SULTAN CITY COUNCIL SUBCOMMITTEE
AGENDA COVER SHEET

ITEM: D - 2

DATE: June 10, 2010

SUBJECT: Water Treatment Plant Evaluation and Optimization

CONTACT PERSONS: Connie Dunn, Public Works Director
Bill Ferry, Water Treatment Plant Operator
Mike Williams, Water Distribution Manager

ISSUE:

For the council subcommittee to review the Water Treatment Plant (WTP) Evaluation and Optimization Report (presented May 10, 2010) prepared by Crazy Mountain Services for the Cadmus Group, Inc. hired by Washington State Department of Health (DOH).

STAFF RECOMMENDATION:

Provide staff with direction to move forward regarding changes that would require low to no impact on the 2010 budget. Items that require additional fund expenditures to be included with the 2011 and 2012 budget requests.

SUMMARY:

Crazy Mountain Services, LLC (Joe Steiner) and South Hills Consulting, LLP (Dan Fraser) were at the Sultan WTP on March 17-19, 2010 conducting a comprehensive performance evaluation of Sultan's plant. The evaluation and report were completed at no cost to the city through a DOH program.(Attachment A)

The purpose of the evaluation is to improve the performance of surface water filtration plants and achieve optimization by identifying and correcting the unique combination of factors in the areas of design, operation, maintenance, and administration that limit performance of the filtration plant.

After reviewing the optimization report city staff recommends the following tasks that should be completed over the next two years (2011-2012).

FISCAL IMPACT:

OPTIMIZATION RECOMMENDATIONS	$	YEAR OF IMPLEMENTATION	NOTES
A-1 Administration Policies – Adopt clear objective and measureable goals to ensure WTP Optimization	Staff Time	2010	Council approving an Ordinance
A-2 Design: Filter to Waste – Engineer WTP design correction to minimize shear forces which cause turbidity spikes. *Suggestion from staff was a Speed Control Valve on Plant Effluent Valve to Clear Wells.	Engineer-ing $20,000 Material $100.00	2011	To slow water flow surge after back wash to control flow going to clear wells
			See * staff comments below
A-3 Technical Guidance – Outside Technical Assistance with training, possibly from DOH	Staff Time Training	Cost are included in the Annual Budget	Starting August 2010 DOH with other Sno.Co. Surface Water Treatment Plants will be having onsite training in Sultan & other plants.
A-4 Application of Water Treatment Concepts – Jar testing, additional turbidity meters, **smaller chemical feed pumps, balance water production with water use, maintain consistency in reporting to DOH	$3,000 for smaller chemical feed pumps	Undeter–mined	Improves finished water quality, efficiency of plant operations
B-1 Minor Design Problems – Continuous turbidity monitoring of Clarifier, record all turbidity meter readings, **over sized chemical feed pumps, filter media size	$20,000	2011 2012	To monitor turbidity after each unit through the plant
	$3,000	2011	See ** staff comments below
	$30,000	2010 2011 2012	Collect samples of the Anthracite Sand research if changing the sand out is necessary.
B-2 Number of Staff – Staffing may be inadequate to achieved and maintain optimization, the report recommends part time but could use part time is distribution system	$45,000 Water Fund	2012	Need to adequately staff the Water Department to provide quality service to the public

*The report recommends hiring a consultant firm to design a change in operation at the Plant to prevent valves open or closing to quickly, in this case the quick change is creating turbidity spikes because of rapid change in filter levels. Staff recommends the installation of a speed control valve on the WPT Effluent valve to control the speed on which it closes and opens.

**The report also recommends that the chemical pumps are oversized. We are currently using the pumps that were put in place during the 2000 – 2001 upgrade improvements on the low end feed setting, except occasionally chemicals are pumped at a high quantity. Staff is recommending continuing use the current pumps until it is time to replace them. The correct size of pump needed will be decided at that time.

For the 2010 Budget, staff recommends to make low to no cost adjustments within current budget restraints, as follows:

- Recommend to City Council to adopt Washington Department of Health's optimization goals.
- Contact DOH for technical assistance from their staff of experts.
- Jar testing completed by the operators, the city owns the testing equipment.
- Using the computer and adjust the reservoir levels before the plant is called to start.
- Maintain consistency with turbidity numbers being reported.
- Add filter media to the one filter that was identified to be low on media.

ATTACHMENTS:

A Optimization Report Recommendations, May 13, 2010 Council Meeting
B Department of Health Treatment Optimization Program Poster

DISCUSSION:

The City of Sultan owns, operates and maintains a municipal owned water treatment facility providing water to the citizens of Sultan from Lake 16, a Surface Water Source. Optimization is not a mandatory program at this time but it does assure the highest standards of drinking water to the City of Sultan consumers.

Sultan Filtration Plant Performance Evaluation Report:
The report provided for review is divided into sections:

A - Major effect on a long-term, repetitive basis,
B - Moderate effect on a routine basis or major effect on a periodic basis
C - Minor Effect

Report Recommendations:

A-1 Administration Policies:
The City of Sultan has not adopted clear objective and measureable goals for finished water quality. The plant operators are working to protect public health goals that are clearly more stringent and protective of public health than the current drinking water regulation. However, measureable optimization goals have not been formally adopted.

Recommendation:
Copies of goals and recommendations were given to the city at the exit interview. Key point goals should be established to maximize public health protection, then communicated to all involved parties, posted for viewing and strived for with a coordinated effort.

A-2 Design: Filter to Waste:
The design at the WTP is such that a severe flow surge through the filters appears to be unavoidable with minor design changes.

Recommendation:
Correction to the design to ensure that there is not an immediate increase in the filtration rate when converting from filter to waste to production. This correction would dampen the shear forces which causes turbidity spikes. Also, the operators should experiment with alternative coagulants, coagulant aids and filter aids to produce stronger floc particles, which will be more resistant to flow changes.

A-3 Operations: Technical Guidance:
Staff could benefit from expert outside technical assistance (e.g., performance based training) that would be very helpful to achieve optimization.

Recommendation:
DOH could be a source of performance based training and potential for receiving technical assistance.

A-4 Operations: Application of Water Treatment Concepts:
Five items are listed (Attachment A) are recommended be put in place for day to day operations.

Recommendation:
Jar Testing; effluent turbidity from the adsorption clarifier measured and recorded; Using water storage to balance water production with water use; use smaller chemical feed pumps; and maintain consistency in numbers reported to DOH monthly reports.

B-1 Design: Minor Design Problems:
Minor design/instrumentation problems make optimization difficult. Flow measurement, continuous turbidity monitoring of the Adsorption Clarifier effluent, record filter-to-waste turbidity, over-sized chemical feed pumps and filter media size.

Recommendation:
Have an engineering firm investigate and suggest changes to better ensure equal proportioning of flow through the three filters. Additional monitoring of filters and the clarifier, installing speed control valves where appropriate, modifications to the SCADA system, smaller chemical feed pumps, and media replacement.

B-2 Administration: Number of Staff:
Staffing may be inadequate to ensure optimization for holidays, weekends, vacations, water distribution emergencies.

Recommendation:
Optimization is typically achieved through step-by-step experimentation over six months to years, which are time consuming. Additional staff, perhaps part time, may be helpful.

Treatment Optimization Program

The Washington Treatment Optimization Program (TOP) is an effort to improve the performance of surface water treatment facilities. TOP focuses on particle removal and disinfection to maximize public health protection from microbial contaminants.

The Washington Department of Health has adopted performance goals for all rapid rate surface water treatment plants in the state.

Optimized Performance

Filtration

- Filtered water turbidity is less than 0.1 NTU 95 percent of the time, based upon maximum daily values recorded (systems without filter-to-waste may exclude 15 minutes after filter backwash).
- Filtered water is below 0.1 NTU within 15 minutes of filter being in production.
- Maximum filtered water turbidity is 0.3 NTU.
- Filters are backwashed before breakthrough.
- Raw water turbidity changes do not affect filtered water turbidity.

Sedimentation

- Settled water turbidity is $\leq$ 2 NTU 95 percent of the time when annual average source turbidity > 10 NTU.
- Settled water turbidity is $\leq$ 1 NTU 95 percent of the time when annual average source turbidity $\leq$ 10 NTU.

Disinfection

- Required CT values are achieved at all times.

Turbidity Monitoring

- Raw water turbidity is monitored at least every 4 hours.
- Effluent turbidity is continuously recorded for each filter.
- Combined filter effluent turbidity is continuously recorded.

For more information about TOP, please contact Stephen Baker at 360-236-3138 or stephen.baker@doh.wa.gov

Washington State Department of Health

Attachment B