Questions and Answers
Updated 1.3.24

CRC Project AVFL-39-2: "Low Phosphorous Low Ash Gasoline Engine Oil to Meet Future Emission Requirements"

1. Can CRC please elaborate on E-141 "Post Tier 3 Vehicle and Fuels" project in more detail?

Regarding E-141 "Post Tier 3 Vehicle and Fuels" project, we don't have many project details so far since it is an idea in development with no Statement of Work yet. The idea was to study fuel effects on emissions for vehicles with the most advanced production emissions aftertreatment systems in a small fleet of about 5 vehicles using chassis dyno tests. Fuel effects of interest include Particulate Matter Index (PMI) and Final Boiling Point (FBP). One of the vehicles proposed for the project is a Ford F-150 with dual injection (PFI and GDI). The only point of discussing this in the AVFL-39-2 E-139-2 project is to indicate potential cost savings by offering a test vehicle already available so we don't incur cost of another test vehicle purchase. The vehicle use will not be possible, however.

2. Selection of Engine: Does CRC has a preferred engine choice (size, NA, Boosted)

Suggestions include:

1. Possibly use same engine as GPF test engine (E-141)
2. *Ford - 3.5 liter GTDI PFI dual injection engine (same as F-150).*
3. *Use uncatalyzed GPF to look at Phosphorus and ash impact. GPF is underfloor aftermarket.*

3. Can CRC confirm that 4 mode cycle = Standard bench Cycle, if not can CRC share more details?

We are using standard road cycles.

4. Can CRC elaborate on the 4-step cycle mentioned?

We are using the standard road cycles (for whole vehicle)- see examples illustrations.

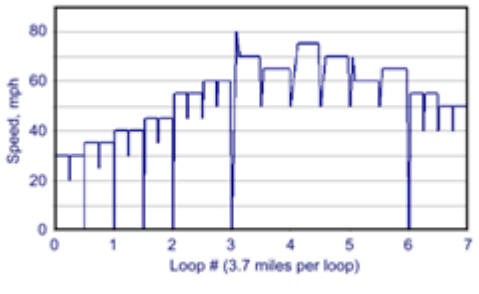

Figure 1. Standard Road Cycle

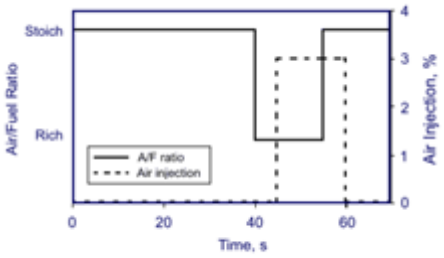

Figure 2. Standard Bench Cycle

5. Is a burner test bench being considered as an alternative to engine test bench for catalyst aging??

Use engine dyno, and not the burner.

6. Can CRC elaborate on Ftp Bag 1 and Bag 2 tests that consumes 10 gallons of test?

FTP bag 1 is a cold start cycle, while bag 2 is transient cycle. Cold soak before each bag 1 - same as CFR. Repeat these cycles until consume 10 gals of fuel. Bag 1 and Bag 2 are one option, another option is Standard road cycle as listed in SOW. Contractor may choose.

7. How is it expected to measure real time ash?

It is very difficult to measure the real time ash, we may need to run certain amount of time (or cycles) and weigh the GPF(may need to run regen cycles first and bake the moisture out before the measurement). If the bidder has other options, the panel is open to consider suggestions.

8. Is ICP-MS analysis to be performed at the end of GPF investigations is currently assumed, can you confirm the same?

Both pretest and posttest's ICP analysis are needed. Potentially more in between.

9. Ash loading – CT scan for distribution and density, ◊ Is this scan expected to be done directly after the ash loading process?

This is open to further discussion with the panel, but one option is to get rid of the soot by running the regen cycle first, this way we can see the ash clearly.

10. Measure real-time Particle Number (PN) and particle size distribution to be measured during the Emission tests or also during the entire GPF investigation process?

The preference is to monitor PN on all tests.

11. Is Filtration efficiency to be measured on a specific cycle, or intended during a steady state engine operation?

The Bidder is requested to make a recommendation to maximize test repeatability and/or applicability to vehicle certification test.

12. How many GPF / catcon test samples are planned for the project?

The bidder is requested to make a recommendation.

13. FTP20C is not mentioned but will have valuable takeaways for CRC, Can FTP 20C therefore be made a standard part of entire program (Catcon + GPF study)?

The bidder is requested to make a recommendation.

14. The emission tests FTP -20C & US06 are GPF investigation relevant and emphasized in EPA Tier IV proposed rule, does CRC intending these tests for catalyst investigation as well?

Not necessarily. Consider the Catalyst and GPF investigations as separate parts of the test program.

15. pressure drop changes◊ any specific test sequence or mapping expected?

Not sure if simply monitor the pressure change before GPF and after GPF is sufficient or not. The bidder is requested to make a recommendation to maximize test repeatability

16. and fuel economy effects of pressure drop--> are the findings to be documented during any specific drive cycles.

The bidder is requested to make a recommendation to maximize test repeatability

17: GPF testing (b**): Can CRC confirm that for the 60h of Dyno testing, it is expected that the SRC is to be simulated using Engine Dyno? Is a combination of TWCC + GPF is expected to be mounted or just GPF without TWCC?

The panel preference is to only use both but not as close-coupled, It would be underfloor (GPF will be further down the exhaust pipe)

18. Catcon testing (a*) Can CRC confirm the following: SRC will be performed on vehicle to determine the heat load data and SBC will be performed on engine dyno for the 150000 miles aging, using the EPA 40 CFR Part 86. Only TWCC will be mounted without GPF. Is GPF for this testing desired?

No. Catalyst and GPF investigations as separate parts of the test program.

19. Is the study targeted for GF7 or GF8 Oils?

Prefer latest generation oil unless there are reasons to use another oil for test repeatability.

Reference

(a) *lower phosphorous concentration on catalysts protection

(b) **ash levels acceptable for GPFs for meeting future emission levels.

TWCC = Three-way catalytic converter (Catcon)