SUPPLEMENTARY

ENGINEERING REPORT

OF

SLUDGE DISPOSAL

AT

CHEMOLITE

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INTRODUCTION

The waste sludge produced at Chemolite comes from two sources. Source I is from the primary treatment unit. This sludge is primarily inorganic and consists mainly of iron oxide and paper pulp fibers. Source II comes from the waste sludge generated by the biological treatment process.

A preliminary study on the characteristics and quantities of sludge has been submitted to you in a report dated May 14, 1969.

At the present time the sludge from the sludge holding tanks when they become full is hauled by truck to a landfill area on the Chemolite property. In this condition the sludge is about 4 percent solids.

The limitations associated with this method of sludge disposal include the following:

1. Wet sludge as taken from the sludge holding tanks is difficult to load and haul because of its high water content.
2. Land area for dumping the wet sludge is becoming limited.
3. Organic contaminants from the sludge may leach into the ground water at the present dumping site.

Because of these limitations a sludge dewatering system followed by land disposal or incineration is needed at Chemolite. Such a system will reduce the sludge volume by approximately 75 percent. Furthermore, the sludge cake that is produced will be easy to handle and can be burned if incineration is chosen as the disposal method. Tests need to be run to determine the extent of leaching caused by the dewatered sludge if land disposal is chosen.

SLUDGE DEWATERING ALTERNATES

For effective dewatering of sludge by vacuum filtration, the influent solids concentration should be fairly high. Chemolite sludge varies from about 0.8 percent from the Phase II biological treatment process to about 3 percent from the Phase I treatment process.

The plan being considered is to mix the two sludges, settle the mixture in the existing sludge holding tanks, and apply the settled sludge to a vacuum filter. If the sludge does not thicken sufficiently in the holding tanks, it may be necessary to thicken the sludge through chemical addition before applying it to the vacuum filter. Therefore, any of the following three alternates may be necessary depending on the characteristics of the settled sludge:

I. Gravity thickening of the tank sludge (accomplished in a circular thickening tank) followed by chemical conditioning and vacuum filtration.*

II. Chemical conditioning of the tank sludge (using iron salts, lime, or polyelectrolytes) followed by . uum filtration.*

III. Pumping of sludge directly f. m the tank onto the vacuum filters.*

At this time all three alternates must be considered. A brief description of each alternative and its costs are described below.

Alternate I

For this alternate, the sludge will be pumped to a circular thickening tank where the solids concentration will be increased about 3 times its initial value. After thickening, the settled sludge will be pumped to a chemical conditioning tank and the supernatant discharged to the existing stabilization ponds. The sludge from the conditioning tanks will then be fed to vacuum filters for dewatering.

*The filter cake must be hauled to a landfill site for final disposal or burned in the new incinerator.

The approximate costs are summarized below:

Item	Cost
Thickening Tank	$50,000
Vacuum Filters	$47,000
Housing & Appurtenances	$24,000
Engineering & Contingency	$17,000
Truck	$ 8,000
Total	$146,000

Alternate II

In this alternate the sludge will be pumped from the sludge holding tanks into the chemical conditioning tank and after conditioning applied to the filter. The process is identical to Alternate I except the thickening step is eliminated.

The approximate costs for this alternate are summarized below:

Item	Cost
Vacuum Filters	$53,000
Housing & Appurtenances	$24,000
Engineering & Contingency	$15,000
Truck	$ 8,000
Total	$100,000

Alternate III

For this alternate, the sludge will be pumped directly from the sludge settling tanks onto the filter. The effectivensss of this method will depend on the degree of thickening accomplished in the existing sludge ponds. Preliminary filtration tests as shown in our report dated March 18, 1968, indicate that this method may work. Vacuum filter costs will be more expensive for this alternate because of a lower filter yield used in the

design calculations. The filter yield used was 3 lbs./ft.^{2}/hour, whereas for I and II, the yields were 6 and 5 lbs./ft.^{2}/hour, respectively.

The approximate costs for this alternate are summarized below:

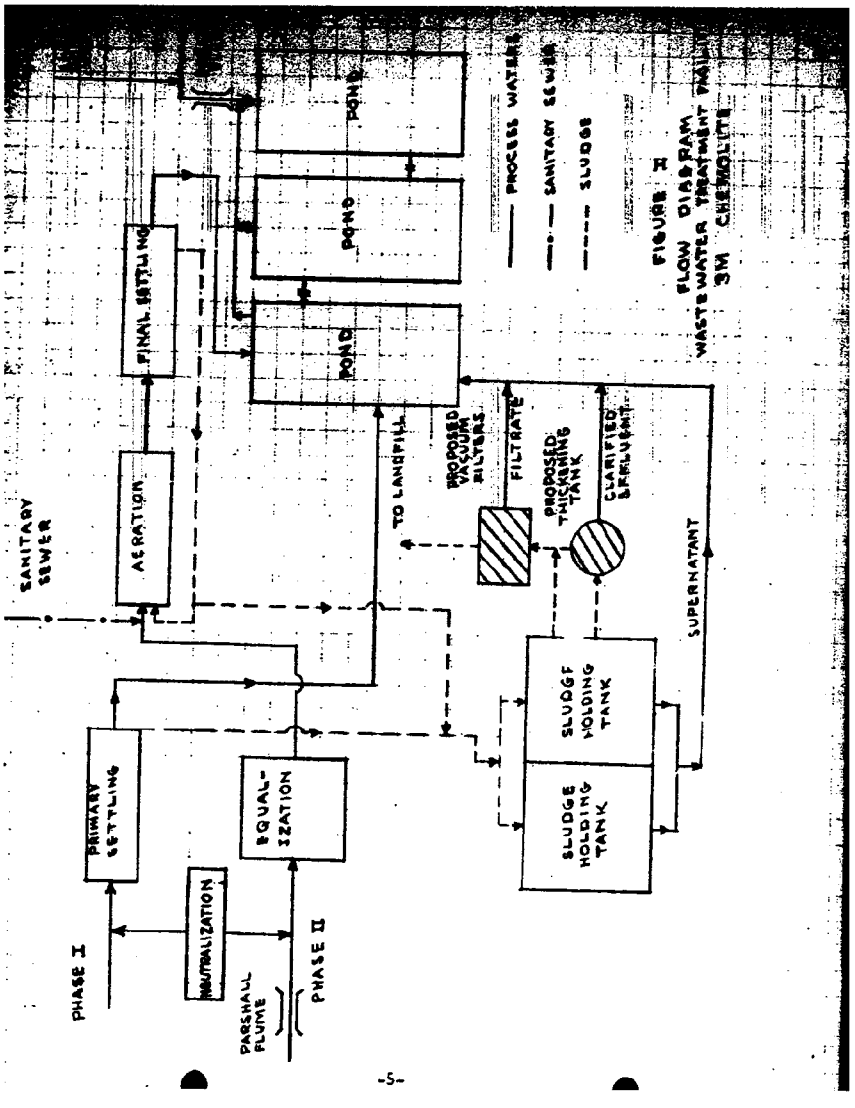
Item	Cost
Vacuum Filters	$70,000
Housing & Appurtenances	$15,000
Engineering & Contingency	$15,000
Truck	$ 8,000
Total	$108,000

Location of Disposal Facilities

Land availability for the dewatering facility is no problem. The track of land adjacent to the existing sludge tanks has been tentatively selected as the site of the disposal facilities. Figure 1 shows the location of the site in relation to the other waste treatment units. This site is most convenient considering land availability and minimum pumping distance for the sludge.

Operation

The filter will be designed to operate on a 16 hour/day schedule and handle 6 tons of sludge daily (future expansion included). The average daily sludge production from both Phase I and II is now approximately 4 tons/day. Therefore, the filters will initially operate less than 16 hours/day. A flow diagram of the existing wastewater treatment facilities and the proposed sludge disposal facilities is also shown in Figure 1. An additional operator will be needed to operate the new sludge disposal facilities. The operator can also be used as the driver of the truck hauling the sludge cake to a dumping site or future incinerator.



If chemical conditioning is employed, additional equipment such as chemical conditioning tanks and chemical feeder will be needed. Also, conditioning chemicals will add to the operational costs. Estimated operating expenses are summarized in the following table. These cost figures include salaries, depreciation, power chemicals and maintenance. Maintenance was figured at 5 percent of the construction costs.

Alternative	Operation & Maintenance Dollars per year
I	$23,000
II	$20,000
III	$18,000

RECOMMENDATIONS

Because of the varying costs of the three alternates, a pilot study should be run this summer to determine the filtering characteristics of the sludge. The pilot unit will be a (prototype) vacuum filter that will be rented from an equipment manufacturer. With this information the capital and operating costs can be determined more accurately. This study will specifically determine the following:

1. Which alternate will be needed to effectively eliminate the sludge disposal problem at Chemolite.
2. The design parameters for thickening if required.
3. The type of chemicals and optimum dosages of chemical conditioning is required.
4. The design parameters for the vacuum filter such as loading rate, cycle time, etc.
5. The combustibility of the dewatered sludge.
6. The leaching effect of the dewatered sludge if it is landfilled.

As indicated in our previous report the approximate cost of this pilot study will be $6,000.

In order to rent this equipment and complete the pilot study this summer the $6,000 should be authorized as soon as possible. We are ready to work with you on this project as soon as you have had a chance to review this report.

If you have any questions or need any more information at this time, please let us know.