



Kirkland Signature Clean Power Gasoline Additive

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Kirkland Signature Clean Power

- Costco is adding tanks and piping to our gas stations to increase the amount of detergent additive in our gasoline.
- Our Kirkland Signature Clean Power detergent additive (UltraZol 9888) is manufactured by Lubrizol and registered with the EPA.
- Engine testing shows that more detergent is needed to keep modern engines clean.
- Clean engines pollute less, go farther, and require less maintenance.
- We'll have five times the EPA required additive in both regular and premium grades.



Clean Power Benefits

- Minimizes intake valve deposits
- Keeps fuel injectors clean
- Cleans up existing deposits
- Small incremental improvements

times many cars

times many miles

= significant impact on emissions and fuel economy.



Costco Gasoline with Kirkland Signature

CLEAN POWER

Gasoline Detergent Additive

- Five times EPA detergent requirement
- Included in both regular and premium grades
- Cleans fuel injectors and intake valves
- Improves performance
- Reduces emissions caused by dirty engines



Now available at this location.



Clean Up Testing Intake Valves

Before

Valve 3



After

Valve 3

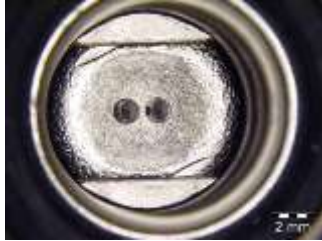


Engine testing performed at Southwest Research Institute, Texas
Test results after only 5,000 miles (Seattle fuel sample)

New Fuel Injector Designs



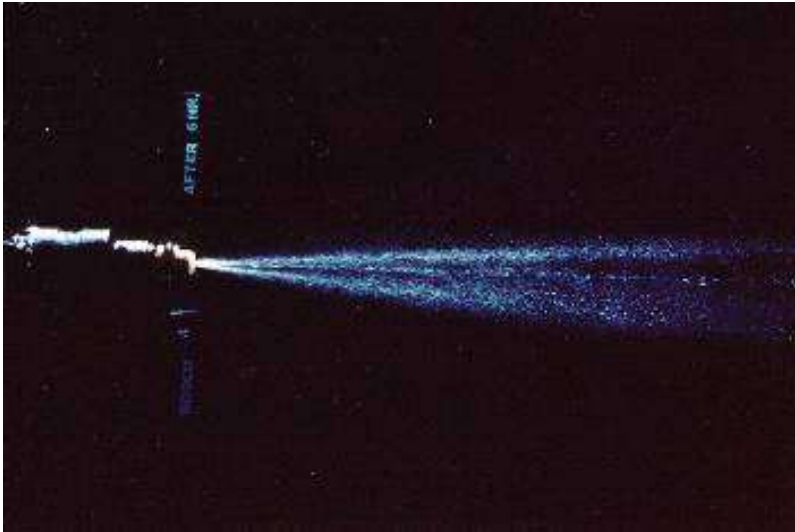
← Older injector design



Newer injector design →

- More, smaller holes per injector increase the atomization of fuel entering the cylinder.
- The finer the fuel spray, the better the combustion.
- Complete combustion improves mileage and decreases emissions.
- Smaller holes are more sensitive to deposits.

Fuel Injector Photos



DIRTY Injector
Flow Restriction
Poor Combustion



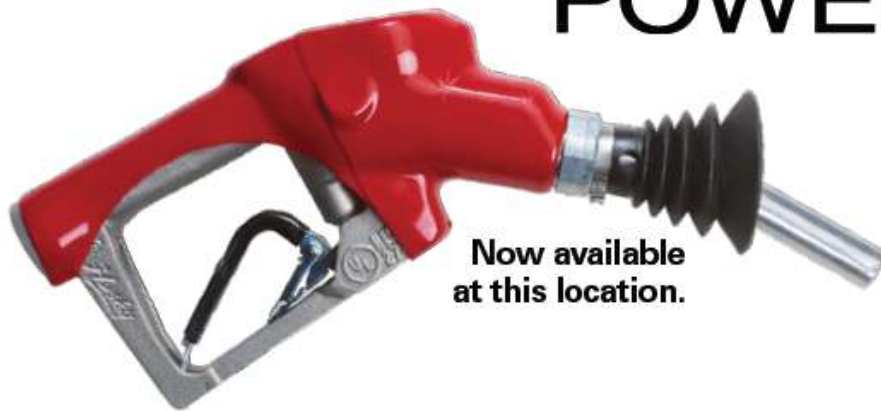
CLEAN Injector
No Flow Restriction
Effective Combustion

Pump Topper

KIRKLAND
Signature

Costco Gasoline with Kirkland Signature

CLEAN
POWER



Now available
at this location.

Gasoline
Detergent
Additive

- Five times EPA detergent requirement
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Progress So Far

- Currently installed at over 150 Costco stations outside of California, in 28 states.
- Estimate that rollout will be complete at all non-CA Costco gas stations by September 2012.
- System is completely automated.



Automated Injection System

- “Batch Controller” in data hut controls:
 - Additive turbine and meter in the additive tank sump.
 - Solenoid valves in each gasoline tank fill sump.
- Attendant keys total fuel gallons immediately prior to each delivery.
- Additive automatically injected at ~3.25 gallons per tanker load (8700 gallons).
- Additive is mixed with the fuel by the delivery agitation.



Automated injection system- key parts

- 1500 gallon DW Containment Solutions UST
- Ameron Dualoy 3000L FRP piping
- $\frac{3}{4}$ hp FE Petro turbine
- OPW 61fStop Overfill drop tube
- Franklin STP-MLD-D mechanical line leak detector
- ASCO solenoid valve.
- Badger oval-gear meter
- Cox Flow Measurement batch controller console

Additive Sump

Franklin turbine & MLD

Oval gear meter



Fill Sump

ASCO solenoid valve



UST Installation



Lynnwood, WA

Piping Installation



Wenatchee, WA

Additive Delivery



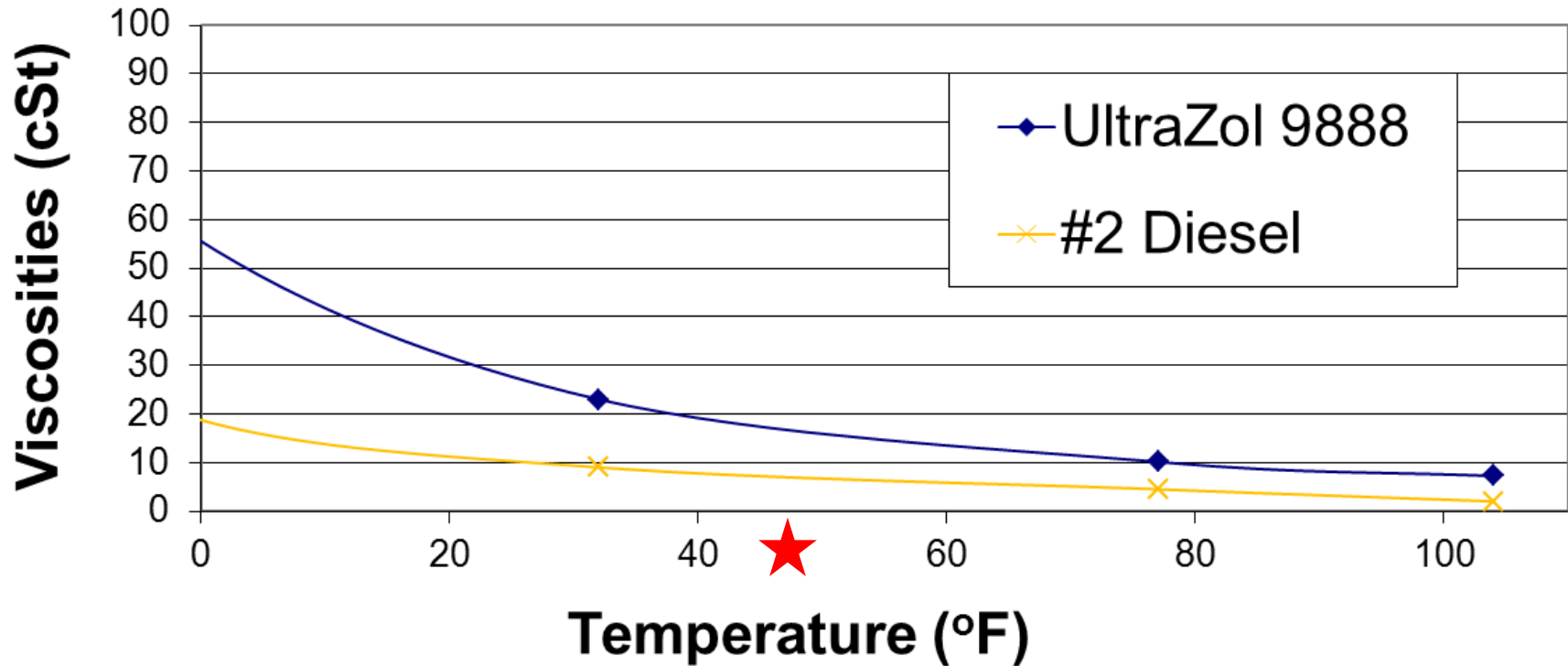
Federal Way, WA



Equipment Compatibility

- Equipment manufacturers confirmed compatibility of Clean Power additive with all tank, piping, and equipment used for storage, piping, and leak detection.
- Independent verification that monitoring equipment works with 100% Clean Power additive.
 - Franklin STP-MLD-D leak detector (LG 113)
 - Veeder-Root sensors
 - Tested by Ken Wilcox and Assoc.
- Costco's application complies with proposed June 1 regulation change to Title 23, CCR Section 2631.
- ASCO solenoid valves are identical to those currently used to dispense additive at many rack terminals.

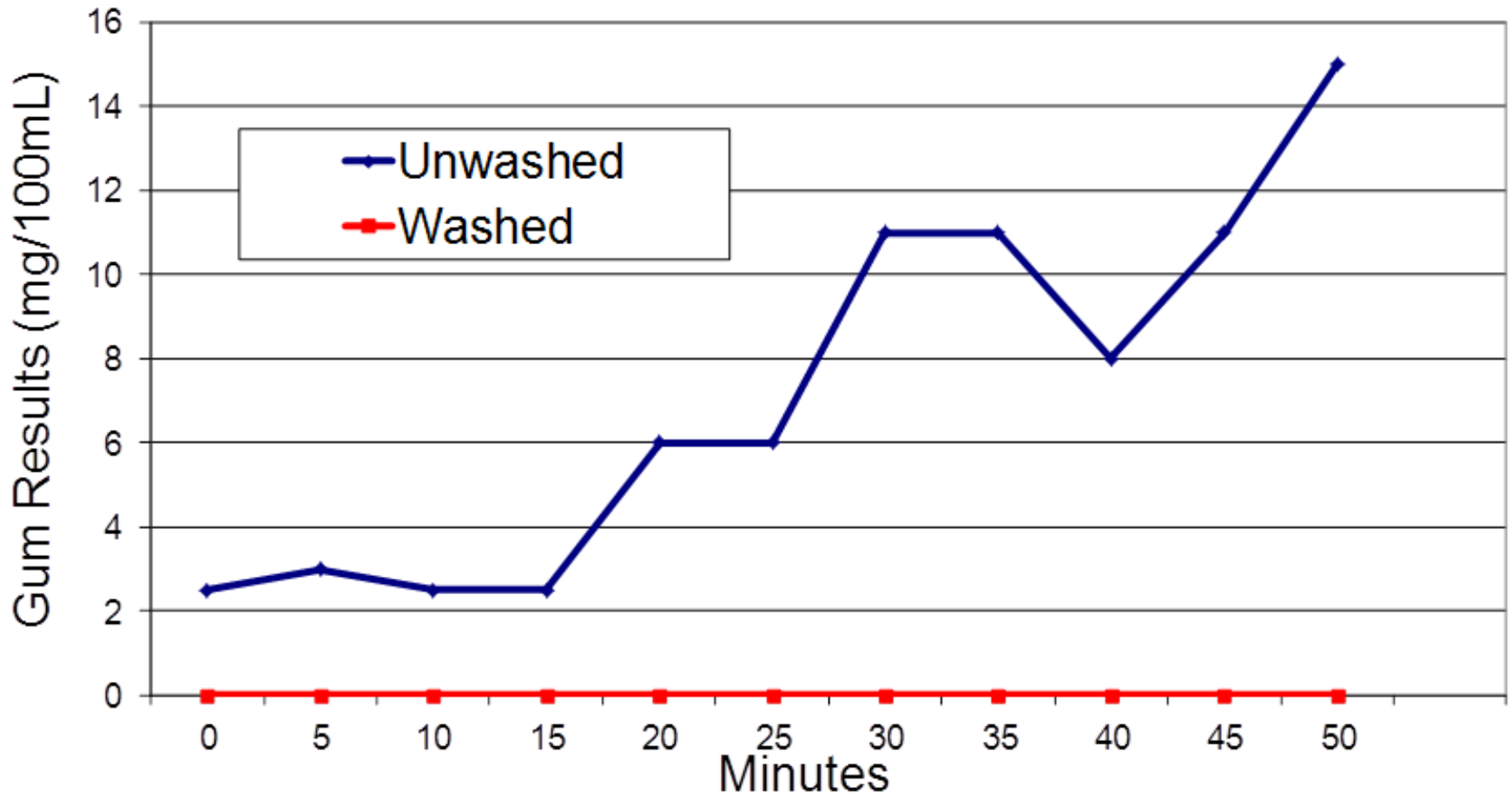
Viscosities vs Temperature



★ The lowest temperature reading in any CA Costco tank last year was 46.7 degrees F. California yearly average tank temperature = 67.7 degrees F.

Additive Mixing

Gum Results over time



Dispersion testing at Seattle, WA during first introduction of Clean Power additive to the gasoline. Samples taken from the nozzle at five minute intervals.

Monitoring

- Continuous monitoring via existing Veeder-Root TLS-350 consoles.
- VR liquid sensors in additive tank sump, vent transition sump, and gasoline fill sumps.
- All Costco stations monitored 24/7 by Gilbarco/Veeder-Root's Fuel Monitoring Service (FMS).
- Automatic service dispatch in response to VR alarms.



Shows as "Tank 4 Additive" on Veeder Root print.



Impact on Designated Operator

- Belshire Environmental is now the D.O. for all Costco gas stations in California.
- All D.O. documentation will be on Belshire's website, available on the computer at each gas station.
- Belshire will coordinate with all their D.O.s throughout the state as each station gets their Clean Power system.
- D.O. will inspect the additive spill buckets, sump sensors, and alarm history as they do for the rest of the station.
- Belshire will assure proper Monitoring and Response Plan updates.
- Costco attendants will be trained to include additive equipment in their daily inspections.

Questions?

