

Jennifer G – Marine Diesel Engine Replacement

Case Study Follow-up visit on 6-23-14

NC DENR, Division of Air Quality



Jennifer G is used year-round to catch various species of crab, shrimp, fish, shark, and other seafood.

Site Overview

Jennifer G is a fishing vessel that operates out of Engelhard, North Carolina. Engelhard is a small fishing community in Lake Landing Township located in the mainland of Hyde County. It has access to the Pamlico Sound, the largest lagoon along the U.S. East Coast.

Jennifer G

Jennifer G is owned and captained by year-round commercial fisherman Michael Sadler. She is a 1988 Gloucester with a single propulsion engine, wet exhaust system, 41.3 foot fiberglass hull and 14 foot beam. After dealing with a variety of engine issues, including chronic and massive oil leaks, Mr. Sadler looked to replace Jennifer G's old engine - a 1990 Caterpillar 3208 with a 435 horsepower, 4 cycle, V8 diesel engine and a Tier 0 rating.

Implementation

In 2012, Michael Sadler was awarded a Diesel Emission Reduction Grant (DERG) that went toward replacing the old engine with a 2012 Cummins 6CTA8.3M2, 430 horsepower, V6 diesel engine and a Tier 2 rating. The new marine engine has led to the following benefits and impacts:

- Reduction of nitrogen oxides (NO_x), fine particulate matter (PM_{2.5}) and carbon monoxide (CO) emissions.
- Tier 2-compliant marine engines generally use electronic fuel control, which reduces fuel consumption compared to older, mechanically-controlled engines. The fuel economy for the existing engine was 11 – 15 gallons/hour. The fuel economy for the new engine is 9-13 gallons/hour.
- The new engine resolved the oil leak problems, so money is saved on extra maintenance and oil-related expenses.
- Mr. Sadler's realized that his past and present health problems could be associated with the former engine's higher levels of diesel emissions. Reduction of black smoke and exhaust in and around Jennifer G at start up, which provides Mr. Sadler with a safer and more pleasant working atmosphere.

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Adjustments and Conclusion

Mr. Sadler did not encounter any major problems related to the grant process. However, there were a few warranty issues with the air pump and oil pressure gauge (among other parts) that arose with the installation of the new engine. These issues added some cost and extended the timeframe for completing the project. Despite the small setbacks, Mr. Sadler has encouraged fellow fishermen in his marina to look into engine replacements, and would still highly recommend this type of project to other fishermen and similar fishing companies.



The new 2012 Cummins 6CTA8.3M2, 430 horsepower, V6 diesel engine. With its Tier 2 rating, hazardous diesel emissions have greatly decreased for Mr. Sadler.



The old unregulated 1990 Caterpillar 3208 with a 435 horsepower, 4 cycle, V8 diesel engine was replaced with the new engine (to the left).

“Every morning after all the boats have warmed up, it’s like we’re all in a thick black cloud. I didn’t associate health problems with the diesel exhaust before, but now I see the difference.”

- Michael Sadler, fisherman

Emission Reductions

Nitrogen Oxides (tons/yr)	Fine Particulate Matter (tons/yr)	Carbon Monoxide (tons/yr)
0.8489	0.0432	0.1061

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