



Request for City Council Committee Action From the Department of Public Works

Date: February 28, 2012

To: Honorable Sandra Colvin Roy, Chair Transportation & Public Works Committee

Subject: **Agreement with the University of Minnesota for a Collaborative Research Project**

Recommendation:

The proper City officials are authorized to enter into an agreement with the Board of Regents of the University of Minnesota to conduct research in characterizing chemical, physical, and biological parameters impacting performance of granular activated carbon filters with respect to particle removal and taste and odor removal.

Previous Directives:

On April 2, 2010 the City Council authorized the proper City officers to enter into an agreement with the Board of Regents of the University of Minnesota to conduct research in determining the most effective type and use of powder activated carbon in drinking water for taste and odor control.

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Approved by:

Steven A. Kotke, P.E., City Engineer, Director of Public Works

Presenters: Annika M. Bankston, Sr. Professional Engineer, Department of Public Works, Water Treatment & Distribution Services

Reviews Not Applicable

Financial Impact

Action is within current department budget

Background/Supporting Information

The 2010-2012 collaborative research project conducted with the University of Minnesota yielded valuable information about effective and optimal use of Powdered Activated Carbon (PAC), a key treatment additive for addressing taste and odor issues. That project was intended to serve as a catalyst for an on-going collaborative research partnership with the

University and local institutions to enable site-specific research yielding results that can be directly implemented in the City's water treatment operations.

The 2012 – 2014 project will investigate another challenge encountered by the City's water treatment process: periodic declines in the particle removal performance of its granular media filters. This operational problem generally occurs during periods when the river is at higher flow rates and higher turbidity and organic levels but lower in mineral content. In addition to these periodic episodes of declining filter performance; MWW has chronic concerns with taste and odor in the water suspected to be caused by naturally-occurring geosmin and trimethylamine. Granular Activated Carbon (GAC) was identified as a feasible advanced treatment technology for the treatment of geosmin based on bench top experiments conducted in a 2011 Study.

The City is in the planning stages of multiple projects to upgrade the Fridley Filter Plant. One project under consideration is replacement of the existing sand and anthracite media with GAC and sand. Conversion to GAC should address the majority of taste and odor concerns, with its performance with respect to trimethylamine to be documented further. GAC may have some effect on particle removal performance because of grain size distribution differences. Furthermore, biologically-active GAC filters create opportunities for enhanced geosmin removal through biodegradation, but the effect on particle removal due to the biofilm on the media needs to be evaluated. Other items that will be considered to improve particle removal include the softening/coagulation operations, the flocculation system, polymer addition, and the backwashing operations.

Pilot-scale GAC filters (with a control filter consisting of anthracite and sand) will be operated at City facilities with assistance by City personnel. Multiple filters will be operated to test the effects of GAC type and pretreatment conditions. Jar tests will be used to evaluate and optimize chemical dosing and/or flocculation conditions to improve particle destabilization and ultimate removal via sedimentation and filtration. The optimal conditions can then be tested with a pilot system that mimics a full-scale treatment train ahead of the pilot filters. Backwashing conditions will be optimized. In addition to particle removal, filter performance with respect to taste and odor compound removal will be assessed. Finally, the filter media will be periodically sampled to quantify biomass and associated geosmin degradation capacity.

The fee for this research project is anticipated to be \$170,000 over a two-year duration. Funding for this research partnership has been allocated in the Division budget. One of the core values of the Public Works Department is to develop collaborative partnerships that lead to a safe, clean, and beautiful urban environment. The University of Minnesota represents a unique and valuable knowledge resource for the Division of Water Treatment & Distribution Services.