

WASTEWATER PLANTS OPERATORS MANUAL

THE ZIA COMPANY

LOS ALAMOS, NM 5/8/86

Policy: Operation of Wastewater Plants

PROCEDURE:

I. Materials, Tools and Equipment

A. Materials Required

1. #90 crankcase oil
2. SAE-30 motor oil
3. General all-purpose lubricating grease

B. Tools and Equipment Required

1. Water hose, 200 feet
2. Shovel
3. Rake
4. Miscellaneous hand tools
5. Squeegees
6. Wire brushes
7. Brooms

II. Standard Hours

- A. Wastewater treatment plants operate 24 hours a day, seven days a week. At no time will wastewater plants be operated on the by-pass without notification of the Zia environmental Office (EENV).
- B. Each plant is checked each weekday, with maintenance, repairs, etc., carried out as necessary. Plants are not normally checked on weekends, but if problems arise, they are either handled by the roving pipefitter, or people are called out on an emergency basis.

III. Safety and Health

- A. Wastewater is a vehicle for many disease-causing bacteria. Operators should take all possible care in personal hygiene, and be immunized for tetanus as recommended by LANL H-2.



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IV. Quality Assurance

- A. The Zia environmental engineer and UWGW Superintendent inspect these plants once a month; the foreman inspects weekly. The plants must be operated so the best treatment is obtained. Quality of final effluent must meet National Pollution Discharge Elimination System (NPDES) Permit Requirements as follows:
1. BOD = 30 mg/L (30-day avg)
 2. Suspended solids = 30 mg/L (30-day avg)
 3. Fecal coliform = 200/100 ml (30-day avg)
 4. ph = 6.0 to 9.0
- B. Monitoring of the plant by Zia Environmental Laboratory personnel is done at the frequency established by EPA and noted in the permit conditions.

V. Standard References

1. Secondary Treatment Information,
40 CFR 133
2. DOE Manual
 - a. Chapter 0510
 - b. Chapter 0513
3. Operation of Wastewater Treatment Plants Manual
(Sacramento State College, Sacramento, California)
4. Water Works Operation ("The Texas Manual")
(Texas A. and M. University, College Station, Texas)
5. Zia Health and Safety Manual
6. U. S. Occupational Health and Safety Act (OSHA),
29 CFR 1910

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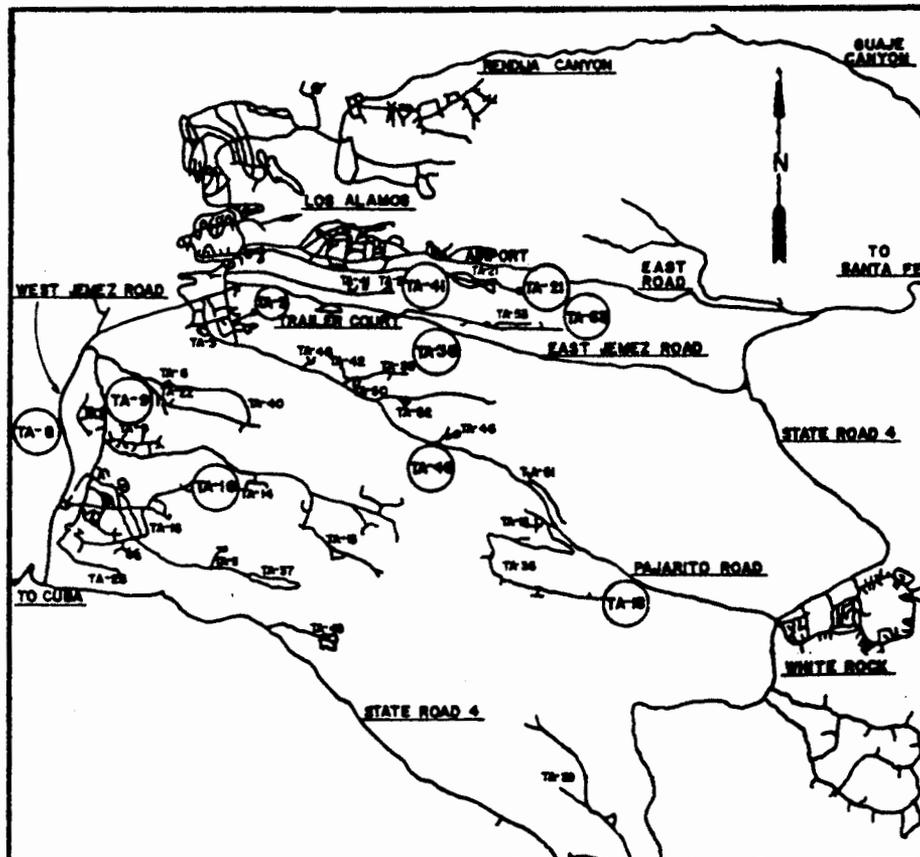
LOS ALAMOS, NM 9/30/85

POLICY: Sewage-Treatment Plants

INTRODUCTION: The Company operates and maintains ten wastewater treatment plants serving the various technical areas of the Los Alamos National Laboratory (See Exhibit). Regular inspection, cleaning and, in some cases, rotation of the use of facilities is required. A series of individual procedures, following this overall outline, detail exact procedures for each individual plant. Certain general considerations, However, that apply to all these plants, are presented in this section.

A similar procedure (Section 162-11 of this manual of Policies and Procedures) has been established for septic-tank operation and maintenance.

EXHIBIT: Locations of Wastewater Treatment Plants



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POLICY: Operation of TA-3 Wastewater Treatment Plant

INTRODUCTION: This plant is located adjacent to and east of the Water, Gas and Wastewater Building, SM-223. The Plant consists of two parallel systems, each with an entrance works, an imhoff tank, a dosing siphon, a trickling filter, and a final clarifier (See Exhibit 1). Sewage is stabilized by physical removal of settleable material in the imhoff tanks, and biological removal of soluble material through the action of bacteria in the trickling filters. Final effluent from both plants empties into a wet well, and is then pumped to the power plant for use as cooling water, or sent to the chlorine contact chamber for disinfection, and then dumped to the canyon.

PROCEDURE:

I. Inspection and Maintenance

- A. Entrance Works are inspected daily by the operator for proper operation. Comminutors are lubricated weekly with SAE-30 oil. All floating debris must be removed from the entrance box and placed in container for disposal at TA-54. The bar screen is hand-raked when necessary and debris placed in containers for disposal at TA-54.
- B. Imhoff Tanks are each washed down with a hose, and floatable scum is removed from the settling compartment through the scum trough every day. Accumulated solids in the tank slot are pushed into the sludge digestion compartment with a squeegee.

Withdraw sludge to sludge beds twice a year. To minimize odor problems, this should be done in the warm dry months of the year, preferably March and September.

1. Plant No. 1

- a. Open valve #1 at imhoff tank.
- b. Open valve D to sludge bed.
- c. Close valve #1 and open valve #2 when sludge has been withdrawn. Continue this sequence with valve #3 and #4 changing sludge beds when sludge level reaches a depth of 6 to 8 inches.

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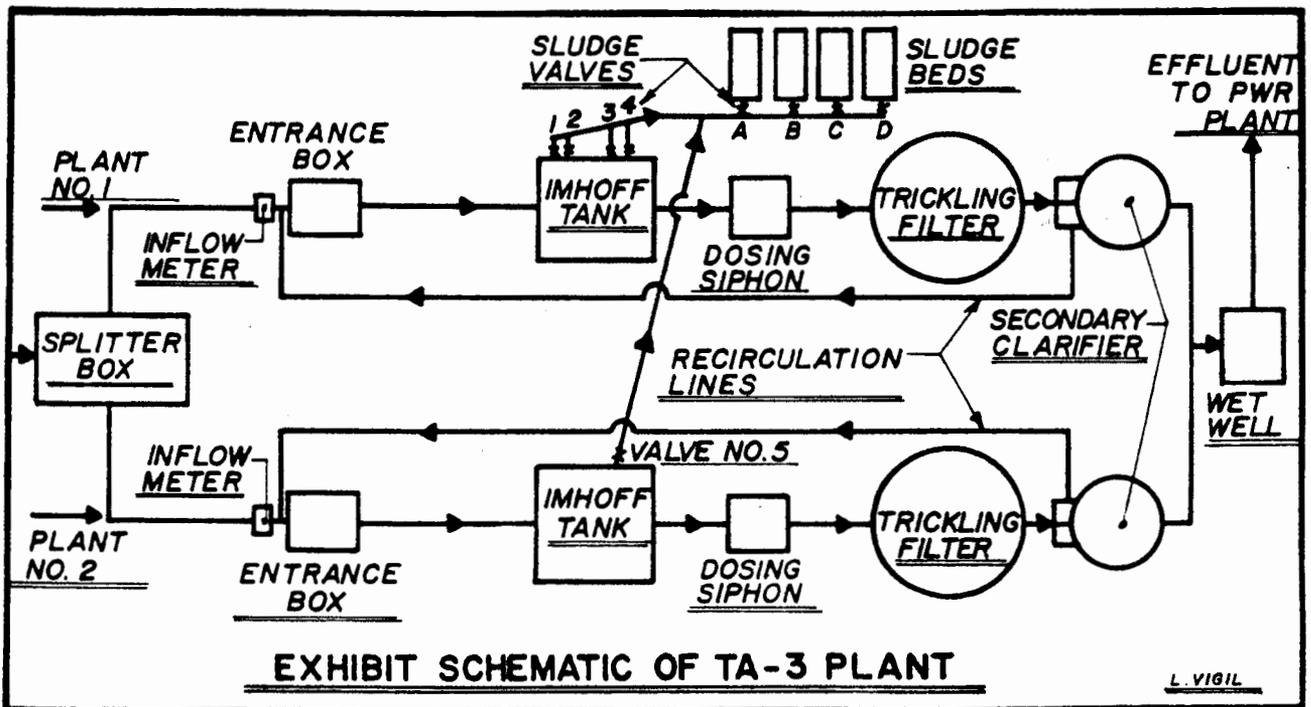
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2. Plant No. 2

- a. Open valve #5 at imhoff tank.
- b. Open valve (A, B, C or D) to available sludge bed.

When sludge from both Imhoff tanks has been emptied, check to see that all valves are properly closed.



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- C. Siphons are checked daily for proper operation. When flow is divided equally between both plants, the siphons will fill and empty to the trickling filter routinely throughout the day. When operating with one plant, the siphon will fill and remain open, emptying continuously to the trickling filter. Occasional cleaning is required because solids sometimes lodge in the vacuum pipe.
- D. Trickling Filters are inspected daily by the operator for signs of ponding, plugging of spray nozzles and proper operation of distribution arms. When spray nozzles become plugged, clean them by opening gates at the end of each arm, sweeping each nozzle with a broom and running a water hose into the arm until normal flow through nozzle is restored. Distribution arms periodically get off-balance and must be releveled. To relevel the distribution arms, the UWGW foreman will request, from the Zia Engineering office, an engineer with a transit or level. The distribution arms should be leveled and sloped so that the elevation difference from the center to the end of each arm is approximately 1-1/2 inches.
- E. Final Clarifier is checked daily by the operator for proper operation and lubrication of pumps and motors.
1. Drive Unit (center of clarifier): Use #90 crankcase oil.
 - a. Check oil level in drive chain compartment.
 - b. Check oil level plug on gear motor.
 - c. Check oil level in worm gear compartment and maintain oil level slightly above worm gear.
 2. Check grease fittings on motor weekly.
 3. Check pumps bearings for excessive heat, noise and excess leakage around seals.
 4. Check recirculation pumps next to each clarifier, for bearing wear and excessive noise. Lubricate pumps weekly, and alternate their operation.

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- F. Final Effluent Wet Well receives the effluent from both plant #1 and #2. This final effluent is pumped to the TA-3 Power Plant for use as cooling water. The two turbine pumps must be checked by the operator daily. Keep oil reservoirs on each pump full of SAE 30 motor oil. Oil for these pumps is located in 55-gallon barrels east of the wet well next to the fence. Check motor for excessive temperature, noise and seal leakage.

- G. When effluent quantities exceed those required for cooling water at the power plant, then the excess flows to the chlorine contact chamber, and after disinfection, to the canyon. The chlorine tank should be checked daily, and the contact chamber weekly.

- H. Sludge Beds are cleaned after sludge has dried adequately subsequent to removal from imhoff tanks. Sludge is dried sufficiently to stack along south side of sludge beds. Because of high concentrations of heavy metals in the sludge, removal for private use is prohibited. After sludge has been removed, sand is replenished in the beds and raked smooth in preparation for next sludge withdrawal.

- I. Metering of sewage entering the plant is done by two flow meters at the head of each plant. The operator reads and records the flow in a Meter Record Book every day.

II. Standard Factors

Standard Hours, Safety and Health Precautions, Quality Assurance and Reference Standards are as outlined in Section 162-10 of this manual of Wastewater Plants.

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POLICY: Operation of TA-9 Oxidation Pond and Intermittent Sand Filter

INTRODUCTION: This plant, located north of the TA-9 fence, but within the security area, combines physical and biological processes to stabilize sewage. The TA-9 plant consists of a one-cell lagoon, a siphon tank and an intermittent sand filter.

PROCEDURE:

I. Inspection and Maintenance

- A. Oxidation Ponds are inspected daily by the operator for any unusual conditions. If unusual conditions exist, the operator will report to UWGW Foreman who in turn will call the Environmental Engineer. Area maintenance in terms of weed control around lagoons and sand filters is of prime importance during the summer months. The operator will assign his laborer this area of responsibility.

The TA-9 Oxidation Pond is designed to operate at a three and five-foot level. During the winter months when temperatures drop and biological activities is low, the lagoons are operated at the five-foot level. This allows an added solids-storage volume. As temperatures rise during the summer months the level is lowered to the three-foot level.

- B. Intermittent Sand Filters are designed to operate on an alternating basis. The period of time that each filter can stay in service before alternating is approximately six months, but they should not be alternated until laboratory analysis shows deterioration of effluent quality, or until the sand becomes excessively clogged or overgrown with weeds. After the filters have been alternated and filter is allowed to dry the operator tills the upper two to three inches of sand surface and then hand rakes it to a level surface. Proper leveling of sand is of prime importance to insure even distribution of water over the filter.

When tilling no longer restores the filter to its full capacity, the upper two to three inches of sand must be removed and replaced with clean specification sand. Old sand is hauled to TA-54 for disposal.

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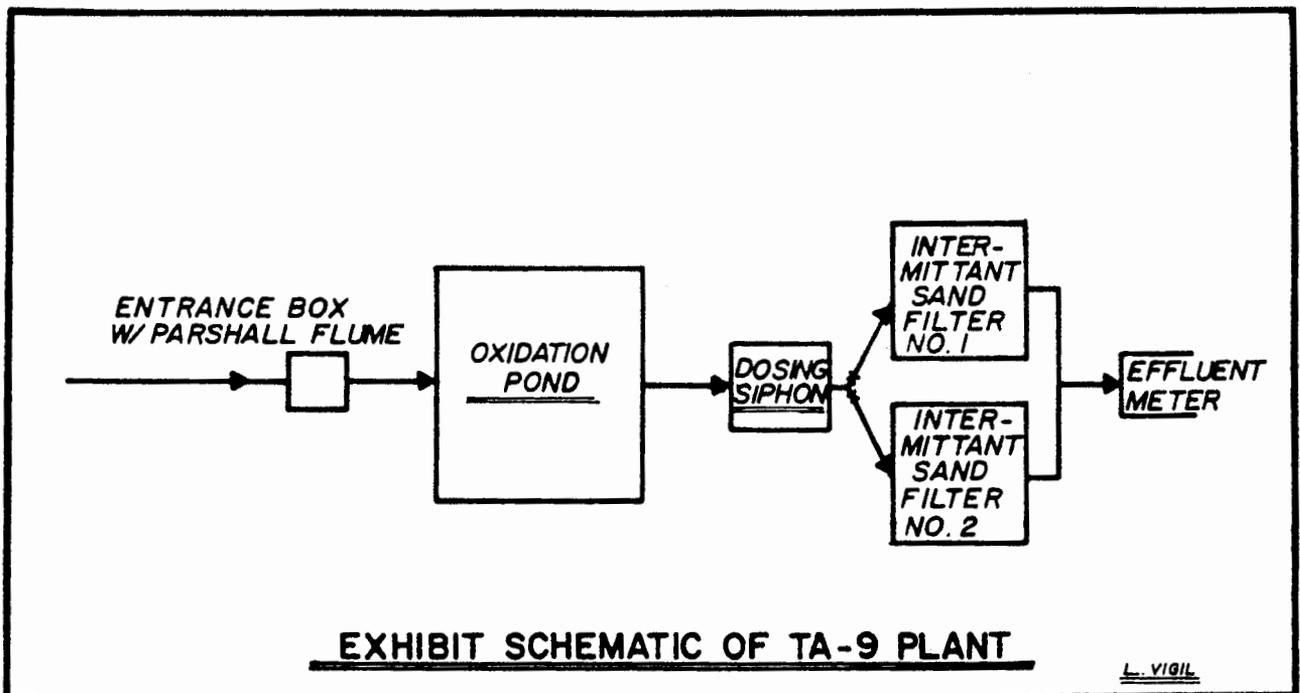
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- C. Metering of sewage effluent is by a flow meter located downstream from the sand filter. The operator shall insure that meter is in proper operating condition; that is, meter clock is kept wound at all times, weir plate v-notch is kept clean and free of all debris, and recording charts are replaced as needed. The operator shall read and record meter readings on a daily basis.

II. Standard Factors

Standard Hours, Safety and Health Precautions, Quality Assurance and Reference Standards are as outlined in Section 162-10 of this manual of Wastewater Plants.



WASTEWATER PLANTS OPERATORS MANUAL

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POLICY: Operation of TA-16 Wastewater Treatment Plant

INTRODUCTION: The TA-16 Wastewater Treatment Plant, east of Group 140 Buildings, consists of four structures: an entrance works, imhoff tank, trickling filter and final clarifier (Exhibit, page 2 of 3).

PROCEDURE:

I. Inspection and Maintenance

- A. Entrance Works are inspected daily by the operator for proper operation. All debris on bar screen will be hand-raked and debris placed in a container for disposal at TA-54.
- B. Imhoff Tank is washed down daily with a hose, and floatable scum removed from settling compartment with wire scoop. Accumulated solids in tank slot should be pushed into sludge-digestion compartment with a squeegee.

The sludge is withdrawn by gravity from the imhoff tank by opening the 6" valves (#1 and #2) on the line to the sludge beds and allowing the sludge to pond to a depth of 6 to 8 inches. Close the valves as the sludge thins to near water consistency. If sludge does not flow readily, pour water into the vent pipe and rod with iron pole to break up sludge cake. The sewer rod machine may be required to start the sludge flow.

- C. Trickling Filter shall be inspected daily by the operator for signs of ponding, plugging of spray nozzles, and for proper operation of distribution arms.
 - 1. When spray nozzles become plugged, the operator will clean them by opening gates at the end of each arm, and running a water hose into the arm to dislodge material in orifice. Clean each nozzle with a broom to insure normal flow through nozzle.
 - 2. Distribution arms periodically get off balance and must be re-leveled. To re-level the distribution arms the UWGW foreman will request, from the Zia Engineering office, a man with a surveying level.

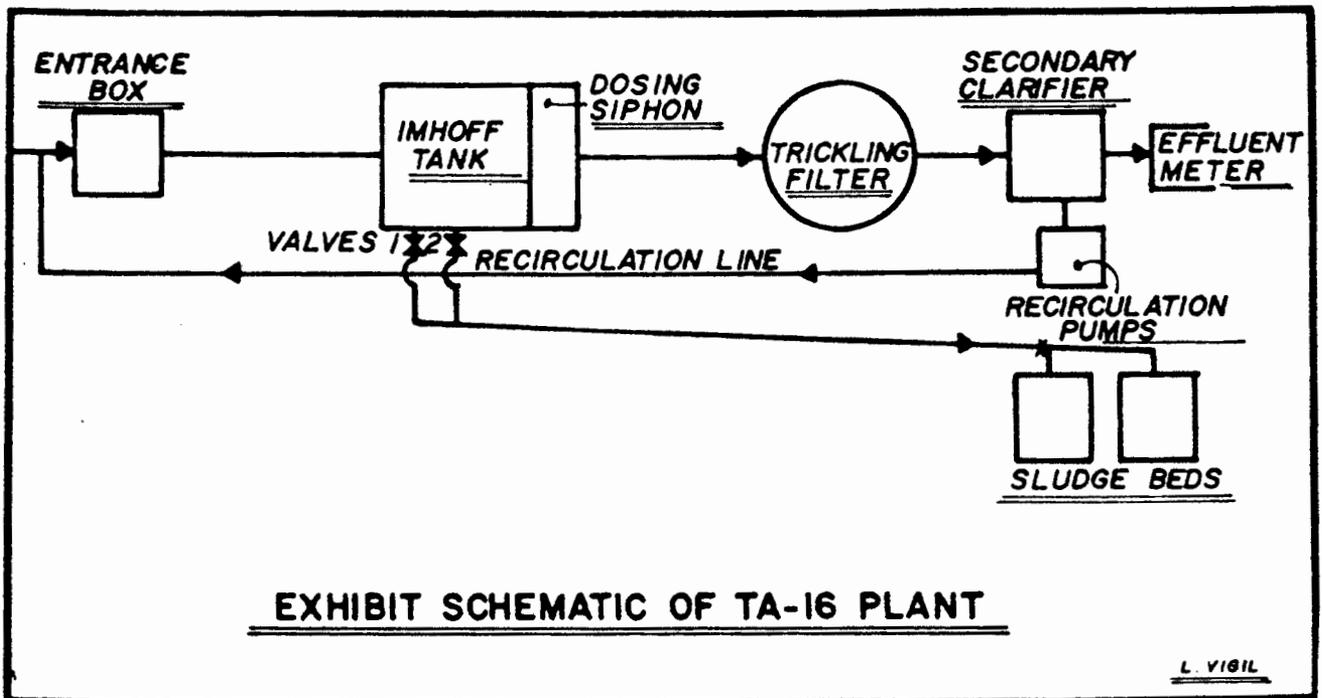
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The distribution arms will be re-leveled and sloped so that the elevation difference from the center to the end of each arm is approximately 1-1/4 inches.

3. Special attention should be given to the trickling filter during the winter months to avoid ice buildup on the filter media. Break ice every day, so the distribution arm can rotate freely.



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- D. Final Clarifier has no mechanical appurtenances (as found at the TA-3 Plant) so very little maintenance is required. The clarifier is washed down weekly to prevent excessive algae growth on clarifier walls and weirs. Sludge depth should be checked four times per year. When the sludge depth exceeds 12 to 14 inches, then the septic tank pump truck should be brought out to remove the sludge.

- E. Recirculation Pumps are located next to the final clarifier in an underground structure. Check pumps daily for excessive heat, noise and leakage around seals. Pumps are lubricated and their use alternated weekly to minimize wear.

- F. Metering of sewage effluent is done by a flow meter downstream from the final clarifier. The operator will insure that meter is in proper operating condition; that is, keep meter clock wound at all times, keep weir plate v-notch clean and free of all debris, and replace recording charts whenever necessary. The operator reads and records meter readings daily.

II. Standard Factors

Standard Hours, Safety and Health precautions, Quality Assurance and Reference Standards are as outlined in Section 162-10 of this manual of Wastewater Plants.

WASTEWATER PLANTS OPERATORS MANUAL

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POLICY: Operation of TA-18 Oxidation Ponds

INTRODUCTION: This plant is located one mile southeast of TA-18 on Pajarito Road and consists of two ponds, plus an entrance and outlet structure. The ponds provide both physical and biological treatment to stabilize the sewage and produce an acceptable effluent (Exhibit, page 2 of 2).

PROCEDURE:

I. Inspection and Maintenance

- A. Inlet and Outlet Structures are inspected daily by the operator for proper operation. Weir gates need to be cleaned of all debris obstructing normal flow over v-notch. The operator removes weir gates weekly and washes down the inlet and outlet structures.
- B. Oxidation Ponds are inspected daily by the operator for any unusual conditions. If unusual conditions exist, the operator reports to the UWGW Foreman, who in turn notifies the Environmental Engineer.
 - 1. Area maintenance in terms of weed control around lagoons is of prime importance during the summer months. The operator assigns his laborer the responsibility of controlling the growth of weed on retaining berms.
 - 2. The TA-18 Oxidation Ponds are designed to operate either in series or in parallel, as conditions require. Changes to operate in either mode are recommended by the Environmental Engineer.
- C. Metering of sewage effluent is done by a flow meter between the two ponds on the downstream side. The operator insures that the meter is in proper operating condition; that is, meter clock wound at all times, weir plate v-notch clean and free of all debris, and recording charts replaced as needed. The operator reads and records meter readings daily.

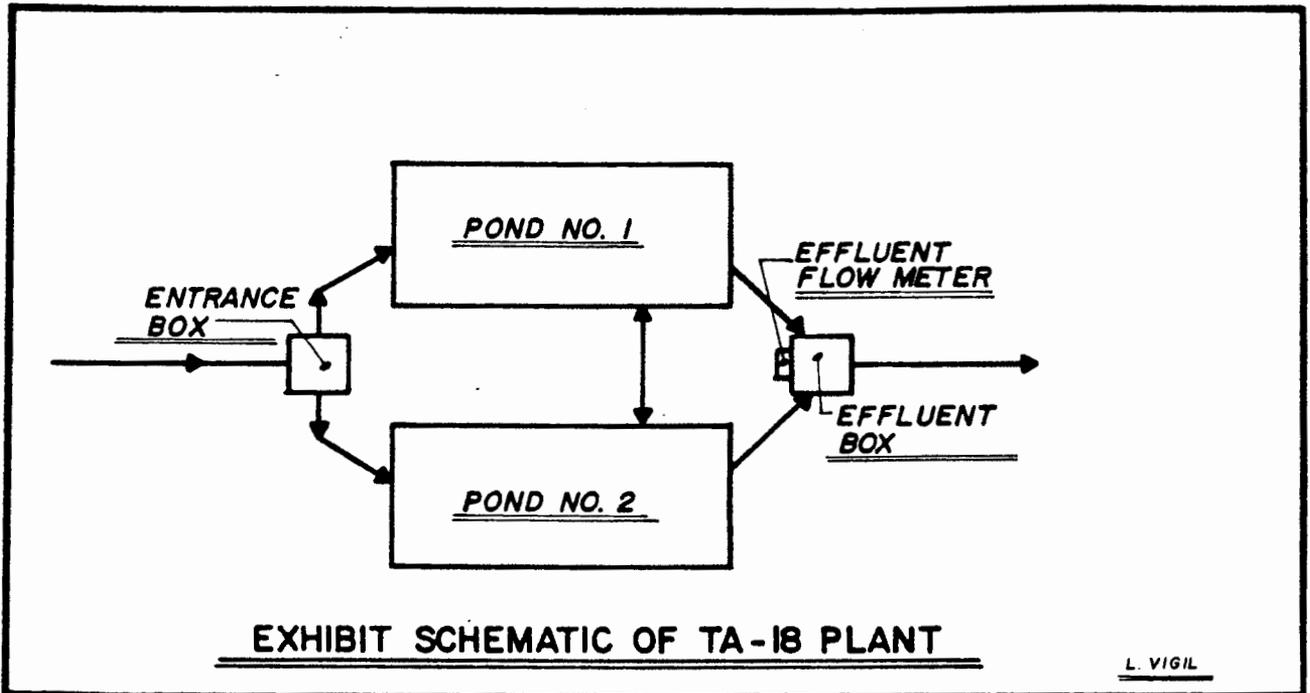
II. Standard Factors

Standard Hours, Safety and Health Precautions, Quality assurance and Reference Standards are as outlined in Section 162-10 of this manual of Wastewater Plants.

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POLICY: Operation of TA-21 Extended Aeration Plant

INTRODUCTION: This plant, located near D.P. Road West, consists of an entrance works, grit chamber, comminutor, aeration tank, clarifier, air compressors, sludge digester and four sludge-drying beds (Exhibit, Page 2 of 3). Biological solids are returned to the aeration tank from the clarifier to maintain an adequate concentration of solids in the aeration tank. This plant requires more operator attention to produce consistently adequate treatment than the other plants referenced in this manual.

PROCEDURE:

I. Inspection and Maintenance

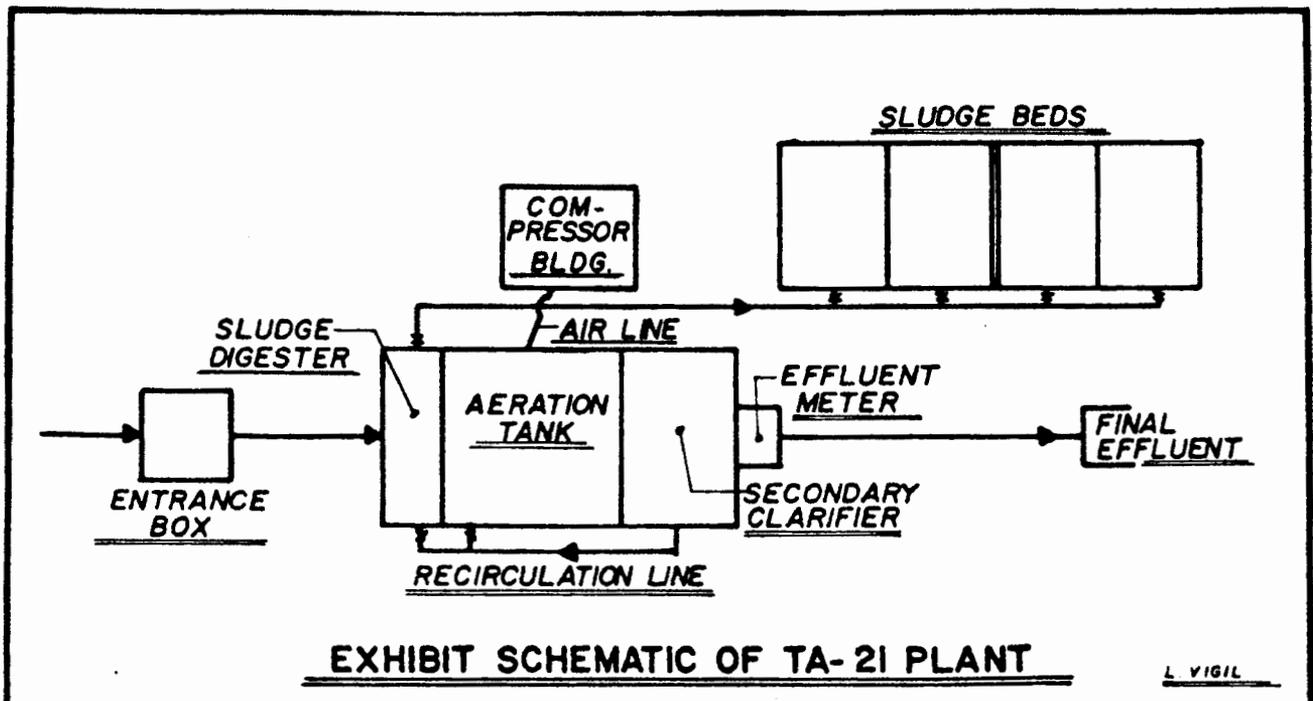
- A. Entrance Works and Grit Chamber are inspected and washed down daily by the operator. Remove sand and gravel from grit chamber to a container for disposal at TA-54.
- B. Comminutor is inspected daily for proper operation and lubrication. Remove all floatable debris to a container for removal to TA-54.. The comminutor has two lubrication points (see 162-10 for materials).
 1. Every month grease fitting is greased with general purpose grease.
 2. The oil reservoir must be inspected weekly and oil level (SAE-30) maintained at level of inspection plug.
- C. Aeration Tank is checked daily for appearance, temperature and concentration of solids, and washed down daily to control slime growing on the walls.
 1. Measure concentration of solids by using a 1000-ml graduated cylinder.
 - a. Fill the cylinder with a representative sample of liquid from the tank, exactly to the 1000-ml mark.
 - b. Let the solids settle for 30 minutes while attending to other duties at the plant.

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- c. Read the height of settled solids in ml on the side of the cylinder, and record this figure in the Plant Log.
2. Read temperature from the permanently mounted temperature gauge and record it in the Plant Log.
3. If the appearance of the supernatant water left after measuring the concentration of solids is unusual in the judgement of the operator, he should notify the UASO Water and Wastewater Engineer at 7-4221.
4. Solids will be wasted to the sludge digester as recommended by the UASO Water and Wastewater Engineer.



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- D. Clarifier is inspected daily for proper operation of recirculation air pumps. Pumps are set so they come on every 30 minutes and pump for four minutes. This pumping operation moves biological solids from the bottom of the clarifier back to the aeration tank. When the valve to the sludge digestion tank is open and the aeration tank valve is closed, solids are wasted from the system. Wash the clarifier down daily and break up floatable solids so that they will settle and can be pumped to the aeration tank.
- E. Sludge Digester is a holding tank for biological solids. Solids from the system are wasted to this tank and aerate for extended periods of time before emptying to sludge drying beds. Little or no maintenance is required for the digester; it is emptied at the discretion of the operator.
- F. Air Compressors must be inspected daily for proper operation. Under normal operating conditions, one compressor provides sufficient air to satisfy the oxygen demand of both the aeration tank and sludge digester; compressors are normally alternated every week.
1. Four grease fittings on each compressor must be greased once a month.
 2. Check and maintain oil level (SAE-30) at the upper line on watch glass.
- G. Metering of sewage effluent is done by a flow meter at the final clarifier. The operator must insure that meter is in proper operating condition; that is, meter clock wound at all times, weir plate v-notch clean and free of all debris, and recording charts are replaced accordingly. The operator reads and records meter readings every day.

II. Standard Factors

Standard Hours, Safety and Health Precautions, Quality Assurance and Reference Standards are as outlined in Section 162-10 of this manual of Wastewater Plants.

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POLICY: Operation of TA-35 Oxidation Ponds

INTRODUCTION: This plant, east of TA-35 in Mortandad Canyon, consists of inlet and outlet structures, three ponds, and four intermittent sand filters. These processes provide combined primary, secondary, and tertiary treatment which should generally meet effluent standards for wastewater (Exhibit, page 3 of 3).

PROCEDURE:

I. Inspection and Maintenance

- A. Inlet and Outlet Structures are inspected daily by the operator for proper operation. Clean all debris obstructing normal flow over weir-gate v-notch. Remove weir gates weekly and wash down the inlet and outlet structures.
- B. Oxidation Ponds are inspected daily by the operator for any unusual conditions. If unusual conditions exist, the operator reports them to the UGWG Foreman, who in turn notifies the Environmental Engineer.
 1. Area maintenance in terms of weed control around lagoons is of prime importance during the summer months. The operator shall assign his laborer the responsibility of controlling the growth of weeds on retaining berms.
 2. The Ponds are designed to operate either in series or in parallel. Changes to operate in either mode will be recommended by the Environmental Engineer.
- C. The intermittent sand filters are designed to operate one-at-a-time, with the remaining three on standby. The filters are numbered in sequence from 1 to 4, with 1 being the highest and 4 the lowest. Operation of the filters should be sequential for convenience, although this may be varied if so directed by the Utilities Water and Wastewater Engineer. Flow should be shifted from one filter to the next when any of the following conditions exist:
 1. If the growth of weeds, cattails, etc., becomes extensive.

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2. If the effluent BOD or TSS as reported by Zia Environmental Lab increases substantially.
3. If the odor from the filter increases and becomes offensive.
4. If water remains standing on the filter surface through an entire cycle of the dosing siphon.

After a filter is removed from service, the following maintenance should be performed.

1. Allow the filter surface to dry adequately.
 2. Pull all weeds and grass, shaking sand from the roots so that it remains on the filter surface.
 3. If a surface layer of algae and slime is present, rake it into piles and discard.
 4. Rake the filter so that it is left in a level condition. If sand must be added to bring it to the grade of the splash pads, then use the sand stockpiled for this purpose.
 5. If, after several filter cycles, the length of a filter cycle has diminished below 3 to 4 weeks, it may be advisable to stir the surface by spading or roto-tilling to break up organic mats. The Utilities Engineer should be consulted in this case.
 6. Sand on the filters is a specially graded coarse sand, and should never be removed from the surface of the filter except at the specific direction of the Utilities Water and Wastewater Engineer.
- D. Metering of sewage effluent is done by a flow meter located downstream from the sand filters. The operator shall insure that meter is in proper operating condition; that is, meter has power at all times, weir-plate v-notch clean and free of all debris, and recording charts replaced as required. The operator reads and records meter readings every day.

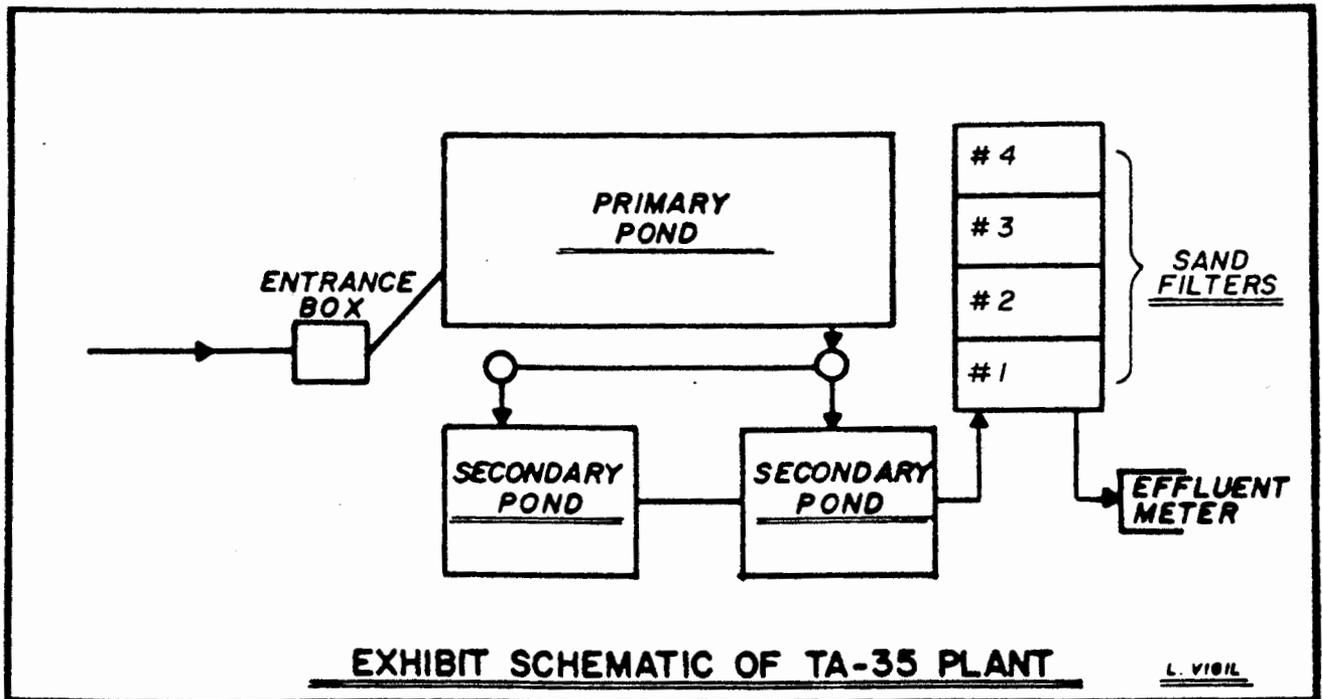
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II. Standard Factors

Standard Hours, Safety and Health precautions, Quality Assurance and reference Standards are as outline in Section 162-10 of this manual of Wastewater Plants.



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POLICY: Operation of TA-46 Oxidation Pond and Intermittent Sand Filters

INTRODUCTION: This plant is at TA-46, east of Building 77, outside of security fence. The plant consists of a one-cell lagoon, a siphon tank and an intermittent sand filter, which combine primary, secondary, and tertiary treatment to provide an effluent which should meet NPDES standards.

PROCEDURE:

I. Inspection and Maintenance

- A. Oxidation Ponds are inspected daily by the operator for for any unusual conditions. If unusual conditions exist, the operator reports them to UWGW Foreman, who in turn calls the Environmental Engineer.
1. Area maintenance in terms of weed control around lagoons and sand filters is of prime importance during the summer months. The operator assigns his laborer this area of responsibility.
 2. This Pond is designed to operate at a three- and five-foot level.
 - a. During the winter months when temperature drop and biological activity is low, the laggons are operated at the five-foot level. This allows an added solids-storage volume.
 - b. As temperatures rise during the summer months, the level is dropped to the three-foot level.
- B. Intermittent Sand Filters are designed to operate on an alternating basis. Each filter can stay in service approximately six months before alternating. These filters should not be alternated until laboratory analysis shows deterioration of effluent quality.

After the filters have been alternated, the used filter is allowed to dry. The operator then tills the upper two to three inches of sand surface and hand-rakes it to a level surface. Proper leveling of sand is of prime importance to insure even distribution of water over the filter.

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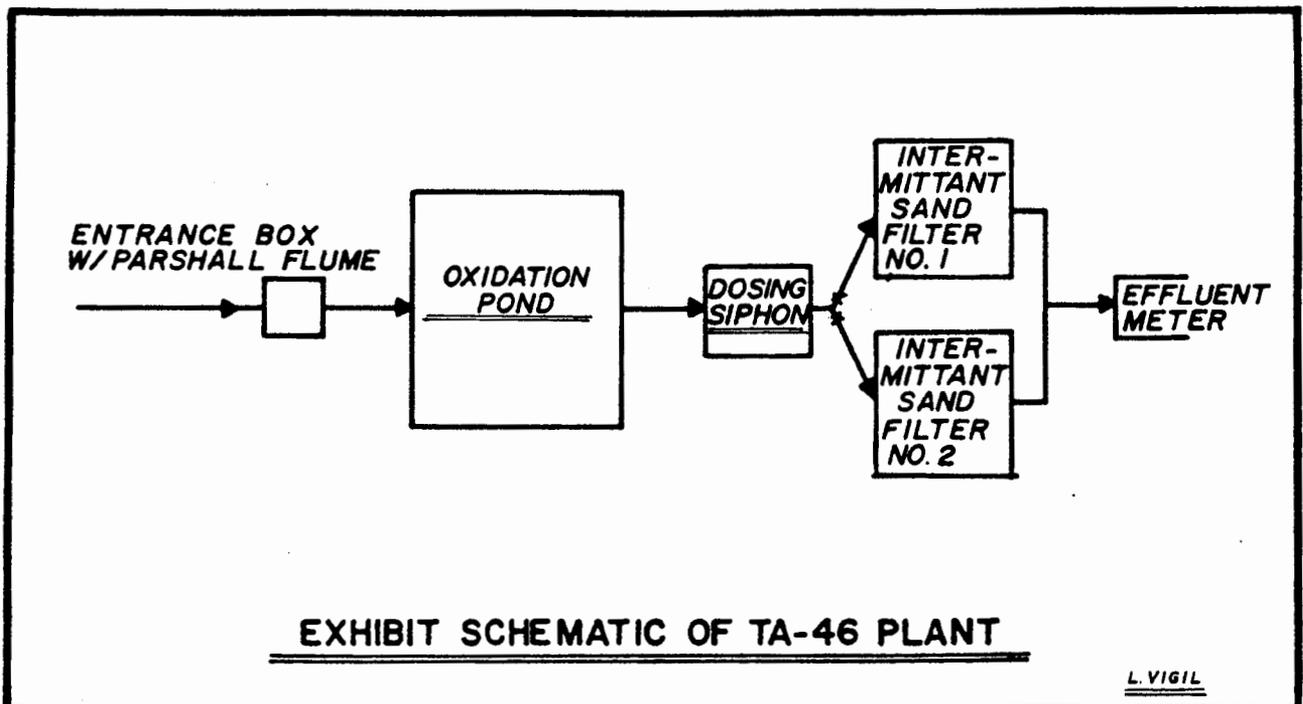
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When tilling no longer restores the filter to its full capacity, the upper two to three inches of sand must be removed and replaced with clean specification sand. Old sand is hauled to TA-54 for disposal.

- C. Metering of wastewater effluent is done by a flow meter located downstream from the sand filter. The operator insures that meter is in proper operating condition; that is, meter clock wound at all times, weir plate v-notch clean and free of all debris, and recording charts replaced as required. The operator reads and records meter every day.

II. Standard Factors

Standard Hours, Safety and Health Precautions, Quality Assurance and Reference Standards are as outlined in Section 162-10 of this manual of Wastewater Plants.



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POLICY: Operation of TA-53 Oxidation Ponds

INTRODUCTION: This plant, east of the Meson Project, consists of three ponds, the first two of which contain surface aerator units, an inlet structure and an outlet structure. This plant is designed for total evaporation, although the aerators provide sufficient treatment that NPDES standards should be met in the event that there is a discharge.

PROCEDURE:

I. Inspection and Maintenance

- A. Inlet and Outlet Structures are inspected daily by the operator for proper operation. Weir gates must be cleaned of all debris obstructing normal flow over the v-notch. The operator removes weir gates weekly and washes down the inlet and outlet structures.
- B. Oxidation Ponds are inspected daily by the operator for any unusual conditions. If unusual conditions exist, the operator reports them to the UWGW foreman, who in turn notifies the Environmental Engineer.
 1. Area maintenance in terms of weed control around lagoons is of prime importance during the summer months. The operator shall assign his laborer the responsibility of controlling the growth of weeds on retaining berms.
 2. The first two ponds are designed to operate either in series or in parallel, while the third lagoon is always in series to the first two. Changes in the mode of operation will be recommended by the UASO Wastewater Engineer.
 3. The surface aerator units should be visually inspected by the operator on a daily basis, and any unusual conditions reported to the electricians. The floats on the aerators are fiberglass, and will be crushed if allowed to freeze in place. Therefore, each fall, when it is cold enough that a solid freeze is possible, all four aerators should be removed from the lagoons and stored on the

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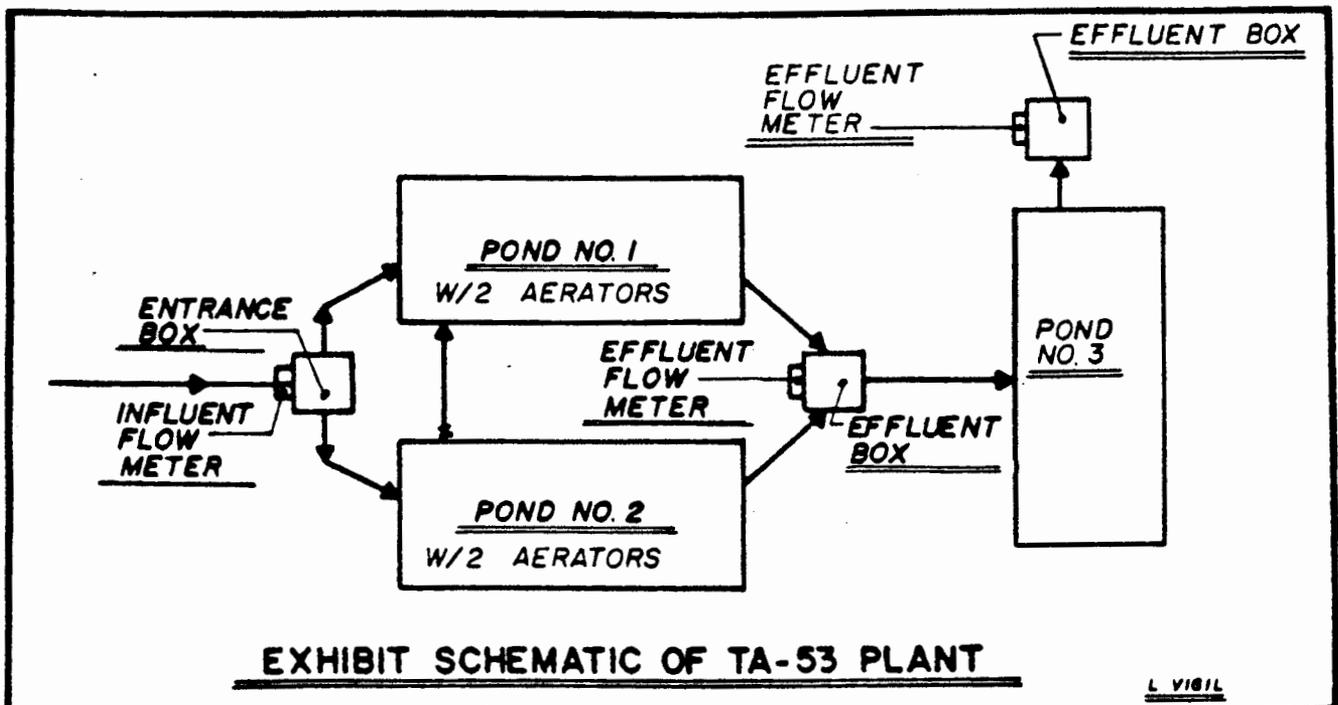
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shore. They should be returned to the lagoons as soon as the lagoons can be reasonably sure of being ice-free, usually by the first of March. After five to six months of operation, and again before they are returned to the lagoons in the spring, the aerators should be greased according to manufacturers specifications.

- C. Metering of sewage effluent is done by a flow meter located to the east of the third lagoon. The operator must insure that meter is in proper operating condition; that is, meter clock wound at all times, weir plate v-notch clean and free of all debris, and recording charts replaced as needed. The operator reads and records meter readings every day.

II. Standard Factors

Standard Hour, Safety and Health Precautions, Quality Assurance and Reference Standards are as outlined in Section 162-10 of this manual of Wastewater Plants.



WASTEWATER PLANTS OPERATORS MANUAL

THE ZIA COMPANY

LOS ALAMOS, NM 9/30/85

POLICY: Operation of TA-41 Imhoff Tank and Chlorinator

INTRODUCTION: This plant, east of TA-41 area of Omega Road, consists of an imhoff tank followed by a chlorine contact chamber (Exhibit, page 2 of 2). Imhoff tanks are designed primarily for the removal of solids by sedimentation, and their subsequent stabilization by anaerobic digestion. The long detention time in the imhoff tank at TA-41 is also effective in removing soluble material with further removal by oxidation in the chlorine contact chamber. The final effluent is discharged into Los Alamos Canyon.

PROCEDURE:

I. Inspection and Maintenance

- A. Imhoff Tank shall be inspected daily by the operator for proper functioning.
1. To maintain good operation, the operator must wash down the plant daily to avoid build-up of slime and sludge on wall surfaces.
 2. Sludge levels must be checked periodically to determine the need for pumping sludge to the drying bed. The procedure for pumping sludge follows:
 - a. Open valve to sludge bed located in Building 7, Pump & Chlorination Building.
 - b. Open valve to imhoff tank, also located in Building 7.
 - c. Start sludge pump with switch on the west wall.
 - d. Open air-bleed line located on discharge side of pump, and close it when the bleed line is discharging water.
 - e. Adjust tension on slip belt by turning the adjustment crank next to the pump motor.
 - f. When pumping has been completed, close valves to drying bed and to imhoff tank. Release tension on slip belt.

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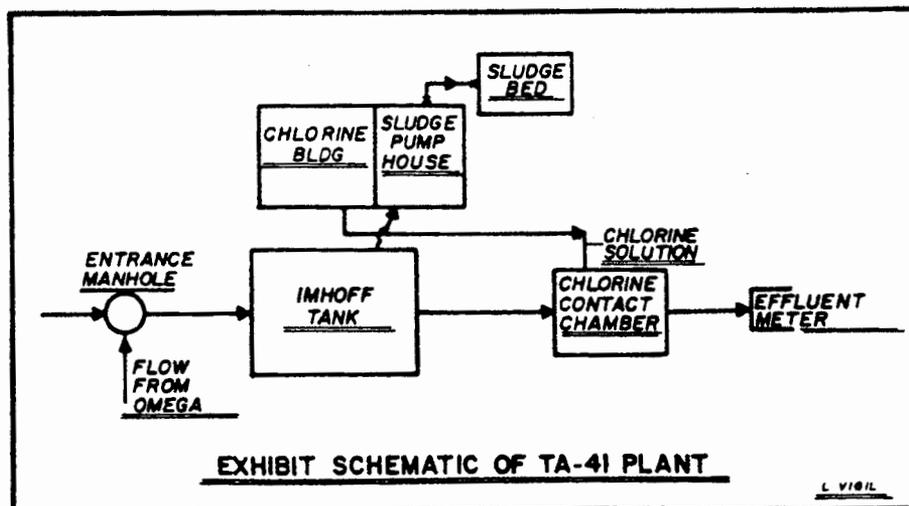
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- B. Chlorinator must be inspected daily for proper operation. If chlorinator equipment fails, the operator will notify the Operator Foreman so repairs can be made. Chlorine feed to the system will be maintained at 2 lbs. per 24 hrs.
- C. Sludge pump shall be lubricated before each use.
1. Use general lubricating grease at lub point.
 2. Keep #90 crankcase oil to proper level in reduction gear box.
 3. Run pump for 15 minutes once a month to insure proper operating condition.
- D. Metering of sewage effluent is done by a flow meter located downstream from the chlorine contact chamber. The operator shall insure that this flow meter is in proper operating condition; that is, meter clock wound at all times, weir plate v-notch clean and free of all debris, and recording charts replaced as needed. The operator reads and records meter readings every day.

II. Standard Factors

Standard Hours, Safety and Health Precautions, Quality Assurance and Reference Standards are as outlined in Section 162-10 of this manual of Wastewater Plants.



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POLICY: Operation of TA-8 Oxidation Pond

INTRODUCTION: This facility is across Anchor Ranch Road from Building TA-8-21. It is a biological unit process using two major groups of micro-organisms to stabilize sewage symbiotically. The TA-8 plant consists of a septic tank with inspection manholes followed by a one-cell lagoon, designed for complete evaporation (Exhibit, Page 2 of 2).

PROCEDURE:

I. Inspection and Maintenance

- A. Oxidation Pond is inspected daily by the operator for any unusual conditions. If unusual conditions exist, the operator reports them to UWGW Foreman, who in turn calls the Environmental Engineer.

Area maintenance in terms of weed control around lagoon is of prime importance during the summer months. The operator shall assign his laborer this area of responsibility.

- B. Septic Tank should be inspected and cleaned as detailed in Section 162-11 of manual of Wastewater Plants. Procedures.

II. Standard Factors

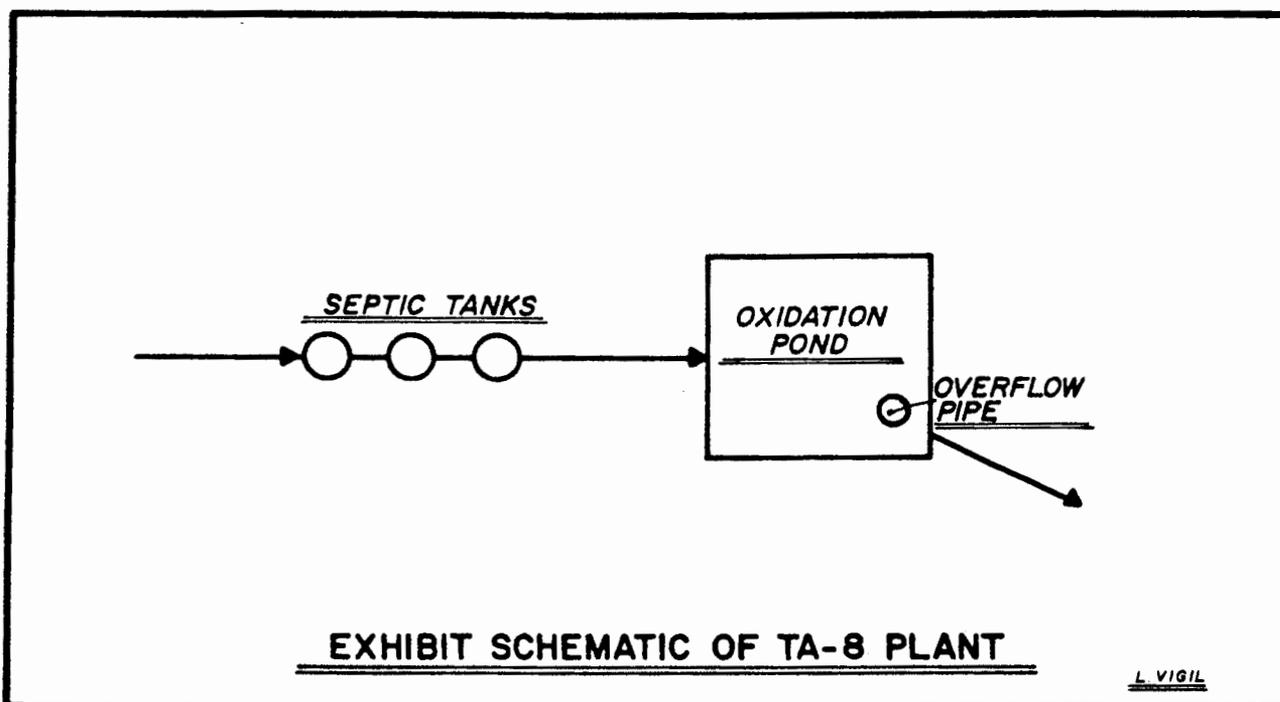
Standard Hours, Safety and Health Precautions, Quality Assurance and References Standards are as outlined in Section 162-10 of manual of Wastewater Plants.

The TA-8 pond requires little attention, and need not be manned on a daily basis as the other sewage treatment facilities; however, the facility should be inspected once weekly to assure proper operations.

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POLICY: Septic Tank Sanitation in Technical Areas

INTRODUCTION: Septic tanks are at remote sites in the Technical Areas, as listed in the Septic Tank Inspection form (Exhibit 1, below). These tanks are built in accordance with the Manual of Septic-Tank Practice cited in I., (Exhibit 1). Septic tanks use a physical-biological unit process to remove solids by sedimentation and digest them anaerobically. This process produces an effluent relatively free of solids. The effluent flows into a trench or sub-surface filter. Unless inspection indicates pumping is needed, the tank operates without maintenance.

PROCEDURE:

I. References

A. Standards to be consulted

1. Secondary Treatment Information,
40 CFR 133
2. DOE Manual
 - a. Chapter 0510
 - b. Chapter 0513
3. Operation of Wastewater Treatment Plants Manual
(Sacramento State College, Sacramento, California)
4. Water Works Operation ("The Texas Manual") (Texas A. and M. University, College Station, Texas)
5. Zia Health and Safety Manual
6. U. S. Occupational Health and Safety Act (OSHA),
29 CFR 1910
7. Manual of Septic-Tank Practice (U. S. Dept. of Health, Education and Welfare Publication 526)

B. Materials, Tools and Equipment required

1. Sludge-measuring stick (See Exhibit 2)
2. Scum-measuring device (See Exhibit 2)
2. Sludge-pump truck

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SEPTIC TANK INSPECTION													
STRUC. NO & LOC	CRITICAL DEPTH OF SOLIDS	DATE CHKD.	DEPTH OF SOLIDS	CORRECTIONS REQUIRED	STRUC. NO & LOC	CRITICAL DEPTH OF SOLIDS	DATE CHKD.	DEPTH OF SOLIDS	CORRECTIONS REQUIRED				
TA-O-14	43"	5/22/69	VENT 1"	Pumping Recommended 6-in. check recommended PUMPED 5-22-69	TA-11-43	18"	5/24/69	16"	Pumping Recommended				
TA-O-69	18"	5/22/69	3"	Pumping Recommended Pumped 5/22/69	TA-14-9	21"	5/24/69						
TA-O-154	18"	5/24/69	14"	Pumping Recommended	TA-15-54	Pages 2 and 3 of this form list the following additional locations: TA-15-205 TA-33-33 TA-16-175 TA-33-93 TA-16-371 TA-33-96 TA-16-178 TA-33-121 TA-16-381 TA-36-17 TA-16-385 TA-39-12 TA-16-527 TA-40-24 TA-18-39 TA-40-25 TA-18-42 TA-48-5 TA-18-120 TA-50-10 TA-22-50 TA-51-4 TA-22-51 TA-52-3 TA-33-31 TA-54-							
TA-O-276	18"	5/22/69	0"	Recommend THAT TANK BE checked in 6 months	TA-15-61								
TA-2-43	18"	6/69	4"	Clean - NO contamination	TA-15-62								
TA-3-239	30"	5/22/69	2"	No water at field drain field ok	TA-15-63								
TA-6-40	18"	5-69	3"	needs new structure sign- post	TA-15-67								
TA-6-43	36"	5-69	3"	Needs new top to replace old hole concrete slab - Ratched when it drip/light WORK COMPLETED 9/23/69	TA-15-72					36"	7/4/69	4"	CLEAN
TA-11-20	36"	5/24/69	22"	Recommend Pumping	TA-15-195					30"	5/24/69	12"	PUMP AT NEXT Insp.

EXHIBIT 1 Septic-Tank Inspection form

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The tank at TA-2, Omega Site, is subject to possible radioactive contamination. Safety and health precautions for radiation must be taken during inspection of this tank, and it should be monitored for radioactivity by appropriate technicians. (See Exhibit 1)

III. Pumping

Tanks with facilities to discharge effluent will be pumped as indicated by the Environmental Engineer. Those without discharge fields will be pumped if the operator recommends pumping or cleaning. Material removed by pumping must be properly disposed of at either the TA-3 or TA-16 wastewater plant. A small residue of sludge should be left in the bottom of the tank to breed anaerobic bacteria so the digesting process can continue.

IV. Safety and Health

Wastewater is a vehicle for many disease-causing bacteria. Operators should take all possible care in personal hygiene, and be immunized for tetanus as recommended by LASL H-2. No person should ever enter an empty septic tank without proper breathing apparatus.

V. Quality Assurance

A. The Zia Environmental engineer and UGW Superintendent inspect each plant once a year. The foreman inspects each tank that has been cleaned. Quality of final effluent must meet National Pollution Discharge Elimination System (NPDES) Permit Requirements as follows:

1. BOD = 30 mg/L (30-day average)
2. Suspended Solids = 30 mg/L (30-day avg)
3. Fecal Coliform = 200/100 mL (30-day avg)
4. pH = 6.0 to 9.0

B. Monitoring of these tanks by Zia Environmental Laboratory personnel is done at the frequency established by EPA and noted in the permit conditions.

Appendix 2 Design Data

TA-3 SEWAGE TREATMENT PLANT
PLANT NO. 1
DESIGN ANALYSIS

1. DESIGN DATA

Design Population	2500
Sewage Flow/Capita/8 Hour Shift	30
Capacity Factor	2
Design Flows:	
Average 8 Hour Flow, Gal.	150,000
Average Hourly Flow, Gal.	18,750
B.O.D. Per 8 Hour Shift Per Capita, Lb.	0.10
Suspended Solids, Per 8 Hour Shift Per Capita, Lb.	0.13
Ether Soluble Solids, Per 8 Hour Shift Per Capita, Lb.	0.05

2. KENNISON FLOW NOZZLE

Maximum Flow Rate	800,000 Gal. Per Day
Minimum Flow Rate	0 Gal. Per Day

3. IMHOFF TANK

Flow-through Chamber	2 Hrs. Retention At Average Hourly Flow Of 18,750 Gal.
Volume Of Two Flow-through Chambers	37,860 Gal.
Sludge Digestion Capacity	Provide 4 Cu.Ft. Per Capita
Volume Sludge Digestion Chambers	10,395 Cu.Ft.

4. TRICKLING FILTER

Unit B.O.D. Loading	600 Lb.Per Acre-Foot Per Day
B.O.D. Load To Plant	500 Lb.Per Day
B.O.D. Removed By Primary	35% Of 500=175 Lb.Per Day
B.O.D. To Filter	325 Lb.Per Day
Filter Volume Required	23,595 Cu.Ft.
Filter Dimensions	72 Ft.Diameter, 6.0 Ft. Average Stone Depth
Rotary Distributor	Designed To Operate On Range Of Flow From 325 g.p.m. minimum to 620 g.p.m. maximum.
Dosing Tank	Volume 1,750 Gal.Effective Depth 1'-10-1/2"; 12" Automatic Syphon With 42 inch bell.

5. FINAL SETTLING TANK

Detention Period	2 Hrs. @ Average Hourly Flow=37,500 Gal.
Over-flow Rate	636 Gal./Sq.Ft./Day
Tank Dimensions	35' Diameter x 6.0' Wall Depth
Volume As Designed	43,290 Gal.

6. SLUDGE DRYING BEDS

Area

1,845 Sq.Ft.=0.74 Sq.Ft. Per
Capita

Dimensions

2 Beds, Each 30' x 30.75'

7. PUMPING EQUIPMENT

Sewage Re-circulating Pump:

Two 100 g.p.m. @ 17 Ft. Head.

Appendis 2 Design Data

TA-3 SEWAGE TREATMENT PLANT
PLANT NO. 2
DESIGN DATA

1. TA-3 TREATMENT PLANT

A. Population: 2,500 People

B. Sewage Flows:

Average, Gallons Per Capita Per Day 30 Per 8 Hour Day
Average, Million Gallons Per Day 0.22
Maximum, Million Gallons Per Day 0.90

C. Design Flows:

<u>Flow</u>	<u>Million Gallons Per Day</u>	<u>Gallons Per Minute</u>	<u>Cubic Feet Per Second</u>
Average	0.45	312	0.70
Maximum	0.90	624	1.39

D. Type Of Treatment:

Imhoff Tank
Trickling Filter (low rate)
Secondary Clarifier
Sludge Recirculation From Secondary Clarifier To Entrance Works

E. Communitor:

Manufacturer Chicago Pump Co. - Model #10A
Capacity 0.17 to 1.2 Million Gallons Per Day

F. Bar Screen - Manual:

Bar Spacing 1-5/8 In. Clear
Width 2' - 0"
Depth 3' - 6"
Area Of Incoming Sewer 78.5 Sq. In.
Area Of Bar Screen On Sewer Projection 348 Sq. In.

G. Imhoff Tank:

Diameter 38' - 0"
Side Water Depth 13' - 0"
Detention Period 2 Hours
Weir Loading 8,330 GPD/LF
Surface Loading 640 GPD/SF
Sludge Storage 2.89 CF/Cap/Day
Gas Area 30 %
Sludge Slope 1:1
Hopper Slops 1½:1

(5) Digester:

TYPE: Heated

Temperature (Mesophilic)
Heat

100° F. Design
External

Volume

5 ft³/cap + 50% for garbage = 7.5 ft³/cap.

(6) Sludge Beds:

TYPE: Sand with Underdrain

Area for Open Beds

1.5 ft²/cap.

Area for Covered Beds

0.75 ft²/cap.

DESIGN FLOWS:

Design Population

5,520

Per Capita Sewage Contribution

100 gallons/day

Average Daily Flow

552,000 gallons/day

Maximum Flow = 2.6 x aver. flow =

1.44 MGD

(From attached Curve)

Average Flow:

0.55 MGD

383 GPM

23,000 GPH

0.853 CFS

51.2 CFM

Maximum Flow:

1.44 MGD

1,000 GPM

60,000 GPH

2.23 CFS

134 CFM

Minimum Flow From Engineers Report
Sheet 8 of 20 - The minimum flow
is 22/80 of the average flow for
the Pueblo Canyon S.T.P. which is
a plant receiving sewage from an
area similar to White Rock.

0.15 MGD

107 GPM

6,400 GPH

0.239 CFS

14.3 CFM

H. Trickling Filter:

Number	1
Diameter	72' - 0"
Media Depth	6' - 0"
Area	4067 Sq.Ft.
Media Volume	24,402 Cu.Ft.
Manufacturer	
BOD Loading	0.37 Lbs./CY
Surface Loading (average)	4.82 MG/Ac/Day
Media Gradation	4" to 6"

I. Secondary Clarifier:

Number	1
Diameter	35' - 0"
Side Water Depth	6' - 0"
Surface Loading	468 Gal./Day/SF
Weir Overflow Rate	4091 Gal./Day/SF

J. Sludge Beds:

Design Population	5,000 Persons
Area	4,800 SF
Depth	9 Inches
Per Capita	0.96 SF/Cap

K. Effluent Pumps

Pump No. 1 and 2 - 10 HP, 440V.	149 gpm @ 58' TDH
Pump No. 2 - 7½ HP, 440V.	250 gpm @ 38' TDH

Appendix 2 Design Data

TA-16 SEWAGE TREATMENT PLANT
INDUSTRIAL WASTE
DESIGN ANALYSIS

1. DESIGN DATA

Design Population	1,000
Sewage Flow Per Capita Per 8-Hour Shift	33 1/3
Capacity Factor	2
Design Flows:	
Daily, Gal.	100,000
Average 8-Hour Flow, Gal.	33,333
Average Hourly Flow, Gal.	4,167
B.O.D. Per 8-Hour Shift Per Capita, Lb.	0.10
Suspended Solids, Per 8-Hour Shift, Per Capita	0.13
Ether Soluble Solids, Per 8-Hour Shift, Per Capita	0.05

2. IMHOFF TANK

Flow-through Chamber:	
Retention Period, At Average Hourly Flow of 4,167 Gal.	1 Hour
Volume Of Flow-through Chamber, Gal.	4056
Sludge Digestion Design Basis, Cu.Ft./Capita/Day	4
Volume-Sludge Digestion Chamber, Cu.Ft.	4800

3. TRICKLING FILTER

Unit B O D Loading, Lb. Per Acre-Foot Per Day	600
B O D Load To Plant, Lb. Per Day	300
B O D Removed By Primary, 35% of 300 Lb./Day	105
B O D To Filter, Lb. Per Day	195
Filter Volume Required, Cu.Ft.	14,157
Dimensions Of Filter	56' Diam. x 6.0' Depth.
Rotary Distributor	Designed to operate on range of flow from 230 g.p.m. at head range from 1'-1" min. to 313" max.
<u>Dosing Tank</u>	Equipped with 6" automatic syphon which operates continuously at rates above 55 g.p.m. Rate of inflow to syphon chamber: max. 267 g.p.m., ave. 70 g.p.m., min. 28 g.p.m. Volume of chamber 760 gal., effective depth 212".

4. FINAL SETTLING TANK

Detention Period, At Ave. Hourly Flow Of 4,167 Gal.	2 Hours
Overflow Rate, Gal./Sq.Ft./Day	510
Tank Dimensions	14' x 14' x 6' Deep
Volume As Designed, Gal.	8810

5. SLUDGE DRYING BEDS

Design Basis, Sq.Ft. Per Capita
Area Of Beds, Sq.Ft.
Dimensions-2 Beds, Ea. 16' x 32'

1
1024

6. PUMPING EQUIPMENT

Sludge Pump

One 50 g.p.m. at 14' Total Head,
Vertical, Bottom Suction Non-clog.