LIFEWATER
ENGINEERING COMPANY

P.O. Box 10750, Fairbanks, AK 99710-0750
www.lifewaterengineering.com

Ph: (907) 458-7024
Fx: (907) 458-7025

ExtremeSTP
Cold Climate
Sewage Treatment Systems

November 2004 Edition

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November 2004

Dear reader:

Lifewater Engineering Company specializes in cold climate wastewater treatment. This information packet provides information for engineers, owners, regulators, and prospective buyers about our aerobic sewage treatment systems known as *ExtremeSTPs* (Extreme Sewage Treatment Plants).

ExtremeSTPs combine unique design with easy installation, simple operation, and minimal maintenance. Several standard residential sizes are available but *ExtremeSTPs* can be sized to serve any facility, whether a cabin, large home, ski resort, construction camp, exploration camp, lodge, hotel, or entire community.

*ExtremeSTP**s*** are available in above ground and below ground models. They are especially designed for permafrost areas and are well suited to all forms of "bad ground" where septic and other subsurface systems perform poorly or not at all.

At the heart of each *ExtremeSTP* is a Fixed Activated Sludge Treatment (FAST®) insert manufactured by Bio-Microbics, Inc. By applying some simple but vital arctic engineering to the FAST® treatment technology we developed and patented (U.S. Patent 6,482,322; Canadian Patent 2,318,710) a system that has proven itself in Alaska since 1999.

Lifewater Engineering Company also offers cold climate environmental engineering consulting services.

Please review the rest of this information packet, and then contact us by phone or email if you have questions or would like further information.

Sincerely,

Robert C. Tsigonis, P.E.
President

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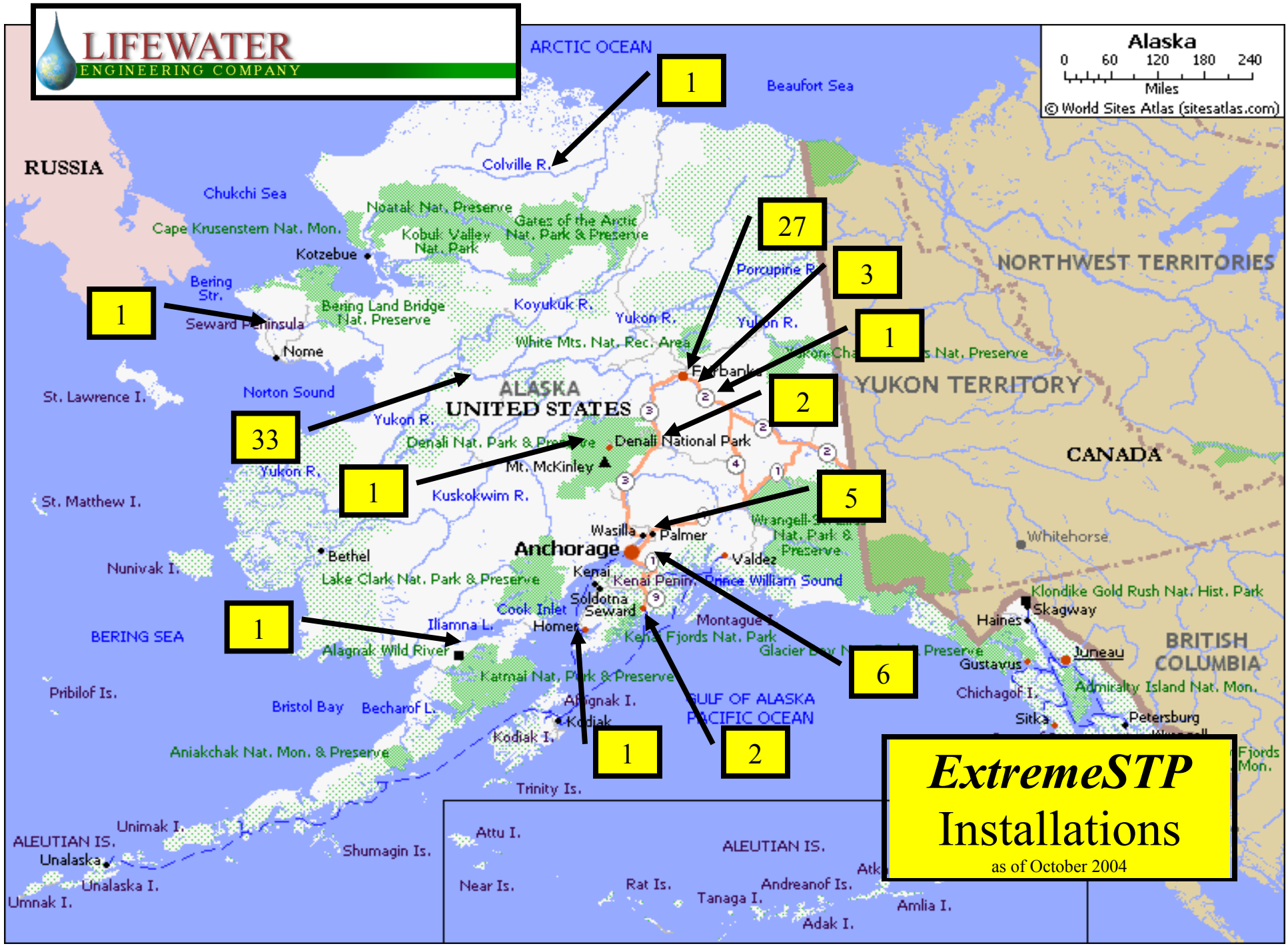
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Kotzebue
Bering Str.
Bering Land Bridge Nat. Preserve
Seward Peninsula
Nome
Koyukuk R.
Yukon R.
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Haines
Iliamna L.
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Montague
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Juneau
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Chichagof I.
Admiralty Island Nat. Mon.
Bristol Bay
Becharof L.
Afognak I.
Kodiak
GULF OF ALASKA
PACIFIC OCEAN
Sitka
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ExtremeSTP
Installations
as of October 2004

Typical Site Conditions for *ExtremeSTPs*

ExtremeSTPs are simple yet fully functional, aerobic, package sewage treatment plants and are consequently more expensive than septic systems. From a cost perspective, if a septic system will work, use one. It will be your least cost solution. However, if site conditions prohibit use of a septic system or if the homeowner or business owner wants to achieve better treatment than can be obtained from septic systems, then an *ExtremeSTP* is a great alternative.

Permafrost

Permafrost presents several engineering challenges to on-site sewage treatment system designers. Some permafrost is thaw-stable, meaning that if heat is put into it causing it to thaw, no settlement will occur. Unfortunately most permafrost is not thaw-stable. In most cases, if some natural or man-induced change causes permafrost to thaw, ground movement will occur. Ground movement is a common cause of failure of on-site systems in which separate components are connected together by pipes. Examples of such systems are a septic tank connected to a leach field; or a pretreatment tank connected to a separate aerobic treatment tank, connected to a lift station, connected to a leach field. *ExtremeSTPs* eliminate the problem of differential movement between components in two ways:

1. Above ground models minimize the chances of the permafrost thawing by minimizing the amount of heat that is put into the ground.
2. *ExtremeSTPs* consist of one multi-compartment tank so if movement occurs, all parts move together (the exception to one multi-compartment tank is when multiple tanks are required for larger systems or because manufacturing or transportation constraints restrict tank size)

Low Permeability or Saturated Soils

Sometimes an impermeable layer such as clay, bedrock, or permafrost restricts the downward flow of water, or the ground may even be naturally saturated. In such cases, it is very difficult or impossible to get water to flow into the ground. *ExtremeSTPs* have been used at sites like this to provide a good quality effluent that can be discharged either directly to the ground surface or into a mounded leach field, or directly to a surface water body. In the case of a hillside home near Palmer, Alaska on a low permeability, saturated site a below ground model was used with surface discharge. In this case an effluent pump was not needed because the slope of the hill allowed the outlet pipe to daylight, allowing effluent to flow out of the unit by gravity. As is typically done for surface discharge, a dosing siphon was used to prevent freezing during winter conditions.

Shallow Groundwater

When the groundwater level is naturally close to the surface, the soil will not provide adsorption or filtration of the particulate matter which is contained in the effluent of a septic system. In these cases, regulations do not allow discharge into the soil without a

mounded leach field or a higher degree of treatment than can be provided by a septic system. Depending on site-specific conditions, regulators may allow less than 4 feet of separation to groundwater if you have a good quality, aerobic, disinfected effluent such as comes from an *ExtremeSTP*. In the case of a fishing lodge near Lake Iliamna, Alaska, the separation to groundwater was reduced to 1.5 feet.

Close Proximity to Surface Water

Depending on site-specific conditions, regulators may allow less than 100 feet separation to surface water if you have a good quality, aerobic, disinfected effluent such as is produced by an *ExtremeSTP*. In the case of a summer home near Big Lake, Alaska, a separation of 60 feet to surface water was approved. In other cases, direct discharge to surface water has been approved.

Small Lot without Room for a Replacement Leach Field

ExtremeSTPs can be used to help prolong the life of a leach field because *ExtremeSTPs* produce oxygen-rich (aerobic) effluent, which encourages aerobic microbes to grow in the leach field. Aerobic microbes can decompose contaminants faster and more thoroughly than anaerobic microbes.

Site with a Failing Leach Field

For the same reason as above, *ExtremeSTPs* can help restore the life of a failing leach field. Further information about this application of FAST® technology can be found under the "Bio-Microbics FAST® (Fixed Activated Sludge Treatment) Insert Information" section.

Nitrate Reduction is Desired

The standard Bio-Microbics FAST® treatment inserts that are used in *ExtremeSTPs* provide good nitrate reduction. However, in cases where a higher degree of nitrate reduction is required, Bio-Microbics NitriFAST® units or ABC-N™ units can be used.

Lagoon Discharge

Bio-Microbics FAST® treatment systems are available in a floating configuration for treating the contents of a lagoon prior to discharge. These floating units can be winterized for use in cold climates, or an *ExtremeSTP* can be used to treat the contents of a lagoon for discharge.

Selecting the Proper Model *ExtremeSTP*

1. Treatment Process Description

ExtremeSTPs utilize aerobic treatment inserts manufactured by Bio-Microbics®, Inc. The FAST® process begins with pretreatment to remove floating and settling solids by trapping them in an anaerobic settling zone. This step is followed by aerobic biological fixed activated sludge (FAST®) treatment in a compartment with a submerged growth media that is colonized by the microbes that are naturally present in sewage.

A blower forces air into an airlift pump inside the FAST® unit. The airlift pump vigorously mixes the air with the sewage and circulates the aerated sewage through channels in the growth media. This brings oxygen and nutrients into contact with the microbes that are attached to the growth media so that they can decompose the impurities. Nitrification occurs in the aerobic zone, and as the airlift pump circulates the water, a small percentage of the water continuously returns to the anaerobic zone where denitrification occurs.

FAST® units can be purchased as modules that can be fitted into fiberglass, steel, or concrete tanks to meet a wide variety of treatment applications. Individual FAST® units are available in sizes ranging from 150 gallons per day (gpd) to 9,000 gpd. Several units can be manifolded together in series or parallel configurations to treat greater flows. The Bio-Microbics®, Inc. link on this website has further information about FAST® systems.

Lifewater Engineering Company's *ExtremeSTPs* begin with the two steps described above, namely pretreatment and aerobic FAST® treatment. However, in order for the systems to work in cold climates two additional steps must be taken.

Before treated effluent is discharged onto the ground surface or into a water body, it must be disinfected. In *ExtremeSTPs* this is generally done using either UV or chlorination. Most of the smaller system use UV and the larger systems use chlorination. A dechlorination step can be added if needed.

Effluent flow control prevents effluent from trickling out the effluent line and freezing in the line itself or on the ground close to the point of discharge. Whenever site conditions will allow, flow control is done using an automatic dosing siphon. This device has no moving parts except water and air, yet it retains treated effluent in the *ExtremeSTP* until a preset amount is accumulated and the siphon is triggered. Then effluent is then discharged rapidly (30 gpm on the smaller systems) until the liquid in the effluent compartment drops to the level where siphoning stops. In this way, relatively large doses of warm effluent are discharged onto a splash plate (to prevent erosion) and the effluent soaks into the natural vegetative mat and flows away from the treatment plant before it freezes.

In cases where there is insufficient head to allow use of a dosing siphon, an effluent pump is used to achieve about the same dosing rate and volume while lifting the effluent to a suitable discharge location. Discharge can also go to a leach field either with or

without a dosing siphon or effluent pump. Systems can be customized to suit particular site conditions.

2. Hydraulic Loading

All wastewater treatment systems must be sized to handle both the hydraulic and organic loadings to which they will be subjected. Since *ExtremeSTPs* use aerobic treatment inserts manufactured by Bio-Microbics®, Inc., the hydraulic capacities of *ExtremeSTPs* are determined by the hydraulic capacities of the Bio-Microbics treatment inserts.

Bio-Microbics' model numbers designate hydraulic capacities in thousands of gallons per day. For example their Model MCF0.5 treatment insert is rated at 0.5 thousand gallons (or 500 gallons) per day and their Model MCF9.0 is rated at 9,000 gallons per day. *ExtremeSTP* model numbers designate hydraulic capacity in gallons per day. For example, a Model XSTP500 system is rated at 500 gallons per day.

Fixed activated sludge treatment (FAST®) systems can process surge flows very well. In FAST® systems, the microbes that decompose the organic matter are fixed on a growth medium rather than suspended in the liquid. Sludge cannot wash out of the clarifier because there is no clarifier. There is a large reserve of treated wastewater inside the FAST® insert and when more sewage enters the treatment plant, an equal amount of treated wastewater is displaced out.

If actual flows are not available, conventional engineering techniques should be used to estimate or predict flows as closely as possible. However, excessive efforts need not be made to refine a flow estimate because in most cases it is not hydraulic capacity that determines which system should be used.

3. Organic Loading

The organic capacities of *ExtremeSTPs* are determined by the organic capacities of the Bio Microbics treatment inserts that are used, and in most cases, especially with modern water-saving fixtures, it is organic loading that determines which size system must be used. Bio-Microbics® rates their residential systems in terms of a range of people they will handle. However, when applying their numbers you must keep in mind that the high end of the range represents a short-term peak rather than a long-term average number of people. If necessary, these numbers can be approximately converted to lbs of BOD_5 per day by multiplying the average of the range of persons per module times the typical factor of 0.2 lbs BOD_5 per person per day.

4. Discharge

If possible, the first choice for discharge of treated effluent from any on-site sewage treatment system is a subsurface soil absorption system. Soil absorption systems should be designed in accordance with generally accepted practices for the local area in which the treatment system will be located. However, since *ExtremeSTPs* produce an oxygen-rich effluent with low suspended solids and low BOD_5, design of the absorption system can be based solely on the hydraulic capacity of the soil. This means that reductions in

absorption system size from what is typically required for a septic system (perhaps up to 50 percent) can sometimes be achieved.

However, since *ExtremeSTPs* were originally designed for permafrost areas where discharge into the ground is not practical, surface discharge is commonly done from *ExtremeSTPs*. In Alaska, each discharge location must be approved by the regulatory body (typically the Alaska Department of Environmental Conservation) on a case-by-case basis as part of the plan approval process.

We have found that surface discharge works best where there is a thick, natural, well-drained vegetative mat. In the Interior of Alaska, black spruce forests provide an ideal environment. If permafrost is an issue, the discharge location should not be close to a foundation or other structure that could be damaged by thermokarsting (ground subsidence due to thawing of unstable permafrost). If thermokarsting is a concern, we recommend use of a thermo siphon under the *ExtremeSTP* and possibly underneath the point of surface discharge.

An automatic dosing siphon is used to prevent effluent from freezing in the discharge pipe or at the point of discharge on top of the ground. The dosing siphon has no moving parts other than the air and water within it, yet it retains effluent in the effluent compartment until it rises to a predetermined level. At that point, a rapid discharge begins and continues until the level drops to the point where the siphoning action is broken and the discharge from the effluent compartment abruptly stops. After the water in the effluent pipe drains, essentially no more is discharged until the next dose occurs. On sloping ground where permafrost is not a problem but soil conditions are poor and a soil absorption system will not work, consider using a below ground system with an above ground discharge.

5. Elevation Requirements

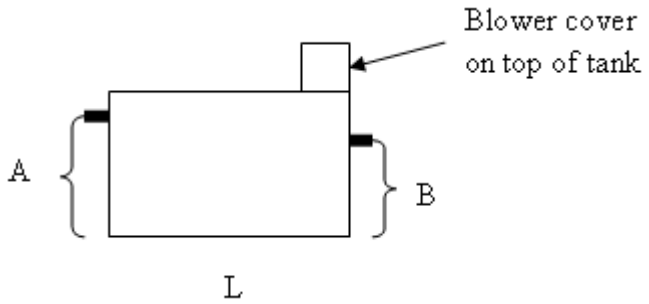
USTP500, USTP750, and USTP900 models without an effluent dosing siphon have a 3 to 5-inch drop from the 4-inch inlet pipe to the 4-inch outlet pipe.

USTP500, USTP750, and USTP900 models with an effluent dosing siphon have an additional 16-inch drop, for a total drop of 20 to 22 inches from the center of the 4-inch inlet pipe to the center of the 2-inch outlet pipe.

XSTP150 and XSTP500 models come standard with an effluent dosing siphon. These models have a 20 to 22-inch drop from the center of the 4-inch inlet pipe to the center of the 2-inch outlet pipe.

If an effluent pump option is chosen, elevation is typically of minimal concern.

Approximate tank dimensions & inlet & outlet pipe elevations:



Model	A - Inlet Height (inches)	B - Outlet Height (inches)	Outlet Diameter (inches)	L - Length (inches)	Width (inches)	Tank Height (inches)
XSTP150UVD	45	30	2	96	48	52
XSTP500UVD	57	36	2	100	69	72
XSTP750/900UVD	54	36	2	165	63	73
USTP500	50	47	4	120	58	58
USTP500…D	~	35	2	169	62	63
USTP500	~	~	2	169	62	63
USTP750 or 900	54.5	45*	2	144	82	58
USTP750 or 900…D	~	2	2	169	63	63
USTP750 or 900…P	54.5	36*	2	129	63	73
Other models	(please ask for dimensions on larger and custom models)					

Notes

- All inlet diameters (except larger models) are 4 inches
- D means automatic dosing siphon
- P means effluent pump
- … means with or without disinfection
- No suffix means no disinfection, no dosing siphon, no pump
- * means dimension can be specified at time of ordering
- XSTP (above ground) models come standard with an automatic dosing siphon but can be ordered with an effluent pump
- All dimensions subject to change without notice

6. Inlet and Outlet Piping

Lifewater Engineering Company recommends that the inlet and outlet pipes be insulated with 2 to 3 inches of polyurethane foam with a k-factor of about 0.17 BTU/hr/ft^2/ºF. The foam should be protected from damage by UV rays, animals, etc., especially where it is exposed above ground. We also recommend that the effluent line be heat traced.

Movement of buildings, pipe supports, and the sewage treatment system can be expected, especially in above ground installations on permafrost. Projected movement should be taken into consideration when designing pipe slopes. For example, when an above ground system is set on top of a thawed active layer, one would expect the treatment system to rise somewhat when the ground freezes, especially if a thermosyphon is used to enhance freezing. In this case, the slope of the sewer line should be set slightly greater than ¼-inch per foot to accommodate the expected movement.

Inlet and outlet piping connections to the *ExtremeSTP* should be made with rubber couplers with stainless steel bands. These will accommodate some movement between the treatment system and the pipes and will provide "weak points" at the inlet and outlet so that neither the pipes nor the treatment plant will be damaged if movement is severe.

7. Venting Requirements

Because air is pumped into the *ExtremeSTP* air must be vented out. *ExtremeSTPs* are constructed so that there is a common air space above all of the internal compartments. For residential and small commercial systems, this air space is commonly vented through the sewer line and out the main stack vent on the roof of the house or building being served. We have found that homeowners like this venting system because it helps keep the roof vent from freezing shut during the winter. Larger systems, whether residential or commercial will require separate venting to the atmosphere.

8. Electrical Requirements

ExtremeSTPs are typically constructed so that there is one point of power connection for the whole unit. For the XSTP150, XSTP500, XSTP750, and XSTP900 gpd models, one 20 Amp, ground-fault protected circuit that is dedicated to the *ExtremeSTP* is normally all that is required, unless the owner wants a separate ground-fault protected circuit for alarm purposes, such as for a high water alarm.

9. Permafrost Considerations

For sites with permafrost, the engineer should consider use of a thermosyphon to enhance freezing in the ground. In every case where a thermosyphon has been used, the treatment system has stayed in place and level. In one case, the yard underwent extensive thermokarsting and the house needed frequent leveling, yet the treatment plant remained in position because a thermosyphon kept the ground frozen.

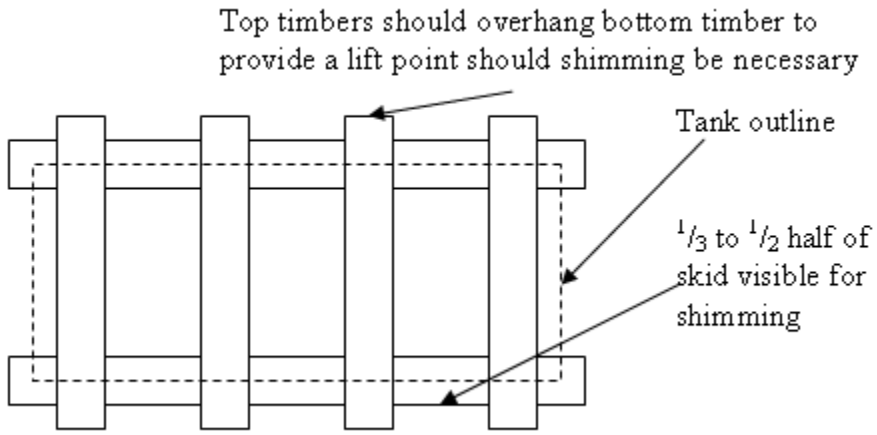
Typically, above ground systems can be installed at any time of year because minimal excavation is required. When installing on permafrost, the best time of year may be in the fall or early winter. At this time of year, only the surface of the active layer has refrozen,

so the ground is easy to excavate to prepare a pad for the system, yet it freezes at night, thereby facilitating equipment operation.

Foundation thoughts for permafrost areas:

The best rule for permafrost areas is this: Do not rely only on these general thoughts to design your tank foundation, rather consult your "local" foundation expert even if that person is 1000 miles away!

- Place on mineral soil - *ExtremeSTPs* should be placed either on an insulated gravel pad (such as is often constructed for a building on permafrost) or on mineral soil. In permafrost areas, it is best to place the unit in a very small clearing shaded by trees (such as black spruce). The natural vegetative mat under the tank foundation should be removed so that it does not compress later causing the tank to shift. If the vegetative mat is removed, it should only be removed under the tank foundation and should be left in place undisturbed everywhere else to preserve ground insulation and minimize permafrost thaw.
- Leave an air space - When installing an XSTP on permafrost consider leaving an air space underneath the tank. This will allow cold air to flow under the tank in winter and reduce ground temperatures so that it is less likely to thaw during the warmer months. One way to do this is with a pressure treated timber foundation.
- Pressure-treated timber foundation - This type of foundation eliminates direct contact between the tank and the permafrost soil, thus reducing heat flow into the ground. We suggest using 3"x12" or 4"x12" timbers that are specially treated and rated for ground contact. Since soil moves seasonally, especially in permafrost areas, consider a timber arrangement similar to that shown below that will allow shims to be paced between the timbers as needed to keep the tank level.
- Extra 2 inches of rigid foam - When the tank must be in direct contact with the ground, consider placing 2 inches of rigid foam between the tank and the ground to slow heat transfer into the ground.



- Thermosyphon - If your property is already experiencing thermokarsting due to permafrost thaw, or if you prefer to take the conservative approach (which

we recommend) you should install a thermosyphon underneath the tank to help refreeze the ground and/or keep it frozen. Consult a local foundation engineer or Arctic Foundations in Anchorage, Alaska (1-907-562-2741, www.arcticfoundations.com) for further information and advice.

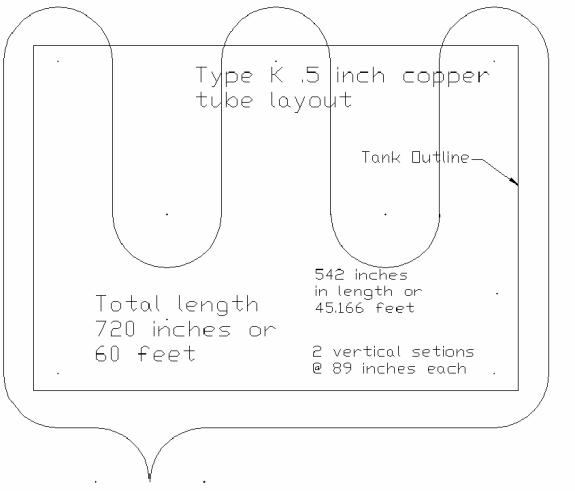
- Flat loop evaporator for thermosyphon - When you are uncertain of the need for a thermosyphon but want to maintain the option of having one if necessary, we recommend you install a flat loop evaporator beneath the tank or timber foundation at the time of installation. This can be done at a small extra cost and will allow a condenser and gas/liquid charge (the expensive parts of a thermosyphon) to be added later if necessary. Keep in mind that if you know you'll need a thermosyphon, it is generally less expensive to install a standard thermosyphon initially than to install just the flat loop evaporator first and the condenser and gas/liquid charge later. Some suggested generic installation instructions appear below, but we recommend that you contact a local foundation engineer or Arctic Foundations in Anchorage, Alaska (1-907-562-2741, www.arcticfoundations.com) for further information and site specific recommendations.

Flat loop evaporator installation instructions:

For model XSTP150, XSTP500, XSTP750, and XSTP900 systems, use 60 feet of ½-inch diameter Type K copper tubing for the evaporator. Solder a cap onto each end of the tubing before taking it out of a clean environment. It is important that the inside of the tubing remain completely clean and dry.

Before setting the tank or its foundation, bed the tubing in 6 inches of sand, with 3 inches of sand below and 3 inches above the tubing. Set the tubing so that both ends are together and extend up to near the top edge of the tank. The rest of the tubing should loop back and forth under the tank so as to get the best coverage (see sketch below). Compact the sand carefully so as not to damage the tubing.

Set the tank or its foundation on top of the compacted sand and secure the ends of the tubing near the top edge of the tank so that a condenser can later be connected to it. Leave the soldered caps in place on the ends of the tubing until they are removed by the technician who installs the condenser.



10. Installation & Field Assembly

Installation is normally done by a certified on-site sewage system installer and is not included in Lifewater's pricing. Installation includes setting the unit in place, running the sewer pipe from the house to the unit, running the outlet pipe from the unit to the point of discharge, and providing electrical power to the unit. A homeowner who is familiar with applicable building codes and normally does his/her own wiring and plumbing can in most cases install a system (if this is allowed in your jurisdiction).

ExtremeSTPs are shop assembled as much as possible, but depending on how and where they will be shipped some field assembly may be required. For below ground units, some field assembly is always required. When the units are being installed at a location close to a distributor, such as near Fairbanks, Anchorage, or Kenai, Alaska, field assembly of *ExtremeSTP* components is typically included in the sales price. Please ask about this when ordering a system.

11. Handling *ExtremeSTPs*

XSTP models (above ground fiberglass tanks) should be picked up using only one of the following means:

- a forklift with extended forks,
- a boom and two fabric straps,
- a fabric sling designed for the purpose.

Cables, chains, or other methods that could damage the fiberglass should never be used.

USTP models (underground steel tanks) typically have a lifting ring or rings welded onto the top. These steel tanks should be picked from above by means of the lifting rings.

Above Ground Model (XSTP) Specifications

(U.S. Patent 6,482,322; Canadian Patent 2,318,710)

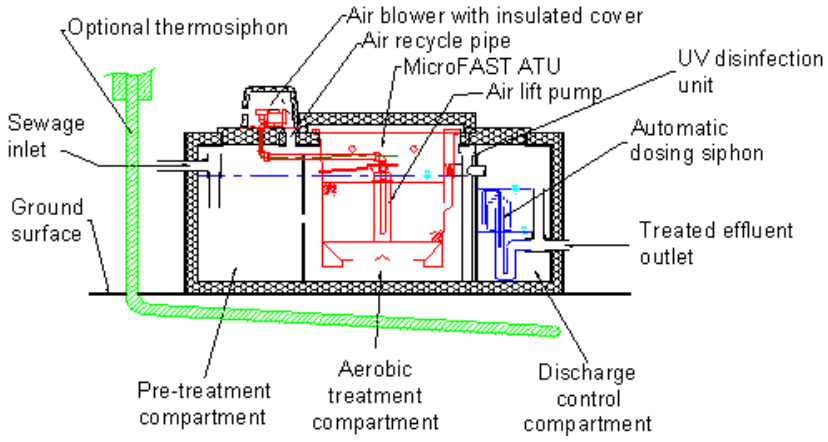
XSTP150 - XSTP500 - XSTP750 - XSTP900

A solution addressing the classic problems of ground impermeability and thaw instability associated with permafrost...

ExtremeSTP models XSTP150, XSTP500, XSTP750, and XSTP900 sewage treatment plants are built to operate above ground in an arctic environment without need of a building or other enclosure. Larger above ground models can be ordered for specific projects.

XSTP models are assembled inside a super-insulated, 3-compartment tank. The tank is made of foam insulation sandwiched between fiberglass on the inside and outside. The first compartment pre-treats the sewage by retaining floating and settling solids. In the second or "aerobic treatment compartment," a Bio-Microbics FAST® (fixed activated sludge treatment) insert aerobically (with oxygen) treats the wastewater and a UV (ultraviolet) light disinfects the effluent.

The third compartment provides effluent flow control. Treated effluent is retained in this compartment until the water rises to a predetermined level, then an automatic dosing siphon (that has no moving parts) allows the water to discharge out of the system at about 30 gpm (gallons per minute) for about one minute. Even at -60ºF, when warm water is discharged at this rate and quantity, it does not freeze at the point of discharge but rather flows away from the system before soaking into the natural vegetative mat, into the ground, or freezing on top of the ground. Thus ice buildup at the point of discharge is minimized or eliminated.



ExtremeSTP Model XSTP150 Specifications

The Model XSTP150 is a residential sewage treatment plant for 1 to 3-bedroom homes on a hauled water system (low-water-use homes). It treats up to 150 gallons of domestic sewage per day from 1 to 5 people.

Key Features:

- Sized to be air-transportable to remote northern communities (9'L x 4'W x 4'8"H not including the blower cover on top of the tank)
- Utilizes a RetroFAST0.25® aerobic sewage treatment unit
- UV disinfection is standard
- Typically wired for 120V but can be wired for 220V
- Draws about 130W of electrical power when operating
- An optional timer can reduce operating time to about 1 out of every 3 hours during the warmer months, cutting electrical usage by nearly 2/3
- Can be fabricated so that the inlet sewer line comes in on the end, left side, or right side of the tank
- Optional data logger and remote monitoring system available
- Optional thermosyphon available to help keep the permafrost frozen underneath the system

ExtremeSTP Model XSTP500 Specifications

The Model XSTP500 is a residential sewage treatment plant for 1 to 3-bedroom homes on a well or piped water system (regular-water-use homes). It treats up to 500 gallons of domestic sewage per day from 1 to 8 people.

Key Features:

- Sized to be air-transportable to remote northern communities (8'6"L x 5'9"W x 6'H not including the blower housing that gets mounted on top of the tank during field assembly)
- Utilizes an MCF0.5 FAST® aerobic sewage treatment unit
- UV disinfection is standard
- Typically wired for 120V but can be wired for 220V
- Draws less than 350W of electrical power when operating
- A timer (standard equipment) can reduce operating time to about 1 out of every 3 hours during the warmer months, cutting electrical usage by nearly 2/3
- Optional data logger and remote monitoring system available
- Optional thermosyphon available to help keep the permafrost frozen underneath the system

ExtremeSTP Model XSTP750 Specifications

The Model XSTP750 is a residential sewage treatment plant for 1 to 5-bedroom homes on a well or piped water system (regular-water-use homes). It treats up to 750 gallons of domestic sewage per day from 1 to 11 people.

Key Features:

- Sized for transportation to remote northern communities (13'9"L x 5'3"W x 6'H not including the blower housing that gets mounted on top of the tank during field assembly)
- Utilizes an MCF0.75 FAST® aerobic sewage treatment unit
- UV disinfection is standard
- Typically wired for 120V but can be wired for 220V
- Draws about 350W of electrical power when operating
- A timer (standard equipment) can reduce operating time to about 1 out of every 3 hours during the warmer months, cutting electrical usage by nearly 2/3
- Optional data logger and remote monitoring system available
- Optional thermosyphon available to help keep the permafrost frozen underneath the system

ExtremeSTP Model XSTP900 Specifications

The Model XSTP900 is a residential sewage treatment plant for 1 to 6-bedroom homes on a well or piped water system (regular-water-use homes). It treats up to 900 gallons of domestic sewage per day from 1 to 14 people.

Key Features:

- Sized for transportation to remote northern communities (13'9"L x 5'3"W x 6'H not including the blower housing that gets mounted on top of the tank during field assembly)
- Utilizes an MCF0.9 FAST® aerobic sewage treatment unit
- UV disinfection is standard
- Typically wired for 120V but can be wired for 220V
- Draws about 350W of electrical power when operating
- A timer (standard) can reduce operating time to about 1 out of every 3 hours during the warmer months, cutting electrical usage by nearly 2/3
- Optional data logger and remote monitoring system available
- Optional thermosyphon available to help keep the permafrost frozen underneath the system

Below Ground Model (USTP) Specifications

(U.S. Patent 6,482,322; Canadian Patent 2,318,710)

USTP500 - USTP750 - USTP900 - USTP1500 - USTP3000

A solution addressing the classic problems of ground impermeability, high water table, and other poor soil conditions...

ExtremeSTP models USTP500, USTP750, USTP900, USTP1500, and USTP3000 sewage treatment plants are built to operate below ground in a cold environment without need of a building or other enclosure. Larger below ground models can be ordered for specific projects.

These systems are typically insulated with two inches of Dow Blueboard rigid foam insulation attached to the outside of the tank to help retain heat and maintain bacterial activity in all compartments.

Up to and including the Model USTP1500, the underground systems are manufactured in a single, multi-compartment tank. The first compartment pre-treats the sewage by retaining floating and settling solids. Some USTPs have an intermediate treatment compartment with a Zabel filter (typically Model 1800A) to provide some additional solids removal before the sewage enters the third compartment.

In the second or "aerobic treatment compartment," a Bio-Microbics FAST® (fixed activated sludge treatment) insert aerobically (with oxygen) treats the wastewater. For those sites where disinfection is needed, an optional UV (ultra-violet) light or chlorination system disinfects the wastewater.

If needed, a third compartment provides effluent flow control. Treated effluent is retained in this compartment until there is a sufficient quantity to trigger discharge. Depending on site requirements, discharge can be controlled by either an automatic dosing siphon or an effluent pump. In the case of a siphon, the water rises to a predetermined level, then an automatic dosing siphon (with no moving parts) allows the water to discharge out of the system at about 30 gpm (gallons per minute) for about one minute. Even at -60ºF, when warm water is discharged at this rate and quantity it does not freeze at the point of discharge. Instead, water flows away from the system before soaking into the natural vegetative mat, into the ground, or freezing on top of the ground. In any case, ice buildup at the point of discharge is minimized or eliminated.

ExtremeSTP Model USTP500 Specifications

The USTP500 is a residential sewage treatment plant for a 1 to 3-bedroom home on a well or piped water system (regular-water-use home). It is rated for up to 500 gallons of domestic sewage per day from 1 to 8 people.

Key Features:

- Dimensions are 12'8"L x 5'2"W x 6'3"H (not including the riser pipes, blower, etc. that get mounted on top during field assembly)
- Consists of one multi-compartment steel tank with 4-inch risers for sludge and septage removal, 6-inch risers for the Zabel filter (standard equipment) and UV system (optional), and a large-diameter riser on which the blower mounts
- Utilizes an MCF0.5 FAST® aerobic sewage treatment unit
- Typically wired for 120V but can be ordered for 220V
- Draws less than 350W of electrical power when operating
- Depending on usage, operating time can be reduced by using the timer (standard equipment) to about 1 out of every 2 hours during the warmer months, cutting electrical consumption by nearly one half
- Options include: UV disinfection, automatic dosing siphon, effluent pump system, heat tape, additional insulation, and skid mounting for transport or seasonal use

USTP *ExtremeSTP* Model USTP750 Specifications

The USTP750 is a residential sewage treatment plant for a 1 to 5-bedroom home on a well or piped water system (regular-water-use home). It is rated for up to 750 gallons of domestic sewage per day from 1 to 11 people.

Key Features:

- Dimensions are 12'8"L x 7'2"W x 6'3"H (not including the riser pipes, blower, etc. that get mounted on top during field assembly)
- Consists of one multi-compartment steel tank with 4-inch risers for sludge and septage removal, 6-inch risers for the Zabel filter (standard equipment) and UV system (optional), and a large-diameter riser on which the blower mounts
- Utilizes an MCF0.75 FAST® aerobic sewage treatment unit
- Typically wired for 120V but can be ordered for 220V
- Draws less than 350W of electrical power when operating
- Depending on usage, operating time can be reduced by using the timer (standard equipment) to about 1 out of every 2 hours during the warmer months, cutting electrical consumption by nearly one half
- Options include: UV disinfection, automatic dosing siphon, effluent pump system, heat tape, additional insulation, and skid mounting for transport or seasonal use

ExtremeSTP Model USTP900 Specifications

The USTP900 is a residential sewage treatment plant for a 1 to 6-bedroom home on a well or piped water system (regular-water-use home). It is rated for up to 900 gallons of domestic sewage per day from 1 to 14 people.

Key Features:

- Dimensions are 12'8"L x 7'2"W x 6'3"H (not including the riser pipes, blower, etc. that get mounted on top during field assembly)
- Consists of one multi-compartment steel tank with 4-inch risers for sludge and septage removal, 6-inch risers for the Zabel filter (standard equipment) and UV system (optional), and a large-diameter riser on which the blower mounts
- Utilizes an MCF0.9 FAST® aerobic sewage treatment unit
- Typically wired for 120V but can be ordered for 220V
- Draws less than 350W of electrical power when operating
- Depending on usage, operating time can be reduced by using the timer (standard equipment) to about 1 out of every 2 hours during the warmer months, cutting electrical consumption by nearly one half
- Options include: UV disinfection, automatic dosing siphon, effluent pump system, heat tape, additional insulation, and skid mounting for transport or seasonal use

Photo shows a USTP900UVD being delivered to a remote fishing lodge

ExtremeSTP Model USTP1500 Specifications

The USTP1500 is a commercial sewage treatment plant for up to 10 bedrooms. It is rated for up to 1500 gallons of domestic sewage per day from 6 to 21 people. These units are typically selected based on engineering calculations of the expected hydraulic and organic loadings.

Key Features:

- Dimensions are 14'L x 7'2"W x 6'3"H
- Weighs about 5,000 lbs, depending on options
- Consists of one multi-compartment steel tank with 4-inch risers for sludge and septage removal, 6-inch risers for the Zabel filter (standard equipment) and UV system (optional), and a large-diameter riser on which the blower mounts
- Utilizes an MCF1.5 FAST® standard strength or an HSF1.5 high strength FAST® aerobic sewage treatment unit (depending on the application)
- Options include: UV disinfection, chlorine disinfection, automatic dosing siphon, effluent pump system, heat tape, additional insulation, and skid mounting for transport or seasonal use
- Typically wired for 120V but can be ordered for 220V
- Draws about than 600W of electrical power when operating
- Depending on usage, operating time can be reduced by using the timer (standard equipment) to about 1 out of every 2 hours during the warmer months, cutting electrical consumption by nearly one half

Photo shows a USTP1500CLP being delivered at a commercial installation

ExtremeSTP Model USTP3000 Specifications

The USTP3000 is a commercial sewage treatment plant rated for up to 3000 gallons of domestic sewage per day from 10 to 42 people. These units are typically selected based on engineering calculations of the expected hydraulic and organic loadings.

Key Features:

- Approximate dimensions are 14'L x 7'2"W x 8'5"H
- Consists of one multi-compartment steel tank with 4-inch risers for sludge and septage removal, 6-inch risers for the Zabel filter (standard equipment) and UV system (optional), and a large-diameter riser on which the blower mounts
- Utilizes an MCF3.0 FAST® standard strength or an HSF3.0 high strength FAST® aerobic sewage treatment unit (depending on the application)
- Typically wired for 230V single phase, but can be ordered for 208-230/460V three phase
- Draws about 2,000W of electrical power when operating
- Depending on usage, operating time can be reduced by using the timer (standard equipment) to about 1 out of every 2 hours during the warmer months, cutting electrical consumption by nearly one half
- Options include: UV disinfection, chlorine disinfection, automatic dosing siphon, effluent pump system, heat tape, additional insulation, and skid mounting for transport or seasonal use

Photo shows a USTP300AT (aerobic treatment compartment only)

ExtremeSTP OWNER'S RESPONSIBILITIES

1. Read and comply with the *ExtremeSTP* Operation & Maintenance Manual. (also see details on safety precautions for some of these items)

2. The OWNER must, at least daily, verify that the blower is operating properly and air is bubbling into the system. This is especially important after a power outage. The sound of air bubbling inside the treatment plant (much like the sound of a Jacuzzi®) is an indication that the blower is working properly.

3. The OWNER must also look for visual alarms, listen for audible alarms, and must take appropriate action if any of the following alarms or conditions occurs:
   - The red light on the Bio-Microbics control panel begins flashing and/or the audible alarm sounds.
   - The UV lamp beacon illuminates and/or the alarm sounds (if so equipped).
   - The high water alarm illuminates and/or sounds (if so equipped).
   - Anything out of the ordinary is noticed about the unit.

4. If the *ExtremeSTP* is covered under a MAINTENANCE INSPECTION AGREEMENT the OWNER must notify Lifewater Engineering Company, or its designated representative, immediately if any one or more of the above conditions occur. If the unit is not covered under a MAINTENANCE INSPECTION AGREEMENT, the OWNER must take immediate appropriate action if any one or more of the above conditions occur.

5. *ExtremeSTP* sewage treatment plants are designed to operate at temperatures as cold as -60°F, providing there is no interruption of electric power. If the electric power to the *ExtremeSTP* is off for any period of time during freezing conditions, it is the OWNER'S responsibility to take immediate appropriate action. Such action must include monitoring the temperatures inside the system and taking whatever action is necessary to prevent freezing of any part of the system. This may include providing power to the unit by means of an auxiliary generator or otherwise protecting the unit from freezing.

6. The OWNER must recognize that soils move, especially permafrost soils, and that it is the OWNER'S responsibility to check and periodically adjust foundations and supports for the *ExtremeSTP*, its inlet and outlet piping, and its electrical service.

7. Clean the UV bulb, fresh air filter, and recycle air filter (if present) every 3 to 4 months. Replace the UV bulb every 1 to 2 years or when indicated by the UV alarm system, whichever comes first. Clean the inside of the blower housing and the blower rotor every 3 to 4 months using a cleanser designed to remove grease.

8. Hire an approved sludge/septage pumping company to pump scum and sludge from the unit (particularly the pretreatment and aerobic treatment compartments) and properly dispose of it every two years, or otherwise as needed.

9. Never dispose of fats, oils, or greases down household drains. β

10. Garbage disposals should be used only sparingly. Never use a garbage disposal to dispose of coffee grounds, meat, bones, or other food products that are difficult to biodegrade. A good rule is, if the waste is such that you can scoop it out of the sink with your hands and place it in the trash, do so. β

11. Never use products that are designed to chemically remove hair, greases, or other obstructions from drains. Such obstructions should be removed by physical means such as using a wire with the end bent into a small hook to remove hair, using a plumber's snake to clean pipes, disassembling drains to remove objects that have fallen into or accumulated in the drain, etc. *

12. Always use cleaning agents and disinfectants sparingly in accordance with the manufacturer's directions. Never dispose of household cleaning fluids or unused antibiotics down the drain. * β

13. Never dispose of automotive fluids such as gas, oil, transmission or brake fluid, greases, or antifreeze down any drains. Do not connect a garage floor drain to an *ExtremeSTP* unless there is an oil/water separator between the floor drain and the sewer. * β

14. Do not dispose of or rinse any containers from pesticides, herbicides or other potentially toxic substances down any drain. Do not dispose of unused antibiotics down the drain. Antibiotics are especially designed to kill microbes, and they will also kill the microbes that are working for you in your sewage system. * β

15. Do not put any non-biodegradable substances or objects, such as cigarette butts, disposable diapers, plastics, rubber items, or feminine products (particularly tampons or feminine napkins) down any toilet or drain. These items should be placed directly into a solid waste container for disposal. β

16. Eliminate wastage of water. Fix leaking toilets, sinks, or other fixtures immediately.

17. Try to run full loads in your washing machine and dishwasher. Spread laundry washing out through the week. For example, do not run six loads on Saturday and none on the other days. Γ

18. Do not use chemicals to "start up" or "clean" your system. These are unnecessary and may actually harm the system, the discharge area, surface water or groundwater.

19. Do not connect any "clear water" source such as a gutter, stormwater drain, or footing/foundation sump pump to the sewage system.

20. If you sell your house, please inform the new owners of their responsibilities by providing them with this and all other OWNER'S documents relating to the sewage treatment system.

ENDNOTES

* Think of the *ExtremeSTP* as though it were a pet. You don't feed your pet poison so don't feed your sewage treatment system poisonous substances either!

β It makes more sense to dispose of these items before they get into the water rather than "flush them away" and then pay to remove them from the water or from a plugged drain or pipe.

γ Think of the *ExtremeSTP* as though it were a pet. Pets like to eat everyday not just once or twice per week.

By my signature I acknowledge receiving this document, and having read it I understand and will fulfill my responsibilities.

_____	_____	_____
Signature of Owner	Printed Name	Date

ExtremeSTP Limited Warranty

Secondary to any warranty that may be provided by Bio-Microbics® Incorporated (see the Bio-Microbics® Incorporated website www.biomicrobics.com or their Owner's Manual), Lifewater Engineering Company (Lifewater) provides the following limited warranty.

Lifewater provides a limited warranty for its *ExtremeSTP* sewage treatment plants against defects in materials and workmanship for a period of 24 months for residential installations and 12 months for all other systems from date of shipment, subject to the following terms and conditions.

ExtremeSTP sewage treatment plants are designed to operate at temperatures as cold as -60°F providing there is no interruption of electric power. If the electric power to the *ExtremeSTP* is off for any period of time during freezing conditions, it is the OWNER'S responsibility to take immediate appropriate action. Such action must include monitoring temperatures inside the system and taking whatever steps are necessary to prevent freezing of any part of the system. This may include providing power to the unit by means of an auxiliary generator or otherwise protecting the unit from freezing.

During the warranty period, if any part is defective or fails to perform as specified when operating at design conditions, and if the equipment has been installed and is being operated and maintained in accordance with the *ExtremeSTP* OWNER'S RESPONSIBILITIES and the *ExtremeSTP* OPERATION AND MAINTENANCE MANUAL as well as all other written instructions provided by Lifewater including the Bio-Microbics® Incorporated Owner's Manual, Lifewater will repair or replace at its discretion such defective parts free of charge. Defective parts must be returned to Lifewater postage paid by the OWNER. The cost of labor and all other expenses resulting from replacement of the defective parts and from installation of parts furnished under this warranty as well as regular maintenance items, such as filters or bulbs, shall be borne by the owner.

This warranty does not cover any components that have been damaged by flooding, freezing, or any components that have been disassembled by unauthorized persons, improperly installed or damaged due to altered or improper wiring or surge protection. This warranty applies only to the treatment plant and does not include any house wiring, plumbing, drainage, or other related or unrelated items. This warranty does not apply to the foundation or supports of the *ExtremeSTP*, its inlet or outlet piping, or electrical service. This warranty does not apply to damage to the *ExtremeSTP* caused by shifting of the system, whether the shifting is due to foundation or support failure or occurs while re-leveling the system after ground or foundation movement.

Since treatment performance depends on many factors including initial selection of the proper treatment system, the user's habits, proper operation and maintenance, etc., this warranty does not cover treatment performance.

Lifewater reserves the right to revise, change or modify the construction and/or design of its *ExtremeSTP*s, or any component part or parts thereof, without incurring any obligation to make such changes or modifications in present equipment. Lifewater is not responsible for consequential or incidental damages of any nature resulting from such things as, but not limited to, defects in design, material, or workmanship; delays in delivery, replacements, or repairs; damage to any structure, component, or ground surface related to ground thawing or freezing.

THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESSED WARRANTIES. ANY WARRANTY IMPLIED BY LAW, INCLUDING WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS IN EFFECT ONLY FOR THE WARRANTY PERIOD SPECIFIED ABOVE. NO REPRESENTATIVE OR PERSON IS AUTHORIZED TO GIVE ANY OTHER WARRANTY OR TO ASSUME FOR LIFEWATER ANY OTHER LIABILITY IN CONNECTION WITH THE SALE OF ITS PRODUCTS.

LIFEWATER
ENGINEERING COMPANY

P.O. Box 10750, Fairbanks, AK 99710-0750
www.lifewaterengineering.com

Ph: (907) 458-7024
Fx: (907) 458-7025

ExtremeSTP (FAST® System) Test Results for Systems in Alaska

(Updated October 2004)

Harris XSTP500UVP recreational, with disinfection

6/22/04	Influent	Effluent
BOD_5 (mg/L)	NM	20.5
TSS (mg/L)	NM	3.6
Fecal Coliform (# per 100 ml)	NM	52

Alan USTP500UVD residential, with disinfection

4/21/04	Influent	Effluent
BOD_5 (mg/L)	NM	24.2
TSS (mg/L)	NM	17.8
Fecal Coliform (# per 100 ml)	NM	≤1

30,000 gpd hotel & restaurant, with disinfection

5/27/03 (seasonal startup)	Influent	Effluent
BOD_5 (mg/L)	235	42
TSS (mg/L)	130	40
Fecal Coliform (# per 100 ml)	NM	≤10

6/30/03	Influent	Effluent
BOD_5 (mg/L)	390	24
TSS (mg/L)	57	22
Fecal Coliform (# per 100 ml)	NM	≤10

7/29/03	Influent	Effluent
BOD_5 (mg/L)	348	27
TSS (mg/L)	180	9.6
Fecal Coliform (# per 100 ml)	NM	≤4

8/26/03	Influent	Effluent
BOD_5 (mg/L)	247	15
TSS (mg/L)	42	8.8
Fecal Coliform (# per 100 ml)	NM	2

Zibrat USTP500UVD residential, with disinfection

7/15/02	Influent	Effluent
BOD_5 (mg/L)	NM	17.6
TSS (mg/L)	NM	102
Fecal Coliform (# per 100 ml)	NM	93

Hopkins XSTP500UVD residential, with disinfection

1/9/01	Influent	Effluent
BOD_5 (mg/L)	NM	13
TSS (mg/L)	NM	10
Fecal Coliform (# per 100 ml)	NM	<2

8/7/02	Influent	Effluent
BOD_5 (mg/L)	NM	46
TSS (mg/L)	NM	31
Fecal Coliform (# per 100 ml)	NM	1,000

Bryant XSTP500D residential, no disinfection

12/21/99	Influent	Effluent
BOD_5 (mg/L)	500	21
TSS (mg/L)	32	11
Fecal Coliform (# per 100 ml)	NM	NM

1/18/00	Influent	Effluent
BOD_5 (mg/L)	520	34
TSS (mg/L)	180	25
Fecal Coliform (# per 100 ml)	NM	32,000
Nitrite(mg/L)	<MRL	2.23
Nitrate (mg/L)	<MRL	44.7
Ammonia (mg/L)	39	6
TKN (mg/L)	66	13
Total Phosphate (mg/L)	35.4	23.2

8/8/02	Influent	Effluent
BOD_5 (mg/L)	NM	<MDL of 6.0
TSS (mg/L)	NM	<MDL of 0.89
Fecal Coliform (# per 100 ml)	NM	5,500

Johnson XSTP500D residential, no disinfection

11/30/99	Influent	Effluent
BOD_5 (mg/L)	96	21
TSS (mg/L)	75	44
Fecal Coliform (# per 100 ml)	NM	NM

12/21/99	Influent	Effluent
BOD_5 (mg/L)	290	67
TSS (mg/L)	180	28
Fecal Coliform (# per 100 ml)		

2/23/00	Influent	Effluent
BOD_5 (mg/L)	86	13
TSS (mg/L)	34	9.2
Fecal Coliform (# per 100 ml)	NM	5,700
Nitrite(mg/L)	<MRL	4.18
Nitrate (mg/L)	<MRL	<MRL
Ammonia (mg/L)	13	8
TKN (mg/L)	20	13
Total Phosphate (mg/L)	6.65	5.10
8/1/02	Influent	Effluent
BOD_5 (mg/L)	NM	25
TSS (mg/L)	NM	83
Fecal Coliform (# per 100 ml)	NM	600

8/8/02	Influent	Effluent
BOD_5 (mg/L)	NM	36
TSS (mg/L)	NM	89
Fecal Coliform (# per 100 ml)	NM	3,000

NM = not measured

Interesting Projects – Galena, Alaska

The City of Galena, Alaska is located in flat, alluvial, permafrost terrain along the Yukon River. They ordered three residential *ExtremeSTPs* a few years ago, and after trying those out they ordered 30 more. Each of these 30 systems has a remote monitoring option in which an antenna mounts to a wooden post on top of the tank. Flat loop evaporators are being installed under each tank and thermosyphon condensers will be added later if needed.

Galena previously tried a piped sewage system but it froze so they wanted a different approach to a community sewage system. They are using a threefold approach that includes septic systems, *ExtremeSTPs*, and holding tanks. Since septic systems have the lowest capital and operating costs, they are used wherever possible. Typically, this is at sites adjacent to "dry lake beds" in old oxbows of the Yukon River.

If a septic system is not appropriate the next system of choice is an *ExtremeSTP* made by Lifewater Engineering Company, Fairbanks, Alaska. ***ExtremeSTPs*** are aerobic sewage treatment plants designed specifically for permafrost areas. They consist of a super-insulated, multi-compartment tank with an aerobic fixed activated sludge treatment insert, UV disinfection, and effluent dosing to prevent freezing in the effluent line or ice buildup at the point of discharge. Typically they discharge directly onto the ground surface, preferably in areas of undisturbed, natural, vegetative mat.

For sites where neither of the above systems will work, insulated sewage holding tanks are used. The contents of these tanks are transferred to the city sewage lagoon by vacuum truck.

The capital costs of ***ExtremeSTPs*** are greater than those of septic systems but operating and maintenance costs are less than those of holding tanks. Overall, the project includes 22 septic systems, 61 *ExtremeSTPs*, and 10 holding tanks.

ExtremeSTP Model XSTP500UVD for the City of Galena

Interesting Projects – Fairbanks, Alaska

(Driven Trail)

An XSTP150UVD is installed at a home near Fairbanks, Alaska. A thermosyphon is installed underneath the sewage treatment plant to keep the ground frozen. This system has a right-hand inlet (meaning that the inlet line enters from the right side instead of the end). The inlet line is 10 feet long and the outlet is 80 feet long. The discharge is onto undisturbed vegetation in a black spruce forest. This home has a hauled water system (tan colored tank closest to the house in the lower right photo).

Interesting Projects – Two Rivers, Alaska

An XSTP150UVD is used on permafrost at a beautiful log home in Two Rivers, Alaska. The discharge goes to the ground surface in an area of natural, undisturbed, vegetative mat in a black spruce forest. A section of log is used as a splash plate to prevent erosion and the effluent soaks into the vegetative mat immediately. Even two feet from the point of discharge there is no sign of the effluent.

Interesting Projects – Kantishna, Alaska

A skid-mounted USTP500UVD is used at Kantishna Air Taxi's office/lodge in Denali National Park. Because this facility is only open seasonally, a less insulated underground model could be used. Skid-mounting was required because the system had to be slid down a steep hill in order to get it into place next to the building.

This whole facility is solar powered, including the sewage treatment plant. A generator system provides backup and supplemental power if needed.

Interesting Projects – Lake Iliamna, Alaska

A USTP900UVD is used at Blueberry Island Fishing Lodge near Lake Iliamna, Alaska. This remote lodge is located on the Kvichak River two miles downstream from the nearest village (Igiugik). Since there is no heavy equipment on the island, the owner had to dig the excavation for the system by hand. The delivery was completed by floating the system down the river. A trailer was left strapped beneath the tank to provide ballast for the float and wheels to get it out of the river. Two river boats pushed while three 4-wheelers pulled it up the planks onto the island. Discharge goes to a shallow bed leach field that is 18 inches above the seasonal high groundwater table.

Interesting Projects – Teller, Alaska

An XSTP750UVD is installed at a Head Start School in Teller, Alaska. This system has a standard inlet and a right hand outlet (meaning that the outlet line exits the tank on the right side rather than the end). Teller is located on a spit (shown in the distance in the lower right photo). The Alaska Department of Environmental Conservation wanted an aerobic treatment plant with disinfection here to help protect the shallow groundwater aquifer.

Interesting Projects – North Pole, Alaska

(North Star Rentals)

A USTP3000AT was installed at an apartment building between an existing septic tank and leach field. This system consists of a single-compartment tank with a Bio-Microbics MCF3.0 sewage treatment insert. The owner wanted to install this system to prolong the life of the leach field because there was no more room on the lot to replace or expand the existing leach field.

Interesting Projects – North Pole, Alaska

(Ball)

A USTP500UVP is installed at a home in North Pole, Alaska. In this case the homeowner could have used a septic tank and mound but wanted a higher level of treatment before discharge. Disinfected effluent goes to a mounded shallow bed leach field.

Interesting Projects – Big Lake, Alaska

An XSTP500UVP was used at a recreational home built on a peninsula at Big Lake. The farthest the discharge could be located from the lake was 60 feet. Treated effluent goes to the ground surface and soaks into the natural vegetative mat immediately. There is no sign of the effluent.