



Value Recognition Report

Landscaping Materials Manufacturer

Account History: This account is the largest manufacturer and provider of mulch, compost and other landscaping materials in Texas, as well as Texas' largest recycler of green material. They operate 17 locations, selling to commercial landscaping contractors, nurseries and homeowners.

Certified Labs' Objective: Provide a performance fuel quality assurance program to decrease operation costs.

Untreated Fuel Costs for 1,200,000 Gallons

Annual Untreated Fuel Costs: \$2.50 per gallon for diesel fuel:

\$3,000,000

(\$2.50/gl fuel X 3,000,000 annual gallons)

DIESEL-MATE Treated Fuel

DIESEL-MATE Fuel Quality Assurance product provided a decrease in overall fuel costs by improving the combustion efficiency, increasing lubricity, reducing fuel oxidation and protecting against corrosion and contamination.

Annual Fuel Costs (treated): **\$2,850,000**

Diesel-Mate is added at a treat rate of 1:1000

Annual DIESEL MATE Costs: \$40,000 (\$40/gl)

Annual Treated Fuel Costs including the cost of DIESEL-MATE: \$2,850,000

Untreated Fuel Cost	\$3,000,000
Treated Fuel Cost	\$2,850,000 –
Savings	\$150,000

Additionally, DIESEL-MATE will typically provide increased savings through reduced downtime, labor rates and parts replacement directly and indirectly associated to the quality of fuel.

Value Added Contributions from Certified Labs:

- 20 Fuel Analysis Tests (Base Cetane, Water Concentration, Cultured for Fungus and Bacteria): \$175/ea = **\$3,500**
- 75qts of TANK TONIC Fuel Biocide: **\$4,500**
- 4 Automatic Dilution Systems for Accurate Dosing of DIESEL-MATE: \$3,000ea = **\$12,000**

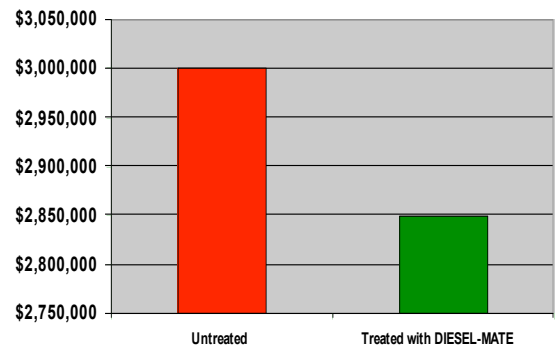
Total Value Added Contributions = \$20,000

In addition to fuel economy savings and improved fuel system performance, Certified Labs' DIESEL-MATE has produced the following results when added at a 1:1000 treat rate to jobber grade diesel fuel.

Averaged Emissions Reductions:

- Black Smoke Emissions: 91%
- Hydrocarbon Emissions: 16.7%
- Nitrous Oxide Emissions : 1.7%
- Carbon Monoxide Emissions: 19.6%
- Particulate Emissions: 11.1%
- Smoke: 24.1%

Annual Fuel Cost



Recognized Savings from Improved Fuel Savings: \$150,000.00
Additional Savings Will Increase Through a Reduction of Parts Replacement, Labor Costs and Downtime.





Value Recognition Report

Department of Transportation

Account History: Department of Transportation experienced severe fuel issues relating to quality. The following is a synopsis of the work Certified Labs provided in order to eliminate these fuel related issues.

Certified Labs' Objective: Provide a performance fuel quality assurance program to decrease fuel operation costs.

Fuel Consumption

Untreated Fuel Consumption

Monthly Consumption (untreated fuel): \$765,522

Annual Consumption: \$9,186,136 of untreated fuel purchased approximately 3,340,000 gallons.

Average Untreated Fuel Costs: \$2.75/gl for diesel fuel

Certified Labs FQA Treated Fuel Consumption

Monthly Consumption (FQA treated fuel): \$697,716

Annual Consumption: \$8,372,592 of FQA treated fuel purchased approximately 2,990,000 gallons.

Average Untreated Fuel Costs: \$2.80/gl for diesel fuel including FQA price.

Untreated Cost	\$9,186,136
Treated Cost	\$8,372,592 –
Savings	\$813,544

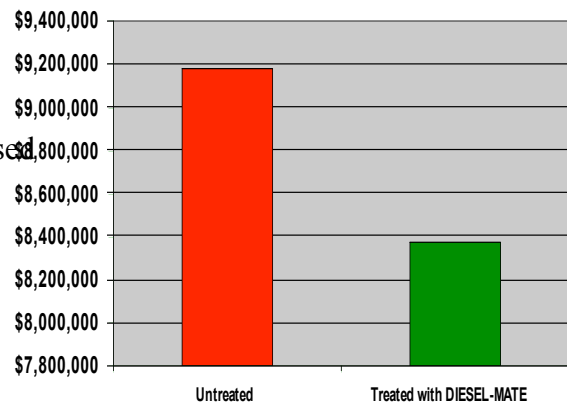
Parts Replacement

Fuel Part Replacement – Untreated vs. FQA Treated

Annual Fuel System Part Replacement Costs

	Untreated	FQA Treated
Injectors:	\$40,000	\$23,000
Injectors Sets:	\$121,000	\$67,000
Control Modules:	\$49,000	\$28,000
Fuel Pumps:	\$73,000	\$39,000
Totals	\$283,000	\$157,000
Savings	-n/a-	\$126,000

Annual Fuel Cost



Savings Summary

Reduced Fuel Consumption\$813,544

Reduced Parts Repair & Replacement\$126,000

Reduced Downtime and Labor Costs.....N/A

Total Savings \$939,544

Recognized Savings: \$939,544



Value Recognition Report

Department of Transportation

This Department of Transportation experienced severe fuel issues. The following is a synopsis of the work Certified Labs provided in order to eliminate these fuel related issues.

Background

- Diesel Equipment
- Diesel Storage Tanks
- Gasoline Equipment
- Gasoline Storage Tanks

Investigation

- Diesel Fuel Issues
- Ethanol / Gasoline Fuel Issues
- Diesel Fuel Analysis from Fuel Delivery Trucks
- Diesel Fuel Analysis from Fuel Storage Tanks
- Ethanol / Gasoline Fuel Analysis from Fuel Delivery Trucks
- Ethanol / Gasoline Fuel Analysis from Fuel Storage Tanks

Proposal

- On-Site Training
- Improve Fuel Quality
- Monitor Fuel Quality
- Develop Web-site for Data Sharing

Results

- Implemented Testing Procedures
- Implemented Data Interpretation
- Implemented Tank Preparation and Fuel Improvement Procedures
- Improved Fuel Quality
- Increased Data Sharing and Communication
- Increased Fuel Economy
- Reduced Fuel System Part Spending



Value Recognition Report

Department of Transportation

Background:

The Director of Maintenance contacted Certified Labs to provide a solution for their severe diesel and gasoline fuel problems. Their 9 divisions operate over 3000 pieces of equipment, maintain 46 fuel depots, and use more than 10 million gallons of fuel per year.

This customer was experiencing the following fuel related problems:

Diesel Equipment

Engines not starting and rough starts

Clogged engine filters

(white, orange, brown, and black gel-like materials, sometimes with foul odors)

Reduced engine power

Poor fuel economy

Discolored fuel (dark, cloudy, emulsified)

Excessive exhaust emissions

(Black and white smoke)

Increased injector and pump repairs

Gasoline Equipment

Engines not starting and stalling

Reduced power

Poor fuel economy

Discolored fuel

(dark, cloudy, emulsified)

Visible colored layers in fuel

Excessive Black smoke exhaust

Frequent Engine Timing Adjustments

Premature upper cylinder wear

Diesel Storage Tanks

Clogged storage tank filters

(white, orange, brown, and black gel-like materials, sometimes with foul odors)

Discolored fuel (dark, cloudy, emulsified)

Rust & corrosion

Gasoline Storage Tanks

Clogged storage tank filters

(opaque gel-like material)

Discolored fuel (dark, cloudy, emulsified)

Visible colored layers in fuel

Rust & corrosion



Value Recognition Report

Certified Labs Investigation

After several weeks of lab testing, visits to the fuel depots, meetings with the Director of Weights and Measures, the Bureau Chief of the Equipment Division, Equipment Maintenance Supervisors, Technicians and Operators, Certified Labs identified the following problems.

Diesel Fuel Issues

State Mandated B-20 Bio-Diesel - Beginning in 2009, a state mandate was put forth to begin using bio-diesel fuel. They began experiencing severe fuel issues relating to the quality of the fuels they purchased. The fuel was not being delivered according to ASTM D 6751 specification and equipment began to experience ignition and timing problems as well as contamination issues. At one point, equipment slated for public auction would not start due to severe oxidation due to inferior bio-diesel fuel.

Bio-Diesel Out Of Specification – Up to 50% of the fuel tested contained increased levels of bio-diesel than specified by ASTM D 6721 as B20 (20% bio-diesel).

Clogged Fuel Systems - Fuel systems and storage pump filters would clog periodically with glycerin due to poorly refined bio-diesel which also resulted in injector repairs and cylinder deposits as well as contributing to deposits at the bottom of the fuel storage tanks.

Tank Degradation - Methyl ester and methanol (ingredient used in bio-diesel production) was found to degrade some plastics and elastomers including the resin in the fuel tanks and clog filters.

Salt Deposits - Sodium (a catalyst NaOH used in bio-diesel production) caused excessive salt deposits on injectors, fuel pumps, pistons, and ring wear.

Bacteria and Fungus - Infested over 75% of the storage tanks contributing to lower cetane, blocked filters and lines, and increased corrosion.

Water Contamination - Excessive water in fuel storage tanks contributed to rust and corrosion as well as fuel oxidation and biological contamination.

Oxidized Fuel – Excessive levels of water, biological contamination and bio-diesel contributed to increase fuel oxidation (discolored fuel) resulting in poor combustion and excessive dark exhaust.



Value Recognition Report

Ethanol / Gasoline Fuel Issues

Ethanol / Gasoline – Up to 40% of the E10 (10% ethanol) blended fuel did not meet the ASTM D 4806 specification for E10 blended fuel. In reality the fuel was much higher in ethanol in certain areas of the storage tanks and lower in others. The fuel experienced phase separation, increased water emulsion and reduced storage stability which lead to engine stalling, injector issues and shorten storage life.

Ethanol / Gasoline Phase Separation - The ethanol / gasoline blended fuel being received was not properly refined resulting in inconsistent levels of ethanol as well as gasoline / ethanol phase separation which caused engine stalling.

Phase separation occurs when water content reaches above 0.27 weight percentage. The water and ethanol separate from the gasoline. The gasoline phase floats above the ethanol water in the tank and in many cases a third layer of just water is found at the bottom. The gasoline layer is lower in octane and is less volatile resulting in poor engine performance including knocking. The phase separation can also cause engine stalling. In many cases, E10 gasoline contained more than 10% Ethanol. Testing confirmed that fuel containing 12%, 13%, and even 14% Ethanol while the pump shows only 10% was possible. Increasing the amount of Ethanol increases the refiner/blenders subsidy and profit while further lowering your fuel economy.

One more concern with Ethanol is that Ethanol when mixed with water readily forms gum deposits in the fuel system much quicker than gasoline without Ethanol. These gums coat fuel system components including filters, carburetors, injectors, throttle plates; and will then form varnish and carbon deposits in the intake, on valves, and in the combustion chamber. These deposits can coat sensors and plug catalytic converters.



Value Recognition Report

Ethanol / Gasoline Fuel Issues

Poor Storage Stability – The ethanol portion contained high levels of dissolved oxygen which increased the chemical breakdown of gasoline contributing to gasoline oxidation which resulted in decreased power, lower fuel economy and injector issues.

Less Power – Overall, the blend provided a lower energy content than straight gasoline which reduced fuel economy.

Non-Alcohol Resistant Materials - Ethanol is a solvent and will slowly swell and degrade various petroleum resistant materials such as the epoxy used in fiberglass storage tanks, as well as various seals and o-rings, adhesives and paints. An opaque, gelatinous material was found to plug several fuel filters. It was discovered that this material was degraded epoxy from the storage tanks.

Water Absorption - Ethanol absorbed condensation much more readily than gasoline. Ethanol also attracted and absorbed contaminants in the tank. Increased water concentrations in gasoline increase the oxidation rate of the fuel making it less powerful. Increased water levels also contribute to rust and corrosion which was present on the inside of the storage tanks.



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BEFORE

Diesel Fuel Analysis from Fuel Delivery Truck

Customer Account Number:

Location: Fuel Delivery Truck Tank – Dist 8

Fuel: B-20

B-20 FUEL ANALYSIS	
Percentage Water	0.07%
Bacteria	1.0E02
Base Cetane	Out of Spec Fuel 44.0 1.
Bio-Diesel Content	Out of Spec Fuel 27% 2.

BEFORE

Diesel Fuel Analysis from Fuel Storage Tank

Customer Account Number:

Location: Fuel Storage Tank – Dist 6

Fuel: B-20

B-20 FUEL ANALYSIS	
Percentage Water	Water Present 1.35% 3.
Bacteria	Bacteria Present 4.0E02 4.
Base Cetane	48.0
Bio-Diesel Content	20%

1. The minimum allowable cetane is 47 for diesel engines. A value lower represents fuel that will not combust properly.
2. Bio-Diesel Content was greater than B20 (20%) which leads to fuel oxidation and biological contamination..
3. Water concentration greater than 0.5% contributes to increased oxidation, fuel system issues and bacterial growth – this is especially true in B20 fuel.
4. Bacteria feeds in the fuel and water phase reducing cetane number and increasing corrosively as well as fuel system blockage..



Value Recognition Report

Ethanol / Gasoline Analysis from Fuel Delivery Truck

Customer Account Number:

Location: Fuel Delivery Truck Tank – Dist 2

Fuel: E10 Gasoline

E10 FUEL ANALYSIS	
Percentage Water	Out of Spec Fuel 4.28%
Bacteria	0
Octane	87
Ethanol Content	Out of Spec Fuel 17%

Ethanol / Gasoline Analysis from Fuel Storage Tank

Customer Account Number:

Location: Fuel Storage Tank – Dist 4

Fuel: E10 Gasoline

E10 FUEL ANALYSIS	
Percentage Water	Water Present 1.35%
Bacteria	0
Octane	87
Ethanol Content	6%

1. Significant water concentration due to high levels of ethanol.
2. Higher than acceptable ethanol concentration due to blending issues.
3. Water concentration greater than 0.5% contributes to increased oxidation, fuel system issues and reduced octane.
4. Lower than acceptable ethanol concentration due to phase separation.



Value Recognition Report

Fuel Testing



A fuel 'thief' is lower into the tanker or storage tank, a sample of fuel is drawn then poured into sample container and shipped to the test lab.

Bacteria / Fungus



Bacteria and fungus entered fuel through water contamination or air vents. There are 14 types of bacteria and 7 types of fungus that feed on the hydrocarbons in diesel fuel.

Clogged Fuel Filter



Slime formation and bacteria feces clog filters as well as injector tips

Carboxylate Salt Deposits

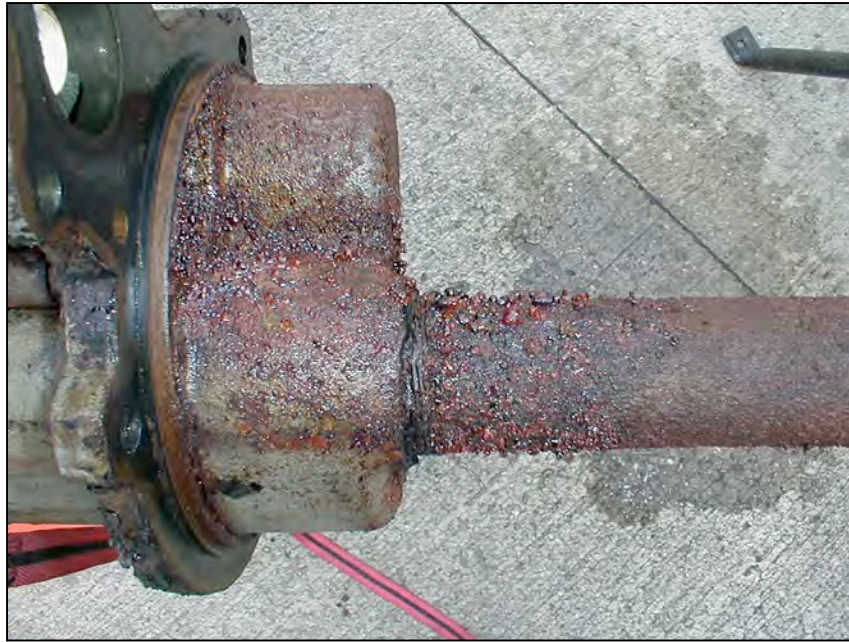


Sodium from ULSD and B20 refining process react to form salts that deposit of fuel pumps, valves and injectors.



Value Recognition Report

Severe Rusting on Pumps and Tanks



ULSD Fuel does not provide enough rust and corrosion protection. The process to remove the sulfur from the ULSD not only removes the natural corrosion inhibitors also increases the sodium content which has been shown to react with the refinery-added corrosion inhibitors thus reducing the overall effectiveness for corrosion and rust protection.





Value Recognition Report

Bio-Diesel Contamination



A B-20 bio-diesel fuel sample with increased levels of contamination and oxidation. The lower phase is a mixture of biological media and water.

Bio-Diesel Glycerin Separation



Poorly refined bio-diesel will have glycerin which will thicken the fuel.

Diesel Oxidation



When diesel becomes contaminated with water, the oxidation rate increases dramatically. Oxidation reduces a fuels energy content.



Value Recognition Report

Gasoline Fuel Testing



A fuel 'thief' is lower into the tanker or storage tank, a sample of fuel is drawn then poured into sample container and shipped to the test lab.

Phase Separation



Ethanol and gasoline will separate to form two distinct layers. The gasoline will have reduced octane and the ethanol will have high water content.

Gasoline Oxidation



When gasoline becomes contaminated with water, the oxidation rate increases dramatically. Oxidation reduces a fuel's energy content.

Storage Tank Degradation



Fiberglass storage tanks were designed to be resistant to petroleum. The alcohol in ethanol blended fuel turns the epoxy resin into a gelatinous contaminant and plugs filters, pumps and lines.



Value Recognition Report

Additional Findings

This DOT also expressed various concerns that were not directly related to fuel quality yet had an influence on the overall success and cost containment of fuel. The following are several of the concerns that they expressed:

- Desire to improve data and information sharing on best practices as it related to fuel issues and improvement procedures.
- Maintain a consistent health and safety protocol as it related to fuel sampling, additive additions and testing.
- Improve upon their information sharing of fuel and equipment related issues.
- Increase on-site training services as it relates to fuel and fuel quality.
- Develop an on-line training program concerning fuel related topics.
- Increase fuel quality monitoring to ensure compliant delivery.
- Alert all divisions immediately on fuel related issues.
- Increase information sharing on emerging trends in fuel.



Value Recognition Report

Proposal:



To: Bureau Chief, Equipment Division
Fr: Director of Technical Development & Reliability
Re: Fuel Quality Assurance Program

After several weeks of lab testing, on-site visits to the fuel depots, meetings with the Director of Weights and Measures, the Bureau Chief of the Equipment Division, Equipment Maintenance Supervisors, Technicians and Operators, Certified Labs has developed the following proposal to solve their severe fuel related issues.

Due to the lack of strict national regulations and enforcement of fuel quality, customer has routinely been delivered sub-standard fuel which has had far reaching affects on equipment such as power and ignition loss, increased injector and fuel pump repair, and a substantial reduction in fuel economy.

In order to address theses fuel related issues, Certified Labs offers the following proposal:

- On-Site Training at all ALDOT's Fuel Depots:** Review fuel test results, direct removal of excessive water and debris from storage tanks where needed, train employees to safely pull accurate fuel samples from both fuel delivery tankers and fuel storage tanks, sterilize fuel storage tanks, and add fuel improvers. Training will be enhanced with easy to follow posters and website videos.
- Improve Fuel Quality:**
 - Sterilize Fuel Storage Tanks with TANK TONIC™**, an aggressive biocide that kills virtually 100% of bacteria and fungus in the fuel phase and water phase of gasoline and diesel fuel in about 8 hours.
 - Improve Diesel Fuel Quality with DIESEL-MATE™**, a multi-functional diesel fuel improver that:
 - Boosts Cetane
 - Reduces Emissions
 - Reduces Friction and Wear
 - Separates Out Water
 - Cleans Injectors and Pumps
 - Prevents Fuel Gelling
 - Reduces Oxidation During Storage
 - Prevents Rust & Corrosion
 - Contains Metal Deactivators
 - Improves Fuel Efficiency



Value Recognition Report



Improve Gasoline and Ethanol Gasoline Quality with MILE-HI™, a multi-functional gasoline improver that:

- Improves Combustion
- Keeps Exhaust System Clean
- Helps Reduce Emissions
- Increases Engine Efficiency
- Lubricates Upper Cylinders
- Reduces Oxidation During Storage
- Improves Cold Weather Performance
- Helps Prevent Ethanol Gasoline Phase Separation

3. **Monitor Diesel Fuel Quality**: Provide comprehensive laboratory fuel analysis for fuel in storage tanks and fuel being delivered:

- Analyze Bacteria Concentration of 14 Types of Bacteria
- Analyze Fungi Concentration of 7 Types of Fungi
- Analyze Water Concentration
- Analyze Base Cetane Level
- Determine Amount of Fuel Improver in Storage Tank
- Determine Biodiesel Content

Help Monitor Gasoline Fuel Quality: Because gasoline can not legally be sent through the U.S. Postal Service, Certified will work with the Weights and Measures Division to help monitor the quality of gasoline.

4. **Develop a Custom Fuel Website**: that can be accessed by any employee with a login code and internet access.

- Post Fuel Analysis Results
- Alert Staff to Critical Fuel Analysis Results
- Training & Safety Instructions and Videos
- Technical Information About Fuel Related Issues
- A Blog Community Where Staff Can Share Maintenance Problems and Solutions.
- Q&A Section Where customer Can Get Answers to Technical Questions from Certified's Technical Staff.

Customer will see immediate results from this comprehensive fuel program by ensuring the delivery of quality fuel that meets ASTM specifications, maintaining quality fuel in the storage tanks, improved equipment performance, better fuel efficiency, and educated employees.



Value Recognition Report

Coal Mine

Account History: This Coal Mine began production in Hallsville, Texas, in 1984. It delivers approximately 4.0 million tons of coal per year. The operation utilizes two Bucyrus-Erie® 1570 draglines for overburden removal, and reclaims about 400 acres of land annually.

Titan's Objective: Provide a performance fuel quality assurance program to decrease operation costs. A 4 month study was performed in order to understand how fuel economy and performance could be improved.

2 Month Analysis of Untreated Fuel (April-May, 8 weeks)

Gallon per Hour Average: 13.40 gallons
Weekly Average Fuel Consumption: 1,340 gallons (\$4,690)
Fuel Cost = \$3.50/gal
Averaged Projected Annual Fuel Cost = \$243,880

Treated Fuel

2 Month Analysis (June-July, 9 weeks)

The Fuel Quality Assurance was administered.
Gallon per Hour Average: 11.98 gallons
Weekly Average Fuel Consumption: 1,198 gallons (\$4,193)
Fuel Cost = \$3.54/gal
Averaged Projected Annual Fuel Cost = \$199,836

Fuel economy Savings

A **17.%** fuel economy improvement was recognized resulting in **\$41,744** in fuel savings.



The Fuel Quality Assurance program will improve the combustion efficiency of diesel engines; producing more power, improved fuel economy and reduced emissions – **the 17% improvement in fuel economy is very atypical and should not be considered to be the typical performance standard for this program.** The typical reported savings averages out to a 5% improvement..

<u>Equipment List</u>	<u>Burn Rate</u>
(2) Komatsu PC125	20gal/hr.
Cat 385C Tier 3	16gal/hr.
(14) Cat 775F	19gal/hr.
Cat 775E	19gal/hr.
Kamatsu HD605	19gal/hr.
(3) Cat D8T	12gal/hr.
Cat D6T	8gal/hr.
Cat 14H	9gal/hr.

TOTAL FUEL SAVINGS: \$41,744



Value Recognition Report

Coal Mine

Testing Confirmed Marked Increase in Cetane Index,
No Water or Bacteria/Fungus Present in Treated Fuel

#1	16-May	28-Jul	15-Aug
Cetane	48.5*	52.6	52.8
#2	28-Jun	28-Jul	18-Aug
Cetane	51.8	54.5	52.9
*Untreated			

Gallon / Hour	Date	General	Gallons Used			
		gal/Hr	100 Hours/Wk 20h/d, 5d/wk	4 Dozers	2 Excavators	21 Ridgid Frame
Untreated	3-Apr	16.44	1644	12.18	23.67	18.36
	10-Apr	11.23	1123	n/a	18.01	12.99
	17-Apr	12.63	1263	11.50	21.02	15.72
	24-Apr	13.54	1354	12.41	24.46	17.17
	1-May	12.40	1240	n/a	23.87	18.50
	8-May	12.61	1261	n/a	25.67	14.43
	15-May	13.90	1390	n/a	22.53	17.25
	22-May	14.48	1448			
	Average	13.40	1340 ave/wk	12.03	22.75	16.35
Gallons Used			10723	14436	31846	240282
Cost (\$3.50/gl)	\$1,002,974			\$50,526	\$111,461	\$840,987
	in 8 weeks					
Hour Cost Average				\$42.11	\$79.62	\$57.21
	Date	General	Gallons Used			
		gal/Hr	100 Hours/Wk 20h/d, 5d/wk	4 Dozers	2 Excavators	21 Ridgid Frame
Treated	5-Jun	11.56	1156	12.11	24.60	13.38
	12-Jun	12.68	1268	11.81	19.21	14.72
	19-Jun	11.98	1198	11.32	21.93	14.48
	26-Jun	12.16	1216	13.02	20.69	12.58
	3-Jul	13.32	1332	10.94	24.74	14.93
	10-Jul	12.44	1244	11.99	23.26	15.27
	17-Jul	10.38	1038	10.70	22.46	12.20
	24-Jul	11.51	1151	13.06	21.95	14.71
	31-Jul	11.26	1126	14.99	22.40	12.87
Average	11.98	1198 ave/wk	12.22	22.36	13.90	
Gallons Used			10729	43976	40248	262794
Cost (\$3.50/gl)	\$1,214,563			\$153,916	\$140,868	\$919,779
	in 9 weeks					
Hour Cost Average				\$42.75	\$78.26	\$48.67
		Change		-1.52%	1.73%	17.56%
		Savings	Hourly	n/a	\$1.36/hr	\$8.54/hr
			Weekly	n/a	\$136	\$854
			Annual	n/a	\$7,072	\$44,408
			\$51,480 Annual Savings			