

TERRAGON REPORTER



No Waste News

A Message to Our Readers

NOVEMBER 2016

Dear Readers,

Welcome to the 4th edition of the **Terragon Reporter** – No Waste News. This past quarter has seen the successful shipment and installation of several MAGS V8s. MAGS is now being successfully employed as a management solution for plastic material contaminated with explosives in the United States in addition to being first used in Canada. Moreover, a new MAGS system is currently being set up in the environmentally conscientious country of Costa Rica, serving as further testament to the important role MAGS has to play in ecologically sensitive environments exposed to potential contamination from various waste streams.

Aside from propelling forward commercially in several markets, Terragon was awarded a contract from a Research Center within the US Department of Defense to deliver a MAGS V8 in January 2017 for evaluation purposes. Finally, Terragon is proud to report that WETT-O was one of five finalists for the Engineering Innovation Award at the September 2016 Lloyd's List Global Awards event held in London, England, which recognizes the best innovations in shipping globally during the last year.

Terragon looks forward to more exciting endeavors in the next several months and, as always, invites you to join our revolution by sharing and following us on Facebook and LinkedIn and visiting our website.



NEWS



WETT-O trial on a Group Ocean tug: A Success Story

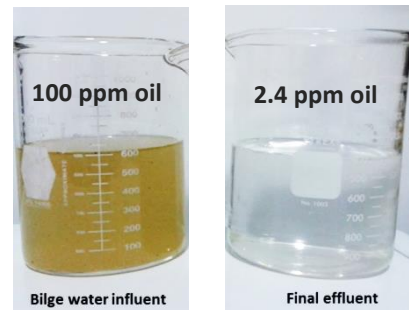
Terragon is proud to announce that the 3rd shipboard trial of its WETT-O bilgewater treatment system, a patented and Type Approved electrochemical treatment technology for oily bilge water was successfully completed. The objectives of the trial were: 1) to validate the WETT-O technology with a view towards commercialization, 2) to assess the operability and durability of the unit and 3) to assess its ease of operation and maintenance by the user.

The WETT-O trial was the result of an exemplary collaboration between Group Ocean and Terragon. The system was installed in March 2016 on the Ocean Basques tug. The tug was at the port of Trois-Rivières and WETT-O operation was overseen by the Chief Engineer. The system treated oily bilge water while the ship was at port; the treated effluent was collected in an effluent tank and discharged when the ship was en route.

WETT-O operated successfully for nearly 700 hours between March and July 2016. Depending on ship operations and bilge water availability, the system was left to run for multiple consecutive days without interruption. WETT-O was operated in high discharge operation mode, which implies treatment of bilge water at 1 liter per minute, collection of treated effluent, and periodic rapid discharge at a high flow rate (87 liters per minutes). The system successfully treated all of the bilge water generated by the tug and at no time did the treated effluent exceed 15 ppm. For more than 80% of the time, WETT-O provided a treated effluent with less than 5 ppm oil content. The 20% of the time that it was above 5 ppm was associated with a deliberate introduction of important quantities of cleaning chemicals into the bilge, malfunctioning of the bilge pump which was due for replacement, or an improperly maintained OCM.

It is important to note that WETT-O comes with a Type Approved TD-107 laser-induced fluorescence sensor to detect oil content in the treated effluent. Unlike other commercially available OCMs based on light scattering, laser-induced fluorescence sensors are not influenced by the presence of suspended particles, gas bubbles or other pollutants that scatter the light. This greatly reduces false positive alarms that result in the unnecessary return of treated effluent to the bilge after treatment.

Oily bilge water and treated effluent samples were collected and analyzed during the trial. The water contained free oil and emulsified oils (about 100 ppm of emulsified oil) and rust particles as demonstrated in the sample pictures. The oil content in a representative sample of treated effluent was analyzed by an accredited laboratory and contained 2.4 ppm oil.



Another shipboard trial of WETT-O is underway until December 2016. After Q1/2017, WETT-O commercial units will be available and Terragon looks forward to revolutionizing ship bilge water treatment with its novel electrochemical approach.



WETT-O installed on-board the Ocean Basques (left). Group Ocean personnel participating in WETT-O commissioning and training and Terragon team (right).



Terragon, Crystal Cruises, and the Northwest Passage

Recently, Crystal Serenity completed a 32-day voyage from Alaska to New York City through the Northwest Passage just north of Canada, marking the first time a large luxury cruise ship successfully traversed its way through the Arctic region.

The Arctic is quickly growing in terms of strategic importance related to new transport routes and natural resources. Development has been met with the recognition that the Arctic is a sensitive environment. Conscious of the pristine nature of this area, Crystal Cruises elected to bring onboard a unique waste-to-energy system developed by Terragon. The patented system (MAGS or Micro Auto Gasification System) is commercially available and can handle up to 50 kg/hour of solid waste, converting it into useful thermal energy. Unlike marine incinerators, MAGS does not release soot or other pollutants to the air, a true benefit for both the environment and the passengers. Throughout the transit, Crystal operated as it always does with a nothing overboard policy, and throughout the voyage it operated in a manner to meet or exceed all environmentally regulatory requirements for the region.

On August 29, the Crystal Serenity stopped at the Northern community of Cambridge Bay (Nunavut), where another MAGS system is undergoing field trials. Thus, for a brief period, a shipboard MAGS and a land-based MAGS were brought together in the Arctic, a testament to the growing recognition of the potential of Terragon's MAGS technology for the North. Providing clean energy fueled by waste to both Cambridge Bay and the Crystal Serenity marks a shift in overall philosophy, where waste is viewed as a valuable resource rather than something to be discharged to land or the ocean. Terragon is proud to be associated with these groups, whose interest in sustainable practices will serve as examples for others and lead the way forward.





*A variety of lettuce is grown daily in the Chena Fresh Greenhouse at Chena Hot Springs Resort in Alaska.
Photo by Denise Ferree*

Integration of MAGS and a Greenhouse for Food Security in Northern Communities

Recently, the issue of Food Security in Northern Canada has become a focus of public discussion and political advocacy. Nearly 20% of Inuit and aboriginal peoples living in Northern communities face severe food insecurities (completely disrupted eating patterns) and up to 70% face some kind of regular food insecurity (skipping meals, reducing portion sizes). This is a serious problem which can threaten social stability, cultural integrity, physical and mental well-being, education, as well as economic development.

Several organizations, including Health Canada, the Council of Canadian Academies, Food Secure Canada, and the Nunavut Food Security Coalition, have released reports detailing the complex issues facing “North of 60” communities with regard to food security and sustainability. There are four components to food security that are highlighted in these reports: availability (wildlife and/or fresh produce), accessibility (finances for hunting supplies and/or groceries), quality (healthy food that has cultural value), and food usage (best practices for obtaining, storing, preparing, and consuming foods). These components are multi-faceted and include interconnected determinants that are outside the reach of any single organization be it academic, private sector, provincial, or federal. A collaborative approach has been recommended and generally agreed upon. It is in this spirit that Terragon is forming partnerships with other organizations to build a MAGS + Greenhouse solution that will help promote food security in the North.

Currently, the growing season in many Northern communities is less than 100 days, often 60-80 days. Extending the growing season with greenhouses has been on the agenda in many communities for a long time, but there remain several hurdles to overcome before these systems can become a feasible solution. Terragon’s MAGS system, when integrated with a modern, technologically robust greenhouse, provides a leap over some of these hurdles by supplying the energy needed for heating during the cold winter months, biochar for carbon sequestration and soil amendment, and the use of CO₂ in the exhaust to enhance the growth of food – all of this while also providing an environmentally friendly way of getting rid of the community’s waste that is currently just open-burned at a dump site. In this new vision of a decentralized, energy autonomous community, “waste streams” become “resource streams” that help bolster food security and energy autonomy and provide a path toward long-term sustainability.