Legends: ‘Safe Water for the World’ The Water Filter Story – Part 2

June 13, 2018

Dr. David H. Manz, P. Eng.

Commercialization remains a very important element of my mission.
First efforts at commercialization in 1995 to:

- Provide a greater role for the technology in developed countries (variety of capacities, scope of treatment and method of operation).
- Increasing accessibility to product – using market system to disseminate technology.
- Solve water treatment challenges in developing countries.
- Generate resources to further develop technology.

Davnor

Water Treatment Technologies Ltd.

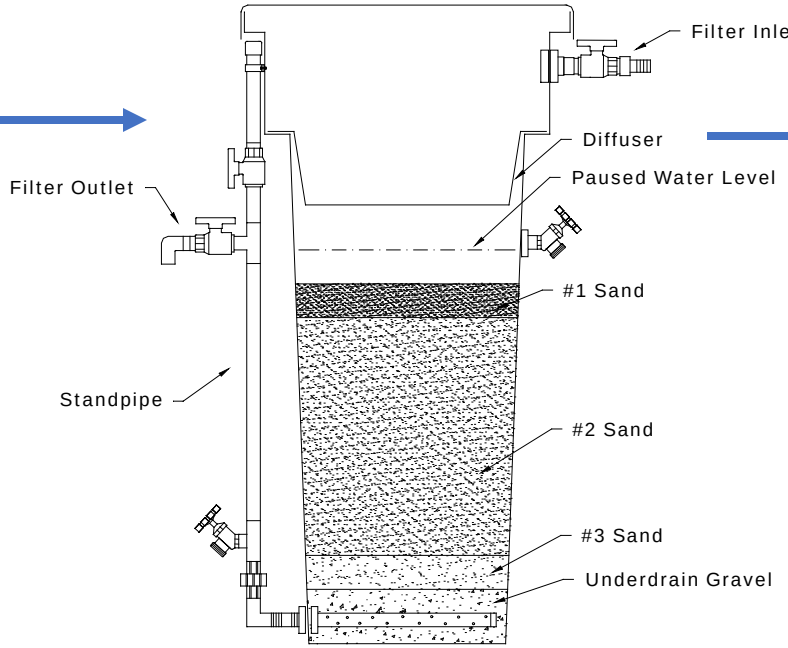
Davnor had the right idea; but only partly successful because of limitations of the technology, the business model and lack of business experience.

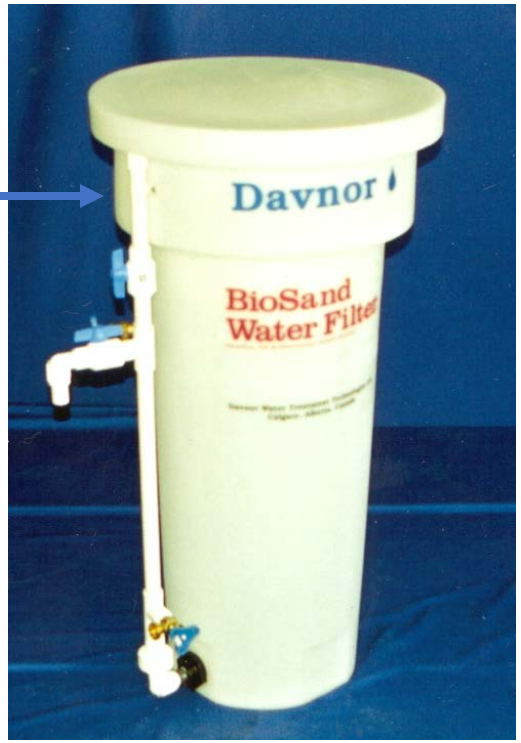
Commercialization of the BSF technology was initiated by Davnor Water Treatment Technologies Ltd. (1995) and was continued by Pure Filtered Water Ltd until recently.

Pure Filtered Water Ltd. Attempted to license the BSF technology to interested companies and NGO's. Only one taker.

Commercialization is considered essential for rapid technology introduction.

Commercial and Concrete Versions of the BioSand Water Filter.





Humanitarian

Commercial

First commercial plastic filter funded by Ranger Oil for use in Angola.

Evaluating performance of BioSand Water Filter (then known as the Canadian Water Filter) at the National Water Research Institute in Burlington, Ontario (funded by the International Development Research Foundation – Dr. Barney Dutka lead the project.

First factory in garage behind home.

First Davnor product named the ‘Canadian Water Filter’.

Davnor continued to develop the humanitarian and commercial product, which could also play an important role in providing safe water to the world.

One of our first plastic filters being installed in a First Nations Community in British Columbia 1997.

CAWST is born!

CAWST was founded in 2001 as a result of conflict-of-interest between interests of a publically traded for-profit company, Davnor Water Treatment Technologies Ltd., and not-for-profit initiatives.

Decided to co-found Centre for Affordable Water and Sanitation Technology with Camille Dow-Baker who would be the CEO. Intention was that CAWST would carry on with my vision for the BSF, and a broader non-commercial agenda that included sanitation.

Under Camille's leadership CAWST became very effective at disseminating the concrete BSF technology.


Davnor show room 2004
Davnor
BioSand
Water Filter
Davnor
GA Carbon
Water Filter

Davnor manufactured a variety of manual and automatically operated filters and filter systems for homes and communities.

Davnor show room 2004

CALGARY HERALD • SUNDAY, NOVEMBER 8, 1998 A9

HURRICANE MITCH

High-tech help on way

MIKE DEMPSTER
CALGARY HERALD

A life-saving shipment of high-tech Calgary water filters is winging its way on a Canadian military jet to Nicaragua, the Central American country devastated by Hurricane Mitch.

Last week's storm killed thousands of people in Central America and left hundreds of thousands stranded and helpless as mudslides and flooding battered Nicaragua, Honduras, El Salvador and Guatemala.

Clean drinking water is in short supply and waterborne diseases threaten helpless survivors, David Manz, said Saturday. The University of Calgary professor, who developed the filters, said the equipment could be in Managua, the Nicaraguan capital, as early as Monday.

Unsanitary conditions provide a breeding ground for numerous diseases, said Manz. Government health officials are especially concerned with cholera, malaria and dengue fever.

"Cholera spreads primarily through feces," said Manz. "If it gets into a stream above a community, that community has serious, serious, serious problems."

Even the rinsed water from someone washing soiled clothes can deploy the bacteria on a deadly rampage, he said.

"When you get cholera, you get vomiting and diarrhea simultaneously. And the people die due to dehydration."

Calgary-based Samaritan's Purse, an international Christian relief organization, has purchased the filters and will distribute them with the co-operation of the Nicaraguan government, said John Clayton.

Eighty small filters, capable of purifying 20 litres of water per hour, and four larger units that will clean 600 litres per hour, will be put to use immediately, he said.

"There is no question they will be deployed rapidly."

Damaged roads and limited air transport has made it difficult to get medical supplies to victims, leaving many survivors at the mercy of quickly spreading diseases.

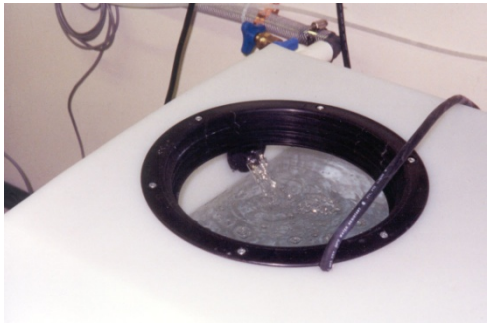
Meanwhile, Celine Danis, a Calgarian working as a lay missionary in the mountains of Nicaragua remains safe, her mother, Annette Danis, said Saturday.

Danis' was to return to Calgary this week from a two-year placement with the Voluntary International Christian Services missionary group. However, the roads are impassible and it will be at least another week before she comes home.

Emergency relief!

Stoney Adolescent Ranch

Alberta



- **Surface water (Bow River) and groundwater for iron.**
- **2x 240 lph BioSand filters with chlorine disinfection.**

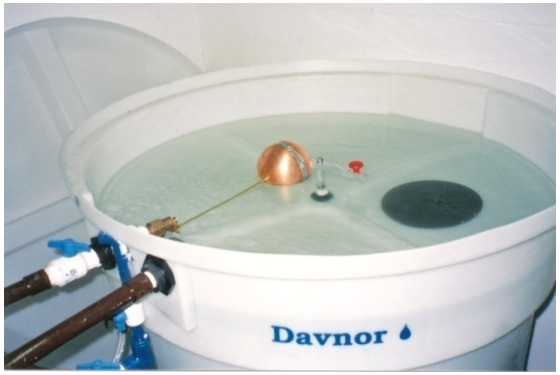
Seymour Arm

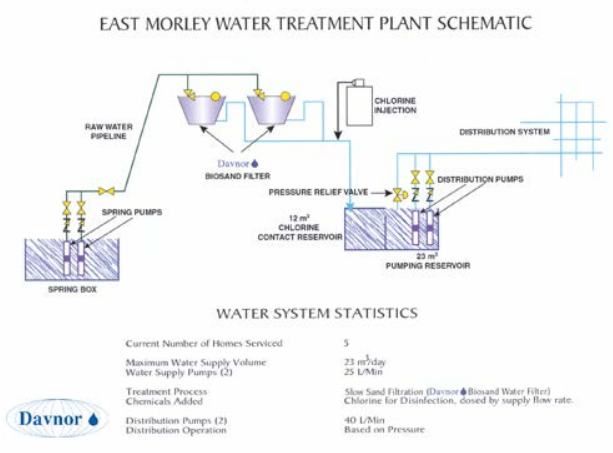
Shuswap Lakes, B.C., Canada:

- **Drinkng water only.**
- **2x240 lph BioSand filter followed by UV disinfection.**
- **Serves 110 cabins, camp ground and a small hotel and restaurant.**
- **Self serve.**
- **Generates own hydropower.**

East Morley, Alberta

- **Shallow spring.**
- **2 x 600 lph BioSand filters used in parallel followed by chlorine disinfection.**

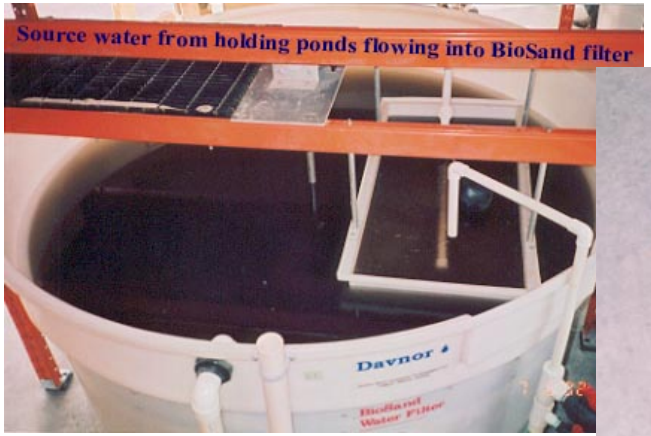


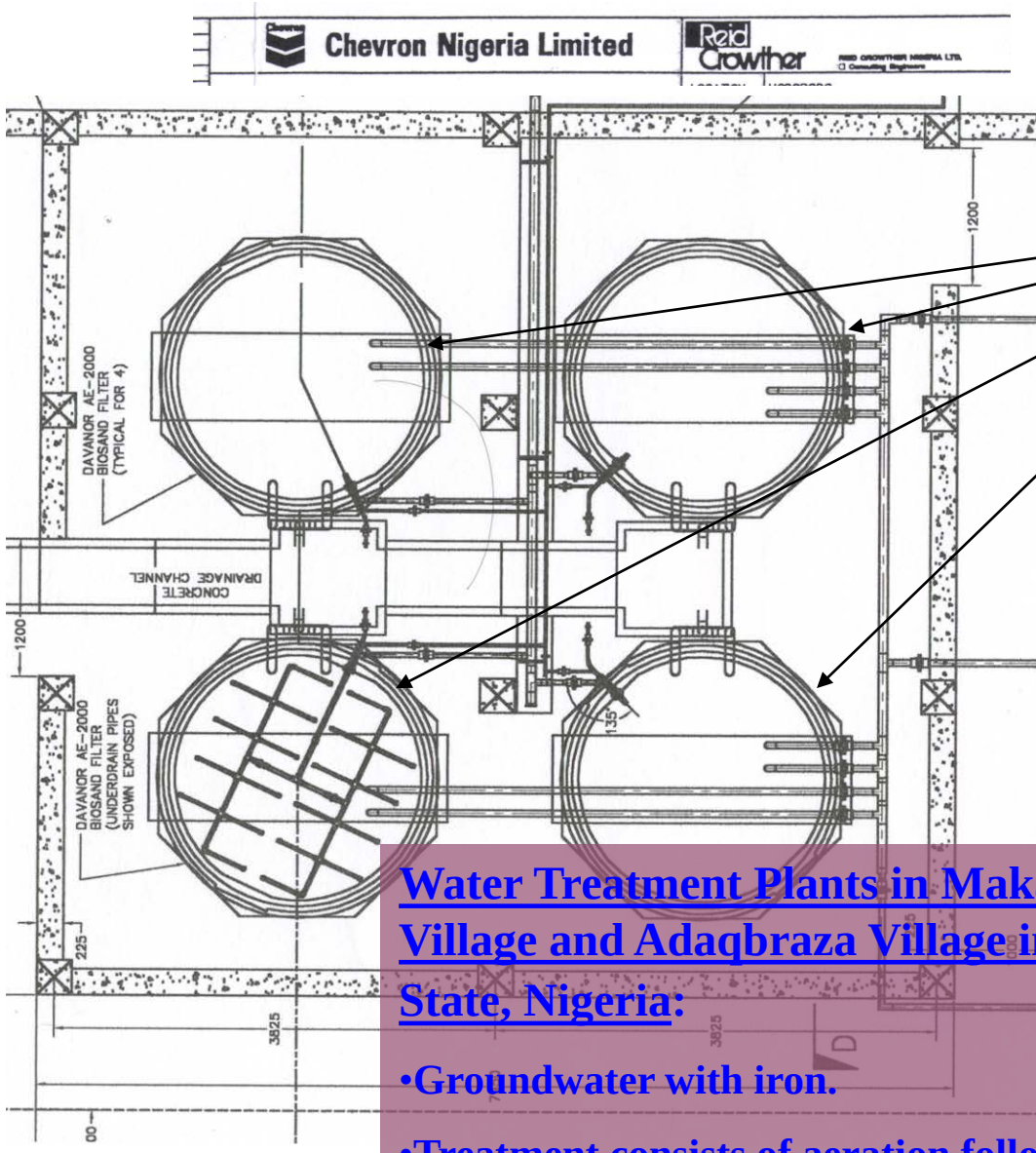


Stormwater Treatment Vancouver Island, B.C.

Stormwater runoff from coal loading pads must be treated prior to discharge into ocean.

2x2000 lph BioSand Filters





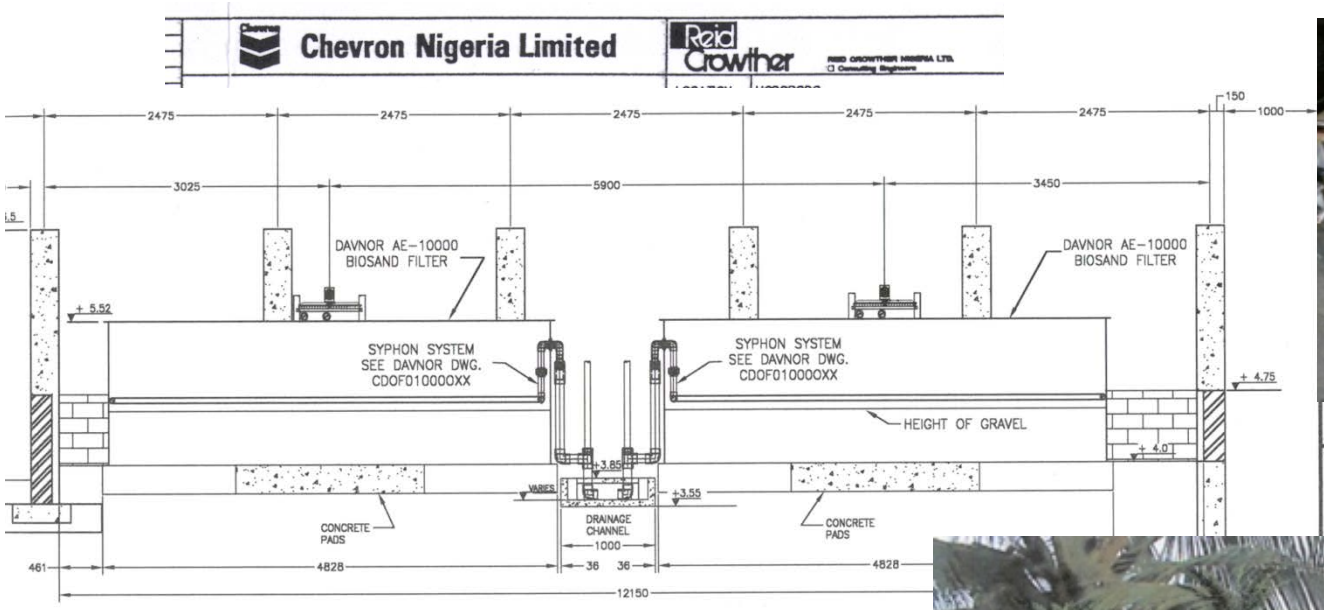
2,000 lph BioSand Water Filter

Davnor Aerator

Water Treatment Plants in Makaraba Village and Adaqbraza Village in Delta State, Nigeria:

- Groundwater with iron.
- Treatment consists of aeration followed by 4x2,000 lph BioSand Water Filters chlorination for purposes of iron removal.

Dave and Ali El Maawia (Davnor engineer) posing on 10,000 Lph BSF ready for shipping.



10,000 lph filter

Water Treatment Plant in Didi Village, Delta State, Nigeria:

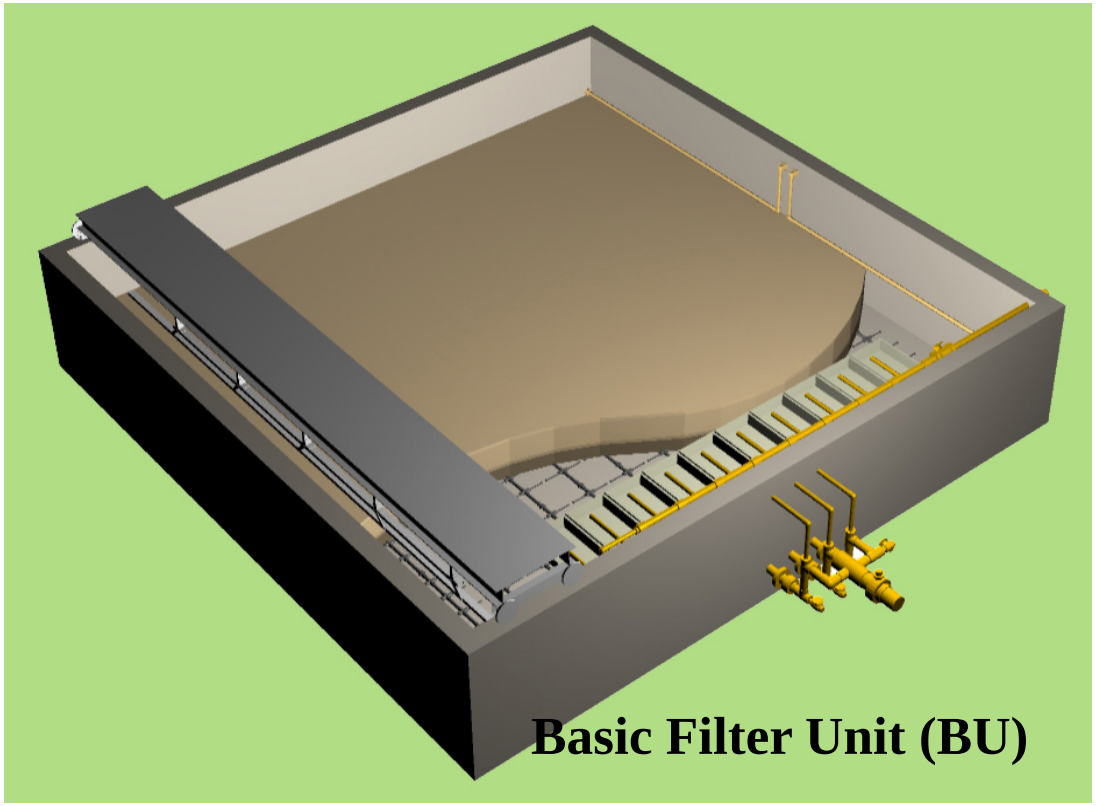
- Groundwater with iron.
- Treatment consists of aeration, 2x10,000 lph BioSand Water Filters and chlorination.

Manufacturing the BioSand Water Filters for the Chevron's Nigerian Projects in Davnor's Manufacturing Facilities in Calgary, Canada.

Container of Davnor filters on the way to Africa.

Finishing construction of the 38,000 lph BSF in Honduras.

Individual filters developed with capacities from 60,000 lph to 960,000 lph - systems to 20,000,000 lph.



Basic Filter Unit (BU)

60,0000 lph will be installed in a small community just south of Calgary, Alberta in 2005.

The biggest problem that faced the BSF technology was that there were very limited economies of scale.

A new technology named the 'Low Operating Head Polishing Sand Filter' or 'LHPF' , a variation of the BSF that could be cleaned using a low budget form of backwash was developed. The LHPF was very successful for treatment of well water but experienced the same challenges as conventional treatment technologies when treating surface water.

Low Operating Head Polishing Sand Filter (LHPF) – next generation of BSF.

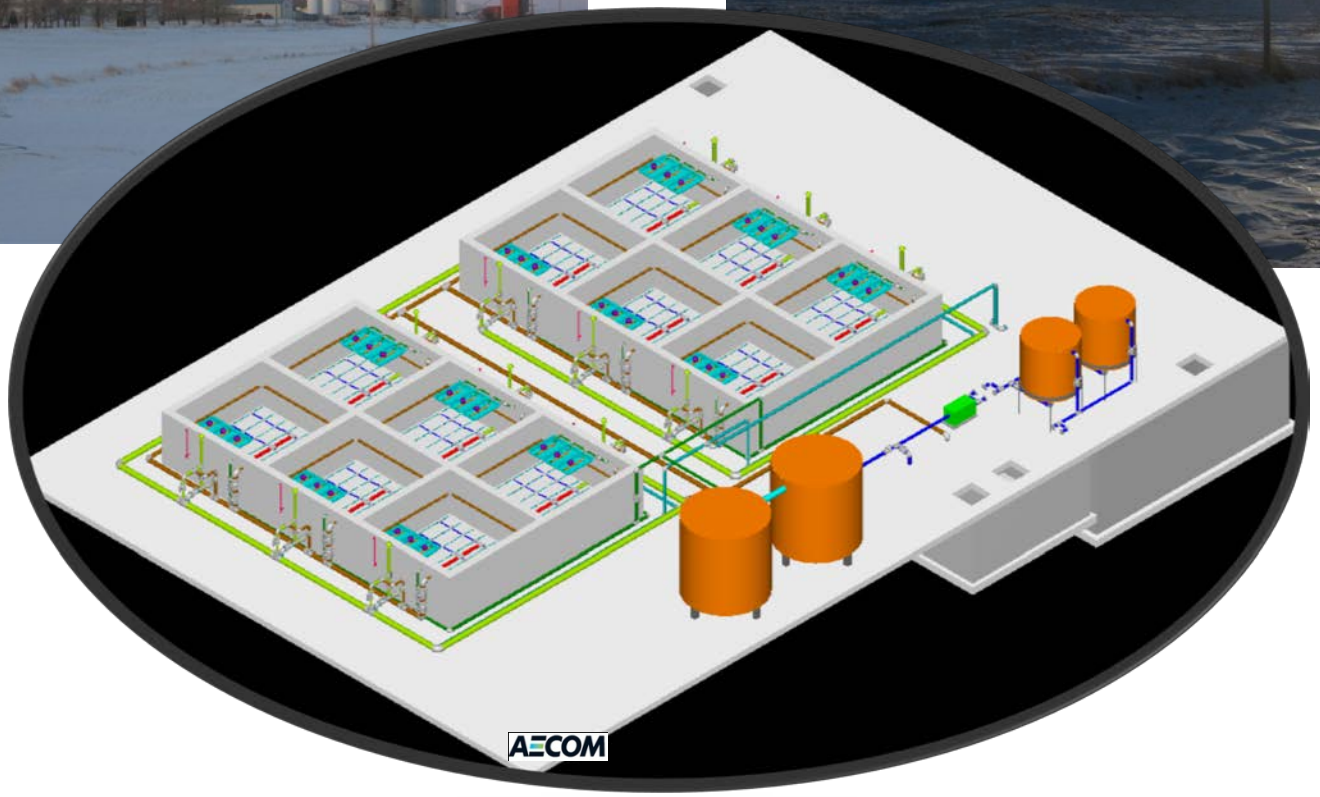
Developed by me and implemented by UMA consulting engineers in 2005. Later attempts to commercialize met with limited success because of intense competition in limited market and lack of financing.

Stavely Water Treatment Plant

50,000 L per hour.

LHPF allows filter cleaning using a backwash process unlike the BSF which is cleaned using surface agitation.

Inside Exshaw water treatment plant showing four filters and three contact tanks.



Water treatment plant to remove complexed iron and manganese from groundwater - Saskatchewan, Canada construction completed 2014- 100,000 LPH with 100% recycle of wastewater.

LHPF - type (4500 LPH) constructed in the Pacific Northwest of Colombia. December 2009

4m x 4m x 2m filters ready for transport to plant.

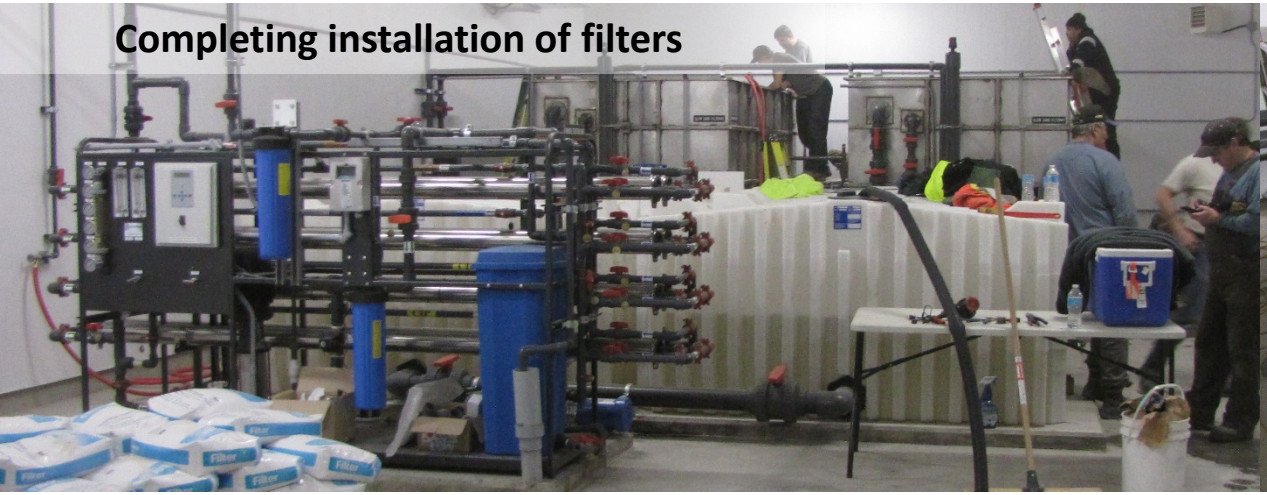
Prefabricated filters
Stainless steel construction

- 4m x 4m x 2m
- 2m x 4m x 2m

Array of four 4m x 4m x 2m filters installed and operating.

Array of two 2m x 4m x 2m filters installed and operating.

Island Lake WTP – Manitoba, Canada



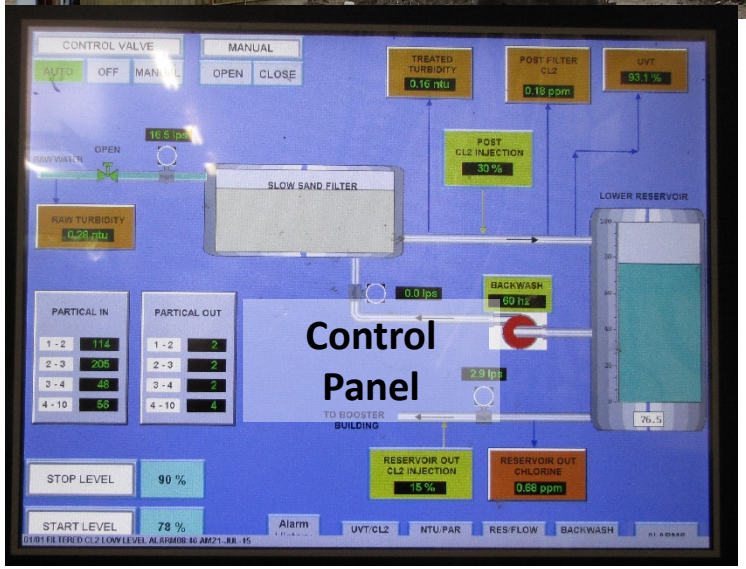
Crane River WTP – Manitoba, Canada

UV Disinfection following nanofiltration

Water is chlorinated using sodium hypochlorite prior to storage and distribution

Fauquier WTP – British Columbia, Canada

Transport to site.



UV disinfection is being added.

Davnor's first attempt to license the BSF technology in Bangladesh in a partnership with Bill Richards and his son Fred Richards around 1995. The project included the construction of a factory in partnership with a major local NGO, Proshika. Funding was provided by the Government of Canada.

Inside the factory and testing the filter.

Continuous developments such for arsenic removal in Bangladesh (40 million people affected).

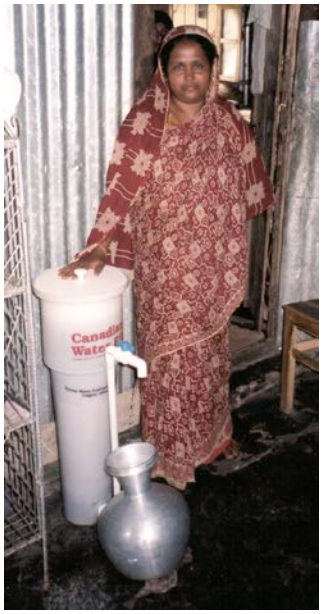
98% removal of arsenic

and pathogens

for less than $3.00 per family per year.

(Awaiting certification 7 years after technology development – CIDA problem.)

The Bangladesh initiative was proving successful but eventually faced serious corruption and destructive political forces.



The BSF technology was purchased by an Alberta Company, Pure Filtered Water, after Davnor Water Treatment Technologies Ltd. stopped operations in 2004.

The HydrAid Filter was manufactured in the United States under license from Pure Filtered Water. This was the only license granted.

The HydrAid Filter was evaluated in Cambodia, Ghana and Honduras and is now marketed near cost around the world.

HydrAid – 1st Licensee for plastic BSF

Cambodia

Ghana

Honduras

Filter is supplied without media and the intended market was to be NGO's.
Limited success attributable to design concept and business plan but still being produced.

The ‘adventure continues’.

Manz Engineering Ltd. – Manufactures and markets community scale treatment systems and frac flowback treatment technology.

Davnor Water Filters Ltd. - Manufactures and markets the Cabin Clean Water Filter.

Latest development is the CABIN 'Clean Water Filter'.
It is a short, light, portable and economical variation of the BSF.
See: www.cabincleanwaterfilter.com

CABIN 'Clean Water Filter'

End Part 2