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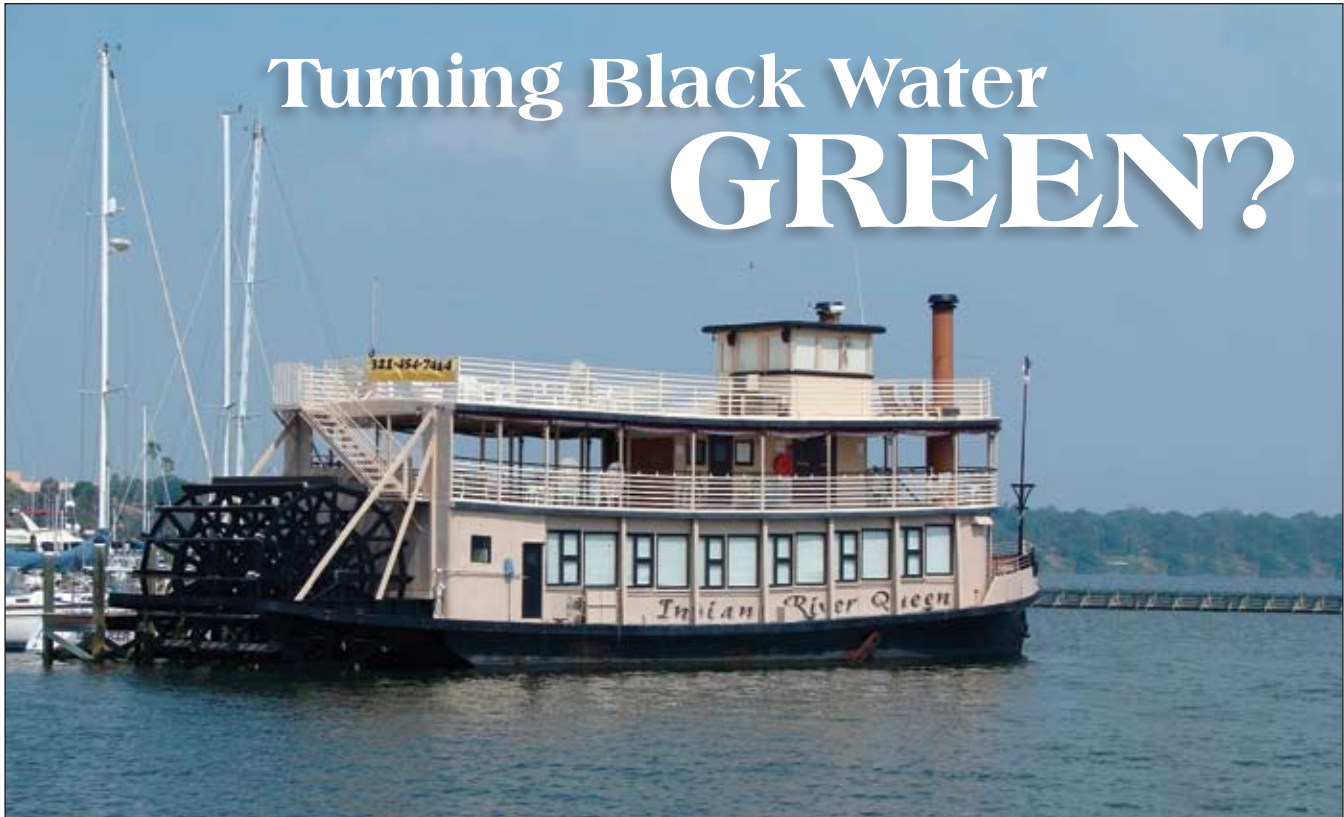
Foghorn Focus:

Environmental Issues

**Turning Black
Water Green?**

Hybrid Propulsion

**EPA Marine
Emissions
for 2009-2018**



New System Reclaims Vessel Wastewater

By Alfredo Teran, AJT/Agrimond

Picture a cruise boat with 250 guests in the afternoon. The crew is on board a couple of hours before the guests begin to arrive and a new kind of onboard black water treatment system has already treated the wastewater from the day before. The portion of the system that processes and treats the black water is activated. The cruise takes approximately five hours. After the guests have left, but before the crew leaves the vessel, the second portion of the process is activated. There are approximately 500 gallons of water in the black water holding/treatment tank with this new kind of black water treatment installed and already doing its magic. The next morning as the crew inspects the vessel, the black water holding tank is now at its lowest level and has full capacity available to store today's

waste. In the reuse tanks, 500 gallons of treated and disinfected water awaits the next cruise. This is not fiction. This new system requires no



Capt. Jim Georges.

dumping, no pumping, no handling and no discharge. The treated water has no odor, is safe, clear and very hard to distinguish between it and tap water. In fact, the treated water

has potential non-potable uses. With the addition of the proper in-line filter(s), the treated water can be used for many other applications such as washing/rinsing the boat, cleaning the deck and cooling, etc.

Issues involving the offshore dumping of black water have been in our local papers for years. In the Port Canaveral area, the local population is upset that the dumping has increased due to the cruise and the entertainment ships operating out of Port Canaveral. As a result, approximately two years ago, Alfredo Teran, the founder of AJT/Agrimond, received a call from Ms. Penny Flaherty. Flaherty owns the famous *Indian River Queen* (IRQ) a riverboat cruise ship, based in Cocoa, Florida. She had seen an article in the local paper about AJT/Argimond's Dragonfly fitted portable land-based

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toilets. She wanted to know if a Dragonfly system could be converted into a marine system and installed in the *Indian River Queen*. IRQ Captain Jim Georges, and AJT/Argimond's engineers went to work on obtaining Coast Guard approval for the MSDIII required modifications. After implementing the modifications, that ship became the first vessel to operate in the Intercoastal Waterways with a totally self-contained black water treatment and reuse system. It has been one year since the system was installed and there has been no need to pump or dump its black water since installation. Needless to say, the project attracted a great deal of attention from the local population, politicians and the Coast Guard. There has never been a system like it in any vessel.

How does the system work?

The owner of the *Indian River Queen* wanted a "green" boat. The environmental consequences of this revolutionary marine black water treatment system ranked as high on her list as being able to run more cruises by not having to take the time to pump out the black water holding tanks. The engineers at AJT/Argimond describe "green" process



Indian River Queen.

as the combination of two different aspects:

The First aspect – Biological Consumption: the biological consumption and breakdown of waste material by specially selected microorganisms results in this task being performed extremely fast and efficiently. Just like some of the most effective systems that treat waste in land based installations, as well as large marine sanitation systems, the Marine Dragonfly utilizes an aerobic (requires/consumes oxygen) based biological treatment process. Unlike anaerobic treatment systems, such as septic tanks, aerobic systems are

extremely fast, efficient and they do not stink. Aerobic systems require oxygen/air to speed up the process.

The Second aspect – Reclamation: reclamation and disinfecting of the water to be reused to flush the toilets. The disinfection technology used in the Marine Dragonfly is different than what is typically used such as chlorine tablets, bleach, and other available chlorine products. The Marine Dragonfly systems use oxygen and ozone. Accordingly, there are no toxic residues, and it is an extremely efficient biological process that uses air as the source for the oxygen. The table below shows the environmental benefits and other important advantages of using ozone versus chlorine.

In the Marine Dragonfly system both aspects are completely and effectively integrated into an environmentally friendly system.

Compliance with Coast Guard Regulations

Creating the cruising flexibility of not being restricted by the black water tank capacity was a major benefit of the system for the *Indian River Queen's* owner. But just as important to Flaherty and Captain Georges

OZONE - MORE THAN JUST A DISINFECTANT		
	CHLORINE/ CHLORINE PRODUCTS	OZONE
Oxidation Potential	1.36	2.07
BOD Reduction/Elimination	Unlikely	High
Color Removal	Fair	Excellent
Odor Removal	Fair	Excellent
Disinfection	Moderate	Excellent
Residual or by-products	Yes	No
Carcinogen Formation	Most Likely	Unlikely
pH Effect	Variable	Minimal
Micro flocculation	None	Moderate
Environmentally Friendly	No	Yes

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(Above) Rocket boost. (Right) Interior.

installed on the world's largest gambling ship. This ship, the Sterling Casino's *Ambassador II*, operates two cruises-per-day, seven days a week, and is based out of Port Canaveral, Florida. It sails with more than 1,700 passengers and crew on each cruise. The system was designed to process up to 10,000 gallons per day of black water. Just like the smaller *Indian River Queen* application, the system



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was U.S. Coast Guard approval. This new system has qualified as an MSD III device. See page 26 for chart of marine sanitation devices.

Modifications on Retrofit

Typical modifications to retrofit a vessel include:

- a) Addition of a sub power panel for the operation of the Marine Dragonfly
- b) Modifications to the MSD III Tank
- c) Modifications to the plumbing system to separate the toilet and urinal water supply from the potable water supply system of the vessel
- d) Installation of the Marine Dragonfly
 1. Programmable Logic Controller (PLC) & relay bank
 2. Secondary water supply system (pump and pressure tank)
 3. Installation of a sewage pump and aeration system
 4. Addition of a clarifier system connected to the black water holding tank

5. An Oxygen/ozone treatment system
 6. Plumbing and valve system controlled by the PLC
- e) The development of engineering drawings and specifications
- f) Operating procedures of the Marine Dragonfly

Both boat owners and the company officials acknowledge that installations designed and installed during manufacturing of a vessel will save considerable cost and time over a retrofit. In addition, Coast Guard approval will also be easier to obtain on a new vessel installation on the production line. The results from these current installations have boat manufacturers and shipyards inquiring into the possibilities.

New Black Water System Knows No Limit

This same technology can be applied to small vessels and private yachts all the way to today's largest cruise ships. In fact, the Marine Dragonfly system is current being

allows for 100% recycling of the water and the sludge from the black water tank. The installation was again an adaptation to an existing system. All of the existing tanks were utilized with minor modifications and the new equipment was installed in a small room (approximately 10ft X 12ft).

The Future is Promising

We can thank NASA's space program and the federal government for this latest technology. This technology and the company that offers it have been in operation for almost 20 years with its roots solidly based in the U.S. Space Program. The technology began almost 15 years ago, when NASA tasked AJT/Agrimond to develop a system to "recycle" wastewater used to clean the shuttle's Solid Rocket Boosters. From that moment on, this technology has been in use in almost every continent in the world and every region of the U.S. as AJT/Agrimond continues to research and

develop unique wastewater treatment systems.

The first human waste system of this kind was installed in a Department of Defense mobile facility almost five years ago. It processed the wastewater of two toilets and three sinks. Like the current marine application, there is zero discharge, 100% reuse of wastewater.

Use of reclaimed water is a standard practice in many communities in the U.S. and around the world. However it is typically found in huge multimillion-dollar municipal wastewater processing plants. This same capability has been duplicated on a much smaller

scale with significant technologies that allow for the key features of the company's Marine Dragonfly system.



Sterling Casino's Ambassador II.

It enables reuse of the water and recycles biomass so as to eliminate the need to dispose of nasty solids from the system. It is science, biology,

chemistry, computer programming and clearly a great deal of experience and ingenuity that stands behind the company's Marine Dragonfly.

The company is now working on a variation of the marine Dragonfly system that can process the gray water. You could say the future of marine waste water is looking very environmentally "green" thanks to the tenacity of passenger boat owners like Penny Flaherty and the company

that made her vision come true, AJT Agrimond. ■

Alfredo Teran, is the CEO & President AJT/Agrimond.