## Background

**Westward Seafoods** operates a power generation plant in Dutch Harbor, Alaska to supply its factory operations and support buildings. They are a major fish processor with a fleet of fishing vessels and trawlers, cold storage and freezing facilities, as well general offices and staff quarters.
Their powerhouse operates three Wärtsilä generators that burn a blend of #2 diesel and kerosene. Alaska does not have any refineries capable of hydro-treating diesel and therefore cannot make a fuel low enough in sulfur to meet EPA regulations. The local fuel wholesaler blends their fuel 55% K-1 and 45% #2 to achieve a comparable sulfur level to CARB type fuels.
They also maintain a steam boiler plant for canning and sterilization. They burn waste lube oils as well as the fish oil recovered during processing.

## Problems

**Westward**'s primary diesel fuel tank is exposed to weather, but their generator day tanks are indoors, and kept next to the fish oil tank. The fish oil is kept hot to prevent gelling, and the radiant heat keeps the diesel tank warm. The change in temperature and humidity creates condensation in the tanks, and bacteria thrived. Their plant engineers have specified the use of biocides to control growth, and they have used BioBorbrand for many years. Biocides are injected by pulse pump directly into the day tank.

Maintenance of the filter system for the fish oil was severe, forcing cleanups of their basket strainers up to 13 times per day. Sludge buildup and excessive soot buildup limited the amount of the fish oil they could burn, creating large stockpiles of the waste oil. Additionally, the fuel oil blend for the generators was limiting output due to high engine temperatures and lower BTU availability. Emissions were considered acceptable; with only a light haze outside the plant exhaust stacks. Carbon deposits in the combustion chamber were typically 1 mm to 2 mm, and although considered acceptable, required as long a week to wire brush clean during routine engine maintenance.

## Application time line

***June 2000***
Mr. Lloyd Williams, **Westward**'s chief engineer initially tested **Xbee** in a laboratory, (CT&E Environmental Services) and noted minor changes in sulfur and moisture, but with no apparent ill effects on viscosity or inorganic contaminants. Tests were made in diesel, crankcase oil, and fish oil.

***August 2000***
Mr. Williams adds **Xbee** via their old biocide pumping system in a double-dose to their 2,800-gallon day tank. The plant burns approximately 7,000 gallons per day.
At 24 hours, the light haze from the exhaust stack had disappeared.
At 72 hours, NOx had dropped from 1175 ppm to 1150 ppm and stack temperatures had dropped by 10 degrees Centigrade.

The fuel filters were typically picking up about three pounds per day of sludge, and after three days, they were picking up four pounds.
Mr. Williams also added **Xbee** to the fish oil for the steam boilers, and immediately reduced the frequency of cleaning the strainer basket from 13 times per day to one time per day. The throttle rack pulled back 3 mm, indicating the rate of burn had reduced fuel consumption by 9%.

***December 2000***
After four months using **Xbee**, during a routine, 12,000-hour maintenance service, the combustion chamber and exhaust valves were examined and were found to have only a light dust-like coating of soot rather than the typical 1mm to 2 mm buildup of hardened carbon deposits. Clean up was done by wiping with a rag, and was done in one night, saving the mechanics five working days.

***January 2001***
Engine efficiency is now holding a steady 9% to 12% improvement. In addition, a 5% mix of fish has been added to the fuel, increasing their savings. Additionally, a bad load of fuel with between one and two feet of bacteria and sludge was delivered, and **Xbee** had re-mediated it completely within 36 hours. Their centrifuge remains spotless, without any of the residue associated with using Bio Bor.

***February 2001***
A follow up emissions test is run and NOx is now reduced over 10%, from 1175 ppm to 1040 ppm. Carbon Monoxide is down 90% from 104 ppm to 11 ppm and the stack temperature is now down 10%, from 768 degrees F. to 688 degrees F.

***August 2001***
One year after going on **Xbee** the local oil company allows them to bulk treat their entire fuel supply. With several weeks of residency as opposed to just a few hours, **Xbee** increases output from 2000 k.w. to a record high output of 2150 k.w. (100% rated) with occasional peaks as high as 2350 k.w.

"We usually have about 1 to 2 millimeter carbon deposit on the combustion side of the head.

After running the Xbee for three weeks, all that was left was a very thin film of soot.

You can see in the picture where I wiped it off with my finger".

***Acknowledgment***
*All documentation (letters and e-mails) supporting this case study and time-line are available upon request and were provided by:*

**Westward Seafoods Inc.**

Lloyd Williams (Chief Engineer)

Dutch Harbor, Alaska

USA

Engines and fuels guarantees:

¤ **Xbee** has been analyzed by the DNV (Norway) and granted non-objection and recommendation letters by the main engines manufacturers.

¤ Moreover, **Xbee** is in compliance with the current European norms: EN 590 Diesel, CSR 441 Heating oil and CSR 500 Heavy Fuel oil.

+1 (0) 907 581-1660

http://www.westwardseafoods.com/

1111 3RD AVE., SUITE 2250
SEATTLE, WASHINGTON 98101
(206) 682-5949 FAX (206) 682-1825

WESTWARD SEAFOODS

P.O. BOX 920608
DUTCH HARBOR, AK 99692
(907) 581-1660 FAX (907) 581-1293

Hello Matt,

Just wanted to give you a quick update on our Soltron use. As you may remember we have 3 Wartsila 6R32 generator sets, and we have been using Soltron for about 3 years now. Some of the things we have noticed are.....

1. We have not replaced our exhaust valves for going on 50,000 hrs. (we used to replace every 12,000 to 15,000 hr.)
2. No wear on valve guides, also 50,000 hrs. (we used to replace with exhaust valves).
3. The injection pumps (plungers) have not been replaced in 36,000 hrs. (we used to replace around 10,000 to 12,000 hrs)
4. The fuel system is staying remarkably clean (centrifuges, filters etc.). We've doubled the life span of the fuel filters.
5. We're averaging 14.9 KWH per gallon..... which is about a 6% increase.
6. Overall we would continue to use your product even if we didn't get the 6% increase in efficiency, because of the savings on the related equipment.

Lloyd Williams
Chief Engineer
Westward Seafoods Inc.
Dutch Harbor, Alaska

*__Xbee__ is distributed under the trademark __Soltron__ in North and South Americas. Yet, the product is exactly the same and comes from the same blending facility.*