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Nunavut Water Board
Sept 04 2002
PB
Public Registry

NWB
Box 119
Gjoa Haven, NU

Re: File No: ~~NWB2TAK0002~~ NWB2~~ANU~~ NAP PB

Application to ~~amend~~ license – new PB

Attn: Dionne Filiatrault

I apologize for the lateness of our response to you letter of March 13, 2002. We have reassessed our requirements for the proposed campsite near the Anuri Kimberlite. I have addressed the following points:

1. Proposed Road: We will withdraw our proposal to construct a road between the camp and fuel cache. As per the recommendations of the government of Nunavut, we would instead refuel our drill site using heli-lift and snowmobile support.
2. Sewage: Our most recent correspondence with Michelle Johnson indicated that sewage will be treated by an above ground septic tank style sewage digester, housed in a building to prevent freezing. The tank would be heated and aerated. A baffles system should permit the solid to separate from liquid. Liquid could them be discharged into a sump. An evaporator could be used to reduce liquids to a manageable amount before discharge. Sump sites would be perk tested to confirm adequate absorption rate. Sludge will be flown out and disposed of at the Yellowknife landfill. Please see the attached document for details.
3. Greywater options are discussed extensively in the attached document
4. Fuel storage would be on a pad, in a bermed area. All fuel caches have GPS coordinates.
5. Solid waste disposal: Waste would be burned daily by incinerator. The area around the incinerator could be fenced to minimize windblown debris. Non-combustibles would be stored within the fence and flown out bi-weekly to be disposed of in the Yellowknife landfill.
6. We would apply on a case-by-case basis for drilling closer than 30 m. As most drilling would be done during on-ice conditions, the Anuri delineation program would not likely be affected.

Regards,

Susan Ball

Susan Ball
Project Geologist
Kennecott Canada Exploration

020904 NWB2NAP Additional Info - ILAE

# INDEX

# Wastewater Disposal

## INTRODUCTION

Wastewater can be broken down into two main categories: grey water, and black water or sewage. Grey water includes any water used in camps where the end product does not pose a significant health threat but is not unaltered. Water from showers, sinks and kitchens should all be dealt with as grey water. Black water is primarily made up of sewage although it could encompass any other effluent that requires treatment to the end product to avoid health risks.

Wastewater disposal should be properly planned. Conditions and volume prevalent or expected in a camp should be considered before decisions are made regarding the management of wastewater. In arctic areas where ground conditions include permafrost and sub-surface ice, proper planning is essential.

This report will not include wastewater produced by field equipment, it is intended for small projects and temporary to semi permanent camp situations only.

The greatest environmental risks are associated with contamination of the water table and disruption of aquatic life and environments, but may also include social as well as aesthetic issues.

All land and water use regulations set out in permits or laws must be strictly adhered to.

# HEALTH, SAFETY AND ENVIRONMENTAL RISKS

## HIGH RISKS

### Contamination of Water Bodies

- Untreated wastewater may enter a lake, stream or river.
- Untreated wastewater could enter the water table.
- Drinking water sources could be contaminated.
- Health hazards associated with standing water and parasites

**Mitigating steps:**

- Grey water or treated grey water should be drained to a sump or containment pit.
- Sumps and pits should be treated with chlorine.
- Areas designated for sumps should be tested or observed for percolation properties.
- Known aquifers should be identified in camp plans.
- Drinking water sources should be a sufficient distance and preferably upstream from any discharge or sump.
- All sumps should be covered.
- All plumbing should include P traps.
- Sumps and pits may be lined with water permiable material to catch solid waste.
- Examine alternate waterless waste management.

## MEDIUM RISKS

### Erosion Due to Poor Wastewater Management

- Water trapped in permafrost table eroding ground below surface and causing ground caving
- Down slope erosion from overflowing sumps

***Mitigating steps:***

- Appropriate size for sumps
- Location of sump
- Berming to avoid overflow
- Downstream staging or settling ponds

# Camp Planning

## 1.01 General

Camps may be anything from simple fly camps to large pre-production camps. Populations may fluctuate throughout the project and water use may vary dramatically. Numbers, as well as activities of people in camp, and the type of job, will determine your consumption rates. Jobs that are inherently dirty or involve radioactive material will require a much greater volume of water for laundry and daily cleaning. Camp locations should be evaluated to determine best locations for wastewater discharge. Planning considerations should include:

- The source for camp drinking water.
- The direction natural drainage will follow.
- The location of buildings where wastewater will be generated.
- The location of other buildings with respect to the location of buildings where wastewater will be generated.
- The level of the water table.
- The existence of permafrost and possible subsurface ice.
- Natural sumps or depressions in the vicinity of the camp.
- Prevalent weather conditions and possible temperature variation.

In almost all scenarios there will be a discharge of treated or untreated wastewater, which will need to be dealt with. Sumps are the most common way of handling discharge. The construction of a sump should follow the Standard Operating Procedure for Excavations.

## 1.02 Small Camps

In a simple setting wastewater is generally dealt with in the simplest way. Fly camps and small camps where plumbing does not exist use very little water as it's acquisition and disposal are labor intensive. Water is collected in buckets and used frugally. All wastewater is disposed of in buckets, usually into a sump. Planning for a sump may not seem essential, as the volume will be very limited and sporadic. It is important to note however, that a sump should be established and maintained nonetheless. Limiting your discharge to one area will help to avoid problems like contamination of drinking water, foul odors and wildlife interaction. A small sump can be maintained daily by simply treating it with an appropriate amount of chlorine.

Black water or sewage is generally dealt with by erecting an outhouse. A simple pit, which is backfilled after occupation, should be dug as far from clean water sources as is possible and convenient. Direction of drainage, as well as prevailing wind, should be taken into account when planning a location for an outhouse. The construction and maintenance of outhouses as well as other alternatives will be covered in greater detail in the following pages.

## 1.03 Large Camps

In larger camps with functional plumbing including showers and laundry, calculating wastewater volume will be a critical part of planning. People in camp can be expected to use approximately 50-70 gallons of water per person per day. This may vary depending on the job specifics.

Simple "perk" tests can be used to help with planning a location for a sump. Digging a small test hole, one foot square and two feet deep, and filling it with water will give you an idea how fast water will drain into surrounding soil. Several perk tests may reveal a preferential location for a sump. It is important to realize that you are not only testing to see if soil will allow a sump to drain fast enough, but will it be too fast. Contamination of ground water and fresh water bodies can result from soil being too permeable. Appendix 1,2 and 3 give you some idea what types of results you should be looking for in a perk test and how to perform them.

Camp layouts should place kitchen and dry (or wash tent) close to each other to minimize plumbing problems between buildings. These buildings should be placed as close as possible to both, a preferred sump location, and the clean water source. Pumping water into holding tanks as well as out to sumps can be a difficult procedure during arctic winter conditions. Demand pumps will require the same planning and building as discharge plumbing to remain functional during winter.

Black water in large camps can be dealt with in a number of ways that are examined in greater detail in the following pages. Planning for the management of sewage in large camps should focus on health issue above all. Adequate facilities if they are housed in a separate building which requires plumbing should be located close to the kitchen and dry to facilitate ease of plumbing.

## 1.04 Plumbing

All outdoor drain plumbing will require the construction of "frost boxes" for cold weather. Frost boxes are simple enclosures for plumbing that allow enough space for insulation, heat trace, and vapor barrier (see fig.1). Construction of frost boxes should include a single panel being screwed down, rather than nailed, to allow for easy access for repair or maintenance. Long sections of discharge plumbing should have cleanouts built in at intervals to allow for removing blockages. All discharge plumbing should be done with standard PVC or ABS pipe. All intake plumbing should be made of suitable piping for potable water. Holding tanks should similarly be made of only material suitable for potable water. Heat traces on any plumbing should be controlled as they may get hot enough to melt standard PVC or ABS pipe if it is empty.

Methods of heat trace control:

- **On/Off switch,** turns the heater on in the winter and off in the spring - lowest installation cost, highest energy use.
- **Ambient control**, turns the heater on when the outside air temperature gets cold, multiple heaters grouped on a single control/contactor - moderate installation cost and energy savings.
- **Pipe sensing control**, turns the heater on only as needed to maintain pipe temperature - highest installation cost, greatest energy savings.

**Special temperature controllers must be used when installed in hazardous locations (explosive gases or dust).

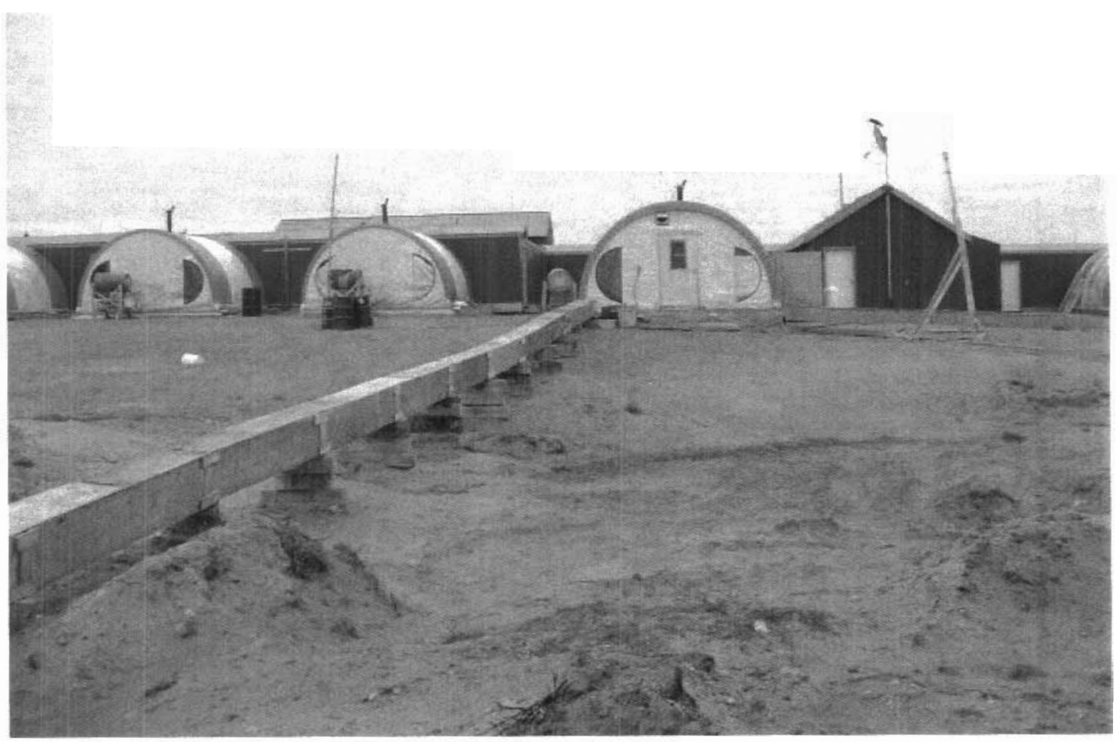


Figure 1: Frost boxes coming from tent to foreground

Frost boxes should also be signed to alert people on site of the existence of live wiring inside the structures (see fig.2). Frost boxes should be opened and plumbing should be examined for breaks and cracks prior to startup each season as frost heaving may cause the boxes to move during freeze up and thaw.

All indoor drain plumbing should include the installation of P traps to avoid odors and potentially hazardous gases from returning up the drain line. These should be well insulated and heat traced to avoid freezing in winter, as they will always contain standing water. P traps with drain plugs are preferable for camps that are not continuously occupied to avoid freezing, however flushing with anti free will avoid the same problem.


Figure 2. Warning signs

## Grey Water

Grey water or water that is the waste product of day-to-day activity, excluding sewage, includes discharge from showers and sinks, water used in the kitchen, and water used for laundry. Most commonly this water is drained into a sump and left to percolate into surrounding soil. Problems arise with this method in areas where the air temperature and ground temperature are well below freezing. Freezing in plumbing, failure in percolation, and overflowing sumps due to ice are common problems. Most ways of dealing with wastewater including Bio-digesters, filtering, evaporation, and settling chambers still leave the problem of dealing with an end product that will freeze. An analysis of each method will reveal that the major problem to overcome is still the management of discharge. Most of these methods are aimed at removing solid waste and making discharges environmentally friendly. The four methods described in this report do not represent the only alternatives, although they are felt to be the most easily implemented and the most cost effective for short-term use. The scope of any project will certainly be the main factor to consider when choosing a system, but logistics and cost may limit the choices. It is our aim to be environmentally friendly and to this end decision should be made with this in mind.

## 2.01 Sumps

Sumps are the easiest most cost effective way of dealing with all wastewater discharge. Choosing a location for a sump is the first and most essential step to avoiding future problems. With almost all of the methods described in this report a sump will be necessary for the final discharge so planning for a sump should be part of the process for each new camp. Sumps are commonly located in a naturally existing depression to avoid having to manage a large excavation. The absence of standing water in any natural depression also indicates good percolation properties in the surrounding soil. Conversely, any natural depression that has standing water may give indications of clay rich soil, which may fail to percolate, but may also indicate the level of the surrounding water table.

Sumps should be treated or disinfected occasionally if standing water is expected. The water to chlorine ratio recommended by the Department of Environmental Quality for the application of disinfecting a drinking water source is determined by contact time. This can also be applied to sumps for the purpose of disinfecting. If a sump has a contact time of 10 hours the recommended ratio for disinfecting is 1/4 gallon of bleach for 100 gallons of water. If a sump has a contact time of 1 hour the recommended ratio for disinfecting is 2 gallons of bleach for 100 gallons of water. These figures assume the use of normal household bleach or 5.25% sodium hypochloride. Your perk tests and the volume of your sump will determine the amount of bleach you will need to add to your discharge. It is important to note that most kitchens are required to use a certain amount of bleach for disinfecting dishes and this may determine whether additional chlorination is required. A greater quantity then that determined by your contact time may be necessary at intervals to reduce odor, however chlorination should be done sparingly rather than with a "more is better" attitude as it also disrupts natural biological activity until it is diluted or dispersed.

Additional considerations for sumps should include: the use of berming, shoring or cribbing to avoid erosion (see fig.1), and covering. In some areas where percolation is a problem a series of sumps or settling ponds may be required to eliminate overflow problems. Heating of the entire enclosure may also be required in arctic winter conditions. Methods of heating sump boxes include low wattage heat lamps and submersible heaters.

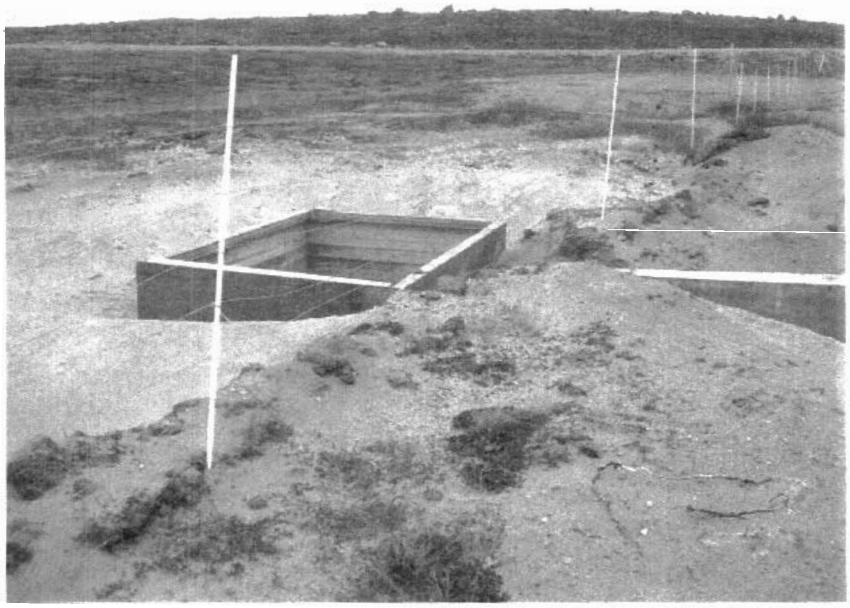


Figure 1. Sump with cribbing to prevent erosion (prior to backfilling)

Sumps can also be lined to prevent the accumulation of solid waste. Water permeable cloth such as landscaping material could be used to line a sump. This could be removed for incineration or discarding at the end of each segment of a program in an occupied camp.

## 2.02 Filter Systems

Simple filter systems could be used to remove solid waste from discharges going to sumps. Sand filter systems are readily available from commercial outlets. These filters come in a variety of sizes as well as a number of models. For an example refer to appendix 4. Filter systems could be even simpler, a screen or "cartridge type" in-line filter could be installed, although these require more maintenance.

## 2.03 Micro-Biological Systems

Micro-biotic systems are generally intended for large-scale treatment. In most cases grey water and black water would be mixed and discharged to a holding area or lagoon. This alternative will be examined further in the Black water section of this report.

## 2.04 Evaporation Systems

Evaporation systems are commercially available for reducing wastewater discharge. They are primarily intended for industrial use where discharge is problematic, namely where it may require trucking for removal. These systems are prohibitive in that they require a power source. In air-supported camps these would likely rely on propane for fuel to reduce wastewater discharge. Another issue that may become evident is the maintenance of the discharge in cold weather. Ice build up around the steam outlet may be problematic as well as dangerous. The capacity of these systems must also be examined before they can be considered as an alternative. An example of a commercially available system is shown in appendix 5.

## Black Water

Black water or sewage can be dealt with in a number of ways. The main concerns when dealing with black water are the contamination of drinking water by introducing fecal coliform to a water system, and other health related issues. The four methods examined in this section do not represent the only alternatives, although they are felt to be the most easily implemented and the most cost effective for short-term use. The basic methods for dealing with black water involve burying, burning, or digesting it. Population and availability of suitable space as well as logistics and cost will all help to determine the usable alternatives. It is important to remember that biological alternatives all require heat during cold weather to operate effectively.

### 3.01 Outhouses

Outhouses are the simplest and most common method of dealing with black water waste. Excavations for an outhouse should follow the standard operating procedure. Holes dug for outhouses may also be identified as confined spaces as per the excavation S.O.P. and should be added to the Confined Space Register in camp. Outhouses should be simple lightweight structures that are easily moved as pits are filled. Lime should be applied daily or as often as is deemed necessary to the pit to speed the break done of solid waste. Once again the more is better rule does not apply, as your treatment should not significantly impact the PH in the surrounding soil. Outhouses are generally not heated as they are very small spaces and the introduction of heat would represent a fire hazard.

### 3.02 Composting Toilets

Composting toilets are toilet systems, which treat human waste by composting and dehydration to produce an end product that can be added directly to soil. Composting toilets are one of the waterless or near waterless alternatives for dealing with black water. The use of aerobic bacteria breaks down and reduces wastes as well as making it safe to return to the soil. They would require a specific time frame as well as maintenance on a regular basis. Where composting toilets are installed instead of septic and mini-treatment systems, there is a large reduction in the "loading" on the effluent treatment system by the removal of "black water". Smaller, less maintenance, grey water systems are possible.

They range from simple twin chamber designs through to advanced systems with rotating tines, temperature and moisture probes and electronic control systems. There are two basic types of composting toilet:

> BATCH SYSTEMS - With the batch systems, a container is filled and then replaced with an empty container. The composting process is completed inside the sealed container. The system may have a single, replaceable container. Or it may be a carousel system where 3 or 4 containers are mounted on a carousel and a new container is spun into the toilet area when the other is full. After a full cycle is complete, the first container is fully composted and ready for emptying.
> CONTINUAL PROCESS SYSTEMS - These systems are in a constant state of composting. "Deposits" are put into the system, composting reduces the volume and moves it downward where it is removed after 6-12 months as fully composted material.

All systems are designed to treat the "deposits" by composting, worm processing, micro and macro-organism breakdown, and by dehydration and evaporation of moisture. An example of a commercially available unit is given in appendix 6.

### 3.03 Incinerating Toilets

Incinerating toilets are another waterless way of dealing with black water. High temperature burners reduce waste to a sterile residue that can be easily dealt with. Incinerating toilets can be either electric or propane. They require regular maintenance to keep them operating efficiently. They are subject to a much shorter cycle time than a composting toilet. A report generated by the Environmental Protection Agency on Incinerating toilets is attached to this report.

### 3.05 Micro-Biological Digesters

Large digesters are an option for larger more advanced operations. These usually involve either a large holding pit or lagoon or an indoor tank similar to a septic tank. This system would require regular maintenance to operate efficiently and would also require the removal of sludge on an as needed basis. These systems operate very simply by separating solid waste from liquid in a holding tank or pond. Solids are digested and liquids are passed on to be treated before being discharged into a septic field or sump. Aerating and heating can both be used to encourage the biological process, as most bacteria used in this process are aerobic. There are a number different configurations and options for this system that are available commercially. There are also a variety of bacteria available commercially that can be introduced into this system. Comparative studies should be done to determine whether there are hardier or more cold resistant strains available. A sample of commercially available products is given in appendix 8.

**Summary**

Kennecott has no current standard procedure for dealing with wastewater. Several options have been investigated and are being investigated in camps at present. Decisions on how to manage wastewater issues must be made with all factors considered. An effort must be focused on continued development of new ideas as health and environmental standards change. The following table outlines some of the pros and cons of the systems examined in this report.

## Comparison of Various Wastewater Disposal Systems

### Grey Water

| Type | cost | Special requirements | Benefits | Drawbacks | Capacity restrictions |
|---|---|---|---|---|---|
| Sump | Negligible | Soil that percolates well. | Easy to build and maintain for most of the year. | Harder to maintain in cold environments. | Capacity will be determined by perk rates and size of sump. |
| Filter | $500 to$1000 | Maintenance and replacement parts. | Limited solid waste being deposited in sumps. | Restriction to water flow. Hard to maintain in cold environments. | Capacity will be limited by the type of filter. |
| Biological | Variable but very high | Aeration and heat will be required to make this system work efficiently. | Combining grey and Black water will simplify plumbing needs. | Constant and costly maintenance. Possible high cost for (lagoon) reclamation. | Capacity will only be limited by the size and type of system used. |
| Evaporation | $7000 to $10000 | Abundance of energy (propane or electric) | No liquid discharge. Could possibly combine grey water and black water. | Hard to maintain in cold environments. Limited capacity. | 120 gallon capacity, evaporating at 12-17 gallons per hour. |

### Black Water

| | | | | | |
|---|---|---|---|---|---|
| Outhouse | $300 | No special requirements | Low maintenance and inexpensive. | Health issues | Capacity is restricted by the ability and availability of places to dig. |
| Composting | $1000 to $1700 per unit | Heat will be required to make this system work efficiently. | Waterless | Long cycle times. Maintenance | Capacity is restricted by the number of units. |
| Incinerating | $2000 to $3000 per unit | Abundance of energy (propane or electric) | Waterless, very little (sterile) residue | Maintenance | Capacity is restricted by the number of units. |
| Biological | Variable but very high | Aeration and heat will be required to make this system work efficiently. | Combining grey and Black water will simplify plumbing needs. | Constant and costly maintenance. Possible high cost for (lagoon) reclamation. | Capacity will only be limited by the size and type of system used. |

*Note: costs do not include installation or estimates of construction time*

**Appendix 1**

# Central Michigan District Health Department

Serving Arenac, Clare, Gladwin, Isabella, Osceola, and Roscommon Counties
"People Caring for People."

## Percolation Test Procedure

- **Location**. The percolation test holes shall be spaced uniformly over the proposed absorption field site area. A minimum of three test holes are required. If only three to five tests are performed the design percolation rate for the absorption system is the slowest rate from all the holes tested. If six or more percolation tests are performed, the design percolation rate for the absorption system is the average of all holes tested as determined by the formula below.
- **Preparation**. An 8-12 inch diameter hole shall be dug or bored to the proposed depth of the absorption field. This will normally be approximately four (4) feet deep. The walls shall be vertical, to expose a natural soil surface, the sides and bottom shall be scraped with a sharp pointed instrument and the loose material shall be removed from the hole. Coarse sand or gravel shall be placed in the bottom of the hole to prevent it from scouring and sealing.
- **Pre-soaking**. The purpose of pre-soaking is to have the water conditions in the soil reach a stable condition similar to that which exists during continual waste water application. The minimum time of pre-soaking varies with soil types and moisture content, but must be sufficiently long enough so the water seeps or soaks away at a constant rate. The following pre-soaking instruction are usually sufficient to obtain a constant rate.
  - A. In sandy or gravely soils place 24-30 inches of water in the hole and allow it to seep away. Fill the hole again with 24-30 inches of water and if the water seeps away quicker than ten minutes per inch this indicates that the soil is very permeable and the percolation rate shall be recorded as ten minutes per inch.
  - B. In other soils where the water remains longer than the ten minutes per inch rate, additional saturation is necessary. If this is the case allow the water to soak in the hole for eight hours or preferable over night. This will allow the soil to swell and become saturated before the actual measurements are taken.
- **Percolation rate measurement**. The water level should be adjusted to 12-18 inches above the gravel initially and after each measured time interval. Refill the hole with water to the 12-18 inch level after each measurement to maintain the same hydraulic loading for each measurement. Time the water level drop in minutes so we know how many minutes it takes the water to drop one inch. The test may be terminated when the water drop is consistent for three consecutive measurements in each percolation hole.
- **Calculations**. The percolation rate for each hole is calculated as follows:

Time interval (minutes) / Final water level drop (inches) = Number of minutes to drop one inch

# Appendix 2

**Perk Rate** - Rate at which soil absorbs water. The perk rate is measured in a standardized unit of Minutes Per Inch (see Minutes Per Inch). Perk rates less than 15 MPI and greater than 105 MPI are too fast and too high, respectively, to permit the installation of a septic system.

A high soil perk rate indicates that the sewage water is not sufficiently filtered by the soil and may subsequently contaminate the groundwater under such soil areas. A low soil perk rate indicates that a septic field installed in such a soil may not be able to absorb the sewage water and a failure may result.

## Appendix 3

**Percolation Testing**:

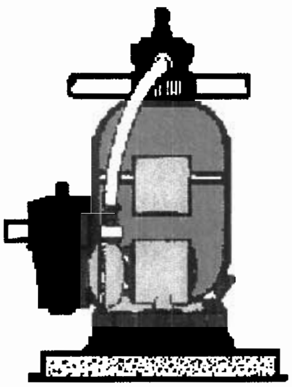
After the test hole is backfilled, the backhoe operator will then dig an additional hole off to the side. This depth is refered to as the "perk bench". The bench is excavated to the soil profile which was specified by the field technician. The percolation test is then performed in order to determine the application rate used for the design of the septic system. The percolation test involves digging a 6 inch diameter hole that is 12 inches deep into the bench that was excavated by the backhoe operator. This is usually done with a post hole digger. The hole is then filled with a standing head of water for a period of at least 4 hours. this is called the presoak period. The MOA will waive the requiredment of a presoak for the soil if when filled with water to a depth of 12 inches, two times, it will drain away completely in less than 10 minutes each time. For most soils, a presoak is required.

After the presoak period the percolation test is performed. The "perk" test is performed by filling the perk hole with 8 inches of water and measuring how much the water level drops in 30 minutes. If all of the water drains away in less than 30 minutes, the time interval is changed to 10 minute readings. At the end of the 30 minute period, the hole is again filled to the 8 inch level and the process repeated. A minimum of three 30 minute readings are taken. From this, the percolation rate is calculated by dividing 30 minutes by the drop in inches during the 30 minute period. The following is a general classification of the percolation rates:

- Less than 1 minute per inch: Coarse sands/gravels that may require the installation of a sand filter to slow down the flow of wastewater through the soil
- 1-5 minutes per inch: Excellent
- 6-15 minutes per inch: Good to Fair
- 15-30 minutes per inch: Fair
- 30-60 minute per inch: Fair to Poor
  Greater than 120 minutes per inch (60 - 120 minutes per inch: poor): Unsuitable for an onsite septic system

With the soil profile identified, the groundwater levels established, and the percolation rate determined. the engineer can then proceed with the septic system design.

# Earthstar Greywater Systems



## Earthstar Greywater Systems

***Automatic operation, sand filter with backwash cleaning***

Simple, high quality, and easy maintenance. When greywater reaches a high level in the 55 gallon tank, a float switch starts a centrifugal pump that begins an irrigation cycle. A simple 5-minute backwash cleaning process every 2 months keeps everything in top shape. And you don't even have to get your hands wet. Comes complete with everything you need to install. Color-coded components make assembly easy in less than an hour. 12 gallon tank good for tight spaces.

With 55 gallon tank (CT125) **$1065.00**
With 12 gallon tank (CT126) **$1065.00**

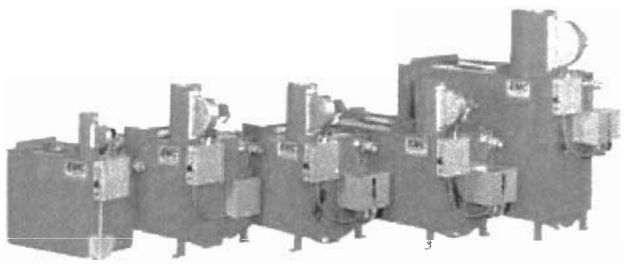
## Appendix 5

**EMC: EQUIPMENT MANUFACTURING CORPORATION**

WASTEWATER EVAPORATORS ■ AUTOMATIC PARTS WASHERS ■ CLEANING STATIONS

# The WATER EATER

**WASTEWATER EVAPORATORS** *since 1984*



The ***WATER EATER*** waste water evaporator has been engineered to efficiently evaporate the water content from most non-volatile water-based liquids. A power exhaust system releases the moisture safely into the air, leaving only a small residue requiring disposal.

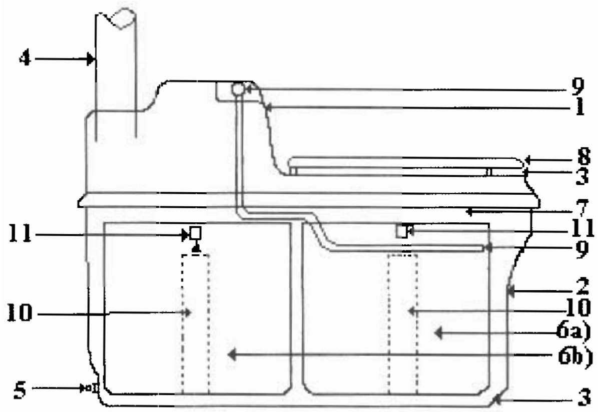
This massive reduction in the volume of liquids requiring disposal not only slashes disposal costs, but also economizes by reducing storage area requirements, labor and time for handling, and frequency of disposals. All ***WATER EATERS*** have been designed to operate simply and efficiently, and are constructed of quality materials and equipment to assure trouble-free operation and long-life service, as demonstrated by the thousands of systems in service.

Available in gas or electric models and capacities from 3 to 55 gallons per hour. Common wastestreams that can be minimized include the following:

| | |
|---|---|
| MACHINE COOLANTS | PARTS WASHER FLUIDS |
| COMPRESSER CONCENTRATES | MOP WATERS |
| RO/UF CONCENTRATES | RINSE WATERS |
| DIE CAST SOLUTIONS | WATER BASED INKS |
| TUMBLING & VIBRATORY SOLUTIONS | PHOTOGRAPHIC SOLUTIONS |
| HOT TANK WATER | STEAM CLEANER WATER |
| DYE PENETRANTS | FLOOR SCRUBBER WATER |
| WATER BASED PAINT WASHUP | ALKALINE CLEANERS |
| ACID RINSES | WIRE DRAW COMPOUNDS |
| STENCIL CLEANERS | PC BOARD CLEANING |

## Appendix 6

BioLet®
Composting Toilets
Waterless Solutions




1. **Top part of BioLet NE**
2. **Bottom Part**
3. **Air inlets**
4. **Air outlets (removable flexible hose)**
5. **Excess liquid outlet (connection to drain pipe)**
6. **Composting containers**
    a. **front composting chamber**
    b. **secondary composting chamber**
7. **Compost cover**
8. **Seat/seat cover**
9. **Leveler**
10. **Air channels**
11. **Recess for handle**

## DESCRIPTION

The BioLet NE is an on-site, self contained, biological toilet, where human waste and toilet paper are collected. Excess liquid is recycled through evaporation/transpiration and solid material is decomposed to a soil-like hygienically safe product (humus) without producing any unpleasant odor.

The BioLet NE uses no ELECTRICITY, WATER nor CHEMICALS and requires no hookup to sewer or septic. Just a simple installation of a vent pipe and drain tube and you're ready to go!

The BioLet NE utilizes the natural process of aerobic decomposition. Within a relatively short period of time, human waste and toilet paper are efficiently transformed into a small amount of fertile compost. The BioLet NE reduces the volume of the waste entering the toilet by approximately 90%, leaving only 10% of an end-product, which can be recycled back to NATURE in a safe way without polluting the environment.

## Appendix 7

STORBURN INTERNATIONAL INC.

### STORBURN Pollution-Free Toilets

With concern for the environment as a major consideration STORBURN makes a lot of sense. STORBURN introduced the "store and burn" incinerator in 1976. The new model 60K builds upon that concept with a completely new control system that is simpler to operate and a new burner designed for increased combustion efficiency.

The STORBURN system represents a significant contribution towards improving the quality of life by not contributing to environmental damage.

- No electricity
- No water
- No holding tanks
- No plumbing
- No moving parts
- No freeze up
- Burns either propane or natural gas

### SANITARY

The STORBURN toilet reduces untreated human waste to sterile mineral ash and harmless water vapor. Because each incinerator cycle sterilizes the entire storage chamber destroying all odor causing bacteria, the chamber never requires washing.

### GUARANTEED ODORLESS

STORBURN'S patented design completely eliminates the foul odor problems that are characteristic of other systems. A written guarantee comes with every STORBURN toilet. "STORBURN GIVES OFF NO FOUL ODORS - INSIDE OR OUTSIDE". We know of no comparable system that carries an equivalent written guarantee.

### NON-POLLUTING

The STORBURN toilet is self-contained and does not discharge any effluent into the soil or harmful gas into the atmosphere. All that remains after the incinerator cycle is sterile ash.

### EFFICIENT AND ECONOMICAL

Under ideal operating conditions a full 100 lb. propane cylinder will burn 16 maximum capacity loads (approximately 960 uses). Because of ambient temperatures, ratio of solids to liquid and other variable factors that affect fuel consumption, it is more reasonable to expect 100 lbs. of propane to burn approximately 600 uses. It is also more efficient to burn full loads rather than partial loads since it takes virtually the same amount of fuel to preheat the combustion chamber under all load conditions.

- **EASY TO INSTALL**

The STORBURN toilet can be installed in virtually any heated or unheated building or enclosure. Installation is similar to a vented free-standing space heater.

- **EASY TO MAINTAIN**

Since there are no complex electrical controls or moving parts, the STORBURN does not require the services of a trained technician to handle routine maintenance which consists mainly of cleaning the burner.

- **LARGE CAPACITY**

The STORBURN toilet can be used 40 to 60 times in succession before incineration is necessary. It will accommodate the needs of 8 to 10 workers in an average 8 to 10 hour day or about 6 to 8 persons in a cottage or residence where the daily use would be about 16 hours.

- **SIMPLE TO OPERATE**

When ready to incinerate, add 1 packet of anti-foam, close the unit, light the pilot with a built-in igniter and activate the burner. Burner shuts off automatically when cycle is complete. The burner cannot be activated while the unit is in use. The unit must be closed and locked (much the same as a self-cleaning oven) before incineration can take place. Cycle takes up to 4-1/2 hours if chamber is full.

- **SAFE**

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- **QUALITY CONSTRUCTION**

The cabinet is made of tough non-corroding fiberglass reinforced plastic. The top deck is heavy guage stainless steel with a heavy duty toilet seat and lid. The storage/combustion chamber is cast nickel alloy.

- **ONE YEAR WARRANTY**

**Appendix 8**

ENVIRO-COMP SERVICES, INC.

All Natural Bacterial Products

# PRODUCT DESCRIPTION

## Municipal and Industrial Waste Water Treatment
## BactaClean - WWT, Type 1

BactaClean - WWT, Type 1 (WWT1) bacterial cultures are a selected suite of high performance, environmentally safe and natural bacterial strains which are cultured to biodegrade a broad range of municipal industrial and commercial organic and hydrocarbon wastes. These wastes include domestic sewage, animal, fecal and plant wastes, carbohydrates, starches, proteins, grease, oils, fats, many organic solvents and petrochemicals.

WWT1 cultures are used to seed new biological treatments plants and optimize existing operations to reduce BOD, COD and TSS effluent levels in aeration basins, clarifiers, trickling filters and RBC's ponds, lagoons, activated sludge systems, aerobic and anaerobic digesters, CSO's and storm water detention basins. They also have exceptional capability to biodegrade grease and fat solids buildup in grease skimming pits, sewer lines, wet wells, pumping and lift stations.

When added at recommended dosages to municipal and industrial waste waters, BactaClean WWT1 cultures soon become the dominate microflora in the treatment area and quickly begin bioconverting organic contaminants into fractions of smaller molecular weight. Ultimately, most organic compounds will be completely metabolized as a source of carbon for energy and cell growth.

Benefits of BactaClean WWT1

1. Clears solid grease sludges, mats and clogs from sewer lines, pumping stations, wet wells, skimming pits, filter beds, scum lines and clarifiers.
2. Reduces hydrogen sulfide gas production and resulting danger to personnel and equipment corrosion.
3. Reduces scum and decay odors in lagoons and ponds.
4. Removes filamentous bacteria and other undesirable strains in activated sludge blankets.
5. Removes excess nitrogen and phosphorus and ammonia from waste waters through improved uptake by cell biomass.
6. Decreases effluent BOD, COD and solids.

Pathogen free and environmentally friendly.