OPERATION & MAINTENANCE MANUAL

For Trained and Certified Service Providers of SepticNET™
Residential Wastewater Treatment Systems

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IMPORTANT INFORMATION

The Operation & Maintenance procedures described in this document must be conducted ONLY by certified **SepticNET™** service providers. Any attempt to maintain the system by the homeowner or other un-certified personnel will result in voiding the warranty and notification to the Montana Department of Environmental Quality (MDEQ).

While conducting any work on the **SepticNET™** system, follow all warnings and safety instructions outlined in this document and posted on individual pieces of equipment. Failure to comply with warnings and safety instructions may lead to severe injury or death.

The following general safety procedures MUST be followed for ALL Operation & Maintenance procedures conducted on the **SepticNET™** system:

- **SepticNET™** treatment vaults, pump chambers, and septic tanks are confined spaces as defined by OSHA regulations. Never enter any of these components without following the confined space entry procedures described in this manual.
- The main electrical circuit breaker to the **SepticNET™** system MUST be turned off and locked out before servicing any electrical component of the system. Failure to do so may result in severe injury or death.
- Open tanks represent a serious hazard that could result in severe injury or death. Never leave an open tank unattended.
- Personal protection equipment (PPE) such as nitrile or latex gloves and safety glasses must be worn at all times while inside the treatment vault. The biological organisms found in domestic wastewater can cause severe illness and death.
- **ALL** OSHA regulations will be followed by installers and service personnel.
- Measures must be taken to eliminate vehicle traffic above any part of the **SepticNET™** system, including the drainfield.
- Use of the **SepticNET™** system for purposes other than domestic wastewater treatment will result in voiding of the warranty.

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INTRODUCTION

The Septic Nutrient Elimination Technology **(SepticNET™)** is an innovative, modular septic treatment system designed for use with new home construction or as an upgrade to existing on-site septic systems. Based on pilot-scale testing and full-scale test model operation, the **SepticNET™** out-performs existing systems **by more than 300%.**

The **SepticNET™** modular wastewater treatment system is designed to remove nutrients, primarily nitrogen, from on-site septic systems. The heart of the **SepticNET™** is an Aerobic Treatment Unit (ATU) nitrification reactor, featuring an up-flow/up-flow aerated, packed-column, fixed-film bioreactor which converts ammonia to nitrate through a process called nitrification. Ammonia is the primary form of nitrogen leaving a standard septic tank. In a conventional system, ammonia is converted to nitrate beneath the leaching field, and no further treatment occurs under many geologic conditions. The nitrification step, often overlooked by other technologies, is the limiting step in total nitrogen removal.

The innovative design of the nitrification reactor allows for the complete conversion of ammonia to nitrate without clogging from biomass production. This is a critical improvement over existing technologies. Wastewater and air enter the column from the bottom and pass through a bed of commercially available plastic bio-filter growth media. Agitation from the air keeps the bio-film healthy and prevents clogging. The air/water mixture exits through the same port, which prevents clogging, and enters an initial clarifier. The hydraulic retention time (HRT) needed for complete conversion of ammonia to nitrate ranges from 0.5 to 4 hours, depending on the filter media, the airflow, and the influent ammonia concentration.

In the next step of the **SepticNET™** process, the nitrate-rich water produced in the aerated bio-filter flows through a primary clarifier. The innovative clarifier design allows for solids generated in the

nitrification process to be pumped back to the septic tank, which prevents clogging in the bioreactor, thus minimizing maintenance of the system.

The next step in the **SepticNET™** process is a packed column, fixed film bio-reactor used for de-nitrification. The de-nitrification process requires an environment without oxygen and a source of organic carbon. Since all of the existing organic carbon is removed in the nitrification process, an external source of carbon is needed for complete de-nitrification. A patent-pending carbon-based bio-film carrier is used for the de-nitrification process. This carrier is insoluble in water and slightly buoyant, thus creating optimum conditions for de-nitrification and at the same time minimizing plugging and channeling of the wastewater.

The final step in the **SepticNET™** process is a final settling tank used to reduce total suspended solids (TSS) in the final effluent. The innovative clarifier design allows for solids generated in the nitrification process to be pumped back to the septic tank, which prevents clogging in the bioreactor, thus minimizing maintenance of the system. The resulting total nitrogen (TN) levels in the **SepticNET™** system effluent are well below drinking water standards (10 mg/L). Following the final settling tank, the wastewater is sent to the drain field.

The **SepticNET™** also has the capability to remove phosphorus, a significant nutrient issue in surface water bodies. Phosphorus is removed by biologic methods to about 50% of the influent concentrations. If further reduction is required, a phosphorus removal media can be placed in the final settling tank and will remove phosphorus below surface water trigger levels. The flexibility of the **SepticNET™** system is also demonstrated by the ability to add additional modules to facilitate the removal of numerous contaminants as required by regulatory agencies.

Nitrogen Cycle

Nitrogen is present in many forms in a septic system. Most nitrogen excreted by humans is in the form of organic nitrogen (dead cell material, proteins, and amino acids) and urea. After entering the septic tank, microorganisms convert organic nitrogen to ammonia. Ammonia is the primary form of nitrogen leaving a standard septic system. Biological conversion of ammonia to nitrogen gas is a two-step process. Ammonia must first be oxidized to nitrate; nitrate is then reduced to nitrogen gas. These two reactions require significantly different environments and occur in separate reactors of the **SepticNET™** system.

In the presence of oxygen, bacteria will convert ammonia to nitrate. In a conventional septic system, most ammonia is converted to nitrate beneath the drainfield, where no further treatment occurs. As a result, nitrate is the primary contaminant of concern from on-site septic systems. As urban sprawl and rural development continues, domestic wells and surface water bodies are increasingly being impacted by nitrate from septic system effluent.

Nitrate in drinking water can have serious human health effects. Nitrogen, in its various forms, and phosphorus can have deleterious effects on the environment. Excess nitrogen in surface water bodies stimulates the process known as eutrophication. For this reason, many alternative technologies have been designed to remove total nitrogen from wastewater. These technologies use bacteria to convert ammonia and nitrate to gaseous nitrogen. Nitrogen gas is inert and may be released to the atmosphere.

The first step in the **SepticNET™** process, conversion of ammonia to nitrite and then to nitrate, is called nitrification. It is important to note that nitrification requires and consumes oxygen. The process is mediated by the bacteria *Nitrosomonas* and *Nitrobacter*, which require an aerobic environment for growth and metabolism of nitrogen. Most existing systems use inefficient trickling filters or have little active aeration. In comparison, the **SepticNET™** system uses a linear air pump and submerged air diffusers to provide a consistent air flow to a packed-bed, fixed-film bio-reactor, thus achieving complete (99.7%) nitrification. Existing systems only accomplish 70% to 90% nitrification.

The second step of the process, the conversion of nitrate to nitrogen gas, is referred to as de-nitrification. This process is also mediated by bacteria. For de-nitrification to occur, the dissolved oxygen level must be at or near zero. The bacteria also require a carbon food source for energy and conversion of nitrogen. The bacteria metabolize the carbonaceous material or biological oxygen demand (BOD) in the wastewater as this food source, metabolizing it to carbon dioxide. This in turn reduces the BOD of the sewage, which is desirable. However, if the sewage is already low in BOD, as is the case in the nitrification/de-nitrification process, the carbon food source will be insufficient for bacterial growth and de-nitrification will not proceed efficiently. To overcome this problem, the **SepticNET™** system incorporates an external source of organic carbon to achieve up to 98% nitrate removal compared to 50% to 80% removal for the currently available systems.

SepticNET™ PROCESS & SYSTEM CONFIGURATION

The full-scale, patent-pending **SepticNET™** system design is based on tested bench-scale and pilot-scale models, with some modifications. The full-scale system is available in a below-ground configuration, but multiple other configurations are possible. The **SepticNET™** system is suitable for retrofitting of existing systems or as part of new construction projects. The below-ground system is housed in a watertight treatment vault.

Depending on the climate, heating elements for the system may also be incorporated. Only the service provider/system installer will have access to the **SepticNET™** system treatment vault. Additional components, including solar and/or other renewable resource devices may be incorporated depending on the results of feasibility testing, the environment, and customer-use patterns. Also, because the system is modular, the ability exists to address other compounds in the wastewater stream (such as PPCPs) by changing or adding specific resins or media to the columns in the final clarifier. The following sections describe the major components of the **SepticNET™** system in detail.

Pump Chamber

The pump chamber consists of a 500 gallon, below-ground tank that is connected to the treatment vault. The pump chamber will be placed downstream of the septic tank and fed by gravity flow. In the **SepticNET™** system, the pump chamber includes an airlift pump, which will provide an adequate supply of wastewater to the Flow Equalization Module, and a pressure transducer depth sensor, which will provide information to the control panel for efficient operation. The pump chamber is represented in Figure 1 and Figure 2 of Appendix A of this document. A detailed schematic of the air-lift is represented in Figure 3 of Appendix A.

Treatment Vault

A water-tight, underground vault constructed of molded plastic, fiberglass, or concrete houses the individual components of the **SepticNET™** system. Housing the components inside of a vault instead of directly burial allows for more precise control of the processes and for easier maintenance of the system. The following components are housed in the reactor vault: flow equalization module; nitrification reactor; initial settling tank; de-nitrification reactor; final clarifier; control panel; solids return pump; and an optional drain field dose pump. The Reactor Vault is represented in Figure 1 and Figure 2 in Appendix A of this document.

Flow Equalization Module

Wastewater flows by gravity from the air lift to the flow equalization module which is located inside the treatment vault. The flow equalization module consists of a precision stainless steel orifice, which controls and stabilizes the flow, and an in-line magnetic drive pump, which prevents solids and biomass from plugging the orifice. The pump is controlled by the control panel and programmed to ensure orifices plugging is eliminated. Wastewater leaving the flow equalization module enters the Nitrification Reactor. The Flow Equalization Module is represented in Figure 4 in Appendix A of this document.

Nitrification Reactor

The nitrification reactor consists of a cone-bottomed polyethylene reactor filled with buoyant, plastic bio-support media and fine and course bubble air diffusers. A linear piston compressor provides the air to the aerators which efficiently oxygenate the water and create conditions needed for nitrification. A key component of the nitrification reactor is an internal settling baffle, which allows for rapid settlement of any solids and converting the flow from down-flow to up-flow. The innovative design of the reactor promotes a healthy and efficient bio-film which converts over 99% of the incoming ammonia to nitrate. The nitrification reactor is fitted with a timed solenoid valve to allow accumulated solids to enter the solids return pump for transport back to the septic tank. The nitrate-rich and bio-mass laden water exits from near the top of the reactor and gravity flows into the initial settling tank. The Nitrification Reactor is represented in Figure 5 in Appendix A of this document.

Initial Settling Tank

The initial settling tank consists of a cone-bottomed polyethylene reactor. A key component of the nitrification reactor is an internal settling baffle, which allows for rapid settlement of any solids and converting the flow from down-flow to up-flow. The innovative design of the internal components of this tank allows for easy solids settling and recirculation to the septic tank, which prevents downstream components from plugging with bio-solids. A timed solenoid valve located at the bottom of the tank is used to allow accumulated solids to enter the solids return pump for transport back to the septic tank. This tank also begins the de-oxygenation of the aerated water, thus preparing it for the de-nitrification reactor. Wastewater exits near the top of the tank and gravity flows into the de-nitrification reactor. The Initial Settling Tank is represented in Figure 6 in Appendix A of this document.

De-Nitrification Reactor

The de-nitrification reactor consists of a cone-bottomed polyethylene reactor filled with slightly buoyant, carbon-based, bio-support media. Nitrified water from the initial settling tank enters the reactor from the top and flows down through the innovative internal settling baffle and then continues up through the patent-pending, carbon-based bio-support media. The de-nitrification reactor is also fitted with a timed solenoid valve to allow accumulated solids to enter the solids return pump for transport back to the septic tank. Waste water exits near the top of the reactor and gravity flows into the final clarifier. The De-Nitrification Reactor is represented in Figure 7 in Appendix A of this document.

Final Settling Tank

The final settling tank consists of a cone-bottomed polyethylene reactor. A timed solenoid valve located at the bottom of the tank will be used to periodically drain the solid back to the septic tank. The water exiting the final clarifier will gravity flow to the drainfield or the optional drainfield dose pump, if required. The Final Settling Tank is represented in Figure 6 in Appendix A of this document.

Control Panel

A custom designed and built control panel is located in the Reactor Vault. The control panel includes a programmable logic controller (PLC) and numerous relays and switches to provide accurate control of all system electrical components. Information is transmitted to and from the PLC by means of a touch-screen viewer that includes a screen for overall system operation; a settings screen that allows for custom control of valve timings, vacation mode settings, and all other timed components; and an alarm screen that shows any alarm conditions and allows for alarm resetting. Also, the touch screen changes color to indicate system status. For example, a green screen background indicates normal system operation and a red screen background indicates an alarm condition.

The control panel also sends an alarm signal to a remote alarm located in either the system owner's house or attached garage. The remote alarm features both audible and visual components and is wired to a separate electrical circuit which allows for alarm operation even if power is interrupted to the treatment unit. Alarm conditions for the SepticNET™ system are high water level in the pump chamber; power outage to the control panel; high solids pump water level; and high level in the optional drainfield dose pump. Once an alarm condition is recognized by the control panel, the alarm will be displayed until the symptom is remedied and the alarm is reset at the control panel. A photo of the main touch screen is included as Figure 8 in Appendix A of this document.

Solids Return Pump

The solids return pump is a packaged pump and basin that pumps accumulated bio-solids back to the septic tank. During the nitrification/de-nitrification process, significant quantities of microorganisms are sloughed off and cause reactor plugging if not adequately managed.

Automated valves located at the bottom of each reactor open at specified times and send the accumulated bio-solids to the solids return pump, which then sends the mixture back to the septic tank where the solids can be further broken down. A conductive level sensor is installed in the pump basin. A high water level in the basin indicates pump failure thus triggering the alarm. Specifications for the solids return pump are included in Appendix B of this document.

Drain Field Dose Pump (optional)

If required by state or local regulations, the **SepticNET™** system can easily accommodate pressure dosing. A dosing tank and pump system can be specified for nearly any application and can easily be installed after the Final Settling Tank. This option will not alter the performance or maintenance of the system, but will slightly increase operating costs.

OPERATION & MAINTENANCE PROCEDURES

All maintenance procedures detailed below should only be performed by trained and certified **SepticNET ™** service providers. Any work performed on the system by unauthorized personnel, including the homeowner, will void the warranty. SepticNET, Inc. will also notify State regulators regarding the incident.

Treatment Vault

The **SepticNET™** treatment vault is a confined space and confined space entry procedures MUST be followed, including confined space training. SepticNET, Inc. confined space entry procedures are located in Appendix C of this document. All procedures outlined in Appendix C must be followed and documented. A confined Space Entry Permit must be completed by the installer, contractor, or service provider prior to conducting ANY work on the inside of the treatment vault.

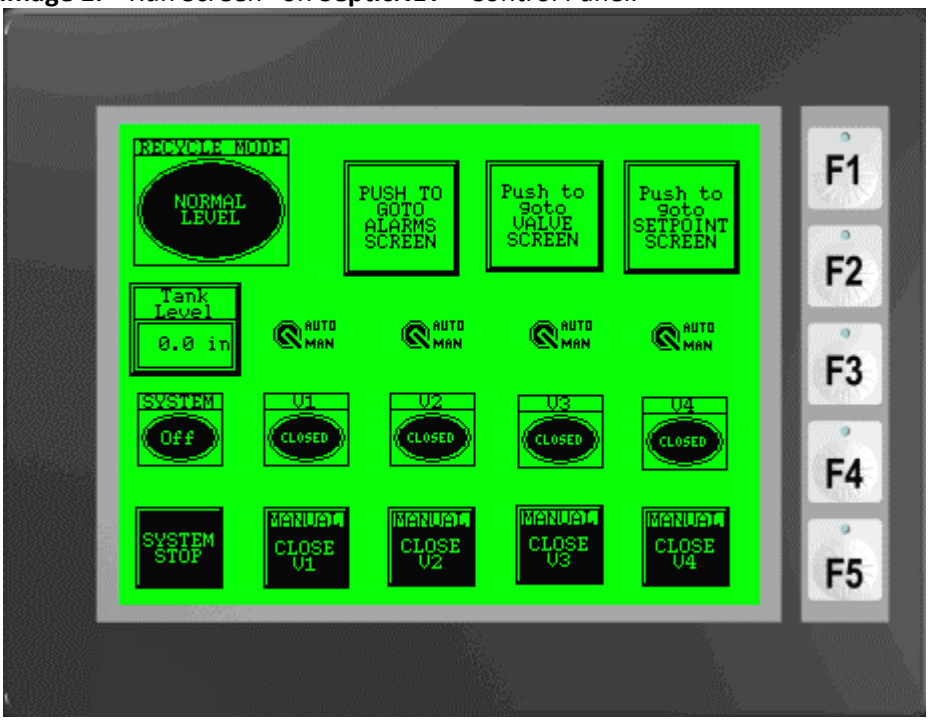
Control Panel (Operation Procedures)

The **SepticNET™** treatment system includes a custom designed and built control panel. The control panel is designed to precisely control key aspects of the process and to provide feedback to service and maintenance personnel as to the operation of the system. A color touch screen is the main system interface and is the ONLY part of the control panel to be operated or used by service and maintenance personnel. The touch screen has the following four (4) different interactive screens available for operation of the system: Run Screen; Alarm Screen; Valve Screen; and Set-Point Screen. Detailed descriptions and operations procedures for each screen are included in the following sections.

Run Screen

The “Run Screen”, pictured below, is the default screen displayed upon start-up of the **SepticNET™** system. The Run Screen provides general information about the status of the system, allows manual operation of the automated valves and provides an interface with the other screens available on the **SepticNET™** control panel. A description of each component (button) on the “Run Screen” follows.

Image 1. "Run Screen" on **SepticNET™** Control Panel.



"RECYCLE MODE" Button – Provides information on the general operation mode of the system based on the water level in the pump chamber. A green screen with the words "NORMAL LEVEL" darkened in the RECYCLE MODE button indicates the system is operating in normal mode. A yellow screen with the words "LOW WATER LEVEL" darkened in the RECYCLE MODE button indicates the system is operating in recycle or vacation mode. A red screen with an alarm message flashing above the RECYCLE MODE button indicates the system has detected alarm conditions from one of the sensors. Details of the system alarms are provided in the "Alarm Conditions" section on page 18 of this manual.

"Tank Level" Button – Shows the depth of water above the pressure transducer located in the pump chamber. The level in the pump chamber dictates if the system is operating in normal mode, recycle mode, or high water alarm.

"PUSH TO GO TO ALARMS SCREEN" Button – Provides an interface to the ALARMS SCREEN. Pressing this button takes you directly to the alarms screen. Details regarding the ALARMS SCREEN are provided in following sections.

"Push to go to VALVE SCREEN" Button – Provides an interface to the VALVE SCREEN where open and close times can be set for the automated valves located on each reactor vessel.

"Push to go to SETPOINT SCREEN" Button – Provides an interface to the SETPOINT SCREEN where settings can be made for the following: month, day, hour, and minute; flow equalization module blowout pump; de-nitrification

reactor circulation pump; high alarm level; vacation mode level; and the alarm delay.

"AUTO/MAN" Toggle Switches – provide either automatic or manual control of the automated valves located on each reactor vessel.

"SYSTEM" Button – Provides information on whether the system is on or off. The status is displayed in the darkened oval area inside this button.

"SYSTEM STOP" Button – Turns the system on or off. Pressing this button cuts power to the system components, but not the control panel.

"V1"Button – Displays the status of Valve 1, which is located on the nitrification reactor. The display will read either "OPEN" or "CLOSED".

"V2"Button – Displays the status of Valve 2, which is located on the initial settling reactor. The display will read either "OPEN" or "CLOSED".

"V3"Button – Displays the status of Valve 3, which is located on the de-nitrification reactor. The display will read either "OPEN" or "CLOSED".

"V4"Button – Displays the status of Valve 4, which is located on the final settling reactor. The display will read either "OPEN" or "CLOSED".

"MANUAL CLOSE V1" Button – Pressing this button closes and opens Valve 1. The status of the valve is displayed in the "V1" Button, which will read either "OPEN" or "CLOSED".

"MANUAL CLOSE V2" Button – Pressing this button closes and opens Valve 2. The status of the valve is displayed in the "V2" Button, which will read either "OPEN" or "CLOSED".

"MANUAL CLOSE V3" Button – Pressing this button closes and opens Valve 3. The status of the valve is displayed in the "V3" Button, which will read either "OPEN" or "CLOSED".

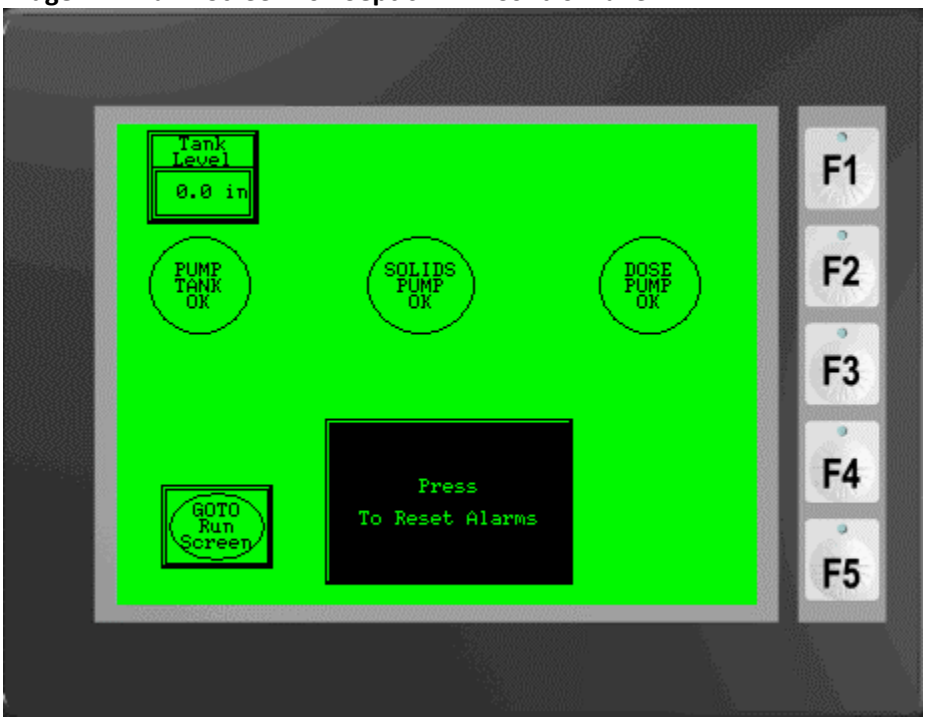
"MANUAL CLOSE V4" Button – Pressing this button closes and opens Valve 4. The status of the valve is displayed in the "V4" Button, which will read either "OPEN" or "CLOSED".

Alarm Screen

The "Alarm Screen", pictured below, provides information about the alarm condition of the system. Level sensors installed in the Pump chamber, Solids Return Pump, and optional Drainfield Dose Pump send signals to the control panel if the levels in any of these key components signify possible system failure. If alarm conditions are met, the control panel screens turn red. The "Alarm Screen" also shows which component(s) have caused the alarm condition and a means to re-set the alarm. Once the alarm has been triggered it can only be reset by the "Alarm Screen" even if the alarm condition

has been remedied automatically. This provides the service provider of a way to properly identify the actual alarm was and where to begin checking the system. A description of each button on the "Alarm Screen" follows.

Image 2. "Alarm Screen" on **SepticNET™** Control Panel.



"Tank Level" Button – Shows the depth of water above the pressure transducer located in the pump chamber. The level in the pump chamber dictates if the system is operating in normal mode, recycle mode, or high water alarm.

"PUMP TANK OK" Button – Shows the status of the alarm conditions in the pump chamber. If the water level exceeds the preset level, the alarm will be triggered, resulting in red screens on the control panel and the "PUMP TANK OK" button will have a black fill with white letters reading "HIGH WATER LEVEL".

"SOLIDS PUMP OK" Button – Shows the status of the alarm conditions in the solids return pump basin. If the water level exceeds the preset level, the alarm will be triggered, resulting in red screens on the control panel and the "SOLIDS PUMP OK" button will have a black fill with white letters reading "HIGH WATER LEVEL".

"DOSE PUMP OK" Button – Shows the status of the alarm conditions in the optional drainfield dose pump basin. If the water level exceeds the preset level, the alarm will be triggered, resulting in red screens on the control panel and the "SOLIDS PUMP OK" button will have a black fill with white letters reading "HIGH WATER LEVEL".

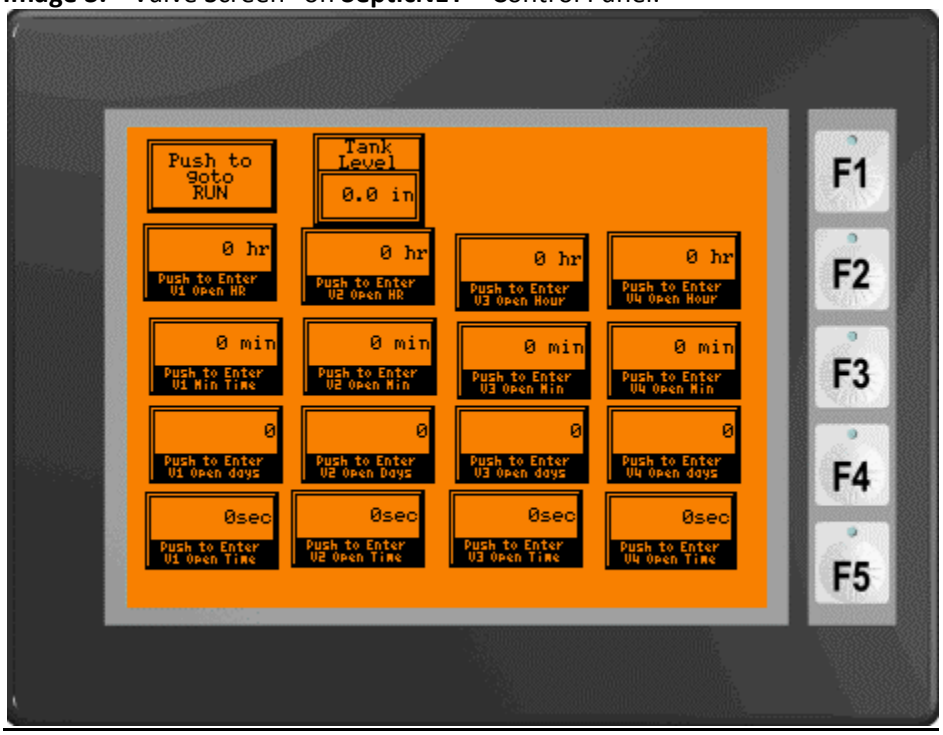
"Press to Reset Alarms" Button – Resets the alarm(s) once all alarm conditions are remedied. This button must be pushed to reset the system alarms. Fixing the alarm conditions alone will not reset the alarm(s).

"GOTO Run Screen" Button – Returns the display to the "Run Screen".

Valve Screen

The "Valve Screen", pictured below, provides programming capabilities for each individual actuated ball valve located under each reactor in the system. A description of each component (button) on the "Valve Screen" and recommended setting are discussed below.

Image 3. "Valve Screen" on **SepticNET™** Control Panel.



"Tank Level" Button – Shows the depth of water above the pressure transducer located in the pump chamber. The level in the pump chamber dictates if the system is operating in normal mode, recycle mode, or high water alarm.

"GOTO Run Screen" Button – Returns the display to the "Run Screen".

"Push to Enter V1 Open HR" Button – Sets the hour of day Valve 1 will open. Pressing this button activates a pop-up screen that allows the operator/service provider to set the hour that Valve 1 will open, based on a 24 hour clock. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 1 Open Hour is 1, which is the 1:00 a.m. hour.

"Push to Enter V1 Open Min" Button – Sets the minute of the hour of day Valve 1 will open. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 1 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 1 Open Min is 0, thus Valve 1 will open at 1:00 a.m.

"Push to Enter V1 Open Days" Button – Sets the number of days between valve opening events. Settings must be greater than 1. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 1 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 1 Open Days is 1, thus Valve 1 will open every day at 1:00 a.m.

"Push to Enter V1 Open Time" Button – Sets the duration that Valve 1 will be open each time. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 1 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 1 Open Time is 15, thus Valve 1 will open every day at 1:00 a.m. for 15 seconds.

"Push to Enter V2 Open HR" Button – Sets the hour of day Valve 2 will open. Pressing this button activates a pop-up screen that allows the operator/service provider to set the hour that Valve 2 will open, based on a 24 hour clock. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 2 Open Hour is 1, which is the 1:00 a.m. hour.

"Push to Enter V2 Open Min" Button – Sets the minute of the hour of day Valve 2 will open. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 2 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 2 Open Min is 10, thus V1 will open at 1:10 a.m.

"Push to Enter V2 Open Days" Button – Sets the number of days between valve opening events. Settings must be greater than 1. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 2 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 2 Open Days is 1, thus Valve 2 will open every day at 1:10 a.m.

"Push to Enter V2 Open Time" Button – Sets the duration that Valve 2 will be open each time. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 2 will open.

A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 2 Open Time is 20, thus Valve 2 will open every day at 1:10 a.m. for 20 seconds.

"Push to Enter V3 Open HR" Button – Sets the hour of day Valve 3 will open. Pressing this button activates a pop-up screen that allows the operator/service provider to set the hour that Valve 3 will open, based on a 24 hour clock. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 3 Open Hour is 1, which is the 1:00 a.m. hour.

"Push to Enter V3 Open Min" Button – Sets the minute of the hour of day Valve 3 will open. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 3 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 3 Open Min is 20, thus Valve 3 will open at 1:20 a.m.

"Push to Enter V3 Open Days" Button – Sets the number of days between valve opening events. Settings must be greater than 1. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 3 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 3 Open Days is 1, thus Valve 3 will open every day at 1:20 a.m.

"Push to Enter V3 Open Time" Button – Sets the duration that Valve 3 will be open each time. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 3 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 3 Open Time is 15, thus Valve 3 will open every day at 1:20 a.m. for 15 seconds.

"Push to Enter V4 Open HR" Button – Sets the hour of day Valve 4 will open. Pressing this button activates a pop-up screen that allows the operator/service provider to set the hour that Valve 4 will open, based on a 24 hour clock. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 4 Open Hour is 1, which is the 1:00 a.m. hour.

"Push to Enter V4 Open Min" Button – Sets the minute of the hour of day Valve 4 will open. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 4 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 4 Open Min is 30, thus Valve 1 will open at 1:30 a.m.

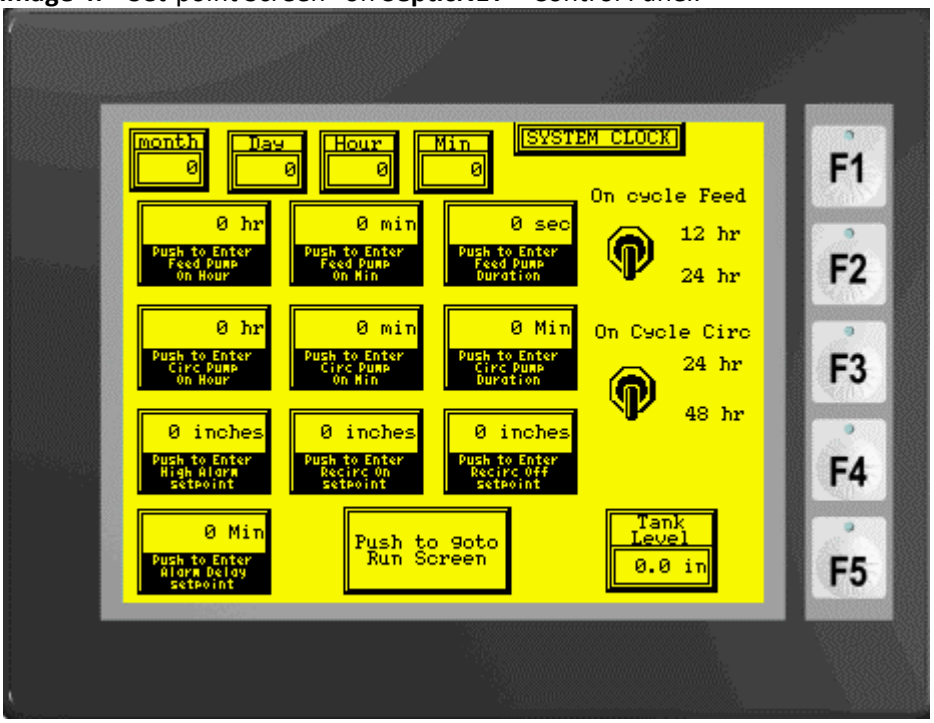
"Push to Enter V4 Open Days" Button – Sets the number of days between valve opening events. Settings must be greater than 1. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 4 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 4 Open Days is 7, thus Valve 4 will open every seventh day at 1:30 a.m.

"Push to Enter V4 Open Time" Button – Sets the duration that Valve 4 will be open each time. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute of the hour that Valve 4 will open. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for Valve 4 Open Time is 15, thus Valve 4 will open every seventh day at 1:30 a.m. for 15 seconds.

Set-point Screen

The "Set-point Screen", pictured below, provides programming capabilities for the Flow Equalization Module blow-out pump; the De-nitrification Reactor circulation pump; the Pump Tank high water level; the system recirculation level in the Pump chamber (vacation mode); and the alarm delay. Also, the system clock settings are displayed on this screen. A description of each component (button) on the "Set-point Screen" and recommended setting are discussed below.

Image 4. "Set-point Screen" on **SepticNET™** Control Panel.



"Tank Level" Button – Shows the depth of water above the pressure transducer located in the pump chamber. The level in the pump chamber dictates if the system is operating in normal mode, recycle mode, or high water alarm.

"Push to goto Run Screen" Button – Returns the display to the "Run Screen".

"SYSTEM CLOCK" Button – displays the month, day, hour and minute the system is currently operating on. This value can only be changed by computer interface with the control panel. The "SYSTEM CLOCK" will be set at the factory and can only be changed or modified with written approval of SepticNET, Inc.

"Push to Enter Feed Pump On Hour" Button – Sets the hour that the Flow Equalization Module blow-out pump will be turned on. Pressing this button activates a pop-up screen that allows the operator/service provider to set the hour that the Flow Equalization Module blow-out pump will be turned on. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for the Flow Equalization Module blow-out pump on hour is 2, thus the pump will turn on at the 2:00 a.m. hour.

"Push to Enter Feed Pump On Min" Button – Sets the minute that the Flow Equalization Module blow-out pump will be turned on. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute that the Flow Equalization Module blow-out pump will be turned on. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting

for the Flow Equalization Module blow-out pump on time minute is 30, thus the pump will turn on at 2:30 a.m.

"Push to Enter Feed Pump Duration" Button – Sets the duration, in seconds, that the Flow Equalization Module blow-out pump will be turned on. Pressing this button activates a pop-up screen that allows the operator/service provider to set the duration that the Flow Equalization Module blow-out pump will be turned on. A default duration will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for the Flow Equalization Module blow-out pump on time duration is 20, thus the pump will turn on at 2:30 a.m. and run for 20 seconds.

"On cycle Feed" Toggle – Provides the option for the Flow Equalization Module blow-out pump to turn on every 12 or 24 hours. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for the Flow Equalization Module blow-out pump toggle is 12 hr. thus the pump will turn on at 2:30 a.m. and run for 20 seconds every 12 hours (twice a day).

"Push to Enter Circ Pump On Hour" Button – Sets the hour that the De-nitrification Reactor circulation pump will be turned on. Pressing this button activates a pop-up screen that allows the operator/service provider to set the hour that the reactor circulation pump will be turned on. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for the De-nitrification Reactor circulation pump on time hour is 2, thus the pump will turn on at the 2:00 a.m. hour.

"Push to Enter Circ Pump On Min" Button – Sets the minute that the De-nitrification Reactor circulation pump will be turned on. Pressing this button activates a pop-up screen that allows the operator/service provider to set the minute that the reactor circulation pump will be turned on. A default time will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for the De-nitrification Reactor circulation pump on time minute is 30, thus the pump will turn on at 2:30 a.m.

"Push to Enter Circ Pump Duration" Button – Sets the duration, in minutes, that the De-nitrification Reactor circulation pump will be turned on. Pressing this button activates a pop-up screen that allows the operator/service provider to set the duration that the reactor circulation pump will be turned on. A default duration will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for the Flow Equalization Module blow-out pump on time duration is 10, thus the pump will turn on at 2:30 a.m. and run for 10 minutes.

"On Cycle Circ" Toggle – Provides the option for the De-nitrification Reactor circulation pump to turn on every 24 or 48 hours. A default time will be set at

the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for the De-nitrification Reactor circulation pump toggle is 24 hr. thus the pump will turn on at 2:30 a.m. and run for 10 minutes every 24 hours.

"Push to Enter High Alarm Setpoint" Button – Sets the maximum operating water level in the pump chamber. Any water level higher than this level will trigger a "High Pump Tank" alarm. A default high level will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for the "High Alarm Setpoint" for the pump chamber is 48 inches.

"Push to Enter Recirc On Setpoint" Button – Sets the water level in the pump chamber at which the system goes into "Vacation" or recirculation mode. As the water level in the pump chamber goes down, either during daily periods of low use or when the residents are not at home, the system will automatically switch to recirculation mode. Recycle mode will be accomplished by opening Valve 4 on the final settling tank when the water level in the pump chamber reaches a specified level, thus pumping treated water to the septic tank instead of to the drainfield. As the water level rises again, the system will be switched back to normal mode of operation. A default "recirculation on" water level will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for the "Recirc On Setpoint" for the pump chamber is 24 inches.

"Push to Enter Recirc Off Setpoint" Button – Sets the water level in the pump chamber at which the system goes out of "Vacation" mode or recirculation mode. As the water level in the pump chamber rises, either during daily periods of high use or when the residents are regularly at home, the system will automatically switch out of recirculation mode. Recycle mode will be discontinued by closing Valve 4 on the final settling tank when the water level in the pump chamber reaches a specified level, thus pumping treated water to the drainfield. A default "recirculation off" water level will be set at the factory and should only be changed or reprogrammed with the written approval of SepticNET, Inc. The default setting for the "Recirc Off Setpoint" for the pump chamber is 28 inches.

"Push to Enter Alarm Delay Setpoint" Button – Sets the time between the first alarm condition and the act of sending the alarm to the control panel. Because alarm conditions are costly to both the homeowner and the service provider, un-necessary callout must be prevented. This function allows for a specified delay between the initial alarm condition and the actual sending an alarm to the control panel. For example, if the homeowner is using excessive amounts of water for a short period of time and the pump chamber level rises above the high water level setpoint for a few minutes and then returns to normal levels, an alarm will not be sent to the control panel, thus preventing a costly service call for an alarm condition that no longer exists. A default "Alarm Delay" will be set at the factory and should only be changed or reprogrammed with the

written approval of SepticNET, Inc. The default setting for the "Alarm Delay Setpoint" for the pump chamber is 6 hours.

Alarm Conditions

All SepticNET™ systems are equipped with multiple sensors at key points in the process. The sensors are designed to send critical information to the control panel, including conditions that warrant immediate service. The following details alarm conditions and the procedures to follow in the event of an alarm.

High Pump Tank

The "High Pump Tank" alarm will be triggered when the water level in the pump chamber exceeds the level set as the high level on the "Set Point Screen" on the control panel. The following are the most common causes and the remedy procedures for the "High Pump Tank" alarm:

1. A plugged orifice in the flow control module.
    a. Press the "SYSTEM STOP" button on the main screen.
    b. Unplug the blowout pump on the flow equalization module.
    c. Remove orifice and inspect for evidence of plugging. If plugged, clean or replace with a new orifice.
    d. Re-install orifice.
    e. Plug-in blowout pump.
    f. Restart the system.
    g. Ensure there is adequate flow by opening the sample port and checking the flow with the flow calibration kit.
    h. Reset alarm.
2. Malfunctioning compressor/inadequate air flow to the airlift.
    a. Inspect compressor to verify overall operation.
    b. Verify airflow to airlift is approximately 5 liter per minute (LPM).
    c. Replace compressor if not operating properly.
    d. Reset alarm.
3. Malfunctioning pump chamber level sensor.
    a. Verify the sensor is plugged in to the control panel.
    b. Remove the riser cover for the pump chamber.
    c. Remove the lid from the pump chamber.
    d. Verify the level the sensor is reporting is accurate by measuring the depth of the water in the tank.
    e. Replace sensor if it is not operating properly.
    f. Reset alarm.
4. Prolonged inflow rate exceeding the design flow.
    a. Inquire with homeowner about recent water usage.
    b. Reset alarm.

High Solids Pump

The "High Solids Pump" alarm will be triggered when the water level in the solids pump chamber contacts the level sensor in the vent piping of the pump system. Water at this

level indicates the solids pump is not in proper working order. The following are the most common causes and the remedy procedures for the "High Solids Pump" alarm:

1. Pump control float switch not working.
    a. Press the "SYSTEM STOP" button on the main screen.
    b. Unplug the pump unit.
    c. Remove pump basin cover.
    d. Test the float switch.
    e. Replace if float switch is not operating properly.
    f. Re-assemble unit and re-start system.
    g. Reset alarm.
2. Solids pump not working.
    a. Press the "SYSTEM STOP" button on the main screen.
    b. Unplug the pump unit.
    c. Disconnect all piping.
    d. Remove faulty pump unit and replace with a new one.
    e. Replace piping.
    f. Plug in the new unit and re-start system.
    g. Reset alarm.

High Drainfield Dose Pump (optional)

The optional "High Drainfield Dose Pump" alarm is only activated on systems requiring a pressure dose pumping system and will be triggered when the water level in the dose pump chamber contacts the level sensor in the in the top of the tank. Water at this level indicates the solids pump is not in proper working order. The following are the most common causes and the remedy procedures for the "High Dose Pump" alarm:

1. Pump control float switch not working.
    a. Press the "SYSTEM STOP" button on the main screen.
    b. Unplug the pump unit.
    c. Remove pump basin cover.
    d. Test the float switch.
    e. Replace if float switch is not operating properly.
    f. Re-assemble unit and re-start system.
    g. Reset alarm.
2. Solids pump not working.
    a. Press the "SYSTEM STOP" button on the main screen.
    b. Unplug the pump unit.
    c. Disconnect all piping.
    d. Remove faulty pump unit and replace with a new one.
    e. Replace piping.
    f. Plug in the new unit and re-start system.
    g. Reset alarm.

Automated Valves (Annual Maintenance Procedures)

At each maintenance visit, ensure ALL automated valves are opening and closing properly by completing the following steps:

1. Turn the system "OFF" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
2. Push the switch area above the V1 closed area to manual ("MAN").
3. Push the "CLOSE V1" button and check to see that the "V1" button changes to "OPEN".
4. Listen for the actuator on the valve to cycle the valve open and for water to drain from the specific tank.
5. Push the "CLOSE V1" button and check to see that the "V1" button changes to "CLOSED".
6. Listen for the actuator on the valve to cycle the valve closed and for water to stop draining from the specific tank.
7. Push the switch area above the V1 closed area to Automatic ("AUTO").
8. Repeat steps 2 through 7 for the remaining valves.
9. Turn the system "ON" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault (if all annual maintenance procedures are complete).
10. Fill out appropriate annual maintenance/service paperwork.

Reactor Exit Ports (Annual Maintenance Procedures)

At each maintenance visit, ensure ALL reactor exit ports are not plugged and operating properly by completing the following steps:

1. Turn the system "OFF" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
2. Open the inspection hatch on the reactor/settling tank.
3. Drain reactor/settling tank to a level below the exit port (see Automated Valve processes above).
4. Remove exit port screen and clean off any bio-film attached to the screen using clean water. Replace the screen with a new one if needed.
5. Re-install exit port screen.
6. Replace reactor/settling tank inspection hatch.
7. Repeat steps 1-6 for each reactor/settling tank.
8. Turn system "ON" by touching the "SYSTEM STOP" area of the touch screen located on the control panel inside of the treatment vault (if all annual maintenance procedures are complete).
9. Fill out appropriate annual maintenance/service paperwork.

De-Nitrification Reactor (Annual Maintenance Procedures)

At each maintenance visit, ensure the de-nitrification reactor and carbon bio-film carriers are operating properly by completing the following steps:

1. Turn the system "OFF" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
2. Open the inspection hatch on the de-nitrification reactor.
3. Drain reactor to a level just below the exit port (see Automated Valve processes above).
4. Remove rubber bio-film containment mat.

5. Inspect bio-film carriers for excessive bio-mat buildup.
6. If needed, agitate the bio-film carriers with the manual agitator by pushing the carriers on the top to the bottom. Repeat several times to ensure excessive bio-mat is broken up.
7. Every third (3rd) annual inspection, add approximately 0.67 cubic feet (5 gallons) of carbon bio-film carriers (if needed).
8. Inspect settling baffle for proper operation.
    a. Insert cleaning nozzle to the bottom of the baffle and let run for approximately 30 seconds.
    b. Remove the cleaning nozzle.
    c. Manually open the automated valve (V3).
    d. Visually ensure water level in the settling baffle changes in relation to the level in the reactor.
    e. Manually close the valve.
9. Inspect and clean the entrance and exit ports.
10. Replace rubber bio-film containment mat.
11. Turn system "ON" by touching the "SYSTEM STOP" area of the touch screen located on the control panel inside of the treatment vault (if all annual maintenance procedures are complete).
12. Fill out appropriate annual maintenance/service paperwork.

Nitrification Reactor (Annual Maintenance Procedures)

At each maintenance visit, ensure the nitrification reactor and plastic bio-film carriers are operating properly by completing the following steps:

1. Turn the system "OFF" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
2. Open the inspection hatch on the nitrification reactor.
3. Drain reactor to a level just below the exit port (see Automated Valve processes above).
4. Inspect bio-film carriers for wear and bio-film development.
5. Inspect settling baffle for proper operation.
    a. Insert cleaning nozzle to the bottom of the baffle and let run for approximately 30 seconds.
    b. Remove the cleaning nozzle.
    c. Manually open the automated valve (V3).
    d. Visually ensure water level in the settling baffle changes in relation to the level in the reactor.
    e. Manually close the valve.
6. Inspect and clean the entrance and exit ports.
7. Turn system "ON" by touching the "SYSTEM STOP" area of the touch screen located on the control panel inside of the treatment vault (if all annual maintenance procedures are complete).
8. Fill out appropriate annual maintenance/service paperwork.

Settling Tanks (Annual Maintenance Procedures)

At each maintenance visit, ensure the settling tanks are operating properly by completing the following steps:

1. Turn the system "OFF" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
2. Open the inspection hatch on the settling tank.
3. Drain settling tank to a level just below the exit port (see Automated Valve processes above).
4. Inspect settling baffle for proper operation.
    a. Insert cleaning nozzle to the bottom of the baffle and let run for approximately 30 seconds.
    b. Remove the cleaning nozzle.
    c. Manually open the automated valve (V3).
    d. Visually ensure water level in the settling baffle changes in relation to the level in the reactor.
    e. Manually close the valve.
5. Inspect and clean the entrance and exit ports.
6. Turn system "ON" by touching the "SYSTEM STOP" area of the touch screen located on the control panel inside of the treatment vault (if all annual maintenance procedures are complete).
7. Fill out appropriate annual maintenance/service paperwork.

Compressor (Annual Maintenance Procedures)

At each maintenance visit, ensure the compressor is operating properly by completing the following steps:

1. Physically feel and/or listen to confirm the compressor is operating.
2. Visually inspect the rotometer in the airline supplying air to the nitrification reactor; ensure the airflow is between 4 and 4.5 cubic feet per minute (cfm).
3. Visually inspect the rotometer in the airline supplying air to the airlift; ensure the airflow is between 4 and 6 liters per minute (lpm).
4. Replace/rebuild compressor if not working or every fifth (5^{th}) annual inspection using the following procedure.
    a. Turn the system "OFF" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
    b. Un-plug the compressor from the specified outlet.
    c. Loosen the hose clamp on the rubber connecting tube and the distribution manifold.
    d. Remove compressor.
    e. Replace old compressor with a new/rebuilt one.
    f. Connect rubber connecting tube to distribution manifold.
    g. Tighten the hose clamp on the rubber connecting tube and the distribution manifold.
    h. Plug the compressor into the specified outlet.

i. Turn the system "ON" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
j. Return "Old" compressor to SepticNET, Inc. for rebuilding.

5. Fill out appropriate annual maintenance/service paperwork.

Pumps (Annual Maintenance Procedures)

The **SepticNET™** system is equipped with three required pumps; a solids return pump, a de-nitrification reactor circulation pump, and a flow equalization module blowout pump. An optional drainfield dose pump may also be included in the system. Detailed annual maintenance and service procedures for each type of pump are described in the following sections.

Solids Return Pump

The solids return pump is a packaged basin/pump/float switch combination unit. Individual components will NOT be switched out in the field. Instead the entire unit will be replaced in the event of malfunction or normal wear. Faulty and/or worn out units will be rebuilt at the SepticNET, Inc. facility. The following outlines the annual maintenance and/or service procedure for the Solids Return Pump.

1. Manually open Valve 2 (initial settling tank) using the following procedure.
    a. Push the switch area above the V2 closed area to manual ("MAN").
    b. Push the "CLOSE V2" button and check to see that the "V2" button changes to "OPEN".
    c. Listen for the actuator on the valve to cycle the valve open and for water to drain from the specific tank.
2. Physically feel and/or listen to verify the operation of the pump unit.
3. Manually close Valve 2 using the following procedure.
    a. Push the "CLOSE V1" button and check to see that the "V1" button changes to "CLOSED".
    b. Listen for the actuator on the valve to cycle the valve closed and for water to stop draining from the specific tank.
    c. Push the switch area above the V1 closed area to Automatic ("AUTO").
4. Replace the pump unit if not working properly or on every fifth (5^{th}) annual maintenance inspection using the following process.
    a. Unplug the solids return pump unit (pump and float switch) from the specified plug on the control panel.
    b. Disconnect all plumbing from the unit including the inlet(s), outlet, and vent.
    c. Remove faulty/worn unit and replace with a new/rebuilt unit.
    d. Reconnect all plumbing to new unit.
    e. Plug pump and float switch back into control panel.
    f. Check for proper operation of the new unit by following Steps 1 through 3 above.
5. Fill out appropriate annual maintenance/service paperwork.

De-nitrification Reactor Circulation Pump

The De-nitrification Reactor Circulation Pump is an in-line magnetic drive pump designed to periodically agitate the carbon-based bio-film carriers in the de-nitrification reactor. The agitation helps keep the bio-film healthy and prevents excessive buildup and plugging resulting from unhealthy bio-films. Water is pumped from the bottom of the reactor through several nozzles located inside of the reactor. The force of the water exiting through the nozzles agitates the buoyant carbon bio-film carriers and removes dead or dying bio-mass from the carriers. The following outlines the annual maintenance and/or service procedure for the De-nitrification Reactor Circulation Pump.

1. Turn the system "OFF" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
2. Unplug the De-nitrification Reactor Circulation Pump from the specified plug on the control panel.
3. Disconnect tubing running from the pump to the reactor at the inlet to the reactor (near the top of the reactor) and place into a bucket.
4. Plug the pump into the auxiliary outlet on the control panel.
5. Ensure adequate flow from the pump to the reactor.
6. Blowout nozzles located inside the reactor by connecting an airline from the compressor to the inlet port on the reactor. Allow to blow out for approximately 30 seconds.
7. Remove airline and reconnect pump tubing if pump is operating properly.
8. To replace a faulty/worn pump follow the procedure below:
    a. Unplug the pump from the specified plug on the control panel.
    b. Close the manual ball valve located near the inlet port of the pump.
    c. Disconnect tubing from the exit port of the pump by loosening the hose clamp.
    d. Disconnect pump from the ball valve.
    e. Install new pump using the above steps in reverse order.
    f. Open the ball valve near the inlet port of the pump.
    g. Plug the pump into the auxiliary outlet on the control panel.
    h. Ensure adequate flow from the pump to the reactor.
    i. Reconnect pump tubing if pump is operating properly.
9. Turn the system "ON" by touching the "SYSTEM STOP" area of the touch screen located on the control panel inside of the treatment vault.
10. Fill out appropriate annual maintenance/service paperwork.

Flow Equalization Module Blowout Pump

The Flow Equalization Module Blowout Pump is an in-line magnetic drive pump designed to periodically blowout any solids deposited in the orifice of the flow control module. The force and velocity of the water pulsing through the orifice dislodges solids and any bio-films that may attach to the orifice opening. The following outlines the annual maintenance and/or service procedures for the Flow Equalization Module Blowout Pump.

1. Place the end of the hose/tubing located on the influent sample port into a bucket.
2. Open the valve on the influent sample port and note relative flow into the bucket.
3. Close the valve located on the inflow pipe into the nitrification reactor.
4. Unplug the Flow Equalization Module Blowout Pump from the specified plug on the control panel.
5. Plug the pump into the auxiliary outlet on the control panel.
6. Verify that there is a significant increase in flow into the bucket from the influent sample port.
7. Replace pump if faulty and/or worn or during every fifth (5^{th}) annual maintenance inspection using the following procedure.
    a. Turn the system "OFF" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
    b. Unplug the pump from the specified plug on the control panel.
    c. Close the manual ball valve located before the flow equalization module.
    d. Remove the pump from the pipe by disconnecting the unions before and after the pump.
    e. Re-plumb new pump using fittings from old pump.
    f. Re-connect pump to pipe using existing unions.
    g. Open the manual ball valve located before the flow equalization module.
    h. Turn the system "ON" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
    i. Plug the pump into the auxiliary outlet on the control panel.
    j. Verify that there is a significant increase in flow into the bucket from the influent sample port.
    k. Un-plug the pump from the auxiliary outlet on the control panel and plug back into specified plug on the control panel.
8. Un-plug the pump from the auxiliary outlet on the control panel and plug back into specified plug on the control panel.
9. Open the valve located on the inflow pipe into the nitrification reactor.
10. Close the valve on the influent sample port.
11. Fill out appropriate annual maintenance/service paperwork.

Drainfield Dose Pump (optional)

The optional Drainfield Dose Pump is a basin/pump/float switch combination unit that is needed only if a pressure dosed drainfield is required by regulations. Individual components, including pump and float switch, will be switched out in the field, if possible. Faulty and/or worn out pumps will be rebuilt at the SepticNET, Inc. facility. The following outlines the annual maintenance and/or service procedure for the Drainfield Dose Pump.

1. Turn the system "OFF" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
2. Disconnect inlet pipe at the union just above the pump basin.

3. Pour water into inlet pipe from an outside source such as hose or bucket.
4. Physically, by feeling and/or listening, verify the operation of the pump unit.
5. Replace the pump unit and/or float switch if not working properly or on every fifth (5th) annual maintenance inspection using the following process.
    a. Unplug the Drainfield Dose Pump unit (pump and float switch) from the specified plug on the control panel.
    b. Disconnect all plumbing from the unit including the inlet(s), outlet, and vent.
    c. Remove pump basin lid by removing bolts.
    d. Remove faulty/worn pump/float switch and replace with new/rebuilt components.
    e. Replace basin lid and tighten bolts.
    f. Reconnect all plumbing to new unit.
    g. Plug pump and float switch back into control panel.
    h. Check for proper operation of the new unit by following Steps 1 through 4 above.
6. Turn the system "ON" by touching the "SYSTEM STOP" button on the control panel touch screen located inside of the treatment vault.
7. Fill out appropriate annual maintenance/service paperwork.

Pump Chamber (Annual Maintenance Procedures)

At each maintenance visit, ensure the pump chamber components are operating properly by completing the following steps:

1. Remove riser cover on the pump chamber riser.
2. Remove pump chamber lid.
3. Visually inspect airlift to ensure proper operation.
4. Measure and record the depth to water from the uppermost rim of the pump chamber.
5. Determine the amount of solids present in the pump chamber by collecting a grab sample with the appropriate sampling device and allowing the sample to settle for ten (10) minutes.
6. Record the depth of solids in the sample container on the inspection sheet and return sample to the pump chamber.
7. Arrange for pumping of pump chamber on every third (3rd) annual visit.
8. Replace pump chamber lid.
9. Replace and secure pump chamber riser lid.
10. Fill out appropriate annual maintenance/service paperwork.

Septic Tank (Annual Maintenance Procedures)

At each maintenance visit, ensure the septic tank and its components are operating properly by completing the following steps:

1. Remove riser cover on the septic tank riser.
2. Remove septic tank lid.
3. Inspect the effluent filter and clean or replace if needed.

4. Measure and record the approximate thickness of the scum layer in the top portion of the septic tank.
5. Measure and record the approximate thickness of the solids layer in the bottom of the septic tank.
6. Arrange for septic tank pumping on every fifth (5^{th}) annual visit or if excessive scum layer or solids are encountered upon inspection (combined depth greater than 34 inches).
7. Replace septic tank lid.
8. Replace and secure septic tank riser lid.
9. Fill out appropriate annual maintenance/service paperwork.

Documentation (Annual Maintenance/Service Procedures)

At each annual maintenance visit and/or service call, ensure the appropriate documentation is completed properly. Samples of all necessary forms are provided in this document in Appendix B. Actual 3-part forms will be filled out by the service technician. The original will be retained by the service provider; Copy 1 will be sent to SepticNET, Inc.; and Copy 2 will be left with the homeowner. Records must be kept on file by the service provider for a minimum of five (5) years.

SAMPLING PROCEDURES

At each annual system maintenance event, samples will be collected from both the influent and effluent sample ports. An influent sampling port is located between the pump chamber and the nitrification reactor. The port is easily accessible to facilitate regularly scheduled sampling events. An effluent sampling port is located near the final clarifier discharge port. The sampling port is also easily accessible to facilitate sampling events.

The following analysis will be conducted on the influent samples:BOD_5; TSS; pH; temperature; specific conductance; alkalinity; TKN; ammonia-N; nitrate-N; nitrite-N; and fecal coliform. Effluent samples will be analyzed for the same constituents except the BOD_5 analysis will be replaced by the $CBOD_5$ analysis. The following sections detail the sampling procedure.

Influent

A grab sample from the influent sampling port will be collected using the following procedure. The grab sample will then be divided into the aliquots needed for the individual analyses. The steps are as follows:

1. Place the sample container under the influent sampling port on the **SepticNET™** system.
2. Open the sampling port valve.
3. Close the sample port valve when sample container contains enough sample to fill the laboratory provided sample bottles.
4. Gently agitate the grab sample bottle to ensure the sample is homogonous.
5. Fill the applicable individual sample bottles from the grab sample container.
6. Add sample preservative as required by laboratory protocol.
7. Label sample bottles with required information and place in a cooler with ice.
8. Fill out Chain of Custody form.

9. Deliver cooler with samples to the analytical laboratory and keep a copy of Chain of Custody form for records.

Effluent

A grab sample from the effluent sampling port will be collected using the following procedure. The grab sample will then be divided into the aliquots needed for the individual analyses. The steps are as follows:

1. Place the sample container under the effluent sampling port on the **SepticNET™** system.
2. Open the sampling port valve.
3. Close the sample port valve when sample container contains enough sample to fill the laboratory provided sample bottles.
4. Gently agitate the grab sample bottle to ensure the sample is homogonous.
5. Fill the applicable individual sample bottles from the grab sample container.
6. Add sample preservative as required by laboratory protocol.
7. Label sample bottles with required information and place in a cooler with ice.
8. Fill out chain of custody form.
9. Deliver cooler with samples to the analytical laboratory and keep a copy of chain of custody form for records.

CERTIFICATE OF GENERAL PRODUCT WARRANTY

Products Warranted
This Warranty applies to the following new SepticNET™ wastewater treatment unit components: treatment vault; reactor tanks; internal and external piping; control panel; and other components made specifically for SepticNET, Inc. (herein referred to as "product(s)".

Warranty Period
SepticNET, Inc. warrants new product(s) to be free from defect in material or manufacture for five (5) years after date of delivery to the first user. This Warranty is made to the original owner of the new product(s) and is transferable for the duration of the period of coverage to subsequent owners with prior written approval of SepticNET, Inc. (See Limitations)

Coverage
SepticNET, Inc. shall repair or, at SepticNET, Inc.'s option, replace any product(s) shown to be defective in material or manufacture. SepticNET, Inc. shall cover, to the extent it has established in its applicable service policy in effect at the time of delivery of the product(s), the cost reasonably necessary to install any repaired or replaced part provided under this Warranty. Travel to and from job site is not reimbursable. The remedies set forth in this paragraph are exclusive and correction by SepticNET, Inc.of product nonconformity in the manner provided above shall constitute fulfillment of all liabilities and obligations of SepticNET, Inc. to those entitled to the benefit of the Warranty.

Exclusions
This Warranty shall not apply to general maintenance items such as carbon bio-film carriers or to the following:

1. Defects or malfunctions resulting from units not installed, operated or maintained in accordance with the specifications and instructions provided by SepticNET, Inc., applicable local codes, ordinances or accepted trade practices.
2. Conditions beyond the control of SepticNET, Inc.
3. Units or any component of system repaired, modified or maintained without prior authorization from SepticNET, Inc.
4. Units or any component of system repaired, modified or maintained by any party other than a Certified SepticNET, Inc. Service Provider.
5. Electrical components, such as pumps, not specifically manufactured for SepticNET, Inc. that have their own warranty.

Limitations
SepticNET, Inc.'s obligation under this Warranty is expressly limited to the conditions as stated above and shall not include duty, taxes or any other charges whatsoever or any liability for direct, indirect, incidental or consequential damage or delay. SepticNET, Inc. MAKES NO OTHER WARRANTY, EXPRESSED OR IMPLIED, AND MAKES NO WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. No employee or representative is authorized to change this Warranty in any way or grant any other Warranty unless such change is made in writing and signed by an officer of SepticNET, Inc.

Obtaining Warranty Service

Purchaser shall assume all responsibility and expense for removal, reinstallation and freight for the product or any part or component of the product. Any item to be repaired or replaced under this warranty must be returned to SepticNET, Inc. at 480 East Park Street, Butte, MT 59701 or call 1-406-782-5220 to coordinate shipment) or such place to be designated by SepticNET, Inc. upon receipt of return authorization from SepticNET, Inc. Contact customer service at 1-406-782-5220 for a Return Materials Authorization (RMA) number on any product being returned for a warranty claim.

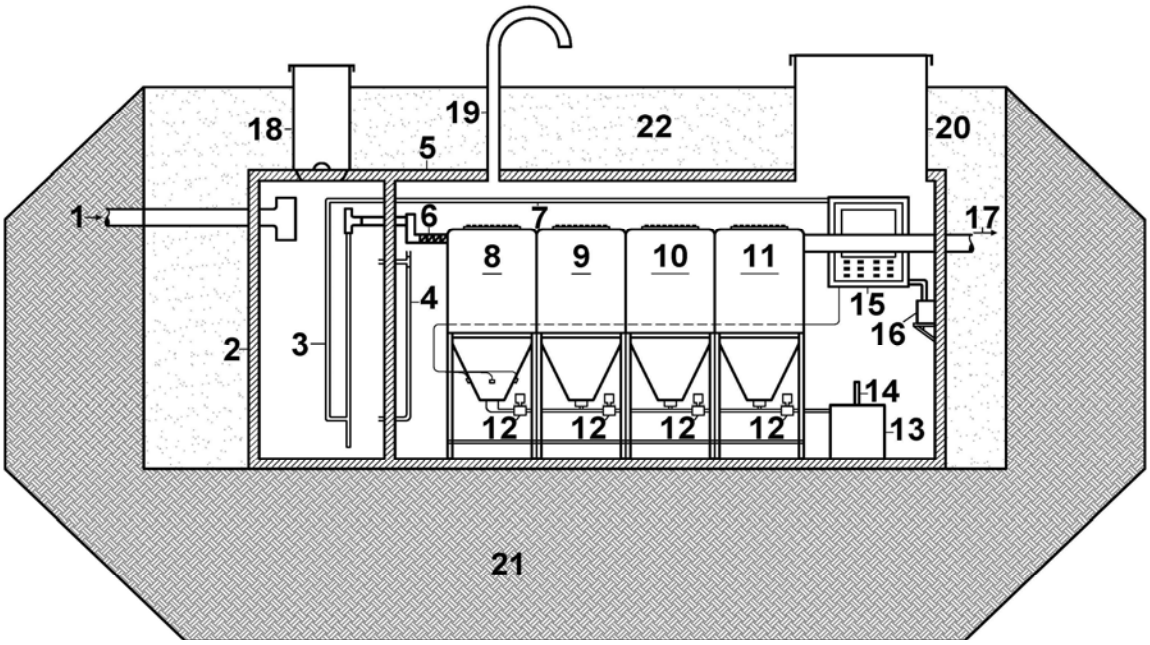
Applicable Law

This warranty shall be governed by and interpreted in accordance with the laws of the State of Montana applicable to contracts made and to be performed in Montana.

Appendix A

SepticNET™ System Design Figures

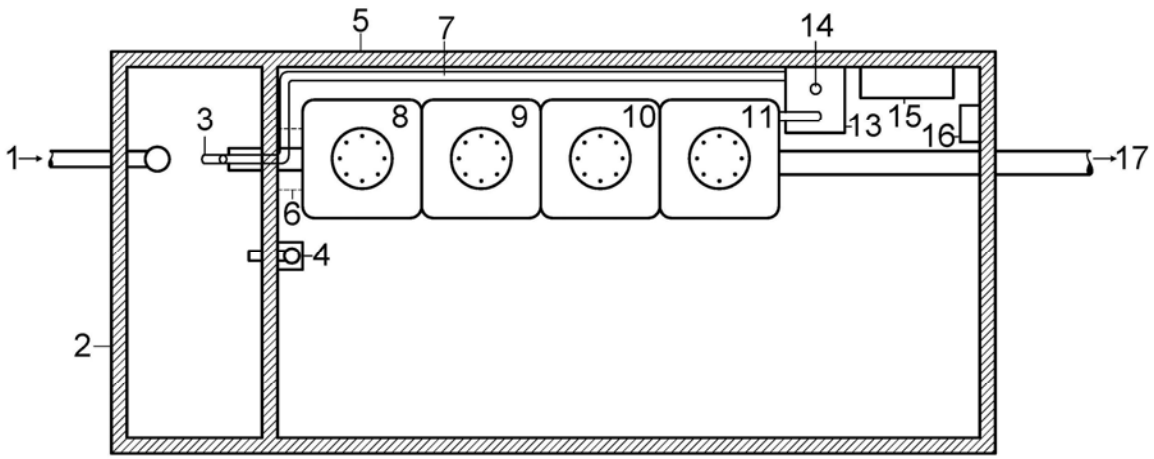
FIGURE 1 – SepticNET™ System Cross Sectional View



SepticNET™ System Cross Sectional View Descriptions

1	Effluent from Traditional Septic Tank (influent into treatment system).
2	Pump Chamber.
3	Air-lift Pump.
4	Pump Chamber Level Indicator.
5	Underground Treatment Vault.
6	Flow Equalization Module.
7	Air Inflow into Air-lift Pump.
8	Nitrification Reactor.
9	Settling Tank.
10	De-nitrification Reactor.
11	Settling Tank.
12	Automated Valves.
13	Solids Return Pump.
14	Solids Return to Septic Tank.
15	Control Panel.
16	Compressor/Air Pump.
17	Treated, De-nitrified Wastewater.
18	Pump Tank Riser and Access Way.
19	Air Intake Duct.
20	Treatment Vault Riser and Access Way.
21	Undisturbed Soil.
22	Compacted Soil Cover.

FIGURE 2 – SepticNET™ Top View



SepticNET™ Top View Descriptions

1	Effluent from Traditional Septic Tank (influent into treatment system).
2	Pump Chamber.
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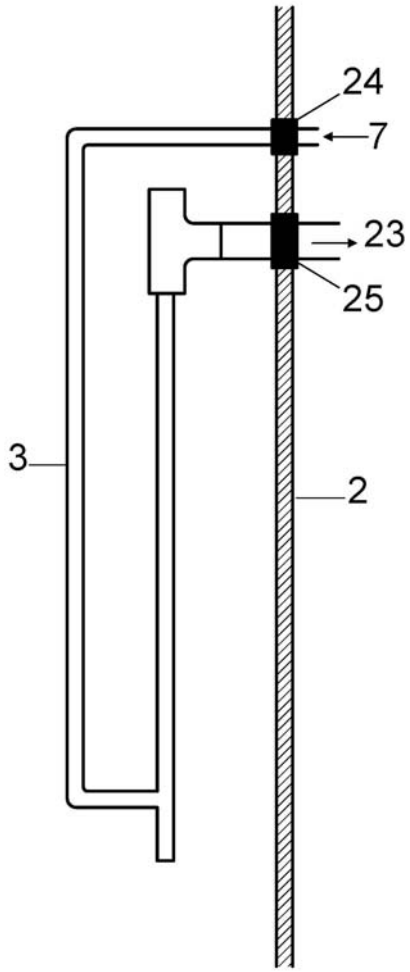
6	Flow Equalization Module.
7	Air Inflow into Air-lift Pump.
8	Nitrification Reactor.
9	Settling Tank.
10	De-nitrification Reactor.
11	Settling Tank.
13	Solids Return Pump.
14	Solids Return to Septic Tank.
15	Control Panel.
16	Compressor/Air Pump.
17	Treated, De-nitrified Wastewater.

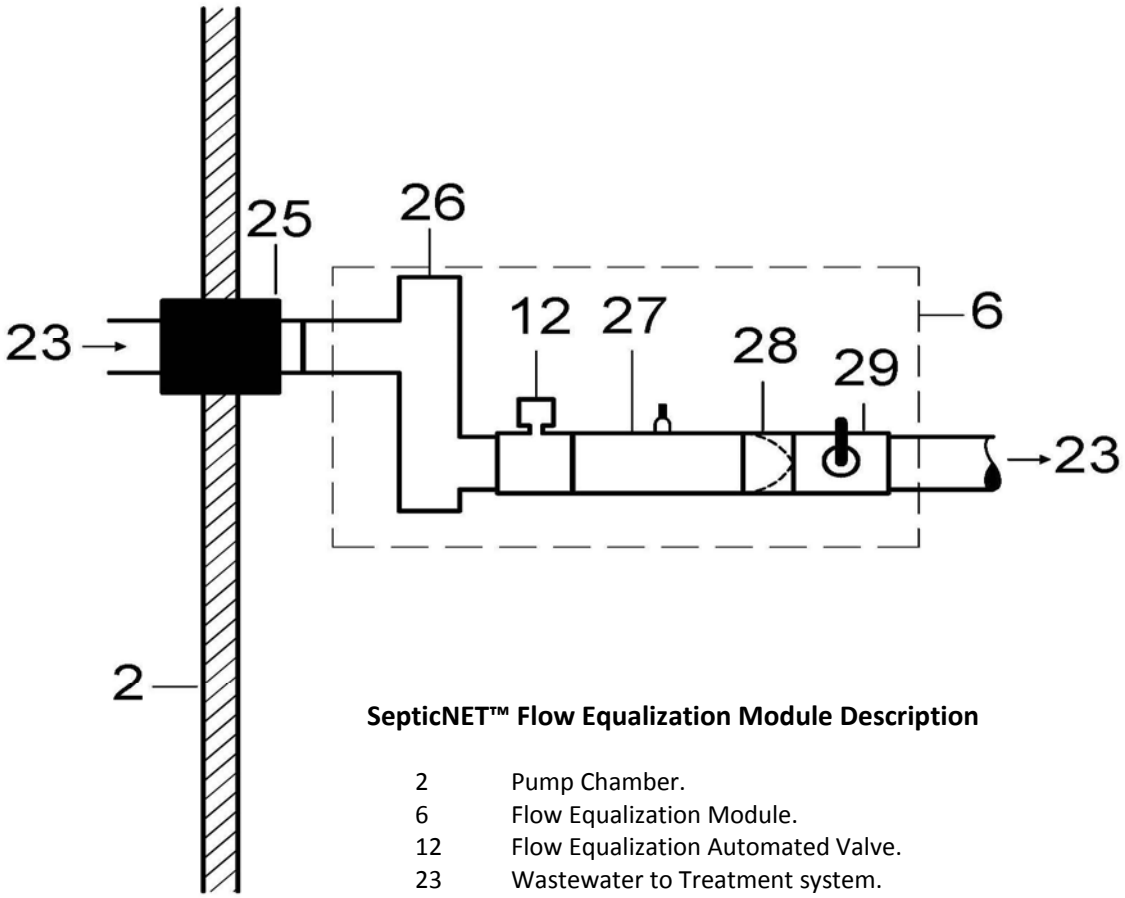
FIGURE 3 – SepticNET™ Air-lift Pump



SepticNET™ Air-lift Pump Descriptions

2	Pump Chamber.
3	Air-lift Pump.
7	Air Inflow into Air-lift Pump.
23	Wastewater to Treatment system.
24	Air Line Bulkhead Fitting.
25	Wastewater Bulkhead Fitting.

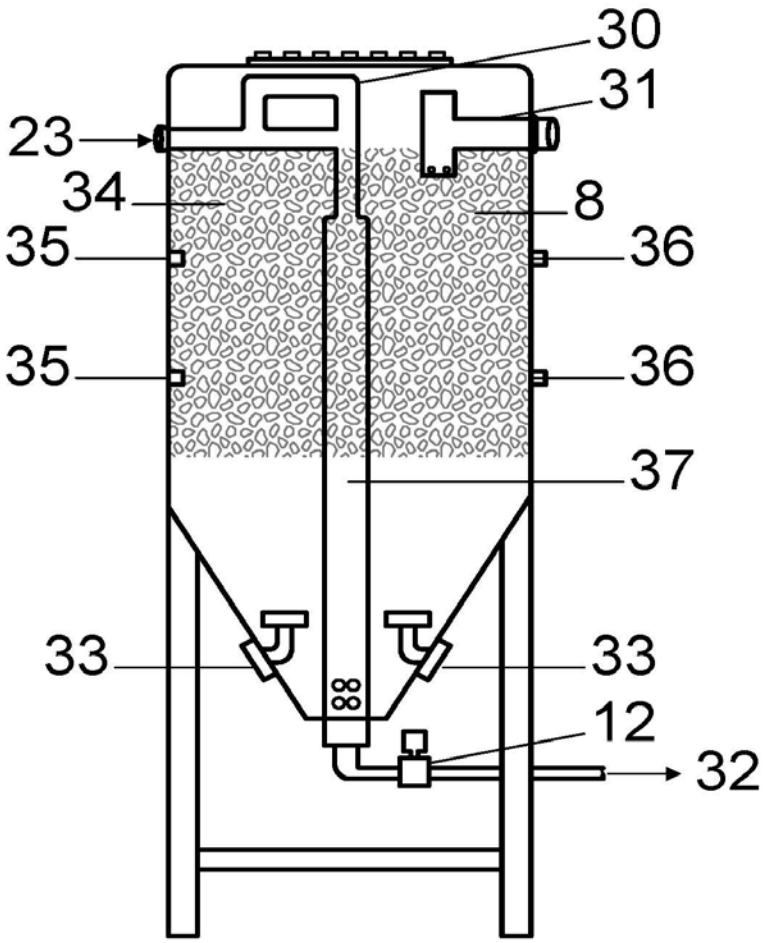
FIGURE 4 – SepticNET™ Flow Equalization Module



SepticNET™ Flow Equalization Module Description

2	Pump Chamber.
6	Flow Equalization Module.
12	Flow Equalization Automated Valve.
23	Wastewater to Treatment system.
25	Wastewater Bulkhead Fitting.
26	Flow Equalization Constant Head Module.
27	Flow Equalization Air Blowout Port.
28	Flow Equalization Flow control Orifice.
29	Flow Equalization Manual Isolation Valve.

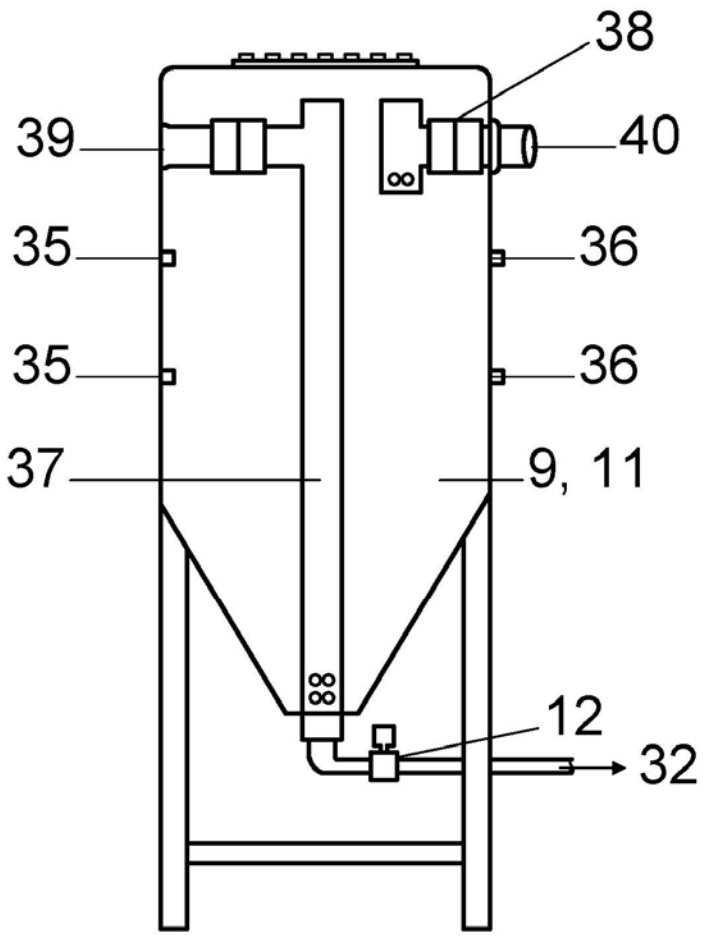
FIGURE 5 – SepticNET™ Nitrification Reactor



SepticNET™ Nitrification Reactor Description

8	Nitrification Reactor.
12	Automated Valve.
23	Wastewater to Treatment system.
30	Influent Isolation Vent Module.
31	Nitrification Outflow Control Module.
32	Biomass/Solids Elimination to Solids Return Pump.
33	Aeration Ports.
34	Plastic Bio-film Support Media.
35	Reactor Alignment and Connection Module (female).
36	Reactor Alignment and Connection Module (male).
37	Inflow Settling Baffle.

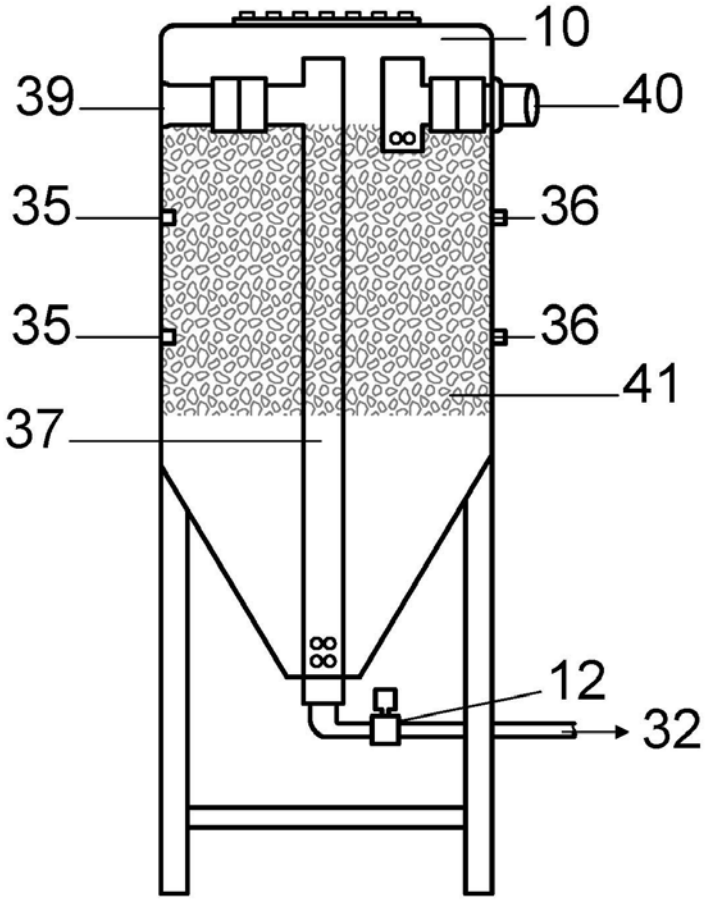
FIGURE 6 – SepticNET™ Initial and/or Final Settling Tank



SepticNET™ Initial and/or Final Settling Tank Description

9	Initial Settling Tank.
11	Final Settling Tank.
12	Automated Valve.
32	Biomass/Solids Elimination to Solids Return Pump.
35	Reactor Alignment and Connection Module (female).
36	Reactor Alignment and Connection Module (male).
37	Inflow Settling Baffle.
38	Settling Tank Outflow Control Module.
39	Reactor Inflow Connection Module (female).
40	Reactor Outflow Connection Module (male).

FIGURE 7 – SepticNET™ De-nitrification Reactor



SepticNET™ De-nitrification Reactor Description

10	De-nitrification Reactor.
12	Automated Valve.
32	Biomass/Solids Elimination to Solids Return Pump.
35	Reactor Alignment and Connection Module (female).
36	Reactor Alignment and Connection Module (male).
37	Inflow Settling Baffle.
38	Settling Tank Outflow Control Module.
39	Reactor Inflow Connection Module (female).
40	Reactor Outflow Connection Module (male).
41	Carbon Based Bio-film Carriers.

Appendix B

SepticNET™ System Operation & Maintenance Forms

Forms Included:

- **Annual Maintenance/Service Report Form**
- **Alarm Report Form**
- **Septic Tank Report Form**

ANNUAL MAINTENANCE/SERVICE REPORT FORM

Basic System Information:

Owner Name: _____

Address (Street): _____

City: _____ **State:** **Zip Code:** _____

System Serial Number: _____
(found inside of control panel door)

Service Provider Information:

Name (print): _____

Total Hours: _____ **Time In:** _____ **Date:** _____

Total Miles: _____

Maintenance/Service Activities:

1. **Treatment Vault**
   - ☐ Confined Space Entry Procedures Followed
     - ☐ Oxygen Level O.K. _____ (value)
     - ☐ LFL Level O.K. _____ (value)
     - ☐ Carbon Monoxide Level O.K. _____ (value)
     - ☐ Hydrogen Sulfide Concentration O.K. _____ (value)

   Comments: _____

2. **Alarm Conditions**
   - ☐ None
   - ☐ High Pump Tank Water Level
     - ☐ Service Required
   - ☐ High solids Return Pump Water Level
     - ☐ Service Required
   - ☐ Power Loss
     - ☐ Service Required
   - ☐ High Drainfield Dose Pump (optional)
     - ☐ Service Required
   - ☐ Filled Out Alarm Report Form

   Comments: _____

3. Automated Ball Valves

- ☐ Valve 1 Inspected (Nitrification Reactor)
  - ☐ Operating Properly
  - ☐ Service Required
    - ☐ Cleaned
    - ☐ Replaced
    - ☐ Other _____
- ☐ Valve 2 Inspected (Initial Settling Tank)
  - ☐ Operating Properly
  - ☐ Service Required
    - ☐ Cleaned
    - ☐ Replaced
    - ☐ Other _____
- ☐ Valve 3 Inspected (De-nitrification Reactor)
  - ☐ Operating Properly
  - ☐ Service Required
    - ☐ Cleaned
    - ☐ Replaced
    - ☐ Other _____
- ☐ Valve 3 Inspected (Final Settling Tank)
  - ☐ Operating Properly
  - ☐ Service Required
    - ☐ Cleaned
    - ☐ Replaced
    - ☐ Other _____

Comments: _____

_____

_____

4. Nitrification Reactor

- ☐ Exit Port Inspected
  - ☐ Cleaned
  - ☐ Replaced
- ☐ Solids Settling Baffle Inspected
  - ☐ Cleaned
- ☐ Bio-film Carriers Inspected
  - ☐ Operating Properly
  - ☐ Added _____ Gallons
- ☐ Aerators Inspected
  - ☐ Operating Properly
  - ☐ Service Required
    - ☐ Cleaned
    - ☐ Replaced
    - ☐ Other _____

Comments: _____

_____

_____

5. **Initial Settling Tank**
   - ☐ Exit Port Inspected
     - ☐ Cleaned
     - ☐ Replaced
   - ☐ Solids Settling Baffle Inspected
     - ☐ Cleaned

   Comments: _____

6. **De-nitrification Reactor**
   - ☐ Exit Port Inspected
     - ☐ Cleaned
     - ☐ Replaced
   - ☐ Solids Settling Baffle Inspected
     - ☐ Cleaned
   - ☐ Reactor Circulation Pump Inspected
     - ☐ Operating Properly
     - ☐ Service Required
       - ☐ Cleaned
       - ☐ Replaced
       - ☐ Other _____
   - ☐ Bio-film Carriers Inspected
     - ☐ Operating Properly
     - ☐ Added _____ Gallons

   Comments: _____

7. **Final Settling Tank**
   - ☐ Exit Port Inspected
     - ☐ Cleaned
     - ☐ Replaced
   - ☐ Solids Settling Baffle Inspected
     - ☐ Cleaned

   Comments: _____

8. Flow Equalization Module

- ☐ Orifice Inspected
  - ☐ Cleaned
  - ☐ Replaced
- ☐ Orifice Blowout Pump Inspected
  - ☐ Operating Properly
  - ☐ Service Required
    - ☐ Cleaned
    - ☐ Replaced
    - ☐ Other _____

Comments: _____

_____

_____

_____

9. Solids Return Pump

- ☐ Solids Return Pump Inspected
  - ☐ Operating Properly
  - ☐ Service Required
    - ☐ Cleaned
    - ☐ Replaced
    - ☐ Other _____

Comments: _____

_____

_____

_____

10. Drainfield Dose Pump (optional)

- ☐ Drainfield Dose Pump Inspected
  - ☐ Operating Properly
  - ☐ Service Required
    - ☐ Cleaned
    - ☐ Replaced
    - ☐ Other _____

Comments: _____

_____

_____

_____

11. Pump Chamber Inspection

Water Level from Control Panel: _____ **in.**

- ☐ **Water Level in Pump Tank Checked** — **Actual Water Level:** _____ **in.**
  - ☐ **Water Level In Normal Range (Does not match control panel reading)**
    - ☐ **Check recent owner use pattern**
    - ☐ **Service/replace level sensor**
- ☐ **Airlift Checked**
  - ☐ **Working Properly**
  - ☐ **Needs Service**
    - ☐ **Airflow Checked** — **Rotometer Reading:** _____ **lpm.**
    - ☐ **Piping Checked/Cleaned**

Comments: _____

_____

_____

_____

12. Septic Tank Inspection

- ☐ **Solid Thicknesses Measured**
  - ☐ **Scum Layer**
  - ☐ **Sludge Layer**
- ☐ **Effluent Filter Inspected**
  - ☐ **Cleaned**
  - ☐ **Replaced**
- ☐ **Septic Tank Report Form Completed**

Comments: _____

_____

_____

_____

I certify that ALL work performed on this SepticNET™ system has been accurately documented and completed as indicated on this form.

Service Provider: _____ _____ _____

(Signature) (Date) (Time)

Company Name: _____

Street: _____

City: _____ **State:** _____ **Zip Code:** _____

Phone: _____

ALARM REPORT FORM

Basic System Information:

Owner Name: _____

Address (Street): _____

City: _____ **State:** **Zip Code:** _____

System Serial Number: _____
(found inside of control panel door)

Service Provider Information:

Name (print): _____

Total Hours: _____ **Time In:** _____ **Date:** _____

Total Miles: _____

Alarm Condition Information:

☐ **High Pump Tank Water Level** **Water Level from Control Panel:** _____ in.

- ☐ Water Level in Pump Tank Checked — **Actual Water Level:** _____ in.
  - ☐ Water Level In Normal Range (Does not match control panel reading)
    - ☐ Check recent owner use pattern
    - ☐ Service/replace level sensor
- ☐ Airlift Checked
  - ☐ Working Properly
  - ☐ Needs Service
    - ☐ Airflow Checked — **Rotometer Reading:** _____ lpm.
    - ☐ Piping Checked/Cleaned
- ☐ Flow Equalization Module Checked
  - ☐ Working Properly
  - ☐ Needs Service
    - ☐ Piping Checked/Checked
    - ☐ Orifice Checked/Cleaned
    - ☐ Blowout Pump Checked
      - ☐ Operating Properly
      - ☐ Replaced/Repaired
- ☐ Nitrification Reactor Entry Port Checked
  - ☐ Working Properly
  - ☐ Entry Port Cleaned

Comments: _____

_____

_____

☐ High Solids Return Pump Water Level

- ☐ Water Level Checked
  - ☐ Water Level In Normal Range (non-alarm level)
    - ☐ Service/replace alarm level sensor
- ☐ Float Switch Checked
  - ☐ Working Properly
  - ☐ Needs Service
    - ☐ Replace solids return pump unit
- ☐ Pump Checked
  - ☐ Working Properly
  - ☐ Needs Service
    - ☐ Replace solids return pump unit
- ☐ Piping Checked
  - ☐ Working Properly
  - ☐ Piping Cleaned

Comments: _____

_____

_____

☐ Power Loss

- ☐ Main Breaker Outside of House Checked
  - ☐ Breaker in "ON" position
  - ☐ Breaker in "OFF" position
    - ☐ Switched to the "ON" position
- ☐ Breaker(s) Inside of Control Pnael Checked
  - ☐ Breaker(s) in "ON" position
  - ☐ Breaker(s) in "OFF" position
    - ☐ Switched to the "ON" position
- ☐ Wires and Connections Checked
  - ☐ Wires and Connections operating properly
  - ☐ Wires and Connections repaired

Comments: _____

_____

_____

☐ High Drainfield Dose Pump Water Level (Optional)

- ☐ Water Level Checked
  - ☐ Water Level In Normal Range (non-alarm level)
    - ☐ Service/replace alarm level sensor
- ☐ Float Switch Checked
  - ☐ Working Properly
  - ☐ Needs Service
    - ☐ Replace float switch
- ☐ Pump Checked
  - ☐ Working Properly
  - ☐ Needs Service
    - ☐ Replace solids return pump
- ☐ Piping Checked
  - ☐ Working Properly
  - ☐ Piping Cleaned

Comments: _____

_____

_____

I certify that ALL work performed on this SepticNET™ system has been accurately documented and completed as indicated on this form.

Service Provider: _____ _____ _____
(Signature) (Date) (Time)

Company Name: _____

Street: _____

City: _____ **State:** _____ **Zip Code:** _____

Phone: _____

SEPTIC TANK REPORT FORM

Basic System Information:

Owner Name: _____

Address (Street): _____

City: _____ **State:** _____ **Zip Code:** _____

System Serial Number: _____
(found inside of control panel door)

Service Provider Information:

Name (print): _____

Total Hours: _____ **Time In:** _____ **Date:** _____

Total Miles: _____

Inspection Information:

☐ **Septic Tank** **Size:** _____ **Gal.** **No. of Chambers** _____

- ☐ **Checked Effluent Filter**
  - ☐ **Cleaned**
  - ☐ **Replaced**
- ☐ **Measure Solids**
  - ☐ **Scum Thickness** _____ **inches**
  - ☐ **Sludge Thickness** _____ **inches**

Recommended Action

- ☐ **Combined solids < 16 inches – Pump at homeowners discretion.**
- ☐ **Combined solids = 16 to 34 inches – Pump tank within 2 months**
- ☐ **Combined solids > 34 inches – Pump tank within 1 week**

Comments: _____

_____

_____

I certify that ALL work performed on this SepticNET™ system has been accurately documented and completed as indicated on this form.

Service Provider: _____ _____ _____
(Signature) (Date) (Time)

Company Name: _____

Street: _____

City: _____ **State:** _____ **Zip Code:** _____

Appendix C

SepticNET™ System Confined Space Entry Procedure

TECHNICAL PROCEDURE

Confined Space Entry – SepticNET™ Treatment Vaults

PURPOSE

The purpose of this technical procedure is to provide SepticNET, Inc. employees, service providers, and contractors the mandatory level of safety while performing necessary work in confined spaces – SepticNET™ Treatment Vaults. Death and injuries in confined spaces are often the result when employees disregard proper safety procedures, take short cuts, refuse to accept the fact that a space may have been safe for years in the past, could develop into a deadly hazardous space and when supervisory personnel fail to heed safety standards and management does not remain fully aware as to what is really taking place in their confined space activities.

Confined space accidents are completely preventable, and when proper training, supervision, equipment and devices are applied, confined space entry is a safe and routine working procedure. The currently accepted state-of-the-art policies and requirements for confined space entry is the OSHA standard 29 CFR 1910.146. Contractors providing services to SEPTICNET, INC. are required to follow the OSHA requirements and the confined space entry program of their company. The contractors confined space entry program must address all monitoring and entry requirements of this procedure.

SCOPE

This procedure applies to ALL SepticNET, Inc. personnel and to all subcontractors utilizing SepticNET, Inc. equipment or working on SepticNET, Inc. contracts.

DEFINITIONS

"Acceptable entry conditions" means the conditions that must exist in a permit space to allow entry and to ensure that employees involved with a permit-required confined space entry can safely enter into and work within the space.

"Attendant" means an individual stationed outside one or more permit spaces who monitors the authorized entrants and who performs all attendant's duties assigned in the employer's permit space program.

"Authorized entrant" means an employee who is authorized by the employer to enter a permit space.

"Confined space" means a space that:

(1) Is large enough and so configured that an employee can bodily enter and perform assigned work; and

(2) Has limited or restricted means for entry or exit (for example, tanks, vessels, silos, storage bins, hoppers, vaults, and pits are spaces that may have limited means of entry.); and

(3) Is not designed for continuous employee occupancy.

"Engulfment" means the surrounding and effective capture of a person by a liquid or finely divided (flowable) solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or crushing.

"Entry" means the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

"Entry permit (permit)" means the written or printed document that is provided by the employer to allow and control entry into a permit space and that contains the information specified in paragraph (f) of this section.

"Entry supervisor" means the person (such as the employer, foreman, or crew chief) responsible for determining if acceptable entry conditions are present at a permit space where entry is planned, for authorizing entry and overseeing entry operations, and for terminating entry as required by this section.

NOTE: An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this section for each role he or she fills. Also, the duties of entry supervisor may be passed from one individual to another during the course of an entry operation.

"Hazardous atmosphere" means an atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

(1) Flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL);

(2) Airborne combustible dust at a concentration that meets or exceeds its LFL;

NOTE: This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 m) or less.

(3) Atmospheric oxygen concentration below 19.5 percent or above 23.5 percent;

(4) Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances, of this Part and which could result in employee exposure in excess of its dose or permissible exposure limit;

NOTE: An atmospheric concentration of any substance that is not capable of causing death, incapacitation, impairment of ability to self-rescue, injury, or acute illness due to its health effects is not covered by this provision.

(5) Any other atmospheric condition that is immediately dangerous to life or health.

NOTE: For air contaminants for which OSHA has not determined a dose or permissible exposure limit, other sources of information, such as Material Safety Data Sheets that comply with the Hazard Communication Standard, section 1910.1200 of this Part, published information, and internal documents can provide guidance in establishing acceptable atmospheric conditions.

"Hot work permit" means the employer's written authorization to perform operations (for example, riveting, welding, cutting, burning, and heating) capable of providing a source of ignition.

"Immediately dangerous to life or health (IDLH)" means any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a permit space.

"Isolation" means the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes, or ducts; a double block and bleed system; lockout or tagout of all sources of energy; or blocking or disconnecting all mechanical linkages.

"Line breaking" means the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

"Non-permit confined space" means a confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

"Oxygen deficient atmosphere" means an atmosphere containing less than 19.5 percent oxygen by volume.

"Oxygen enriched atmosphere" means an atmosphere containing more than 23.5 percent oxygen by volume.

"Permit-required confined space (permit space)" means a confined space that has one or more of the following characteristics:

(1) Contains or has a potential to contain a hazardous atmosphere;

(2) Contains a material that has the potential for engulfing an entrant;

(3) Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or

(4) Contains any other recognized serious safety or health hazard.

"Permit-required confined space program (permit space program)" means the employer's overall program for controlling, and, where appropriate, for protecting employees from, permit space hazards and for regulating employee entry into permit spaces.

"Permit system" means the employer's written procedure for preparing and issuing permits for entry and for returning the permit space to service following termination of entry.

"Prohibited condition" means any condition in a permit space that is not allowed by the permit during the period when entry is authorized.

"Rescue service" means the personnel designated to rescue employees from permit spaces.

"Retrieval system" means the equipment (including a retrieval line, chest or full-body harness, wristlets, if appropriate, and a lifting device or anchor) used for non-entry rescue of persons from permit spaces.

"Testing" means the process by which the hazards that may confront entrants of a permit space are identified and evaluated. Testing includes specifying the tests that are to be performed in the permit space.

PROCEDURES

A. Entry Without Permit/Attendant

Certification

Confined spaces may be entered without the need for a written permit or attendant provided that the space can be maintained in a safe condition for entry by mechanical ventilation alone, as provided in 1910.146(c)(5). All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. Any employee required or permitted to pre-check or enter an enclosed/confined space shall have successfully completed, as a minimum, the training as required by the following sections of these procedures. A written copy of operating and rescue procedures as required by these procedures shall be at the work site for the duration of the job. The Confined Space Pre-Entry Check List must be completed by the LEAD WORKER before entry into a confined space. This list verifies completion of items listed below. This check list shall be kept at the job site for duration of the job. If circumstances dictate an interruption in the work, the permit space must be re-evaluated and a new check list must be completed.

Testing

The atmosphere within the space will be tested to determine whether dangerous air contamination and/or oxygen deficiency exists. Detector tubes, alarm only gas monitors and explosion meters are examples of monitoring equipment that may be used to test permit space atmospheres. Testing shall be performed by the LEAD WORKER who has

successfully completed the Gas Detector training for the monitor he will use. The minimum parameters to be monitored are oxygen deficiency, LFL, carbon monoxide, and hydrogen sulfide concentration. A written record of the pre-entry test results shall be made and kept at the work site for the duration of the job. The supervisor will certify in writing, based upon the results of the pre-entry testing, that all hazards have been eliminated. Affected employees shall be able to review the testing results. The most hazardous conditions shall govern when work is being performed in two adjoining, connecting spaces.

Entry Procedures

If there are no non-atmospheric hazards present and if the pre-entry tests show there is no dangerous air contamination and/or oxygen deficiency within the space and there is no reason to believe that any is likely to develop, entry into and work within may proceed. Continuous testing of the atmosphere in the immediate vicinity of the workers within the space shall be accomplished. The workers will immediately leave the permit space when any of the gas monitor alarm set points are reached as defined. Workers will not return to the area until a SUPERVISOR who has completed the gas detector training has used a direct reading gas detector to evaluate the situation and has determined that it is safe to enter.

Rescue

Arrangements for rescue services are not required where there is no attendant. See the rescue portion of section B., below, for instructions regarding rescue planning where an entry permit is required.

B. ENTRY PERMIT REQUIRED

Confined Space Entry Permit

All spaces shall be considered permit-required confined spaces until the pre-entry procedures demonstrate otherwise. Any employee required or permitted to pre-check or enter a permit-required confined space shall have successfully completed, as a minimum, the training as required by the following sections of these procedures. A written copy of operating and rescue procedures as required by these procedures shall be at the work site for the duration of the job. The Confined Space Entry Permit must be completed before approval can be given to enter a permit-required confined space. This permit verifies completion of items listed below. This permit shall be kept at the job site for the duration of the job. If circumstances cause an interruption in the work or a change in the alarm conditions for which entry was approved, a new Confined Space Entry Permit must be completed.

Testing

The confined space atmosphere shall be tested to determine whether dangerous air contamination and/or oxygen deficiency exists. A direct reading gas monitor shall be used. Testing shall be performed by the SUPERVISOR who has successfully completed the gas detector training for the monitor he will use. The minimum parameters to be monitored are oxygen deficiency, LFL, carbon monoxide, and hydrogen sulfide concentration. A written record of the pre-entry test results shall be made and kept at the work site for the duration of the job. Affected employees shall be able to review the

testing results. The most hazardous conditions shall govern when work is being performed in two adjoining, connected spaces.

Space Ventilation

Mechanical ventilation systems, where applicable, shall be set at 100% outside air. Where possible, open additional manholes to increase air circulation. Use portable blowers to augment natural circulation if needed. After a suitable ventilating period, repeat the testing. Entry may not begin until testing has demonstrated that the hazardous atmosphere has been eliminated.

Entry Procedures

The following procedure shall be observed under any of the following conditions:

1.) Testing demonstrates the existence of dangerous or deficient conditions and additional ventilation cannot reduce concentrations to safe levels;

2.) The atmosphere tests as safe but unsafe conditions can reasonably be expected to develop;

3.) It is not feasible to provide for ready exit from spaces equipped with automatic fire suppression systems and it is not practical or safe to deactivate such systems; or

4.) An emergency exists and it is not feasible to wait for pre-entry procedures to take effect.

All personnel must be trained. At least one worker shall stand by the outside of the space ready to give assistance in case of emergency. There shall be at least one additional worker within sight or call of the standby worker. Continuous communications shall be maintained between the worker within the confined space and standby personnel.

If at any time there is any questionable action or non-movement by the worker inside, a verbal check will be made. If there is no response, the worker will be moved immediately. Exception: If the worker is disabled due to falling or impact, he/she shall not be removed from the confined space unless there is immediate danger to his/her life. Local fire department rescue personnel shall be notified immediately. The standby worker may only enter the confined space in case of an emergency (wearing the self contained breathing apparatus) and only after being relieved by another worker. Safety belt or harness with attached lifeline shall be used by all workers entering the space with the free end of the line secured outside the entry opening. The standby worker shall attempt to remove a disabled worker via his lifeline before entering the space.

In any situation where their use may endanger the worker, use of a hoisting device or safety belt and attached lifeline may be discontinued.

When dangerous air contamination is attributable to flammable and/or explosive substances, lighting and electrical equipment shall be Class 1, Division 1 rated per National Electrical Code and no ignition sources shall be introduced into the area.

Continuous gas monitoring shall be performed during all confined space operations. If alarm conditions change adversely, entry personnel shall exit the confined space and a new confined space permit issued.

Rescue

Call the fire department services for rescue. Where immediate hazards to injured personnel are present, workers at the site shall implement emergency procedures to fit the situation.

CONFINED SPACE ENTRY PERMIT

A confined space may NOT be entered until this permit has been completed. A new permit must be completed each day.

Date and Time Issued: _____ Date and Time Expires: _____
Job site/Space I.D.: _____ Job Supervisor:_____
Equipment to be worked on: _____ Work to be performed: _____

Stand-by personnel: _____

1. Atmospheric Checks: Time _____
Oxygen _____%
Explosive _____% L.F.L.
Toxic _____ 10 PPM H_2S
Toxic _____ 25 PPM CO

2. Tester's signature: _____

3. Source isolation (No Entry):	N/A	Yes	No
Pumps or lines blinded,	( )	( )	( )
disconnected, or blocked	( )	( )	( )

4. Ventilation Modification:	N/A	Yes	No
Mechanical	( )	( )	( )
Natural Ventilation only	( )	( )	( )

5. Atmospheric check after isolation and Ventilation:
Oxygen _____% > 19.5 %
Explosive _____% L.F.L < 10 %
Toxic _____PPM < 10 PPM H_2S
Toxic _____PPM < 25 PPM CO
Time _____
Testers signature: _____

6. Communication procedures: _____
_____

7. Rescue procedures: _____
_____
_____
_____

8. Entry, standby, and back up persons:	Yes	No
Successfully completed required training?	( )	( )
Is it current?	( )	( )

9. Equipment:	N/A	Yes	No
Direct reading gas monitor - tested	( )	( )	( )
Safety harnesses and lifelines for entry and standby persons	( )	( )	( )
Hoisting equipment	( )	( )	( )
Powered communications	( )	( )	( )
SCBA's for entry and standby persons	( )	( )	( )
Protective Clothing	( )	( )	( )
All electric equipment listed Class I, Division I, Group D and Non-sparking tools	( )	( )	( )

10. Periodic atmospheric tests:

Oxygen	____%	Time ____	Oxygen	____%	Time ____
Oxygen	____%	Time ____	Oxygen	____%	Time ____
Explosive	____%	Time ____	Explosive	____%	Time ____
Explosive	____%	Time ____	Explosive	____%	Time ____
Toxic	____%	Time ____	Toxic	____%	Time ____
Toxic	____%	Time ____	Toxic	____%	Time ____

We have reviewed the work authorized by this permit and the information contained here-in. Written instructions and safety procedures have been received and are understood. Entry cannot be approved if any squares are marked in the "No" column. This permit is not valid unless all appropriate items are completed.

Permit Prepared By: _____
Approved By: (Supervisor)_____
Reviewed By (Operations Personnel) :

_____ _____
(printed name) (signature)

This permit to be kept at job site. Return job site copy to Safety Office following job completion.

Copies: Safety Office
Supervisor
Job site