plants

PLANT OR PURCHASER	UTILITY	PUMP SERVICE	NUMBER OF PUMPS
Byron/Braidwood	Commonwealth Edison	Service water booster	4
Comanche Peak	Texas Utilities Generating	Station Service Water	4
Combustion Engineering	Unknown	Gas stripper with baseplate	8
Forked River 1	Jersey Central Power & Light	Equipment drain pump Boric acid makeup Reactor drain pump	2 2 2
Hartsville 1 & 2	TVA	Fuel pool Essential service water pump with baseplate	8 4
Hope Creek 1 & 2	Public Service Electric & Gas	ECCS jockey pumps Control room chilled water Fuel pool	8 4 4
Limerick 1 & 2	Philadelphia Electric	Safeguard piping fill pumps with baseplate	4
Marble Hill	Public Service of Indiana	Service water booster	2
Millstone 3	Northeast Utilities	Service Water	4
Oconee	Duke Power	Spent fuel pump	1

Hayward Tyler Pumps - Domestic Nuclear Power Plants

PLANT OR PURCHASER	UTILITY	PUMP SERVICE	NUMBER OF PUMPS
Palo Verde 2	Arizona Public Service	Gas stripper system	6
Phipps Bend	TVA	Fuel pool	4
		Essential service water pump with baseplate	2
Pilgrim 2	Boston Edison	Boric acid makeup	2
		Equipment drain pump	2
River Bend 1	Gulf States Utilities	Standby service water	4
Salem 1 & 2	Public Service Electric & Gas	Waste holdup tank recirculation pump	4
Sharon Harris	Carolina Power & Light	Emergency service water and cyclone separators	4
South Texas 1 & 2	Houston Lighting & Power	Component cooling water pump with baseplate	6
		Reactor makeup	4
		Electrical auxiliary building chilled water	6
		Essential cooling water screen wash booster pump	6
		Essential cooling water	6
WPPSS 3 & 5	Washington Public Power Supply System	Condensate makeup pump with baseplate	4
		Fuel pool cooling pump with baseplate	2
		Component cooling water pump with baseplate	10
		HVAC chilled water pump with baseplate	4

Hayward Tyler Pumps - Domestic Nuclear Power Plants

PLANT OR PURCHASER	UTILITY	PUMP SERVICE	NUMBER OF PUMPS
Yellow Creek 1 & 2	TVA	Reactor drain pump	4
		Boric acid makeup	4
		Fuel pool cooling water	4
		Normal component cooling water	4
		Component cooling system	4
		Essential raw cooling water	2

Actions To Be Taken by Nuclear Power Reactor Facilities Holding an Operating License (OL) or Construction Permit (CP)

1. Those holders of operating licenses and construction permits that use or plan to use ASME Code pumps important to safety manufactured by HTPC are to take the following actions:

   a. Review all ASME Code pumps manufactured by HTPC and provide a list of affected pumps and their service application. A list of affected pumps that was developed by review of HTPC records is given in Attachment 1.

   b. Provide a summary of the inservice test requirements or plans to develop inservice test requirements for each affected pump at your facility.

   c. Conduct a pump performance test to assure that each pump will perform its intended safety function. As a minimum, this test should contain the criteria given in Attachment 2. In addition to the criteria presented in Attachment 2, it should be demonstrated that the pumps operated satisfactorily for a minimum duration of 48 hours without maintenance or repair. Provide the results of the pump tests or, if testing has not been completed at the time of the bulletin response, provide a description of the test plan. Nuclear reactor facility licensees with pumps that are currently in service can provide the results of previous tests and/or operating experience that provide equivalent data and results in lieu of performing the above tests.

   d. Provide the results of the required ASME Code system hydrostatic pressure test that was performed at your facility when the pump was tested and any corrective actions taken as a result of the test. If the system hydrostatic test has not been completed, provide the test plans.

2. Those holders of operating licenses and construction permits that use or plan to use spare parts manufactured by HTPC in Code pumps important to safety are to take the following actions:

   a. Review the HTPC recommendations on replacement parts given in Attachment 3. For those facilities that have not yet installed the replacement parts, implement the recommendations given in Attachment 3 in your procedures for pump assembly or provide the basis for any deviations. For those facilities with parts already installed, describe any deviations from the recommendations given in Attachment 3 and discuss their significance.

   b. Provide the information requested in Item 1b.

c. Conduct a pump performance test as specified in Item 1c unless it can be demonstrated that the spare part in question will not affect any parameters that are measured or function demonstrated by the test.

d. For spare parts that form part of the ASME Code pressure boundary, perform the actions required in Item 1d.

3. Nuclear reactor facilities holding an operating license or a construction permit, are to submit a report describing the results of the actions taken or planned for Items 1 and 2 within 90 days of receipt of this Bulletin.

4. Nuclear reactor facilities holding an operating license, are to complete the actions requested by Items 1c and 2c, as applicable, prior to start-up from the outage during which the pump or part is installed or, if the pump or part is already installed, before startup from the next refueling outage.

5. Nuclear reactor facilities holding a construction permit, are to complete the actions requested by Items 1c and 2c, as applicable, before issuance of the OL.

6. Those holders of construction permits whose construction permits are suspended, delayed, or cancelled are to take no action unless reactivation of construction or transfer, sale, or other consignment of the subject pumps, or spare parts to another nuclear plant site is contemplated. In such cases both the NRC and recipient permit holders or licensees should be notified of the disposition of said pumps or spare parts to assure that 10 CFR Part 50 requirements will be satisfied. Recipients of such pumps or parts are to perform the actions specified in Items 1 and 2, as appropriate, and notify the NRC.

The written report required by Item 3 above shall be submitted to the appropriate Regional Administrator under oath or affirmation under provisions of Section 182a, Atomic Energy Act of 1954 as amended. In addition, the original copy of the cover letters and a copy of the reports shall be transmitted to the U.S. Nuclear Regulatory Commission, Document Control Desk, Washington, D.C. 20555 for reproduction and distribution.

This request for information was approved by the Office of Management and Budget under clearance number 3150-0011. Comments on burden and duplication should be directed to the Office of Management and Budget, Reports Management, Room 3208, New Executive Office Building, Washington, D.C. 20503.

Although no specific request or requirement is intended, the following information would be helpful to the NRC in evaluating the cost of this bulletin:

1. Staff time expended to perform requested review and testing.
2. Staff time expended to prepare requested documentation.

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EXPANDED COMMISSIONING TESTS AND INSPECTIONS

At the time new or rebuilt pumps are commissioned, the following tests and inspections should be made to ensure that the equipment (i.e., motors, pumps, mountings, etc.) is correctly installed and will operate properly and reliably. Some of these tests and inspections are already included in the Instruction Manuals, but in less detail than below.

A. Pre-Starting Tests

1. Pump-to-Motor Alignment

Using dial gauges, measure the pump-to-motor alignment for concentricity and trueness to parallel. Make corrections, as required, to bring both parameters to within .002 inch Total Indicated Reading (T.I.R.) for vertical pumps and .005 inch T.I.R. for horizontal pumps.

2. Rotation

With the coupling disconnected, rotate horizontal pump shafts slowly by hand, checking for signs of rubbing or binding.

B. Operational Tests

After starting the pumps take the measurements listed in Steps 1 through 5 below:

1. Head Check

The head check should be made as soon as the head has stabilized (i.e., when the pump has reached operating equilibrium and pressure gauge fluctuation has ceased). Using pressure gauges on the pump suction and discharge pipes, measure the differential pressure across the pump and calculate the pump head. Adjust the discharge valve to obtain a head which corresponds to the normal flow condition on the pump performance test curve (provided in the pump data package).

2. Vibration Measurement

The vibration measurements should be taken once the pump has been set at the desired head and flow and should be made consistent with Hydraulics Institute guidelines. Using a vibration meter, measure the pump vibration on the bearing housing (for horizontal pumps) or at the top of the motor (for vertical pumps). These readings should be within Hydraulics Institute Limits.

Note: At minimum flow (see following page), a slight increase in vibration is normal and should be expected.

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EXPANDED COMMISSIONING TESTS AND INSPECTIONS

3. Temperature Check

The temperature check for horizontal and vertical pumps should be conducted some 10-15 minutes after the temperature to be measured has stopped rising (slight fluctuations in temperature will occur due to changes in conditions localized in the pump, but the upward trend from start-up should be ceased).

For horizontal pumps, run the pump for sufficient time for the pump bearing temperature to stabilize. This temperature should be no more than ambient temperature plus 90 F^{o} (e.g., if ambient temperature is 70 F^{o} bearing temperature should be no more than 160 F^{o}).

For vertical pumps, check the packing gland for excessive temperature. The gland temperature should not exceed that of the pumped fluid or seal water by more than 20 F^{o}.

4. Motor Current

Using a clamp-on ammeter or another suitable current measurement device, check the motor current in each phase for uniformity. Using these readings and the motor nameplate data, calculate the pump horsepower and compare this with the pump performance test curve (the difference should be no more than 10%) and check for a motor overload condition.

5. Leakage Check

During pump operation, check the pump for any leaks at joints and the mechanical seal. This check should take approximately 5 minutes. A small leakage is required for proper operation of the seal, but this should not exceed a few cc's per minute. Seepage at the packing gland is normal.

Upon completion of Steps 1 through 5 at normal flow, repeat at minimum and runout flow.

C. Pump Rundown Check

Adjust the discharge valve to operate the pump at normal flow conditions and stop the motor. Carefully note the rundown time and check to see whether the pump runs down smoothly. A short rundown indicates a potential problem. If identical pumps do not have consistent rundown times, repeat the pre-starting checks to verify correct alignment and rotation.

D. Evaluation of Results

The results of the foregoing tests and inspections should be evaluated by a qualified engineer against the contract requirements and the results of the pump performance test previously conducted at Hayward Tyler for consistency and acceptability.

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INSTALLATION OF REPLACEMENT PARTS

For reassembly of pumps using new parts, the following additional steps will be required.

1. New pump parts such as keys, sleeves, glands, impellers and shafts may require hand fitting in order to mate exactly with existing parts and to provide a snug fit. Such hand fitting is also normal procedure during original assembly of the pump. For example, the key is intentionally machined slightly large so that it can then be hand fitted to mate exactly with the shaft and impeller without any looseness. Ordinarily, such fitting will involve the use of hand files, a portable hone, or emery cloth, depending upon the part involved and the amount of material to be removed for proper fitting.

2. After installation of a new wear ring on an impeller, the wear ring should be checked for concentricity with the shaft. This can be done by spinning the shaft and impeller and indicating the wear ring with a dial gauge. The maximum allowable eccentricity is 0.004 inch Total Indicated Reading.

3. Spare impellers will be supplied at the same diameter as the original impeller in the pump for which the spare is bought. However, if the customer has more than one identical pump, it may be advantageous to order spare impellers with a maximum diameter and trim them during assembly to fit the specific pumps in which they are to be installed. The final diameter of the original impeller is shown on the Hayward Tyler performance test curve.

If there are any questions concerning the foregoing, contact Hayward Tyler.

Attachment 4
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LIST OF RECENTLY ISSUED IE BULLETINS

Bulletin No.	Subject	Date of Issue	Issued to
83-04	Failure of the Undervoltage Trip Function of Reactor Trip Breakers	03/11/83	All PWR facilities holding an OL except W DB type breakers for action and other nuclear reactor facilities for information
83-03	Check Valve Failures in Raw Water Cooling Systems of Diesel Generators	03/11/83	All power reactor facilities holding an OL or CP
83-02	Stress Corrosion Cracking in Large-Diameter Stainless Steel Recirculation System Piping at BWR Plants	03/04/83	Table 1 BWRs for action and all other licensees and holders of a CP
83-01	Failure of Reactor Trip Breakers (Westinghouse DB-50) to Open on Automatic Trip Signal	02/25/83	All PWR facilities holding an OL and other power reactor facilities for information
82-04	Deficiencies in Primary Containment Electrical Penetration Assemblies	12/03/82	All power reactor facilities holding an OL or CP
82-03 Rev. 1	Stress Corrosion Cracking in Thick-Wall Large-Diameter Stainless Steel, Recirculation System Piping at BWR Plants	10/28/82	Operating BWRs in Table 1 for action and other OLs and CPs for information
82-03	Stress Corrosion Cracking in Thick-Wall Large-Diameter, Stainless Steel, Recirculation System Piping at BWR Plants	10/14/82	Operating BWRs in Table 1 for action and other OLs and CPs for information
82-01 Rev 1, Supp 1	Alteration of Radiographs of Welds in Piping Subassemblies	08/18/82	All power reactor facilities with an OL or CP

OL = Operating License
CP = Construction Permit

If you have any questions regarding this matter, please contact the Regional Administrator of the appropriate NRC Regional Office, or one of the technical contacts listed below.

James H. Sniezek /for

Richard C. DeYoung, Director
Office of Inspection and Enforcement

Technical Contact: A. W. Dromerick, IE
301-492-4784

J. R. Fair, IE
301-492-4509

Attachments:
1. List of Hayward Tyler Pumps
2. Pump test requirement
3. Pump assembly procedures
4. List of Recently Issued IE Bulletins