FAST and Asset-Level Data Reporting
Lessons Learned and Insights

Ron Stewart • Idaho National Laboratory
We’ll cover…

• FY 2017 fleet data call overview and status

• Asset-level data reporting: what we’ve learned

• Fleet insights: new ways we can look at the fleet

• Looking forward…

• Discussion / Q&A
FY 2017 Fleet Data Call Overview

• 39 of 49 reporting Federal agencies submitting per-vehicle data

• Remaining 10 agencies submitted aggregated fleet data
  – 1 large agency fleet
  – 2 medium agency fleets
  – 7 small agency fleets

• 90% of Federal fleet covered in new data shape
  – Approximately 650,000 vehicles and their data

• Dataset not yet final
  – Several agencies still working on initial submission
  – DOE feedback to agencies may result in updates
ALD: Lessons Learned - Validation

• Flagging business rules will all be evaluated
  – Thresholds / ranges evaluated to make sure they are actually flagging outliers
    • Flagging too much?
    • Not flagging things they should?
  – Tune how / when rules are applied:
    • Some rules apply only to vehicles in fleet entire year?
    • Some rules may need to be more specific: ranges based on vehicle type rather than class?
  – Elevate flagging rules to block clearly invalid data?

• A few areas where we will look to revise blocking rules

• We (all) need additional ways of exploring flagged data in FAST
ALD: Lessons Learned - Process

• Simpler approaches worked better
  – Simpler reporting hierarchy
  – Fewer people involved in data cleaning, issue resolution, and submission

• Effort associated with data cleanup was significant
  – Starting earlier made a big difference
  – Evaluation of both data and processes was important

• Approach this year will help determine ease vs. pain next year
  – Factoring of data corrections into MIS data (and processes)
  – Process and tool changes to minimize pain points
ALD: Lessons Learned – Data Issues

• Use of license plate # for vehicle identifier
  – Not permanent and immutable!

• Groups of “identical” vehicles
  – Example: 13 vehicles in a fleet that are identical in all regards except vehicle identifier (VIN)
  – Vehicles with the same vehicle ID (e.g., VIN) reported in multiple agencies, none of which show as disposal?

• Consistency of cost reporting

• Consistency of EPAct exemption designations

• Issues with vehicle mileage and fuel consumption
  – Reporting annual miles vs. odometer reading?
  – Fuel units matter!
  – Tracking electricity consumption in vehicles?
ALD: Insights

• Caveat: partial and preliminary dataset

• Looking at “the fuel coding issue”

• Very diverse fleet (we knew that)
  – … now we can quantify “how diverse?”

• Some examples of new ways of looking at the fleet
ALD: Insights – Inconsistent Fuel Data

- Long-recognized “fuel coding issue”
  - Inconsistent fuel types based on vehicle fuel type/configuration
  - Example: DSL fuel consumed in GAS/ELE PH vehicle

- Largely swallowed up in older aggregated reporting method

- Problem with coding at the pump?
  - … or in data handling within purchasing systems?
  - … or in data entry?
  - … or in fleet MISs?
  - … something else?

- FAST management team decided to accept and flag inconsistent fuel consumption
  - Challenge for DOE/GSA/EIA: use of invalid data?
  - Work with agencies to better understand scope and cause of issues
ALD: Insights – Inconsistent Fuel Data

• Data from 37 agencies
  – 556,500 vehicles
  – 853,500 fuel entries
  – 298M GGE fuel

• At the Federal level:
  – 21 of 37 agencies have vehicles with inconsistent fuel consumption
  – 39,700 vehicles (7.1% of all vehicles)
  – 42,539 fuel records (5.0% of all fuel records)
  – 3.6M GGE (1.2% of all fuel volume)

• At the agency level
  – 0.1% - 15.6% of vehicles with inconsistent fuel
  – 0.1% - 10.0% of fuel records
  – 0.0% - 9.3% of fuel volume

ALD: Insights – A Diverse Fleet

- 31 different vehicle types
  - Vehicle counts/type range from 1 to over 160,000

- 150 different combinations of vehicle type + fuel type/configuration

- 170 different vehicle makes
  - 1 to over 235,000 vehicles/make

- Vehicle location:
  - 5% foreign
  - 7% domestic and location withheld
  - 25% domestic by ZIP code (over 7,100 different ZIP codes)
  - 63% domestic by lat/long (over 22,100 distinct locations)

## ALD: Insights – A diverse fleet

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<tr>
<th>Inventory Parameter</th>
<th>Min</th>
<th>Median</th>
<th>Mean</th>
<th>Max</th>
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<td>Model Year</td>
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<td>2018</td>
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ALD: Insights – New ways to look at the fleet

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FY 2017 Vehicle Acquisitions & Disposals by Model Year

Correlation matrix: visualization of relationships between data elements

Dot size and color: magnitude of correlation

ALD: Insights – New ways to look at the fleet

FY 2017 Inventory Correlation Matrix

FY 2017 Inventory - Sedans/St Wgns - Correlation Matrix

All sedan/station wagon inventory

$n = 75,003$

ALD: Insights – New ways to look at the fleet

All sedan/station wagon inventory less:
- EV’s (ELE DE, GAS/ELE PH, etc.)
- Vehicles with miles < 500

\[ n = 68,743 \]

ALD: Insights – New ways to look at the fleet

All sedan/station wagon inventory less:
- EV’s (ELE DE, GAS/ELE PH, etc.)
- Vehicles with miles < 500
- Hybrids (GAS HY, DSL HY)
- Vehicles with fuel efficiency > 100

n = 50,262

ALD: Insights – New ways to look at the fleet

FY 2017 Sedans/St Wgns Inventory: Cost/Mile vs Months in Service

All sedan/station wagon inventory
n = 75,003

Looking forward...

• Planned on the FAST side:
  – Review and tuning of business rules
  – Additional ways to look at the data and flags

• Recommendations for the agency side:
  – Make sure data corrections go back into fleet MIS(s)
  – Review what was flagged… and why
  – Review data-related processes that contribute(d) to missing, invalid, or questionable data
    • Find ways to address those as far upstream and early as possible?
    • Look for ways to highlight questionable data within fleet MIS(s) and review processes?
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