

GROUNDWATER TREATMENT FACILITY DESIGNED TO OPERATE UNDER FLOOD CONDITIONS

Location: Central Alabama

Client: Major Oil Company

Project Cost: \$170,000

PROBLEM

Remtech Engineers was engaged by the corporate environmental engineering department of a Fortune 100 Energy Corporation to design a groundwater treatment plant for leachate generated from a chemical waste landfill in Alabama to operate under flood conditions.

SOLUTION

A waste impoundment was closed by constructing an engineered storage facility. Bentonite slurry walls were constructed and solidification agents were introduced to stabilize wastes. Gas vents, and a High Density Polyethylene Liner was installed to prevent surface water infiltration. A cap was constructed over the landfill.

An estimated three-foot water depth frequently covered the site due to the Corps of Engineers altering spillway elevations at dams located up and downstream. PVC extraction wells were installed in the cap and drilled inside and outside of the slurry wall to intercept and treat leachates from the landfill and direct clean upgradient groundwater around the storage facility.

Submersible pumps were placed in the bottom of each well to produce extraction rates of 50 gpm. North and south galleries were connected to control panels to facilitate operation of single or multiple pumps. The collection gallery initially drained into an existing onsite concrete retention basin.

Remtech evaluated alternative functional designs and prepared detailed plans, specifications, material takeoffs, and contract/bid documents in a 60-day period. This plant was constructed 8-months later. Remtech Engineers also trained plant operations personnel.

COST/BENEFITS

Unit operation carbon and stainless steel tanks, quartz lighting, and safety railing were salvaged from the client's onsite abandoned phenoxy plant. An existing concrete retention basin was used as a foundation and secondary containment structure for the plant. Unique Remtech plant design features (see next page), including floating weirs, saved the client over \$110,000 thousand dollars.



Petrochemical Site Prior to Closure



Bentonite Slurry Wall, Cap, and Leachate Control Wells



Remtech Groundwater Treatment System

UNIQUE PLANT DESIGN FEATURES

1. Leachates were channeled into two, 600 foot by four-inch PVC collection galleries connected to fourteen, two-foot diameter PVC extraction wells with depths up to 50 feet.
2. A polyethylene air driven diaphragm pump was selected to extract contaminated groundwater from one extraction well with a pH less than 1.0 ($< 5\%$ sulfuric acid) at 50-gallons per minute. Thirteen additional wells were equipped with Gould submersible pumps and flow totalizers.
3. Groundwater was neutralized with a 20 percent sodium hydroxide solution to eliminate caustic tank heat tracing and the need for special corrosion resistant construction materials in downstream treatment vessels.
4. The plant was designed to operate as a physicochemical and/or extended aeration treatment system in a batch or continuous mode. Floating surface aerators (with submerged motors) were selected to supply oxygen for extended aeration, air for stripping of volatile organic compounds, and mixing for suspension and removal of sludges.
5. Treatment design capacities are expandable from 10,000 to 75,000 gallons/day. Flow rates can be varied for dynamic waste loadings and characterizations by altering reactor retention times, overflow rates, sludge wasting rates, pump recycling rates, and treating waste streams in series or parallel.
6. Optional treatment paths were incorporated into the design by establishing various directional flow/reactor piping with flow and valve controllers.
7. Plant reactors, quartz lighting, and safety railing were salvaged from an abandoned, client-owned phenoxy plant located 300 feet from the designated construction site and were retrofitted into the design of the new facility. Cost savings were estimated at \$70,000 compared to new equipment.
8. Floating weirs were designed by inverting fiberglass skimmers and installing draft tubes. This approach saved an estimated \$40,000 over conventional decanters.
9. Explosion-proof and waterproof electrical mixers conduit, aerators, pumps, and controllers were specified to operate in flood conditions. Reactors were designed to withstand floodwaters of five-feet which are created by changing spillway levels at two Corps of Engineers dams located up and down-river from the plant.
10. Remtech CAD and construction management software programs were utilized to prepare design specifications and monitor project task performance with project schedules and budgets.



Treatment Plant Designed by Remtech