



## Memorandum

7-C

February 25, 2008

TO: Public Works Committee  
FR: Dave Sauer, City Engineer  
RE: Wastewater Treatment Facility (WWTF)  
Permit Compliance Issues

The City operates the wastewater treatment facility (WWTF) in accordance with the current Wisconsin Pollutant Discharge Elimination System (WPDES) permit issued April 1, 2006. Included with this permit was schedules of compliance for installing additional groundwater monitoring wells (by September 30, 2006) and for reducing nitrates and chlorides in the wastewater prior to discharge to the infiltration basins. We now have additional data on the test results taken from the new groundwater monitoring wells and from the treated wastewater since we have modified operations to achieve limits. This memo and attachments summarizes this new information and recommends our next steps to maintain compliance with our permit.

### Groundwater Monitoring Wells

Monitoring wells 101A, 114, 114A, 113 and 113A were installed in 2006. Well 101A is a new upgradient well which shows background groundwater quality at a point 20 feet below the top of the groundwater table. Both background wells Well 101 and 101A have nitrate concentrations of approximately 5 mg/l. This is less than the nitrate concentrations 10 years ago. This is important because the groundwater standard for the downgradient wells is dependent upon the upgradient nitrates in Wells 101 and 101A. Chloride concentrations in Wells 101 and 101A range from 20-45 mg/l. Groundwater quality standards by code for nitrate is 10 mg/l and is 250 mg/l for chloride.

Monitoring wells 113, 113A, 114 and 114A are downgradient from the infiltration basins. Existing Wells 102 and 112 are also downgradient wells. Test results from each of these wells show nitrate concentrations ranging from 13 mg/l to 20 mg/l. Chloride concentrations in these range from 225 mg/l to 275 mg/l. Both nitrate and chloride concentrations exceed existing code standards.

### Wastewater Data

The existing wastewater treatment was constructed in 1982 and has a design capacity of 0.60 MGD and a BOD loading rate of 987 lb/day. The facility was designed for a 20-year design period. The facility was not however designed to remove nitrate or chloride. The current

loading rates to the facility are 0.45 MGD and BOD of 845 lbs/day. Nitrogen loading rate is 160 lb/day to 170 lb/day which represents a nitrogen concentration of 42 mg/l to 45 mg/l.

Although the loading rates remain below the original design values for flow and BOD, the facility is approaching 75% to 85% of design capacity. Given this information, and the need to upgrade the facility to meet current groundwater standards, it is recommended to size the upgraded treatment system to both meet groundwater standards and to treat future wastewater flows for the next 20 years.

Projected wastewater loads for the upgraded treatment facility have been estimated based on the last 10 years of wastewater influent load information and includes projected waste loads for the future construction of the bio-diesel and bean-crushing operations. The projected loads are listed below:

Flow	=	0.68 MGD
BOD	=	1268 lb/day
TSS	=	1153 lb/day
Nitrogen	=	295 lb/day

#### Wastewater Treatment Options

The original plan for upgrading the wastewater treatment facility has been to use the existing wastewater lagoons and infiltration basins but to add process improvements to allow treatment for nitrate nitrogen. Process improvements were to include installation of an insulated cover over the lagoon(s) and to add a treatment process to treat nitrate nitrogen. Due to the size of existing lagoons, approximately 500 feet x 350 feet (4 acres), the cost for covering the lagoons with an insulated cover becomes significant (\$700,000). In addition, the nitrate treatment process to be added will require the addition of a carbon source (methanol) on a daily basis. This chemical addition cost is directly related to the cost of methanol which increases each year. Treating for 40 mg/l nitrate could require use of up to 20 gallons of methanol per day which could cost up to \$20,000/year.

An option to upgrading the existing lagoons is to construct a mechanical wastewater treatment facility which would have much lower power costs and which would eliminate the need to add methanol and further reduce operating costs. New wastewater treatment technologies have been available over the last 10 years which appear to be very attractive for the City's application. We have assembled preliminary design information on these new processes which confirms our opinion.

#### Wastewater Facility Planning Recommendations

It is recommended to complete a formal wastewater facility plan for the treatment system rather than just install a cover over the existing lagoon(s) and continue to use the existing system. The facility planning process is required by the WDNR when a new design period and new treatment processes are being considered. The plan would identify in more detail, the projected construction costs and operating costs of the different options. The options to be considered would be to continue to use the existing lagoon system and to construct a new mechanical treatment system.

Preliminary costs for the two options have been completed. The lagoon option has a cost of \$1.85 million while the mechanical treatment system option has a cost of \$2.26 million. Operating costs for the lagoon option have been estimated to be approximately \$40,000/year higher than the proposed mechanical treatment system. This estimated operating cost difference makes the mechanical treatment system option more cost effective after about 12 years of operation. This cost recover time period could be less than 12 years if energy costs continue to rise which is likely to happen. The 12 year time period was calculated based on current electricity costs and current methanol costs.

#### Schedule

The Facility planning process typically takes 4-6 months before receipt of approval from WDNR. The next step would be to prepare plans and specifications (June/July 2008) for construction purposes. Construction of the improvements would take approximately 12 months which would require the existing treatment system to be operated as it is today during the construction period. Estimated construction would occur during 2009 with final operations of the new facility completed during the Spring 2010.