

EXHIBIT A

EPA_{ct} STUDY FOIA RECORD EXCERPTS

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Emissions from Tier 2 Vehicles Running on Ethanol/Gasoline Blends

Presentation for ATRA, March 10, 2011

Rich Cook

Office of Transportation and Air Quality

How These Data Will be Used

- Improve understanding of how fuel changes affect Tier 2 vehicles
 - Including E15 effects
- Improve MOVES emissions model
- Improve speciation of emissions for photochemical modeling
- Provide emissions data supporting upcoming analyses and potential regulations
 - Inform analyses done in response to May, 2010 Presidential memo
 - Inform analyses to satisfy anti-backsliding study and mitigation requirements

AWARD/CONTRACT		1. THIS CONTRACT IS A RATED ORDER UNDER DPAS (15 CFR 350)		RATING	PAGE OF PAGES
2. CONTRACT (Proc. Inst. Ident.) NO. EP-C-07-028		3. EFFECTIVE DATE 6/28/07		4. REQUISITION/PURCHASE REQUEST PROJECT NO. PR-CI-07-10057	
5. ISSUED BY Environmental Protection Agency Cincinnati Procurement Operations Division 26 W. Martin Luther King Drive Cincinnati, OH 45268		6. ADMINISTERED BY (if other than Item 5)			
7. NAME AND ADDRESS OF CONTRACTOR (No., street, city, county, State and ZIP Code) SOUTHWEST RESEARCH INSTITUTE 6220 CULBERA ROAD San Antonio, TX 78238		8. DELIVERY [] FOB ORIGIN [X] OTHER (See below) Destination		9. DISCOUNT FOR PROMPT PAYMENT N/A	
CODE	FACILITY CODE	10. SUBMIT INVOICES (4 copies unless otherwise specified) TO THE ADDRESS SHOWN IN:		ITEM 12	
11. SHIP TO MARK FOR If applicable, see Section B of the schedule.		12. PAYMENT WILL BE MADE BY Environmental Protection Agency Research Triangle Park Financial Management Center (D143-02) Research Triangle Park, NC 27711			
13. AUTHORITY FOR USING OTHER THAN FULL AND OPEN COMPETITION: [] 10 U.S.C. 2304(c)() [] 41 U.S.C. 253(c)()		14. ACCOUNTING AND APPROPRIATION DATA See Accounting and Appropriation data in Section B			
15A. ITEM NO.	15B. SUPPLIES/SERVICES	15C. QUANTITY	15D. UNIT	15E. UNIT PRICE	15F. AMOUNT
					15G. TOTAL AMOUNT OF CONTRACT \$1,078,095.00
16. TABLE OF CONTENTS					
SEC.	DESCRIPTION	PAGE(S)	SEC.	DESCRIPTION	PAGE(S)
PART I - THE SCHEDULE			PART II - CONTRACT CLAUSES		
A	SOLICITATION/CONTRACT FORM		I	CONTRACT CLAUSES	
B	SUPPLIES OR SERVICES AND PRICES/COSTS		PART III - LIST OF DOCUMENTS, EXHIBITS AND OTHER ATTACH.		
C	DESCRIPTION/SPECS./WORK STATEMENT		J	LIST OF ATTACHMENTS	
D	PACKAGING AND MARKING		PART IV - REPRESENTATIONS AND INSTRUCTIONS		
E	INSPECTION AND ACCEPTANCE		K	REPRESENTATIONS, CERTIFICATIONS AND OTHER STATEMENTS OF OFFERORS	
F	DELIVERIES OR PERFORMANCE		L	INSTRS., CONDS., AND NOTICES TO OFFERORS	
G	CONTRACT ADMINISTRATION DATA		M	EVALUATION FACTORS FOR AWARD	
H	SPECIAL CONTRACT REQUIREMENTS				
CONTRACTING OFFICER WILL COMPLETE ITEM 17 OR 18 AS APPLICABLE					
17. [] CONTRACTOR'S NEGOTIATED AGREEMENT (Contractor is required to sign this document and return _____ copies to issuing office). Contractor agrees to furnish and deliver all items or perform all the services set forth or otherwise identified above and on any continuation sheets for the consideration stated herein. The rights and obligations of the parties to this contract shall be subject to and governed by the following document: (a) this award/contract. (b) solicitation, if any, and (c) such provisions, representations, certifications, and specifications, as are attached or incorporated by reference herein. (Attachments are listed herein.)			18. [X] AWARD (Contractor is not required to sign this document.) Your offer on Solicitation Number PR-CI-07-10057 , including the additions or changes made by you which additions or changes are set forth in full above, is hereby accepted as to the items listed above and on any continuation sheets. This award consummates the contract which consists of the following documents: (a) the Government's solicitation and your offer, and (b) this award/contract. No further contractual document is necessary.		
19A. NAME AND TITLE OF SIGNER (Type or print)			20A. NAME OF CONTRACTING OFFICER KATHLEEN A. ROE		
19B. NAME OF CONTRACTOR		19C. DATE SIGNED	20B. UNITED STATES OF AMERICA	20C. DATE SIGNED	
BY _____ (Signature of person authorized to sign)			BY <i>Kathleen A. Roe</i> (Signature of Contracting Officer)	6/21/07	

NSN 7540-01-152-8089
PREVIOUS EDITION UNUSABLE

26-107

STANDARD FORM 26 (REV 4-85)
Prescribed by GSA
FAR (48 CFR) 53.214(a)

SECTION E - INSPECTION AND ACCEPTANCE

E.1 NOTICE Listing Contract Clauses Incorporated by Reference

NOTICE:

The following solicitation provisions and/or contract clauses pertinent to this section are hereby incorporated by reference:

FEDERAL ACQUISITION REGULATION (48 CFR CHAPTER 1)

NUMBER	DATE	TITLE
52.246-5	APR 1984	INSPECTION OF SERVICES--COST-REIMBURSEMENT

**E.2 HIGHER-LEVEL CONTRACT QUALITY REQUIREMENT (GOVERNMENT SPECIFICATION)
(FAR 52.246-11) (FEB 1999)**

The Contractor shall comply with the higher-level quality standard selected below.

	<u>Title</u>	<u>Numbering</u>	<u>Date</u>	<u>Tailoring</u>
<input checked="" type="checkbox"/>	<i>Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs</i>	ANSI/ASQC E4	1994	See below
<input type="checkbox"/>				
<input type="checkbox"/>				

As authorized by FAR 52.246-11, the higher-level quality standard ANSI/ASQC E4 is tailored as follows:

The solicitation and contract require the offeror/contractor to demonstrate conformance to ANSI/ASQC E4 by submitting the quality documentation described below.

In addition, after award of the contract, the Contractor shall revise, when applicable, quality documentation submitted before award to address specific comments provided by EPA and submit the revised documentation to the Contracting Officer's Representative.

SOUTHWEST RESEARCH INSTITUTE®

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ENGINE, EMISSIONS AND VEHICLE RESEARCH DIVISION
FAX: (210) 522-3950
ISO 9001 Certified
ISO 14001 Certified

November 17, 2008

To: Environmental Protection Agency
Cincinnati Procurement Operations Division
26 West Martin Luther King Drive
Cincinnati, OH 45268

Attention: Ms. Tammy Thomas
Contract Officer

From: Peter Morgan
Emissions Research and Development Department
Southwest Research Institute
P.O. Drawer 28510
San Antonio, Texas 78228-0510

Subject: Work Plan for Work Assignment 1-09, EPA Contract EP-C-07-028, under SwRI
Project 03.14175, SwRI Proposal No. 03-54043.

Contract Title: "Testing and Related Support for Energy Bill-Mandated
Activities"

Assignment Title: "Comprehensive Gasoline Light Duty Exhaust Fuel Effects
Test Program to Cover Multiple Fuel Properties and Two Ambient Test
Temperatures, Interim Testing"

1.0 INTRODUCTION

Section 1506 of the Energy Policy Act of 2005 (Energy Act) requires EPA to produce an updated fuel effects model representing the 2007 light duty gasoline fleet, including determination of the emissions impacts of increased renewable fuel use.

The use of ethanol in gasoline has increased more than five-fold since 2000, and it is likely that its use will continue to expand into the next decade. It is also likely that use of high-level blends such as E85 will expand significantly.

Additionally, recent investigation related to the Mobile Source Air Toxics (MSAT2) rulemaking has shown that hydrocarbon emissions from light duty gasoline vehicles increase significantly as test temperature is decreased. As a result, the MSAT2 rulemaking promulgated NMHC standards at 20°F. However, this being a relatively new area of study, fuel effects data at temperatures lower than 72°F are scarce for use in emissions models.



SAN ANTONIO, TEXAS
HOUSTON, TEXAS • WASHINGTON, DC • ANN ARBOR, MI

TABLE 1. TEST VEHICLES FOR RECRUITMENT

MAKE	YEAR	BRAND	MODEL	ENGINE	FAMILY	T2 BIN	NOTE
GM	2008	Chevrolet	Cobalt	2.4L I4	8GMXV02.4025	5	
GM	2008	Chevrolet	Impala	3.5L V6	8GMXV03.9052	5	FFV
GM	2008	Saturn	Outlook	3.6L V6	8GMXT03.6151	5	
GM	2008	Chevrolet	C1500 Silverado	5.3L V8	8GMXT05.3373	5	FFV
Toyota	2008	Toyota	Corolla	1.8L I4	8TYXV01.8BEA	5	
Toyota	2008	Toyota	Camry	2.4L I4	8TYXV02.4BEA	5	
Toyota	2008	Toyota	Sienna	3.5L V6	8TYXT03.5BEM	5	
Toyota	2008	Toyota	Tundra	4.0L V6	8TYXT04.0AES	5	
Ford	2008	Ford	Focus	2.0L I4	8FMXV02.0VD4	4	
Ford	2008	Ford	Taurus	3.5L V6	8FMXV03.5VEP	5	
Ford	2008	Ford	Explorer	4.0L V6	8FMXT04.03DB	4	
Ford	2008	Ford	F150	5.4L V8	8FMXT05.44HF	8	FFV
Chrysler	2008	Dodge	Caliber	2.4L I4	8CRXB02.4MEO	5	
Chrysler	2008	Dodge	Caravan	3.3L V6	8CRXT03.3NEP	8	FFV
Chrysler	2008	Jeep	Liberty	3.7L V6	8CRXT03.7NE0	5	
Honda	2008	Honda	Civic	1.8L I4	8HNXV01.8LKR	5	
Honda	2008	Honda	Accord	2.4L I4	8HNXV02.4TKR	5	
Honda	2008	Honda	Odyssey	3.5L V6	8HNXT03.54KR	5	
Nissan	2008	Nissan	Altima	2.5L I4	8NSXV02.5G5A	5	

For WA 1-09, SwRI will use a subset of six vehicles from those previously procured for testing as described in Table 2.

TABLE 2. TEST VEHICLES FOR WA 1-09

MAKE	YEAR	BRAND	MODEL	ENGINE	FAMILY	T2 BIN	NOTE
GM	2008	Chevrolet	C1500 Silverado	5.3L V8	8GMXT05.3373	5	FFV
Toyota	2008	Toyota	Camry	2.4L I4	8TYXV02.4BEA	5	
Ford	2008	Ford	Focus	2.0L I4	8FMXV02.0VD4	4	
Chrysler	2008	Dodge	Caravan	3.3L V6	8CRXT03.3NEP	8	FFV
Honda	2008	Honda	Accord	2.4L I4	8HNXV02.4TKR	5	
Nissan	2008	Nissan	Altima	2.5L I4	8NSXV02.5G5A	5	

Two additional CRC provided vehicles, as described in Table 3, will be shipped from Automotive Testing Laboratories (ATL). The cost of round-trip shipping between ATL and SwRI is included in the attached cost estimate.

TABLE 3. CRC TEST VEHICLES

MAKE	YEAR	BRAND	MODEL	ENGINE	FAMILY	T1	NOTE
Honda	1999	Honda	Accord	2.3L	XHNXV02.3PA3	NLEV	
Toyota	2001	Toyota	Corolla	1.8L	1TYXV01.8FFA	NLEV	

3.4 Test Lubricants

Engine lubricants for this program have been provided by the EPA under WA 0-01.

3.5 Test Fuels

The required test fuels (Fuel 17, Fuel 18, and Fuel 19) are already in SwRI's possession. Fuel procurement, analyses, storage, and handling for this project are covered under WA 1-04.

SwRI will inform the EPA WAM if there is a shortage of these fuels and EPA will ship additional drums which were also blended for this project, from their Ann Arbor laboratory.

SwRI will utilize fuel storage and handling practices that will minimize, to the greatest extent possible, any changes in test fuel properties or mislabeling of fuel drums, or any other possible situations which could lead to misfueling of the test vehicles. These practices will include the storage of test fuels in sealed 5B drums, indoors, at temperatures not exceeding 72°F.

Furthermore, to assure that no drums are mislabeled, SwRI will confirm fuel properties listed in Table 4 using a Petrospec analyzer each time a new drum is opened. Additionally, unique alphanumeric labels assigned to individual drums will be recorded each time a vehicle is fueled.

TABLE 4. TEST FUEL PROPERTIES TO BE CONFIRMED USING THE PETROSPEC

ETHANOL CONTENT OF THE FUEL, VOL. %	FUEL PROPERTIES TO BE CONFIRMED
0 - 15	Ethanol content, aromatic content, T90
>15	Aromatic content, T90

Fuel Speciation will be performed on Fuels 17, 18 and 19. SwRI will provide detailed hydrocarbon analysis using ASTM method D6729.

3.6 Vehicle Preparation

All vehicle preparations were completed under WA 0-01 with exception of the CRC test vehicles. These vehicles will undergo a thorough inspection before beginning the test preparation sequence. The inspection and preparation list can be found in Appendix A. SwRI will perform maintenance and repairs needed to be sufficient for safe and reliable operation of the vehicles on

EPAct Program Update for Chet France

Status and Budget

March 2, 2009

Options to Reduce Cost

- Delay testing of CRC fuels: \$195,000
- Reduce the number of test fuels
 - Reduction of the number of fuels by 1 would drop the G-efficiency of emission models below the minimum acceptable limit of 50%
 - Coverage drops, fuel effects become confounded
 - The emphasis of this program is on fuels, not vehicles
- Reduce the number test vehicles
 - Reduction of the number of vehicles from 19 to 15 doubles the probability of getting a non-significant result in emission models. The power of the statistical test of 0.80 is the lowest acceptable in std practice (0.95 was used in AutoOil)
 - We are working with DOE on vehicle selection
 - Reducing the number of test replicates from 2 to 1 has an even stronger impact
- Eliminate continuous THC, NOx... measurements in raw exhaust
 - Would make critical types of information unavailable
 - Minimal savings
- Reduce the scope of exhaust HC speciation
 - The cost of HC and alcohol/carbonyl speciation: \$1,320/Bag 1 or \$2,640/Bags 1,2&3
 - Data necessary for AQ modeling and toxic emission factors
 - Phase I and II data not adequate due to fuel blending problems

Joseph
Somers/AA/USEPA/US
EPA-OAR,OTAQ,ASD
Sent by: Joseph Somers

Received Date:
01/08/2008 03:53 PM
Transmission Date:
01/08/2008 03:53:06 PM

To: Kathryn Sargeant@EPA, Rich Cook@EPA, Chad
Bailey@EPA
cc: Marion Hoyer@EPA, Carl Scarbro@EPA, Richard
Baldauf@EPA
bcc:
Subject: EPACT gasoline/ethanol emission studies - meeting with
NREL



EPAct Program_1-8-2008 EPA-DOE Collaboration.ppt

This e-mail summarizes the status of the EPACT test program with 16 fuels (or 19 or 29 fuels in the expanded version) with 19 vehicles with E0, E10, E15 as a result of the meeting today with Doug Lawson and Wendy Clark of NREL. Carl Scarbro is one of the main people working on this program and, at times, Marion Hoyer and I provide input. Besides Carl and me, others at the meeting were John Koupal, Paul Machiele, Tony Fernandez, Rafal Sobotowski (who has the lead for this work), and Mike Christianson. Joe McDonald also participated in some of the meeting.

Attached is a presentation summarizing the program. This work will be done by Kevin Whitney at SwRI who is also doing the DOE NREL testing on effects of lube oil on PM for LDGV.

Phase 1 of the program would be the 75 degree testing to be completed by in the coming several months (by April 30th) so results can be used for the RFS 2 regulation with the 50 degree testing to be done soon thereafter (by July 30th). Bill Charmley is to call SwRI emphasizing the priority of this program and the need to meet the schedule. **The overheads show what is in the initial program plus the DOE add-on which will include more fuels with higher ethanol content, mostly 15-20% but one E85 fuel). DOE now regards E85 work as lower in priority with the advent of E15-E20 gasolines.** Of interest is the effect of adding 15-20% of the fuel distillation curve showing increases in the fuel evaporated at lower temperatures up to the 50% point which could affect emissions.

Of interest to us is the fact that some of the DOE \$2,000,000 funding will be used to obtain speciation for PM (actually a combined SVOC/PM sample) for some (a limited number) of the samples which, due to small PM sample quantities, will be combined across several driving cycles and vehicles. Joe McDonald mentioned the possible in-house program to obtain PM speciation data (a briefing for Chet on a proposed program is scheduled soon). Despite concerns about gasoline PM speciation with the SwRI dilution tunnel having some problems (due to losses on the tunnel walls) which could affect the PM profile, it was agreed that having PM speciation data would be useful.

There was a discussion of obtaining data at 50 degrees where the same gasolines could be used versus lower temperatures (20 degrees) which would require different gasoline composition. There was also a discussion of oil break-in periods (as well as a general discussion of the contribution of oil to gasoline PM and how ethanol might affect/increase it).

There was a discussion on having a high emitting vehicle (funded in the DOE portion) with induced malfunctions (catalyst removed or oxygen sensor disabled). There was also a brief discussion of a future lean-burn technology and its fuel economy benefits. Such technology may require lower sulfur gasolines. There was a discussion on how to obtain the specially blended gasolines.

There will be an updated Work Statement reflecting some of the changes agreed to (like the PM speciation) with separate funding/contract paper work for the rest of the expanded program to be done separately.

As an aside, Doug Lawson asked me beforehand to meet with him to discuss what I see as future work areas for a short plan he is putting together for James Eberhardt of DOE to have for when Congress asks for energy/emission programs it could fund. I talked to John Koupal, Paul Machiele, and Chad Bailey (and tried talking to others) to get input. What I suggested is more fuels work with nonroad engines for gasoline and diesel. Such work should could include studies on locomotive and C-3 marine. Also, biofuels work (influence of fuels on diesel after treatment) was another topic. Emissions at cold temperatures (20 degrees) was another topic (which could be increasingly important for catalytic diesel PM traps in the same way that such emissions became more important with the introduction of catalysts where the emission reductions obtained at 70 degrees were not obtained at lower temperatures due to increased time for warm-up compared to non-catalytic systems). Measuring emissions under malfunction conditions was also suggested.

Expanded EPAAct Program

EPA/DOE Collaboration

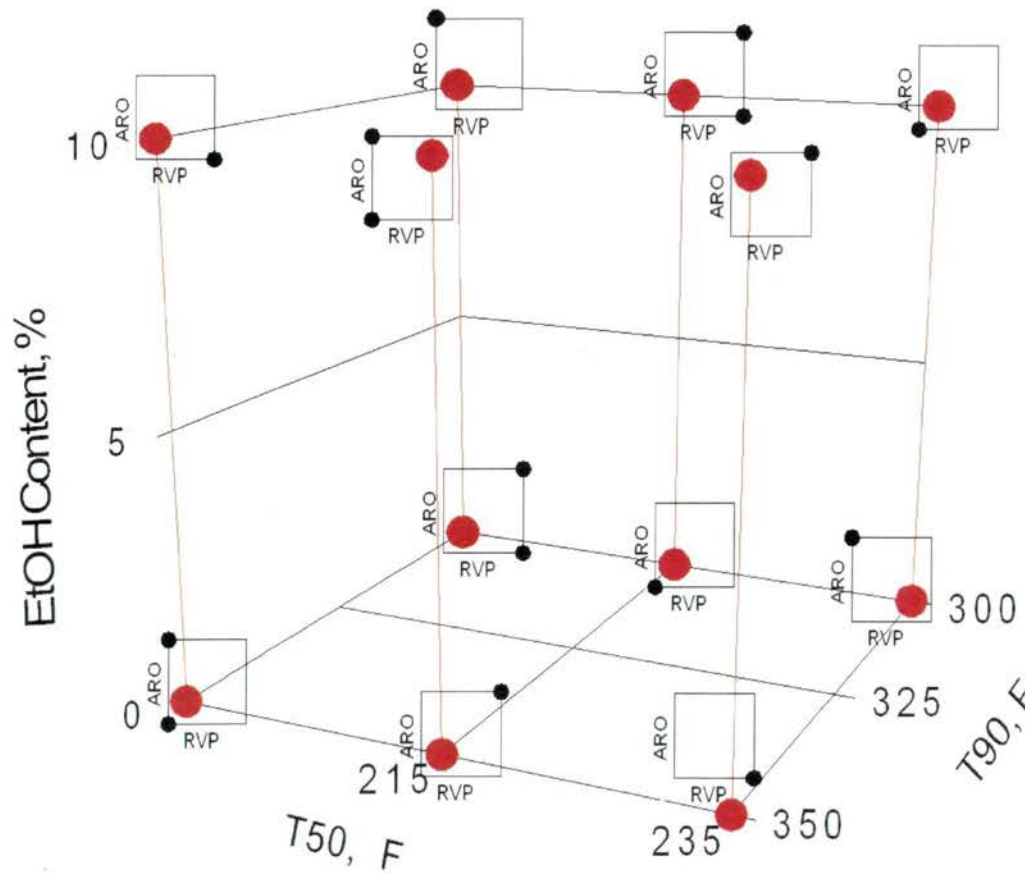
January 8, 2008

Base EPA Act Program

- Objective: Establish effects of RVP, T50, T90, aromatic content and EtOH on exhaust emissions from Tier 2 vehicles
- 16 fuels, 19 vehicles in main program
- “GHG Pilot” to precede main program
 - E0, E10, E15 fuels tested in all 19 vehicles at 75°F and 50°F
 - Test results to feed into RFS 2 NPRM
- Parameters measured: Regulated emissions, CO₂, NO₂, VOCs, ethanol, carbonyls
 - Also N₂O, NH₃ and HCN by FTIR
 - No PM speciation
- **5 U.S.C. § 552(b)(5) Deliberative / Non-Responsive**
 - Discussions underway with SWRI to reduce program cost

Base Fuel Matrix

5 variables, 3x2x2x2x2, 16 fuels (+3 GHG fuels)
RVP range: 7-9 psi; Aromatic content range: 15 – 40%



Base Fuel Matrix (Cont'd)

- Computer generated optimal design
- Fuel variables:
 - T50 (3 levels)
 - T90 (2 levels)
 - EtOH (2 levels)
 - RVP (2 levels)
 - Aromatics (2 levels)
- Terms in model: Main effects, $T50^2$, $T50*EtOH$, $T90*EtOH$, $RVP*EtOH$, aromatics* EtOH
- Number of test fuels: 16 (+3 GHG fuels)
- G-Efficiency: 83.6%

Expanded EPAAct Program

- \$0.9M has been made available to NREL from DOE's Biomass Program for use in expanding the EPAAct Program
 - NREL has already received a funding letter from DOE for this amount
- Additional \$1.1M is expected to become available shortly from DOE's Vehicle Technology Program
- Expanded fuel matrix consists of the following 29 fuels:
 - Base fuel matrix (16 + 3 fuels)
 - Includes the same fuels as Base EPAAct Program
 - 9 additional E15 and E20 fuels and one E85 fuel per prior discussions with DOE
- DOE expressed interest in testing additional vehicles
- Lubrizol has committed to provide lubricant support for this program

Expanded EPA Act Program (Cont'd)

- Further timeline and cost estimates assume the following:
 - 3 additional vehicles used in Phases 1, 2 and 3 of the program
 - Test program design similar to Base EPA Act Program
 - Phase 1: GHG Pilot at 75°F
 - E0, E10, E15; 22 vehicles
 - Phase 2: GHG Pilot at 50°F
 - E0, E10, E15; 22 vehicles
 - Phase 3: Main Program
 - 25 fuels, 22 vehicles
 - One E85 fuel tested in four FFVs
 - Same parameters measured
- The add-on cost of the DOE component is estimated at \$2.0M
- Expanded Program Timeline, w/o safety margin
 - Jan. 2008 – May 2008: Fuel blending
 - April 2008 – April 2009: Emissions testing
 - May 2009 – July 2009: Reporting

Expanded Fuel Matrix

Fuel #	T50	T90	ETOH	RVP	ARO
	°F	°F	%	psi	%
1	235	300	10	7	15
2	235	350	0	9	15
3	195	350	10	9	15
4	195	350	0	7	40
5	195	300	10	7	40
6	235	300	0	7	40
7	215	350	10	7	15
8	215	300	10	9	15
9	215	350	0	9	40
10	215	300	0	7	15
11	215	300	10	9	40
12	215	350	10	7	40
13	195	350	0	7	15
14	195	300	0	9	15
15	235	350	10	9	40
16	195	300	0	9	40
17	215	325	0	9	30
18	202	325	10	9	25
19	195	325	15	9	23
20	160	300	20	7	15
21	168.2	300	15.3	7	15
22	160	350	20	7	40
23	160	300	20	9	40
24	160	350	20	9	15
25	195	300	15.3	7	15
26	168.2	350	15.3	9	40
27	195	350	15.3	9	40
28	160	350	20	9	40
29	TBD	TBD	85	TBD	TBD

Base Matrix (1-16) →
 GHG Subset (17-19) →
 DOE Fuels (20-29) →
 E85 →

-
- ➔ Largest fuel effects program since Auto/Oil
 - Auto/Oil program cost 30 Million (1990) dollars, took 5+ years to complete
 - ➔ Scope of Program: Fill data gap on effects of selected fuel parameters on “instantaneous” Tier 2 vehicle emissions
 - Focus on E0/E10 effects and interactions with other fuel parameters, which was missing in previous programs
 - Gather detailed PM and toxic info
 - Assess fuel effects at 50 deg
 - ➔ Program initially designed before GHG rule and interaction with DOE re: E20

➔ Base Matrix (Cont'd)

Fuel #	T50 °F	T90 °F	ETOH %	RVP psi	ARO %
1	235	300	10	7	15
2	235	350	0	9	15
3	195	350	10	9	15
4	195	350	0	7	40
5	195	300	10	7	40
6	235	300	0	7	40
7	215	350	10	7	15
8	215	300	10	9	15
9	215	350	0	9	40
10	215	300	0	7	15
11	215	300	10	9	40
12	215	350	10	7	40
13	195	350	0	7	15
14	195	300	0	9	15
15	235	350	10	9	40
16	195	300	0	9	40
17	220	325	0	9	30
18	207	325	10	9	25

→ Expanded Fuel Matrix

- Includes E15/E20 fuels
- Consists of the following fuels:
 - ✓ Base fuel matrix (16+2 fuels)
 - ✓ Nine additional E15 and E20 fuels
 - ✓ Additional fuel to be used in 50°F and PM toxics tests
 - ✓ E85 fuel
- Total number of fuels: 29
- Fuel parameters investigated: Ethanol content, T50, T90, aromatics and RVP
- Emissions model will include:
 - ✓ Effects of the five selected fuel parameters
 - ✓ Nonlinear effects of ethanol and T50
 - ✓ Five selected interactions between fuel properties

➔ Expanded Fuel Matrix (Cont'd)

Fuel #	T50 °F	T90 °F	ETOH %	RVP psi	ARO %
1	235	300	10	7	15
2	235	350	0	9	15
3	195	350	10	9	15
4	195	350	0	7	40
5	195	300	10	7	40
6	235	300	0	7	40
7	215	350	10	7	15
8	215	300	10	9	15
9	215	350	0	9	40
10	215	300	0	7	15
11	215	300	10	9	40
12	215	350	10	7	40
13	195	350	0	7	15
14	195	300	0	9	15
15	235	350	10	9	40
16	195	300	0	9	40
17	220	325	0	9	30
18	207	325	10	9	25
19	160	325	20	9	20
20	160	300	20	7	15
21	168	300	15	7	15
22	160	350	20	7	40
23	160	300	20	9	40
24	160	350	20	9	15
25	195	300	15	7	15
26	168	350	15	9	40
27	195	350	15	9	40
28	160	350	20	9	40
29	A-22 TBD	TBD	85	TBD	TBD

To: CN=Rafal Sobotowski/OU=AA/O=USEPA/C=US@EPA[]
Cc: CN=Connie Hart/OU=AA/O=USEPA/C=US@EPA;CN=Carl Scarbro/OU=AA/O=USEPA/C=US@EPA;CN=Michael Christianson/OU=AA/O=USEPA/C=US@EPA;CN=Richard Rykowski/OU=AA/O=USEPA/C=US@EPA;CN=John Koupal/OU=AA/O=USEPA/C=US@EPA;CN=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]; N=Carl Scarbro/OU=AA/O=USEPA/C=US@EPA;CN=Michael Christianson/OU=AA/O=USEPA/C=US@EPA;CN=Richard Rykowski/OU=AA/O=USEPA/C=US@EPA;CN=John Koupal/OU=AA/O=USEPA/C=US@EPA;CN=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]; N=Michael Christianson/OU=AA/O=USEPA/C=US@EPA;CN=Richard Rykowski/OU=AA/O=USEPA/C=US@EPA;CN=John Koupal/OU=AA/O=USEPA/C=US@EPA;CN=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]; N=Richard Rykowski/OU=AA/O=USEPA/C=US@EPA;CN=John Koupal/OU=AA/O=USEPA/C=US@EPA;CN=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]; N=John Koupal/OU=AA/O=USEPA/C=US@EPA;CN=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]; N=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]
From: CN=Paul Machiele/OU=AA/O=USEPA/C=US
Sent: Tue 2/5/2008 1:21:19 AM
Subject: Re: T50 in EPAct
[E10 T50 vs RVP.TC](#)
[Ethanol Content vs. T50.ppt](#)

I couldn't open the E10T50vs RVP file - had a TC suffix for some reason.

Ex. 5 - Deliberative

Paul

-----Rafal Sobotowski/AA/USEPA/US wrote: -----

To: Paul Machiele/AA/USEPA/US@EPA
 From: Rafal Sobotowski/AA/USEPA/US
 Date: 02/04/2008 05:28PM
 cc: Connie Hart/AA/USEPA/US@EPA, Carl Scarbro/AA/USEPA/US@EPA, Michael Christianson/AA/USEPA/US@EPA
 Subject: T50 in EPAct

Paul,

The first file shows T50 distribution over 7-10 psi RVP range for E 10 fuels. Our current design of the fuel matrix assumes RVP range of 7-9 psi and T50 range of 195-235 deg. F for E0 and E10.

Ex. 5 - Deliberative

Ex. 5 - Deliberative

These numbers look reasonable, plus Haltermann is already working on these fuels.

If you are in agreement, I will explore the T50/RVP issue for Phase 3 fuels with Haltermann tomorrow morning. Pls advise.

Best regards,

Rafal A. Sobotowski
Assessment and Standards Division
U.S. Environmental Protection Agency
2000 Traverwood Drive
Ann Arbor, MI 48105
sobotowski.rafal@epa.gov
734/214-4228 fax 734/214-4050

To: Rafal Sobotowski/AA/USEPA/US@EPA;"Clark, Wendy" [Wendy_Clark@nrel.gov]; Clark, Wendy" [Wendy_Clark@nrel.gov]; Lawson, Doug" [doug_lawson@nrel.gov]; UIHLEIN, JAMES P" [JUIH@chevron.com]

Cc: Aron Butler/AA/USEPA/US@EPA;Carl Scarbro/AA/USEPA/US@EPA;Connie Hart/AA/USEPA/US@EPA;Michael Christianson/AA/USEPA/US@EPA;"Gerry, Frank S" [Frank.Gerry@bp.com]; arl Scarbro/AA/USEPA/US@EPA;Connie Hart/AA/USEPA/US@EPA;Michael Christianson/AA/USEPA/US@EPA;"Gerry, Frank S" [Frank.Gerry@bp.com]; onnie Hart/AA/USEPA/US@EPA;Michael Christianson/AA/USEPA/US@EPA;"Gerry, Frank S" [Frank.Gerry@bp.com]; ichael Christianson/AA/USEPA/US@EPA;"Gerry, Frank S" [Frank.Gerry@bp.com]; Gerry, Frank S" [Frank.Gerry@bp.com]

From: "Simnick, James J"

Sent: Wed 2/20/2008 2:19:05 PM

Subject: RE: EAct Fuel Matrix Options

[Link](#)

Rafal

Sorry I could not get back to you Tuesday, I got stuck in meetings till 6:30 pm.

Ex. 5 - Deliberative

Thanks for asking.

Jim

From: Sobotowski.Rafal@epamail.epa.gov [mailto:Sobotowski.Rafal@epamail.epa.gov]

Sent: Tuesday, February 19, 2008 11:40 AM

To: Clark, Wendy; Lawson, Doug; Simnick, James J; UIHLEIN, JAMES P

Cc: Butler.Aron@epamail.epa.gov; Scarbro.Carl@epamail.epa.gov; Hart.Conn@epamail.epa.gov; Christianson.Michael@epamail.epa.gov

Subject: EAct Fuel Matrix Options

Based on the feedback from our conference call last Thursday, Bob Mason has defined three candidate fuel matrices for the EAct Program. See attachment.

You will notice that we are down to T50 of 150 at ethanol content levels of 10 and 15%. There are only two fuels each at those locations as RVP is kept at one level (10 psi).

There are four E15 fuels in fuel matrix #1 (G-eff = 65.6) and five in fuel matrices #2 (G-eff = 68.1) and #3 (G-eff = 68.2) .

The number of EPA fuels (16) and DOE fuels (9) has not changed relative to the pre Feb. 1 design.

Bob Mason's recommendation is to choose either matrix #2 or #3.

Pls let me know asap which matrix you 'd prefer to see tested in EAct Program, by COB EST today, if possible.

Best regards,

Rafal A. Sobotowski

Assessment and Standards Division
 U.S. Environmental Protection Agency
 2000 Traverwood Drive
 Ann Arbor, MI 48105
 sobotowski.rafal@epa.gov
 734/214-4228 fax 734/214-4050

Rafal Sobotowski/AA/USEPA/US
 EPA-OAR,OTAQ,ASD

Received Date:
 02/15/2008 09:32 AM

Transmission Date:
 02/15/2008 09:32:24 AM

To "Clark, Wendy" <Wendy_Clark@nrel.gov>, "Lawson, Doug" <doug_lawson@nrel.gov>
 cc Carl Scarbro/AA/USEPA/US@EPA, Connie Hart/AA/USEPA/US@EPA, Michael
 Christianson/AA/USEPA/US@EPA, Aron Butler/AA/USEPA/US@EPA
 Subject Feb. 15 Version of EPA Act Fuel MatrixLink

Wendy and Doug,

Attached below is the latest version of the fuel matrix.

You will notice that we are down to T50 of 150 at ethanol content levels of 10 and 15%. There are only two fuels each at those locations as RVP is kept at one level (10 psi).

Per your request there are four E15 fuels in the matrix and the number of EPA fuels (16) and DOE fuels (9) has not changed relative to the pre Feb. 1 design. The G-efficiency of this matrix equals 65.6% and Bob Mason will spend the rest of this morning trying to boost this number.

Pls review the attached design and let me know if it meets your requirements. If we are to introduce any changes, this is the time.

[attachment "25-trial matrix 2-14-08.xls" deleted by Rafal Sobotowski/AA/USEPA/US]

Best regards,

Rafal A. Sobotowski
 Assessment and Standards Division
 U.S. Environmental Protection Agency
 2000 Traverwood Drive
 Ann Arbor, MI 48105
 sobotowski.rafal@epa.gov
 734/214-4228 fax 734/214-4050

To: CN=John Koupal/OU=AA/O=USEPA/C=US@EPA[]
Cc: CN=Aron Butler/OU=AA/O=USEPA/C=US@EPA;CN=Paul
 Machiele/OU=AA/O=USEPA/C=US@EPA;CN=Rafal
 Sobotowski/OU=AA/O=USEPA/C=US@EPA[]; N=Paul
 Machiele/OU=AA/O=USEPA/C=US@EPA;CN=Rafal
 Sobotowski/OU=AA/O=USEPA/C=US@EPA[]; N=Rafal
 Sobotowski/OU=AA/O=USEPA/C=US@EPA[]
From: CN=Michael Christianson/OU=AA/O=USEPA/C=US
Sent: Thur 6/7/2007 5:50:19 PM
Subject: Re: CRC input on fuels testing
[Fuel Matrix Table 6-7-07.xls](#)

I took a stab at tabularizing the fuels Matrix as it stands. For the target parameters that are held constant, I used 2006 AAM survey average values.

Ex. 5 - Deliberative

Rafal and I (and hopefully Aron if he's free) are sitting down this afternoon to iron out some fuel issues, so look for this to change relatively quickly.

 Michael G. Christianson
 Office of Transportation and Air Quality
 U.S. Environmental Protection Agency
 2000 Traverwood Drive, Ann Arbor, MI 48105
 Phone (734) 214-4624 / Fax (734) 214-4050

John Koupal/AA/USEPA/US
 06/07/2007 09:47 AM
 To Michael Christianson/AA/USEPA/US@EPA, Aron Butler/AA/USEPA/US@EPA, Paul
 Machiele/AA/USEPA/US@EPA, Rafal Sobotowski/AA/USEPA/US@EPA
 cc
 Subject CRC input on fuels testing

as expected my presentation of our fuels testing program at the CRC committee meeting generated a lot of interest and questions. The CRC members are very eager to provide input to us, and to this end there will be a conference call set up in the next 2-3 weeks for us to present our thinking on the LD exhaust plan in detail for them to provide comment on. We should share supporting material in advance of this if possible - for example they asked for the fuel matrix in tabular form. I made it clear that although we were on a quick schedule to get the SOW out, what we are showing was our first draft and we are definitely seeking their input to finalize, especially on the fuel matrix. Most of the questions and comments revolved around the fuel matrix, including:

- we should consider how the CRC E-80 program might overlap with this and whether our FFV questions could be better addressed through supplementing that program
- not understanding the "half factorial" approach
- not sure how the points on the matrix will give us what we want
- wondering about not including olefins

Also it looks like CRC will be adding E20 to the current E-77-2 evap program, at Loren Beard's request

John Koupal
Director, Air Quality & Modeling Center
Assessment & Standards Division
U.S. EPA Office of Transportation & Air Quality
2000 Traverwood Drive Ann Arbor, MI 48105
(734) 214-4942 koupal.john@epa.gov

To: CN=Carl Scarbro/OU=AA/O=USEPA/C=US@EPA[]
Cc: CN=Aron Butler/OU=AA/O=USEPA/C=US@EPA;CN=Rafal Sobotowski/OU=AA/O=USEPA/C=US@EPA;CN=John Koupal/OU=AA/O=USEPA/C=US@EPA;CN=David Korotney/OU=AA/O=USEPA/C=US@EPA;CN=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]; N=Rafal Sobotowski/OU=AA/O=USEPA/C=US@EPA;CN=John Koupal/OU=AA/O=USEPA/C=US@EPA;CN=David Korotney/OU=AA/O=USEPA/C=US@EPA;CN=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]; N=John Koupal/OU=AA/O=USEPA/C=US@EPA;CN=David Korotney/OU=AA/O=USEPA/C=US@EPA;CN=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]; N=David Korotney/OU=AA/O=USEPA/C=US@EPA;CN=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]; N=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA[]
From: CN=Ed Nam/OU=AA/O=USEPA/C=US
Sent: Tue 7/1/2008 8:39:39 PM
Subject: Re: E 67 fuel effects on NOx
[\(embedded image\)](#)
[\(embedded image\)](#)

Thanks Carl!

Hey all,
some of you may have already seen this report, but I quote from this E67 report (measuring fuel effects on LEVs and ULEVs) from the exec summary:

"o There was a statistically significant interaction between ethanol and T50. The interaction showed that NOx emissions increase with increasing ethanol content at the low level of T50. At the mid-point level of T50, NOx emissions are largely unaffected as ethanol content is increased from the zero to the mid-point level, but increase as ethanol is increased to the high level. At the high level of T50, NOx emissions are largely unaffected by ethanol content. Looked at another way, NOx emissions decreased with increasing T50 at the high level of ethanol, but were largely unaffected by T50 at the zero and mid-point levels of ethanol."

On p 3, the T50 range is
low = 195
mid = 215
hi = 235

Ours is 209, closer to their mid range.

Ex. 5 - Deliberative

- Ed

Carl Scarbro/AA/USEPA/US
EPA-OAR,OTAQ,ASD
Sent by: Carl Scarbro
Received Date:
07/01/2008 02:53 PM
Transmission Date:
07/01/2008 02:53:44 PM
To Ed Nam/AA/USEPA/US@EPA, Aron Butler/AA/USEPA/US@EPA
cc Rafal Sobotowski/AA/USEPA/US@EPA
Subject E 67 fuel effects on NOx

Attached is the test data and fuel data for E 67. The fuels were matched pretty closely for aromatics and varied by Ethanol content. The vehicle technologies are mixed. Might help resolve the aromatic effect we may be having in epact

[attachment "E-67 Final Report.doc" deleted by Ed Nam/AA/USEPA/US] [attachment "E67 vehicle data for EPA.xls" deleted by Ed Nam/AA/USEPA/US] [attachment "E-67 data set original.xls" deleted by Ed Nam/AA/USEPA/US]

To: CN=Catherine Yanca/OU=AA/O=USEPA/C=US@EPA[]
Cc: CN=Joseph Somers/OU=AA/O=USEPA/C=US@EPA;CN=Kathryn Sargeant/OU=AA/O=USEPA/C=US@EPA;CN=Marion Hoyer/OU=AA/O=USEPA/C=US@EPA[]; N=Kathryn Sargeant/OU=AA/O=USEPA/C=US@EPA;CN=Marion Hoyer/OU=AA/O=USEPA/C=US@EPA[]; N=Marion Hoyer/OU=AA/O=USEPA/C=US@EPA[]
From: CN=Rich Cook/OU=AA/O=USEPA/C=US
Sent: Wed 2/25/2009 4:24:52 PM
Subject: Re: Options for keeping toxics in a reduced EPAAct program
 (embedded image)

Of course this matrix was selected to best inform a statistical analysis, and whittling down the fuels may leave us with significant gaps in our ability to model fuel effects.

I like the idea of bracketing the aromatics levels.

I think it would be good to have a high aromatics fuel with low RVP. Maybe 13?

Priorities (in my view):

- 1) ethanol
- 2) aromatics
- 3) RVP

If we have to whittle down fuels, let's not worry about T50/T90 effects.

Rich Cook
 Environmental Scientist
 U.S. EPA
 Office of Transportation and Air Quality
 2000 Traverwood Drive
 Ann Arbor, MI 48105
 Phone: 734-214-4827 Fax: 734-214-4939

Catherine Yanca/AA/USEPA/US
 EPA-OAR,OTAQ,ASD
 Sent by: Catherine Yanca
 Received Date:
 02/24/2009 05:21 PM
 Transmission Date:
 02/24/2009 05:21:17 PM
 To Rich Cook/AA/USEPA/US@EPA, Joseph Somers/AA/USEPA/US@EPA
 cc Kathryn Sargeant/AA/USEPA/US@EPA, Marion Hoyer/AA/USEPA/US
 Subject Options for keeping toxics in a reduced EPAAct program

Problems with the EPAAct budget have most recently coalesced into the presenting options to Chet for reducing the scope of the program. Chet is emphasizing ethanol effects as a goal of the program. There is a briefing scheduled for tomorrow at 4 pm at which Chet has requested different scenarios be presented

Ex. 4 - CBI

Ex. 5 - Deliberative

end, Tony and Aron are considering an option that would include picking 6 fuels out of the matrix below, and still testing all 19 vehicles for Bag 1, three of which would still include all 3 bags. We need to let them know which 6 fuels are most relevant for us. Fuels 6 and 14 are only different in ethanol content and are 15% aromatics. Fuels 13 and 16 are only different in their ethanol content, as are fuels 11 and 15 but these have high aromatic content (40%). Tony and Aron mentioned having only one or maybe two E0 fuels to act as an "anchor fuel" with the rest being E10. We also need to tell them which variable would be our second priority- our first is ethanol, would the second be RVP, aromatics, T50 or T90?

We are probably only going to get one test per vehicle, no replicates.

Ex. 4 - CBI**Ex. 4 - CBI**

Bottom line questions: (1) Which 6 fuels are most relevant for us? (2) Which variable is our second priority?

To: Rafal Sobotowski/AA/USEPA/US@EPA[]
From: "Bain, Sonia S."
Sent: Thur 7/17/2008 2:28:48 PM
Subject: RE: FW: D86-07b Reproducibility Values
<mailto:rey.g.montemayor@esso.ca>

You're welcome Rafal. Please feel free to forward the information to EPA analytical labs. Keep me posted on your findings.

Best Regards,

Sonia

From: Sobotowski.Rafal@epamail.epa.gov [mailto:Sobotowski.Rafal@epamail.epa.gov]
Sent: Tuesday, July 15, 2008 2:27 PM
To: Bain, Sonia S.
Subject: Re: FW: D86-07b Reproducibility Values

Sonia,

The D86 reproducibility data you have forwarded to me put the whole issue in a new perspective. Thank you for this valuable feedback.

Best regards,

Rafal A. Sobotowski
Assessment and Standards Division
U.S. Environmental Protection Agency
2000 Traverwood Drive
Ann Arbor, MI 48105
sobotowski.rafal@epa.gov
734/214-4228 fax 734/214-4050

"Bain, Sonia S." <ssbain@marathonoil.com>
Sent by: "Bain, Sonia S." <ssbain@marathonoil.com>

Received Date:
07/15/2008 01:38 PM
Transmission Date:
07/15/2008 01:38:28 PM
To Rafal Sobotowski/AA/USEPA/US@EPA
cc
Subject FW: D86-07b Reproducibility Values

EPAAct Program Update for Chet France

Status and Budget

February 19, 2008

Status of Testing and Fuel Blending

- Phase 1 testing complete
 - 75°F testing of 19 vehicles on 3 fuels (E0, E10, E15)
- Interim FTP-cycle testing complete
 - 75°F testing of 6 vehicles on 3 fuels (E0, E10, E15)
- Phase 2 testing complete
 - 50°F testing of 19 vehicles on 3 fuels (E0, E10, E15)
- Phase 3 testing expected to begin next week
 - 75°F testing of 10? (originally 19) vehicles on 27 fuels (E0, E10, E15, E20)
- Test fuel development being done by Haltermann and ASD
 - EPA defines fuel recipes
 - Haltermann prepares hand blends, bulk blends and performs fuel analyses
- 22 of the 28 fuels needed in Phase 3 have been blended in bulk
 - 13 have been delivered to SWRI

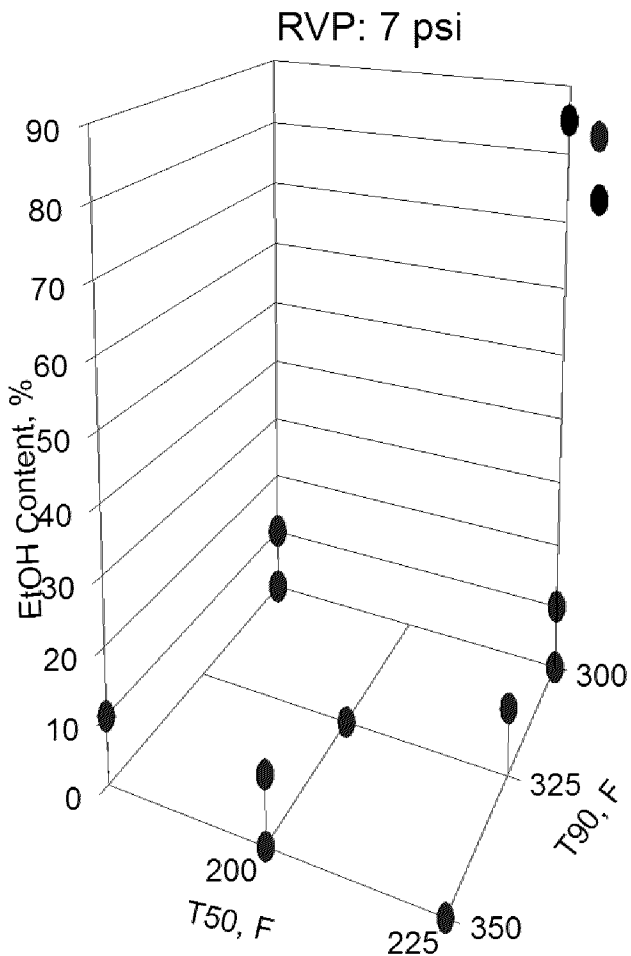
EPAct Program

Fuel Matrix Design Options

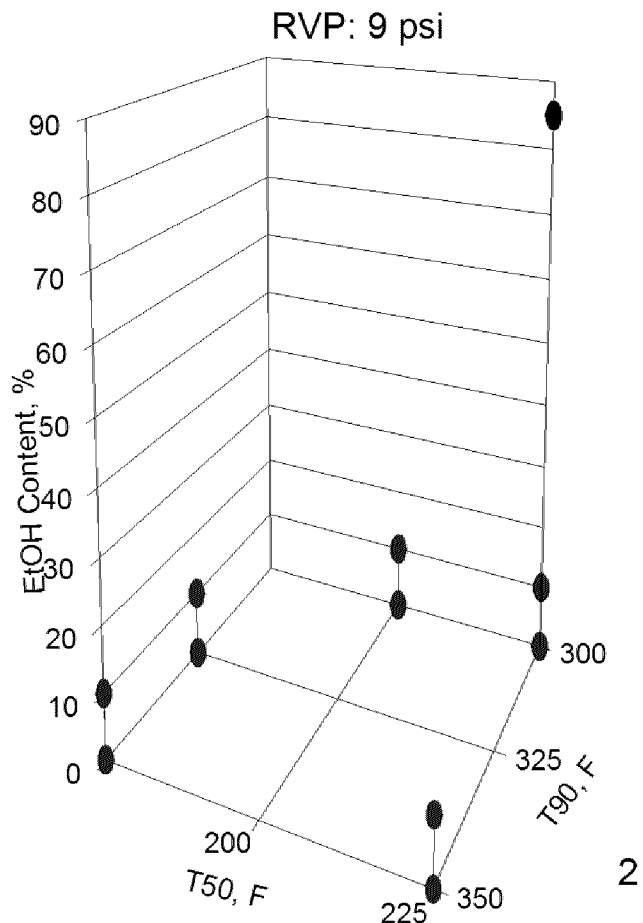
July 18, 2007

Fuel Matrix No.1

(4 variable, mixed level)



- Computer generated optimal design
 - 20 fuels
 - G-Efficiency*: 86.4%
- * >60% considered satisfactory



Fuel Variables	# of Levels	Terms in Model
T50	3	Main effects
T90	3	$T50^2$, $T90^2$
EtOH	2	$T50 \cdot EtOH$
RVP	2	$T90 \cdot EtOH$ $RVP \cdot EtOH$

EPA Act Program Update for Chet France

January 23, 2008

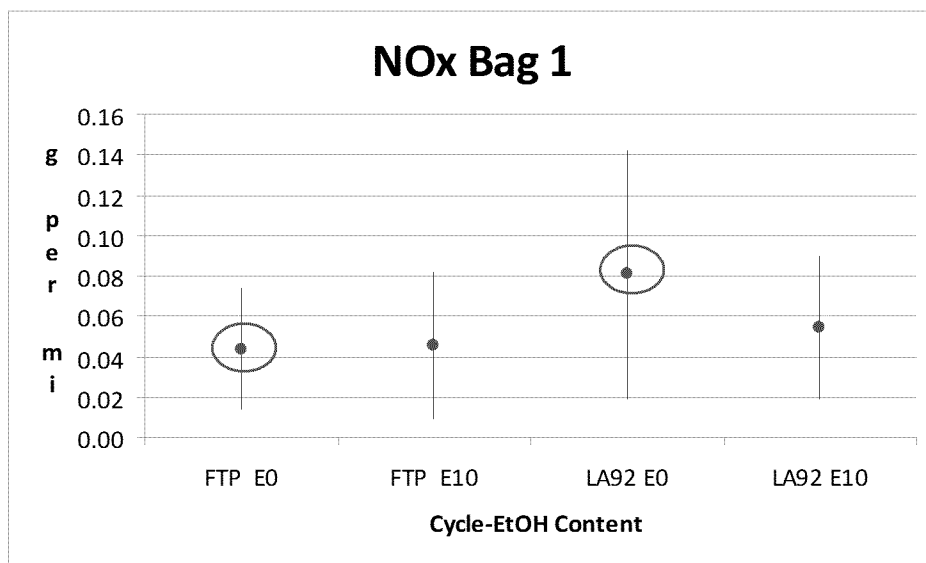
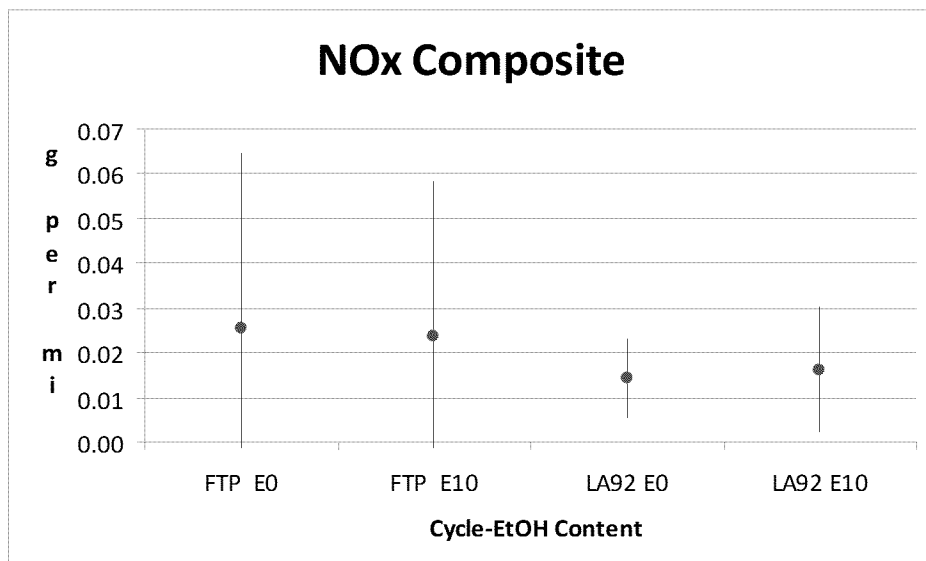
Preliminary information – not for release outside EPA

Status of Testing

- Phase 1 testing complete
 - 75F testing of 19 vehicles on 3 fuels (E0, E10, E15)
 - Data was received by EPA, briefing materials were presented on primary findings
- Interim FTP-cycle testing complete
 - 75F testing of 6 vehicles on 3 fuels (E0, E10, E15)
 - Data was received by EPA, this briefing contains primary findings
- Phase 2 testing underway
 - 50F testing of 19 vehicles on 3 fuels (E0, E10, E15)
 - Fuel 17 and 18 testing were recently completed
 - Fuel 19 testing has begun, to be completed by 2/6
 - Data is being processed at SWRI and here
- Phase 3 testing expected to begin mid-February

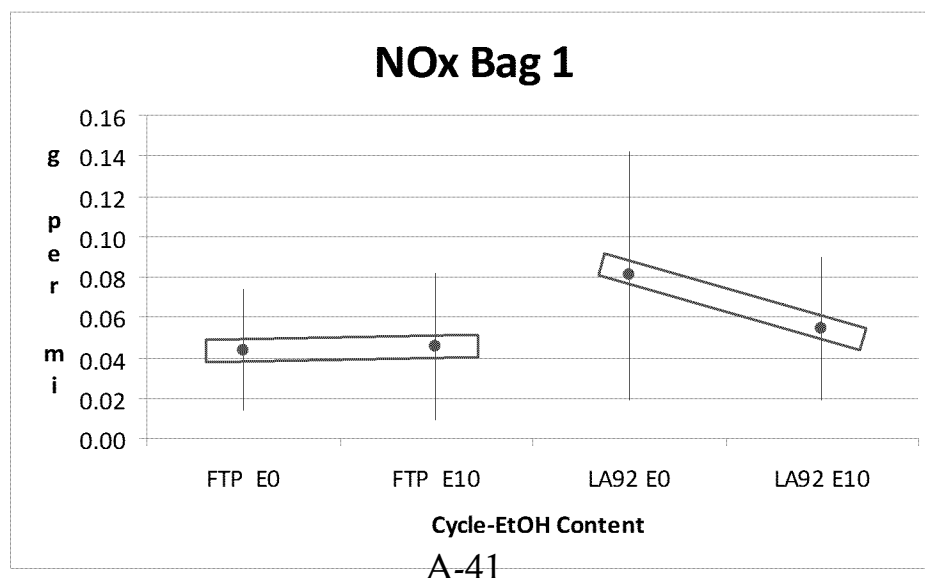
Preliminary Findings on Effect of Test Cycle - NOx

- Results suggest no significant NOx effect or interaction in the composite
- Only significant finding was in Bag 1:
 - LA92 > FTP on E0
 - *This finding could be a primary driver of our results*
- Note: Statistical significance in these slides is $p < 0.05$ level
 - Things within a colored circle are significantly different from things within a different circle of the same color



A Few Words About the Cycle Results

- What question were we trying to answer with this FTP testing?
 - “Were the effects of ethanol seen in Phase 1 a result of Tier 2 vehicles actually behaving differently from older vehicles, or just an artifact of the LA92 test cycle we chose?” (Focusing primarily on NOx)
- Did we answer this? What were we looking for in the data?
 - The means appear to suggest E10 may show more favorable effects on cold start NOx emissions with LA92, but deltas are not statistically significant
 - Thus, for now we conclude test cycle was not (highly) influential on NOx results
- Conclusions about test cycle effects were more tenuous than conclusions drawn in Phase 1 about ethanol effects in general, because only six vehicles were tested on FTP cycle



PROPOSED SPECIATION LIST 3/11/09

	fuel	T50	T90	EEOH	RVP	Arom
RVP	3	220	300	10	7	15
Arom	4	220	340	10	10	15
	12	150	340	10	10	40
E10	10	220	340	10	7	40
	13	220	340	0	7	40
E10	6	190	340	10	7	15
	14	190	340	0	7	15
E15	27	190 220	340	15	7	15
	28	190 220	300	15	7	40
	31	160	325	20	10	15
	23	160	340	20	7	15
	14	190	340	0	7	15
	(7	190	300	0	7	15)?

E15 & E20 COMP'S

↳ 11 FUELS SPECIATED

Ex. 4 - CBI

EPA Act/EISA Test Programs in ASD
23rd Bi-Weekly Report
 March 12, 2009

1. Light Duty Gas Exhaust Fuels

Contractor: SwRI, EP-C-07-028, WA 0-1, WAs 1-1, 1-2, 1-3, 1-4

WAM: Connie Hart

Alt. WAM: Rafal Sobotowski

Other team members: Mike Christianson, Tony Fernandez, Carl Fulper, Aron Butler

Budget: Ex. 4 - CBI

Objective: Phases 1 and 2 are in support RFS 2 NPRM and Phase 3 is to establish the effects of RVP, T50, T90, aromatic and EtOH content on exhaust emissions from Tier 2 vehicles

Time Line

- Testing began by second week of April 2008
- Phase 1 and half of Phase 2 finished by the end of June: Fuels 17 and 18 of Phase 1 were complete by end of June. Fuel 19 by end of July due to fuel delivery delays. Phase 2 started by mid-November 2008. to finish mid February 2009.
- Phase 3 will be finished May 2009: Phase 3 to be complete by January 2010 between testing/fuel delays to date and additional CRC fuels added into our random matrix.

Program Status:

- Phase 3 testing started today.
 - Speciation shall be included for 8 out of 16 of our fuels (12 overall) without replicate testing, after coordination with and extra funding from DOE
 - Calculation of NMOG has been finalized
- Fuel status for Phase 3:
 - All eight E0 fuels have been delivered to SwRI
 - Halterman has reblended Fuel #5 – samples are at SwRI for confirmatory testing before shipping.
 - E10 fuels:
 - 3 have been delivered to SwRI
 - 3 have been bulk blended, awaiting confirmatory tests before shipping
 - 1 in bulk blending phase
 - 1 more is close to approval for bulk blending.
 - E20 fuels:
 - 2 have been delivered to SwRI
 - 3 has been bulk blended, awaiting confirmatory tests before shipping.
 - 2 are in bulk blending stage.
 - E15 fuels:
 - 1 is in the bulk blending phase
 - 2 are in the hand blend stage
- Phase 2 cold room testing complete

- Briefing on preliminary results scheduled for Chet 3/19/09.
- Data/Analysis:
 - Data for Phase 2: continuing analysis, working on quality checks.

1.a. Supplemental Testing

Contractor: SwRI, EP-C-07-028, and NVFEL
 Lead: Tony Fernandez
 WAM: Connie Hart
 Alternate WAM: Mike Christianson
 Other team members: Aron Butler
 Budget: Ex. 4 - CBI

Objective: Gather additional information during vehicle down-time to answer questions arising from test results to date.

Time Line

- Testing to occur at SwRI before and after Phase 2, while waiting for cold room to be fully functional.

Program Status:

- Testing of the 6 (of 19) vehicles on fuels 17, 18 and 19 has been completed.
 - Data has been QA/QC'd and analyzed.
- 2 Tier 1 CRC vehicles which were shipped from Phoenix have been prepared for testing. They will be tested after or during Phase 3 if funding is available.

2. Oil Study

Contractor: NVFEL
 Project lead: Mike Christianson, Rafal Sobotowski
 Budget:

Objectives: Results to impact Phase 3 of EPAAct study at SwRI (July)

Objective 1: Define duration of engine oil conditioning needed to stabilize the effect of oil volatility on PM emissions

Objective 2: Define the impact of lubricant interaction with fuel ethanol on PM emissions

Time Line

- Estimated duration of pilot: 15 weeks (May 11)

Program Status:

- Presenting results at CRC Workshop end of March.

- Statistically significant changes in PM observed: PM mass decreased rapidly from 0 to 500 miles in both vehicles. Trend continues to 2000 miles occurs but change is small.
 - PM variability increases at full useful life (5000 mi)
 - Trends for gaseous pollutants vary by vehicle, but are mainly insignificant
 - Ethanol results are inconclusive
 - Qualitative reduction in PM observed with ethanol
 - Gaseous pollutants not statistically significant except NMHC and FE reductions as expected
 - Oil drain analysis indicates no significant deterioration of lubricant quality with E10 and E20

3. PM Speciation

Contractor: NVFEL

Project lead: Mike Christianson, Marion Hoyer

Other team members: Rafal Sobotowski, Joe McDonald

Budget: **Ex. 4 - CBI** on inventory and data issues from other EPAAct programs)

Objective: To determine fuel effects on PM mass, size and composition, and obtain speciated semi-volatile VOC, metals and ions, and gaseous VOC (MSATs), alcohols and carbonyls.

Time Line: Late 2008 (to take place in 2009)

Program Status:

- LOD and NRML site modifications ongoing (LOD will be done first).
- Testing will likely begin in May in LOD prior to a round robin/correlation program at NRMRL.
- Still on track to complete all testing this year.
- Toxics sampler prototype assembled; system checks have begun, available in mid-April for program

4. Nonroad Exhaust Program

Contractor: Carnot Intertek

WAM: Cheryl Caffrey

Alt. WAM:

Budget: **Ex. 4 - CBI**

Project Overview:

Objective: Testing 6 paired engines including 2 Class 1, 2 Class 2, 2 Class 4, (one Class 2 engine has catalyst) on three fuels; national average non-oxy gasoline (Fuel A), an octane matched E10 (Fuel B), and a certification fuel (E0).

Timeline

- The original program was to be completed last year
- Should begin by April 1st and finish in October of this year: delays in schedule due to fuel delivery status.

Program Status

- Work will be complete by the end of March.
 - Individual engine reports are being written and reviewed
 - Last handheld engine is being aged and emission tested.

4.a. Nonroad Exhaust tie-in with CARB

Contractor: SwRI
 WAM: Cheryl Caffrey
 Alt. WAM:
 Other team members: Tony Fernandez
 Budget: Ex. 4 - CBI

Program Status

- Small engine testing is ongoing in coordination with ARB and results are coming in.
- Equipment is being acquired
 - ARB marine engines
 - Two nonroad 2 stroke motorcycles
- Fuel has been ordered.
- On schedule for June completion

5. Evap Testing

Contractor: SwRI, EP-C-07-028, WA 1-5
 WAM: Connie Hart
 Alt. WAM: Dave Brzezinski
 Other team members: Tony Fernandez
 Budget: Ex. 4 - CBI

Objective: Additional, newer technology, high sales volume vehicles to the CRC E-77-2 permeation test program.

Time Line: Testing from June 2008 thru June 2009: Testing started in fall.

Program Status:

- E10, 10 psi tests coming to completion.
- Two vehicles are in 4 week prep for E0 testing.

- Preliminary results along with E-77-2 results will be presented at the CRC Workshop at the end of the month.

6. Determine Percent of High Evaporative Vehicles in Fleet

Contractor: ERG, EP-C-06-080, WA 1-2, 2-2

WAM: Connie Hart

Alt. WAM: Dave Brzezinski

Other team members: Carl Fulper, Tony Fernandez, Jim Warila

Budget: Ex. 4 - CBI

Objective: Find the percentage of high emitting evaporative emission vehicles in the average fleet of on-road motor vehicle passenger cars and light trucks.

Time Line

- ICR clock started with Federal Register notice 2/14/08
- SOW package went to Cincinnati 2/22/08
- Approval of Work Plan by March 24: Work Plan was approved June 19 (after CRADA signed).
- Contractor to supply supporting documents for ICR submission March 31: delivered May 8th.
- Another 30 day comment period for ICR, roughly month of May.
- Goal is to have ICR in place by mid-June for recruitment and pilot field work to begin. Partial ICR approval was given for the Pilot phase.
- Finalize test procedure for larger program by August 22 so recruitment can begin for field work in Sept and October. Larger program to be defined by end of September for small version of larger program - San Antonio Pilot.
- Compile data and draft report by early December of 2008. Larger program is planned for spring of 2009, report end of summer 2009.

Program Status:

- Will be presenting project at CRC Workshop end of March
- ERG continuing to QA/QCing and analyze the data.
- Proceeding with ICR for larger program.
- Looking for funds for larger program.
 - Requesting \$500K in FEEs \$\$
 - CRC is interested in program, will consider in next years budget.

EPAct Light Duty Fuel Effects Test Program

Experimental Design Proposals

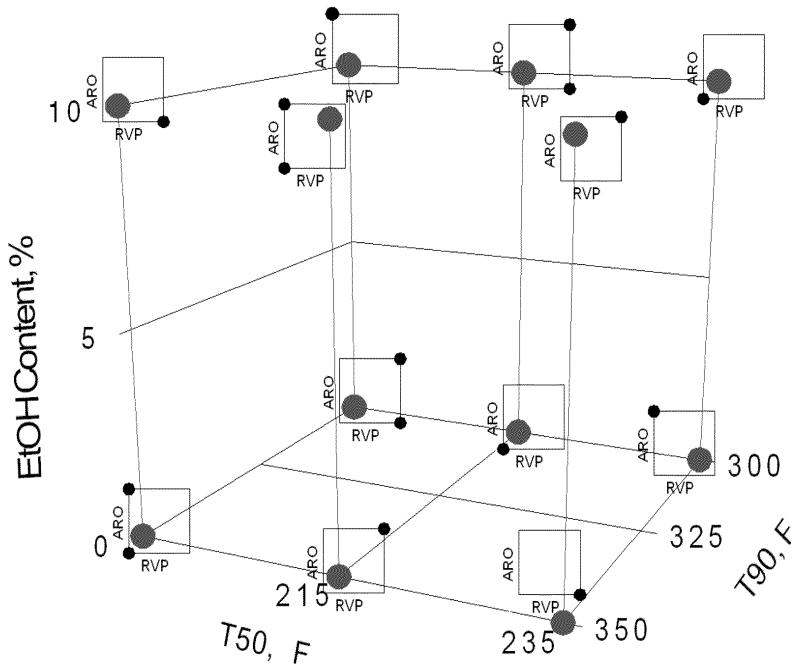
September 14, 2007
Presentation to CRC

ED_000545A_00001717-00001

Base Fuel Matrix

5 variables, 3x2x2x2x2, 17 fuels

RVP range: 7-9 psi; Aromatic content range: 15 – 40%



Base Fuel Matrix (Cont'd)

- Computer generated optimal design
- Fuel variables:
 - T50 (3 levels)
 - T90 (2 levels)
 - EtOH (2 levels)
 - RVP (2 levels)
 - Aromatics (2 levels)
- Terms in model: Main effects, $T50^2$, $T50*EtOH$, $T90*EtOH$, $RVP*EtOH$, aromatics* EtOH
- Number of test fuels: 17
- G-Efficiency: 83.6%

EPA's Plans for Fuel Effects Testing

FACA MOVES Review Workgroup
September 18th, 2007

John Koupal
U.S. EPA Office of Transportation & Air Quality

1

Fuel Testing Programs

- Separate but overlapping programs to address
 - Nonroad exhaust & evap (initial work starting '07)
 - LD exhaust with focus on Tier 2 (starting '07)
 - LD evap (proposed for '08)
- The data will be used to develop an up-to-date fuel effects model, which feeds:
 - MOVES (SIP, inventory and air quality analyses)
 - New regulatory programs (e.g. GHG rule)
 - Legislative and policy options
 - EPAAct studies (anti-backsliding, fuel harmonization)

2

Fuel Testing: Light Duty Exhaust

- Fill data gap on effects of select fuel parameters on Tier 2 vehicles
- Compliments recent and ongoing testing by CRC and EPA/Auto
 - **EPA/Auto MSAT test program:** RVP, benzene, sulfur effects on 9 Tier 2 vehicles
 - **CRC E-67:** Ethanol, T50, T90 effects on 12 LEV/ULEV vehicles
 - **CRC E-74b:** Ethanol, RVP, and test temp (50 and 75°F) effects on 15 Tier 1, NLEV, and Tier 2 vehicles
- EPA program designed to fill specific additional needs:
 - Evaluate interactive effects of ethanol, RVP, T50, T90 and aromatics on exhaust emissions
 - Test at multiple temperatures (e.g. 50°F and 75°F)
 - Collect regulated pollutants as well as speciated VOCs, speciated PM, unregulated gases and second-by-second data

5

Base Fuel Matrix

- Computer-optimized design
 - Evaluated based on “G-Efficiency” (83.6%)
- Fuel variables (17 fuels)
 - T50 (3 levels)
 - T90 (2 levels)
 - EtOH (2 levels)
 - RVP (2 levels)
 - Aromatics (2 levels)
- Terms in model
 - Main effects, T50², T50*EtOH, T90*EtOH, RVP*EtOH, aromatics*EtOH
- Limitations of this program
 - No sulfur effects or ethanol blends > E10
 - Limited 50°F testing on a subset of fuels and vehicles
 - No 20°F tests
 - Will not resolve all the interactive and nonlinear effects
 - Limited number and type of vehicles (Tier 2 only)

6

To: CN=John Koupal/OU=AA/O=USEPA/C=US@EPA[]
Cc: CN=Connie Hart/OU=AA/O=USEPA/C=US@EPA;CN=Carl
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N=Carl Scarbro/OU=AA/O=USEPA/C=US@EPA;CN=Rafal
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N=Rafal Sobotowski/OU=AA/O=USEPA/C=US@EPA;CN=Antonio
Fernandez/OU=AA/O=USEPA/C=US@EPA;CN=Aron Butler/OU=AA/O=USEPA/C=US@EPA[];
N=Antonio Fernandez/OU=AA/O=USEPA/C=US@EPA;CN=Aron
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From: CN=Michael Christianson/OU=AA/O=USEPA/C=US
Sent: Tue 10/2/2007 4:10:27 PM
Subject: A few items to bring up with CRC

John,

We just finished our first conference call with SwRI about the EPA Act program Work Assignment. It was a very productive call and we're making it an ongoing weekly call on Tuesday AM. A few issues with a high degree of saliency came up - the timing is great for you to engage CRC tomorrow (or today - Connie mentioned you'll be in with the real world group this afternoon). Please bring up the following items with the appropriate groups within CRC:

-CRC membership companies' capability to offer cold temperature (~40°F) fuel drum storage

This program will require at least 300 drums of fuel, and Southwest only has the capacity for about 50 drums at cold temp (and another 100 at room temp). The ability for CRC membership to offer storage space for the duration of the program would be key.

-Fuel (and oil?) analysis

While SwRI and the blender will perform their own analysis of test fuels, it would be great if CRC would be willing to contribute (donate) fuels analysis as part of a round robin analysis program (if they're concerned about their results compared with other labs, we could offer to mask each individual lab's identity...). CRC verbally commented 2 weeks ago that this would be a possibility.

-Lending us test vehicles from other CRC programs

Southwest commented that it may be cost prohibitive to lease/rent vehicles for 2 years, and that procurement may be cheaper. However, there may be some restrictions as to how we would buy vehicles ourselves, or as to how we'd provide money to SwRI to buy vehicles (a sunk cost that is not recovered until the end of the program). If there are planned CRC programs with vehicles fitting the criteria in our program (see our SOW) that have or will complete testing, perhaps CRC could loan us these vehicles before they are re-sold.

I hope this reaches you in time for your meetings (hooray for blackberry!). Please call one of us if needed.

-Mike

Michael G. Christianson
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Christianson/OU=AA/O=USEPA/C=US@EPA[]; N=David
Korotney/OU=AA/O=USEPA/C=US@EPA;CN=Connie
Hart/OU=AA/O=USEPA/C=US@EPA;CN=Carl
Scarbro/OU=AA/O=USEPA/C=US@EPA;CN=Michael
Christianson/OU=AA/O=USEPA/C=US@EPA[]; N=Connie
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Christianson/OU=AA/O=USEPA/C=US@EPA[]
From: CN=Rafal Sobotowski/OU=AA/O=USEPA/C=US
Sent: Mon 3/3/2008 7:29:36 PM
Subject: EAct Program Overview
[EAct Program Overview 3 3 08.pdf](#)

Ellen,

As a follow-up to the meeting between the EPA and AAM which took place in Ann Arbor on February 13, attached is a presentation which contains an overview of the EAct Light Duty Vehicle Fuel Effects Program. This presentation includes the latest version of the EAct fuel matrix which was recently redesigned to accommodate the T50 level as low as 150F for the E10 and the E15 fuels.

Please feel free to forward this presentation to your member companies.

Best regards,

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