



CANADIAN Environmental Protection

A Baum Direct Response Publication

Alberta taking the lead in researching new pressurized At-Grade onsite sewage system

As development increases throughout Canada and the United States, the need to provide cost effective onsite wastewater treatment that protects the environment is an ongoing challenge. This has been the catalyst for the development and testing of a number of new system designs, applications and product innovations in the onsite septic industry. In Alberta, the Safety Codes Council and Alberta Municipal Affairs (AMA), in conjunction with the University of Alberta, have embarked on a research project to provide interim guidelines for the effective use of pressurized At-Grade effluent treatment and dispersal systems.

At-Grade effluent treatment systems are private onsite sewage systems that provide final treatment of sewage effluent so that water can be safely returned to the environment. Safe use of this technique relies on the successful removal of contaminants in the applied effluent by filtration, chemical reaction and biological activity in soil. These systems are becoming increasingly popular in Alberta and are being considered for residential and commercial installations to address soil conditions including shallow limiting layers and/or low permeability.

Leading a study on the effectiveness of these systems at the University of Alberta is Noorallah Juma. The focus of the \$130,000 study is on evaluating the effectiveness of the At-Grade design, while also investigating the movement of water, dissolved organic compounds, soluble nutrients and organisms in a forested landscape. The biochemical oxygen demand for the decomposition, the number of total coliforms, fecal coliforms, and total suspended solids in the effluents are being quantified and their fate in soil is being determined. This will provide relevant data to the Safety Codes Council, AMA and others who are considering this type of onsite treatment.

Dale McLure, President of the Alberta Onsite Wastewater Contractors' Association comments, "Contractors are looking for innovative solutions to very challenging sites. This cooperation between the AMA and the University of Alberta is key to advancing our understanding and continued application of the At-Grade technology."

How do At-Grade systems work?

The pressurized At-Grade system design recognizes that the infiltration rates and hydraulic conductivity of the upper layers of soil are normally much greater than the soils even a few inches below the surface. The ability of the upper soil layers to accept and move water quickly enables the effluent to spread in the upper layer of soil.

In contrast to typical septic systems, the sewage is first treated to a secondary treatment level typical of an NSF-40 advanced treatment system. It then moves to an effluent dispersal system, which is an arrangement of pressurized distribution piping placed on the humus layer. The humus layer is the 4½ to 5 inches of material that has collected on the site over years of



The 1 ½" PVC piping inside the chamber is supported by injection moulded pipe support units that firmly hold and elevate the piping above the humus layer.

leaf decomposition. This distribution piping is covered by an open bottom chamber or a 300 mm (12") or larger ½-pipe, providing a protective housing that is then covered with wood chips and/or shredded tree cuttings. The forest canopy provides additional insulation in the cold winter



A 225-foot lateral of Equalizer 24 chambers contour through trees and are placed directly onto undisturbed humus layer.



Over time, the entire At-Grade system will soon become a natural part of the forest landscape.

months when weeklong stretches of minus 40°C are not uncommon. Effluent is delivered to the upper, very permeable, layers of soil, where it is quickly absorbed, reducing the risk of human and animal contact with the effluent. The effluent, moving vertically through the upper permeable layers, spreads horizontally over the underlying less permeable soil and slowly infiltrates into the soil to achieve final treatment and return to the environment.

Pressurized distribution is the key

Pressurized distribution of the effluent throughout the length of the system, assures that the entire available area is used and prevents localized overloading. Slope, soil type and soil conditions dictate the orifice sizing, spacing and location in the pressurized distribution laterals. Distribution is aimed at preventing the saturation of the soils over significant periods of time, as this would make the soils anaerobic. Effective distribution also prevents saturation of the soil to a point where the surface becomes noticeably wet causing a danger to people or animals, or creating foul odours. Because these systems are on the surface and are subjected to changes in weather including the potential for freezing, the distribution piping must drain after each dosing so there is no standing water in the pipe to freeze.

Next steps

"Pressurized At-Grade Systems seem to be providing an effective solution for difficult site conditions when used in a forested area where a substantial forest floor "litter layer" is present," said Alf Durnie, Technical Administrator for AMA. "The interim guideline for the At-Grade system design anticipates sites with very restrictive soil layers. While the systems show promise, at this time they are only allowed under variance. Once the results of the research study are available, we can refine the design

requirements and decide on whether to include it as a standard system in the Private Sewage Systems Standard of Practice."

System profile

The Alberta Lutheran bible camp used the Equalizer 24 Chambers from Infiltrator Systems Inc. for a recent At-Grade system installation.

Camp Kuriokus was faced with a need to improve and expand the treatment of wastewater from camp activities, but was

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challenged by a forested site with little open area for a trench leachfield. The camp knew that they needed to come up with an alternative solution to their effluent treatment and disposal problem. After learning that the University of Alberta was studying At-Grade systems as an alternative technology, the camp applied for a variance to use the pressurized At-Grade system design.

During the site evaluation, it was determined that this site was suitable for advanced treatment and At-Grade technology. As a result, excavation contractor and onsite installer, Dale Ringuette, of All-Rite Trenching in Sherwood Park, Alberta, used his past experience with the At-Grade approach and began to work with AMA. Dale needed to design a system that could handle a total maximum flow of 3,000 imperial gallons per day in peak summer months, reverting back to approximately 250 to 400 gallons in off-peak periods. In the past, he had designed similar systems using 1/2-pipe for effluent disposal. This time, Dale looked for new options for the advanced treatment system and selected the Equalizer 24 (EQ24) chamber from Infiltrator Systems Inc. for the effluent disposal portion of this particular design. The Equalizer 24 chamber is a plastic leaching chamber that features a large open area, increased storage volume to accept peak flows and a wide footprint for stability on the humus layer as compared to the 1/2 pipe method.

A requirement of the AMA for any At-Grade effluent treatment and disposal system is that it must follow an NSF-40 advanced treatment-system, not a standard septic tank. In this case, the wastewater from the various camp facilities flows through a Norweco sewage treatment plant. A large grease trap, used to pretreat the kitchen waste, was also installed prior to the Norweco plant. This treatment plant is an aerobic design that provides 6/10 BOD/TSS level sewage quality when the effluent leaves the treatment plant and flows to the EQ24 chambers. Ringuette points out that in addition to this study information, should the fecal count be an issue at some delicate or rare site, disinfection is well proven and readily available for use.

At Camp Kuriokus, the effluent leaves the treatment plant and is pumped approximately 500 feet to the At-Grade disposal system. This disposal system includes 675 feet of EQ24 chambers in three, 225-foot runs. The EQ24 chambers are installed over the humus layer on a two to three percent slope, about 35 feet apart. The 1 1/2" PVC piping inside the chamber is supported by injection moulded pipe support units that firmly hold and elevate the piping above the humus layer. Orifices within this pipe are 1/8-inch diameter on five-foot centres. Utilizing pressure dosing, each run is dosed at maximum flow of eight times per day. The At-Grade system is then covered over with specially prepared bark mulch that is shredded to provide stability and the correct amount of frost protection for the disposal area. Over time, this cover causes the system to virtually blend in to the surrounding landscape – an appealing feature to the property owner.

Because the system sits on top of the ground, no excavation was required, protecting the natural environment that is so important to the camp.

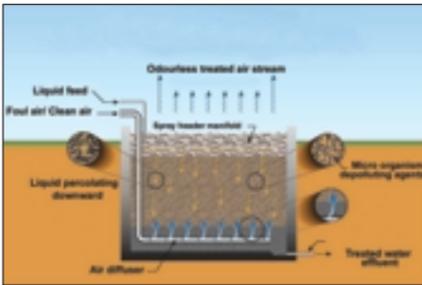
"This system provided the camp with a cost effective alternative to conventional treatment methods on a very challenging site," Ringuette commented. "Using the EQ24 was new for me, but was a viable option that I would certainly consider again in the future."

Infiltrator Systems Inc.

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Featured Products

BIOSOR Wastewater treatment



Wastewater treatment for small and remote applications requires simple and robust solutions. With this objective in mind, BIOSOR has been developed over 10 years of R&D by the Quebec government Centre de Recherche Industriel du Quebec (CRIQ). BIOSOR is low maintenance and requires no operation. Also, no biologic sludge needs to be managed. All it takes is a media change-out every three to five years.

BIOSOR has been used in domestic wastewater treatment and offers effective solutions in agriculture, food processing & transformation, and slaughtering houses. Filter Innovations can simply identify if BIOSOR is the right solution for your application.

Filter Innovations

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DEWATERING SYSTEMS Compact



A series of affordable compact belt filter presses and gravity belt thickeners specifically designed for smaller municipal wastewater plants is offered by PHOENIX Process Equipment Co.

When supplied as skid mounted systems, they include all necessary pumps, controls, polymer dosing systems, and require only four external connections, thus greatly simplifying installation.

The compact gravity belt thickeners can be used to reduce sludge volume prior to digestion or to minimize liquid hauling costs. The belt filter presses will produce a dry cake for hauling, composting or drying, and can eliminate sand or vacuum drying beds. Both presses and thickeners are also available trailer mounted for greater versatility.

PHOENIX Process Equipment

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FILTRATION SYSTEM Improved backwash

Serfilco, Ltd. announces an improved version of its line of Titan-90 Automatic Filtration Systems. The systems use permanent media to provide solids/liquid separation. They are capable of handling waste effluents in the metal finishing and/or general industrial, chemical,

pharmaceutical and processing industries, where their automatic backwashing capability ensures continuous high flow, with minimal cost for media and labour.

System improvements include the standardization of pumps and valves used on the various models and sizes, stainless steel hardware to replace plated hardware, and analogue and digital flow meters with totalizers to replace the analogue variety formerly used. In addition, the control panels have been redesigned to take CE requirements into account.

All units are being painted with a new epoxy enamel to provide a more durable, longer-lasting protective coating to the equipment. Also, the systems are being mounted on new bases that have been designed to be "lift truck friendly" so that they can more easily be moved for installation or if operations change and relocation of the equipment is required.

Service Filtration of Canada

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LUMINOTOX Now with ammonia detection

WEFTEC
Booth: 4753

LuminoTox, a device to determine toxicity in water, can now be used to track down ammonia nitrogen.

The LuminoTox system consists of a portable analyzer that measures the reaction of biochemical reagents to different toxic chemicals in water. Its outstanding advantages over standard bioassays and chemical testing is its rapidity and low cost. LuminoTox is used for rapid screening of municipal and industrial effluents, as well as drinking water. The analyzer itself is a portable, robust and battery-powered instrument providing quick reference field data.

Conventional LuminoTox test kits (Whole Toxicity and Herbicide Specific) allow users to determine Whole Toxicity – the acute toxicity of contaminated water. Following positive measurements, it is possible to verify if this toxicity is the result of herbicide contamination. The latest innovation is a test kit that is specific to Ammonia Nitrogen, allowing users to verify further the origin of the toxic effect, if any.

Lab_Bell Inc.

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ISOLATION VALVES For critical flow control applications

High-pressure miniature inert isolation valves provide the same reliable performance and corrosion resistance in high-pressure applications (up to 550 psi) as Bio-Chem's lower pressure valves.



These high-pressure isolation valves feature full corrosion resistance, high cycle life, low power requirements, and fast response times. Inert materials of construction include PEEK, PPS and Teflon. Quick turnaround is offered for custom modifications. Customizable options include: port configuration and orientation; voltage; materials of construction; electrical power;

and assembly mounting onto manifolds for controlling multiple flow lines.

Bio-Chem high-pressure valves can be used to replace more expensive pressure regulator systems or pressure feedback systems where the upper pressure limit needs to be controlled.

Bio-Chem Valve Inc.

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From the Cover OIL SKIMMER Solar-powered



Abanaki Corporation has released an innovative new design for its PetroXtractor oil skimmer that includes solar-powered capability for the even the most remote environments.

The PetroXtractor Solar Skimmer is designed to remove oil, fuel and other hydrocarbons from groundwater using recovery or monitoring wells. The solar unit allows for unattended remediation in areas where no electricity is available or convenient.

Like the standard PetroXtractor, the new PetroXtractor Solar Skimmer unit comes with any of three belt widths that allow its use in two-inch, four-inch, or six-inch diameter well casings. With the widest belt size, the unit can remove up to 12 gallons of floating oil per hour. Belt lengths can be customized for well depths of 100 feet or more, which assures hydrocarbon removal even when the water level fluctuates. The lower belt pulley is tethered to the drive unit to prevent accidental loss in the well casing.

Abanaki Corporation

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FLOWMETER Two-wire, electromagnetic

WEFTEC
Booth: 4925

The FM approved ALTOFLUX 2W hybrid electromagnetic flowmeter (EMF) is the first and only EMF with hybrid connection technology. The ALTOFLUX 2W's advanced power booster enables operation in a 2x2 wire connection mode for difficult applications.

Unlike other loop-powered magmeters, the ALTOFLUX 2W features an available power booster to meet the most stringent process conditions. Despite the limitations of most 2-wire magmeters, improved electronics enable the ALTOFLUX 2W to handle 99% of all applications. The ALTOFLUX 2W can be upgraded to 2x2 with no process turndown or meter removal and without impact on rating, cabling or calibration.

Ideal for water and wastewater, chemical and pharmaceutical applications, the ALTOFLUX 2W's advanced technology is able to handle the most difficult of applications, including fluids with solid contents or low conductivity. Its high reliability enables extremely stable and accurate results with steady or pulsating flows.

KROHNE, Inc.

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