



# CONSTRUCTION EQUIPMENT BIODIESEL B-20 PILOT PROGRAM



Status Update  
May 2009

# Introduction

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- Working with USA Construction Management/Corrosion Control, Environmental Management coordinated the use of Biodiesel in construction equipment at KSC for the first time
- USA solicited and received the support of Met-Con, Inc., along with Pinnacle Central Company (equipment supplier) and Watkins Oil (fuel supplier) for using Biodiesel (B-20) in a pilot program
- Met-Con is under subcontract to USA, and both Pinnacle and Watkins are under contract to Met-Con, under the USA umbrella
- After individual and collaborative discussion and research, the companies agreed to voluntarily participate in a pilot program using Biodiesel in some of their compatible construction equipment
- Met-Con rents the Biodiesel compatible equipment from Pinnacle Central Company, Inc., and Watkins Oil provides the fuel purchased from a National Biodiesel Board certified fuel supplier, TransMontaigne, Inc.
- USA team members led several pre-project meetings to address the pros and cons and to establish plans and guidelines for the pilot program
- The pilot program, underway since April 2008, was originally forecast to end in September 2008, but has been extended indefinitely

# What Are Biodiesel and B20?

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- **Biodiesel is a clean burning alternative fuel made from domestic renewable resources such as vegetable oils, animal fats, algae, cooking oils, etc.**
- **Biodiesel was the first alternative fuel to have a complete evaluation of emission results and potential health effects submitted to the U.S. Environmental Protection Agency (EPA) under the Clean Air Act Section 211(b)**
- **100% Biodiesel is non-toxic and essentially free of sulfur and aromatics**
- **Biodiesel has a much higher flash point than regular diesel fuel**
- **There is no net gain of CO<sub>2</sub> in the atmosphere when using 100% Biodiesel because it comes from plants that breathe carbon dioxide**
- **Using Biodiesel helps decrease dependence on foreign oil and puts money back into the U.S. economy**
- **100% Biodiesel contains no petroleum but can be blended with petroleum to make a Biodiesel blend, such as the B20 used in our pilot program**
- **B20 refers to this blend of Biodiesel, containing 20% Bio fuels and 80% petroleum diesel. All pilot program equipment are using B20 Biodiesel.**
- **Overall, Biodiesel is a safer, cleaner, and a more environmentally friendly fuel than standard diesel fuel**

# B20 Emissions

## AVERAGE BIODIESEL EMISSIONS COMPARED TO CONVENTIONAL DIESEL, ACCORDING TO EPA

Emission Type	B20
<b><u>Regulated</u></b>	
Total Unburned Hydrocarbons	-20%
Carbon Monoxide	-12%
Particulate Matter	-12%
Nox	+2% to -2%
<b><u>Non-Regulated</u></b>	
Sulfates	-20%*
PAH (Polycyclic Aromatic Hydrocarbons)**	-13%
nPAH (nitrated PAH's)**	-50%***
Ozone potential of speciated HC	-10%

\* Estimated from B100 result  
\*\* Average reduction across all compounds measured  
\*\*\* 2-nitroflourine results were within test method variability

# Biodiesel B-20 Pilot Program

- The Biodiesel Pilot Program is based at the K7-188 Equipment yard where Met-Con has offices, and where they stage their equipment for use throughout the entire LC39 complex



# Biodiesel B-20 Pilot Program

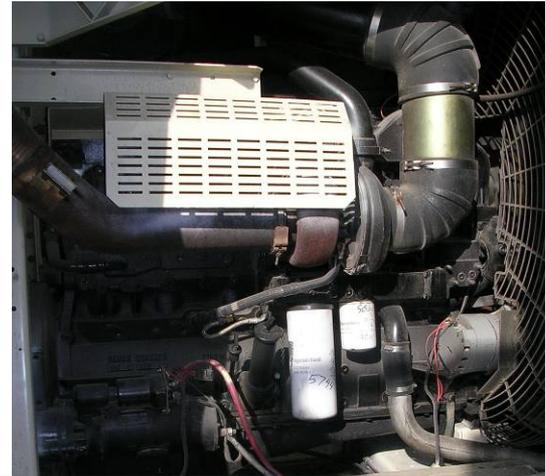
- The program started with one high volume compressor and eventually expanded to (as many as) 6 compressors and one high reach lift, to date
- All the equipment was manufactured compatible with B20, meaning that no mechanical alterations were needed, before or following Biodiesel use

Signs were fabricated and attached to all equipment using B20 for the pilot program



# Biodiesel B-20 Pilot Program

- The highest volume compressor in use is an Ingersol Rand 1300 with a 560 HP Cummins engine
- This equipment averaged over 30 hours of use each week for the year
- Total fuel usage for the year:  
13,326 gallons
- Total hours for the year:  
1,561 hours
- Average fuel consumption:  
8.54 GPH



# Biodiesel B-20 Pilot Program

- Watkins Oil typically fuels the equipment daily, at the equipment locations

Watkins Fuel Truck



Fueling taking place



# Biodiesel B-20 Pilot Program

- Pilot equipment was fueled and maintained like other (non-pilot) equipment-- there were no modifications or changes that had to be made to the equipment or the work schedule
- The equipment and fuel filters were periodically checked and maintained by Pinnacle professionals. There was no unusual damage or wear & tear. The B20 has been working perfectly with the equipment.
- Some fuel filters showed some unusual (clean) patterns, but nothing suggesting engine damage or malfunction, at standard maintenance intervals

Used Fuel  
Filter Samples



# Diesel / B20 Financial Comparison Chart

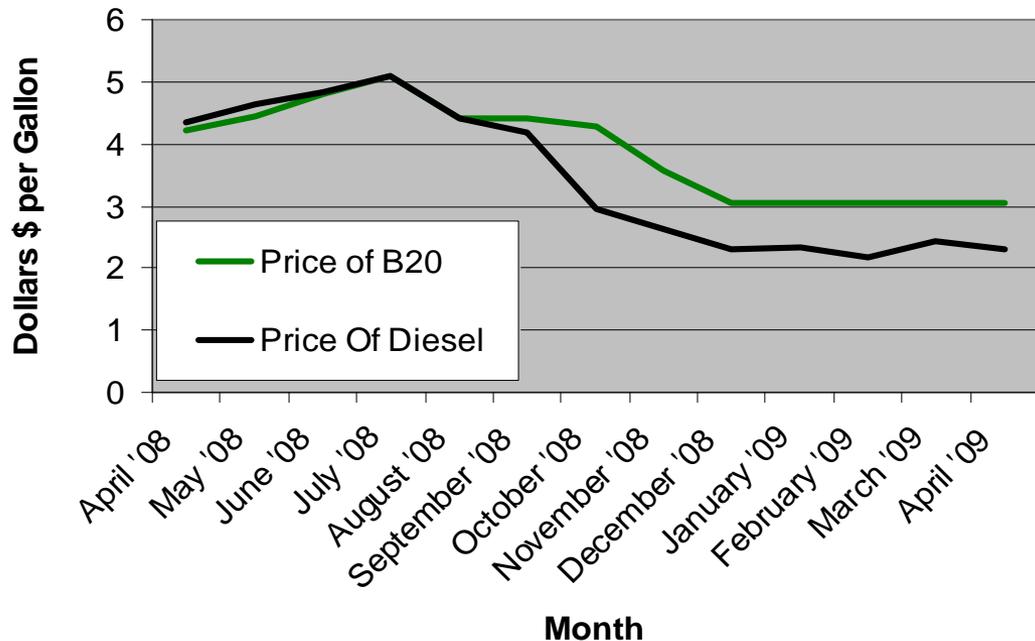
Initially the price of B20 was lower, compared to the price of diesel. The prices evened out over time, and then the diesel price dropped below the B20 price

## Year End Fuel Prices:

**Diesel: \$2.31/gal**

**B20: \$3.06/gal**

### Price Comparison of Diesel and B20



# Financial & Environmental Analysis

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- From mid-April, 2008 through mid-April, 2009, more than 19,331 gallons of B20 have been used in the equipment, resulting in over 3,300 hours of problem free operations
- The total cost of the B20 was \$66,583.86
- The price of equivalent gallons of diesel fuel would have been \$58,096.67
- The cost of using B20 was \$8,487.19 more expensive (compared with diesel fuel) being used over the same time frame
  - This means that Biodiesel (B-20) increased our fuel costs by nearly 14.6% during the year. 1 year price averages: Diesel -- \$3.76/gal. B-20 -- \$4.15/gal.
- By using B20, a total amount of more than 85,829 pounds of CO2 was prevented from being added to the net gain of CO2 in the atmosphere.
- B20 reduces CO2 emissions by 15% (during production)
- Using a B20 blend produces 12-18% fewer air emissions and reduces particulate matter by 12-15%

# B-20 Pilot Program Lessons Learned

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- Don't believe what the naysayers will tell you about Biodiesel fuels!
  - Do your own homework and research—allow adequate time to prepare and plan before use. The National Biodiesel Board web site is an invaluable source of data and information ( <http://www.biodiesel.org/> ).
  - Check equipment and motor warranty information up-front, and don't be afraid to investigate fuel vendors and suppliers. Use a Biodiesel Board BQ-9000 certified fuel supplier.
  - Use common sense regarding cleaning fuel tanks, maintaining equipment, using certified suppliers, etc. Remember, most engine fuel contamination related problems are caused by dirty fuel tanks (not dirty fuel).
- Fuel and fuel filter samples were analyzed or examined at Wiltech; crankcase oil was analyzed by Pinnacle. Throughout all analysis, **NO\*** concerns or abnormalities have been noted in any samples during the program.
  - \*One raw fuel sample contained foreign material, later determined to be sand. After evaluation, revised fueling procedures and awareness have eliminated this contamination source.

# B-20 Pilot Program Lessons Learned

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- **The pilot program is an overall smashing success that has significantly reduced harmful emissions to the atmosphere while promoting alternative fuel choices and fostering good communication and cooperation with the Environmental Management office**
- **After use, no one involved with this Pilot program has negative views or concerns with the B20 fuel. Admittedly somewhat surprised, everyone feels as if the results have been rather easily achieved, and the use of B20 fuel nearly a seamless transition. All are pleased about reducing the environmental impacts of operating this equipment.**
- **Pinnacle is so happy with the fuel and the program, they are now promoting the flexibility of Bio-fuel choices for their equipment to their customers**
- **Workers in areas near operating equipment have indicated that they prefer the B20 emissions scent to that of petroleum diesel**
- **USA Florida Environmental Management is very satisfied with the project, and is working to promote increased usage of Biodiesel fuels in USA equipment at KSC locations**