

*Centra-flo™ Gravity Sand Filter
Pilot Testing at
Panorama Village, Texas
Wastewater Treatment Plant*

July 14, 1993 thru July 22, 1993

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Introduction

Through arrangements made with the City of Panorama Village, Texas, a Model CF-3 Centra-flo Gravity Sand Filter was tested at the City Wastewater Treatment Plant. The plant flow diagram consist of a primary contact chamber followed by aeration. From aeration basin, the flow is to the clarifier with waste solids going to the belt filter press and the clarifier overflow to the chlorine contact chamber. The City utilizes a portion of it's final effluent for watering the golf course. The water tested was pumped from the metering basin to the filter. The effluent water also contains algae. The CF-3 is a two foot diameter filter with approximately 3 square feet of plan surface area.

Test Objectives

The primary goal of the test for Applied Process Technology was to determine the Centra-flo's capability to reduce influent TSS and reduce turbidity to 2 or less in order to meet the requirements California's Title 22. Title 22 stipulates that reclaimed water "shall not exceed an average operating turbidity of 2 turbidity units and does not exceed 5 turbidity units more than 5 percent of the time during any 24-hour period."

Test Performance

The test was conducted from July 14, 1993 to July 22, 1993. During the 9 day test the Centra-flo was operated 24 hours a day without any shutdown or lost operational time.

Test runs 1-6 were completed without the use of any chemical addition. The results indicated the units capability to reduce turbidity below 2 without chemicals.

Test runs 7-61 were completed with the use of Clarifloc C-2005. The chemical consist of an alum-cationic polymer mixture for neutralization/flocculation. The average chemical dosage was 13 ppm. The results of influent and effluent turbidity are shown on Charts 1 & 2. The average influent turbidity was 3.53 NTU while the average effluent was 0.55 NTU. The average removal for 50 tests was 85%.

Total Suspended Solids test were also performed by Eastex Environmental Laboratory. A total of four samples were taken for lab analysis. Average influent TSS was 15.5 with a high of 20. Average effluent TSS was 2 with a low of 1. The average removal was 87%.

The complete run test data can be found attached on Table 1.

Reject flow rates for this test are inflated due to the small size of the filter and the low flow to the filter. The washbox must have a pre-determined optimum flow rate to carry out the accumulated solids from the filter bed. This flow rate will be inflated on the smaller filters because of the low total flow rate. As the filters increase in size this

optimum flow becomes a much smaller percentage of the total flow to the filter. For example, the reject flow for the CF-3 as tested had an average influent flow of 12.5 gpm and an average reject flow rate of 1.93 gpm or 15%. This is highly inflated. On a Model CF-50, the design flow to the filter is 250 gpm with a reject flow rate of 12.5 gpm or 5% of the total flow to the filter. This is the design reject rate for all filters other than the CF-3.

Laboratory Analysis

All data was collected by Applied Process Technology and recorded. Plant personnel witnessed turbidity testing. NTU readings were done on all samples on a Hach 2100P portable Turbidimeter. Total Suspended Solids test were performed by Eastex Environmental Laboratory.

Considerations

The Centra-flo utilizes a high quality multi-grade silica sand. The mixture for this particular test was 13.33% 8-12, 53.33% 12-20, and 33.33% 16-30. This media mixture is typical. The mixture can be tightened up substantially utilizing a finer grade media, thus ensuring even better performance and lower TSS and NTU readings, if required. The one drawback to this will be an increase in the pressure drop across the filter.

Another consideration is the diameter of the filter. Being only 2', the fastest moving, dirtiest sand in the filter is only 5" from the face of the filtrate nozzle. In a larger filter, for example a CF-78, this 5" dimension becomes approximately 51" (10 times the distance). This will also ensure better performance.

Conclusion

Based on the pilot unit test conducted, the Centra-flo Gravity Sand Filter will reduce the influent TSS and Turbidity by an average of 85% running at 6 gpm/sqft. The Centra-flo has proven it's capability to exceed the requirements of Title 22 of the California Code of Regulations by consistently reducing the effluent quality below 2 NTU.

Applied Process Technology would like to thank the City of Panorama Village for their hospitality and assistance during the test. It was appreciated very much.

Respectfully,

APPLIED PROCESS TECHNOLOGY, INC.

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attachments