

City of Rockford

SMART Emissions Reducer Trial Program Report



December 18, 2012

Prepared by:



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Report and Results

Introduction:

Extreme Energy Solutions Inc., SMART Air Fuel Saver LLC (Extreme/SMART), working in partnership with local SMART Emissions Reducer Product Representative Larry Robertson, had offered the City of Rockford a free trial program that would assist in the validation of the SMART Emissions Reducer installed in their vehicle fleet. The purpose of the program would demonstrate to officials of City of Rockford that the SMART Emissions Reducer would reduce harmful vehicle emissions while providing a return on investment by reducing fuel consumption.

The City agreed to the trial program proposed by Extreme/SMART, at no upfront cost. If the SMART Emissions Reducer did not prove its worthiness, then the equipment would be removed from the vehicles, and returned to Extreme/SMART, at the cost of both companies, and would restore the vehicles to the previous state before the modifications took place. In the event the City found the devices to have value, and perform as represented, then the City would have the option to purchase the equipment, pay for labor services, and continue a rolling production of installs of the device, provided by Extreme. This trial program would last a period of 90 days.

On April 9, 2012, Extreme Energy Solutions Inc. began to install devices on vehicle authorized to be retrofitted for the trial program. This authorization and program was supervised by Roger Enderle, City of Rockford.

Action Plan:

On Wednesday, June 26, 2012, Extreme/SMART Technicians reported to the City of Rockford Yard Compound, (the City DPW facility), located at 500 Independence, Rockford, IL, to begin installing the SMART Emissions Reducer on selected vehicles. All installs were then concluded by Friday, June 28, 2012.

Prior to the SMART device installation, a series of vehicle verifications, to qualify the vehicle free from any mechanical issues that would effect the results of the overall outcome of the testing, would be performed. Each vehicle would undergo an emissions test, using a calibrated five gas analyzer and provide a copy of the results on site. At the conclusion of the 90 day period, each vehicle would again be tested for emissions readings. This would demonstrate the emissions increase or decrease at that time. Diesel vehicles would undergo an opacity test to check emissions levels before the device was installed and after the vehicles had operated 90 days with the SMART device.

A total of five vehicles were originally selected to be offered as candidates. And additional vehicle was added later during the program.

City of Rockford would track its fuel mileage results throughout the 90 day trial period, and Extreme/SMART would monitor the emissions results before and after the 90 day

trial program, then compile all results in a report, and share them with the City for review. The City would regularly share fuel consumption data with Extreme/SMART Representatives, so Extreme/SMART Representatives could examine the trend of the program, and make a determination whether SMART devices would have to be serviced.

During the 90 day trial program, Extreme/SMART Technicians and Representatives, would be responsible for troubleshooting any and all issues with the device, perform periodic emissions testing of vehicles retrofitted with the SMART device, and assist in servicing the SMART Emissions Reducer, as required by the manufacturer (SMART Air Fuel Saver LLC). Extreme/SMART Technicians would share how to maintain the unit with City of Rockford Fleet Mechanics, so City Mechanics can take on the responsibilities of maintaining the SMART units. In Addition, Extreme/SMART Technicians would bring to the attention of City Mechanics, any potential vehicle faults that Extreme/SMART Technicians would find during their monitoring of the vehicles, for priority to be repaired. This would allow for vehicles with faults not to run out the clock of the 90 day trial program without being repaired, and those faults effecting the vehicle's test results.

Officially, the 90 day trial program calendar had concluded on September 26, 2012, however the trial program was monitored and facilitated until, October 26, 2012, when Extreme/SMART Technicians and representatives had the opportunity to collect any and all final emissions data, and meet with City Officials, to review the data, and report generated by his department concerning the fuel economy results collected by the county. Extreme/SMART was asked to compile all data, reports, and proposals for review, including an invoice submitted for all SMART devices and labor services provided to date.

Vehicle Inventory:

Rockford City Vehicles retrofitted with the SMART Emissions Reducer for trial program include the following:

- 1. City of Rockford #508 .** Ford F-150 Pick-up VIN #1FTRF12208KE92989, Retrofitted with R200 SMART device for gasoline engines.
- 2. City of Rockford #2111.** Ford Explorer SUV, VIN #1FMPU18506LA20440. Retrofitted with P200 SMART device for gasoline engines.
- 3. City of Rockford.** 2006 Chevrolet Impala. VIN #ZG1WS551769386779, Plate Number 816-0652. Retrofitted with R200 SMART device for gasoline engines.
- 4. City of Rockford #3.** Ford F-150 Pick-up, VIN #1FTRF12248KE9326. Retrofitted with R200 SMART device for gasoline engines.
- 5. City of Rockford #4.** Ford F-250 Pick-up, VIN 1FTNF20582EB69710. Retrofitted with R200 SMART device for gasoline engines.

Review and Results:

In October 2012, Extreme Energy Solutions Inc./SMART Air Fuel Saver LLC received from its local representative, a copy of the SMART Air Fuel Saver Emissions Control Device Beta-Test Report (see **Appendix item A**). In this document it was expressed the fuel economy results the City experienced.

As of Friday, October 26, 2012, all final emissions results were collected. Original documents containing results before installation and after the 90 day trial have been put into a comparison chart for each vehicle. Original data testing tabs are included in the Appendix (see **Appendix item B**).

Emissions Test Results for the following vehicles:

1. City of Rockford #508 . Ford F-150 Pick-up VIN #1FTRF12208KE92989

| Type of Emissions Being Tested | Prior to Install of SMART Devices | At Conclusion of Trial Program | Trend Decrease or Increase Emissions |
|--------------------------------|-----------------------------------|--------------------------------|--------------------------------------|
| O2% | 0.71 | 0.52 | - |
| CO2% | 14.9 | 15.1 | + |
| HC PPM | 101 | 20 | - |
| CO% | .22 | .08 | - |
| COK% | .21 | .07 | - |
| AFR | 15.08 | 15.00 | Not Applicable |
| NOX PPM | .00 | .00 | No Change |
| | | Overall Trend | Decrease in Emissions |

2. City of Rockford #2111. Ford Explorer SUV, VIN #1FMPU18506LA20440

| Type of Emissions Being Tested | Prior to Install of SMART Devices | At Conclusion of Trial Program | Trend Decrease or Increase Emissions |
|--------------------------------|-----------------------------------|--------------------------------|--------------------------------------|
| O2% | .65 | .40 | - |
| CO2% | 15.0 | 15.2 | + |
| HC PPM | 108 | 72 | - |
| CO% | .32 | .06 | - |
| COK% | .31 | .05 | - |
| AFR | 14.99 | 14.94 | Not Applicable |
| NOX PPM | 126 | 10 | - |
| | | Overall Trend | Decrease in Emissions |

3. City of Rockford. 2006 Chevrolet Impala. VIN #ZG1WS551769386779

| Type of Emissions Being Tested | Prior to Install of SMART Devices | At Conclusion of Trial Program | Trend Decrease or Increase Emissions |
|--------------------------------|-----------------------------------|--------------------------------|--------------------------------------|
| O2% | 2.95 | 6.64 | + |
| CO2% | 13.3 | 10.5 | - |
| HC PPM | .15 | -.02 | - |
| CO% | .10 | -.02 | - |
| COK% | .11 | .00 | - |
| AFR | 16.97 | 21.27 | Not Applicable |
| NOX PPM | 00 | 00 | - |
| | | Overall Trend | Decrease in Emissions |

4. City of Rockford #3. Ford F-150 Pick-up, VIN #1FTRF12248KE9326

| Type of Emissions Being Tested | Prior to Install of SMART Devices | At Conclusion of Trial Program | Trend Decrease or Increase Emissions |
|--------------------------------|-----------------------------------|--------------------------------|--------------------------------------|
| O2% | .64 | .52 | - |
| CO2% | 15.0 | 15.1 | + |
| HC PPM | 10 | 9 | - |
| CO% | .12 | .07 | - |
| COK% | .11 | .06 | - |
| AFR | 15.08 | 15.06 | Not Applicable |
| NOX PPM | 00 | 00 | No change |
| | | Overall Trend | Decrease in Emissions |

5. City of Rockford #4. Ford F-250 Pick-up, VIN 1FTNF20582EB69710

| Type of Emissions Being Tested | Prior to Install of SMART Devices | At Conclusion of Trial Program | Trend Decrease or Increase Emissions |
|--------------------------------|-----------------------------------|--------------------------------|--------------------------------------|
| O2% | .64 | .53 | - |
| CO2% | 15.0 | 15.0 | No Change |
| HC PPM | 7 | 2 | - |
| CO% | .09 | .05 | - |
| COK% | .08 | .04 | - |
| AFR | 15.14 | 15.03 | Not Applicable |
| NOX PPM | 15 | 10 | - |
| | | Overall Trend | Decrease in Emissions |

Summary:

Overall emissions reductions were achieved on the vehicles in the 90 day SMART Emissions Reducer product trial program. The City of Rockford expressed fuel economy gains (reduction in fuel consumption) via their report.

Report prepared by:

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Appendix

Appendix A:

Copy of original 90 day SMART fuel economy results supplied by Roger Enderle.

Appendix B:

Original Emissions testing tags, performed on site, both before and after.

Appendix A:

Copy of original 90 day SMART Fuel Economy Results, supplied by Roger Enderle.

City of Rockford

| Vehicle | 5/1-6/26 | | | 6/27-7/26 | | | 7/27-8/26 | | | 8/27-9/26 | | | Percentage |
|---------|-----------|--------------|-------|-----------------|--------------|-------|----------------------|--------------|-------|-----------|--------------|-------|------------|
| | Fuel Used | Miles Driven | MPG | Fuel Used | Miles Driven | MPG | Fuel Used | Miles Driven | MPG | Fuel Used | Miles Driven | MPG | |
| 21111 | 197.89 | 2026 | 10.24 | 88.502 | 1339 | 15.13 | 69.45 | 851 | 12.26 | 90.75 | 1126 | 12.41 | 21.191 |
| 21222 | 121.25 | 1869 | 15.42 | 39.822 | 676 | 16.98 | 73.262 | 1080 | 14.75 | 67.18 | 1187 | 17.67 | 14.591 |
| 34003 | 125.3 | 943 | 7.53 | 33.1 no mileage | 738 | 9.21 | 45.804 mileage wrong | 515 | 8.96 | 66.00 | 689 | 10.44 | 38.645 |
| 34004 | 94.52 | 609 | 6.45 | 80.2 | 1077 | 10.47 | 57.5 | 691 | 11.26 | 40.48 | 295 | 7.29 | 13.023 |
| 72508 | 114.126 | 1019 | 8.93 | 102.931 | | | 61.371 | | | 79.76 | 1116 | 14.00 | 56.774 |

Appendix B:

Emissions Testing for vehicles retrofitted with SMART Emissions Reducer.

Vehicle #508 (Before)

508 before

SNAP ON

DATE 06-28-12
TIME 01:44:51

FUEL GASOLINE

| | |
|---------|-------|
| O2 % | 0.71 |
| CO2 % | 14.9 |
| HC ppm | 101 |
| CO % | 0.22 |
| COK % | 0.21 |
| AFR | 15.00 |
| NOX ppm | 00 |

Vehicle #508 (After)

Rock #508

SNAP ON

DATE 10-25-12
TIME 14:02:31

FUEL GASOLINE

| | |
|---------|-------|
| O2 % | 0.52 |
| CO2 % | 15.1 |
| HC ppm | 200 |
| CO % | 0.08 |
| COK % | 0.07 |
| AFR | 15.00 |
| NOX ppm | 00 |

after

Vehicle #2111 (Before)

EXPLORER before

SNAP ON

DATE 06-28-12
TIME 02:41:48

FUEL GASOLINE

| | |
|---------|-------|
| O2 % | 0.65 |
| CO2 % | 15.0 |
| HC ppm | 100 |
| CO % | 0.32 |
| COK % | 0.31 |
| AFR | 14.99 |
| NOX ppm | 100 |

Vehicle # 2111 (After)

2111

SNAP ON

DATE 10-26-12
TIME 09:51:44

FUEL GASOLINE

| | |
|---------|-------|
| O2 % | 0.40 |
| CO2 % | 15.2 |
| HC ppm | 72 |
| CO % | 0.06 |
| COK % | 0.05 |
| AFR | 14.94 |
| NOX ppm | 10 |

after

Vehicle #Chevy Impala (Before)

SNAP ON

DATE 06-28-12
TIME 03:26:52

FUEL GASOLINE

| | |
|---------|-------|
| O2 % | 2.95 |
| CO2 % | 13.3 |
| HC ppm | 15 |
| CO % | 0.10 |
| COK % | 0.11 |
| AFR | 16.97 |
| NOX ppm | 88 |

BeColl

Vehicle #Chevy Impala (After)

DATE 10-07-12
TIME 12:57:52

FUEL GASOLINE

| | |
|---------|-------|
| O2 % | 6.64 |
| CO2 % | 10.5 |
| HC ppm | 10 |
| CO % | 0.07 |
| COK % | 0.08 |
| AFR | 21.27 |
| NOX ppm | 88 |

#222
816 0652 ILL
06 Chevy Impala
2G1WS551769386779

Vehicle #3 (Before)

SOLINE

| | |
|---------|-------|
| O2 % | 0.64 |
| CO2 % | 15.74 |
| HC ppm | 18 |
| CO % | 0.10 |
| COK % | 0.11 |
| AFR | 16.88 |
| NOX ppm | 88 |

Vehicle #3 (After)

Rock #3

SNAP ON

DATE 10-25-12
TIME 14:25:08

FUEL GASOLINE

| | |
|---------|-------|
| O2 % | 0.52 |
| CO2 % | 15.1 |
| HC ppm | 09 |
| CO % | 0.07 |
| COK % | 0.06 |
| AFR | 15.66 |
| NOX ppm | 88 |

afw

Vehicle #4 (After)

9:38 Am -
28 JUNE 2012

| FUEL | GASOLINE |
|---------|----------|
| O2 % | 0.64 |
| CO2 % | 15.0 |
| HC ppm | 0.87 |
| CO % | 0.03 |
| COX % | 0.08 |
| AFR | 15.14 |
| NOX ppm | 15 |

F-250 #4
before

Vehicle #4 (After)

004
SNAP ON

DATE 10-15-12
TIME 15:45:10

| FUEL | GASOLINE |
|---------|----------|
| O2 % | 0.53 |
| CO2 % | 15.0 |
| HC ppm | 0.02 |
| CO % | 0.04 |
| COX % | 0.04 |
| AFR | 15.00 |
| NOX ppm | 10 |

after