ITEM #:	**22**
DATE:	**09-23-25**
DEPT:	**ELEC**

COUNCIL ACTION FORM

SUBJECT: **INCONEL OVERLAID REPLACEMENT BOILER TUBES FOR POWER PLANT**

BACKGROUND:

The City's Power Plant operates two high-pressure steam units to generate electricity. These units are referred to as Unit 7 and Unit 8. Until 2016, the primary fuel for these units was coal, with the secondary fuel being Refuse Derived Fuel (RDF) produced by the Resource Recovery Plant. The combusting coal created ash, which neutralized the corrosive properties from burning RDF.

In 2016, both Units 7 and 8 were converted from coal to natural gas and continued to co-fire RDF. Because natural gas does not produce ash, the corrosive environment created by combusting RDF is not neutralized, and accelerated boiler tube corrosion occurs. The tube corrosion is especially apparent in the superheat section of the boiler in both units. The superheat section is located in the upper portion of each boiler where the steam is dried and subjected to the highest temperatures and pressures.

Boiler tube failures result in forced outages of the unit, resulting in several days of reduced power plant capacity (and potential financial penalties), along with an interruption in the ability to dispose of the RDF from the community's solid waste.

When it became apparent that accelerated tube corrosion was beginning to occur in both boilers, staff performed extensive research and found that applying a hardened metal called Inconel over the tubes dramatically slows the corrosion of the tube base metal. The superheat section of tubes was replaced with Inconel coated tubes in Unit 7 in 2019. Unit 8's superheat tubes were replaced in 2020 with Inconel tubes.

It was recently discovered that some of these superheat tubes in both units have had their Inconel overlay compromised and are now failing. It appears the failures are due to pinhole size areas where the coating was not fully covering the tube. This allowed a path for corrosion of the base metal, weakening the tube.

Unit 8 recently suffered a tube rupture because of a weak tube caused by this kind of corrosion. After thoroughly cleaning Unit 8 boiler and then performing an inspection of each superheater tube, 18 tubes were found to have been compromised with corrosion and need to be fully replaced.

Due to the specialized process for overlaying the boiler tubes with Inconel, few companies are able to perform the overlay process with the high-quality procedures required. **Therefore, staff solicited quotes from the two known qualified providers of this type of specialized work which are shown below.**

VENDOR	COST
Helfrich Brothers Boiler Works Inc. Lawrence, MA	$56,000
Boiler Tubes of America Lyman, SC	$88,443

After evaluating the quotes, staff determined the low quote from Helfrich Brothers Boiler Works, Inc, of Lawrence, MA, is acceptable. Funding for the purchase of the tubes will come from the Unit 8 operating budget where there is $100,000 budgeted for replacement parts and supplies.

Once the tubes are manufactured and delivered, the installation for the Unit 8 tubes will occur through an existing agreement with a contractor for Power Plant boiler maintenance. Installation is expected to cost $130,000. The existing contract for boiler maintenance with this company in FY 2025/26 is for an amount not-to-exceed $350,000, of which $295,000 remains unspent.

FUTURE BOILER OPERATIONS:

Installing Inconel-overlaid tubes is an established approach to reduce corrosion in a waste-to-energy boiler. Therefore, the appearance of corrosion in this section of the boiler tubes gives staff pause about whether the corrosion observed is an isolated occurrence or whether corrosion may continue to appear throughout the boiler. Although staff performed a thorough inspection of the Unit 8 superheat section and identified these 18 tubes in need of replacement, the tight spacing of the tubes in this section makes it difficult to inspect every surface adequately.

The use of the Power Plant boilers for waste-to energy is expected to continue until summer 2027. Soon after, the Electric Department's New Thermal Generation project is expected to be in service to replace the capacity of Unit 7, which will be retired. Unit 8, however, is planned to continue operating for at least ten years longer. If Unit 8 experiences major boiler tube reliability issues, the utility is at risk of significant expenses to perform a major boiler overhaul (on aging and soon-to-be retired equipment) or paying major financial penalties for lost generating capacity.

The 18-tube replacement for Unit 8 described in this Council Action Form is expected to be completed in November. Meanwhile, Unit 7 is combusting natural gas and RDF. When Unit 7 is brought down to address known leaks, it is expected to require an outage of approximately two months. It is staff's expectation that, in the probable case, Unit 7 can be utilized through 2027 for RDF combustion, handling approximately 30-40% of the RDF produced. Unit 8 is large enough to dispose of the entire amount of RDF produced. **However, the question for staff is the level of confidence in operating Unit 8 to combust RDF, and whether doing so will cause further deterioration leading to reliability issues.**

In light of these concerns, staff is discussing how to best approach the next 20 months of Power Plant operation, balancing: 1) the need to dispose of the community's solid waste during that time, 2) the preservation of the lifespan of Unit 8 for at least ten years beyond the conclusion of waste-to-energy, and 3) the burden of alternative approaches

to waste-to-energy (e.g., landfilling and transportation of solid waste) on partners, such as Resource Recovery, garbage haulers, and the landfill.

The best approach to address all three of these areas of concern is to reduce the amount of waste entering the solid waste system and eventually becoming refuse-derived fuel. This is particularly important for plastic waste, which staff believes is the largest contributor to the boiler tube corrosion concerns. Staff is anticipating returning to the City Council in October with additional information about a curbside recycling program, which would address a significant amount of the plastic waste disposed in the Power Plant boilers.

ALTERNATIVES:

1. Award a contract to Helfrich Brothers Boiler Works, Inc., Lawrence, MA, for Boiler Tubes for the Power Plant in the amount of $56,000.

2. Award a contract to the other company that submitted a quote.

3. Do not approve the contract and direct staff to solicit formal bids in an effort to obtain more competitive pricing.

   However, staff is uncertain that other companies exist that are qualified to accomplish this work, and delays will increase costs.

CITY MANAGER'S RECOMMENDED ACTION:

The purchase of the Inconel overlaid tubes is critical for the longevity and reliability of Unit 8 boiler. Without specialized overlaid tubes, tube failures will increase causing significant unit downtime. The installation of these tubes will be completed under a separate, existing contract for Power Plant boiler maintenance. Therefore, it is the recommendation of the City Manager that the City Council adopt Alternative No. 1.