



*The First in Synthetics*®

# Gasoline Engine Case Study With Guardian Pest Control

Learn how switching to AMSOIL lubricants  
has saved Guardian Pest Control  
*tens of thousands of dollars.*

- Fewer Oil Changes
- Reduced Downtime
- Less Waste Oil
- Reduced Maintenance Costs
- Extended Equipment Life



## Guardian Pest Control

Guardian Pest Control is a family owned and operated firm located in Duluth, Minn. R. David Wick founded Guardian Pest Control in 1966 with a single service technician. Today Wick is on the Guardian staff as a consultant, and sons Jason and Jeffrey Wick serve as President and Vice President of the firm.

Guardian Pest Control offers programs and services to residential, commercial and industrial clients that include integrated pest management, organic pest management, rodent control, bird management and many more.

### Extreme Conditions

Guardian's fleet of over 60 vehicles provides service to urban and rural areas in Minnesota, Wisconsin, Iowa, Michigan's Upper Peninsula and the eastern Dakotas. The majority of the service trucks Guardian employs are Ford F150 2-wheel drive pickups with V6 engines and manual transmissions.

The fleet is subjected to all types of severe driving conditions. Trucks used in urban settings are



Guardian Pest Control President  
Jason Wick

subjected to stop-and-go driving, short trips and prolonged idling, while the rural units accumulate thousands of miles on dirt roads. The trucks also operate in extreme heat and sub-zero temperatures.

### Before AMSOIL

Before converting to AMSOIL motor oil every truck in the fleet was running conventional petroleum oil. Oil changes were performed at 3,000- to 5,000-mile intervals.

### Oil Changes

Six quarts of oil at an average price of \$1.85 per quart is \$11.10. That plus the \$4.88 for the average cost of an oil filter equals \$15.98 for an oil change per truck, not counting labor. With 60 vehicles in operation, Guardian paid \$958.80 to change oil in the entire fleet. At an average of one oil change per month per vehicle Guardian paid \$11,505.60 per year to change oil in its fleet using conventional motor oil.

### Downtime

Guardian's trucks easily accumulate 3,000 miles every month, oftentimes more. Using conventional oil, the company's trucks came in once a month for

### Oil Change Costs

	Conventional Motor Oil	AMSOIL Synthetic Motor Oil
Oil and filter cost	15.98	43.65
Plus labor cost	10.00	10.00
<b>Cost to change oil per truck</b>	<b>\$25.98</b>	<b>\$53.65</b>
Cost to change oil per truck	25.98	53.65
Multiplied by number of yearly oil changes	12	3
<b>Cost to change oil per truck per year</b>	<b>\$311.76</b>	<b>\$160.95</b>
Cost to change oil in one truck	25.98	53.65
Multiplied by 60 vehicles	60	60
<b>Cost to change oil in entire fleet</b>	<b>\$1,558.80</b>	<b>\$3,219.00</b>
Cost to change oil in entire fleet	\$1,558.80	\$3,219.00
Multiplied by number of yearly oil changes	12	3
<b>Total cost per year</b>	<b>\$18,705.60</b>	<b>\$9,657.00</b>
		\$18,705.60
		<u>- \$9,657.00</u>
<b>Amount saved annually by switching to AMSOIL:</b>		<b>\$9,048.60</b>

oil changes and routine maintenance. That equates to each truck being in the shop 12 days out of the year. With 60 trucks that is 720 days a field technician either works only a partial day or not at all.

If each oil change takes 30 minutes, performing 720 oil changes requires 360 hours of labor in addition to other routine maintenance the trucks require. At \$20.00 per hour for maintenance labor, 360 hours of labor cost Guardian \$7,200.00.

### Waste Oil

Each truck produces six quarts of waste-oil once per month. With 60 vehicles, that's 360 quarts per month and 4,320 quarts or 1,080 gallons per year. This is a tremendous amount of unnecessary waste, and disposing of used oil is typically very costly.

### Vehicle Replacement

At an average of 36,000 miles per year, Guardian's trucks reached 150,000 miles and needed to be replaced every 4.2 years. The base price on a 2006 Ford F150 is \$20,975, without tax. Using conventional motor oil, changing oil in one truck for 4.2 years cost Guardian \$1,309.39, bringing the total lifetime cost of the vehicle to \$22,284.39.

That means each truck cost Guardian \$5,305.81 per year or \$0.15 per mile to operate.

### After AMSOIL

In 1997, Guardian Pest Control converted its entire fleet of vehicles to AMSOIL Synthetic 5W-30 Motor Oil and AMSOIL filters. Oil changes are performed every 12,000 to 15,000 miles.

### Oil Changes

Six quarts of AMSOIL 5W-30 Synthetic Motor Oil at \$5.35 per quart (commercial pricing) is \$32.10. That plus \$11.55 for an AMSOIL EaO-34 oil filter is \$43.65 for an oil change per truck, not counting labor. With 60 vehicles in operation, it costs Guardian \$2,619.00 to change oil in the entire fleet. An average of one oil change every four months per vehicle costs Guardian \$7,857.00 per year to change oil in its entire fleet using AMSOIL Synthetic Motor Oil. That's a savings of \$3,648.60 per year on oil costs alone.

### Downtime

Reducing the frequency of visits for routine maintenance and oil changes has benefited Guardian substantially. It has prevented the company from

<b>Cost of Ownership</b>		
	<b>Conventional Motor Oil</b>	<b>AMSOIL Synthetic Motor Oil</b>
Miles at replacement	150,000	200,000
Divided by yearly mileage	36,000	36,000
<b>Years trucks remain in service</b>	<b>4.2</b>	<b>5.6</b>
Cost to change oil per truck per year	311.76	160.95
Multiplied by years of service	4.20	5.60
<b>Lifetime cost to change oil per truck</b>	<b>\$1,309.39</b>	<b>\$901.32</b>
Base price of 2006 Ford F150	20,975.00	20,975.00
Plus lifetime of oil changes	1,309.39	901.32
<b>Lifetime cost of truck</b>	<b>\$22,284.39</b>	<b>\$21,876.32</b>
Lifetime cost of truck	22,284.39	21,876.32
Divided by years of service	4.2	5.6
<b>Annual cost of truck</b>	<b>\$5,305.81</b>	<b>\$3,906.49</b>
Annual cost of truck	5,305.81	3,906.49
Multiplied by 60 vehicles	60	60
<b>Annual cost of fleet</b>	<b>\$318,348.60</b>	<b>\$234,389.40</b>
		\$318,348.60
		-\$234,389.40
<b>Amount saved annually by switching to AMSOIL:</b>		<b>\$83,959.20</b>

having to employ additional mechanics and allowed it to remain in its current facility without adding on to the shop space. Vehicles now come in for service an average of once every four months. That equates to each truck being in the shop three days out of the year. With 60 trucks that is 180 days a field technician is not in the field, 540 days less than when using conventional motor oil. If each oil change takes 30 minutes, performing 180 oil changes requires 90 hours of labor. At \$20.00 per hour for maintenance labor, 90 hours of labor costs Guardian \$1,800.00. That is 270 hours of labor and \$5,400.00 saved simply by switching to AMSOIL. Reducing stress on the facility and savings on labor aside, the peace of mind and convenience provided by extended oil drain intervals with AMSOIL have proved invaluable for Guardian. Downtime has been reduced and trucks and technicians spend more time in the field.

### **Waste Oil**

Each truck produces six quarts of waste-oil per oil change. With 60 vehicles being serviced every four months, that's 360 gallons per year. By switching to AMSOIL Guardian Pest Control prevents the disposal of 720 gallons of waste-oil every year. The environmental impact of this savings is enormous. It also frees up shop space that would be eaten up by drums of used oil.



*Engine main bearing halves show very little wear and are still suitable for continued use.*

### **Vehicle Replacement**

The superior protection of AMSOIL has allowed Guardian to keep its trucks in service longer than previously possible. At an average of 36,000 miles per year, Guardian's trucks reach 200,000 miles and need to be replaced every 5.6 years. The base price on a 2006 Ford F150 is \$20,975, without tax. Using AMSOIL Synthetic Motor Oil, changing oil in one truck for 5.6 years cost Guardian \$901.32, bringing the total lifetime cost of the vehicle to \$21,876.32. That means each truck cost Guardian \$3,906.49 per year or \$0.11 per mile to operate. That's a savings of \$1,399.32 or \$0.04 per mile per truck, per year. In a fleet of 60 vehicles that translates to a savings of \$83,959.20 per year or \$2.40 per mile.

### **What This Means For Guardian**

Extended drains have allowed Guardian to go from changing the oil in each truck every month, to changing oil once every three to six months. The company reduced the amount of waste-oil produced and lessened the demand on its facility and trucks. Guardian employs one mechanic that services the entire fleet and the trucks remain in service longer than previous units. Before switching to AMSOIL, the trucks would be replaced after attaining around 150,000 miles. Now Guardian retains its trucks until after they have accumulated over 200,000 miles, keeping most trucks in service for five or more years. This has led to a high level of satisfaction and money saved for Guardian.

"We are using the oil because we believe in the oil," said Guardian President Jason Wick. "It has been beneficial to us because we aren't having any service issues with engines, it has reduced maintenance costs and added the convenience of extended drain intervals."



*The inside of the engine oil pan was very clean. There were no sludge deposits found in the bottom of the pan.*

It is incredible that the fleet has quadrupled in size and Guardian has not had to add another mechanic. Even more amazing is that more trucks could be added without having to hire additional maintenance help.

“There is a lot of room for growth without adding another person,” said Wick.

Trucks returning for service less frequently not only alleviated a great deal of strain on Guardian’s facility, it meant they are spending more time in the field.

“If the truck is down, my guy isn’t working and that’s not productive,” said Wick. He listed convenience as the number one benefit Guardian receives from using AMSOIL products.

“Convenience is absolutely number one,” said Wick. “We try to change oil at 12,000 miles, but if we go past, it’s not a big deal, I know our trucks are protected with AMSOIL.”

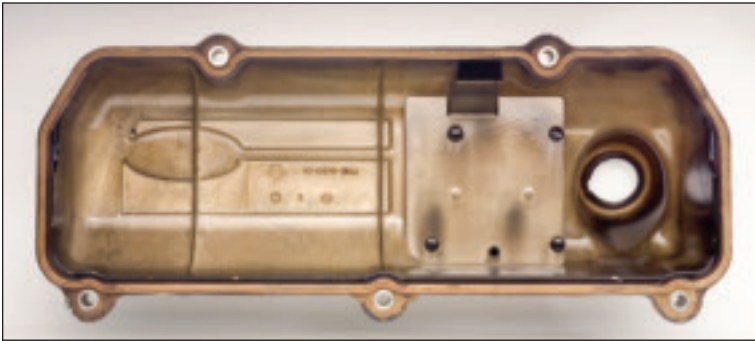
The reliability, integrity and convenience of the oil has led Guardian to start stocking more AMSOIL

products. The trucks are being converted to AMSOIL ATF, Gear Lube, Grease and more.

“Like I said, we believe in the benefits and the superiority of AMSOIL,” said Wick. “When you’re talking about 50-plus vehicles putting on a few thousand miles per month, we are not having engine problems.”

## Truck Tear-Down

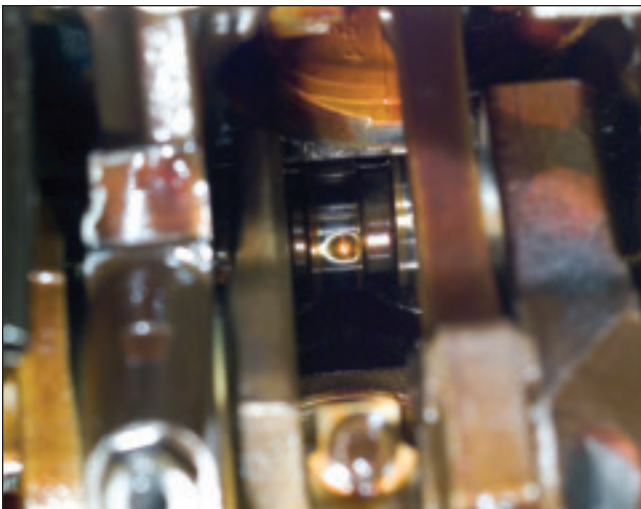
AMSOIL purchased one of Guardian’s service trucks and disassembled the engine. The test truck is a Ford F150 two-wheel drive manual transmission unit with 225,000 miles. AMSOIL has been performing used oil analysis on Guardian’s fleet since April 2005, and tested emissions and the catalytic converter on the truck the company purchased from Guardian. The accompanying photos detail the condition of the 225,000-mile engine at the tear-down.



*The inside of the valve cover was very clean. There were no sludge or heavy varnish deposits present. Note that you can still read the manufacturer’s markings.*



*The oil pickup tube was very clean. There were minimal carbon deposits in the pickup tube screen..*



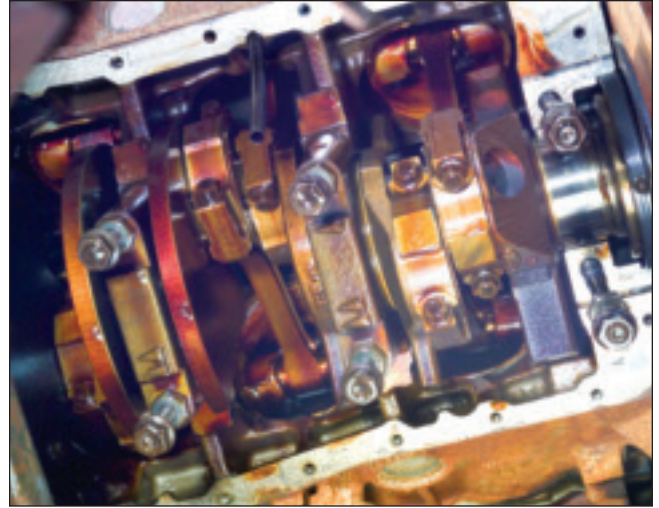
*The underside view of the camshaft shows no visible wear. There were no signs of deposits or varnish. Note the oil is still clinging to the camshaft. This picture was taken three days after the engine oil was drained and the engine pan removed, which indicates the AMSOIL engine oil was staying on crucial engine areas.*



*The rear main bearing cap and oil seal were in good condition. The rear seal was very pliable and still in tact, showing no signs of deterioration.*



*The head and rocker arms were very clean and free of heavy deposits. Note that you can still see the honey-comb stamping and manufacturer's part number. This is normally an area of the engine where you would see heavy varnish deposits with a conventional engine oil.*



*The lower crankcase area was very clean and free of any sludge deposits. The rear main bearing journal was removed showing no signs of visible wear on the crankshaft journal.*



*A wider view of the head and rockers. Very clean.*



*A closeup view of the rear main crankshaft journal. No visible wear detected.*

## **Emissions Test Results**

AMSOIL had an emission analysis performed on the truck the company purchased from Guardian. The test, performed by Wisconsin Indianhead Technical College, analyzes levels of hydrocarbons, carbon monoxide, oxygen and carbon dioxide present in the vehicle's exhaust.

Test equipment used included the Sun 450EL Engine/Emissions Analyzer Snap-On Technologies and the NGS Ford Factory Scan Tool. The vehicle had no signs of abnormal problems and no warning indicators were displayed on the instrument panel. The readings were taken at engine idle speed and at 2,000 RPM with the engine at normal operating temperature. The exhaust system was intact and complete with proper catalytic converters in place and no signs of any exhaust leaks.

Hydrocarbon readings were between 0 and 38 ppm, indicating good combustion and good catalyst operation.

Carbon Monoxide readings were between .02 percent and .16 percent, indicating good catalyst operation.

Oxygen readings were between .14 percent and .42 percent, indicating good combustion and enough oxygen for proper converter operation.

Carbon dioxide readings were between 15 percent and 15.1 percent, indicating good combustion.

## **Emission Analysis Conclusion**

Overall, all emission readings indicate that there is good combustion and the catalytic converters are operating properly. Scan tool analysis shows that there were no trouble codes stored, indicating that the vehicle is still in compliance with federal OBD-II standards. If the catalytic converters were not operating properly the catalyst monitor would fail, store a trouble code and illuminate the "check engine" light.

SUN MACHINE  
EMISSIONS DIGITAL

PRESENTED BY:

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Automotive Dept.  
600 N. 21st Street  
Superior WI 54880

Amsoil  
TRUCK

715-394-6667 Ext. 6328

Engine....2  
Cyl....V6  
Fuel....EFI  
AREA....NW  
MISC.....ALL  
Year....1998  
Make....Ford  
Model....Pickup F150  
Liters....4.2  
CID....255  
Trans....ALL

CUSTOMER INFORMATION

Amsoil Inc.  
2912 Winter St.  
Superior WI 54880  
W: 715-392-7101  
N/A

	LOW	RESULTS	HIGH
RPM	0	0	0
VAC "HG	-0.4	-0.3	0.0
HC PPM	0	0	38
CO %	0.00	0.02	0.16
O <sub>2</sub> %	0.00	0.14	0.42
CO <sub>2</sub> %	0.00	15.0	15.1
A/F RATIO	0.000	14.8	15.0
FLOW		GOOD	

Analysis conducted by  
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5-2-05

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