APPENDIX

TECHNICAL SPECIFICATIONS OF EQUIPMENT

I. Hydrated Lime System

A. Storage Tank

An 18,000-gallon cylindrical steel baffled tank 15 ft in diameter that is 15.5 ft high and has a liquid level of 13 ft. The mixer is a top entering heavy duty mixer, driven by a 50 HP motor with a right angle speed reducer provided by Philadelphia Gear Company. The shaft is 165 in. long with 2 P-type axial flow turbines, 48 in. diameter, made of carbon steel. The lower turbine has stabilizing fins. The hydrated lime slurry has a specific gravity of 1.25 or a concentration by weight of 30% solids.

B. Specific Gravity Tank

This is a 6 ft square by 6.5 ft high steel constant specific gravity (1500-gallon) tank with a 5 HP Lightnin top entering mixer, manufactured by Mixing Equipment Company, with a right angle speed reducer. The mixer, which is provided with an axial flow turbine, is rated for continuous service. The hydrated lime slurry is diluted to a specific gravity of 1.05 or a concentration by weight of 10% solids.

C. Dust Collector

A modular fabric type dry dust collector is installed on the storage tank roof with an 800 CFM fan and 200 ft^2 area of filter cloth. The dust collector is provided with an automatic motorized bag shaker.

D. Pumps

1. Concentrated Hydrated Lime Transfer Pump

One horizontal centrifugal Galigher Vacseal belt driven pump with a 40 gpm capacity at 20 ft TDH when lime slurry specific gravity is 1.25. This pump is used to convey concentrated lime slurry to the lime slurry dilution tank, in place of gravity flow.

2. Hydrated Lime Dilute Slurry

Two Galigher Vacseal horizontal centrifugal belt-driven pumps with a 40 gpm capacity at 30 ft TDH when lime slurry specific gravity is 1.10.

3. Clarifier Effluent Water Pump

One horizontal centrifugal pump to storage tank. 200 gpm capacity at 15 ft TDH convey water from the clarifier to lime slurry tank. The suction side of the pump is connected to mud valves located just under the liquid surface in the solids-contact clarifier.

E. Proportioning Weir Tanks

Three 316 stainless steel proportioning weir boxes supplied by B-I-F Industries with a 30 gpm capacity and an air-actuated flow splitter ranging from 0 - 100% at a 3 - 15 PSIG signal. The agitators are 1/3 HP Lightnin agitators.

II. Equalization Lagoon

Two million-gallon capacity equalization lagoon with a 10 mil plasticized PVC liner under a 12 in. layer of debris-free earth.

A butterfly valve installed on the lagoon's outlet which is connected to the waste treatment plant inlet may be closed automatically in case of power failure. The valve is designed to remain open when air pressure is available and to fail safe by closing when pressure is not available.

III. Neutralization Tank

A 10' x 10' x 6.4' water depth (4000-gallon) concrete tank with a 40-mil thick plastic liner. A 5 HP continuous duty Lightnin mixer of 316 stainless steel with a 54 in. type P axial flow turbine with stabilizing fins.

IV. Lift Pumps for Raw Waste

Two Beloit-Passavant screw lift pumps operating against a 15 ft head and installed at a 38° angle. The 36 in. pump is rated at 2000 gpm and the 54 in. at 6000 gpm. Automatic operation by liquid level electrodes.

V. Clarifier

A clarifier of the solids-contact type furnished by Eimco Corporation 75 ft in diameter with a 14 ft side water depth that meets the following conditions:

1. Peripheral speed at rake = 8 ft/min
2. Maximum flow: 2100 gpm
3. Flash mix detention time: approximately 30 sec
4. Reaction time: 15 min
5. Variable slurry recirculation rate 4 to 6 times the flow.

6. Rise rate: 0.5 gpm per sq ft
7. Overflow rate: 7.0 gpm/ft of weir
8. Total nominal detention time of not less than 210 min @ 2200 gpm

Sludge transfer pump of the progressive cavity type (Moyno), manufactured by Robbins-Myers with variable speed from 50 to 250 gpm, driven by a 5 HP motor.

VI. Sludge Thickener

A concrete tank, 30' x 30' x 10' side water depth, with bottom slope of 2-3/4 in./ft. The sludge removing rake is provided with pickets to enhance dewatering of the sludge.

Waste sludge pumps - Two progressive cavity type "Moyno" 100 gpm, driven by 5 HP motors.

VII. Sludge Storage Lagoons

Two lagoons respectively with 150,000 and 200,000-gallon capacity. Two decanting boxes are provided to remove supernant and to aid in dewatering the sludge.

VIII. Bypass Lagoon

Capacity: 250,000-gallon, lined with 10-mil thick plasticized PVC liner with a 12 in. thick debris-free earth cover. The lagoon is used to provide additional settling capacity, should the clarifier effluent contain relatively high suspended solids concentration. The lagoon may be used for additional settling capacity when connected in series with the clarifier and may also be used temporarily in place of the clarifier.

IX. Polymeric Flocculant System

A. Tanks

Two 100-gallon tanks 30 in. dia x 48 in. provided with dispersers for application of polymeric flocculant.

B. Agitators

Two 1/3 HP Lightnin agitators with a 48 in. shaft length and three-blade propellers constructed of stainless steel type 316.

C. Metering Pump

One B-I-F Industries metering pump with two pumping heads, diaphragm type, capable of providing a variable feed flow from nearly zero to 20 gallons per hour of 0.5% solution of a polyacrylamide type polymeric flocculant with a viscosity of 1000 centipoises.

X. Process Water System

All process water originates from the clarifier effluent. In addition to the 200 gpm pump, listed under Item I.D.3, which is used to convey water to the hydrated lime slurry storage tank during the lime loading cycle, there are two 50 gpm centrifugal pumps capable of operating against a TDH of 100 ft. These pumps, also connected to the previously described effluent mud valves trough of the solids-contact clarifier, to provide process water for preparation of solutions or slurries of chemical reagents, pump water seals, backflush of sludge lines and other purposes.

Some of the water is conveyed to a Culligan pressure sand filter 30 in. in diameter, 45 in. in height with a 10 gpm capacity. The filtered water flows to a 1000-gallon storage tank and is pumped to a 220-gallon hydropneumatic tank by one of two 40 gpm Deming multistage centrifugal pumps capable of operating against a TDH of 75 psig.

As the liquid level controller in the hydropneumatic tank calls for water, a chemical proportioning pump, connected to a 50-gallon plastic tank containing a calcium hypochlorite solution, is energized to inject the solution in the water for disinfection purposes, as it flows to the hydropneumatic tank. This water is used for sanitary (not potable) purposes in place of well water. This was initially used but was later abandoned because it was of poorer chemical quality than clarifier effluent water.

The 200-gallon steel hydropneumatic tank meets A.S.M.E. specifications for an unfired pressure vessel.

XI. Sanitary Waste

Water from the toilets and sump pumps is discharged to a package type sewage treatment unit, of the Cavitette type, as manufactured by Yeomans Brothers Company, Melrose Park, Illinois. The unit is provided with a timer operated recirculation system.

XII. Electrical Equipment

A 480 V 3-phase 60 Hz service feeder line enters the plant. The motor control center has been designed to comply with NEMA

type B construction. The center is made up of 90 in. high sections 2 ft wide and 2 ft deep. Main bus bars are rated at 600 amps and are capable of withstanding 25,000 amps, RMS fault current. Motor starter units are of the combination type with circuit breakers. The circuit breakers operating handles are interlocked with the unit doors so that the doors cannot be opened when the switch is on the "ON" position. Thermal relays have been provided for motor protection.

XIII. Instrumentation

A. Neutralization Tank pH

Beckman flowthru assembly and high-low alarms plus strip chart recorder by Fischer & Porter Company. The pH electrodes consist of a glass electrode, plastic reference electrode and temperature compensator.

B. Clarifier pH

Same as neutralization tank pH electrode assembly connected to neutralization chamber in clarifier.

C. pH Effluent

Same as above except that only an indicator with chart is provided.

D. Impounding Lagoon Level Recording System

Bubbler system with a strip chart to record the liquid level furnished by Fischer & Porter.

E. Hydrated Lime Slurry Storage Tank Level

Capacitance type probe plus alarms.

F. Specific Gravity Unit in Dilution Tank

Air bubbler system with DP cell controlling both level and a specific gravity, provided with high and low alarm contacts, and recording strip chart. Liquid level controller actuates opening or closing of concentrated lime slurry valve. Specific gravity controller actuates valve on diluting water line.

G. Telemergency Unit

Alarms cause a telephone signal to be sent to various operators when plant is unattended.

XIV. Miscellaneous

A. Air Supply for Instrumentation

Two Gardner-Denver belt driven compressors with 32 CFM capacity provided with a Hankison Condensifilter Model M-30T, 30 SCFM air dryer at 100 psig. The compressor is provided with a 240-gallon vertical ASME approved air receiver.

B. Basement Floor Sump Pumps

Two 40 gpm capacity 11 ft TDH, Galigher wet pit sumps discharge the basement drainage to the Cavitette unit. They are operated automatically by electrodes.