THE EXTRA MILE.

IT'S ON OUR WAY.

BIG G EXPRESS

GOING THE EXTRA MILE SINCE 1995

Big G Express is 100% employee owned, asset-based truckload carrier, headquartered in Shelbyville, Tennessee. With 600 tractors and over 1,300 trailers, we provide general commodity, irregular route, dry van truckload and regional flatbed services to nationwide customers. By using state-of-the art equipment and the latest technologies, our trucking services and our employee-owners drive our success.

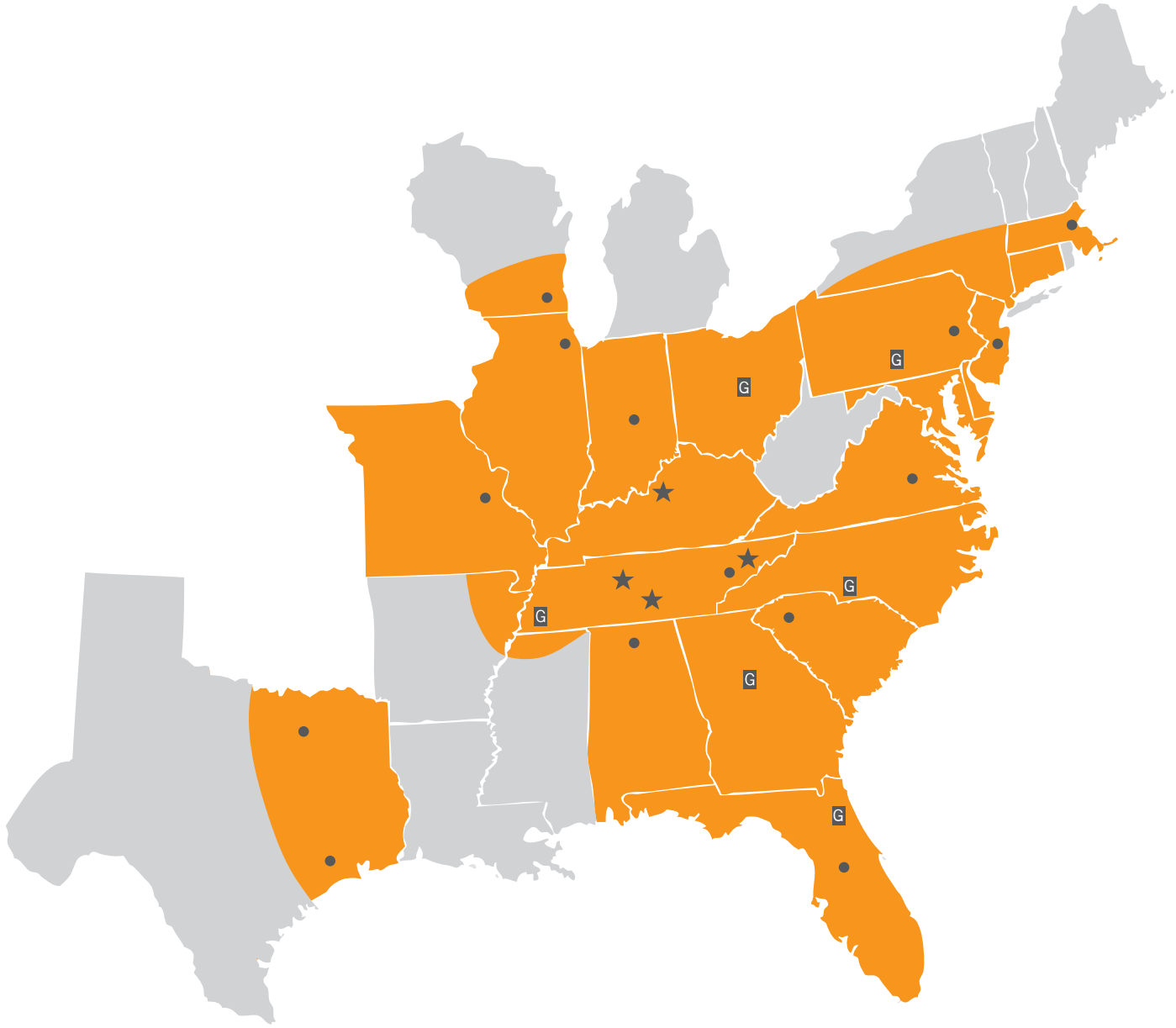
SERVICE AREA MAP

TERMINALS: ★ DROP YARDS: G

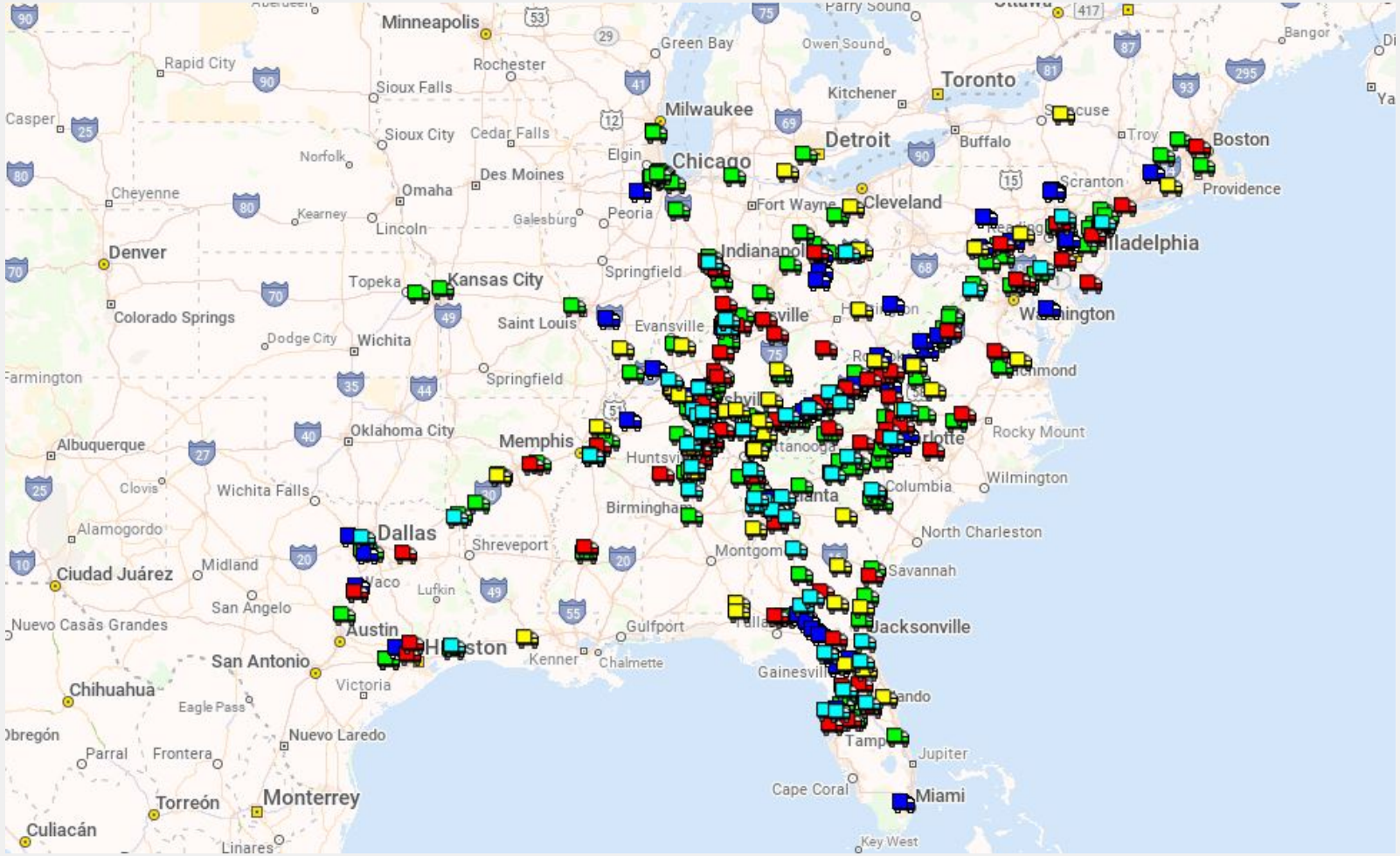
Huntsville, Alabama
Jacksonville, Florida G
Orlando, Florida
Atlanta, Georgia G
Chicago, Illinois
Indianapolis, Indiana
Louisville, Kentucky ★
Boston, Massachusetts

St. Louis, Missouri
Somerset, New Jersey
Charlotte, North Carolina G
Colombus, Ohio G
Allentown, Pennsylvania
Carlisle, Pennsylvania G
Greenville, South Carolina
Knoxville, Tennessee

Memphis, Tennessee G
Morristown, Tennessee ★
Nashville, Tennessee ★
Shelbyville, Tennessee ★
Dallas, Texas
Houston, Texas
Richmond, Virgina
Milwaukee, Wisconsin



Fleet Footprint



Trucking in a nutshell

1. Contract to move freight for customer.
2. Determine dates and times for pickup and delivery
3. Pick up freight and deliver it on time as per Customer's instructions…
4. Get Paid

But… it's not quite that simple

Driver Retention

- 2017 industrywide driver turnover was at 88%

Driver/Equipment Utilization

- How to maximize your investment in people/equipment?

Customer Data Requirements

- How to provide your customers with the reporting/data that they require?

Equipment Maintenance

- How to keep your fleet rolling and making money?

Paying your drivers

- How to take care of your employees?

Safety

- How to keep your people/the public safe?

But… it's not quite that simple

Fuel

Fuel Economy

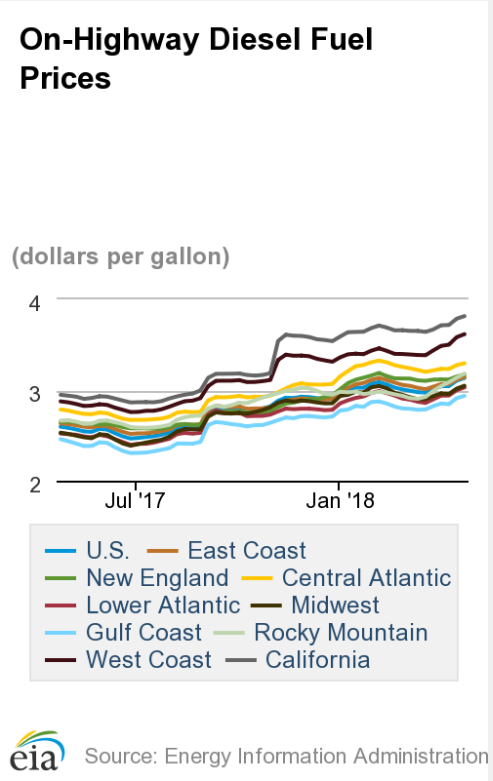
Fuel is expensive. What can you to do get the most miles out of a given gallon?

Fuel Purchasing

Fuel is expensive. How can you get the most fuel for your dollar?

Theft Protection

Fuel is expensive. How can you protect your business from theft?



But… it's not quite that simple

Fuel

For a 200 gallon capacity holds $626 worth of fuel. For a quick cash turnaround, at current prices, 32 gallons of fuel yields $100.

U.S. On-Highway Diesel Fuel Prices* (dollars per gallon) — full history

	04/09/18	04/16/18	04/23/18	Change from week ago	Change from year ago
U.S.	3.043	3.104	3.133	↑ 0.029	↑ 0.538
East Coast (PADD1)	3.066	3.116	3.142	↑ 0.026	↑ 0.510
New England (PADD1A)	3.116	3.149	3.171	↑ 0.022	↑ 0.521
Central Atlantic (PADD1B)	3.232	3.275	3.295	↑ 0.020	↑ 0.510
Lower Atlantic (PADD1C)	2.939	2.998	3.028	↑ 0.030	↑ 0.508
Midwest (PADD2)	2.957	3.016	3.047	↑ 0.031	↑ 0.517
Gulf Coast (PADD3)	2.844	2.910	2.936	↑ 0.026	↑ 0.478
Rocky Mountain (PADD4)	3.086	3.137	3.181	↑ 0.044	↑ 0.519
West Coast (PADD5)	3.500	3.583	3.616	↑ 0.033	↑ 0.741
West Coast less California	3.226	3.326	3.366	↑ 0.040	↑ 0.580
California	3.717	3.787	3.815	↑ 0.028	↑ 0.868

But… it's not quite that simple

1. You want to catch as many instances of fuel theft as you can, but…
2. You want to make sure you're as certain about it as possible before initiating action against the driver – You don't want to fire someone who is innocent.

Not only does this mean you wronged someone who was working for you, but you can guarantee that the driver will tell everyone they know how you did them wrong.

Why We're Here

In 2017, we had 120,000 purchases through our fuel vendors, totaling approximately 8½ million gallons of fuel.

This accounts for almost $19 Million in direct costs to the company. Fuel costs eat up almost 18% of our total revenue.

Even a small finding of theft, at a fleet level, could result in real, appreciable savings. Depending on whose numbers you believe, stolen gallons could account for up to 8%** of purchased fuel.

**I'm inclined to believe that while theft is real, the number is smaller than that, but I'm not trying to sell anything…

Over The Road Fuel Theft

Most over the road fuel theft happens via either:

A: Driver siphons fuel from tractor into personal vehicle/tractor or to sell

B: A third party siphons fuel from the truck as it is parked either near the driver's home, or at a fuel stop.

Industry Solution --

Anti Siphon Devices can be fitted to the fuel tanks, however, these can be defeated. We often see these
in our shop with the bottoms pushed out.

When this happens, we do not know
where/when the theft occurred, only that it did…

Point of Purchase Fuel Theft

Most commonly, point of purchase fuel theft works like this --

Driver negotiates with another driver to come in after his truck, while laying fuel hoses on ground so second driver can add fuel under the first driver's fuel transaction. This can net the driver a quick payout, and is quite difficult to catch…

Industry Solution --

Some Fuel stops are implementing systems to prevent point of purchase fuel theft --

Implementing a RFID based system which will automatically activate/deactivate the pump based on proximity of a permanently mounted RFID tag on the vehicle.

Industry Solution --

However, Loves appears to be the main vendor working on this, and they are our smallest fuel vendor.

Current Methods of Detection

Point of Purchase -- Currently, we sometimes receive phone calls alleging our driver is selling fuel to other drivers at a truck stop. We often have suspicions about this type of behavior, but we currently don't have a reliable way to spot this independently through our data/analysis systems.

Over the road – We sometimes suspect, however, our measures of the vehicles MPG does not catch this type of theft. We occasionally find damaged anti-siphon devices in the tanks of the trucks.

Knowing the location where fuel disappears can also inform how we think the fuel was stolen – was it siphoned into a personal vehicle, or was it a case of theft where the truck was parked?

Measurement Metrics

Our most common metric for measuring performance is the vehicle's MPG.

However, Our Vehicle Performance Metrics are based off of engine fuel used; which doesn't take the amount pumped into account.

Even if it did, the impact on those metrics would be relatively small…

For this month, our trucks average 2372 miles traveled per week…

(for trucks that travelled at least 1000 miles in a week)

For this month, our trucks average 330.49 gallons of fuel used…

(with a standard deviation of 86 gallons (same sample as above))

For this month, our trucks average 7.17 MPG

Over a year, our trucks average approximately 7.0MPG…

A theft of 30 gallons on one week would result in the weekly MPG going to approx. 6.58

BUT – what's the difference between theft and a week of bad traffic/normal ebb and flow?

Data Available

We have provided several sources of data available that should help us to mitigate these problems:

- Fuel Purchase Information (PTCHTRANH)
  - Provided by Fuel Transaction Processor (EFS)
  - We know measures, etc. will be accurate

- Fuel Tank Levels (ExactFuelEvents/ExactFuelTankLevels)
  - Provided by our equipment
  - Fairly high frequency (approx. every 15 minutes)
  - Many possible issues with accuracy

Data Available (continued)

ExactFuelEvents/ExactFuelTank Levels come from Omnitracs ExactFuel web service…

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    <equipment equipType="tractor" unitAddress="105304126" ID="2097"/>
    <driverID>OAKR</driverID>
    <position posTS="2018-04-19T18:15:11.000Z" lon="-85.22175" lat="36.08737"/>
    <speed>51</speed>
    <heading>305.9</heading>
    <odometer>45044.3</odometer>
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    <efFuelTankLevel>
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</tran>
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Data Available (continued)


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  <eventTS>2010-12-01T18:27:15Z</eventTS>
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  <driverID>000003274</driverID>
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  <posType>3</posType>
  <ignitionStatus>1</ignitionStatus>
  <tripStatus>0</tripStatus>
  <dataStartTS>2010-11-30T10:09:00Z</dataStartTS>
  <dataEndTS>2010-12-01T18:27:01Z</dataEndTS>
  <distance>25</distance>
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  <engineTime>1051</engineTime>
  <moveTime>226</moveTime>
  <intertripIdleTime>653</intertripIdleTime>
  <shortIdleTime>653</shortIdleTime>
  <overRPMTime>22</overRPMTime>
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  <idleFuelUsed>3.8</idleFuelUsed>
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  <registeredDriver>0</registeredDriver>
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  <topGearTime>0</topGearTime>
  <gearDataSource>3</gearDataSource>
  <spdRpmTimes spdUnits="MPH">1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,
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</T.4.01.0>
```


Vehicle Performance Data (QCPerformanceExtract) –

Weekly frequency reporting of miles driven/fuel used

Fuel amounts are in gallons

Time items are in minutes

Distance is in miles

Data Available (continued)

All dates and Times are synchronized to CST/CDT.

```
select ExactFuelEvents.Id, EventTimeStamp, ExactFuelEvents.EquipmentID, Latitude, Longitude, Speed,
Heading, Odometer, TankLevelPercent, TankLevelGallons from ExactFuelEvents join ExactFuelTankLevels on
ExactFuelEvents.Id = ExactFuelTankLevels.ExactFuelEventId where EventTimeStamp > '2018-04-22 12:00:00'
and EquipmentID = '2057' order by EventTimeStamp asc
```

Id	EventTimeStamp	EquipmentID	Latitude	Longitude	Speed	Heading	Odometer	TankLevelPercent	TankLevelGallons
21747421	2018-04-23 00:34:25.920	2057	40.002710	-77.549280	68	37.500000	123261.900000	37.40	74.80
21747671	2018-04-23 01:34:26.217	2057	40.416240	-76.557070	67	67.600000	123325.700000	34.30	68.60
21747711	2018-04-23 01:48:06.230	2057	40.464010	-76.340020	0	262.800000	123338.100000	29.90	59.80
21747813	2018-04-23 02:12:36.310	2057	40.463930	-76.340360	0	253.500000	123338.100000	98.70	197.40
21747827	2018-04-23 02:12:36.310	2057	40.463930	-76.340360	0	253.500000	123338.100000	98.70	197.40
21747829	2018-04-23 02:13:36.310	2057	40.463930	-76.340370	0	253.500000	123338.100000	98.70	197.40

```
select TRNDAT, TRNTIM, TRNPI1, TRNPQ1 from BGETCHDATA.PTCHTRANH where TRNDAT = 20180423 and TRNUNT = '2057
```

TRNDAT	TRNTIM	TRNPI1	TRNPQ1
20180423	207	ULSD	114.15

Data Available (continued)

Unit Information (UNITS)

- From Dispatch Systems (includes make & model of truck)

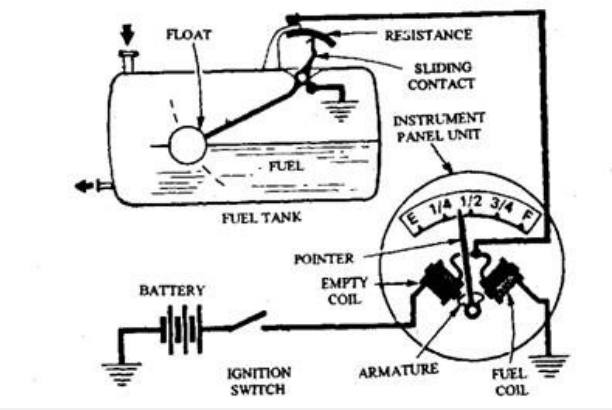
Unit Fuel System specification (BGEIDSC.EF2EFFP)

- Entered by Maintenance Department
- Includes Tank Capacity (total, not individual tanks)
- *Should* be accurate…

Issues with the fuel tank level data

Moving Vehicle:

While vehicle is in motion, acceleration causes the liquid onboard to slosh around.

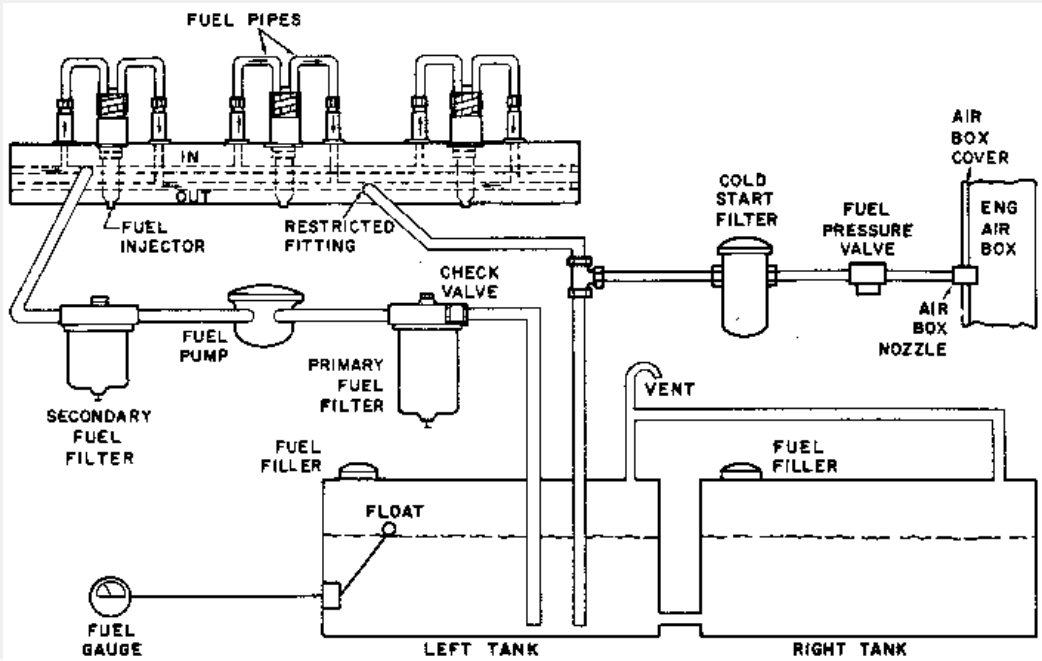


Single Fuel Sensor:

Our Current Trucks are configured with a single fuel level sensor

Balance (linked tanks)

Uneven fill amounts to each tank will cause the tanks to re-balance. This can take up to 30 minutes or so, depending on the size of the imbalance.



Issues (continued)

Diesel fuel expands with temperature.

Coefficient of expansion for Diesel Fuel is .00083/°C

Average Temp Swing in TN is ~10.4°C

100 gallons of diesel at the low temp. of the day will be 100.8632 gallons at the high temp.

Issues (continued)

Our trucks only have a fuel sensor on one side.

Due to balanced Tanks, this works “well enough”

Signal/Noise Ratio

15	21747671	2018-04-23 01:34:26.217	2057	40.416240	-76.557070	67	67.600000	123325.700000	34.30	68.60
16	21747711	2018-04-23 01:48:06.230	2057	40.464010	-76.340020	0	262.800000	123338.100000	29.90	59.80
17	21747813	2018-04-23 02:12:36.310	2057	40.463930	-76.340360	0	253.500000	123338.100000	98.70	197.40
18	21747827	2018-04-23 02:12:36.310	2057	40.463930	-76.340360	0	253.500000	123338.100000	98.70	197.40
19	21747829	2018-04-23 02:13:36.310	2057	40.463930	-76.340370	0	253.500000	123338.100000	98.70	197.40
20	21747815	2018-04-23 02:13:36.310	2057	40.463930	-76.340370	0	253.500000	123338.100000	98.70	197.40
21	21747877	2018-04-23 02:23:56.310	2057	40.463800	-76.338770	21	343.900000	123338.300000	99.70	199.40
22	21748046	2018-04-23 03:02:56.560	2057	40.575590	-75.620760	0	142.000000	123378.200000	95.60	191.20
23	21748079	2018-04-23 03:09:36.577	2057	40.558080	-75.633000	0	171.500000	123380.100000	97.20	194.40
24	21748238	2018-04-23 03:41:36.827	2057	40.557990	-75.632980	0	171.500000	123380.100000	97.20	194.40
25	21748273	2018-04-23 03:41:36.827	2057	40.557990	-75.632980	0	171.500000	123380.100000	97.20	194.40
26	21748279	2018-04-23 03:43:26.827	2057	40.558000	-75.632950	0	171.500000	123380.100000	97.20	194.40
27	21748244	2018-04-23 03:43:26.827	2057	40.558000	-75.632950	0	171.500000	123380.100000	97.20	194.40

Issues (continued)

Not all trucks have same tank configuration.

Refer to BGEIDSC.EF2EFFP/IBGEFILE.UNITS for correlation to tank size to make/model of truck

Trucks with 200 gallon capacity tanks generally have two 100 gallon tanks

Trucks with 230 gallon capacity typically have a 80 gallon tank on driver side, and 150 gallon tank on passenger side.

Issues (continued)

Anti-Idling Technologies (APUs)

Emmissions regulations require that engine idling be minimized.

OTR Drivers have nowhere to go while on break, so comfort needs to be maintained.

APU's provide electric power for truck amenities, A/C, heat, etc.

Idling a semi engine consumes on the order of 1 gal/hr.

Running an APU consumes on the order of .2 gal/hr.

The engine does not record APU fuel usage.

Usage pattern is seasonal – year round, approx. 40 hr/week. Summertime, up to 80 hr/week. Winter, can be as low as 10 hr/week.

Goal

Our goals for this project is to arrive at a technique, or collection of techniques to take the sources of data available to seek out anomalies in the fuel level of a truck, so that we can investigate possible instances of fuel theft. Ideally, suspected theft events could be identified through normal processes and reports delivered via automated means.

Not all instances of over the road theft are due to nefarious behavior on the part of an employee, but being able to identify events where it happens would make it much easier to come to a determination.

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