

ITEM #: 18  
DATE: 03-26-24  
DEPT: ELEC

**COUNCIL ACTION FORM**

**SUBJECT:       UNIT 7 BOILER FEEDWATER PUMP NO. 2 INSPECTION AND REPAIR  
PROJECT - CHANGE ORDER NO. 2**

**BACKGROUND:**

Feedwater pumps are required for operation of the Power Plant, as they are the primary pumps used to pump water through the boiler for conversion to steam to drive the turbine. To keep the pumps operating and providing required pressure, these pumps require routine inspection and repair. This project includes disassembling the Unit #7 feedwater pump, documenting as-found conditions, addressing components that need to be replaced or repaired, reassembly, documenting as-repaired conditions, and returning the pump to the City.

On August 8, 2023, City Council awarded a contract to Flowserve Corporation, Chicago, IL, for the inspection and repair of the 72 Boiler Feedwater Pump in the amount of \$115,876.95 (inclusive of sales tax).

**PREVIOUS ACTION:**

Change Order No. 1 was approved by City Council on December 12, 2023, in the amount of \$178,185.97 for additional repair and restoration. When the pump was disassembled, it was found with several components out of tolerance from the original equipment manufacturer's specifications. The impellers which provide the flow and pressure were found with too large an opening in the middle for the shaft. Repairing this opening required welding additional material on the inside of the impellers and then machining the new material to the appropriate dimension.

Another major item found was the need to replace the existing studs. The studs are large, threaded bolts that hold the case together. Because of the high operating pressure, the torque applied to the studs is very high, ranging between 2,000 and 5,500 ft-lb. This high torque causes the bolts to stretch and after one or two uses, they need to be replaced.

**THIS ACTION:**

One of the final steps in the repair process is hydro-static testing: the pump is filled with water and pressurized to test for areas of weakness or leaks. As the test started, a leak was observed in the case. The leak is located in an area where no work was performed during this overhaul. Flowserve performed an initial investigation and found a pinhole leading to a crack at least 1.5 inches long. The extent of the damage is not known until the crack is excavated further. It is assumed the crack will lead to a small void deeper in the case. If this damage is not fully repaired, the pump is at risk of suffering major damage.

Staff recommends authorizing Flowserve to perform full excavation of the entire crack and weld repair the damaged area. It is estimated that the additional cost for this will require a change order in the amount of \$60,000. Because of the location of the leak and the pump case material, there are extra steps needed to ensure the pump is restored correctly. This will involve disassembly of the pump, stress

relieving the casing, and machining the split face surfaces and casing bores.

Flowserve offered a cheaper patch repair option involving surface welding the crack, for a price of \$4,500. Staff discussed this option but determined it would be unwise to attempt. The crack and void would continue to exist under the patch, most likely causing the patch weld to crack during operation and causing the patch repair to be ineffective.

**To perform the proper repair, the cost of the change order is \$60,000 (inclusive of sales tax). Funds will come from the Power Plant operating budget Unit 7 Turbine/Generator maintenance account. This account contains available funds from a separate project that will be less than originally anticipated.**

**ALTERNATIVES:**

1. Approve Change Order No. 2 in the amount of \$60,000 to Flowserve Corporation, Chicago, IL, to perform a full case crack repair for a total purchase order amount of \$354,062.92.
2. Approve Change Order No.2 in the amount of \$4,500 to Flowserve Corporation, Chicago, IL, to perform a patch weld repair. **Staff advises that this repair is not likely to be successful and could result in additional repair costs once the pump is placed back in service.**
3. Do not approve the change order and direct staff to seek other options available to complete this work.

**CITY MANAGER'S RECOMMENDED ACTION:**

The boiler feedwater pump operates at high pressure and temperature; it is important to have the damaged area restored properly. Approving this change order will restore the Unit 7 Boiler Feedwater Pump No. 2 to good operating condition providing reliable performance for the future. Therefore, it is the recommendation of the City Manager that the City Council adopt Alternative No. 1, as described above.