



Carbon Polishing Brings Plant Into Compliance

According to a National Pollution discharge Elimination Systems (NPDES) permit, the primary/secondary wastewater treatment plant at Chanute Air Force Base, Rantoul, Illinois, must produce effluent BOD of 10 mg/L or less as a daily average and 12 mg/L or less SS daily average, with a daily allowable maximum of 15 mg/L of BOD and SS. These effluent quality goals are designed to prevent pollution to Salt Fork Creek, which receives the plant's wastewater discharge. However, it was not possible to attain this degree of treatment with the existing wastewater treatment plant.

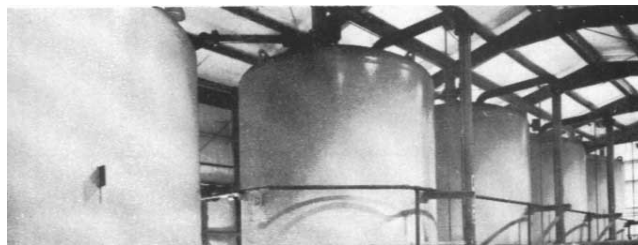
Chanute's original system consisted of primary treatment including a clarifier and an Imhoff tank which were operated in parallel. Secondary biological treatment was provided by an intermediate rate trickling filter and two final clarifiers which were operated in series.

Construction of a totally new treatment plant at the base would have taken three to five years at substantial cost. A second alternative, building of a regional treatment facility to serve the base and the Rantoul area, would have also involved a number of years in planning and completion. It was decided to use a granular activated carbon system, supplied by Calgon Corporation's Activated Carbon Division, which has consistently and economically met the stringent objectives. As an additional consideration, the regional treatment plant remains a viable option for the future.

The carbon system, installed in 1980, includes four free-standing, back-washable adsorbers, each holding 20,000 pounds of carbon, and a transfer vessel. The adsorbers operate in a downflow parallel configuration. Dissolved organic chemicals in the wastewater are removed during passage through the carbon system at a superficial contact time of five minutes per column.

Influent wastewater, at a flow of 1.5 to 2.0 mgd (base population is over 12,000), goes through primary treatment including the Imhoff tank and clarifier for sedimentation and sludge digestion. Next, secondary biological treatment utilizes an intermediate rate trickling filter, a polymer and ferric chloride feed system to aid coagulation and flocculation, final clarification, carbon treatment, and chlorination. Digested sludge is discharged to sand drying beds. Effluent wastewater is discharged to storm drains and then in turn to Salt Fork Creek, about a mile downstream from the treatment plant. Carbon is replaced twice a year and its cost is inclusive in Calgon's annual service fee of 0.9 cents per gallon. The new granular activated carbon adsorption system cost \$ 2.50 million.

Although some effluent quality problems were experienced during the early operation of the carbon system, as expected of any new system, a comprehensive fine tuning of the whole treatment system, including improved pretreatment of organics before reaching the carbon, has resulted in satisfactory carbon performance," said Jay Crail, Calgon's manager of Carbon Services Administration.





Four modular adsorbers plus a transfer tank, each holding 20,000 pounds of granular activated carbon, remove dissolved organics from Chanute AFB wastewater.

Performance Data

"Daily data on carbon performance in 1981 indicates that effluent quality at the plant has averaged 7.37 mg/L BOD per month and 8.11 mg/L SS per month, both comfortably under the maximum allowable standards," he said.

For example, during May 1981, the highest raw wastewater influent BOD was 545 mg/L (on May 29). Primary treatment reduced it to 350 mg/L, secondary treatment reduced it to 40 mg/L, and final carbon treatment reduced it to 8 mg/L at the plant effluent.

In the same month, the highest SS of 166 mg/L in raw wastewater occurred on May 30. Primary treatment reduced it to 74 mg/L, secondary treatment reduced it to 28 mg/L, and carbon polishing reduced it to 5 mg/L at the plant effluent. "Although BOD and SS occasionally peaked on some days in 1981 at higher levels than expected - probably due to heavy rainfall and higher flow rates - the overall monthly effluent averages were consistently in NPDES compliance," Crail noted.

Average raw wastewater influent BOD for May was 235 mg/L. Primary treatment reduced it to an average of 122 mg/L, secondary treatment to an average of 30 mg/L, and final carbon treatment to an average of 7 mg/L. Average SS figures for the same month read: influent, 121; primary, 70; secondary, 25; and carbon treatment, 6.

Properly designed to meet Chanute Air Force Base's specifications for BOD and SS removal, the carbon system was able to polish water down to the final levels that made the difference between NPDES compliance and violation.

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