Table 2. Categories of Work Currently Planned or Underway for Motor Vehicle Fuels and Fuel Additives (F/FA)[1]

	Animal								Human				Exposure		
	Pharmaco-kinetics	Muta-genicity	Sub-chronic Toxicity	Chronic Non-cancer	Reproduc-tive Toxicity	Develop-mental Toxicity	Neuro-toxicity	Onco-genicity	Acute Toxicity	Chronic Non-cancer	Cancer	Pharmaco-kinetics	Emissions	Transport and Fate	Moni-toring
Neat Additive:															
MTBE															
vapor	T ?	[2,3,4]						T[2]							
liquid								TT	[5]						
EtOH															
vapor	T ?	[3,4]													
liquid								TT	[5]						
ETBE															
vapor	T TT ?[3]	[6,4] TT[6]	TT[6]		T[6]	T[6]	TT[6]	?[7]							
liquid								TT	[5]						
TAME															
vapor	T TT ?[3]	[8,4] TT[8]	TT[8]		TT[8]	TT[8]	TT[6]	?[7]							
liquid								TT	[5]						
TBA															
vapor															
liquid															
DIPE															
vapor															
liquid								TT	[5]						
TAEE, etc.															
Fuel Product:															
"Baseline" gasoline:															
evap.	T	[3] T[9]	T[9]		T[9]	T[9]	T[9]	?[4]							
combust.		T	[9]T[9]		T[9]	T[9]	T[9]	?[4]					T[9]TT[10]		

Table 2 (cont'd). Categories of Work Currently Planned or Underway for Motor Vehicle Fuels and Fuel Additives (F/FA)[1]

	Animal								Human				Exposure		
	Pharmaco-kinetics	Muta-genicity	Sub-chronic Toxicity	Chronic Non-cancer	Reproduc-tive Toxicity	Develop-mental Toxicity	Neuro-toxicity	Onco-genicity	Acute Toxicity	Chronic Non-cancer	Cancer	Pharmaco-kinetics	Emissions	Transport and Fate	Moni-toring
Post-1990 gasoline plus:															
MTBE[11]	?[3]	T[9]	T[9]		T[9]	T[9]	T[9]	TT[5]?[4]	T[12]				T[9]TT[10]	T[13]	TT[14]
EtOH[11]		T[9]	T[9]		T[9]	T[9]	T[9]	TT[5]?[4]					T[9]TT[10,15]		TT[14]
ETBE[11]		T[9]	T[9]		T[9]	T[9]	T[9]	TT[5]?[4,7]					T[9]TT[10]		T[16]
TAME[11]		T[9]	T[9]		T[9]	T[9]	T[9]	?[4,7]					T[9]		
TBA[11]		T[9]	T[9]		T[9]	T[9]	T[9]	?[4]					T[9]		
DIPE[11]		T[9]	T[9]		T[9]	T[9]	T[9]	?[4]					T[9]		
TAEE, etc.[11]															

[1]T = planned; TT = underway; ? = under consideration, but no firm commitment for testing
[2]Oxygenated Fuels Association and Chemical Industry Institute of Toxicology — Pharmacokinetics and cancer mechanisms studies of MTBE
[3]Health Effects Institute — Approved for funding in 1996
[4]Information on these endpoints could be required under Alternative Tier 2 or Tier 3 provisions of the F/FA rule (see footnote 9), but no decision has been made.
[5]Bologna Institute of Oncology — Series of cancer studies by ingestion route (Belpoggi et al., 1995)
[6]ARCO Chemical — Voluntary testing of ETBE
[7]National Toxicology Program — HEI nomination of ETBE and TAME (alone and in combination with gasoline vapors) for cancer studies; HEI nomination of short-chain aldehydes
[8]EPA/OPPTS and API — TSCA Enforceable Consent Agreement for testing of TAME
[9]Information on these endpoints is required under the F/FA rule in accordance with Section 211 of the Clean Air Act; if adequate information is not already available for these endpoints, standard inhalation toxicity assays are prescribed under Tier 2 of the rule (see Table 3 for information on these tests); substitute or more extensive testing could be required under other provisions of the rule (Alternative Tier 2 or Tier 3).
[10]Auto/Oil Air Quality Improvement Research Program — Emissions characterization of different fuel formulations
[11]Includes both evaporative and combustion emissions
[12]EPA/ORD/NHEERL and/or Environmental and Occupational Health Sciences Institute — Laboratory studies of human volunteers with self-reported sensitivity to oxyfuels
[13]U.S. Geological Survey—Measurements of MTBE in air, precipitation, runoff, surface water, and ground water
[14]American Petroleum Institute (API)—Personal exposure measurements of service station attendants and mechanics
[15]AK Dept. Environmental Conservation cooperative agreement with EPA/ORD/NERL — Emissions characterization projects related to ethanol-oxygenated gasoline in Alaska
[16]API—Microenvironmental measurements of non-occupational personal exposures

N.B.: Check marks do not necessarily represent equivalent levels of effort. The headings may subsume quite disparate levels of testing or research efforts (e.g., the pharmacokinetics studies for "pure" MTBE are more extensive than those for ETBE or TAME).