



TAP Demonstration Final Report

May 14, 2018

This is the final report for the demonstration of unit 555421 that was purchased in November 2016. The 2014 Freightliner Cascadia in day-cab configuration purchased in November 2016 with approximately 27,000 miles on the existing ISX12G Engine (Rated at 0.2gm/bhp-hr NOx). The engine was replaced in Unit 555421 in December 2016 with a pre-commercial 12 Liter (400HP and 1,450lbs-ft torque) near-zero, ultra-lowNOx (0.02 gm/bhp-hr) LNG engine.

The unit started the demonstration period on July 10, 2017 and completed the demonstration on February 5, 2018. Below is a summary of the data from the period in time



- **Total Number of Revenue Trip Taken within the Six Month Period**
 - 532 Port related Moves
- **Number of Shifts and Total Hours of Operation**
 - Based on Qualcomm Data, total engine hours was: 1,181.9
- **Total Miles Traveled**
 - Beginning odometer Reading (07/10/17): 37,922.7
 - Ending odometer Reading (02/05/18): 56,413.2
- **Total Gallons of Fuel Used and Costs**
 - Total Gallons of LNG Fuel Used: 3,045.9
 - Total Fuel Cost for Period: \$8,629.63
- **Total Repair Cost of Unit**
 - Total cost of repairs (Excluding Cummins Repair Costs) were: \$3,797.08
- **Total Cost of Operation**
 - Personnel Cost for Period: \$63,085.48
 - Fuel Costs for Period: \$8,629.63
 - Repair Costs for Period: \$3,856.24
- **Total Cost of Operation for Period: \$75,571.35**

Maintenance



(Install process of the new, low NOx 12 Liter Engine – on left)

The maintenance on Unit 55421 is broken into 2 parts; the engine and the rest of the truck. The engine was serviced by Cummins Sales & Service in Downey, CA. The service of the rest of the truck was performed by various repair companies which is considered normal wear and tear in the course of vehicle operation.

Below is a matrix of repairs and costs performed on the unit during the demonstration period. Please note that the repairs costs performed by Cummins for this unit is not included in this detail and is unknown to TTSI.

Service Date	Invoice Number	Truck #	Vendor	Cost	Type of Service
8/15/2017	EF725	555421	J N H Truck Repair	\$237.41	BIT Inspection
8/29/2017	89505	555421	Long Beach Maintenance and Repair Inc.	\$50.00	BIT Inspection
9/4/2017	90751	555421	Long Beach Maintenance and Repair Inc.	\$59.42	Wiper Blades
9/24/2017	92224	555421	Long Beach Maintenance and Repair Inc.	\$133.89	7-Way Cable
9/24/2017	92233	555421	Long Beach Maintenance and Repair Inc.	\$29.61	Blown Fuse
9/25/2017	98569	555421	Cummins Pacific	\$0.00	Check Engine Light
12/7/2017	101472	555421	Long Beach Maintenance and Repair Inc.	\$31.85	Fuses
12/20/2017	99425	555421	Long Beach Maintenance and Repair Inc.	\$86.72	Flat Mirror Replacement
12/20/2017	99402	555421	Long Beach Maintenance and Repair Inc.	\$1,472.12	BIT Inspection
12/28/2017	100003	555421	Long Beach Maintenance and Repair Inc.	\$419.68	Replace Batteries
1/3/2018	100088	555421	Long Beach Maintenance and Repair Inc.	\$39.40	Engine Codes
1/3/2018	100028	555421	Long Beach Maintenance and Repair Inc.	\$135.39	Mud flaps
1/3/2018	100035	555421	Long Beach Maintenance and Repair Inc.	\$30.30	Air Line Adjustment
1/3/2018	100006	555421	Long Beach Maintenance and Repair Inc.	\$39.90	Fifth Wheel
1/4/2018	100259	555421	Long Beach Maintenance and Repair Inc.	\$276.66	Air Lines and 7 Way
1/5/2018	100309	555421	Long Beach Maintenance and Repair Inc.	\$0.00	Engine Oil
1/9/2018	100544	555421	Long Beach Maintenance and Repair Inc.	\$90.68	Cab lights
1/10/2018	101683	555421	Long Beach Maintenance and Repair Inc.	\$40.71	Turn Signal / Electrical
1/23/2018	101028	555421	Cummins Pacific	\$0.00	E.C.M Calibration
2/16/2018	103677	555421	Long Beach Maintenance and Repair Inc.	\$51.00	BIT Inspection

Renewal Natural Gas (RNG)

We utilize Clean Energy Stations to fuel the truck with Liquid Natural Gas (LNG). The Clean Energy Stations in California dispenses Redeem™ renewable natural gas (RNG). They (Clean Energy) state that Redeem is made entirely from organic waste and is up to 70% cleaner than diesel, making it the cleanest fuel available in North America. We did not encounter any issues with this fuel while operating the truck.

Driver Comments



Truck Operations

This unit was immediately incorporated into our fleet after the repower to the Alpha Engine. Our fleet operates day and night shifts, four (4) days of the week with one shift on Fridays and Saturdays. We “Slip Seat” our trucks in order to continue to move containers during these shifts. “Slip Seat” is a term in which one (1) truck is operated by two (2) drivers at different intervals (Shifts).

We have operated 8.9 Liter LNG Trucks in our fleet for the past 8 years with negative comments from the drivers. The trucks had limited power (320HP) for our drayage applicable. Drivers were very reluctant to operate the trucks due to the lack of power and maintenance problems.

In one instance, CHP pulled over one of our drivers as he was transporting a loaded container over the Vincent Thomas Bridge. He told our driver that if he catches him again in this truck on this bridge, he would issue a citation to him for impeding traffic on the bridge.

This unit performed very well in our operations. The first question most drivers asked, “Does it have power?” The power on this unit with the Alpha Engine is rated at 400HP which is very good with torque at 1,450BHP. The real test was transporting containers over the Gerald Desmond and Vincent Thomas Bridges. The drivers reported that they did not have any issues with power traveling over the bridges.

When we received this truck (12Liter) and placed it into service, drivers did not want to drive the truck due to past experience. We literally had to pay a stipend to have the drivers operate the truck. After a couple of days of operating the truck, the first driver was very impressed with the power the truck produced. After a couple of weeks of placing this unit into service, we had other drivers asking us if we are going to obtain additional 12 Liter LNG Trucks. The driver we initially assigned would get upset when we had to take the truck out of service due to a software update or take the truck to an event.

As for fueling, we did not have any issues with the fueling on this unit. We used the Clean Energy Fueling Stations in Long Beach and Carson and fuels was available during operational hours.

In conclusion, the drivers really like the performance of the truck. It has great power to transport the 38K Containers around the port complex comparable to the diesel equivalent trucks. One additional comment by one of our drivers, "I do not smell like diesel when I go home."

