Kennedy/Jenks Consultants
Engineers & Scientists

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Wastewater Treatment Plant Upgrades Facilities Plan For Susanville Consolidated Sanitary District

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Chlorine Destruction

The chlorine destruction Pond No. 6B has performed very well since it was put into operation in 1995. Residual chlorine had been identified as a possible toxicant in bioassays with ceriodaphnia and fat-head minnows. The design criteria was to provide one to five days of detention, but in actuality the effluent chlorine residual of up to 2.6 mg/l breaks down to a non-detectable concentration in less than one day. The 4.2 Mgal pond could polish 2.0 MGD in two days or 4.0 MGD in one day.

Emergency Storage

Ponds 4, 5 and part of 6 store raw wastewater during plant shutdowns, power outages and wet weather peak flows that exceed the permitted capacity of the plant. At the 1.4 MGD dry weather flow the total storage area of 12.9 Mgal provides nine days of storage for complete plant shutdown. At 2.0 MGD peak month with peak hours of 4.0 MGD, the ponds would provide over six days of storage for all flows above the 2.0 MGD treatment capacity of the plant. New piping was installed in 1995 to drain the ponds by gravity back to the plant headworks after the bypass conditions have passed. The return flow is manually controlled by opening or closing a plug valve. It is desirable to return the raw wastewater to the plant as quickly as possible.

It is recommended that an automatic valve be installed on the return pipeline so that return flows can be metered in during the night when the influent flow rate is at its lowest. This can be accomplished with a solenoid valve controlled by a programmable logic controller that receives a signal from the influent flow meter and a new return flow meter, and would adjust the bypass return valve to produce a combined flowrate selected by the operator. This feature is scheduled for installation by early 1999.

Wetlands Treatment

The wetlands was constructed and planted in Pond 3 in early spring of 1996 as a mitigation project in lieu of a cash fine for an accidental permit violation. Some of the original plants died and some have spread. The vegetation is healthy, and has filled in the bottom and banks of the wetlands channel. The nutrient removal has varied seasonally as one would expect. Even after the vegetation has produced a steady cycle of growth and dormancy, the nutrient removal will still vary seasonally. It is too early to forecast its future performance based on these early results.

In a fully vegetated wetland the plant litter provides a carbon source for denitrifying bacteria to thrive. A typical mature weltand of reeds and cattails produces 2.5 tons/year of carbon. At a demand ratio of 5C:1N for denitrification, one acre of wetland is estimated to remove 0.3 mg/l of NO3-N from 1 MGD of effluent. At a loading rate of 1.4 MGD per 1.1 acres of open water, wetlands are estimated to remove about 0.3 mg/l of nitrate nitrogen. If the rest of Pond 3 is developed as a wetlands, the average removal is anticipated to be 1.9 mg/l of NO3 - N.

1999 and 2000 are important years for monitoring the nitrogen removal process in the oxidation ditches and the wetlands. By 1999 the vegetation should have filled in to a steady state. Monthly monitoring of phosphorus, nitrate, ammonia, and TKN in the plant influent, plant effluent and wetlands effluent will track the performance. We can better project the need for additional acreage of wetlands.

It is important to remember that wetlands can not be controlled like a series of oxidation ditches can be controlled to optimize and manage nutrient removal. Phosphorus removal may be less than 50% in a wetlands. Complete nitrification must continue to be accomplished at the treatment plant in order to meet the limit for acute toxicity. Wetlands should be considered as for polishing to remove residual suspended solids, nitrate, other bio-available nitrogen and some phosphorus prior to discharge to the Susan River.

Section 1 of this report presented historic measurements of water quality in the Susan River and in the SCSD effluent. It is clear that SCSD and the Brockman Slough contribute only a small fraction of the nitrogen, phosphorus, sulfate and total dissolved solids in the River downstream of Susanville. The farms that share the Jensen/ Brockman Slough system with SCSD use all of the effluent in the summer. They typically do not fertilize the irrigated land, nutrient loads from agricultural runoff would be from livestock on those pastures. Water quality in the Susan River downstream of Susanville could be improved by constructing wetlands on geothermal water discharges and agricultural return water ditches. The wildlife preserve at the mouth of Honey Lake has developed many acres of wetlands to mitigate acres of wetlands that have been filled in by construction elsewhere. This will improve water quality in Honey Lake.