



**DULUTH ENERGY
SYSTEMS**

Date: May 5, 2017

From: Daniel Cebelinski

Via: Terry Nanti

To: Amanda Ashbach, Purchasing Director, City of Duluth

Subject: Boiler Natural Gas Burner Management System Upgrade Project – Change Order #2 for Additional pipe fitter work.

1. The circumstances leading up to the requirement for issuance of a \$77,244.47 change order to Contract #22878 originally awarded to Stack Bros Mechanical at a value of \$172,690 are as follows:
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 - a. The purpose of the project is to replace unreliable 1960s vintage natural gas systems on two of the steam plant's four boilers. These upgrades to the gas system triggered coal system code requirements which had been grandfathered since the original gas system installation.
 - b. The project was scheduled to be completed by the end of October 2016. Due to DES provided material that was delayed, the completion of the project was compressed into a 1-month period. Due to the time restraint, DES requested that the Mechanical Contractor work overtime in order to complete their tasks prior to the heating season. The contractor originally bid the project working normal 8-hour days.
 - c. The project specifications directed the contractor to replace the existing coal pipe. Upon installation of the coal pipe, it was determined that a diffusers needed to be fabricated and installed inside the coal duct to create the proper flame shape inside the boiler. Without the diffusers, the flame shape would cause pre-mature failure of the boiler. The contractor had to remove the newly installed pipe, fabricate the diffuser and reinstall the coal pipe.
 - d. The original project specifications included installing new gauge glasses and water columns. DES directed the contractor to relocate the gauge glass on boiler #3 in order to provide the operators better visibility. The contractor had to remove additional sections of pipe, reconfigure the piping, remove an existing handrail and reinstall the handrail in a manner that will provide safe operation and maintenance of the gauge glass.
 - e. During the start up, testing, and commissioning process DES discovered multiple design issues that had to be corrected in order for the boilers to operate. First, the gas piping serving the ignitors was too small and needed to be re-piped with larger diameter pipe. New flexible tube had to be purchased and the piping had to be modified in order for the ignitors to function properly. Secondly, the flame scanners did not have a good view of the fire inside the boiler and

kept tripping it out. The scanners had to be relocated and re-piped in order for the scanners to operate properly.

- d. The boiler code requires pulverized coal boilers to have a mill inerting system installed. The project specifications called out for the contractor to install owner provided mill inerting nozzles. The nozzles initially were planned to be purchased with the material from ProTherm, the original designer of the system. During the procurement process, it was found the lead time for the material did not meet the project schedule. Additionally, since mill inerting is a specialty product, the manufacturers required you purchase the entire inerting system, the cost of which is in excess of \$250,000. It was determined that Stack Brothers could fabricate the nozzles at a fraction of the cost and were directed to complete this work.
2. The boiler natural gas Burner Management System upgrade is critical to system reliability and personnel safety. It is even more critical now that we are burning natural gas for 7-month trial period. Additionally, in the event of a malfunction of the plant's emission control equipment, the boilers must be shifted from coal to gas within one hour to avoid a reportable air permit deviation. The old gas systems were unreliable, often requiring in excess of an hour of troubleshooting efforts before a gas fire can be safely and successfully ignited. For this reason, municipal bonding proceeds were requested and earmarked for this project in late 2015 and the design, over a year in the making, was completed. Contracts for material, electrical labor and mechanical labor were awarded through the City's Purchasing Department and presented to the City Council for approval as required by policy. Your support in presenting the resolution related to this Change Order to the City Council, recommending approval, is requested.