



Coordinating Research Council

CRC Background

Brent Bailey

Coordinating Research Council, Inc.
Alpharetta, Georgia

**CRC Workshop on Life Cycle Analysis of
Transportation Fuels**

Argonne National Laboratory
Argonne, IL

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Introduction

- Equipment and fluids have to work together
- Fuels developed in parallel with other technologies
- Cooperative research model developed early in the 20th Century

CRC Charter

- CRC's objective, as stated in our charter, is:

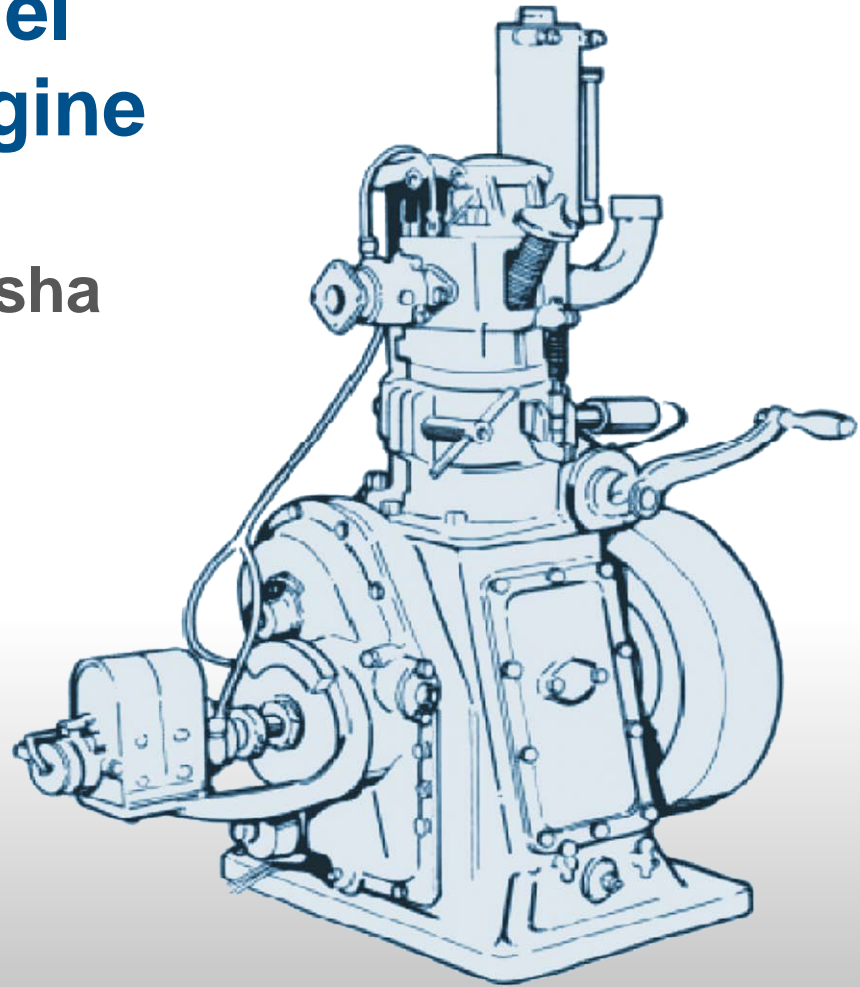
“To encourage and promote the arts and sciences by directing scientific cooperative research in developing the best possible combinations of fuels, lubricants, and the equipment in which they are used, and to afford means of cooperation with the Government on matters of national interest within this field.”

The Coordinating Research Council

- Started in 1920's as an SAE committee (CFR)
- Became independent organization in 1942
- Environmental research started later:
 - Air Pollution Research Advisory Committee in 1968
 - Auto/Oil in 1989
 - Post-Auto/Oil programs beginning in 1996

The Cooperative Fuel Research (CFR) Engine

Manufactured by Waukesha
Circa 1928



1931 – CFR Committee



Cooperative fuel research committee members representing:

- Atlantic Refining Co.
- Ethyl Gasoline Co.
- General Motors
- National Bureau of Standards
- Sinclair Refining, Co.
- Standard Oil of Indiana
- The Texas Co.
- University of Pittsburgh
- Waukesha Motor Co.
- Yale University

2013 – LCA Workshop Organizing Committee

Members representing:

- Ford – Jim Anderson
- EPA – Vince Camobreco
- RFA – Geoff Cooper
- CARB – John Courtis
- U of MI – John DeCicco
- USDA – James Duffield
- USDA – Marvin Duncan
- Exxon Mobil – Jeff Farenback-Brateman
- Chevron – Phil Heirigs
- SCAQMD – Aaron Katzenstein
- API – David Lax
- Ford – Chul Kim
- EPA – Robert Larsen
- NRCan – Derek McCormack
- U of Toronto – Heather Maclean
- JRC – Luisa Marelli
- UCS – Jeremy Martin
- Marathon – Mani Natarajan
- CONCAWE – Ken Rose
- NBB – Don Scott
- Argonne NL – Michael Wang

CRC Website

www.crcao.org



More about CRC History

SAE Paper 881609

by Gilbert Way of Ethyl Corp and Member of Desert Rats

Abstract – Liaison between the Coordinating Research Council (CRC) and the Military Forces began before World War II.

- It was implemented when an M3-A3 light tank was shipped to San Bernardino, California to participate in the Road Test Program in 1942
- CRC organized test teams to study problems in operations under extreme ambient conditions that were related to fuels and lubricants.
- The CRC War Advisory Committee was formed about the same time...

CRC War Committee



SAE Paper 881609 – *Continued*

by Gilbert Way of Ethyl Corp and Members of Desert Rats

- CRC was able to implement the war-time programs without delay because of the large-scale centralized CFR road knock tests conducted at Uniontown, Pennsylvania in 1932 and 1934.
- The CRC test teams were composed of the same people so the machinery was already in place for rapid mobilization.
- Early in 1942, Earl Bartholomew, Director of Ethyl's Research Laboratories, made a visit to Camp Young located in the California Desert — here General Patton was training the 7th Armored Division for anticipated desert warfare in North Africa — and shortly thereafter set in motion the first CRC wartime test program at Camp Seeley.

SAE Paper 881609 – *Continued*

by Gilbert Way of Ethyl Corp and Member of Desert Rats

The records show that the first Camp Seeley project was accomplished in an unbelievably short period:

- ✓ June 8, 1942 approved of project and organization of test team at CRC offices in New York
- ✓ June 16 start of ONR road tests at Camp Seeley
- ✓ July 7 summary tabulations of all ONR and spark timing investigations
- ✓ July 10 completion of vapor lock testing including fuel system modifications with fuel test samples still being inspected at San Bernardino
- ✓ July 20 Restricted CRC Report “Fuel Octane Number and Vapor Pressure Requirements of Quartermaster Motor Vehicles in Desert Operation” completed (CRC No. 126)

SAE Paper 881609 – *Continued*

by Gilbert Way of Ethyl Corp and Members of Desert Rats



Fig. 15 M4-A1 Tank on Vapor Lock Test Course

SAE Paper 881609 – *Continued*

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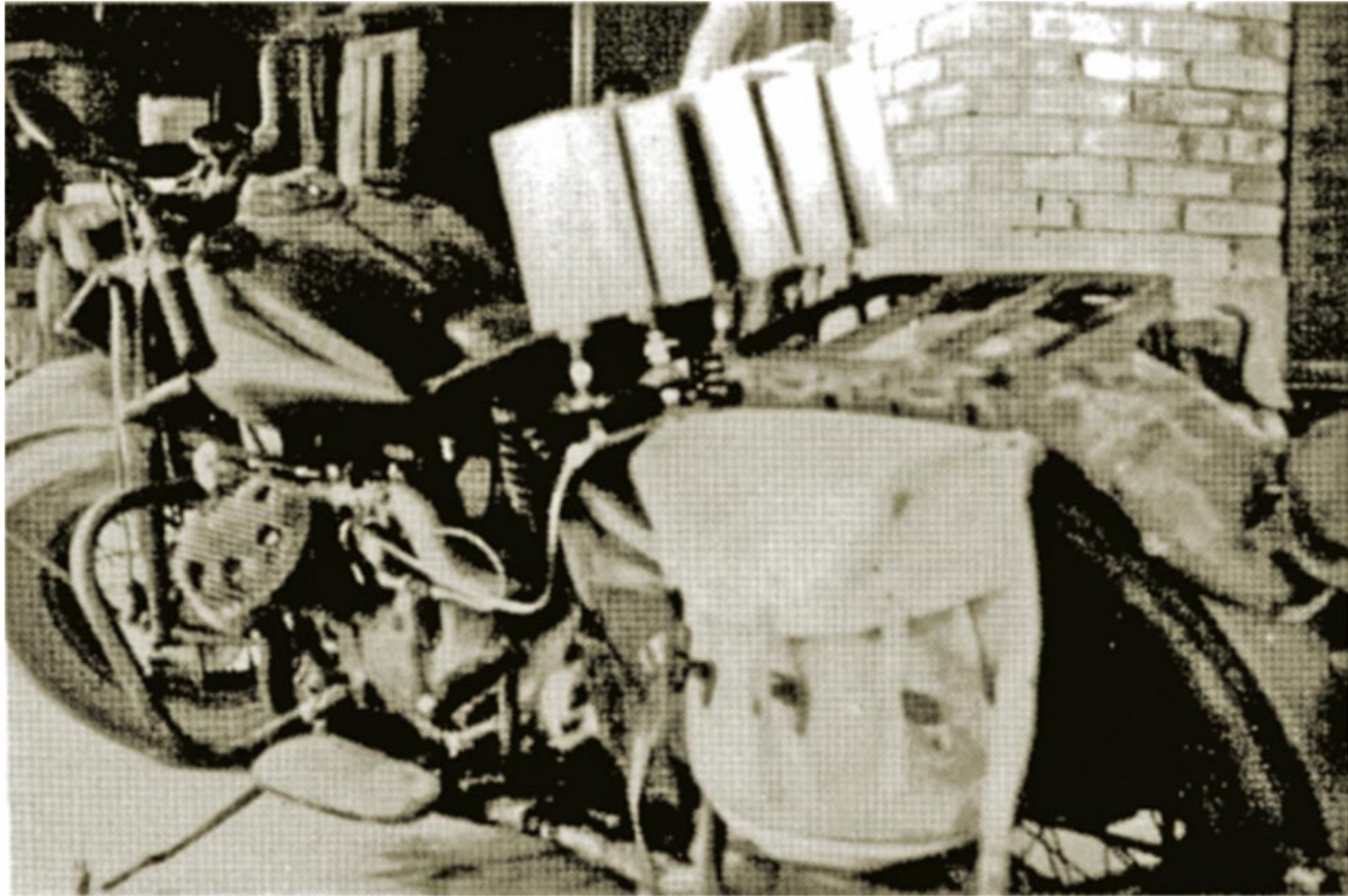


Fig. 7 QMC Motorcycle with Reference Fuel Cans for ONR Tests

SAE Paper 881609 – *Continued*

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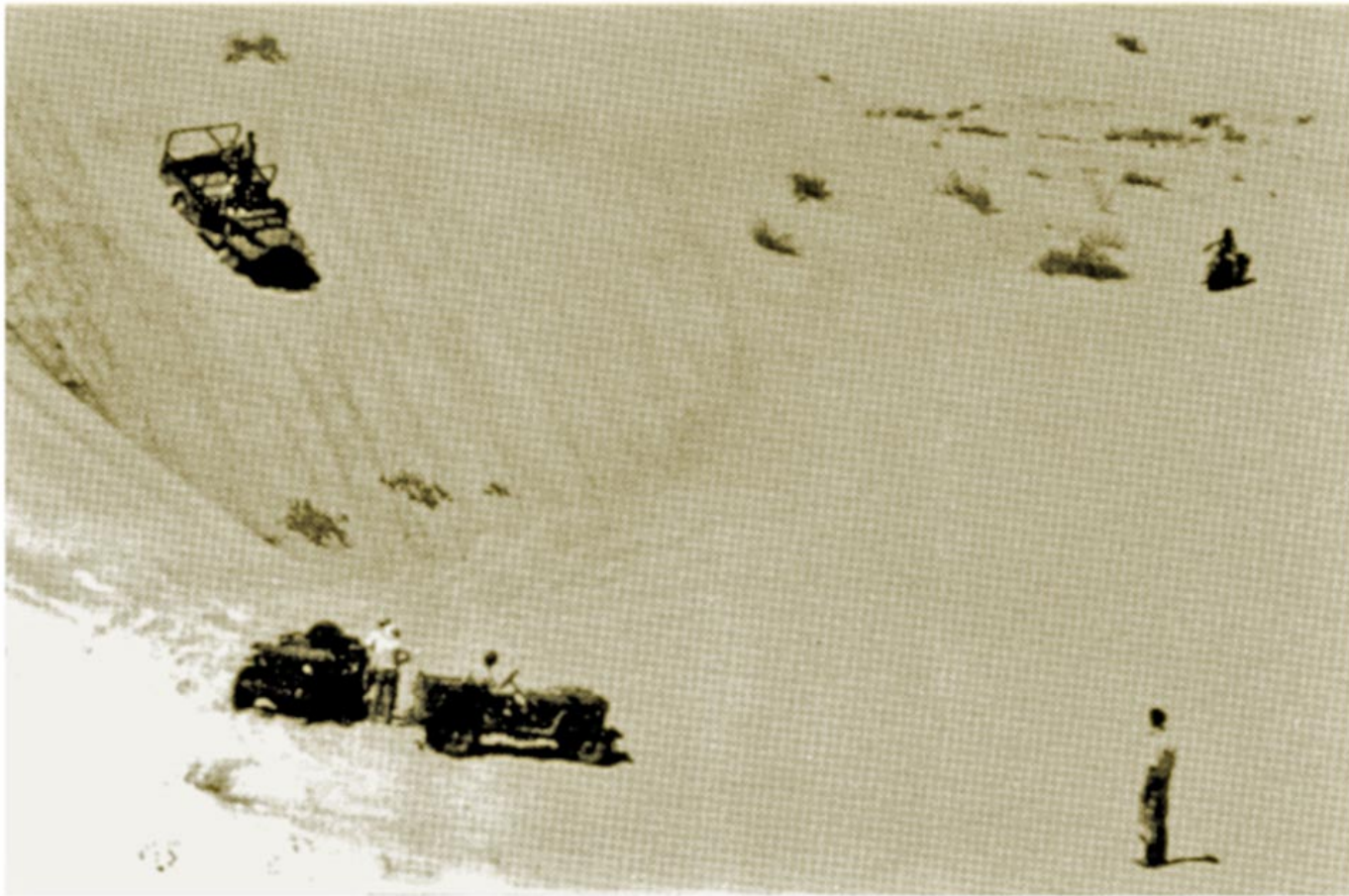


Fig. 4 Yuma Sand Dunes and QMC Vehicles

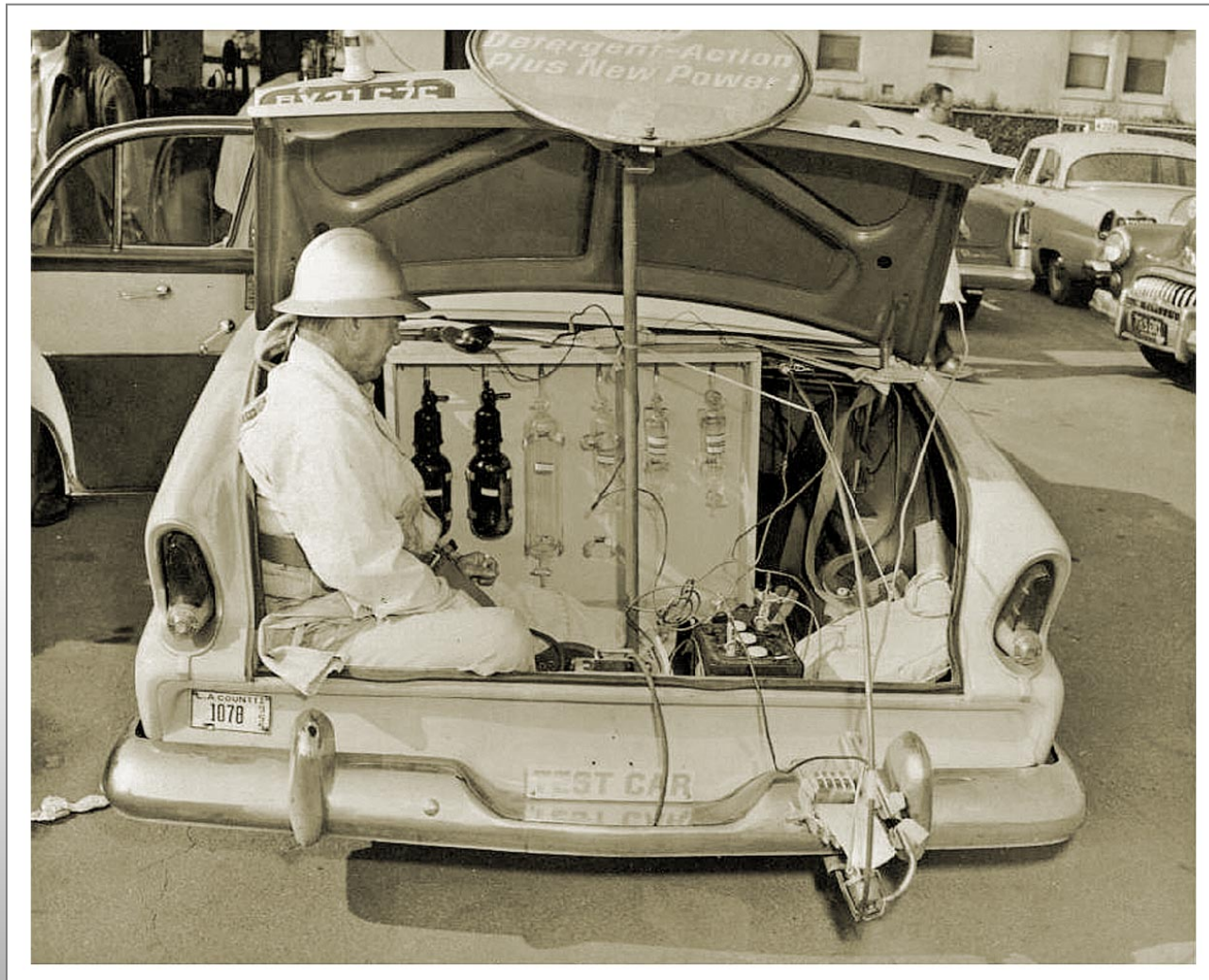
Early Vehicle Emissions Program – *Continued*

The CRC 1955 Los Angeles Riverbed Study

- Preliminary Study developed and tested new measurement techniques for HC, CO, CO₂, and NOx (293 vehicles)
- Liston-Becker 15 and 28 Model spectrometers used to measure HC, CO and CO₂

Early Vehicle Emissions Program – *Continued*

The CRC1955 Los Angeles Riverbed Study



Early Vehicle Emissions Program – *Continued*

The 1955 Los Angeles Riverbed Study

Summary of Hydrocarbon Emissions

Driving Conditions	Unburned* Hydrocarbons lb/hr		Percent of Fuel Unburned		Air-Fuel Ratio	Fuel Consumption Rate lb/hr
	Model 28	Model 15	Model 28	Model 15		
Idle	0.32	0.16	14.4	6.5	11.9	2.60
Cruise						
20 mph	0.43	0.40	10.8	6.2	13.0	6.17
30 mph	0.42	0.42	9.0	4.7	13.3	8.73
40 mph	0.42	0.45	7.7	3.7	13.6	12.38
50 mph	0.87	0.86	9.4	5.1	13.9	16.58
Acceleration						
0-60 mph – Wide Open Throttle	2.51	1.86	9.5	4.2	12.7	45.60
0-25 mph – Part Throttle (13 seconds)	0.99	0.80	11.4	5.6	13.0	14.42
15-30 mph – Part Throttle (11 seconds)	0.67	0.70	9.2	4.7	13.3	14.87
Deceleration						
50-20 mph – Free Deceleration	0.87	0.54	40.2	21.1	11.9**	2.60
40-20 mph – Heavy Brake (5 seconds)	0.51	0.33	23.8	12.8	11.9	2.60
30-0 mph – Light Brake (11 seconds)	0.49	0.26	21.1	10.3	11.9	2.60
30-15 mph – Light Brake (10 seconds)	0.49	0.30	23.3	1.6	11.9	2.60

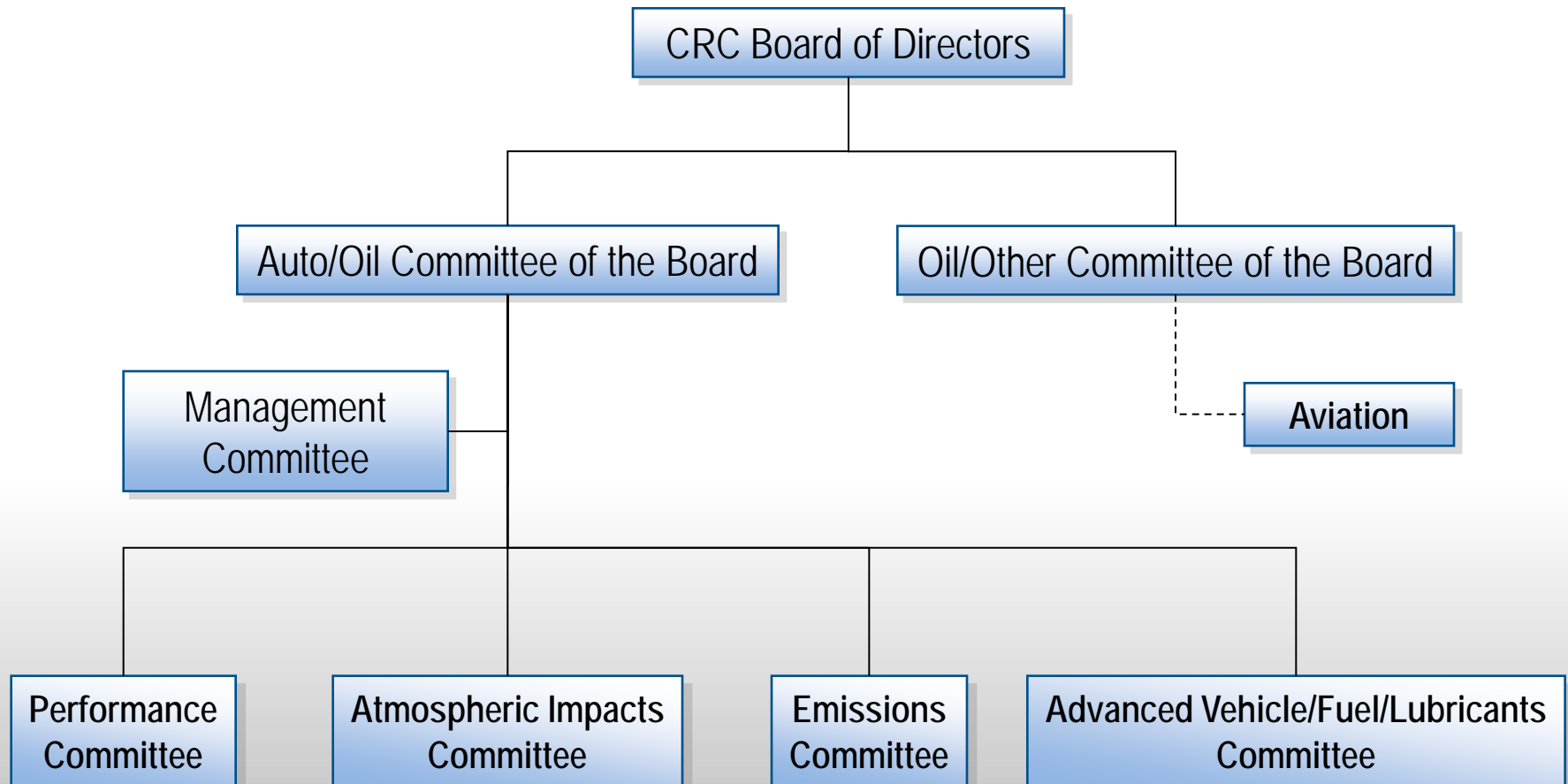
*Model 28 emissions are corrected for instrument response to water and carbon dioxide.

**All deceleration airflow rates and air-fuel ratios were taken as equal to idle.

The Process Established

- Technology identified
- Stakeholders work together to assess benefits
- International cooperative development
 - Fuel industry
 - Engine/aircraft industries
 - Government agencies
 - Academic/Consulting experts
- Technology deployed

CRC Organization



CRC Member Companies

- Chrysler
- Daimler
- Ford
- GM
- Honda
- Mitsubishi
- Nissan
- Toyota
- Volkswagen
- BP
- Chevron
- Phillips 66
- ExxonMobil
- Marathon
- Shell