Hydra Renewable Resources Inc.

providing innovative solutions to the challenges of wastewater management

Dwayne Kalynchuk
General Manager, Environmental Services
Capital Regional District
PO Box 1000, 625 Fisgard Street
Victoria, BC V8W 2S6

31 January 2007

BY HAND

Sir:

Re: **REQUEST FOR EXPRESSIONS OF INTEREST REGARDING INNOVATIVE SEWAGE TREATMENT AND RESOURCE RECOVERY TECHNOLOGY FOR VICTORIA, BRITISH COLUMBIA, CANADA**

We write in response to your call for expressions of interest regarding innovative sewage treatment and resource recovery technologies and strategies that may be suitable for effectively and sustainably treating and processing sewage generated by a predominately residential community of about 300,000 (initially) to 400,000 people.

Specifically, we would like to introduce you to a new option for waste water treatment in the Capital Region District. The system, labeled CleanStream™ and developed by MicroMedia Filtration, Inc. of California, is modular: designed specifically for distributed installation: fully automated, and employs an inexpensive polymer-based up-flow filtration system designed to provide a quality of effluent directly suitable for water reclamation and recycling, while providing solid-cake sludge feed suited to pyrolysis and conversion to synthetic gas. Perhaps best of all, the system was developed to meet the treatment needs and financial capacities of communities such as the CRD.

A CleanStream™ 950 m^3/d module

Macromedia's system was developed in California to meet that States "Title 22" surface discharge standards, the most stringent in North America. The system meets and exceeds all of the requirements of the Province of British Columbia's Municipal Sewage Regulations and produces an effluent that is well suited to variety of reclamation and recycling strategies.

Most notably, however, the system represents an option for Victoria and region to achieve and maintain the highest metropolitan treatment standards at a capital outlay, operating cost, and land area commitment that is less - *markedly less* - than the cost of developing a traditional treatment system.

The CleanStream™ System:

- **achieves high level treatment standards**, equivalent to micro filtration systems, *without* the cost of the associated filter media, producing an effluent that meets BC standards for reclamation. The use of reclaimed water is one of the techniques adopted in a comprehensive, integrated water management program in the City of Victoria's Dockside Green project. The aquatic specialists on this project, Aqua-Tex Scientific Consulting Ltd. are using the reclaimed water as the water source for a brand new urban stream that is the showpiece for the development, as well as for toilet flushing and balcony planters.
- **presents low capital cost alternative -** a complete 950 m^3/d system can usually be delivered for less than $1.3 million with additional 950 m^3/d modules (up to 7 additional per train) for less than $1.1 million each –treatment capacity equivalent to 6,650 m^3/d or 1.46 million imperial gallons per day [ig/d]) at some $6.20 per imperial gallon capital cost *with redundancy* –the implication for core treatment equipment costs for Victoria is, in all probability, less than CDN $150 million;
- **provides for distributed operation with centralized control and management** –any number of trains can be configured to meet the processing requirements of the CRD - each train has its own computer control and monitoring system, allowing for centralized management using a standard internet connection –eliminating the need for certified operators at each of the distributed sites –within the CRD the CleanStream™ system could be deployed in several locations throughout the region thus alleviating the pressure to locate and make available a large single site; allowing for effective water recycling in a variety locations throughout the CRD.
- **Reduced installation and commissioning –**all modules are prefabricated and site installation can be performed in markedly less time than the fabrication and commissioning of a traditional facility.
- **requires minimal maintenance presence -** an 8 unit train can be maintained, typically, on a simple 2 hour per day routine manageable by competent maintenance staff;
- **eliminates the need for chlorine contact tanks**;
- **achieves filtration and disinfection *in one step***;

- **uses ozone as the disinfection method** thus providing *complete pathogen removal* with no by-products;
- **effects superior nutrient reduction -** both phosphorus and ammonia are consistently reduced below effluent standards;
- **includes *no moving parts*** in the filter itself using gravity and head pressure for flow;
- **operates 100% of the time** –without the downtime associated with traditional filter configurations;
- **integrates its own pumping system** allowing the greatest flexibility in locating on an existing site;
- **occupies a very small footprint** - typically less than 600 ft^2 to accommodate a treatment capacity of 950 m^3/d and just 1500 ft^2 for 3,800 m^3/d (835,880 ig/d);
- **requires minimal energy** –the 950m^3/d module consumes just 60kWh per day;
- **incurs comparatively low operating costs** –polymer costs for the 950m^3/d module are typically $20-$25 per day - in total, operating costs can be expected to be just 40% of conventional facilities and 50% of MBR systems;
- **can be expanded modularly** as the need arises –the 950 m^3/d can be assembled in trains of 8 to treat up to 6,500 m^3/d with one complete modular 950 m^3/d unit on redundancy standby. Multiple trains can be employed to achieve any desired capacity;
- **incorporates an automated preliminary separator** that filters solids to 100 microns and, using an air knife and screw press, produces a dry-cake sludge that is 35% + solids, well suited to pyrolysis and conversion to synthetic gas thus converting a traditional cost centre –sludge disposal –to a potential income stream. Dockside Green proposes that the organic sludge from sewage on their site will be used in energy co-generation and the heat will be extracted to fuel a district energy system.

We trust that this outline of our features and capabilities provides a clear view of our alternate technology. Hydra Renewable Resources is most interested in working with the Capitol Region District to make our innovative sewage treatment and resource recovery option available as a solution to the CRD's requirements and we would be delighted to present further information on MicroMedia's CleanStream™ at your convenience.

It may be of more than passing interest that the continuous backwash up-flow media (CBUM) technology, the patented core of the CleanStream™ system, is employed in a system designed and commissioned by MicroMedia's founder Ken Stedman – creator of the technology - to treat some 60 million US gallons per day of tertiary waters drawn from 14 treatment facilities in upstate New York. The CBUM treated waters are employed directly to recharge the potable water supply for New York City.

We have enclosed a brochure for the system and a brief description of the operating technologies. In addition we enclose a letter from Mr. Sam Luxemburg, President of MicroMedia Filtration, Inc. attesting to the system ś capacity to meet and exceed the municipal standards for British Columbia.

Thank you

G. Dale Bishop
Principal

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Hydra Renewable Resources, Inc.
3827 Marine Drive
Royston BC Canada
V0R 2V0
250 703-3142
dale @hydraresources.com
enc.

EXPRESSION OF INTEREST –
INNOVATIVE SEWAGE TREATMENT AND RESOURCE RECOVERY TECHNOLOGY

Hydra Renewable Resources, Inc.
3827 Marine Drive
Royston BC Canada
V0R 2V0

250 703-3142
info@hydraresources.com

as exclusive Canadian representative of

MicroMedia Filtration, Inc.

CleanStream™

A Fully Automated Filtration System

Highly Efficient Solution for Wastewater Treatment

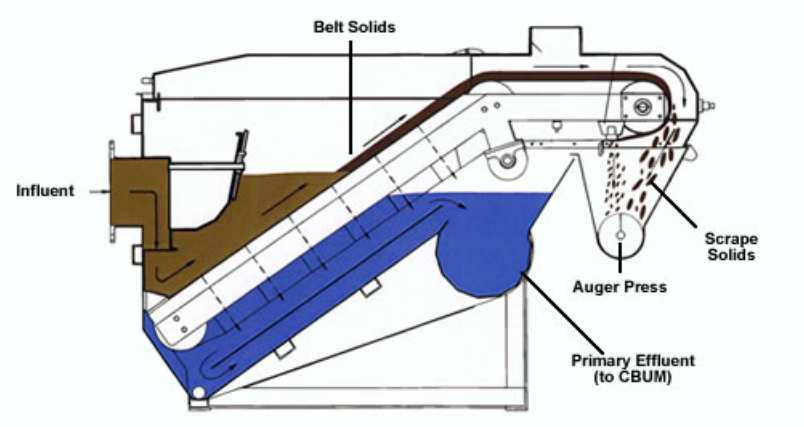
The CleanStream Process

CleanStream is a fully automated continuously cleaned media filtration system. The process includes a preliminary separator which removes the gross solids from the raw influent. In addition, the separator auger dries the solids to produce a 30% dry matter "log" instead of the conventional sludge from a normal primary clarification. The preliminary effluent is then filtered in a continuous backwash upflow media (CBUM) filter. The reject flow from the CBUM filter is returned to the preliminary separator and decanted over the gross solids. In this way, the contaminants removed by the CBUM filter are combined with the gross solids and dried through the auger press. The reject liquid is returned to the CBUM filter with new influent. This allows for complete processing of the raw influent without the need to handle reject sludge.

The Preliminary Separator

The **CleanStream** preliminary separator utilizes a screen filter to separate solids over 50 microns from the raw liquid influent. This screen can be installed with varying size openings depending on the specifications of the specific installation. The separator accepts raw influent and allows the water to drain through the screen while capturing the larger solids. The screen is moved as needed to allow for the continuous flow of liquid through the separator. As the screen rotates, an air knife removes the solids from the screen and deposits them into an auger basin. The auger then squeezes the solids to remove as much water as possible. The dried solids are then discharged from the separator into a holding bin for ultimate removal. The final discharge to the holding bin is solids with a 30% dry matter.

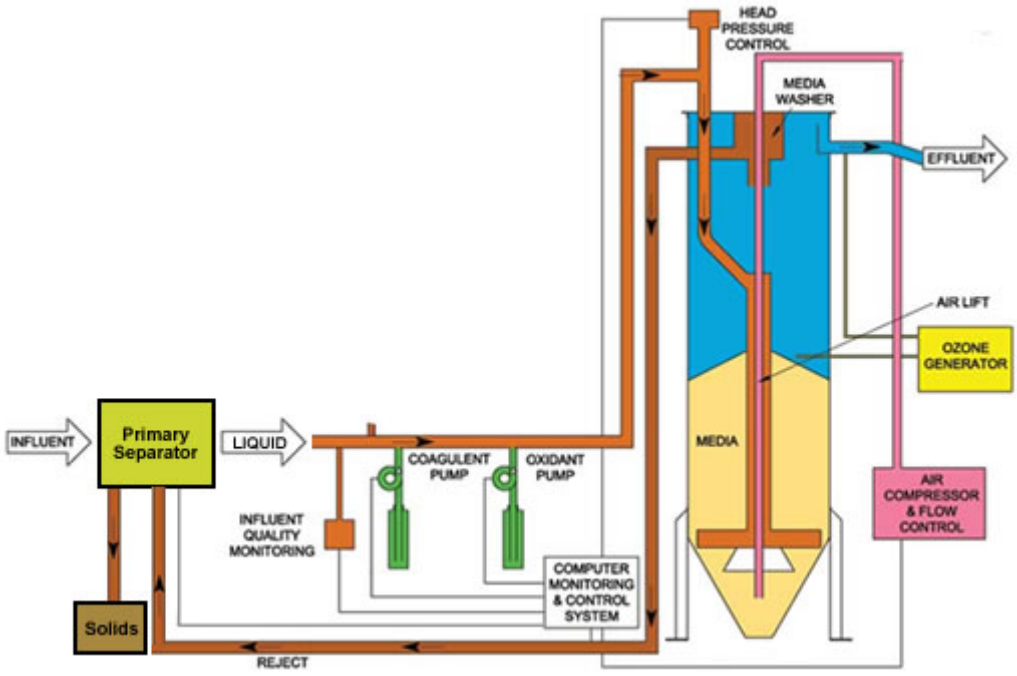
In addition to the preliminary filtration of the influent, the **CleanStream** process includes the return of reject from the CBUM filter to the preliminary separator. This reject is decanted directly onto the screen which contains the removed solids. The polymer and contaminants contained in the reject flow are captured on the screen while the reject liquid is allowed to flow through the screen and be combined with new influent to flow through to the CBUM filter. Using this process, no reject liquid (sludge) needs to be disposed of by the plant.



The CBUM Filter

CleanStream takes the preliminary effluent and flows it through a continuous backwash upflow media filter, while using a polymer to effectively create a “polymer barrier” inside the filter. This controllable “barrier” will remove virtually all suspended solids and BOD remaining in the water. Removing particles that could shield or protect microbes provides increased transmittance for more effective utilization of UV.

The preliminary separator effluent is flowed to the bottom of the CBUM vessel. At the same time, the chemical polymer is added to the influent to allow the polymer to coagulate at the bottom of the media bed. Since the contact time between the polymer and the influent is only seconds, the polymer does not have time to coagulate with the contaminants in the water, as is the conventional process with a CBUM filter. The clean polymer binds with the polymer already in the media, thus reinforcing the barrier within the media. It is this polymer barrier which traps the contaminants from the influent. As the influent moves up within the CBUM vessel, the media is pulled down through the use of an airlift at the bottom of the vessel. Since the dirtiest media is at the bottom, this media is lifted up to a media washer located at the top of the vessel. It is here that the trapped contaminants and polymer are removed from the sand and create a reject flow that is returned to the primary separator. The cleaned media is then allowed to fall back to the top of the media bed and the media cleaning process continues. This cleaning process allows for the breakdown of the barrier by removing the dirtiest areas of the barrier and contaminants. In this manner, the polymer barrier is constantly being formed, through the injection of new polymer, and being destroyed, through the airlift cleaning of the media. Within the vessel, the polymer barrier is being completely reformed every 6 – 8 hours. This eliminates the need for a shutdown of the system for interval cleanings.



Once the influent passes through the media, it is mixed with ozone for the destruction of harmful bacteria and viruses that may be in the water. The use of ozone as the final disinfectant ensures that bacteria, chlorine resistant organisms such as protozoan cysts and even viruses are removed. Since there is no chlorine being injected into the treated water, there are no harmful chlorine byproducts being formed. However, since ozone has no residual contact time, the introduction of chlorine may be necessary after the treated water is removed from the vessel. This will depend on the application being contemplated by the user for the effluent.

Finally, it is possible to place two or more of the CBUM filters in series to obtain higher quality effluent or redundancy for greater assurance of the cleaning process. This is commonly done in municipal wastewater applications where the second vessel provides redundancy protection in the filtration process. Additionally, the second filter can be separated and run in parallel to provide additional capacity for rain intrusion.

Low Maintenance, Low Costs

CleanStream has no moving parts in the filter itself, using mostly gravity and head pressure for flow, and has very little energy consumption. The continuous cleaning of the sand in the filters assures that there is no need for a cleaning cycle or high-pressure pumps. There is no scale build up; irreversible fouling or damage from free chlorine, bacteria or pre-treatment residuals (acids, bases) etc. The preliminary separator utilizes an air knife to clean its screen on an as needed basis.

CleanStream can operate 100% of the time with no down time. When compared to micro-filtration, this is a huge saving in time, money and maintenance. Operational costs are lower than other systems because **CleanStream** is extremely reliable and easy to operate with minimal maintenance requirements.

Modular Design

CleanStream filter tanks can be built of several different media's; concrete, steel, stainless steel or fiberglass, and can be constructed in place or made modular for ease of movement. These filter tanks can be installed either above or below ground.

Because of a very small footprint, **CleanStream** can increase your capacity in the same amount of space by replacing obsolete equipment.

Superior Phosphorus Removal

Under normal wastewater treatment operations, **CleanStream** consistently reduced phosphorus levels below the EPA standards for effluent. As the countries of the world demand more and more control over the removal of nutrients, **CleanStream** has proven to be the technology leader. Our waterways are in trouble from the discharge of badly treated wastewater; **CleanStream** is an effective, low cost method of dealing with these problems.

General Benefits of CleanStream Filtration

Micro-Filtration Performance Without the Cost

Due to reduced capital costs and dramatically lower operation costs over the life of the product, **CleanStream** provides incredible value and performance when compared to Membrane micro-filtration products.

- Minimal energy and back-up power generation needs.
- Continuous self-cleaning filtration and disinfection; No backwash cycle needed.
- Low filter to waste loss.
- Reject water is less than 5% of the total flow so there is little impact on existing plant hydraulics.
- No Membrane replacement due to irreversible fouling, scaling, damage from free chlorine, bacteria or pretreatment residuals (acids, bases) etc.
- No chemical cleaning (CIP), ever!

Small Footprint and Modular Design

Increase your capacity in the same amount of space by replacing obsolete equipment with **CleanStream**

- Modular design makes it an easy fit for large or small filtration applications
- Small footprint allows installation at existing plants or sites with limited space requirements

Contaminant and Chemical Removal

The **CleanStream** System is carving out a niche for itself in wastewater treatment. With no peer in tertiary filtration, **CleanStream** provides a less expensive alternative to membrane micro-filtration. For phosphorus restricted discharge basins and reclamation projects in arid, coastal, and highly populated environs, **CleanStream** is the cost effective solution.

- **CleanStream** reduces total effluent Phosphorus to exceed US Government standards
- Small footprint and modular design makes **CleanStream** a natural for upgrades or new construction.
- Continuously cleaned sand beds eliminate the need for mud wells, clear wells, and backwash pumps.
- Filtration and disinfection are performed in one step, eliminating the need for chlorine contact tanks.
- Ozone is the disinfection method used providing complete pathogen removal with no by products.

Wastewater Pollutant Removals Chart

Parameter	Average Influent to CleanStream	CleanStream Average Effluent
BOD 5	>100 mg/l	< 3.0 mg/l
Suspended Solids	>100 mg/l	< 3.0 mg/l
Turbidity	>100 NTU	< 1.0 NTU
Phosphorus	>15 mg/l	< .1 mg/l
Ammonia	>30 mg/l	<5.0 mg/l
Fecal Coliform	TNTC	< 1 count per 100ml
Cryptosporidium and Giardia	Spike Challenges with final effluent showing non-detect	

Through the use of the patented operating system, ozone and various polymer coagulants, **CleanStream** has been demonstrated to remove most suspended organic and inorganic materials found in wastewater. The processed water is available for reuse in landscaping irrigation and commercial applications.

A Summary of the General Benefits of CleanStream Filtration

- Low operating and maintenance cost in comparison to micro-filtration or conventional sand filtration
- Minimal energy needs (and minimal back-up power generation needs)
- Continuous self-cleaning filtration and disinfection
- Chlorine contact tank eliminated
- No backwash pumps or air scour blowers required
- No clear or mud wells required, no equalization basin, etc.
- Reject water is recycled back across the preliminary separator so there is little impact on existing plant hydraulics
- Unlike micro-filtration, **CleanStream** system is not susceptible to membrane failure due to short-term overloading, irreversible fouling, scaling, damage from free chlorine, bacteria or pre treatment residuals (acids, bases)
- Easily incorporated into most existing facilities
- Modular design allows maximum flexibility for large or small filtration applications

- Integrated pumping system allows flexibility in locating on an existing site
- Small footprint allows installation at existing plants or sites with limited space requirements
- The system is provided on an installed basis to insure performance and cost control

Flexibility towards the Future

CleanStream is more than just a filter; **CleanStream** is a flexible chemical and physical treatment that addresses soluble constituents as well as filterable solids. **CleanStream** filtration also serves as a flexible platform for enhanced chemical processes to meet future treatment needs**.** And our team at MicroMedia Filtration, Inc. is constantly researching new methods for better ways to provide clean water.

MicroMedia Filtration, Inc.
30336 Esperanza, Rancho Santa Margarita, CA 92688
Phone: 949-459-1466 Fax: 949-459-1865
www.micromediafiltration.com
info@micromediafiltration.com

Affordable Wastewater Treatment

There are few things more demanding of communities than the challenge of dealing with municipal wastewater. From the considerable costs associated with even the simplest of traditional lagoon-based treatment systems to the requirement for large parcels of land; the demands imposed upon limited capital resources; the constant struggle to achieve permitted discharge standards and protect the public health of the community; the issue of odour control; the maintenance costs; and the challenge of designing for future population growth, all have to be addressed.

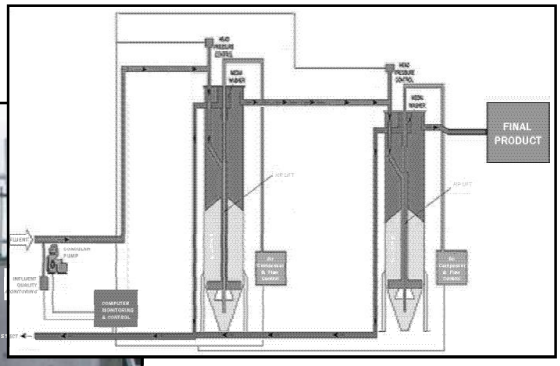
But there is a solution — *a simple, innovative solution!*

Developed by *MicroMedia Filtration, Inc.* in California, perhaps the most demanding performance environment in the world, **CleanStream**™ is a solution that's available, affordable, and effective... indeed, it's now recognised as being among the very best in the world. Offered exclusively in Canada by *Hydra Renewable Resources, Inc.*, **CleanStream**™ simplifies all the challenges of selecting, locating and operating a wastewater treatment system. It is a highly efficient and economical solution for wastewater treatment within small communities — a solution that addresses all the specific needs of a municipality, from performance to affordability.

CleanStream™ is a fully automated, upflow media sysytem that occupies an exceptionally small footprint. The system is markedly superior, in both performance and pricing, to conventional aerobic and anaerobic digesters and lagoon treatment technology. Briefly, it:

- ***Offers Exceptional Economy*** — less expensive than conventional lagoon systems or digesters;
- ***Achieves Superior Treatment*** — employs a unique continuous backwash upflow media (CBUM) filter, using GRAS polymer to create a uninterrupted and automatically regenerating barrier that removes suspended solids, turbidity, BOD_5, COD, phosphorous, and ammonia, etc.;
- ***Polishes with Ozone*** — as the final treatment stage, ozone disinfection ensures that bacteria (fecal coliforms etc.), chlorine resistant organisms, e.g. protozoan cysts, viruses, and heavy metals, are removed;
- ***Produces Exceptional Discharge Quality*** — certified under California Title 22, the world's most stringent discharge standards for surface discharge of treated wastewater;
- ***Occupies An Exceptionally Small footprint*** — a 246 m^3/day system requires a foot print of only 37m^2, a 946 m^3/day system requires only 55m^2;
- ***Can Be Readily Expanded*** — its modular design enables ready expansion to meet future processing needs — up to 7,500 m^3 /day per train.
- ***Facilitates Low Maintenance*** — no moving parts in the CBUM filter, continuous self-cleaning filtration and disinfection, it conserves manpower, energy, and capital;
- ***Reduces Engineering Design Costs*** — it is a modular packaged system; and it
- ***Enables Waste Recovery*** and water recycling — by-products can be recovered and converted to a renewable energy source.

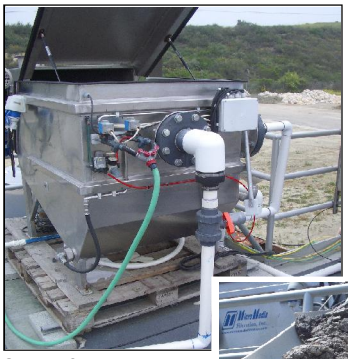
CleanStream™



System Schematic

***Complete CleanStream™ system**: sludge separator, equalization tank, and CBUM filtration columns.*

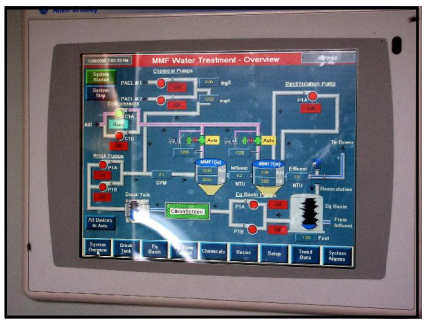
PRELIMINARY SEPARATOR: The **CleanScreen™** separator, an integral part of **CleanStream™**, removes solids from the raw influent prior to wastewater treatment. The resulting sludge cake is a remarkable 30% - 35% dry matter. Sludge cake can be disposed of in several different manners *OR* converted to renewable energy using the *gasification* option.



CleanScreen - *see shipping skid as a scale for footprint.*

PROCESSING CAPACITY & FOOTPRINT: **CleanStream™** is configured in modular incriments. The small module processes up to 246 m^3 / day (65,000 US gallons / day) and occupies a footprint of just 37 m^2 (400 ft^2). The large module will process up to 946 m^3pd (250,000 gpd) and requires just 56 m^2 (600 ft^2). Multiple modules, up to 8 per train, can be configured to operate in parallel, with a single train capable of treating up to 7,500 m^3/ day (2 million gpd). Multiple trains can be configured to achieve any processing capacity desired.

FULLY AUTOMATED SYSTEM: The computer control screen, below, provides an overview of the **CleanStream™** systems management environment. The system is designed to allow for off-site monitoring and management using a simple internet connection.



GASIFICATION: As an option, recovered sludge cake can be converted to renewable energy by gasification. Methane, a direct result of the process, can be employed in a variety of applications. In addition, the dry ash residue from gasification - typically 5% of the volume of the feed cake - is both nontoxic and a commercial grade of fertilizer.

For further information please contact:

Hydra Renewable Resources Inc.
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Alberta: Elmer (El) Haluschak
telephone: 780.646-3300
email: elmer@hydraresources.com

British Columbia: Dale Bishop & Mark Paganelli
telephone: DB - 250.703-3142 MP - 250.218-1725
email: dale@hydraresources.com / mark@hydraresources.com

January 26, 2007

Mr. Dale Bishop
Hydra Renewable Resources
4706 49th Street
Myrnam, Alberta T0B 3K0
Canada

RE: REGULATORY REQUIREMENTS FOR DISCHARGE IN BC

Dear Dale:

You have requested that MicroMedia Filtration, Inc. review the Municipal Service Regulations for treated wastewater discharge in British Columbia. We have reviewed these Regulations and the requirements for unrestricted public access standards for reclaimed water. These standards, as detailed in Schedule 2 of the Regulations, require that treated wastewater maintain a BOD level of <10 mg/L and NTU levels of <2.0. Additional requirements are fecal coliform levels <2.2/100mL.

The CleanStream® filtration system has been designed to effectively treat domestic sewage to levels that meet the regulatory requirements of California. The typical effluent from the system has consistently demonstrated BOD, TSS and Ammonia levels below 5 mg/L. Additionally, NTU levels typical average 1.2 – 1.4 NTU's over a 24 hour period. Fecal coliform levels have typically been at a non-detect level with detection limits of 1/100mL.

Based on our review of the BC regulations, the CleanStream filtration system will meet and exceed all requirements for the permitted use of reclaimed water on unrestricted public access venues.

Very truly yours,

Sam Luxenberg
Chief Executive Officer

30336 Esperanza, Rancho Santa Margarita, CA 92688
Phone: (949) 459-1466 Fax: (949) 459-1865 E-Mail: slux@micromediafiltration.com