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SEPTIC TANK SYSTEM O&M GUIDE AND SEPTAGE DISPOSAL

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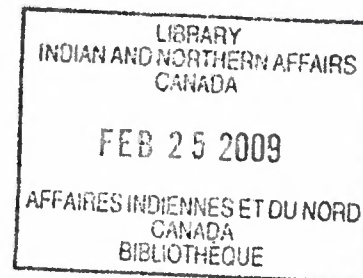
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**Technical Services
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**SEPTIC TANK SYSTEM O&M GUIDE
AND SEPTAGE DISPOSAL**

March 1986

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systèmes à fosse septique

SEPTIC TANK SYSTEM O&M GUIDE

Table of Contents

1.0	INTRODUCTION
2.0	OPERATION AND MAINTENANCE
2.1	Grease Traps
2.2	Detergents, Lye and Other Household Cleaners or Disinfectants
2.3	Waste Discharges From Household Water Softener Units
2.4	Addition of Preparations to Start, Accelerate or Improve Bacterial Action in the Tank
2.5	Septic Tank Inspection
2.6	Septic Tank Inspection Methods
2.7	Pump-out Contractors
2.8	Protection Of Leaching Beds
2.9	Overloading the Septic Tank System
3.0	SEPTAGE DISPOSAL
3.1	Septage Characteristics
3.2	Land Disposal
3.3	Disposal in Sewage Treatment Facilities
4.0	REFERENCES

1.0

The band usually operates and maintains sewage treatment plants and piped sewerage systems on reserves. In areas not served by sewers, householders are responsible for their own sewage disposal. The most common method is the septic tank and soil absorption system (see Figure 1).



1. The above layout is suitable for a leaching bed using normal construction methods.
2. Location of tank and leaching bed to be on lower ground than adjacent wells or springs, if possible.
3. Min. 8 m (25 ft.) from dwelling if tile field equal to or above level of lowest floor or 3 m (10 ft.) if tile field is below level of lowest floor.
4. Internal plumbing and main drainage outlet should be designed with a view to connecting to possible future sanitary sewers.
5. Roof water, surface water, discharge from footing drains, must be excluded from entry to septic tank.
6. Leaching beds **NOT** to be located in swampy ground or in ground liable to flooding.

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A correctly designed and constructed septic tank and soil absorption system will function effectively and safely, but a system which is poorly designed and located or badly constructed, can cause public health problems and be very expensive to repair. It is most important that the installation be planned and built so that sewage does not surface in the tile field area (ponding) causing possible disease transmission by insects or by direct contact, or contamination of surface or ground water supplies.

2.0 OPERATION AND MAINTENANCE

2.1 Grease Traps

For normal domestic systems no grease trap is necessary as only a small amount of grease enters the system, usually from the kitchen.

2.2 Detergents, Lye and Other Household Cleaners or Disinfectants

Care should be taken to make sure that excessive and unnecessary quantities of detergents, lye, and other household cleaners or disinfectants do not enter the septic tank. The amounts required for normal domestic use will not hinder the bacterial action in the septic tank.

2.3 Waste Discharges from Household Water Softener Units

Water softeners do not have an adverse effect on the action of the septic tank but will slightly shorten the life of the leaching bed installed in some clay type soils. They should not be connected directly to the tile bed.

When installing a water softener, extreme care should be taken in connecting the unit to the disposal system in order to prevent cross connection between the water supply and the waste plumbing system. This may be prevented by installing a backflow preventer.

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2.4 Addition of Preparations to Start, Accelerate or Improve Bacterial Action in the Tank

All bacteria necessary for the operation of septic tanks are already contained in the sewage entering the system. No commercial additives are necessary to promote bacteriological action and in some cases will hinder it.

2.5 Septic Tank Inspection

Septic tanks should be inspected at least once a year and pumped out when necessary; however with proper design capacities it should not be necessary to pump out a tank more than once every three years.

When a tank is not pumped out when required, sludge or scum will be carried into the leaching or absorption bed. This will clog the bed and stop it functioning entirely. When an absorption bed becomes clogged the septic tank must be pumped out and the bed replaced.

2.6 Septic Tank Inspection Methods

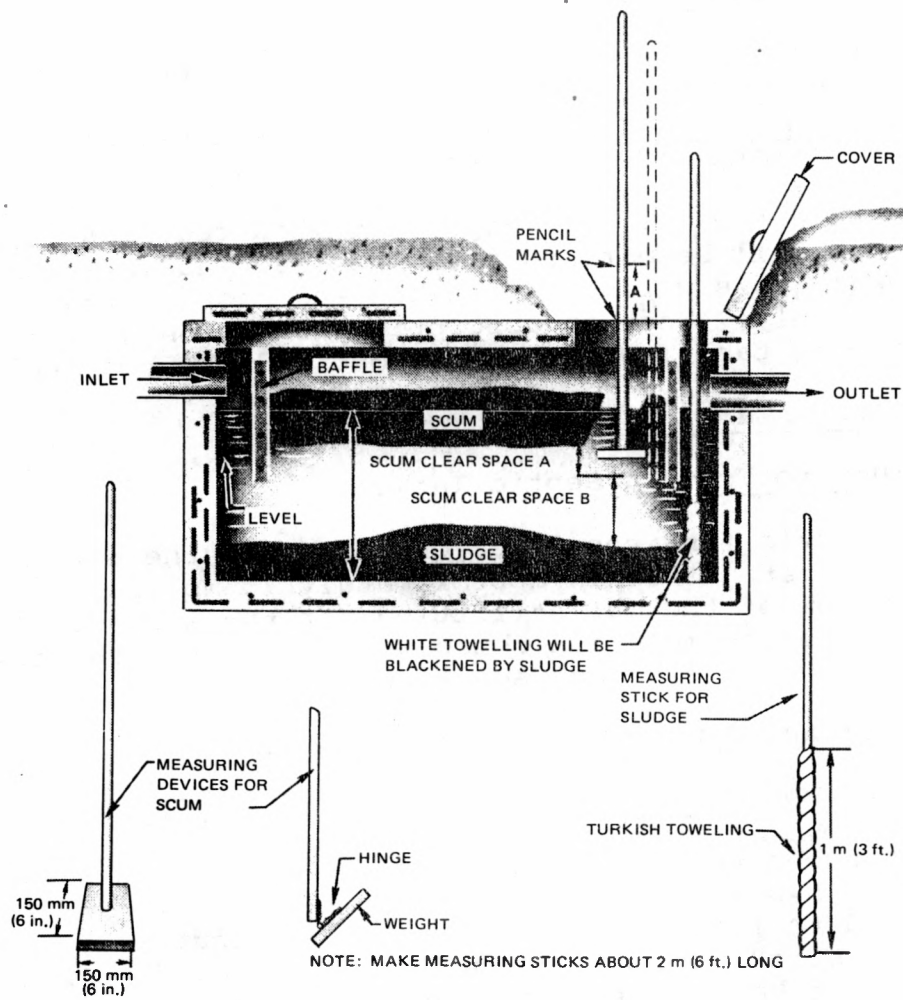
2.6.1 When to Empty a Septic Tank

A septic tank should be emptied when the bottom of the scum mat is within approximately 75 mm (3 in.) of the bottom of the outlet fitting, or the surface of the sludge accumulation comes within 450 mm (18 in.) of the outlet fitting (see Figure 2).

2.6.2 Scum And Sludge Measurement Methods

2.6.2.1 Scum Measurement

Scum can be measured with a stick to which a weighted flap has been hinged, or with any device that can be used to feel out the bottom of the scum mat. Force the stick through the mat. The hinged flap will fall into a horizontal position. Then raise the stick until you can feel resistance from the bottom of the scum. You can use the same tool to find the distance to the bottom of the outlet device (see Figure 2).



NOTE: CLEAN WHEN A IS 80 mm (3 in.) AND WHEN B IS 460 mm (18 in.)

Figure 2 Devices For Measuring Sludge And Scum

2.6.2.2 Sludge Measurement

A long stick wrapped with rough, white towelling and lowered to the bottom of the tank will show the depth of sludge and the depth of liquid in the tank. Lower the stick behind the outlet device to avoid scum particles. After several minutes, carefully remove the stick. The sludge line can be distinguished by sludge particles clinging to the towelling (see Figure 2).

2.7 Pump-out Contractors

In most localities there are contractors who will pump out septic tanks. Septic tanks should not be washed or disinfected after pumping. Using a strong light, inspect all interior surfaces of the tank for leaks and cracks. Pumped-out septic tanks often contain toxic gases and only an experienced person should clean out or repair them.

A small amount of sludge should be left in the tank for seeding purposes. Seeding is the method which re-activates the bacteriological process in the tank during start-up.

The contents of the tank must be disposed of in a dumping area approved by the local health and/or environment authority and is the responsibility of the pump-out contractor. For more information see 3.0.

2.8 Protection Of Leaching Beds

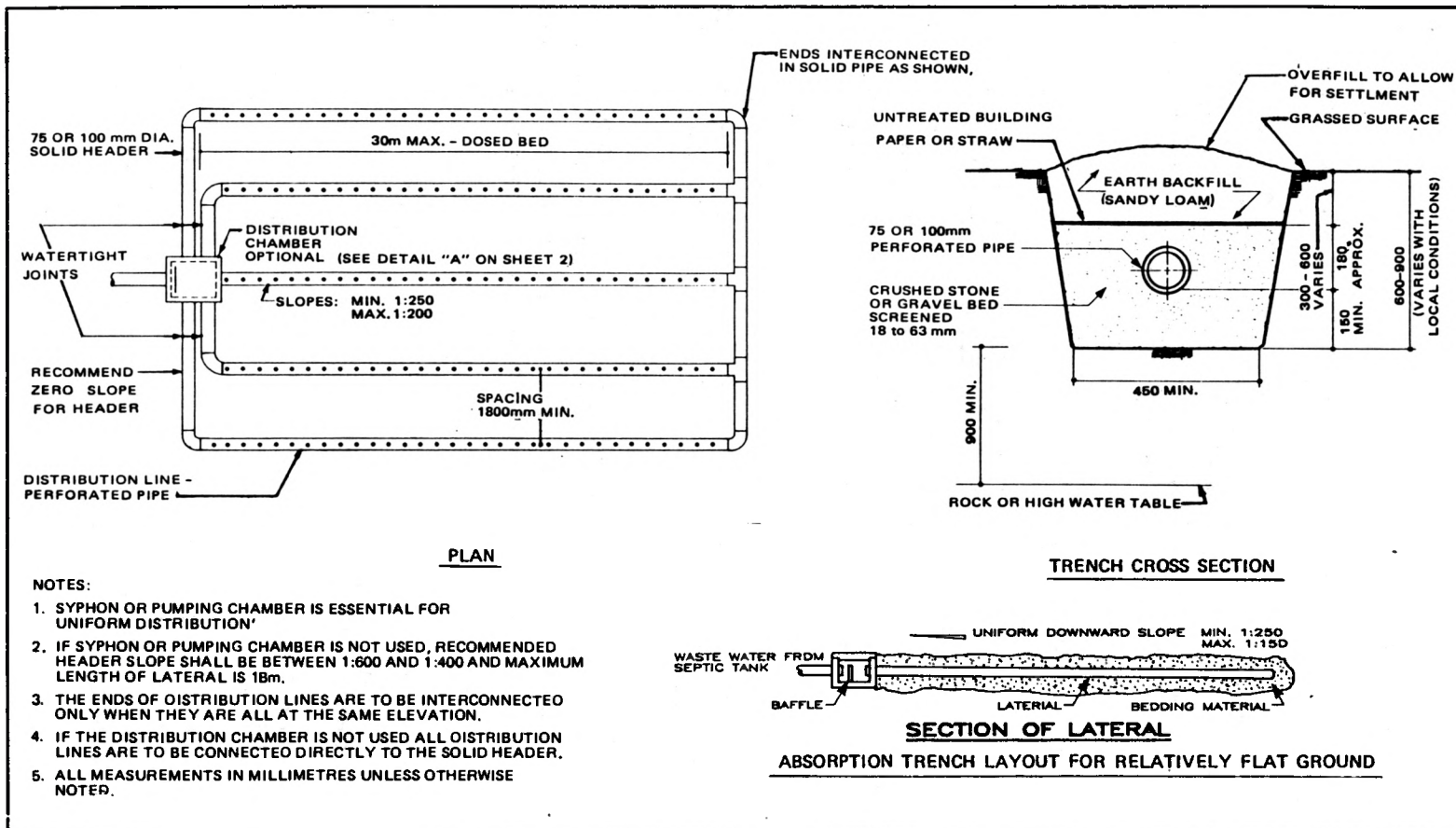
At least once a year dosing tanks and distribution boxes should be opened and settled solids removed as necessary (see Figure 3 for design details).

When designing a septic tank system consider the following:

- a. Sump pumps, eavetroughs, and roof drains should not be discharged to the disposal bed area, nor should a sump pump discharge directly into a field absorption bed.

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Figure 3



- b. The lot should be graded so that surface water is carried away from the disposal field and away from the house.

A tile field can be damaged by vehicular traffic, root growth and freezing. To prevent deep root growth, maintain a good grass cover. Do not permit the area to be used as a parking lot as the weight of a car, truck or snowmobile can break the distribution line.

In winter snow forms a natural insulation and removing or compacting the snow cover can cause frost to penetrate the tile field. Do not use the area as a skating rink. Erecting a snow fence around the area will help preserve the snow cover and also discourage snowmobilers.

2.9 Overloading the Septic Tank System

The septic tank can be overloaded by the following:

- a. the after effects of large house parties;
- b. flooding of the surface of the leaching bed due to lawn watering, surface or roof drainage or because of faulty valve closures; and
- c. an increase in family size, or a change in ownership with an increase in household population.

If the increase in household population exceeds the design capacity of the septic tank a larger size tank should be installed. For example a 4500 litre (1000 gallon) tank may be required instead of a 2700 or 3600 litre (600 or 800 gallon) (see Figure 4 and Table 1).

A tile field or leaching bed can be expanded by adding additional tile runs providing the field is still functioning properly.

Table 1

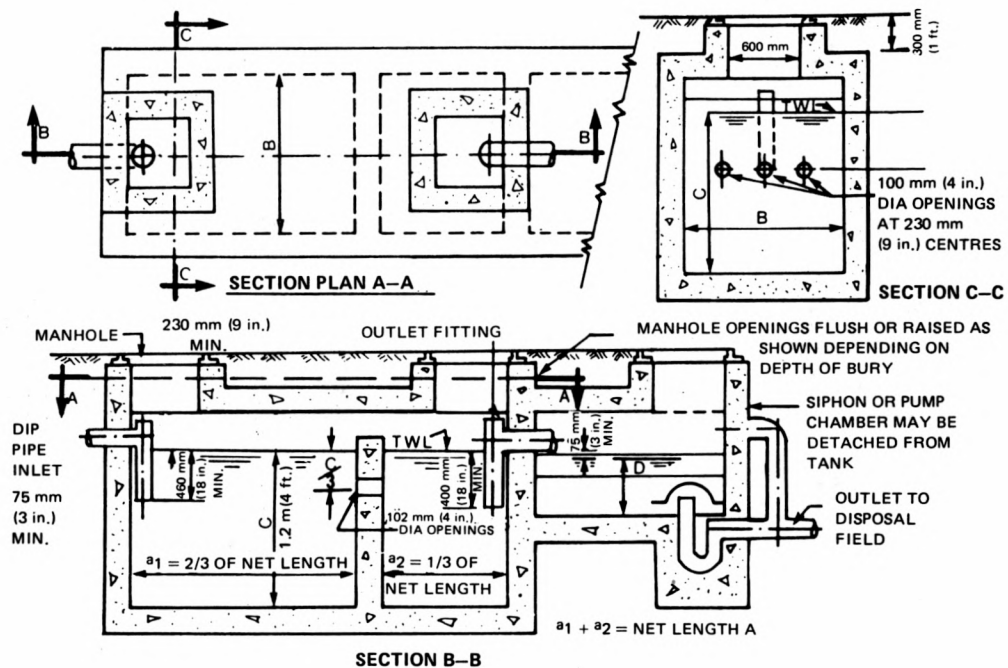
SEPTIC TANKS - WORKING CAPACITIES AND DIMENSIONS

NO. OF BEDROOMS	NO. OF OCCUPANTS	WORKING CAPACITY L (GAL.) REQUIRED	RECOMMENDED INTERNAL DIMENSIONS OF RECTANGULAR TANK - m (ft. - ins.)			
			LENGTH		WIDTH	WATER DEPTH
			1st COMPARTMENT (2/3)	2nd COMPARTMENT (1/3)		
2 or less	4 or less	*2300 (500)	1.4 (4'6")	0.7 (2'3")	0.9 (3'0")	1.2 (4'0")
3	5 or 6	*2730 (600)	1.6 (5'4")	0.8 (2'8")	0.9 (3'0")	1.2 (4'0")
4	7 or 8	3400 (750)	1.8 (6'0")	9 (3'0")	1.1 (3'6")	1.2 (4'0")
5	9 or 10	4100 (900)	1.8 (6'0")	0.9 (3'0")	1.2 (4'0")	1.2 (4'0")
6	11 or 12	4900 (1080)	1.9 (6'4")	1.0 (3'3")	1.2 (4'0")	1.4 (4'6")
COLUMN 1	2	3	4	5	6	7

*Suitable in areas of low consumption of water.

Note: The above dimensions are calculated for households with an automatic washer. The recommended minimum capacity is 3400 L (750 imp. gal.) for areas using normal water consumption.

Figure 4 Septic Tank With Siphon (Note Item #6)



NOTES:

1. Manhole access shall be provided to each compartment located to facilitate servicing of the inlet and outlet.
2. Baffles may be used at inlet and outlet of dip-pipes. The top edge should be not less than 150 mm (6 in.) above T.W.L. and bottom edge not less than 460 mm (18 in.) below T.W.L.
3. Inlet pipe may enter side wall of tank if convenient, but centre-line of pipe must not be more than 150 mm (6 in.) from inlet end wall.
4. The slope of the inlet pipe should be such that inlet velocity does not exceed 1 m (3 ft.) per second (25 mm (1 in.) in 18 m (6 ft.) for 102 mm (4 in.) dia. pipe; 25 mm (1 in.) in 3.6 m (12 ft.) for 150 mm (6 in.) dia. pipe).
5. Provision should be made for not less than 300 mm (1 ft.) of cover to tank (this may be raised above general ground level when available fall to distribution system is limited).
6. A siphon or pump shall be used to dose the leaching bed when more than 152 m (500 ft.) of distribution pipe is required.
7. Dimension D should be according to siphon manufacturer's requirements.
8. Add 230 mm (9 in.) to dimension C for total internal depth.
9. Inspect tanks annually. Tank to be cleaned when the level of the bottom of the scum is within 76 mm (3 in.), or the surface of the sludge is within 480 mm (18 in.), of the bottom of the outlet fitting.

3.0 SEPTAGE DISPOSAL

3.1 Septage Characteristics

The term "septage" is used to describe the sludge that is periodically removed from septic tank systems. It is a mixture of the sludge, scum and sewage in the tank.

Septage is a highly variable anaerobic slurry with the following properties:

- a. large quantities of grit and grease;
- b. a highly offensive odour;
- c. the ability to foam;
- d. poor settling and dewatering abilities;
- e. high solids and organic contents; and
- f. a high concentration of pathogenic and non-pathogenic micro-organisms.

Septage may contain many pathogenic bacteria and viruses and the health hazard it poses must be considered when selecting the method of disposal. Three methods are usually considered. These are:

- a. application to land;
- b. disposal to a waste stabilization pond; and
- c. disposal to a wastewater treatment plant.

3.2 Land Disposal

3.2.1 General Remarks

Land application of septage is the most frequently used technique for disposal.

Land disposal includes such methods as surface application, subsurface trench and fill and the use of sanitary landfill sites. Some of the more important factors to be considered in evaluating a potential land disposal site and method are:

- a. the general topography of the area;
- b. its proximity to surface waters, wells, and residential development;

- c. the soil condition;
- d. the depth to groundwater - a minimum of 1 m is recommended, but a greater depth may be desirable for rapidly drained soils;
- e. the depth of unconsolidated soils to bedrock and the nature of the rock - it is recommended that this method should not be used where the depth is less than 1.5 m except where a site specific study shows that the risk of surface or groundwater contamination is low and a lesser depth would suffice;
- f. the use of the land - hauled sewage should not be applied to land which will be used within six months for grazing livestock or twelve months for growing fruit and vegetables;
- g. the use of neighbouring land for pasture or parkland; and
- h. climatic conditions.

3.2.2 Surface Application

Septage may be applied to the land by spreading or by ridge and furrow irrigation.

Tables 2 and 3 show clearance requirements.

Table 2

Clearance Requirements from Features

Feature	Clearance
Individual dwelling	90 m
Wells	90 m
Public roads	30 m
Residential development	450 m

Note: Site specific criteria may require increased distances.

Table 3

Clearance from Surface Waters for Application
during Non-freezing Period

<u>Maximum Sustained Slope</u>	<u>Clearance for Rapid to Moderately Rapid Permeability</u>	<u>Clearance for Moderate to Slow Permeability</u>
0 - 3%	60 m	120 m
3 - 6%	120 m	240 m
6 - 9%	180 m	360 m

It is important to spread the sewage over the site as evenly as possible.

Areas subject to flooding should be avoided and to prevent outflow, septage should not be placed on frozen or ice covered ground or during spring run-off.

3.2.3 Subsurface Application

Septage may be applied to the subsurface directly into prepared furrows or trenches and then covered with 0.6 m of soil.

When the subsurface application method is used the clearance values shown in Table 2 may be reduced by up to 50%. The clearances from surface water are the same as those in Table 3 for rapid to moderately rapid soil permeability.

The recommended application rates are shown in Table 4.

Table 4

Septage Subsurface Application Rates Based
on Soil Absorption

<u>Surface soil percolation time "T" min/cm</u>	<u>Maximum single application in L/m² and total for any 7 day period</u>
less than 10 (rapid)	75
10-25 (moderately rapid to moderate)	25
26-50 (moderate to slow)	15
greater than 50 (slow)	5

Note: If possible avoid application within 24 h of heavy rain.

3.2.4 Use of Sanitary Landfill Sites

Septage may be disposed of in sanitary landfill sites but there are certain restrictions due to leachate production and odour problems. Septage should not be disposed of in landfills in areas with more than 90 cm of precipitation a year. A 150 mm earth cover should be applied immediately to each area that was dosed with septage, and 0.6 m of final cover within one week of the placement of the final lift.

The recommended application rate is 50 L of septage to each m³ of solid waste.

3.2.5 Comparison of Land Disposal Practices

The advantages and disadvantages of the various land disposal methods are shown in Table 5.

Table 5

Land Disposal Methods

<u>Land Disposal Method</u>	<u>Advantages</u>	<u>Disadvantages</u>
1. Surface application:		
Land spreading.	Same truck can be used for transport and disposal.	Odour immediately after spreading. Limited to 9% slopes.
Ridge and furrow.	Can be used in furrow on crops not grown for human consumption.	Some odour. Limited to 1.5% slopes.
2. Subsurface application:		
Furrows or trenches	No slope limits. No climatological limits.	Odour problems. High groundwater restriction. Vector problems.
3. Sanitary Landfill	No topographic limits.	Odour problems. Rodent and vector problems. Limited to areas with less than 90 cm/a of precipitation unless there is a leachate collector or the area is isolated from groundwater.

3.3 Disposal in Sewage Treatment Facilities

3.3.1 Disposal in Mechanical Sewage Treatment Plants

If a mechanical sewage treatment plant is located on the reserve it may be used for the disposal of septage.

Proper handling is essential and a technical assessment of the treatment plant should be undertaken to ensure that it can handle the waste. Septage should not be disposed of in sewage treatment plants under the following circumstances:

- a. the plant is presently experiencing difficulty in maintaining the dissolved oxygen (DO) level;
- b. the plant is already hydraulically and organically overloaded;
- c. during peak flow periods; and
- d. when the septage volume exceeds 10% of the plant's average daily flow.

Because septage contains significant quantities of grit and rags, it should be introduced into the sewerage system through a manhole adjacent to the plant. The septage will thus become diluted with regular sewage before treatment.

3.3.2 Disposal in Waste Stabilization Ponds

The use of an existing wastewater stabilization pond to treat septage is permitted if relatively small quantities are involved. Septage should be introduced through a manhole into the sewerage system adjacent to the pond to provide for dilution of the septage with regular sewage before it reaches the pond.

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