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EPAct Program Update for Chet France

Module A – Status and Budget

February 10, 2008

Preliminary information – not for release outside EPA

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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

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Fuel Blending Is On-Schedule

- Test fuel development being done cooperatively by Haltermann and ASD
  - EPA defines fuel recipes
  - Haltermann prepares hand blends, bulk blends and performs fuel analyses
- 21 of the 28 fuels needed in Phase 3 have been or are being blended in bulk
  - 8 have been delivered to SWRI
  - E85 fuel will be obtained from CRC
- The remaining 7 fuels are in hand blend stage
- We expect to have all fuels blended in bulk by mid-February
- This will allow randomization of fuels for Phase 3, as planned

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Revised EPAct Fuel Matrix

Phase 3
Base Program (EPA)
(Fuels 1-16)

Phases 1 and 2
RFS 2 Subset (EPA/DOE)
(Fuels 17-19)

Phase 3
Additional Fuels (DOE)
(Fuels 20-29)

E85 (DOE)

CRC Additional Fuels

Fuel #	T50 °F	T90 °F	ETOH %	RVP psi	ARO %
1	150	300	10	10	15
2	240	340	0	10	15
3	220	300	10	7	15
4	220	340	10	10	15
5	240	300	0	7	40
6	190	340	10	7	15
7	190	300	0	7	15
8	220	300	0	10	15
9	190	340	0	10	40
10	220	340	10	7	40
11	190	300	10	10	40
12	150	340	10	10	40
13	220	340	0	7	40
14	190	340	0	7	15
15	190	300	0	10	40
16	220	300	10	7	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	160	300	20	7	40
22	160	300	20	10	15
23	160	340	20	7	15
24	160	340	20	10	15
25	160	340	20	10	40
26	150	340	15	10	40
27	190	340	15	7	15
28	190	300	15	7	40
29	TBD	TBD	85	TBD	TBD
30	150	325	10	10	40
31	160	325	20	10	15

Revised Fuels

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Budget Considerations Going Forward

- Original program cost estimate: $4,271,000
- Cost overrun wrt the original scope of program: Ex. 4 - CBI
- Cost overrun including additional projects: Ex. 4 - CBI
- ASD staff continuously interacts with SwRI to control costs while still keeping the program intact

	Program or Project	Cost	Cumulative Cost	Difference of Total From the Original Estimate of $4,271,000	
ORIGINAL PROGRAM	EPAct Program, April 2008 Cost Estimate	$ 4,271,000	-	-	-
	EPAct Program, February 2009 Cost Estimate	$ 4,698,000	Ex. 4 - CBI		
	Fuel Cost Adjustment	Ex. 4 - CBI			
ADDITIONAL PROJECTS	FTP Testing (Partially Competed)				
	EFM Resolution (Completed)				
	Miscellaneous				
	Blending of Two CRC Fuels				
	EmissionTesting of Two CRC Fuels				
	Grand Total >>>>		$ 5,508,500	$ 1,237,500	29.0%

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Budget Considerations Going Forward (Cont'd)

- Funds spent or incurred as of Jan. 27, 2009: **Ex. 4 - CBI**
- Phase 3 (Starts in Feb. 2009): **Ex. 4 - CBI**
- Testing of CRC fuels: **Ex. 4 - CBI**
- Current shortfall: **Ex. 4 - CBI**

Options to reduce cost:

- Delay testing of CRC fuels: $250,000
- Reduce the number of test fuels
  - Reduction of the number of fuels by 1-2 would drop the G-efficiency of emission models below the minimum acceptable limit of 50%
- Reduce the number test vehicles
  - Reduction of the number of vehicles from 19 to 15 doubles the probability of getting a non-significant result
  - 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
- Eliminate speciated exhaust HCs/oxygenates
  - Important for anti-backsliding
- Request additional DOE support

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Summary of Current/Recent Test Programs

Informal Title	Parties	Contractor	Est. Completion	Est. Cost (ASD)	Funding by others	Contact
Light Duty Exhaust Fuel Effects	EPA, CRC, DOE	SwRI	Mar 2010	$5.4M	$1.2M NREL $250k CRC	Rafal
Effect of Oil Age on PM	EPA	None	Complete	$40k		Mike C.
PM Speciation	EPA (ASD/ORD)	Arcadis/EPA	Late 2009	$345k	$895k ORD	Mike C.
In-Use Sulfur Effects	EPA, possibly autos	None	Early 2010		$730k OAR	Kent
Light Duty Evap (E77-2)	EPA, DOE, CRC	ATL	Complete		$379k CRC $100k NREL	Connie
Light Duty Evap (E77-2b)	EPA, CRC, NREL	ATL via SwRI	Late 2009	$700k		Connie
Light Duty Evap (E77-2c)	EPA, CRC, NREL	SwRI	Mid-2009		$250k CRC $125-$250k NREL	Connie
Evap High Emitters (E77-3)	EPA, CDPHE	ERG	Late 2009?	$1M		Connie
Nonroad Exhaust 1	EPA, DOE	Intertek Carnot	Early 2009	$844k		Cheryl
Nonroad Exhaust 2	EPA, CARB	SwRI	June 2009	$500k	$507k CARB	Cheryl

Projected Schedule Going Forward

- Launch of Phase 3 testing: Mid-February 2009
- Completion of Phase 3 testing: Early December 2009
- Reporting: December 2009 – mid-March 2010

		JAN 2009				FEB 2009				MAR 2009					APR 2009				MAY 2009				JUN 2009					JUL 2009				AUG 2009					SEP 2009				OCT 2009				NOV 2009					DEC 2009			
		5	12	19	26	2	9	16	23	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28
Phase 1[a]	14 weeks																																																						
50F setup	3 weeks																																																						
Phase 2[b]	9 weeks	4	5	6	7	8	9																																																
50F teardown	2 weeks																																																						
Phase 3[a]	26 weeks							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26																							
NREL fuels[a]	17 weeks																																	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17				
CRC fuels	4 weeks																																																			1	2	3	
NREL high emitter	2 weeks																																																						
draft final report	6 weeks																																																			1	2	3	
EPA/NREL review	4 weeks																																																						
final report	4 weeks																																																						

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		5	12	19	26	2	9	16	23	2	9	16	23	30	6	13	20	27	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	31	7	14	21	28	5	12	19	26	2	9	16	23	30	7	14	21	28
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Summary of Next Steps

- Complete analysis of FTP cycle effect
  - E15 data is still pending
- Complete Phase 2 testing & analysis
  - Analyze and present results for E10 and E15 fuels
- Complete fuel blending and delivery to SwRI
- Perform Phase 3 testing

Additional Slides

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Light Duty Exhaust Program Summary

- EPA/DOE collaboration
- Objective: Establish effects of RVP,T50,T90, aromatic content and EtOH on exhaust emissions from Tier 2 vehicles
- Fuel matrix includes 29 fuels + 2 added by CRC = total of 31
- Test Program Design
  - Phase 1: RFS 2 Pilot at 75°F
    - 3 fuels (E0, E10 and E15) tested in 19 vehicles
    - Test results to be available for RFS 2 NPRM
  - Phase 2: RFS 2 Pilot at 50°F
    - Same as Phase 1, except temperature
  - Phase 3: Main Program
    - 27 fuels tested in 19 Tier 2 vehicles, E85 tested in 4 FFVs
- LA92 test cycle used throughout the program
- Species measured: Regulated emissions, CO_2, NO_2, VOCs, ethanol, carbonyl compounds
  - N_2O, NH_3 and HCN by FTIR
  - Some PM and SVOC speciation

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Measured Species

- Bag (phase) level and composite emissions of THC, NMHC, NMOG, CO, CO_2, NOx, NO_2, ethanol and PM
- Bag (phase) level speciated volatile organic compounds (VOCs)
  - Over 200 compounds, incl. alcohols and carbonyls
- Continuous and integrated by bag (phase) emissions of the following species in raw exhaust:
  - THC, NMHC, CO, CO_2, NOx
  - N_2O, NH_3 and HCN by FTIR for a subset of tests
- Semi-volatile and high molecular weight VOC and PM measured in Phases 1 and 2 only