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**TO:** Chris Shaw, Utilities Director

**CC:** Robert Kennedy, Wastewater Operations Supervisor

**FROM:** Chris Stempa, Utilities Deputy Director

**DATE:** May 5, 2015

**RE:** *Appleton Wastewater Treatment Plant Anaerobic Digester Maintenance and Upgrades Project Update -- Sole Source Contract to August Winters in the Amount of \$12,359; Biogas Flow Meter Procurement \$6,000 ea.*

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**BACKGROUND:**

Since late 2014 the AWWTP has been engaged in a CIP and O&M project with our contracted engineer McMahon for Anaerobic Digester Maintenance and Upgrades work. As the project has developed, plans and needs have been refined and the need for specialized gas flow monitoring equipment and contract work outside of McMahons original contract with their subcontracts has been identified. A decision on what path to proceed with procurement of specialized equipment and engagement of a separate contract for the equipment installation was predicated on design-build implications (prohibited in WI).

The preliminary planning and evaluation phases of the digester maintenance and upgrades work was initiated by McMahon in the last quarter of 2014 thus the project at large was carried over into 2015. The upgrade tasks (CIP related) involve optimizing the methane mixing system, installing accurate gas metering technology and introducing instruments and SCADA improvements for improved process control and energy reduction savings (utilize one 75 hp gas mix compressor vs. two for estimated annual savings of \$30K/yr). The maintenance side of the project (O&M budget) involves biogas piping cleaning and inspection services, exterior digester cover repair, metal flashing repair and recoating work. The majority of the CIP and O&M project tasks are being blended as part of a single public bid project with the exception of piping cleaning and inspection. McMahon as the contracted engineer is designing various improvements, creating bidding documents, and performing necessary construction management services but also subcontracting the gas pipe purging and cleaning services. The cleaning and inspection services portion was segregated from the other tasks because information discovered during this phase would or could significantly modify the originally

conceived project. The biogas piping has not been inspected since original construction in the early 1990's. Pipe condition and potential sludge build-up within are two critical factors currently unknown which the inspection will reveal.

## **JUSTIFICATION:**

### Deviation from Contract scope with McMahan and Sole Source Justification:

Through the preliminary engineering and planning phases it was determined that the originally constructed biogas piping (a.k.a. "waste gas" piping) connected to each anaerobic digester shared a common connection point before extending down the elevator chase in independent legs then re-joining in a common larger gas header pipe. The existing gas flow meters were discovered to have been historically inaccurate partially because they are of an older, less accurate technology. Equally, if not more significant, was that the common juncture point for the digester gas piping was causing significant error in instantaneous flow measurements. This makes process diagnostics and the goal of system balancing through use of modified gas mix compressor operation difficult to impossible. Furthermore, the AWWTP is now required by WDNR air permit to accurately report gas emissions which the current meters cannot provide.

- **Gas Piping Modifications and Gas Flow Meter Installation:** August Winters is currently under contract by McMahan as part of the inspection and cleaning phase of this project (they are also on site as the lead contractor for the WW Bar Screen Project). They provided a quote to segregate or eliminate the junction point of the two biogas pipes and install new gas flow meters. The piping modification work and gas meter installation cost estimate totaled \$12,359. This cost appears to be reasonable for the work identified and the space in which they will be performing it (vertical shaft of digester tower). If acceptable, the AWWTP would issue a PO to August Winters for this work. This avoids design-build implications (explained also in next bullet) and various avoidable costs (see last paragraph) while preserving a project schedule most beneficial to the AWWTP. Costs for this work would come from the project budget.
- **City Procurement of Gas Flow Meters:** Three different gas flow meters were evaluated to determine the most appropriate replacement technology based on the WW plants needs (ex. accuracy, resolution, maintenance requirements, and other engineering factors). The selected device (FCI ST 100, see attached spreadsheet summary) meets our system requirements and overall needs while still being the least cost option at \$6,000 for each meter (require two meters, one for each digester). McMahan was reluctant to purchase the biogas meters as part of their contract because of "design-build" implications which is prohibited under Wisconsin state statues. Therefore, it is suggested that the City procure this equipment directly for the contractor (August Winters) to install. The cost for this equipment was identified as a line item cost when formulating the original 2014 project budget.

## **CONCLUSION:**

By conducting this work (bullets above, plus cleaning and inspection) the AWWTP will only be required to have the complete gas management system down once (estimate 8-10

hours) which includes a single nitrogen purge to remove explosive gases from the associated piping that will facilitate inspection and piping modification tasks. If this work was split up into separate tasks or multiple day events it would require additional shut down and nitrogen purging greatly increasing contract costs and also costs incurred because of natural gas consumption. Under normal operation the biogas produced is utilized for process and building heat by the Hurst Boilers. Annually this savings is approximately \$140,000 so on a daily basis it may not be significant but nonetheless an avoidable cost. A more important reason, aside from costs to conducting the work under a single shut down event, is safety. Each time the gas management system is shut down, purged, and worked on it involves a level of risk because of the explosive nature of methane gas. Lastly, each gas management system shut down results in biogas not being burned via waste gas flare or biogas boilers which has implications to the AWWTP air emissions permit. Unburned biogas is considered an emissions pollutant which counts against annual permitted thresholds for various constituents (e.g. greenhouse gases methane and carbon dioxide) which are enforceable under state and federal regulations.

The contract with August Winters in the amount of \$12,359 is under the procurement policy threshold of \$15,000 which requires Utilities Committee and Common Council approval authorization. Finance Department approval was sought and granted by Jeff Fait on April 29, 2010. In summary, the approach being taken achieves project objectives quickly, efficiently, safely, and cost effectively. If you have any questions regarding this project please contact Chris Stempa ph: 832-5945